Kenya Civil Aviation Authority
Efficiently Managing Air Safety

Advisory Circular

CAA-AC- AGA015D

June, 2024

OPERATIONAL SAFETY DURING WORKS ON AERODROMES

1. PURPOSE

1.1. This Advisory Circular (AC) provides guidance on procedures to be used to ensure maintenance of safety during works on aerodromes as required by Civil Aviation (Aerodromes Design and Operations) Regulations 2013.

1.2. This **AC** supersedes **CAA-AC-AGA015C** issued in **January, 2022**.

1.3. This AC is effective on 1st June, 2024.

2. REFERENCES

2.1 Civil Aviation (Aerodromes Design and Operations) Regulations.

2.2 Civil Aviation (Certification, Licensing and Registration of Aerodromes) Regulations.

3. CONTROL OF WORK AND SAFETY PRECAUTIONS TO BE TAKEN DURING AERODROME WORKS

3.1 Aerodrome works.

3.1.1 Introduction

3.1.1.1 Periodically, construction and heavy maintenance activities are performed in movement areas. If aircraft operations continue around the construction/maintenance site, or access is required through the affected movement areas, there shall be precautions in place to ensure the safety of aerodrome operations. These precautions include the protection and safety of the worksite and workers.

3.1.1.2 Wherever major work affecting operational areas is planned, it is important that the aerodrome operator identifies and mitigates the risks generated by work in progress (WIP).

3.1.1.3 Part of effective safety management related to works lies in timely and comprehensive planning coordinated with all involved parties and relevant stakeholders.

4.1.4 Prior to their commencement, all measures necessary for the works to be undertaken safely, including timely notification of resulting operational changes, need to be communicated to all involved parties and relevant stakeholders.

3.1.2 Objectives

3.1.2.1 The aerodrome operator shall develop a process for managing the aerodrome operational safety during works on the movement area.

3.1.2.2 The process shall clearly establish and document the responsibilities and procedures for the:

a) authorization of the works;
b) implementation of any proposed change to operational facilities;
c) date and time when the facilities will be withdrawn or changed from normal operations;
d) methods by which such changes will be promulgated;
e) oversight and control of the WIP; and
f) compliance with all relevant movement area safety rules.

3.1.3 Operational practices

3.1.3.1 The process for managing the aerodrome operational safety during works should contain, at a minimum, the following elements:

a) a works planning procedure;
b) a procedure for a safety assessment of the planned changes to the operations or systems;
c) a works authorization procedure;
d) a procedure for the promulgation of information related to the works;
e) a procedure for worksite establishment and return to aircraft operations; and
f) a procedure for monitoring, oversight and control of the works.

Note 1.— The safety assessment methodology is included in Part I, Chapter 3 of this document.

Note 2.— The works authorization procedure identified in c) refers to local aerodrome operator approval for the commencement of works.

Note 3.— Annex 15 — Aeronautical Information Services *includes appropriate methods on the promulgation of information.*

Note 4.— The process for managing the aerodrome operational safety during works may concentrated in one local procedure or be divided to several procedures, depending on local circumstances.

3.1.3.2 The works planning procedure should provide for the planning and coordination of works on the movement area so as to ensure that they are undertaken in a safe and compliant manner, while maintaining the operational safety, capacity, and efficiency of the aerodrome operations. During the planning process, representatives from aerodrome operations and other concerned stakeholders (such as ATS) should be involved at the earliest opportunity to consider the requirements for the efficient operations of the aerodrome during the proposed works.

3.1.3.3 A safety assessment of all planned works should be completed beforehand in order to ensure the risks to the safe operation of aircraft have been identified by the aerodrome operator in coordination with interested parties, and appropriate mitigation measures introduced to keep risks to an acceptable level.

3.1.3.4 Processes, procedures, actions and decisions should be documented and made available to all relevant parties and stakeholders involved in the works or affected by any change in operations.

3.1.3.5 Before implementation, draft operational procedures, instructions or other information to be promulgated, should be discussed and coordinated with the directly affected stakeholders, and subjected to verification, thereby ensuring that their meaning is clear to potential users. Practical checks of proposed arrangements should be made by personnel having a comprehensive understanding of the operational implications of the works.

3.1.3.6 Where reduced runway length operations are required due to works, procedures shall be developed and implemented by the aerodrome operator, in accordance with provisions in Appendix 1 to this chapter.

3.1.3.7 Prior to the commencement of works, an authorization should be provided by the aerodrome operator to the party conducting the works. An authorization document should be used to ensure that specific permissions and conditions are recorded and agreed upon between the aerodrome operator and the relevant stakeholders. This document should also be communicated to the contractors, in order for them to be fully aware of what they can and cannot do.

3.1.3.8 The following actions should be taken when establishing the worksite, as well as throughout the duration of the works, when necessary:

a) unserviceability markers are displayed when any portion of a taxiway, apron, or holding bay is unfit for the movement of aircraft, but it is still possible for aircraft to bypass the area safely;
b) existing markings leading into a worksite should be masked or the route closed;
c) unserviceability lights should be used and existing aeronautical ground lighting and signs leading into a worksite should be extinguished or masked on a movement area used at night or during low visibility;
d) suitable site fencing should be installed to protect from jet blast, and FOD containment within the site should be enforced; and
e) the perimeter of the worksite should be clearly marked and/or lit, particularly at night or during reduced visibility.

Note 1.— Unserviceability relates to areas temporarily not available for operational use.

Note 2.— A checklist for establishing worksites and returning them to operational use is included in the attachment to this chapter.

Note 3.— Unserviceability markers and lights are placed at sufficiently close intervals so as to clearly delineate the unserviceable area.

Note 4.— Measures for the situational awareness of pilots and drivers on the manoeuvring area need to take into consideration human factors that may lead to a runway incursion. Guidance material on Human Factors principles can be found in the Human Factors Training Manual *(Doc 9683) and in the* Manual on the Prevention of Runway Incursions *(Doc 9870).*

3.1.3.9 Pre-startup and regular site meetings should be held to ensure that safety requirements are met and possible conflicts between the works and operations are resolved. Points to be considered include:

a) safety awareness in relation to work on the movement area;
b) workplace health and safety requirements;
c) security requirements;
d) protection of construction workers from aerodrome hazards, including jet blast and noise;
e) procedure for quickly summoning emergency responders in case of a fire, spill, accident or similar event; and
f) operational briefings on the interaction of the works with the aerodrome operations (e.g. runway(s) in use, likely visibility conditions, meteorological conditions, safety issues).

3.1.3.10 Procedures should be developed and implemented to monitor the safety of the aerodrome and aircraft operations in proximity of the works, such that timely corrective action is taken when necessary to assure their continued, safe operations. Additional procedures on worksite control are included in Appendix 5 to this circular.

3.2 Control of Works

The aerodrome operator is responsible for controlling any work in progress on the aerodrome and establishing the safety requirements and procedures.

3.3 Routine maintenance

Persons authorized by the aerodrome operator may enter active parts of the movement area subject to clearance from Aviation Security. They must comply with the rules developed for the control of vehicles at that aerodrome in conducting routine tasks such as grass cutting.

3.4 Minor construction or maintenance work

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

a) no work takes place on the active movement area without the knowledge of either the aerodrome operator or air traffic service unit;
b) permitted times of work are strictly followed;
c) all individuals taking part in the work are briefed in detail on the following —
    i) precise areas in which the work may be done;
    ii) the routes to be followed to and from the work area;
    iii) the radiotelephone or other control procedures to be used, the maintenance of a radio listening watch, and the use of lookouts;
    iv) the safety precautions to be observed; and
    v) the reporting procedure to be followed on completion of the work; and
d) at the conclusion of the work, the aerodrome operator inspects the work area to ensure that it has been left in a safe condition.

3.5 Major work

3.5.1 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.

3.5.2 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.

3.5.3 The work plan should address the items detailed in Appendix 1 to this AC.

3.6 Management and control of aerodrome works.

The aerodrome operator shall—

a) Appoint a project manager to coordinate the carrying out of works at the aerodrome. The project manager shall 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;
b) Ensure that aerodrome works are carried out according to the MOWP for major works;

c) Ensure NOTAM are issued to give notice of the works; and

d) Appoint a person as a works safety officer to carry out the functions set out in Appendix 2 to this AC.

3.7 Coordination

Before the commencement of any substantial work on the aerodrome:

a) A coordination process should be established between representatives of the aerodrome operator, the air traffic service unit, the major aerodrome users, and the contractor who is to do the work.
b) 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 organizations involved.

3.8 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 permanently be off during the working period.

3.9 General working rules

Before work commences agreement should be established on:
a) The hours of work allowed;

b) The authorized vehicle routes;
c) The control of vehicles;
d) The communication equipment to be used and the associated procedures;

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

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

3.10 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 with identifiable distinctive jackets.

3.11 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. Particular attention should be paid 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 regularly done to ensure that the necessary cleaning has been carried out.

3.12 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.

3.13 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.

3.14 Work activity on or adjacent to aerodrome movement areas

Appendix 3 contains procedures for dealing with temporary hazards posed by work activity on or adjacent to aerodrome movement areas and which may interfere with safety of aircraft operations.

3.15 Reduction of runway distances

Work activity off the end of any runway, stopway, clearway or safety area will probably reduce the runway distance available for aircraft operations as the equipment used penetrates the obstacle free surfaces. In these cases, it is essential to provide the aircraft operators with accurate revised runway effective operational lengths. If the runway concerned serves most aircraft in excess of 5700 kg MTOW, the height and location of the temporary obstructions associated with the work should be provided to aircraft operators.

3.16 Notification of work

3.16.1 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 air 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.

3.16.2 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.

3.17 Safety considerations

Safety considerations which will need attention during aerodrome works include but not limited to:

a) Minimum disruption of standard operating procedures for aircraft operations;
b) Clear routes from rescue and firefighting stations to active aerodrome movement areas;
c) A procedure for notification, and authority to change safety-oriented aspects of the construction plan;
d) Initiation, currency, and cancellation of NOTAM;
e) Suspension, or restriction, of aircraft activity on aerodrome movement areas;
f) Runway end or threshold displacement, or both, and appropriate temporary lighting and marking;
g) Installation and maintenance of temporary lighting and marking for closed, or diverted, aircraft routes on the aerodrome movement areas;
h) Revised vehicular control procedures, or additional equipment and personnel;
i) Marking and lighting of construction equipment;
j) Parking of construction equipment and storage of material, when not in use;
k) Designation of responsible representatives of all involved parties, and their availability;
l) Location for construction personnel vehicle parking and their transportation to and from the work site;
m) Marking and lighting of construction areas and obstructions;
n) Location of the construction offices;
o) Location of the contractor plant;
p) Designation of waste areas and disposal of waste;
q) Debris cleanup responsibilities and schedule;
r) Conspicuous identification of construction personnel and equipment;

s) Location of haulage roads;
t) Security control of temporary gates and relocated fences;
u) Noise pollution;
v) Explosives regulation and control;
w) Dust, smoke, steam, and vapour controls;
x) Location of utilities;
y) Provision of temporary utilities or immediate repairs, or both, in the event of a disruption to the established utilities;
z) Location of power and control lines for electronic visual navigation aids;
aa) Additional security measures necessary, if it is a security designated aerodrome;
bb) Marking and lighting of closed aerodrome movement areas
cc) Phasing of work;
dd) Shutdown or protection, or both, of aerodrome electronic visual navigation aids;
ee) The need to notify the rescue and firefighting unit when working on water lines;
ff) Provision of traffic directors, aircraft marshallers, wing walkers, etc, as needed to assure clearance in construction areas.

3.18 Examples of hazardous and marginal conditions

Analysis of past accidents and incidents has identified many contributory hazards and conditions. The recurring threats to safety during construction that should be watched carefully include safety encroachments, improper ground vehicle operations, and unmarked or uncovered holes and trenches in the vicinity of aircraft movement surfaces.

3.19 Inspection

Frequent inspections shall 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 program.

3.20 Aerodrome Works Oversight

The aerodrome operator shall seek approval from the Authority prior to commencement of aerodrome works.

The Authority shall inspect aerodrome works during and after completion to ensure they comply with the conditions of approval before closed sections of the aerodrome are reopened for operations.

The Authority may requires some works to be redone to ensure safety of operations.

Minor repairs and time limited works may be exempted from the requirements above provided the aerodrome operator has given adequate notification and coordination procedures with Air Traffic Services are in place and evidence of the same submitted to the Authority before promulgation of NOTAMs.

Regulatory fee for the approval of aerodrome works shall be as specified in the relevant Aeronautical Information Circulars issued by the Authority.

Civil Aviation Authority

APPENDIX 1 METHOD OF WORK PLAN (MOWP)

1. Introduction

The following is an example of a MOWP contents page:

a. Title Page
b. Works Information
c. Restrictions to Aircraft Operations
d. Restrictions to Works Organization
e. Administration
f. Authority
g. Drawings
h. Distribution List

2. Title page

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

Project: Rehabilitation of the Runway Pavement

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 start and completion dates and 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 organization

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, which 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 & location of critical obstacles, location of temporary taxiways, access routes, storage areas for material & equipment, and the location of utilities & 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 organizations:

a) the project manager
b) the works safety officer(s)
c) the aerodrome security service, if any
d) the aerodrome air traffic service unit, if any
e) regular air transport operators who might be affected by the works
f) aircraft operators based at the aerodrome
g) the rescue fire service, if any
h) Contractors and Subcontractors, if any.

APPENDIX 2 WORKS SAFETY OFFICER FUNCTIONS

The functions of the works safety officer shall be to:

a) ensure the safety of aircraft operations in accordance with these directions and the MOWP;
b) 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;
c) where applicable, daily, advise the aerodrome air traffic service of whatever information is necessary for the safety of aircraft operations;
d) discuss, daily, with the project manager any matters necessary for the safety of aircraft operations;
e) 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;
f) 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;
g) ensure that all other requirements in the MOWP relating to vehicles, plant and equipment and materials are complied with;
h) 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;
i) 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;
j) 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;
k) remain on duty at the works area while work is in progress and the aerodrome is open to aircraft operations;
l) 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;
m) require the immediate removal of vehicles, plant and personnel from the movement area where necessary for the safety of aircraft operations;
n) ensure that the movement area is safe for normal aircraft operations following removal of personnel, vehicles, plant, equipment, and rubbish, from the works area;
o) 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 include 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 immobilized 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.

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

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

(c) Whether or not alternative runways are available.

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

(e) 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.

(f) 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 Aerodrome design and operations Regulations.

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.

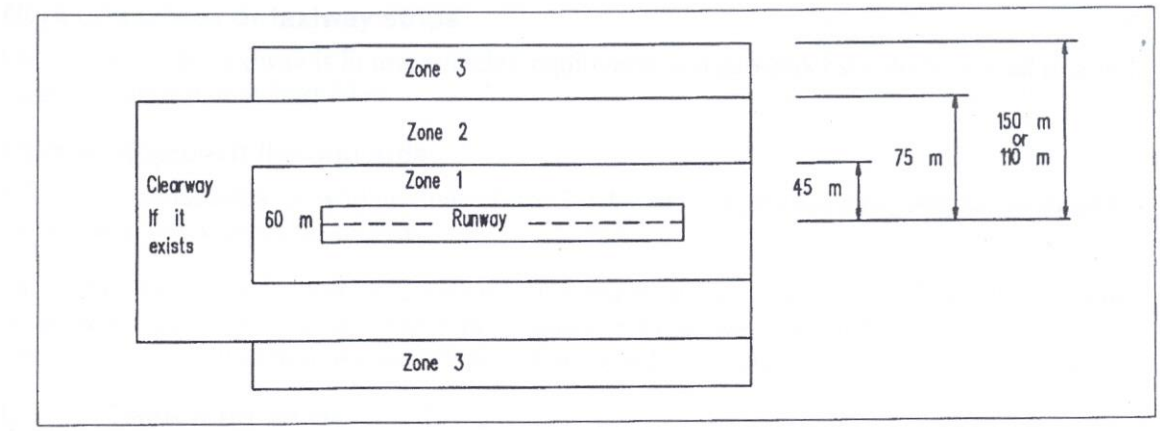

Figure 1. Zones surrounding a runway

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.

3.1.4 ATS should advise pilots on approach, or before take-off, that at some 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 a position clear of any aircraft movements.

3.3 Vehicles, equipment, and personnel, engaged in the work, should be moved to one side of the runway:

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

(b) 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 its 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 m^2, 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 —

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

(b) 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 aircraft, 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 m^2.

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 m^2 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 the period of aircraft 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 m^2.

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 aircraft 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 immobilized Aircraft

9.1 **Zone 1.** The runway should be closed when any part of a crashed or immobilized 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 effective operating length (EOL) will need to be calculated using the appropriate obstacle free gradient over the immobilized 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 the new effective operating length (EOL) will need to be calculated.

9.7 The EOL which can be declared will depend on the location of the immobilized 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.

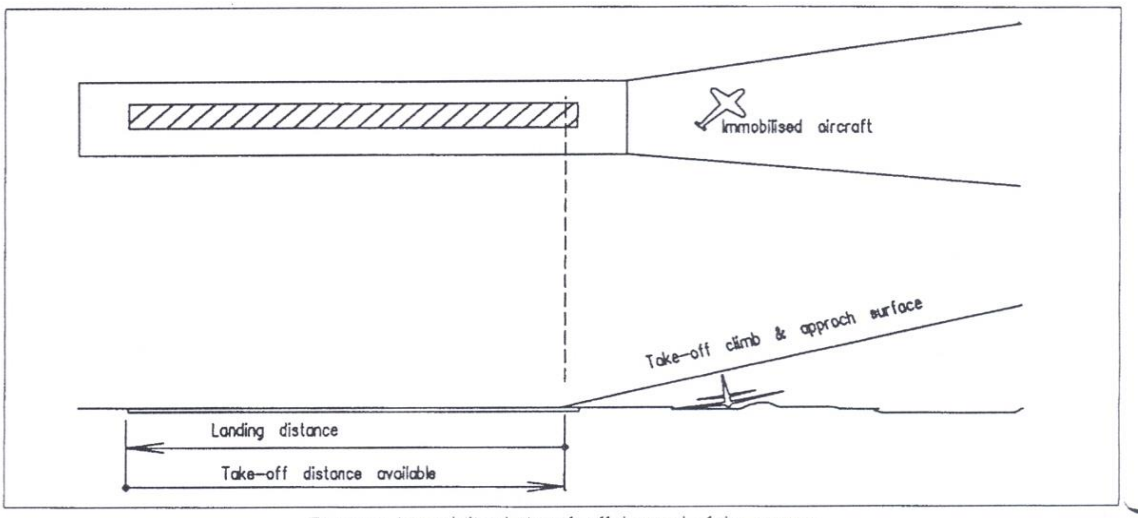

Figure 2. Immobilised aircraft off the end of the runway

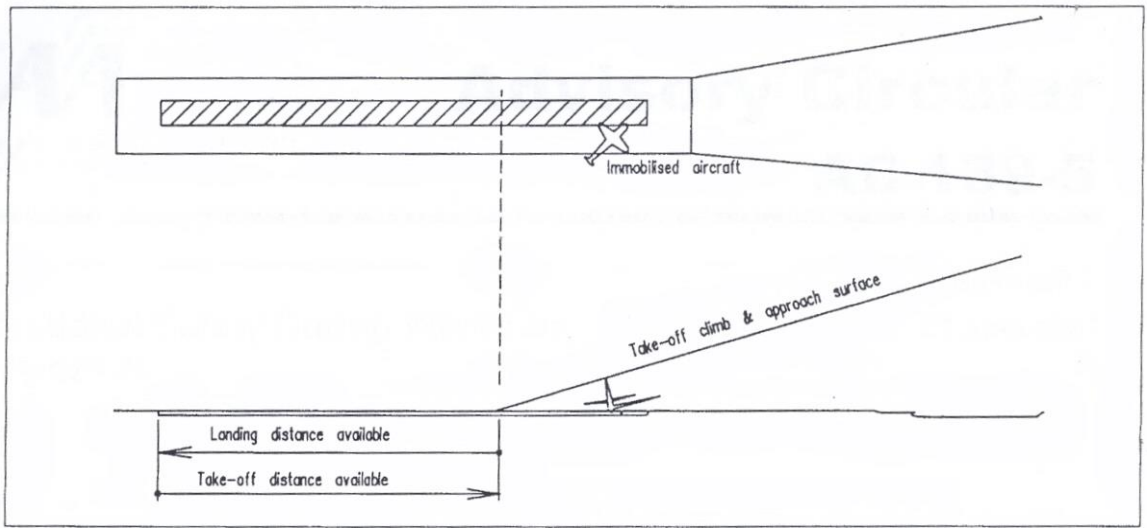

Figure 3. Immobilized aircraft in the strip

10. Grass mowing in runway strip

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.

10.3 **Zone 2**. Mowing may be carried out in daylight hours during the operation of small aircraft, 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 than 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.

APPENDIX 4 REDUCED RUNWAY LENGTH OPERATIONS

Note:-In some cases, conducting works on a runway while maintaining flight operations may be possible. This is a complex activity directly affecting aircraft performance and safety and requires close coordination with ATS and aircraft operators. The following provides procedures on conducting works under these conditions. It is important to note that additional hazards may arise when works involving a reduction in the available runway distances are conducted.

1.1 In circumstances where works require the runway length to be reduced below the declared distances, the aerodrome operator shall:

a) identify and assess the associated risk and mitigate as necessary the potential hazards before, during, and on cessation of operations with reduced runway length available and/or WIP in order to ensure the safety of aircraft operations;

Note. — Risks may result from inappropriate or potentially misleading displays of visual aids; inappropriate or potentially misleading navigational aids; adverse environmental conditions; or unusual meteorological conditions; and from restricted obstacle clearance and wingtip separation distances. It is important to recognize that the identified hazards may cover a wide range of topics, including those that do not pose a risk only to aircraft but also to personnel, e.g. the potential risk from jet blast.

b) calculate and establish, where necessary, a revised runway strip, runway end safety area (RESA) and obstacle limitation surfaces (OLS), such as the approach and take-off climb surfaces;

c) establish a safety zone between the area of the runway that is in use and the WIP or unusable runway;

Note:-The location, size and shape of the safety zone depends on the temporary configuration of the runway, to provide for items such as RESAs, jet blast protection and abbreviated or simple approach lighting systems.

d) promulgate the details of the reduced runway distances established, using all appropriate methods. As a minimum, it is advisable to issue a NOTAM and, when possible, broadcast the information on automatic terminal information service (ATIS);

Note.— The Civil Aviation (Aeronautical Information Services) Regulations includes appropriate methods on the promulgation of information.

e) test, wherever practicable, the suitability of a procedure prior to its implementation;

f) ensure that the roles and responsibilities for operations and tasks associated with the reduction of the runway length available and the WIP are clearly understood and complied with;

g) provide markings and lights to clearly indicate the boundary of the safety zone and the WIP area;

h) clearly mark, light and/or barricade any movement area that is to be used by persons involved in the WIP, and not to be used by aircraft;

i) manage and control the movement on or around a runway or taxiway of contracted staff, who may not be as familiar with the aerodrome and aviation practices;
j) consider and address the impact on the ability of RFF and emergency services to perform their functions; and
k) promulgate in a timely manner all the relevant operational information to all relevant parties.

1.2 The aerodrome operator shall be responsible for the coordination and management of the opening/closing of the runway (and other movement areas, as necessary) and the WIP. If tactical decisions concerning aircraft operations deviate from the agreed operational procedures (with the exception of an urgent safety nature), they shall be coordinated with, and approved by, the aerodrome operator.

1.3 Monitoring the safety of the aerodrome and aircraft operations in proximity of the works should be conducted by the aerodrome operator, to ensure that timely and corrective action is taken when necessary for continued, safe operations. This is particularly important when operational changes or unprecedented or unpredicted events occur.

APPENDIX 5 WORKSITE CONTROL PROCEDURES

1.1 Aspects of the control and procedures for movement area works should include, but are not limited to:

a) all contractor drivers should be escorted by a qualified vehicle operator or undergo movement area driver training and testing;
b) access routes should be agreed upon in advance and clearly identified to minimize interference with operations on the aerodrome;
c) the existing road layout may require changes depending on the vehicle traffic levels;
d) staff access routes should also be agreed upon in advance and if such a route does not exist, then a safety risk assessment should be undertaken to ensure access can be safely achieved;
e) hours of operation of the works should be agreed upon in advance;
f) service clearance checks (underground location of services) should be undertaken before work commences to ensure that cables or pipes are not damaged;
g) smoking restrictions should be advertised, monitored and enforced;
h) hot works restrictions (possibly involving a separate hot works permit) should be described, monitored and enforced;
i) the use of lookouts and/or a listening watch on the appropriate ATS frequency may be required, along with suitable training for this task;
j) any cranes should be suitably lit and operating heights should not infringe the protected surfaces;
k) should the construction activity continue into darkness or in low visibility conditions, procedures should be in place to discontinue or modify the activity, depending on its location and if necessary;
l) procedures should be in place for taxiway crossings, if required;
m) all contractors should have adequate FOD, noise and dust control measures in place to cover all eventualities;
n) vehicles entering or exiting the worksite may need to be cleaned to prevent mud or debris being deposited in the movement area;
o) in case of possible adverse meteorological conditions (e.g. lightning strikes, high winds, snow) or aircraft emergencies, an appropriate alerting mechanism should be in place and works activities may be suspended; and
p) precautions should be taken to ensure that worksite floodlighting (light direction and/or height) does not affect aircraft and ATS operations.

1.2 In terms of customer service and the availability of facilities, a scheduling process should be in place to ensure that construction or maintenance works do not close or restrict too many stands or operational areas at once.

1.3 Where significant changes to markings or lighting are being made, it may be necessary for the aerodrome operator to conduct a preliminary check in order to ensure that the proposals have been correctly implemented and are functioning as intended.

1.4 Where shift working is in operation, it will be necessary to ensure that each shift is properly and fully briefed. The aerodrome operator should obtain feedback from the parties involved to ensure the implementation of corrective measures, if necessary.

1.5 The aerodrome operator should ensure that contractors have made available a point-of-

contact outside normal working hours.

ATTACHMENT 1

WORKSITE CHECKLIST

WORKSITE CHECKLIST: SETTING UP SITE				
Date:	Time:	Work permit no:	Location:	
Task				Task completed
1	Ensure work permit clearance with ATS watch manager, and apron advised of stand(s) affected			
2	Close area with ATS on RTF – either ground or tower			
3	Inform OPS control desk of area closed, who will advise fire service by land line			
4	Isolate area with barriers			
5	Ensure green centre line routes are suppressed through work area			
6	Ensure taxiway centre lines are blacked out			
7	Ensure taxiway sign boards are amended			
8	Check clearances from taxiway centre line to worksite fencing and height of fence			
9	Verify worksite lighting			
10	Ensure a safe route for contractor to site			

WORKSITE CHECKLIST: RE-OPENING UP SITE				
Date:	Time:	Work permit no:	Location:	
Task				Task completed
1.	Verify that pavement surface is sound and clean			
2.	Verify that light fittings are secure and clean			
3.	Ensure all pit lids are closed with barriers			
4.	Verify grass areas are clear of FOD			
5.	Verify that grass areas are reinstated and secure from aircraft blast			
6.	Inspect reinstated taxiway lighting routes			
7.	Ensure taxiway centre lines are reinstated fence			
8.	Ensure taxiway sign boards are reinstated			
9.	Final sweep of area			
10.	Remove barriers and reopen area with ATS on RTF – either ground or tower			
11.	Inform OPS control of reopening			