# Advisory Circular

# AC139-4

## Operational Safety During Works On Aerodromes

**Initial Issue**

**01 July 2002**

### GENERAL

Civil Aviation Authority Advisory Circulars (AC) contain information about standards, practices and procedures that the Director has found to be an Acceptable Means of Compliance (AMC) with the associated rule.

An AMC is not intended to be the only means of compliance with a rule, and consideration will be given to other methods of compliance that may be presented to the Director. When new standards, practices or procedures are found to be acceptable, they will be added to the appropriate Advisory Circular.

### PURPOSE

This Advisory Circular provides methods, acceptable to the Director, for showing compliance with the works on aerodromes requirements of Part 139 and explanatory material to assist in showing compliance.

### RELATED CAR

This AC relates specifically to Civil Aviation Rule Part 139 rule 139.107.

### CHANGE NOTICE

There was no previous issue of this AC, consequently no change is in effect.

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# Table of Contents

# Control of work and safety precautions to be taken during aerodrome works

## 1.1 Control of works

The aerodrome operator is responsible for controlling any work in progress on the aerodrome and establishing the safety requirements and procedures. This AC provides guidance for compliance with these responsibilities and further guidance is contained in AC139-9 Control of obstacles.

## 1.2 Routine maintenance

Persons authorised by the aerodrome operator may enter active parts of the movement area subject to clearance from an applicable aerodrome control service unit, if present. They must comply with the rules developed for the control of vehicles at that aerodrome in conducting such routine tasks as grass cutting and the like.

## 1.3 Minor construction or maintenance work

For minor construction or maintenance work, a control system should be developed to ensure that—

(1) no work takes place on the active movement area without the knowledge of either the aerodrome operator or any applicable air traffic service unit; and

(2) permitted times of work are strictly followed; and

(3) all individuals taking part in the work are briefed in detail on the following —

(i) precise areas in which the work may be done; and

(ii) the routes to be followed to and from the work area; and

(iii) the radiotelephone or other control procedures to be used, the maintenance of a radio listening watch, and the use of look-outs; and

(iv) the safety precautions to be observed; and

(v) the reporting procedure to be followed on completion of the work; and

(4) at the conclusion of the work, the aerodrome operator inspects the work area to ensure that it has been left in a safe condition.

## 1.4 Major work

**1.4.1** The aerodrome operator should establish a method of work plan (MOWP) before commencing any major construction work on the aerodrome, unless the runway is to be closed.

**1.4.2** When preparing a MOWP the aerodrome operator should consult with the major aerodrome users, the aerodrome air traffic service unit (ATS), if present, and if applicable, the works contractor.

**1.4.3** The work plan should address the items detailed in Appendix 1.

## 1.5 Management and control of aerodrome works

The aerodrome operator should—

(1) appoint a project manager to coordinate the carrying out of works at the aerodrome. The project manager should make arrangements and establish procedures for the safety of aircraft operations while the works are in progress. These arrangements and procedures should be published in the MOWP; and

(2) ensure that aerodrome works are carried out according to the MOWP for major works; and

(3) ensure NOTAM are issued to give notice of the works; and

(4) appoint a person as a works safety officer to carry out the functions set out in Appendix 2.

## 1.6 Liaison

Before the commencement of any substantial work on the aerodrome:

(1) A liaison process should be established between representatives of the aerodrome operator, the applicable air traffic service unit, the major aerodrome users, and if applicable the contractor who is to do the work.

(2) It would be useful to set up a committee composed of representatives of those concerned with the works, including the contractors. This committee should have as its primary concern the identification of interface problems between the various organisations involved.

## 1.7 Isolation of work area

As far as practicable working areas should be blocked off from the active movement areas by physical barriers. These barriers serve to warn pilots and to preclude work vehicles inadvertently straying onto each other's active movement areas. The barriers should be marked for day use and adequately lit for night use. The lights of taxiways leading into working areas should be permanently off during the work period. Specification on the marking of unserviceable areas is contained in Annex 14.

## 1.8 General working rules

Before work commences agreement should be established on:

(1) The hours allowed to be worked.

(2) The authorised vehicle routes.

(3) The control of vehicles.

(4) The communication equipment to be used and the associated procedures.

(5) The permitted heights of vehicles and equipment, and the limitations to be placed on operating heights of crane jibs and the like.

(6) Any limitation on the use of electrical equipment to prevent interference with navigation facilities or aircraft communications.

## 1.9 Safety

Construction personnel should be warned, in writing, of possible hazards to personnel working on aerodromes, in particular jet-blast problems and noise. Where necessary, look-out persons should be provided wearing identifiable distinctive jackets.

## 1.10 Paved area cleanliness

Where work is conducted on, or involves traversing, paved areas the paving should be thoroughly inspected before being opened for aircraft use. Pay particular attention to the presence of debris and the general cleanliness of the surface. Where aircraft are constantly using areas open to the construction activity, inspection should be regular to ensure that the necessary cleaning has been carried out.

## 1.11 Marking and lighting

Tall equipment such as crane jibs should be marked and, if the aerodrome is open for night operations, lit. If work is of prolonged duration, a constant watch should be maintained to ensure that the marking and lighting, of obstacles and unserviceable areas, are serviceable. This is particularly important for marking and lighting arrangements to indicate a displaced threshold.

## 1.12 Effect on operating limits

The effect of tall equipment, such as crane jibs, on ILS and radar will need to be considered, in conjunction with those responsible for electronic landing aids, and steps taken to reduce interference to the minimum. Construction equipment may have adverse effects on obstacle clearance limits and should be considered when working plans are being formulated.

## 1.13 Work activity on or adjacent to aerodrome movement areas

The guidelines contained in Appendix 3 are for use in preparation of plans and specifications when work activities are to be conducted in areas which may interfere with aircraft operations.

## 1.14 Reduction of runway distances

Work activity before the end of any runway, or any stopway, clearway or safety area will probably reduce the runway distance available for aeroplane operations as the equipment used intrudes into the obstacle free surfaces. In these cases it is essential to provide the aeroplane operators with accurate revised runway declared distances and the height and location of the temporary obstructions associated with the work.

## 1.15 Notification of work

**1.15.1** If the work restricts the availability of a runway or reduces the runway length available, advance notice should be given to the aerodrome's regular air operators. These aeroplane operators plan their schedules well ahead and need sufficient time to study the effect of reduced runway distances, or restrictions on the use of the runway, on their loading and schedule of operations.

**1.15.2** If the work activity is likely to restrict aircraft operations, despite the restriction having been discussed with the aerodrome's regular operators, the changed circumstances are to be notified in a NOTAM issued not less that 24 hours prior to the start of the work and preferably a week before.

**1.15.3** The AIS should be provided with details of the work, including any limitations and restrictions applicable to aircraft operations, for early promulgation of an AIP supplement, giving at least 3 months notice to aircraft operators.

## 1.16 Safety considerations

The following is a partial list of safety considerations which will need attention during aerodrome works. There may be others in your particular situation that will need attention.

(1) Minimum disruption of standard operating procedures for aircraft operations.

(2) Clear routes from rescue and firefighting stations to active aerodrome movement areas.

(3) A procedure for notification, and authority to change safety-oriented aspects of the construction plan.

(4) Initiation, currency, and cancellation of NOTAM.

(5) Suspension, or restriction, of aircraft activity on aerodrome movement areas.

(6) Runway end or threshold displacement, or both, and appropriate temporary lighting and marking.

(7) Installation and maintenance of temporary lighting and marking for closed, or diverted, aircraft routes on the aerodrome movement areas.

(8) Revised vehicular control procedures, or additional equipment and personnel.

(9) Marking and lighting of construction equipment.

(10) Parking of construction equipment and storage of material, when not in use.

(11) Designation of responsible representatives of all involved parties, and their availability.

(12) Location for construction personnel vehicle parking, and their transportation to and from the work site.

(13) Marking and lighting of construction areas and obstructions.

(14) Location of the construction offices.

(15) Location of the contractor plant.

(16) Designation of waste areas and disposal of waste.

(17) Debris cleanup responsibilities and schedule.

(18) Conspicuous identification of construction personnel and equipment.

(19) Location of haulage roads.

(20) Security control of temporary gates and relocated fences.

(21) Noise pollution.

(22) Explosives regulation and control.

(23) Dust, smoke, steam, and vapour controls.

(24) Location of utilities.

(25) Provision of temporary utilities or immediate repairs, or both, in the event of a disruption to the established utilities.

(26) Location of power and control lines for electronic visual navigation aids.

(27) Additional security measures necessary, if it is a security designated aerodrome.

(28) Marking and lighting of closed aerodrome movement areas.

(29) Phasing of work.

(30) Shutdown or protection, or both, of aerodrome electronic visual navigation aids.

(31) The need to notify the rescue and firefighting unit when working on water lines.

(32) Provision of traffic directors, aircraft marshallers, wing walkers, and the like, as needed to assure clearance in construction areas.

## 1.17 Examples of hazardous and marginal conditions

Analysis of past accidents and incidents have identified many contributory hazards and conditions. Conditions that should be watched carefully are listed below.

(1) Excavation adjacent to runways, taxiways, and aprons.

(2) Stockpiles of earth, construction material, temporary structures, and other obstacles in proximity to aerodrome movement areas and runway approach and take-off surfaces.

(3) Runway projects resulting in excessive lips greater than 25 mm for runways and 76 mm for edges between old and new surfaces at runway edges and ends.

(4) Heavy equipment operating or idle near aerodrome movement areas.

(5) Proximity of equipment or material which may degrade radiated signals from, or impair monitoring of, navigation aids

(6) Tall but relatively inconspicuous objects, such as cranes, drills, and the like, in critical areas such as safety areas and runway approach and take-off surfaces.

(7) Improper or malfunctioning lights or unlighted aerodrome hazards.

(8) Holes, obstacles, loose pavement, rubbish, or other debris, on or near aerodrome movement areas.

(9) Failure to maintain barriers, such as fences, during construction to prevent unauthorised access.

(10) Improper marking or lighting of runways, taxiways, and displaced thresholds.

(11) Attractions for birds such as exposed earthworks, rubbish, grass seeding, or ponded water on or near aerodromes.

(12) Inadequate or improper methods for marking temporarily closed movement areas including improper and unsecured barricades.

(13) Obliterated markings on active movement areas.

*[Safety encroachments, improper ground vehicle operations, and unmarked or uncovered holes and trenches in the vicinity of aircraft movement surfaces are the most recurring threats to safety during construction]*

## 1.18 Inspection

Frequent inspections should be made by the aerodrome operator or a representative during critical phases of the work to ensure that the contractor is following the prescribed safety procedures and that there is an effective litter control programme.

# Appendix 1 — Method of work plan (MOWP)

## 1. Introduction

The following is an example of a MOWP contents page:

**Somebody's Aerodrome**

**Contents**



Page i Dated 28 Sep 93

## 2. Title page

The title should have the date of issue and indicate the location of the work and give a short description of the project, for instance

Somebody's Aerodrome] : Runway Repairs.

## 3. Works information

**3.1** Outline the full scope of the works and state which facilities are affected.

**3.2** The planned date and time of commencement, the duration of each stage and the date and time of completion.

**3.3** The MOWP should contain the following statement:

*The actual date and time of commencement will be advised by NOTAM, to be issued no less than 48 hours before the work commences.*

## 4. Restrictions to aircraft operations and the issue of NOTAM

**4.1** This section of the MOWP should be in a form that allows its separate issue to aircraft operators and permits those operators to have easy reference to the information as it affects them.

***Work stages***

**4.2** Any restrictions to aircraft operations on the manoeuvring area, or in the approach and take-off areas that is to be listed in the MOWP should be shown on drawings of each stage of the works.

**4.3** When complex works are being undertaken, a table showing the restrictions applicable to each stage of the works and for each type of aircraft operation should be included.

**4.4** The table should outline the various work stages with restrictions on overlapping stages (if that is the case) with the estimated time each stage will take and the start and completion dates. It should also have a remarks column to list details of special restrictions and the issue of NOTAM for the information of pilots before flight.

***Emergencies and adverse weather***

**4.5** Outline details, if any, of special arrangements to be made during works if emergencies arise or adverse weather conditions occur.

**4.6** The intended text of all planned NOTAM associated with the aerodrome works should be included.

## 5. Restrictions of works organisation

***General***

**5.1** Provide details of any restrictions on the carrying out of aerodrome works and requirements for the restoration of normal safety standards.

***Personnel and equipment***

**5.2** When personnel and equipment are required to vacate the movement area for aircraft movements, specific mention of this fact should be made. This should include the withdrawal line or area for personnel and equipment, and the limitation on stockpiling of material, excavations and the like.

***Access***

**5.3** The MOWP should identify the routes to and from the work areas and the procedures for entering any work areas within the movement area.

**5.4** Particulars of routes to and from the work areas should be shown in drawings attached to the MOWP.

***Aerodrome markers, markings and lights***

**5.5** Details of arrangements for the installation, alteration, or removal of aerodrome markers and lights in work areas and other areas affected by the aerodrome works should be shown on drawings attached to the MOWP.

***Protection of electrical services***

**5.6** Set out the procedures for ensuring that utilities and transport services dependent on electrical services are not damaged.

***Special requirements***

**5.7** Provide details of any special requirements arising during or on completion of aerodrome works. Examples are, arrangements for leaving paved surfaces swept and clean before evacuation of the works area, leaving bare soil compacted or protected from erosion, and the like.

## 6. Administration

**6.1** Provide the name of the project manager and works safety officers appointed by the aerodrome operator and the means of contact, including the means outside normal working hours.

## 7. Authority

**7.1** Each MOWP should contain the following statement:

*All works will be carried out in accordance with the MOWP.*

**7.2** Each MOWP should require compliance with these statements and be signed by the aerodrome operator or the project manager.

## 8. Drawings

Attach drawings that provide a visual reference for each stage of the work. The drawings should contain specific details such as work areas, restrictions to aircraft, location of radio navigation aids, exact location of visual aids and markings, details of the height and location of critical obstacles, location of temporary taxiways, access routes, storage areas for material and equipment, and the location of utilities and transport services which may be disturbed during the works.

## 9. Distribution list

The distribution list of the MOWP should include at least the following persons and organisations:

- the project manager
- the works safety officer(s)
- the aerodrome security service, if any
- the aerodrome air traffic service unit, if any
- regular air transport operators who might be affected by the works
- aircraft operators based at the aerodrome
- the rescue fire service, if any
- contractors and subcontractors, if any.

# Appendix 2 — Works safety officer functions

The functions of the works safety officer should be to —

- ensure the safety of aircraft operations in accordance with these directions and the MOWP;
- ensure that, where applicable, the aerodrome works are notified by issue of a NOTAM and that the text of the NOTAM is as set out in the applicable MOWP;
- where applicable, daily, advise the aerodrome air traffic service of whatever information is necessary for the safety of aircraft operations;
- discuss, daily, with the project manager any matters necessary for the safety of aircraft operations;
- ensure that unserviceable portions of the movement area, temporary obstructions, and the limits of the works area are correctly marked and lit in accordance with the applicable MOWP;
- ensure that vehicles, plant and equipment carrying out aerodrome works are properly marked and lit or are under works safety officer supervision or within properly marked and lit work areas;
- ensure that all other requirements in the MOWP relating to vehicles, plant and equipment and materials are complied with;
- ensure that access routes to work areas are in accordance with the applicable MOWP, are clearly identified and that access is restricted to those routes;
- ensure that excavation is carried out in accordance with the MOWP to avoid damage to any utility or transport service, or loss of calibration associated with a precision approach and landing system or any other navigational aid;
- report immediately, to the aerodrome air traffic service unit and the aerodrome operator, any incident, or damage to facilities, likely to affect air traffic services or the safety of aircraft;
- remain on duty at the works area while work is in progress and the aerodrome is open to aircraft operations;
- ensure that the aerodrome air traffic service unit is kept informed of the radio call signs of the vehicles used by the works safety officer;
- require the immediate removal of vehicles, plant and personnel from the movement area where necessary for the safety of aircraft operations;
- ensure that the movement area is safe for normal aircraft operations following removal of personnel, vehicles, plant, equipment, and rubbish, from the works area;
- ensure that floodlighting or any other lighting required to carry out aerodrome works is shielded so as not to present a glare to pilots.

# Appendix 3 — Procedures for dealing with temporary hazards on or adjacent to aerodrome movement areas

## 1. Introduction

1.1 The term temporary hazards includes work in progress adjacent to aerodrome movement areas in connection with aerodrome construction and maintenance. It also includes the plant, machinery, and material arising from such work, or aircraft immobilised near runways.

1.2 The following guidelines should be adapted to the needs of a particular project and not incorporated verbatim into project specifications.

1.3 The prime responsibility for determining the degree of hazard and the extent of acceptable obstacles rests with the aerodrome operator, who should take into account the following.

(1) Available runway length and the associated obstacle limitation surfaces.

(2) Types of aircraft using the aerodrome and distribution of aircraft movements.

(3) Whether or not alternative runways are available.

(4) The possibility of cross-wind operations, bearing in mind seasonal variations.

(5) The weather conditions likely to prevail at the time, such as visibility and precipitation. The latter is significant as it adversely affects the braking coefficient of the runway, and thus an aircraft's controllability during ground run.

(6) The possibility of a compromise between a reduction in runway length and some degree of obstacle infringement in the established take-off climb and approach surface.

1.4 Significant obstacles in the take-off flight path area and any reduction in the runway effective operational lengths must be promulgated by NOTAM.

1.5 All temporary hazards should be marked and lit as specified in Annex 14, Volume I, Aerodromes Design and Operations.

## 2. Work zones

2.1 General. The following zones are established around runways, when use of the runway is permitted to continue whilst works are carried out. Outside the zones no restrictions need be applied other than maintaining the normally required obstacle free surfaces.

2.2 Zone 1. This zone is rectangular. It symmetrically surrounds the runway. Its sides are 45 m from the runway centreline and its ends 60 m beyond the runway ends.

2.3 Zone 2. The ends coincide with the ends of Zone 1, except that where there is a clearway the end is extended to include it. The sides are 75 m from the runway centreline.

2.4 Zone 3. This zone is only required at aerodromes having a runway strip wider than 150 m. It extends to the edge of the runway strip, that is 110 m or 150 m from the runway centreline where appropriate.

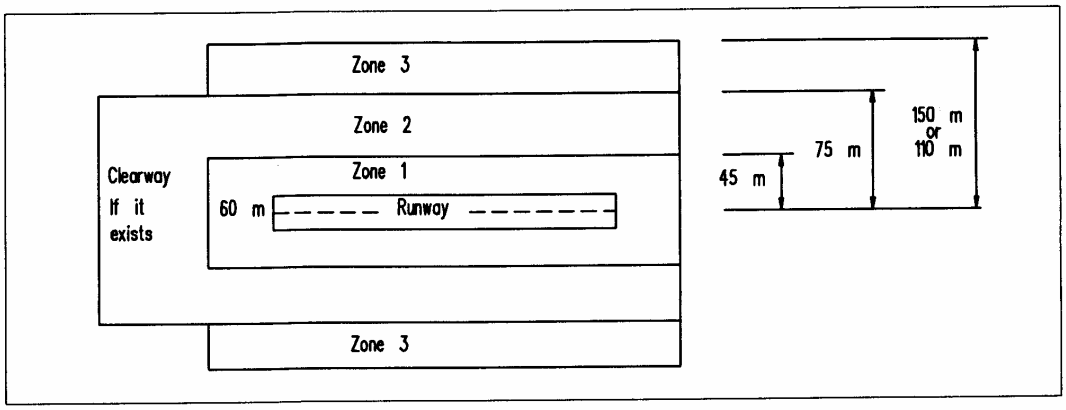


Figure 1. Zones surrounding a runway

## 3. Control of personnel, equipment and vehicles

***Work on runways or runway strips***

3.1 The following procedures should be observed when the runway is in use.

*[The distances stipulated are intended to emphasise common sense awareness of safety for aircraft. For example, the distance from a taxiway (see paragraph 3.6) may vary for a Boeing 747 having a wingspan of 60 m or a commuter aircraft with a wingspan of 25 m]*

3.1.1 All drivers and works personnel should be briefed on what is expected of them and what the procedures are.

3.1.2 Vehicles carrying gravel should not be permitted on runways or taxiways without prior permission, and anything dropped should be immediately swept up.

3.1.3 Vehicles should be suitably marked or lit. Refer to Annex 14 Volume I, Chapter 6.

3.1.4 ATS should advise pilots on approach, or before take-off, that at a particular location personnel will be working within the runway strip area. This is in addition to normal NOTAM action.

3.2 Zone 1. Personnel and light-weight frangible equipment used in the calibration of landing aids may be left in position clear of any aircraft movements.

3.3 Vehicles, equipment, and personnel, engaged in the work, should be moved off the runway and—

(1) For turbojet movements, to the outer edge, or clear of, Zone 2.

(2) For other aircraft movements, to the outer edge, or clear of, Zone 1.

3.4 Zone 2. All equipment and personnel should be at the outer edge, or clear of, Zone 2 except that when the crosswind is less than 10 kts, work may continue without interruption during the movement of aircraft other than turbojets.

3.5 Zone 3. The only consideration in this zone is to identify whether the presence of work equipment and vehicles could interfere with the integrity of the electronic approach aids. If such an area is identified, equipment and vehicles should be cleared from the area when the electronic approach aids are being used by an approaching aircraft.

**Work on taxiway or taxiway strips**

3.6 When the taxiway is in use, vehicles, equipment, and personnel should be moved to give a wingtip clearance of at least 10 m.

***Work on approach lighting area***

3.7 The procedures for work in Zones 1 and 2 detailed in the previous paragraphs are equally applicable to any work in those areas.

3.8 For work outside the zones, vehicles and equipment should not intrude above the plane of the approach lights. If any equipment does it should be withdrawn when the runway is in use, unless the runway threshold has been displaced to allow for it's height.

## 4. Trenching work

4.1 **Zone 1**. Work should be limited to one side of the runway at a time, and excavation of any trench should be limited as follows:

***Day operations***

4.1.1 A trench may be open with a maximum width of 300 mm but the open area of the trench should not exceed 9 m2, for example 300 mm x 30 m or 200 mm x 45 m.

4.1.2 When the trench lies almost parallel with a runway, or is within 10 degrees either side of runway alignment, a second trench at right angles to, and extending from the first trench to Zone 2, may be open to a maximum width of 200 mm.

4.1.3 During aircraft movements any open trenches within 10 m of the runway edge should be covered with load bearing steel plates. They should be adequately held on the ground and marked by securely fixed cones at a maximum spacing of 6 m. The plate covering should exceed the dimensions of the excavation by a minimum of 150 mm on all sides. If this cannot be done the runway should be closed.

***Night Operations***

4.1.4 Any trench should be backfilled and consolidated before ceasing work for the day. A maximum length of 3 m may be left unfilled but covered overnight as provided in paragraph 4.1.3 above and marked with red obstruction lights.

4.1.5 Any materials not associated directly with the work in progress should be removed from the zone during the period of aircraft operations.

4.1.6 Spoil removed from a trench should be located on the side away from the runway and the maximum height should not exceed 200 mm. For trenches at right angles to the runway centre line the spoil should be placed on the side remote from the nearest landing threshold. If it is necessary to place the spoil on both sides of the trench the maximum height should not exceed 200 mm.

***At Runway End***

4.1.7 Any trench across the end of the runway should not exceed 300 mm in width. During daylight hours only, a maximum length of 3 m may be left unfilled during an aircraft movement but should be covered with load bearing steel plates adequately held on the ground and marked by securely fixed cones at a maximum spacing of 6 m. The plate covering should exceed the dimensions of the excavation by a minimum of 150 mm on all sides. If this cannot be done then the runway should be closed.

4.1.8 Spoil removed from a threshold trench should be removed to a point at least 10 m clear of the runway or a displaced landing threshold should be declared by NOTAM and marked.

4.1.9 **Zone 2**. For a Code Number 4 runway which is dry with not more than 15 kt crosswind component, or for other runways with 10 kt crosswind component, the excavation of trenches in this zone should be limited to —

(1) a trench parallel to the runway may be open with a maximum width of 300 mm and a length not exceeding 100 m; or

(2) two trenches at right angles to the runway may be open with a maximum width of 300 mm and a total length of 100 m provided that the trenches are at the same end and same side of the runway.

Spoil removed from a trench should be located on the side away from the runway, its maximum height should not exceed approximately 500 mm.

For trenches at right angles to the runway centreline, the spoil should be located on the side remote from the closer landing threshold and the maximum height should not exceed approximately 300 mm. If it is necessary to place the spoil on both sides of the trench then the maximum height should not exceed approximately 300 mm.

## 5. Work on rapid exit or normal taxiways

5.1 Work on or close to any taxiways, should conform to the requirements relating to the zone in which that part of the taxiway lies.

5.2 Where practicable, until work is complete, the taxiway should be closed to aircraft movements and pilots advised by radio and NOTAM.

5.3 If it is not practicable to close the taxiway while work is being carried out, pilots should be advised by NOTAM and radio to reduce taxiing to walking speeds within 50 m of the works.

5.4 The work should be carried out as follows:

***Day Operations***

5.4.1 A trench, with a maximum width of 300 mm, may be open on one side only to the edge of the taxiway, and the open area of the trench should not exceed 9 m2, for example 300 mm x 30 m or 200 mm x 45 m.

5.4.2 If trenching is required on both sides of the taxiway, the trench on one side should be covered with load bearing steel plates which are adequately held on the ground and marked by securely fixed cones at a maximum spacing of 6 m. Where the trench is at right angles to the taxiway and its width is 300 mm or less, the trenches on both sides of the taxiway can remain open. The plate covering should exceed the dimensions of the excavation by a minimum of 150 mm on all sides.

***Night Operations***

5.4.3 Any trench should be backfilled and consolidated before ceasing work for the day except that a maximum length of 3 m can be left unfilled and covered overnight as provided in paragraph 5.4.2 above, and marked with red obstruction lights.

5.4.4 Any materials not associated directly with the work in progress should be removed from the taxiway strip area during the period of aircraft operations.

5.4.5 Spoil removed from a trench in Zone 1 should be located on the side away from the runway and the maximum height should not exceed 200 mm. For trenches at right angles to the taxiway centre line, the spoil should be placed on the side furthest away from the nearest landing threshold. If it is necessary to place the spoil on both sides of the trench, the maximum height should not exceed 200 mm.

## 6. Work on visual approach slope systems

VASIS or PAPI may be deactivated during some aircraft operations, however:

(a) for all international arrivals, the normally available VASIS or PAPI should be provided; and

(b) for domestic operations by turbojet aeroplanes, one side of a VASIS or PAPI or T-VASIS should be provided.

## 7. Installation of light bases

7.1 VASIS and PAPI

7.1.1 The trenching work limitations in Zones 1 and 2 are equally applicable to these works.

***Zone 1***

***Day operations***

7.1.2 Only one base excavation should be open at any one time, having a maximum area of 9 m2.

7.1.3 If the work is within 10 m of the runway edge then the concrete should be cast on the day that the excavation is made, and covered with steel plates until it can withstand an aircraft running over it. A cover-plate should then be placed and bolted in position. A further excavation may then be made.

7.1.4 Spoil within 10 m of the runway edge should be removed. Spoil beyond this distance should be placed on the side away from the runway to a maximum height not exceeding 200 mm.

***Night operations***

7.1.5 Any excavation should be backfilled and consolidated before ceasing work for the day except that a maximum excavation area of 3 m2 may be left unfilled but covered overnight as in 7.1.3 above and marked with red obstruction lights.

7.1.6 Any materials not associated directly with the work in progress should be removed from the strip area during period of aeroplane movements.

7.1.7 Spoil removed from an excavation in Zone 1 should be located on the side away from the runway and the height should not exceed 200 mm. If it is necessary to place spoil on both sides, or at the ends of the excavation, the maximum height should not exceed 200 mm.

***Zone 2***

7.1.8 Only one base excavation should be open at any one time, having a maximum area of 9 m2.

7.1.9 Spoil removed from the excavation should be placed on the side away from the runway, to a height not exceeding 500 mm. If it is necessary to place spoil on both sides, or at the ends of the excavation, the maximum height should not exceed 300 mm.

## 8 Work on runway lights

8.1 Excavations for not more than two bases should be made at any one time. During aeroplane movements, any holes within 10 m of the runway edge should be covered by load-bearing steel plates which are adequately held on the ground and marked by securely fixed cone markers spaced at intervals of 6 m. The plate covering should exceed the dimensions of the excavations by 150 mm on all sides.

8.2 Concrete should be cast on the day that the excavation is made, and covered with steel plates until it can withstand an aircraft running over it. A cover plate should then be placed and bolted in position. A further excavation may then be made.

## 9. Crashed or immobilised aircraft

9.1 **Zone 1**. The runway should be closed when any part of a crashed or immobilised aircraft is in Zone 1.

9.2 **Zone 2**. The runway may be in use during daylight hours in visual flight rule weather conditions provided the runway is dry and the crosswind does not exceed 10 kts.

9.3 The runway should be closed to all movements at night and in instrument flight rule weather conditions.

9.4 If the clearway is infringed by an obstruction, then the new runway declared distance will need to be calculated using the appropriate obstacle free gradient over the immobilised aircraft.

9.5 **Zone 3**. Instrument approaches should be limited to non-precision approach minima.

***Reduction of Effective Operating Lengths***

9.6 If the runway strip area infringement is such that a shortened runway can be used, then a new runway declared distance will need to be calculated.

9.7 The runway declared distance which can be declared will depend on the location of the immobilised aircraft within the runway strip area and the residual portion of the runway that can be considered available.

9.8 Consideration should be given to the type and size of aircraft which would use the remaining runway, for example, a crashed aircraft 100 m from the end of a 3000 m runway could leave an adequate operational length for many aeroplanes.

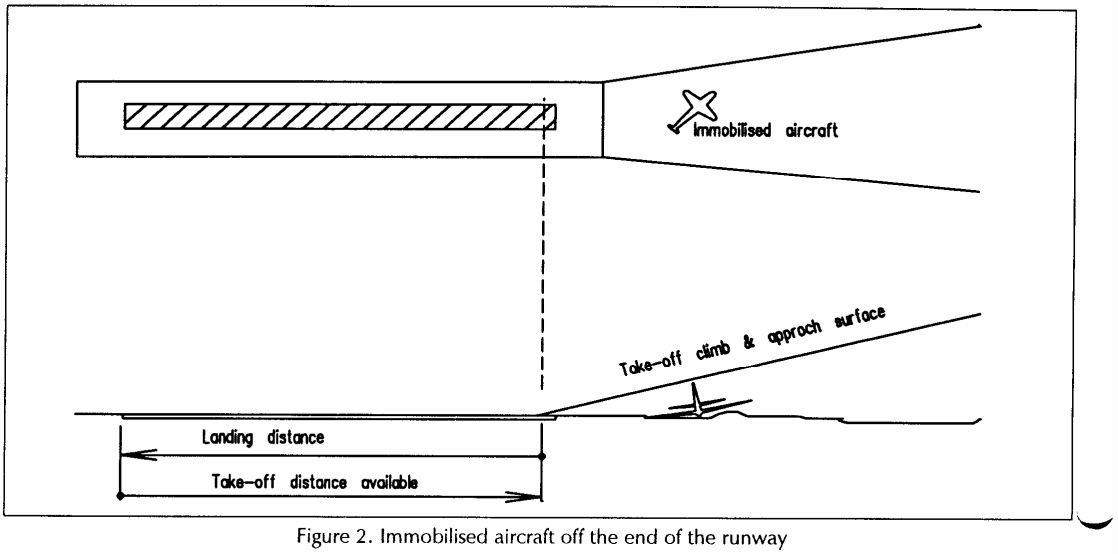


Figure 2. Immobilised aircraft off the end of the runway

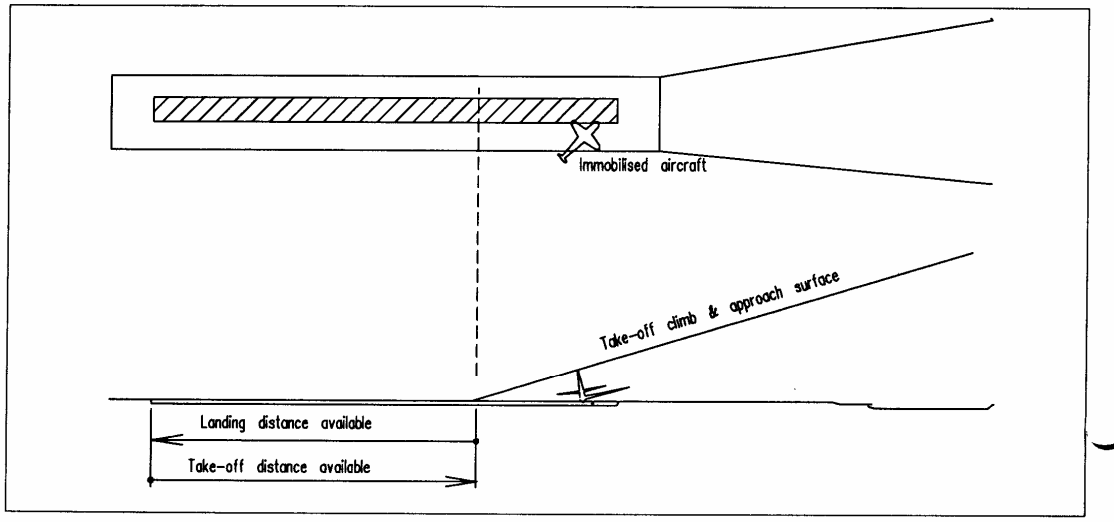


Figure 3. Immobilised aircraft in the strip

## 10. Grass mowing in runway strip areas

10.1 **General**. Mowing should be done in the upwind half of the runway strip. When the swaths nearest the runway are being cut, the mowing circuit should be towards the aircraft landing or taking off so that the driver can see the moving aircraft.

10.2 **Zone 1**. Mowing should not take place in zone 1 when the runway is in use unless the mower operator is under the direct supervision of a safety officer or aerodrome air traffic control.

10.3 **Zone 2**. Mowing may be carried out in daylight hours during the operation of aeroplanes, provided that the crosswind component does not exceed 10 kts and the runway is dry.

10.4 For movements by larger aircraft or when the crosswind is greater then 10 kts or the runway is wet, the mower should move to the outer edge, or clear, of the zone.

10.5 Mowing in the area beyond the approach end of the runway should not be permitted during aircraft landings.

10.6 Mowing in the area beyond the take-off end of the runway should not be permitted during aircraft take-offs.