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Policy, Application and Technical Guidelines

Emergency Landing Strips

NETWORK OPERATIONS DIRECTORATE

D22#738726
May 2023

Authorisation

As Manager Traffic Management Services, I authorise the issue and use of this Policy and Application Guideline for Emergency Landing Strips in Western Australia

MANAGER TRAFFIC MANAGEMENT SERVICES

Date: 22/5/2023

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Document Control

Owner	Principal Design Manager RTE – Section 6 Manager Traffic Management Services – All other sections
Custodian	Traffic Technical Services Manager
Document Number	D22#738726
Issue Date	May 2023
Review Frequency	5 years

Amendments

Revision Number	Revision Date	Description of Key Changes	Section / Page No.
1	28/11/2003	DESIGN GUIDELINE CLAUSES 10.3.3.1-12 DEVELOPED	ALL
2	18/03/2004 09/02/2004	POLICY STATEMENT DEVELOPED PROVISION GUIDELINE DEVELOPED	10.1 10.2
2A	20/09/2005	GUIDELINE CONTACT AMENDED	HEADER
2B	26/02/2009	NEW CRITERIA INSERTED INTO THE 9TH DOT POINTOF DESIGN REQUIREMENTS	10.3.3.1
3	14/04/2011	GUIDELINE REVISED	ALL
4	09/12/2011	EDITORIAL CHANGE	10.3.2
5	22/03/2012	POLICY STATEMENT AND APPLICATION GUIDELINES UPDATED	1 to 4
5A	01/05/2013	BROKEN LINK RECTIFIED	ALL
5B	13/05/2015	CONTACT UPDATED	HEADER
5C	21/05/2019	CONTACT PERSON CHANGED	HEADER
5D	24/06/2020	CONTACT PERSON CHANGED	HEADER
5E	21/02/2022	CONTACT PERSON CHANGED	HEADER
6	22/05/2023	GUIDELINE REVISED	ALL

1 POLICY STATEMENT

Main Roads is agreeable to sections of State roads being built or upgraded to act as emergency landing areas for use by the Royal Flying Doctor Service and other similar authorities such as WA Police Air Wing. The provision of emergency landing areas is subject to meeting the Application Guideline requirements, the availability of funds and funding priorities.

The purpose of this Policy is to outline Main Roads requirements for provision of emergency landing areas on State roads within Western Australia (WA).

2 SCOPE

2.1 Background

An emergency landing strip is a runway constructed in remote areas where access to medical facilities by road may not be a viable option due to factors such as flooding or distance and timeconstraints.

In remote areas of Western Australia where a permanent runway strip is not warranted due to limited usage and access to medical facilities by road may not be a viable option due to factors such as flooding or distance and time constraints., State roads can be built or upgraded to accommodate emergency landings and evacuations by Royal Flying Doctor Service (RFDS) and other similar authorities such as WA Police Air Wing.

2.2 Application

This guideline applies to routes designated as State roads in remote areas in WA.

Maps of State roads can be located on the Main Roads website under Road Information Mapping System.

3 ROLES & RESPONSIBILITIES

Applications for an Emergency Landing Strip shall be submitted in writing by the Royal Flying Doctor Service to the relevant Main Roads Regional Director and recommended by the Regional Director. Approval of Emergency Landing Strips shall be in line with the Delegation of Authority.

4 DEFINITIONS

The definitions provided below are for terms not contained in or have a different meaning for this Guideline to the definitions given in Main Roads Glossary of Technical Terms. Additional terminology is adopted as defined by the Aeronautical Information Publication (AIP) published by Airservices Australia.

Term	Definition
Aerodrome	An area of land or water (including any buildings, installations, and equipment), the use of which as an aerodrome is authorized under the regulations, being such an area intended for the use wholly or partly for the arrival, departure and movement of aircraft. *Civil Aviation Act 1988 (Cth).*
Aerodrome Proprietor	Any Owner, Licensee, Authority, Corporation, or any other body which has a legal responsibility for a particular aerodrome.
Apron	A defined area on a land aerodrome, intended to accommodateaircraft for purposes of loading passengers, mail, cargo, fuelling, parking or maintenance.
AS	Australian Standard.
Emergency Landing Strip	A runway constructed in remote areas where access to medical facilities by road may not be a viable option due to factors such as flooding or distance and time constraints.
Landing Area	The part of the movement area intended for the landing or take-off of aircraft.
Main Roads	Main Roads Western Australia
Manoeuvring Area	The part of an aerodrome to be used for take-off, landing and taxiingof aircraft, excluding aprons.
Movement Area	The part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, consisting of the manoeuvring area and the apron(s).
Parking Area	A specially prepared or selected part of an aerodrome within which aircraft may be parked.
Runway	A defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft.
Runway Strip	The defined area, including the runway (and stop way if provided), intended both to reduce the risk of damage to aircraft inadvertently running off the runway and to protect aircraft flying over it during take-off, landing or missed approach.
Stopway	A defined rectangular area on the ground at the end of the take-off run (runway) available prepared as a suitable area in which an aircraft can be stopped in the case of an abandoned take-off.
State road	A highway or a main road under the control of Main Roads Western Australia.

5 APPLICATION GUIDELINES

5.1 General Conditions

The prerequisites for an emergency landing area are as follows:

- Where access to medical facilities by road may not be a viable option due to flooding of roads or distance/time constraints
- There are no landing areas for the Royal Flying Doctor Service (RFDS) and other similar authorities such as WA Police Air Wing
- Construction of a permanent landing area is not warranted due to the limited usage of the facility

If a suitable permanent landing area is available nearby then the RFDS is required by law to use it and an emergency landing area should not be provided.

5.2 Design Considerations

The following design factors shall be considered when designing the emergency landing area:

- The needs and safety of all road users
- Costs associated with construction, maintenance, and site location
- Impact on the environment
- Visual integration with the surrounding environment
- Operational efficiency
- The ultimate layout (road and adjacent developments) in the vicinity of the landing area can be accommodated with minimum reconstruction in the future, considering any proposed future development
- Night landing requirements

5.3 Funding

The provision of an emergency landing area is subject to the availability of funding and funding priorities. Additionally, sections 5.3.1 and 5.3.2 apply.

5.3.1 New Roadwork Projects

Main Roads will generally fully fund the extra work to enable the road to act as an emergency landing area, including the provision of associated equipment.

5.3.2 Existing Roads

Main Roads will fund 50% of the cost subject to the balance of the cost being funded by other parties such as the Royal Flying Doctor Service, Department of Planning, Department of Transport and/or Local Government.

5.4 Maintenance

Main Roads shall fund and arrange all maintenance for the emergency landing area andassociated equipment, including night lights.

5.5 Application Process

An application for an emergency landing area shall be submitted in writing by the Royal Flying Doctor Service to the relevant Main Roads Regional Director. The following must be included in the application:

- Reasons why the nearest local airport or private station airstrip is unsuitable (e.g., distance,flooding)
- Reasons why the provision of a permanent off-road airstrip is not warranted (e.g., limited usage)
- A copy of the latest RFDS "Airstrips Standards & Reporting Arrangements"
- If the proposed runway is to be longer than the minimum length, then supporting information shall be provided
- Confirmation that traffic volume using the road is less than 1,000 vehicles per day
- Confirmation that the proposed section of road fulfills the Site Location Criteria in Section 6.2
- An Incident Management Plan

5.6 Approval Process

Applications for an Emergency Landing Strip shall be submitted in writing by the Royal Flying Doctor Service to the relevant Main Roads Regional Director and recommended by the Regional Director.

Approval of Emergency Landing Strips shall be in line with the Delegation of Authority.

6 TECHNICAL GUIDELINES

6.1 General Standards and Applications

The purpose of this section is to specify standards for the design of emergency runway strips in Western Australia and to provide practical guidelines for the application of these standards.

6.2 Site Location Criteria

Sites for emergency runway strips shall be straight sections of road, which meet RFDS requirements.

The Main Roads regional office should first be contacted regarding specific locations and the procedures involved with their use. The RFDS can provide a diagram showing approach angles, lighting requirements and surface slopes that may be used as the basis for selecting suitable sites.

The selected site must:

- Comfortably accommodate the required airstrip dimension 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

If there are several sites available, then the preferred site shall be the one that best meets the following factors:

- No hills (or terrain) or manmade 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

The following is not permitted within the site of emergency runway strips:

- Horizontal curves
- Floodway
- Culverts
- Diversion drains
- Intersecting roads/community access roads
- Cattle grids
- Parking bays

6.3 Design Criteria

6.3.1 Design Requirements

When designing emergency runway strips the following criteria relevant to the road design shall be met:

- Runway, aircraft and ambulance parking area/apron, aircraft turning area, and surrounding area designed in accordance with Drawing No. 200431-0003
- Maximum longitudinal slope is 2.86% at any point, averaging no more that 2% between runway ends
- 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 vertical curves should not be less than:
    - the absolute numerical values of the corresponding slope changes multiplied by 5000 metres; or
    - 45 metres, whichever is the greater.

- Road edge lines and centre line markings shall be in accordance with Main Roads pavement marking guidelines
- Signs, straight line distance (SLK) markers, and focal point distance markers are not permitted in the vicinity of the emergency runway strips
- Guideposts located within the emergency airstrip must be positioned in suitable steel sleeves to enable the removal during the use of the emergency runway strips
- The minimum surfacing treatments for the emergency runway strips shall be cutback prime orprimer seal followed by a double coat seal with 14mm and 10mm aggregate
- Consideration for provision of special facilities for pedestrians, disabled and elderly is to be made; however, due to the remoteness of the site, such facilities are unlikely to be required. This issue is site specific and needs to be assessed on a case-by-case basis
- The use of permanent drop-down or removable signs is to be maximised for the most efficient deployment of signs
- A wind direction indicator (windsock) is required, preferably portable, located in the vicinity of the ambulance and aircraft parking area (apron), and clear of the approach, take-off, and lateral transition flight zone airspace
- Consideration should be given to provide storage facilities on site for storage of equipment (signs, guideposts, etc.) required for the emergency runway strip

6.3.2 Runway Lights and Lighting of Aircraft Parking Area

For a night landing, runway lights shall be placed in the pre-determined locations, as detailed by RFDS Standards (Figure 8, 9 and 10). All lights shall be anchored using bridge spikes or an equivalent method and shall meet the requirements of Section 5 of RFDS Airstrip Standards.

6.4 Operating Procedure

6.4.1 Traffic Management Plan

For each landing site a Traffic Management Plan shall be prepared in accordance Traffic Management for Works on Roads Code of Practice. The site's Traffic Management Plan shall contain, as a minimum, the following information:

- Plan showing the placement of all signs and lights
- Contact details for the Main Roads Regional Representative, local police, and any other relevant contacts
- Operational requirements such as aerodrome proprietor's contact details, State Emergency Service contact details, RFDS contact details including radio frequency for communication withincoming pilot, and notification of the public that the road will be closed so that the RFDS can land

A sample traffic management plan is shown in Main Roads Drawing No. 200431-0013.

Upon initiation of the emergency evacuation by the Royal Flying Doctor Service, the service must contact the aerodrome proprietor (one of the Main Roads Representatives - Customer Services Manager or Regional Director) to inform them of the impending road closure. The Main Roads representative must then issue a public notice to the effect that the road is to be closed (radio announcement, social media post and update to Travel Map) and the reasons for the road closure. The RFDS response times are such that they are typically airborne within 90 min of being notified that an emergency evacuation is required.

All efforts shall be made by Main Roads and local authorities to have police or Main Roads representation on site for evacuations. Where police or Main Roads representatives are on site,these persons will have overridden authority for the evacuation in respect to all traffic matters.

When the RFDS pilot advises that a landing is to take place, all signs and lights are to be deployedand traffic controllers are to take their places at each end of the runway strips. At the instruction of the pilot, the road will then be physically closed until the aircraft has landed and is in the parking area. Once the RFDS aircraft has landed, and engines have been stopped, at the approval of the RFDS pilot the road may be reopened until such a time that the pilot orders the road to be closed again for take-off.

Speed will be reduced to 60km/h when reopening the road during the evacuation process80km/h buffer will be utilised to reduce traffic speeds in accordance with the Emergency Landing Strip's Traffic Management Plan.

At the completion of the evacuation, all non-permanent signage shall be removed from the site.

It is anticipated that each road closure will be for a period typically between 30-60 minutes. The time that the RFDS will be on the ground is dependent on the time required to stabilise the patient and that could be up to three hours.

The aerodrome proprietor shall advise RFDS of any changes that may affect the safe conduct of the flight (e.g. reduction to the length of the runway strip, new or temporary obstacles, etc.).

During landing a minimum safety distance of 500m is required by RFDS for all vehicles to be away from the runway strip.

6.4.2 Maintenance

The vegetation abutting emergency runway strip (fly over area) must be clear of all vegetation andlarge objects over 1.0m in height, 22.5 m on either side of the runway strip (Airstrip Standards & Reporting Arrangements).

Routine maintenance intervention parameters for sections of road proposed for use as an emergency landing area should be specified to be of a higher standard than other sections of road because of the special use function of the road.

On sections of road where table drains occur, the maintenance area should be extended to a distance of 1m beyond the table drain invert.

All lights shall be subject to periodic checks and maintenance, especially the state of the batteries.

Replacement of batteries shall be at the costs of the aerodrome proprietor.

6.4.3 Reporting Arrangements

Reporting to the RFDS Aviation Data Coordinator on permanent and temporary changes to the runway strips shall be as specified in Airstrip Standards & Reporting Arrangements - Royal Flying DoctorsService of Western Australia.

Changes may include, but are not limited to, changes in the direction, length, or width of the runway, the availability of airstrip lighting, and contact information.

6.4.4 Site Safety

The safety of road users, persons carrying out the road closure, and the RFDS aircraft and personnel is paramount. Emergency evacuations shall be completed ensuring the maximum safety and adherence to the Work Health and Safety Act and Regulations.

The following criteria shall be met for all evacuations:

- All vehicles involved in traffic management at times of evacuation shall be fitted with andoperating flashing orange beacons
- Traffic Controllers shall be used at all evacuations, at both ends of the runway strips as shown on Drawing No. 200431-0013
- No landing or take-offs shall take place unless all signs are in place, in accordance with the emergency landing strip's Traffic Management Plan, and Traffic Controllers are in place
- Runway strips shall be inspected and cleared of all stock or native fauna prior to landing

7 REFERENCES AND RELATED DOCUMENTS

Document Number	Description
N/A	Airstrip Standards & Reporting Arrangements - Royal Flying Doctors Service of Western Australia
AS1742	Manual of Uniform Traffic Control Devices
AGTTM	Austroads Guide to Temporary Traffic Management
N/A	Traffic Management at Roadworks on State Roads Policy and Application Guidelines by Main Roads
N/A	Work Health and Safety Act 2020
N/A	Work Health and Safety (General) Regulations 2020
N/A	Aeronautical Information Publication (AIP) published by Aeronautical Information Services (AIS), Airservices Australia
200431-0003	Emergency Runway Strip Details by Main Roads
200431-0013	Emergency Runway Strip Traffic Management Plan by Main Roads

8 APPENDICES

Appendix	Title
Appendix A	Airstrip Standards & Reporting Arrangements – Royal Flying Doctors Service of Western Australia
Appendix B	Traffic Management Plan (Sample)

APPENDIX A – AIRSTRIP STANDARDS & REPORTING ARRANGEMENTS – ROYAL FLYING DOCTOR SERVICE OF WESTERN AUSTRALIA

Royal Flying Doctor Service
WESTERN OPERATIONS

AIRSTRIP STANDARDS & REPORTING ARRANGEMENTS

REV. 3.2 – DATED: 1 SEPTEMBER 2013

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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; and

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 plane of specified dimensions that originate 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

a) Look for areas that are naturally well drained and not subject to flooding or water ponding.

b) 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.

c) Give preference to sites having soil types that, from local experience, remain smooth and compact when trafficked. Avoid:

   i. Very sandy soils;

   ii. Rocky terrain; and

   iii. Soils that become boggy or slippery when wet.

d) Make sure that the selected site:

   i. Can comfortably accommodate the required airstrip dimensions and physical characteristics and is aligned into the stronger prevailing surface winds;

   ii. Avoids penetration of the approach and take off surfaces and the lateral transitional surfaces (where required) by immovable objects; and

   iii. Remains accessible to normal surface transport at all times when the airstrip is useable.

e) Endeavour to select a site where:

   i. No hills (or terrain) or manmade objects (masts, buildings, etc.) more than 45 metres above airstrip elevation exist within 2500 metres (ideally 4000 metres) of the site;

   ii. Aeroplanes will not fly close to or over residential or built up areas, particularly during normal landing and take-off phases of flight; and

   iii. 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 (Appendix 2 - Figures 1 and 2).

The preferred runway width is 20 metres.

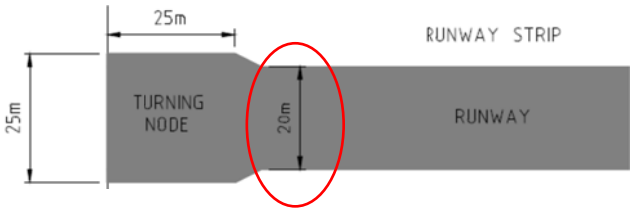


Figure 4.1.1: Runway Width and Turning Nodes

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 2.86%.

Where there are longitudinal slope changes:

a) They are to be gradual[1].

b) Undulations or appreciable slope changes located close together along a runway should be avoided[2].

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 transverse 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:

a) Isolated soft wet areas;

b) Loose surface sand;

c) Ruts;

[1] 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.

[2] 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.

d) Potholes;

e) Sand build up around grass growth;

f) Excessive high grass growth;

g) Shrub regrowth;

h) Embedded rock protruding above the runway surface;

i) Loose surface stones; and

j) Use of the runway as a road.

The smoothness of a runway can be tested by driving a stiffly sprung vehicle (e.g. 4x4 Ute) 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 (Appendix 2 - Figures 1 and 2).

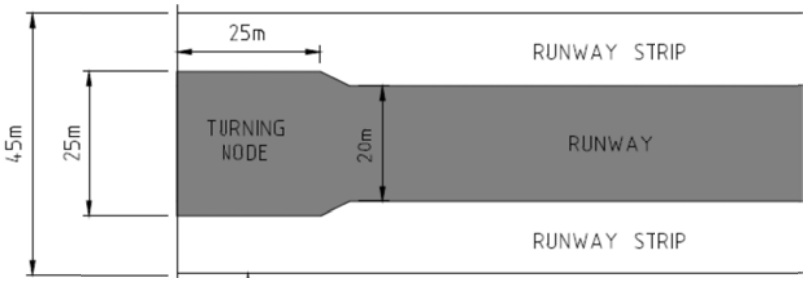


Figure 4.2.1: Runway Strip Width

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 be of a lesser standard, but one such that an aircraft running off the runway is not likely to suffer damage, namely:

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 stiffly sprung vehicle (e.g. 4x4 Ute) driven over it at 40km/h, and without risk of bogging; and

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:

a) For operations by day, 60 metres (Appendix 2 - Figure 1); or

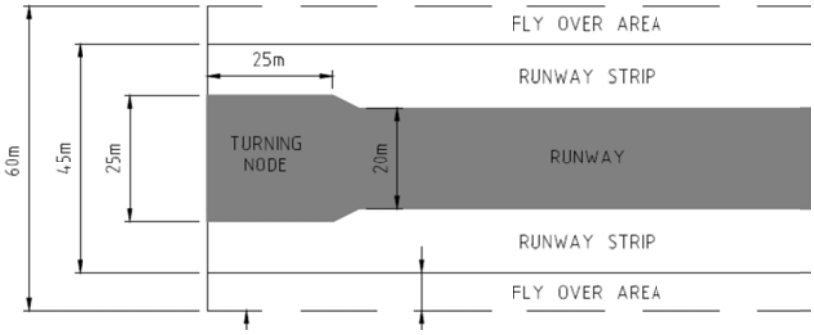


Figure 4.3.1 (a) – 60m Wide Runway Strip and Flyover Area (Day)

b) For operations at night, 90 metres (Appendix 2 - Figure 2).

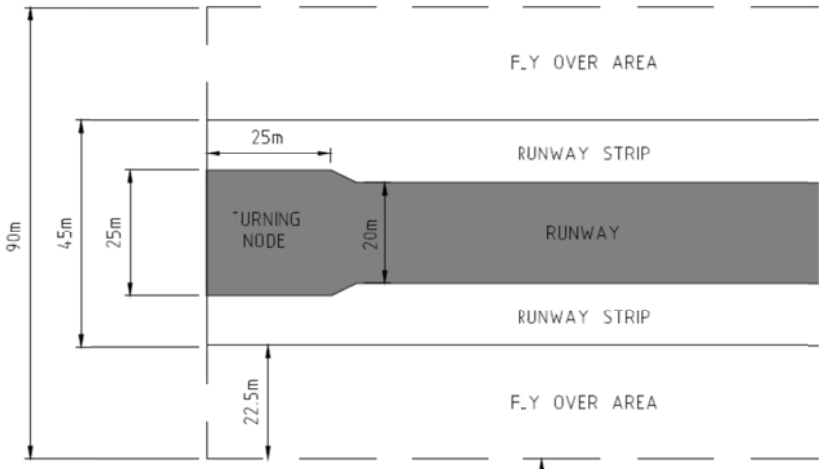


Figure 4.3.1 (b) – 90m Wide Runway Strip and Flyover Area (Night)

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 trees, fences, mounds, and rock outcrops.

4.4 APPROACH & TAKE-OFF SLOPE SURFACES

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

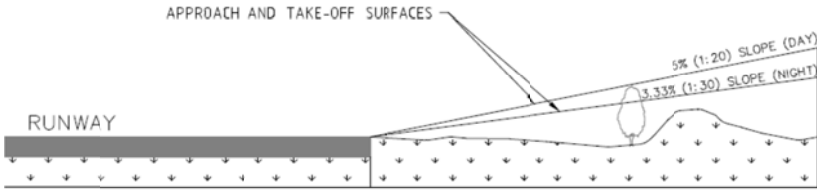


Figure 4.4 – Approach and Take-Off Surfaces

4.5 LATERAL TRANSITIONAL SURFACE

Obstacle protection of this surface (Appendix 2 - Figure 4) is required at airstrips to be used at night and is encouraged at other airstrips, particularly those with trees, ridges or manmade structures located within 45 metres of the outer edges of the flyover areas or close to the approach surface.

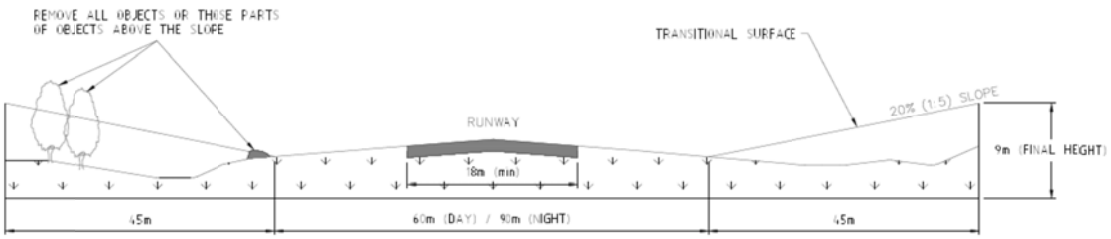


Figure 4.5 – Lateral Transitional Surfaces

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 (Appendix 2 - Figures 1 and 2).

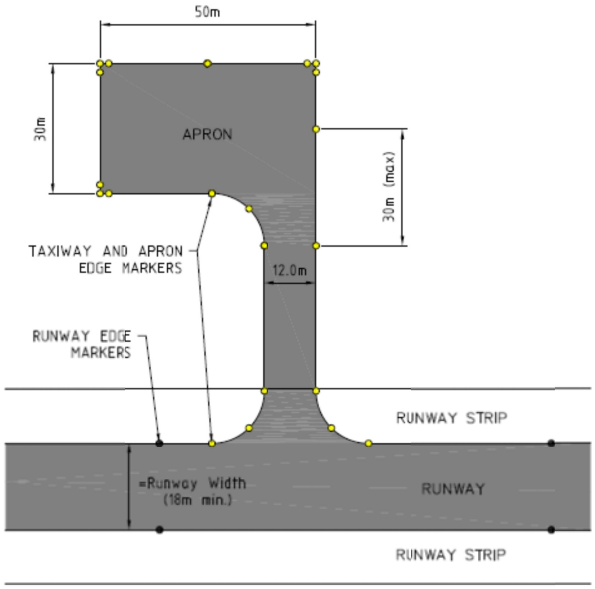


Figure 4.6.1 – Apron Dimensions

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:

a) At any convenient point along the length of the runway;

b) External to the flyover area; and

c) So that aircraft parked on the apron will not obstruct the lateral transitional surface, if provided. The tail height of the RFDS' Pilatus PC-12 aircraft is 4.5 metres. Therefore, to be clear of the lateral transitional surface (1:5 slope) when parked, the edge of the parking position should be at least 22.5 metres from the edge of the flyover area.

4.7 TAXIWAY

4.7.1 DIMENSIONS

The minimum taxiway width is 12 metres (Appendix 2 - 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 in Appendix 2 illustrates the layout for runway strip edge and corner markers. All runway strip markers are to be white.

The individual marker units may be:

a) Large cone or gable markers equivalent to those displayed at registered or certified aerodromes;

b) 200 litre drums cut longitudinally into two halves to make two marker units; or

c) Medium size truck tyres e.g. Hino FD or 4x4 Land Cruiser tyres.

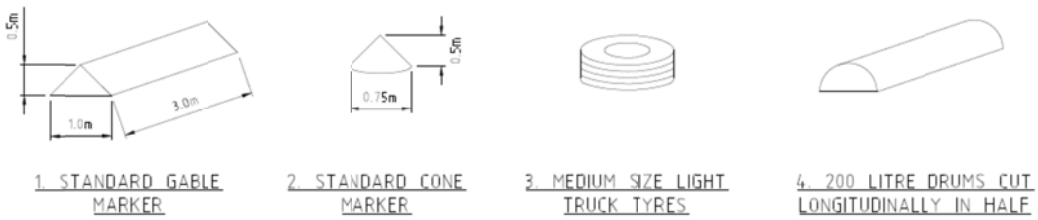


Figure 5.1 – Runway Strip Markers

5.2 RUNWAY EDGE AND CORNER MARKERS

Runway edge 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 in Appendix 2 illustrates the layout for runway edge and end markers. The individual marker units are normally small cone markers, equivalent to those used at registered and certified aerodromes, or small car tyres.

All runway edge and corner markers are to be white.

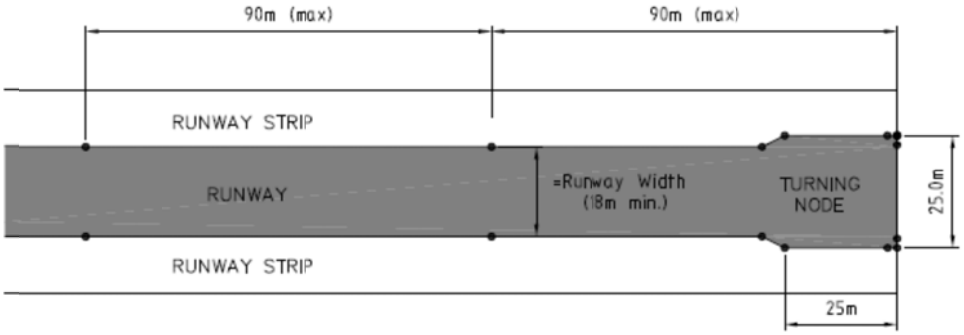


Figure 5.2 – Runway Edge Markers

5.3 AIRSTRIP LIGHTING

5.3.1 TYPES OF LIGHTING

The types of aerodrome lighting suitable for use by RFDS at night are:

a) **Coloured Aerodrome Lights** – These can be fixed electric lights connected to a mains supply (or generator) or a full set of correctly coloured portable battery-powered lights. For a 1200m long runway, a full set of lights consists of:

Colour	Quantity	Beam	Location
White	24 (at 92.46m intervals)	Omni-Directional	Runway Edge
Blue	23 (dependent on taxiway / apron size)	Omni-Directional	Taxiway / Apron Edge
Green	4	Omni-Directional	Runway Threshold – Outer
Green / Red	12	Bi-Directional	Runway Threshold

Figure 7 in Appendix 2 illustrates the layout for this lighting system.

Professional advice should be sought for the design and installation of mains powered lighting, and is advised due to the expensive nature and specific lights required. Fixed electric lighting can also be fitted with a pilot activated lighting (PAL) system.

To allow for rapid deployment of portable lights, the locations should be clearly marked and maintained.

b) **Portable White Lights** – If coloured lights are not available, the aerodrome lights may comprise of only white lights. These can be battery-powered electric lights, liquid fuel-burning flares, lamps or large tins ⅓ filled with sand saturated with kerosene and lit. To indicate to the pilot the preferred landing direction, a line of 4 equally spaced lights should be placed across one end of the runway. 30 lights would be required for a 1200m long runway, with additional lights used to mark the taxiway and apron, if available.

To allow for rapid deployment of portable lights, the locations should be clearly marked and maintained.

Figure 8 in Appendix 2 illustrates the layout using portable white lights.

c) **Reflectors & White Lights** – If options a) and b) are not possible, the runway ends and edge may be lit using only eight (8) portable white lights and a series of reflectors. Four (4) of the portable lights should be used to mark the preferred landing direction by placing them equally across one end of the runway, so that the aircraft lands into the wind.

The reflectors should face towards the landing aircraft and be equally spaced along the full length of the runway at 90m ± 10m intervals on light-weight frangible frames.

To allow for rapid deployment of the reflectors, the mounting frames can be permanently left in position and the reflectors placed after the landing direction has been determined.

Figure 9 in Appendix 2 illustrates the layout using reflectors and white lights.

d) **Vehicle Headlights** – The least preferred method to light the aerodrome is by using vehicle headlights. Vehicles are to be positioned outside of the runway strip and positioned so that the headlights are angled at approximately 45 degrees to the runway centre-line and indicate the preferred landing direction. The corners of the runway strip should be lit first, followed by any other available vehicles at even intervals outside both edges of the runway strip.

Figure 10 in Appendix 2 illustrates the layout using vehicle headlights.

In all lighting options, an illuminated wind direction indicator is also required. Illumination can be from fixed electric lighting or vehicle headlights. If vehicle headlights are used, they should be aimed downwind.

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.

The normal heights of wind direction indicators are usually 6.5 metres for unlit and 8 metres for lit. Therefore, to be clear of the lateral transitional surface (1:5 slope), an unlit windsock position should be at least 32.5 metres from the edge of the flyover area, or a lit windsock position should be at least 40 metres from the edge of the flyover area.

Figure 11 in Appendix 2 illustrates standard wind indicator sleeve dimensions and suitable mast assemblies for daylight operations

An illuminated wind indicator and mast assembly equivalent to registered or certified aerodrome standard should be provided at airstrips with electric lighting - see section 5.3.1 (a). Professional advice should be sought for the design and installation of illuminated wind direction indicators, and is advised due to the expensive nature and specific assembly required.

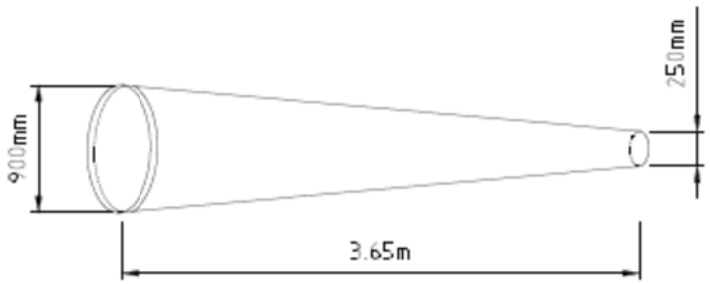


Figure 5.4 – Standard Wind Direction Indicator Sleeve Dimensions

5.5 FENCING

Where possible, a fence is to be constructed around the perimeter of the aerodrome with the intention of keeping livestock and wildlife away from the operational areas. Typically, animal-proof boundary fencing is 1.8m high and it should be positioned so it doesn't infringe the lateral transitional or the take-off and approach surfaces associated with the aerodrome. Gates should also be considered at appropriate locations to chase out wildlife should the need arise. Professional advice should be

considered for the design and installation of an aerodrome fence due to the expensive nature and specific positioning required.

6. AIRSTRIP REPORTING ARRANGEMENTS

6.1 AIRSTRIP INFORMATION

For operational and air safety reasons, the 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/fax 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 e-mail (AviationDataCoordinator@rfdswa.com.au), when any changes to Data Sheet details occur. If e-mail is not available and the permanent change is operationally significant e.g. permanently reduced runway length, the change should be advised by telephone on (08) 9417 6376 or after hours on (08) 9417 6364 or fax (08) 9417 6379.

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:

   i. Data Sheet information is still correct;

   ii. 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:

   i. Any reduction to the serviceable length and/or width of the runway or runway strip;

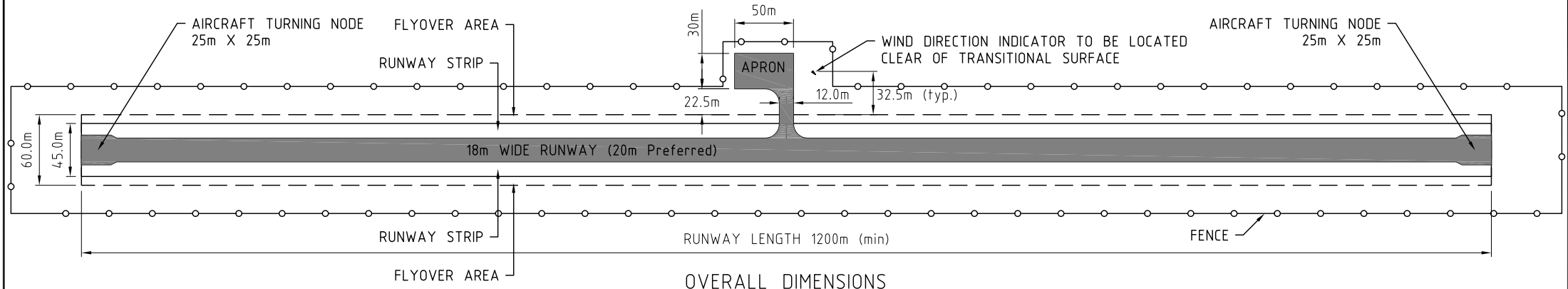
   ii. Describe the location of any areas within the runway or runway strip that may be suspect or not safe to use;

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

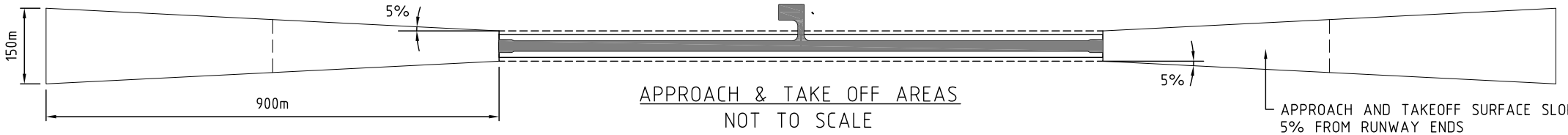
APPENDIX 1 - CONTACTING RFDS FOR MEDICAL CONSULTATION OR PATIENT EVACUATION

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; and
    c) Take note of weather conditions in the area; and
    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 5 a, b, c and d. A Decision will then made whether to proceed to a nominated alternate airstrip.
8. Aircraft will land and shut down.
9. Vehicle or employees must not approach aircraft until pilot has alighted and motioned to come across.
10. Vehicle must not back into aircraft, vehicle to park 3 meters from wingtip and parallel to aircraft body
11. If Doctor and Nurse require going to patient they will require suitable vehicle to transport personnel, medical equipment and possibly aircraft stretcher (length 190cm), suggest Ute or Land Cruiser Troop Carrier with rear seats removed.
12. 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.
13. After transfer of patient complete including documentation, vehicle to move off airstrip.
14. Aircraft will start up and depart.

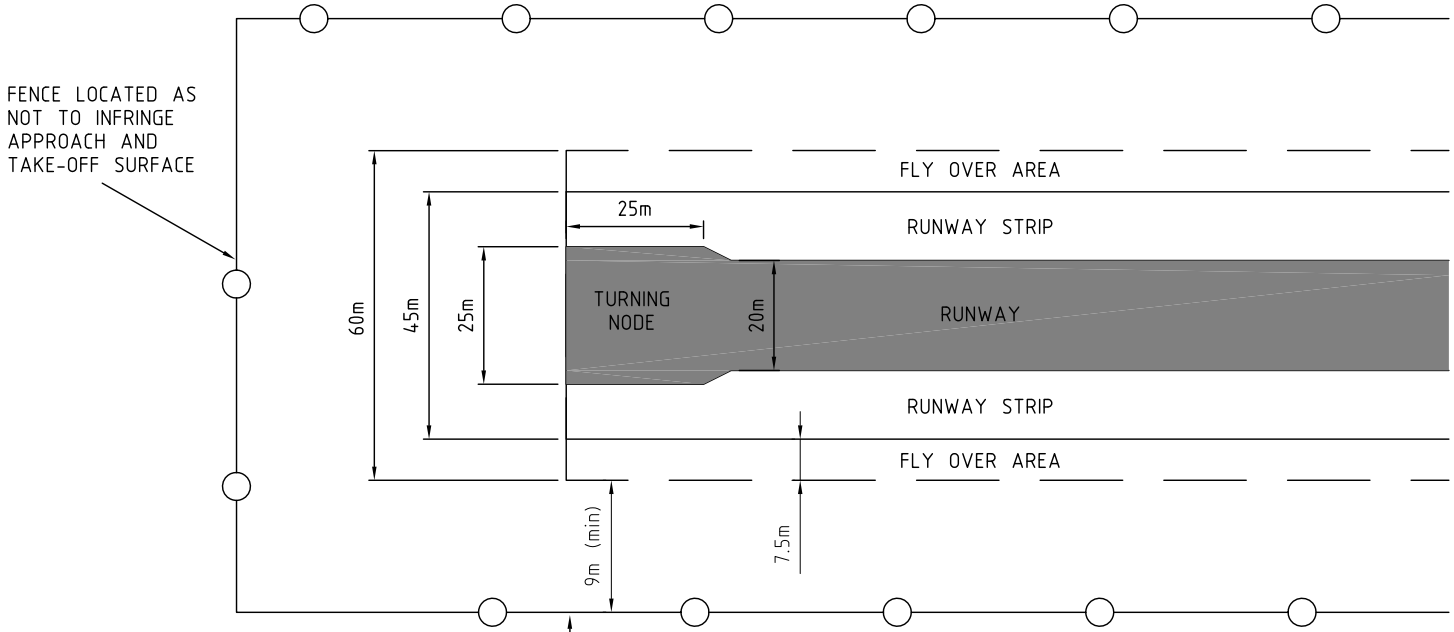
APPENDIX 2 - AIRSTRIP STANDARDS - DIMENSIONAL DRAWINGS



OVERALL DIMENSIONS
NOT TO SCALE



APPROACH & TAKE OFF AREAS
NOT TO SCALE



STRIP DETAILS
NOT TO SCALE

NOTE:
TO CATER FOR POSSIBLE FUTURE OPERATIONS AT NIGHT, CONSIDERATION SHOULD BE GIVEN TO LOCATING THE APRON AREA, WIND DIRECTION INDICATOR AND FENCE EXTERNAL TO A 90 METRE WIDE FLYOVER AREA.

Royal Flying Doctor Service
WESTERN OPERATIONS

ROYAL FLYING DOCTOR SERVICE
TYPICAL AIRSTRIP DIMENSIONS
DAY OPERATIONS
FIGURE 1

AMS
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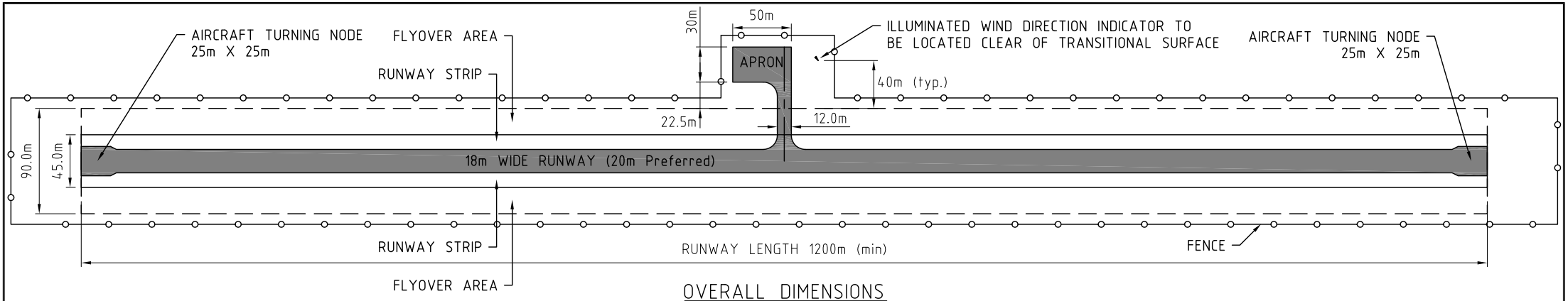
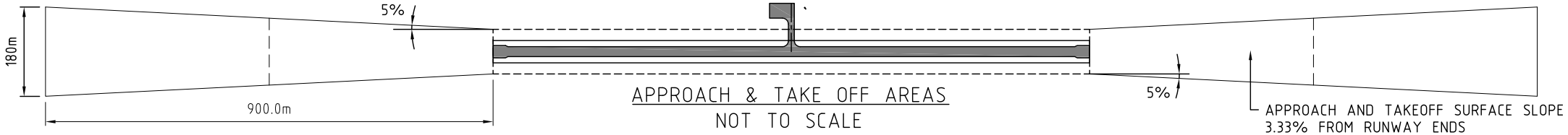
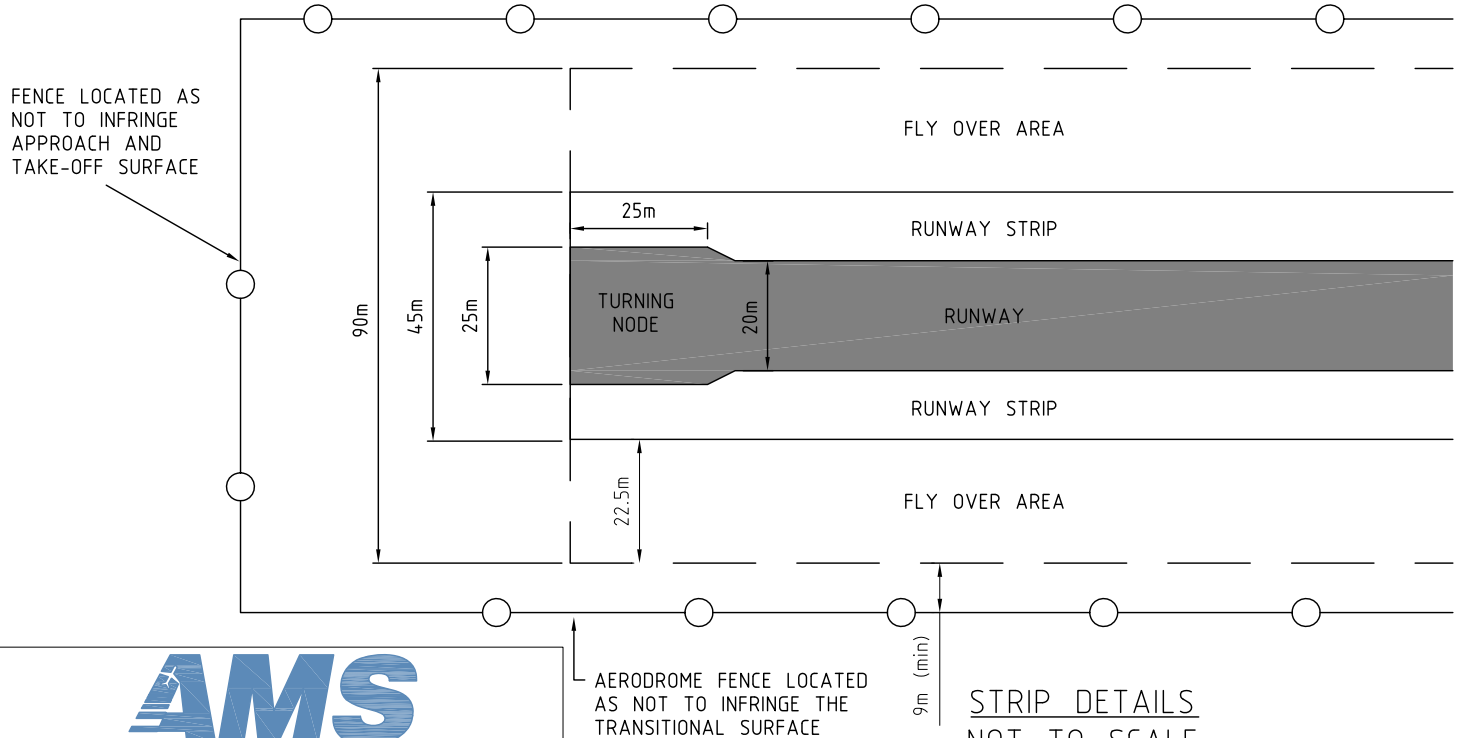
Telephone (08) 9221 6777 : Facsimile (08) 9221 6776 : Email ams@amsaustralia.com



OVERALL DIMENSIONS
NOT TO SCALE



APPROACH & TAKE OFF AREAS
NOT TO SCALE



STRIP DETAILS
NOT TO SCALE

Royal Flying Doctor Service
WESTERN OPERATIONS

ROYAL FLYING DOCTOR SERVICE
TYPICAL AIRSTRIP DIMENSIONS
NIGHT OPERATIONS
FIGURE 2

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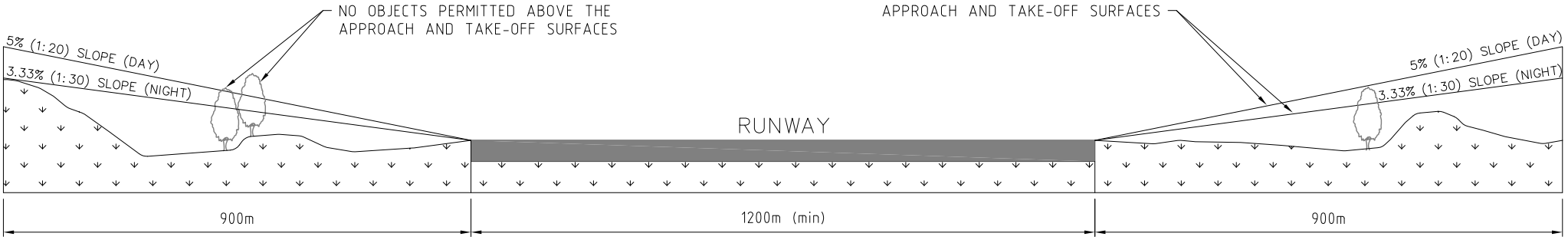
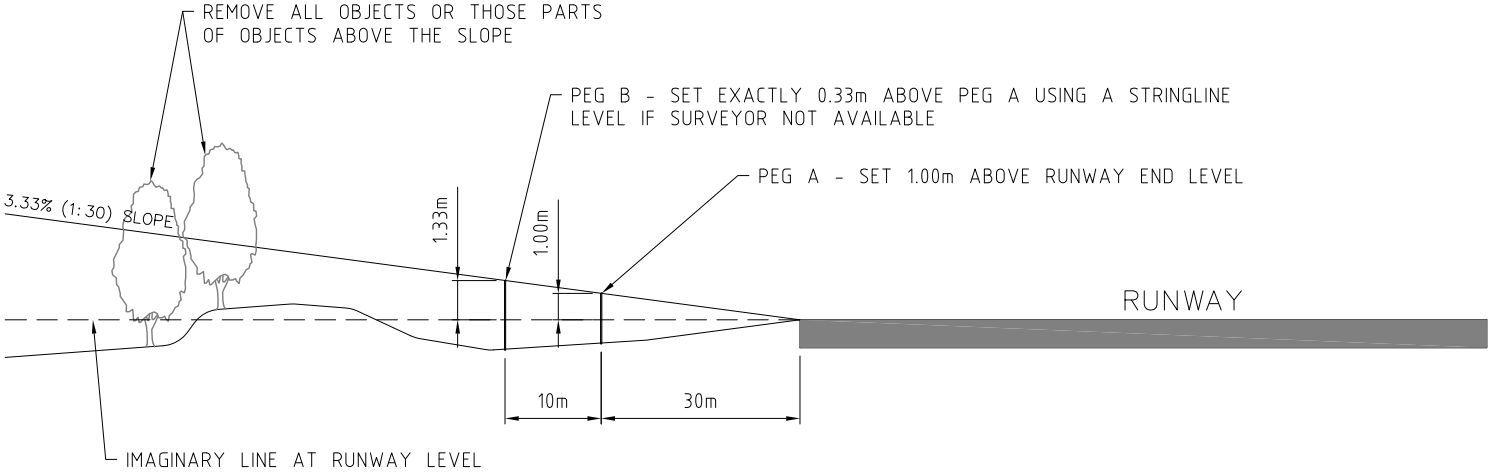


APPROACH AND TAKE-OFF SURFACES
CROSS SECTION
NOT TO SCALE

	ALLOWABLE HEIGHT OF OBJECTS ABOVE RUNWAY END	
DISTANCE FROM RUNWAY END	DAY (1:20 SLOPE)	NIGHT (1:30 SLOPE)
50m	2.5m	1.7m
450m	22.5m	15m
900m	45m	30m



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.

A METHOD FOR MEASURING A 1:30 SLOPE
NOT TO SCALE

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WESTERN OPERATIONS

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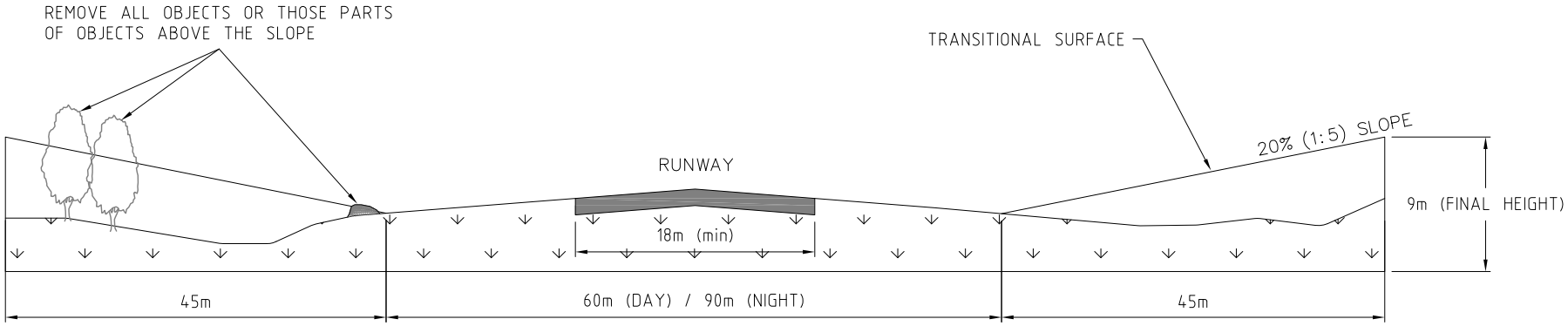
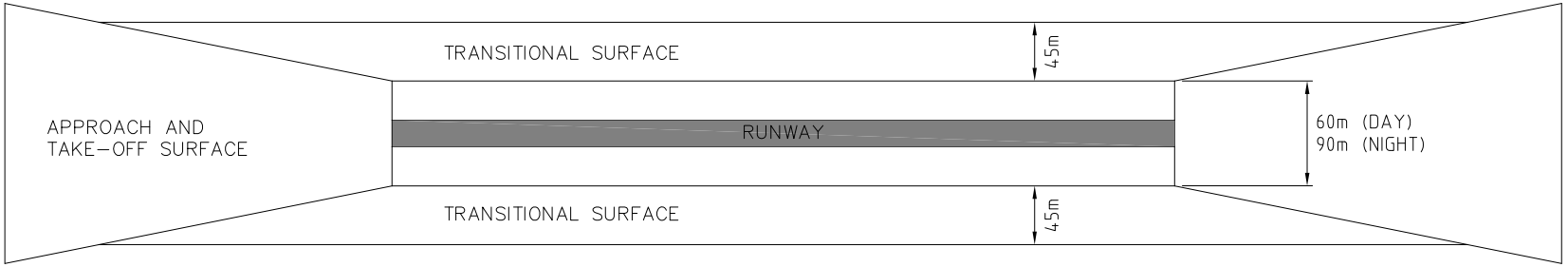
ROYAL FLYING DOCTOR SERVICE
APPROACH AND TAKE-OFF SURFACES
FIGURE 3



TRANSITIONAL SURFACES
CROSS SECTION
NOT TO SCALE



TRANSITIONAL SURFACES
PLAN VIEW
NOT TO SCALE

Royal Flying Doctor Service
WESTERN OPERATIONS

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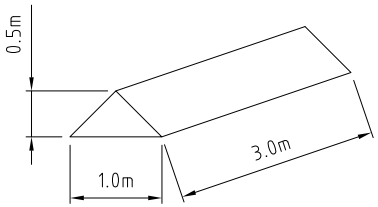
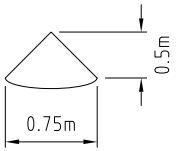
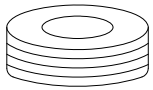
ROYAL FLYING DOCTOR SERVICE
TRANSITIONAL SURFACES
FIGURE 4



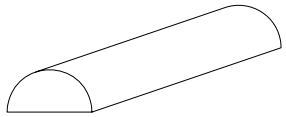
1. STANDARD GABLE MARKER



2. STANDARD CONE MARKER



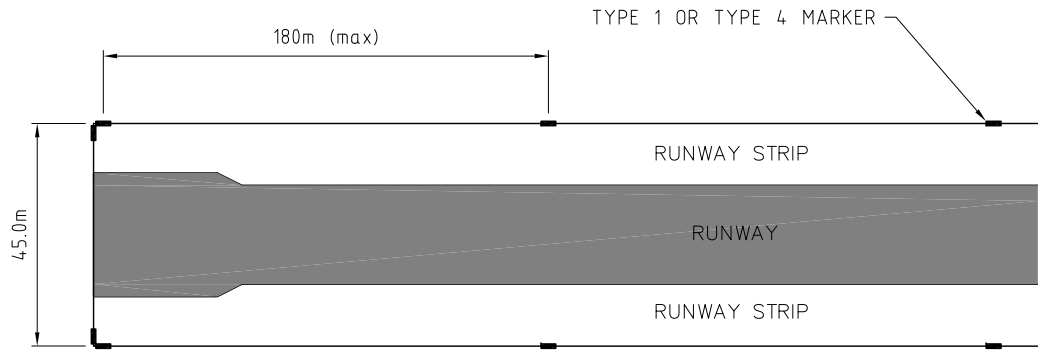
3. MEDIUM SIZE LIGHT TRUCK TYRES



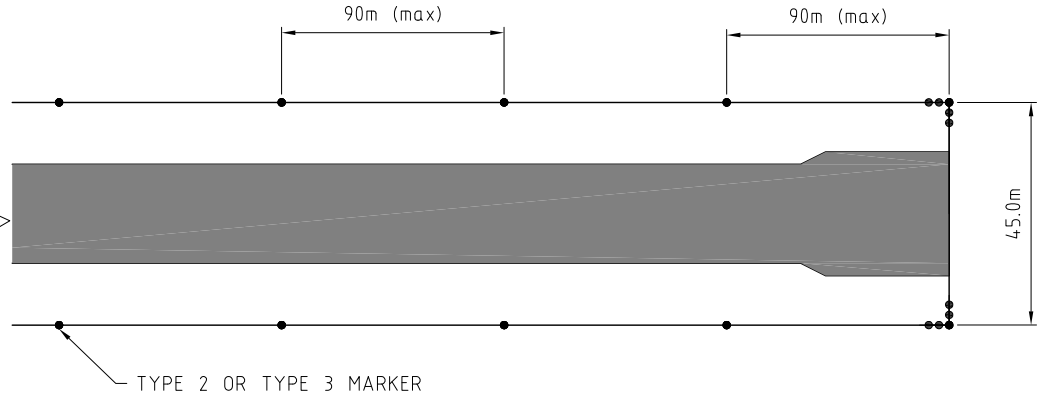
4. 200 LITRE DRUMS CUT LONGITUDINALLY IN HALF

NOTE:
1. ALL MARKERS ARE TO BE PAINTED WHITE.
2. MARKERS TYPE 1 OR 2 ARE PREFERRED AT FREQUENTLY USED AIRSTRIPS. THESE MARKERS MUST BE LIGHTWEIGHT AND FRANGIBLE, e.g. FIBRE GLASS.

TYPES OF RUNWAY STRIP MARKERS
NOT TO SCALE



LAYOUT - TYPE 1 & TYPE 4
NOT TO SCALE



LAYOUT - TYPE 2 & TYPE 3
NOT TO SCALE

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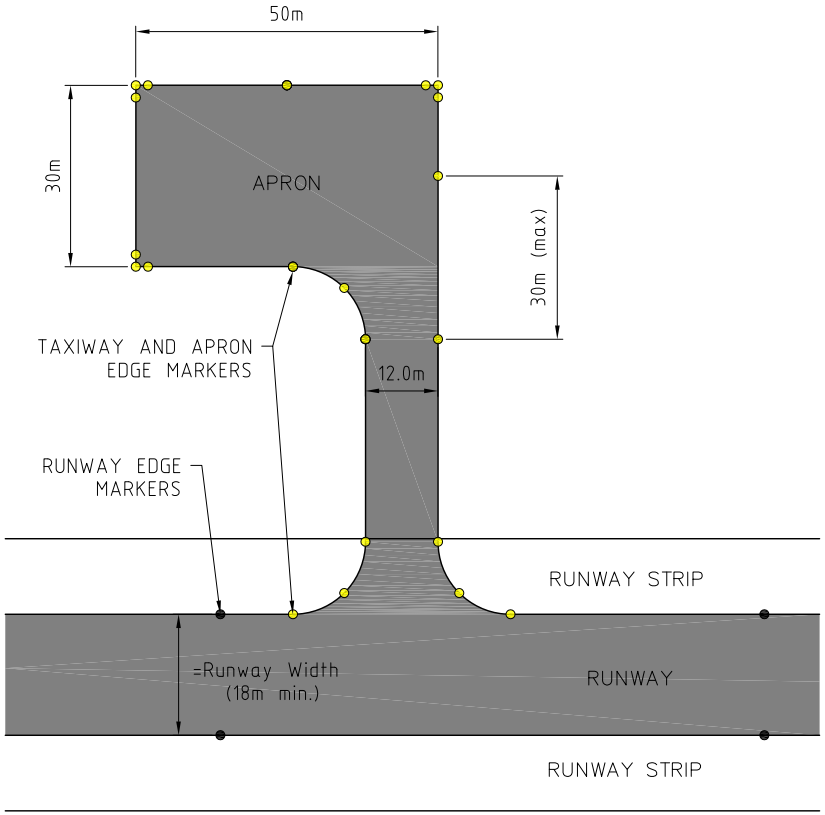
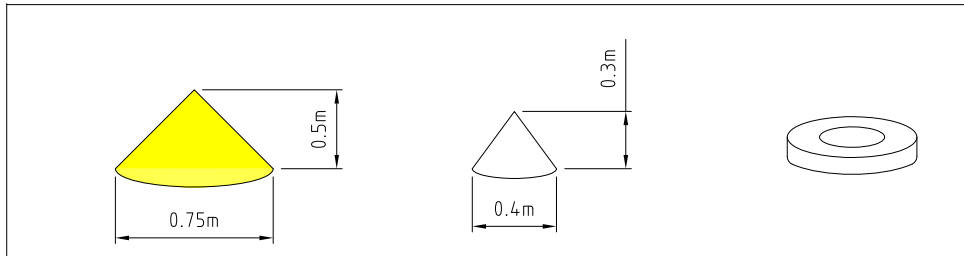
Royal Flying Doctor Service
WESTERN OPERATIONS

ROYAL FLYING DOCTOR SERVICE
RUNWAY STRIP MARKERS
FIGURE 5



LAYOUT - TAXIWAY AND APRON EDGE MARKERS
NOT TO SCALE

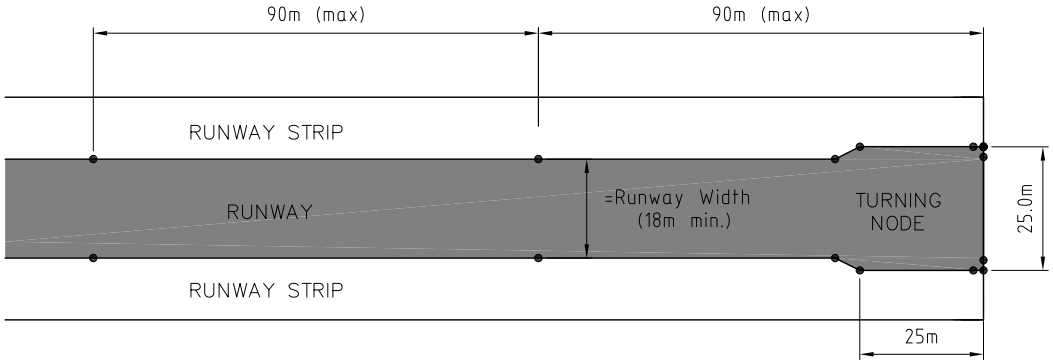


1. TAXIWAY/APRON EDGE MARKER (YELLOW)

2. RUNWAY EDGE MARKER (WHITE)

3. SMALL CAR TYRES

TYPES OF EDGE MARKERS
NOT TO SCALE



LAYOUT - RUNWAY EDGE MARKERS
NOT TO SCALE

NOTES:

1. ALL RUNWAY EDGE MARKERS ARE TO BE WHITE.
2. ALL TAXIWAY AND APRON EDGE MARKERS ARE TO BE YELLOW.
3 CONE MARKERS TYPE 1 & 2 ARE PREFERRED AT FREQUENTLY USED AIRSTRIPS. THESE MARKERS MUST BE LIGHTWEIGHT AND FRANGIBLE, e.g. FIBRE GLASS.
4. RUNWAY EDGE MARKERS ARE REQUIRED IF THE RUNWAY STRIP SURFACE IS NOT MAINTAINED TO THE SAME STANDARD AS THE RUNWAY - SEE SECTION 4.2.3.

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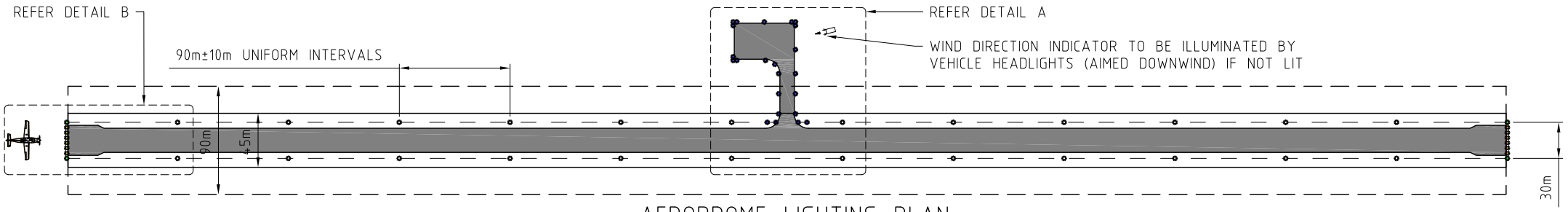
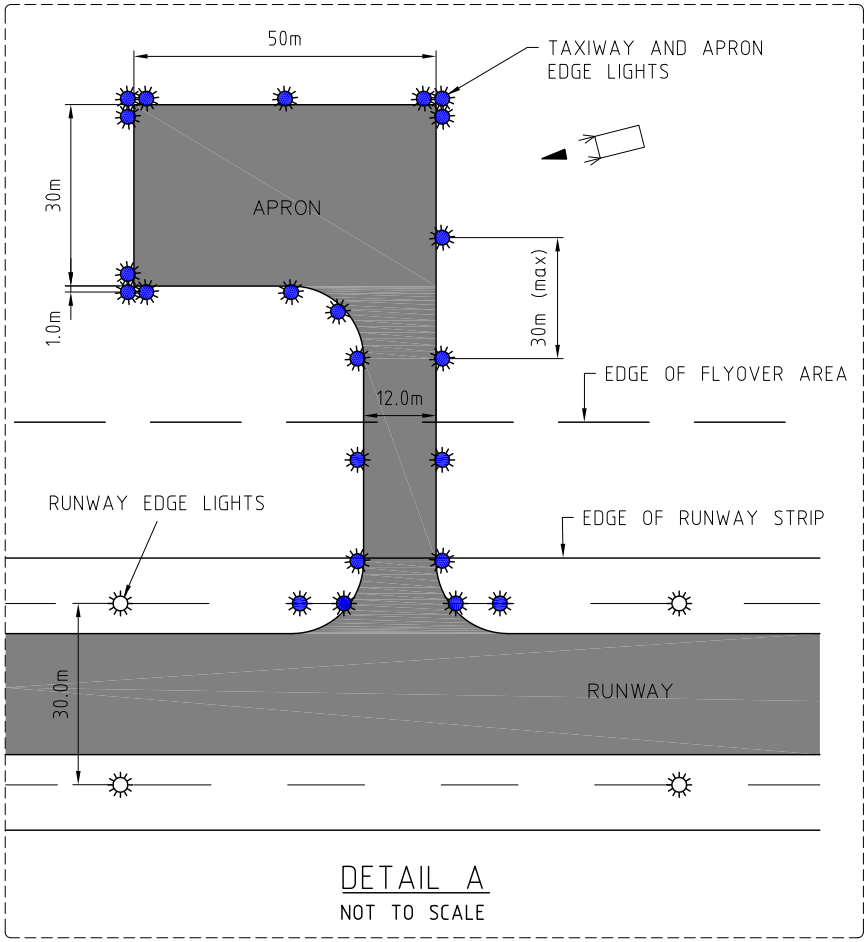
Royal Flying Doctor Service
WESTERN OPERATIONS

ROYAL FLYING DOCTOR SERVICE
RUNWAY EDGE AND CORNER MARKERS
FIGURE 6



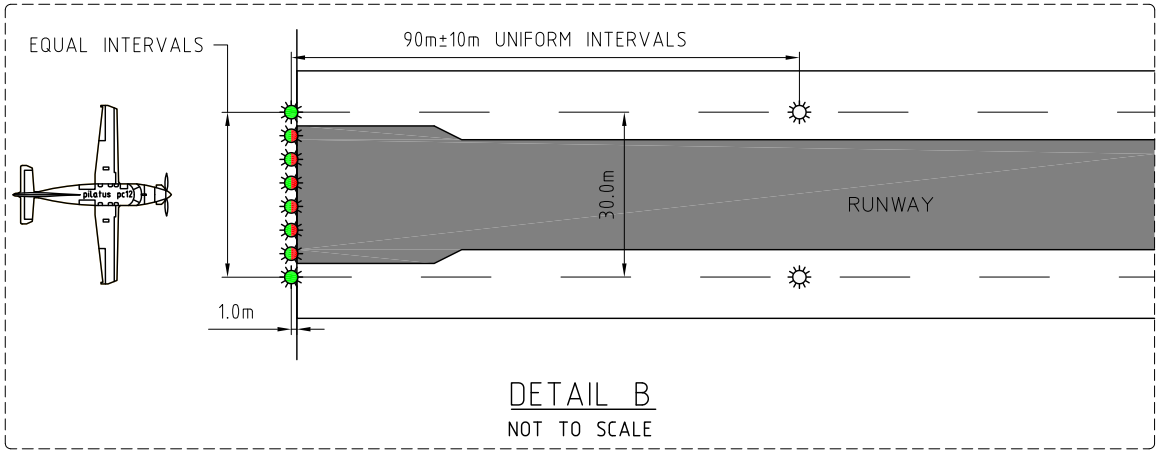
AERODROME LIGHTING PLAN

NOT TO SCALE



DETAIL A

NOT TO SCALE



DETAIL B

NOT TO SCALE

LIGHTING LEGEND - FOR A 1200m LONG RUNWAY				
QUANTITY	SYMBOL	COLOUR	BEAM	SYSTEM
24 (AT 92.46m INTERVALS)		WHITE	OMNI-DIRECTIONAL	RUNWAY EDGE
23 (DEPENDING ON APRON SIZE)		BLUE	OMNI-DIRECTIONAL	TAXIWAY / APRON EDGE
4		GREEN	OMNI-DIRECTIONAL	RUNWAY THRESHOLD IDENTIFICATION OUTER
12		GREEN / RED	BI-DIRECTIONAL	RUNWAY THRESHOLD IDENTIFICATION

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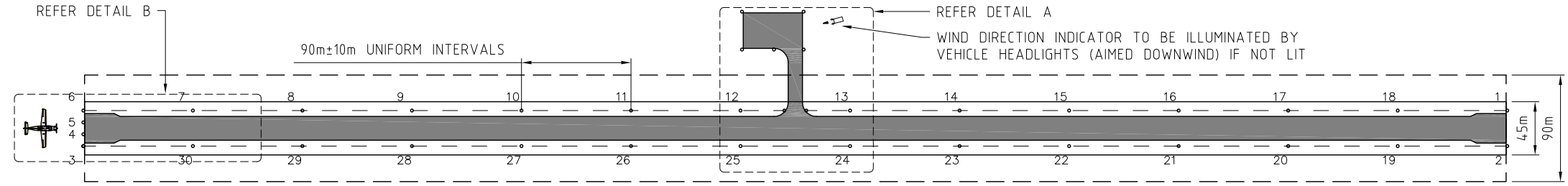
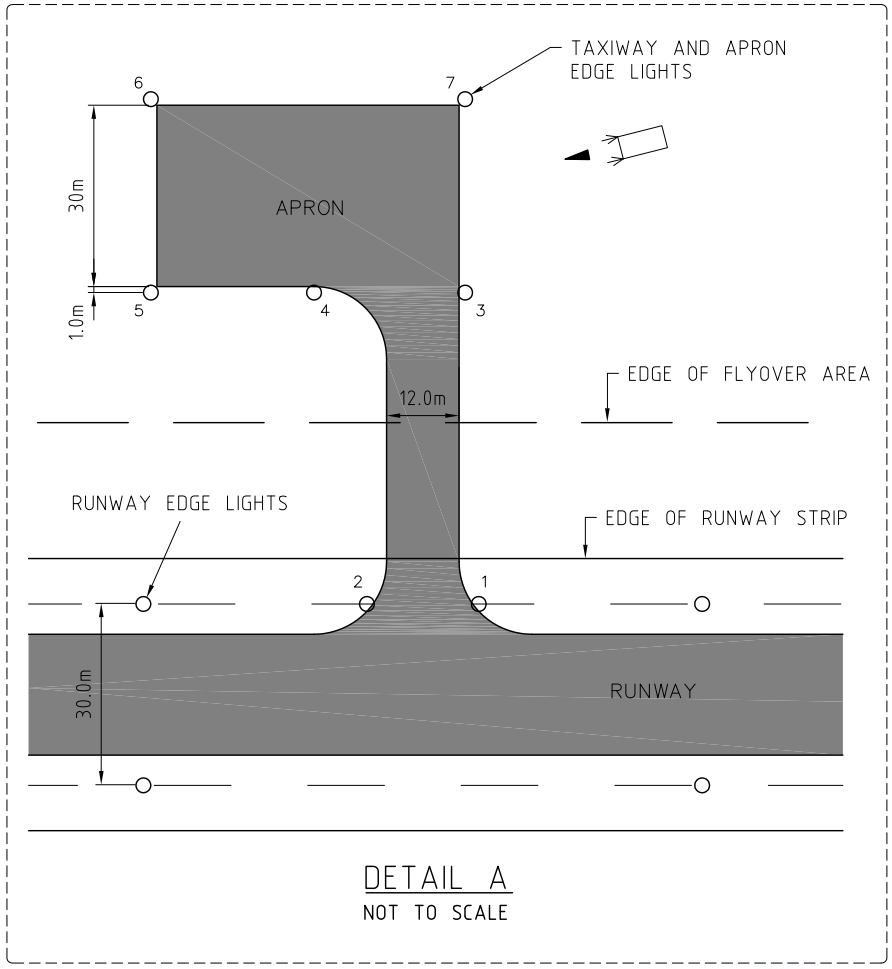
WESTERN OPERATIONS

ROYAL FLYING DOCTOR SERVICE
AERODROME LIGHTING - FULL SET OF COLOURED LIGHTS
FIGURE 7



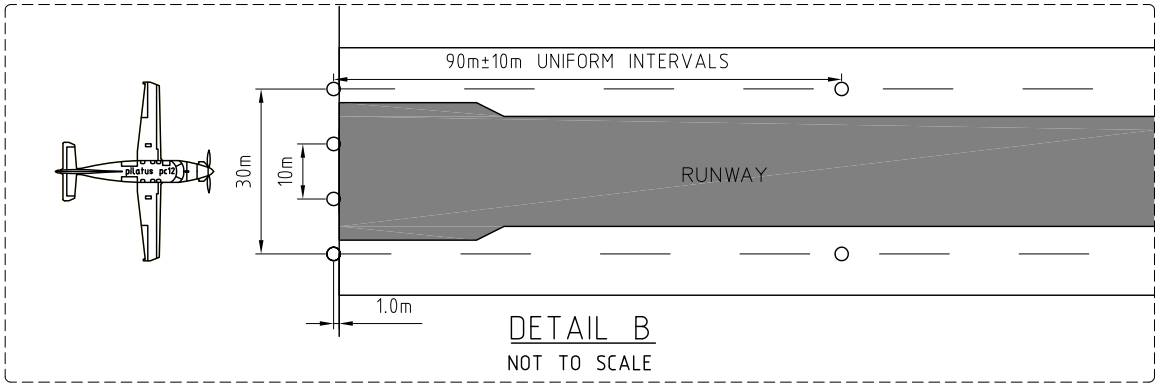
AERODROME LIGHTING PLAN - PORTABLE LIGHTS

NOT TO SCALE



DETAIL A

NOT TO SCALE



DETAIL B

NOT TO SCALE

LIGHTING LEGEND - FOR A 1200m LONG RUNWAY				
QUANTITY	SYMBOL	COLOUR	BEAM	SYSTEM
30 (AT 92.46m INTERVALS)	○	PORTABLE LIGHTS/FLARES WHITE	OMNI-DIRECTIONAL	RUNWAY ENDS & EDGE
7 (DEPENDING ON APRON SIZE)	○	PORTABLE LIGHTS/FLARES WHITE	OMNI-DIRECTIONAL	TAXIWAY / APRON EDGE

NOTES:

1. EXAMPLES OF PORTABLE WHITE LIGHTS: A) KEROSENE FLARES, B) BATTERY POWERED OMNI-DIRECTIONAL WHITE LIGHTS OR C) LARGE TIN 1/3 FILLED WITH DRY SAND SATURATED WITH KEROSENE. (USE OF A CLOTH / ROPE WICK WILL AID IGNITION).
2. INDICATE TO THE PILOT THE PREFERRED LANDING DIRECTION BY PLACING A LINE OF 4 LIGHTS ACROSS ONE END OF THE RUNWAY AS SHOWN IN DETAIL B. IF THERE IS ANY SURFACE WIND THE 4 RUNWAY LIGHTS MUST BE PLACED SO THAT THE AIRCRAFT LANDS INTO THE WIND.
3 PLACE THE RUNWAY EDGE LIGHTS FIRST IN THE ORDER SHOWN, AS TIME PERMITS, FOLLOWED BY THE TAXIWAY AND APRON LIGHTS.
4. AVOID USING A MIX OF DIFFERENT LIGHTS IF POSSIBLE.

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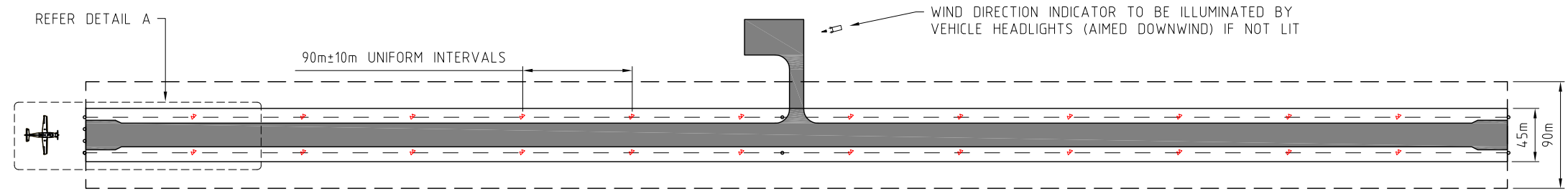
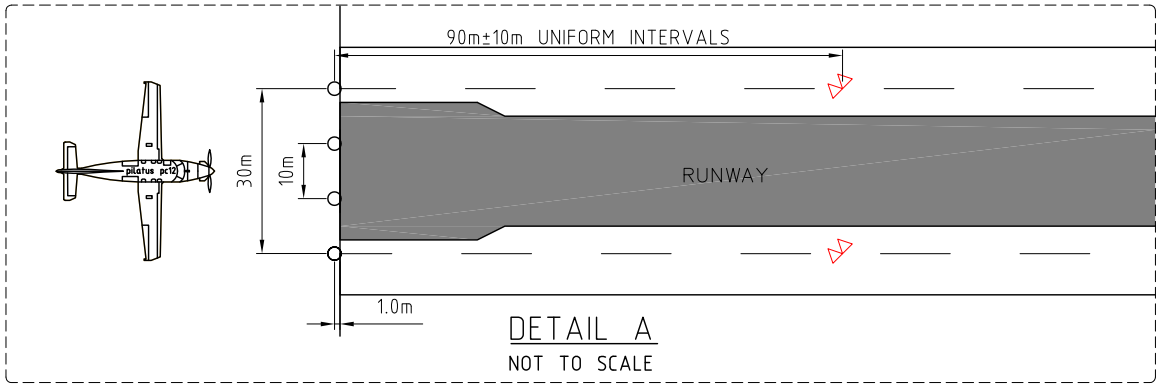
WESTERN OPERATIONS

ROYAL FLYING DOCTOR SERVICE
AERODROME LIGHTING - PORTABLE WHITE LIGHTS ONLY
FIGURE 8



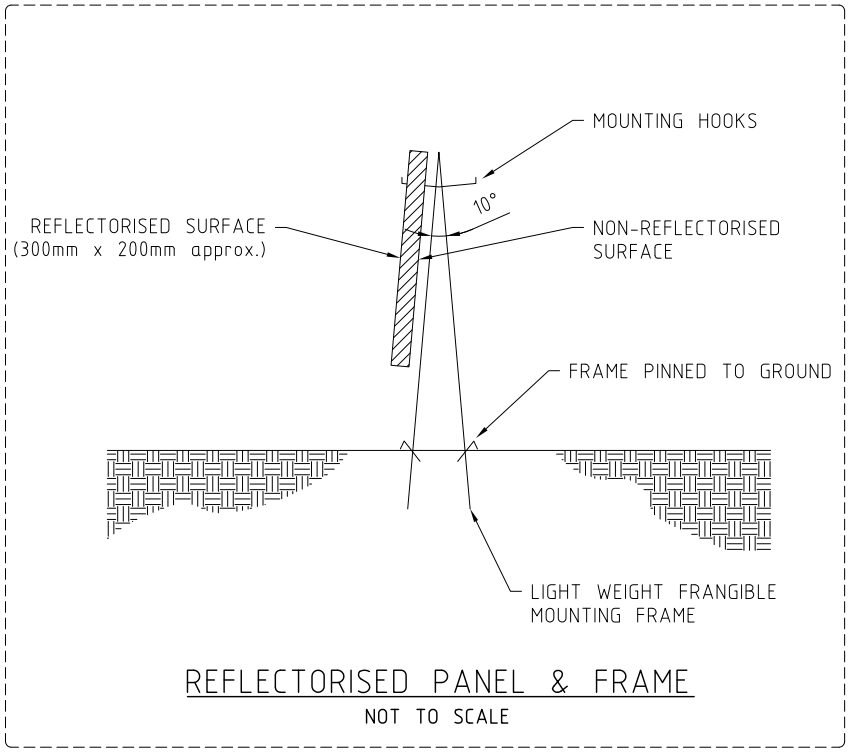
AERODROME LIGHTING PLAN - PORTABLE LIGHTS & REFLECTORS

NOT TO SCALE



DETAIL A

NOT TO SCALE



REFLECTORISED PANEL & FRAME

NOT TO SCALE

LIGHTING LEGEND - FOR A 1200m LONG RUNWAY				
QUANTITY	SYMBOL	COLOUR	BEAM	SYSTEM
8	○	PORTABLE LIGHTS/FLARES WHITE	OMNI-DIRECTIONAL	RUNWAY ENDS
24 (AT 92.46m INTERVALS)	◁	REFLECTORISED PANEL	REFLECTOR	RUNWAY EDGE

NOTES:

1. PLACE ALL LIGHTS FIRST.
2. EXAMPLES OF PORTABLE WHITE LIGHTS: A) KEROSENE FLARES, B) BATTERY POWERED OMNI-DIRECTIONAL WHITE LIGHTS OR C) LARGE TIN 1/3 FILLED WITH DRY SAND SATURATED WITH KEROSENE. (USE OF A CLOTH / ROPE WICK WILL AID IGNITION).
3. INDICATE TO THE PILOT THE PREFERRED LANDING DIRECTION BY PLACING A LINE OF 4 LIGHTS ACROSS ONE END OF THE RUNWAY AS SHOWN IN DETAIL B. IF THERE IS ANY SURFACE WIND THE 4 RUNWAY LIGHTS MUST BE PLACED SO THAT THE AIRCRAFT LANDS INTO THE WIND.
4. THE REFLECTORISED PANELS MUST FACE TOWARDS THE LANDING AIRCRAFT. (THE MOUNTING FRAMES ARE USUALLY LEFT IN POSITION AND THE REFLECTOR PANELS POSITIONED AFTER THE LANDING DIRECTION HAS BEEN DETERMINED.

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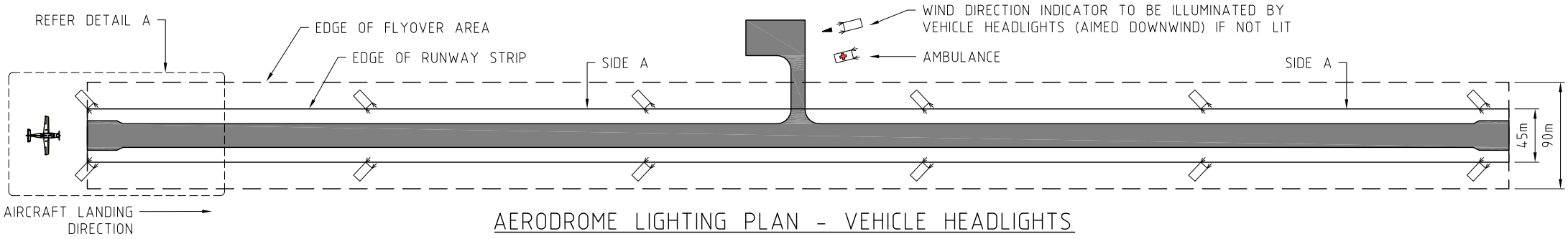
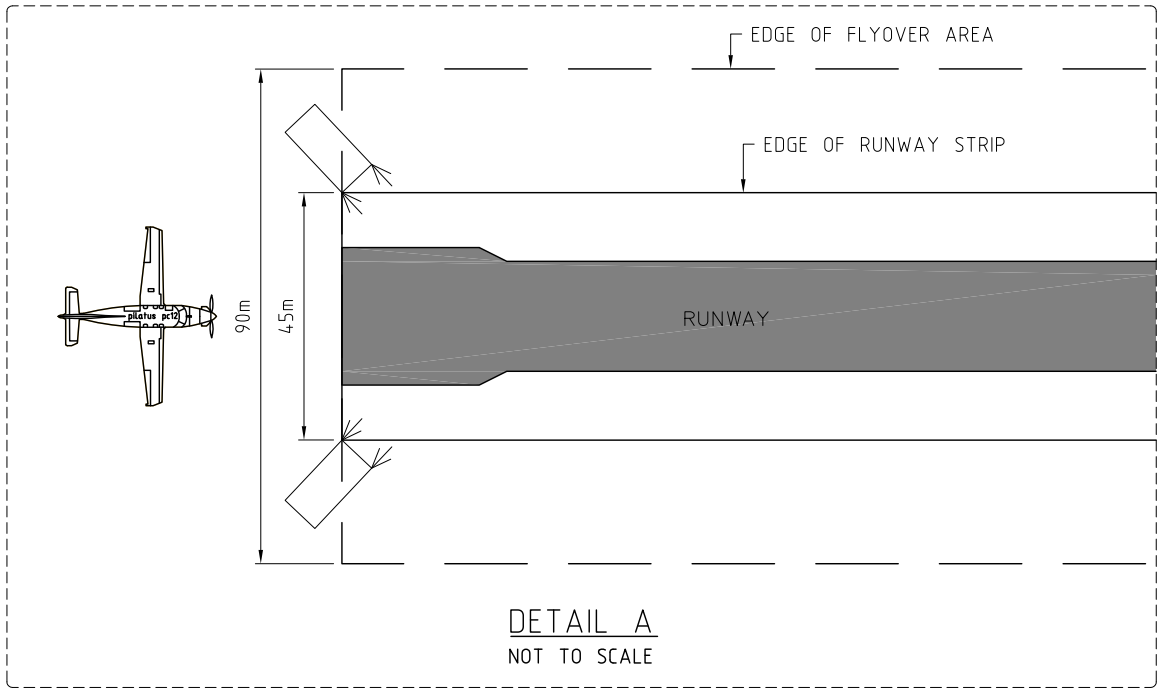
WESTERN OPERATIONS

ROYAL FLYING DOCTOR SERVICE
AERODROME LIGHTING - REFLECTORS & LIGHTS
FIGURE 9



AERODROME LIGHTING PLAN - VEHICLE HEADLIGHTS

NOT TO SCALE



DETAIL A

NOT TO SCALE

METHOD:

1. THIS IS THE LEAST PREFERRED LIGHTING OPTION.
2. VEHICLE HEADLIGHTS ARE TO BE ANGLED AT APPROXIMATELY 45° TO THE RUNWAY CENTRE-LINE TO INDICATE THE PREFERRED DIRECTION FOR THE AIRCRAFT TO LAND. IF THERE IS ANY SURFACE WIND THE VEHICLE HEADLIGHTS MUST BE ANGLED SO THAT THE AIRCRAFT LANDS INTO THE WIND.
3. POSITION A VEHICLE OUTSIDE EACH CORNER OF THE RUNWAY STRIP, SO THAT THE DISTANCE BETWEEN EACH PAIR OF VEHICLES AT THE END OF THE RUNWAY STRIP IS NOT LESS THAN 45m.
4. POSITION OTHER AVAILABLE VEHICLES AT EVEN INTERVALS OUTSIDE BOTH EDGES OF THE RUNWAY STRIP. PARK THE AMBULANCE VEHICLE AIMED INTO THE WIND WITH HEADLIGHTS AND ROTATING BEACON ON.
5. IF AFTER LIGHTING THE RUNWAY STRIP CORNERS, THERE ARE ONLY LIMITED AVAILABLE VEHICLES REMAINING, USE THESE TO MARK SIDE A.

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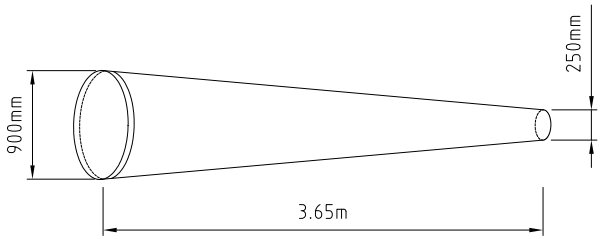
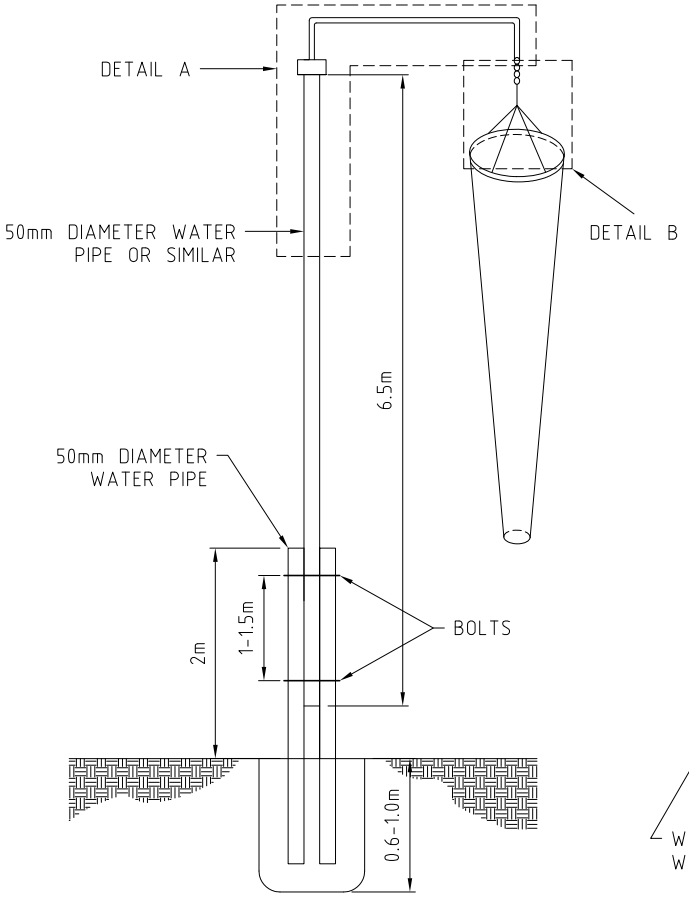
ROYAL FLYING DOCTOR SERVICE
AERODROME LIGHTING - VEHICLE HEADLIGHTS
FIGURE 10



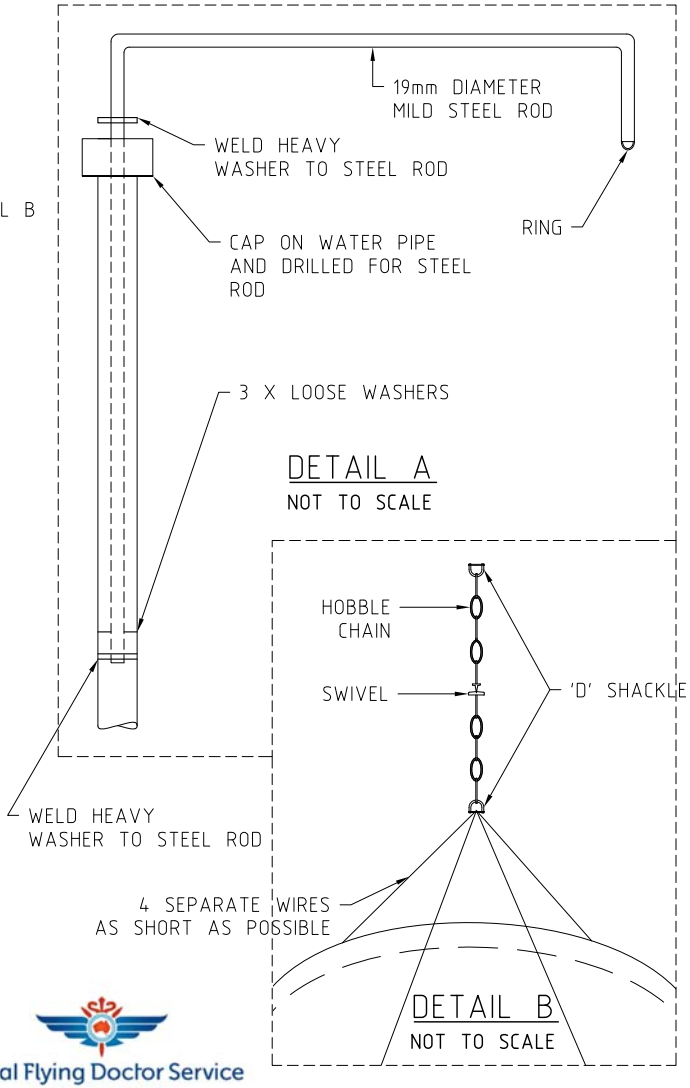
WIND INDICATOR SLEEVE

NOT TO SCALE



ASSEMBLY EXAMPLE 1

NOT TO SCALE



DETAIL A

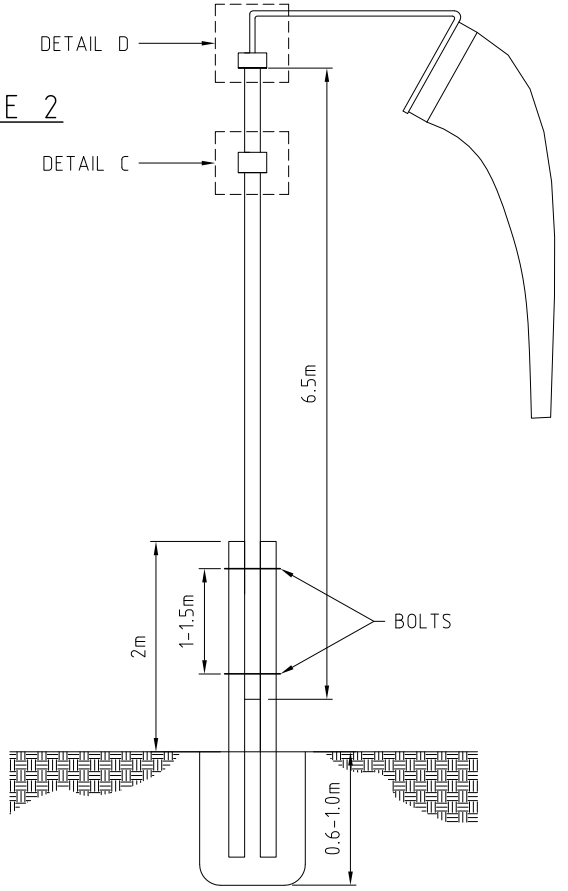
NOT TO SCALE

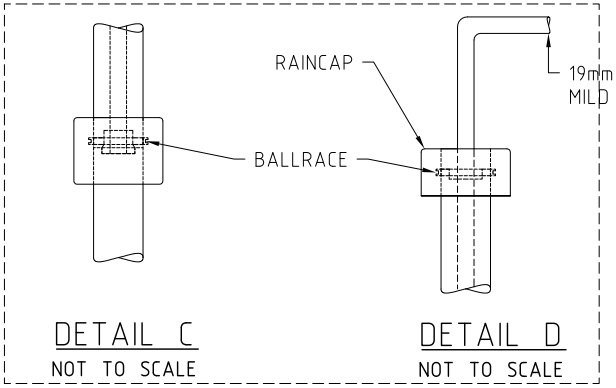
DETAIL B

NOT TO SCALE

ASSEMBLY EXAMPLE 2

NOT TO SCALE





DETAIL C

NOT TO SCALE

DETAIL D

NOT TO SCALE

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WIND DIRECTION INDICATORS
FIGURE 11