DEPARTEMEN PERHUBUNGAN
DIREKTORAT JENDERAL PERHUBUNGAN UDARA

PERATURAN DIREKTUR JENDERAL PERHUBUNGAN UDARA

Nomor: SKEP/ 76 / VI /2005

TENTANG

PETUNJUK PELAKSANA KEPUTUSAN MENTERI PERHUBUNGAN NOMOR 47 TAHUN 2002 TENTANG SERTIFIKASI OPERASI BANDAR UDARA

DENGAN RACHMAT TUHAN YANG MAHA ESA

DIREKTUR JENDERAL PERHUBUNGAN UDARA,

Menimbang :

a. bahwa dalam Keputusan Menteri Perhubungan Nomor 47 tahun 2002 tentang Sertifikat Operasi Bandar Udara telah diatur mengenai Setiap Penyelenggara Bandar Udara wajib memiliki Sertifikat Bandar Udara;

b. bahwa untuk melaksanakan ketentuan sebagaimana dimaksud dalam huruf a, perlu menetapkan Petunjuk Pelaksana Keputusan Menteri Perhubungan Nomor 47 Tahun 2002 tentang Sertifikasi Operasi Bandar Udara dengan Peraturan Direktur Jenderal Perhubungan Udara;

Mengingat :

1. Undang-undang Nomor 15 Tahun 1992 tentang Penerbangan (Lembaran Negara Nomor 53 Tahun 1992, Tambahan Lembaran Negara Nomor 3481);

2. Peraturan Pemerintah Nomor 3 Tahun 2001 tentang Keamanan dan Keselamatan Penerbangan (Lembaran Negara Tahun 2001 Nomor 9, Tambahan Lembaran Negara Nomor 4075);

3. Peraturan Pemerintah Nomor 70 Tahun 2001 tentang Kebandarudaraan (Lembaran Negara Tahun 2001 Nomor 128, Tambahan Lembaran Negaa Nomor 4146);

4. Peraturan Presiden Nomor 9 Tahun 2005 tentang Kedudukan, Tugas, Fungsi, Susunan Organisasi, dan Tata Kerja Kementrian Negara Republik Indonesia;

5. Keputusan Menteri Perhubungan Nomor KM 24 Tahun 2001 tentang Struktur Organisasi dan Tata Kerja Departemen Perhubungan sebagaimana telah diubah terakhir dengan Keputusan Menteri Perhubungan Nomor KM 42 Tahun 2004;

6. Keputusan Menteri Perhubungan Nomor 47 Tahun 2002 tentang Sertifikasi Operasi Bandar Udara ;

7. Keputusan Menteri Perhubungan Nomor 48 Tahun 2002 tentang Penyelenggaraan Bandar Udara Umum.

M E M U T U S K A N :

Menetapkan : **PERATURAN DIREKTUR JENDERAL PERHUBUNGAN UDARA TENTANG PETUNJUK PELAKSANA KEPUTUSAN MENTERI PERHUBUNGAN NOMOR KM. 47 TAHUN 2002 MENGENAI SERTIFIKASI OPERASI BANDAR UDARA.**

PERTAMA : Petunjuk Pelaksana Keputusan Menteri Perhubungan Nomor KM. 47 Tahun 2002 tentang Sertifikasi Operasi Bandar Udara, sebagaimana tercantum dalam Lampiran Peraturan ini, terdiri dari :

1. Lampiran I tentang Ketentuan Pedoman Pengoperasian Bandar Udara, terdiri dari :

   a. Buku 1 : Pedoman pengoperasian Bandar Udara (CASR 139);
   b. Buku 2 : Petunjuk Teknis Pengoperasian Bandar Udara (*Manual of Standard / MoS)*.

2. Lampiran II tentang Pedoman bagi Personil Direktur Jenderal Perhubungan Udara dalam melakukan Audit Bandar Udara untuk mendapatkan Sertifikat, terdiri dari ;

   a. Format A : Prosedur Pengoperasian Bandar Udara (Instruksi Staf (SI) 139-01);
   b. Format B : Check Sheet Pemeriksaan Prosedur dan Petunjuk Pelaksanaan Kegiatan dalam rangka Sertifikasi Operasi Bandar Udara (Aerodrome Certification);
   c. Format C : Check Sheet Pemeriksaan Personil Penerbangan dalam rangka Sertifikasi Operasi Bandar Udara (Aerodrome Certification);
   d. Format D : Check Sheet Pemeriksaan Fasilitas Bandar Udara dalam rangka Sertifikasi Operasi Bandar Udara (Aerodrome Certification);

3. Lampiran III tentang Bentuk dan Format Sertifikat Operasi Bandar Udara.

KEDUA : Direktur Keselamatan Penerbangan mengawasi pelaksanaan Peraturan ini.

KETIGA : Peraturan ini mulai berlaku sejak tanggal ditetapkan.

Ditetapkan di : JAKARTA
Pada tanggal : 20 JUNI 2005
2005

DIREKTUR JENDERAL PERHUBUNGAN UDARA

Ttd

CUCUK SURYO SUPROJO
NIP.120089499

SALINAN Keputusan ini disampaikan kepada :

1. Menteri Perhubungan ;
2. Sekretaris Jenderal Dephub ;
3. Sekretaris Direktorat Jenderal Perhubungan Udara ;
4. Para Direktur Dilingkungan Ditjen Hubud.

SALINAN sesuai dengan aslinya

Kepala Bagian Hukum
Ditjen Hubud

E.A. SILOOY
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LAMPIRAN I
PERATURAN DIREKTUR JENDERAL PERHUBUNGAN UDARA
NOMOR : SKEP/76/VI/2005
TANGGAL : 20 JUNI 2005

BUKU 1

PEDOMAN PENGOPERASIAN BANDAR UDARA

LAMPIRAN I
PERATURAN DIREKTUR JENDERAL PERHUBUNGAN UDARA
NOMOR : SKEP/76/VI/2005
TANGGAL : 20 JUNI 2005

BUKU I

PEDOMAN PENGOPERASIAN BANDAR UDARA (CASR 139)

PEDOMAN PENGOPERASIAN BANDAR UDARA (CASR 139)

BAB I

1. UMUM

1.1 Pemberlakuan

Ketentuan ini mengatur tentang :

a. Sertifikasi Operasi Bandar Udara (*Aerodrome Certificate)*;

b. Persyaratan bagi penyelenggara bandar udara yang bersertifikat, termasuk hal hal yang terkait dengan buku pedoman pengoperasian bandar udara (aerodrome manual);

c. Pengecualian dari kewajiban pemenuhan ketentuan;

d. Registrasi operasi bandar udara dan persyaratan yang berlaku untuk penyelenggara bandar udara yang beregistrasi;

e. Persyaratan bagi Pejabat Pelaksana Pelaporan (Reporting Officer) dan Inspeksi Keselamatan yang berlaku untuk penyelenggara bandar udara tertentu yang dipergunakan untuk kegiatan dan operasi kegiatan angkutan udara niaga dan kegiatan angkutan udara bukan niaga.

1.2 Definisi

a. **Operasi Bandar Udara** adalah wilayah daratan dan perairan termasuk didalamnya semua bangunan, instalasi maupun peralatan, yang digunakan sebagian atau keseluruhan untuk pendaratan, lepas landas maupun pergerakan pesawat udara dipermukaan;

b. **Sertifikat Operasi Bandar Udara (Aerodrome Certificate)** adalah tanda bukti terpenuhinya persyaratan pengoperasian bandar udara;

c. **Fasilitas atau Peralatan Operasi Bandar Udara** adalah semua fasilitas dan peralatan baik didalam maupun diluar daerah kerja bandar udara, yang dibangun, diinstalasi dan dipelihara untuk tujuan melayani pendaratan, tinggal landas dan pergerakan pesawat udara permukaan;

d. **Penyelenggara Bandar Udara (Aerodrome Operator)** adalah Instansi Pemerintah atau Badan Hukum Indonesia yang mengoperasikan bandar udara;

e. **Apron** adalah daerah tertentu pada operasi bandar udara yang digunakan untuk parkir, mengisi bahan bakar, perawatan ringan pesawat udara dan tempat naik turun penumpang, bongkar muat cargo atau pos;

f. **Daerah Manuver (Maneouvering Area)** adalah daerah tertentu pada operasi bandar udara kecuali apron yang digunakan untuk tinggal landas, mendarat, dan taxi oleh pesawat udara;

g. **Daerah Pergerakan (Movement Area)** adalah bagian dari wilayah operasi bandar udara yang dipergunakan untuk tinggal landas, mendarat dan taxi oleh pesawat udara, yang terdiri dari manoeuvering area dan apron.

h. **Manual of Standards** adalah standar teknis dan prosedur pembangunan, pengoperasian dan perawatan operasi bandar udara;

i. **Aerodrome Manual** adalah dokumen resmi tentang data dan informasi operasi bandar udara, prosedur pengoperasian bandar udara dan prosedur perawatan operasi bandar udara;

j. **Rambu (Marker)** adalah tanda yang dipasang untuk menunjukkan adanya obstacle atau batas-batas tertentu dalam pengoperasian bandar udara;

k. **Marka (Marking)** adalah simbol atau lambang yang dipasang pada permukaan movement area untuk menyampaikan informasi aeronautika;

l. **Kemampuan Angkut Maksimum (Maximum carrying capacity)** adalah maksimum kapasitas tempat duduk pesawat udara atau maksimum beban angkut pesawat udara berdasarkan sertifikat type of approval pesawat udara;

m. **Maksimum Kapasitas Tempat Duduk Pesawat Udara (Maximum Passenger Seating)** adalah jumlah maksimum tempat duduk penumpang di pesawat udara berdasarkan sertifikat type of Approval pesawat udara;

n. **Obstacle adalah obyek benda tetap (permanen atau sementara) dan obyek benda bergerak yang ketinggiannya melebihi permukaan tertentu untuk pengoperasian pesawat udara waktu terbang** di daerah yang digunakan untuk pergerakan pesawat udara;.

o. **Obstacle Free Zone** adalah suatu ruang udara yang terletak diatas inner approach surface, inner transitional surface, balked landing surface dan bagian dari runway strip yang dibatasi oleh ketiga surface, yang tidak boleh ditembus/dilewati oleh suatu obstacle tetap kecuali yang berupa benda-benda yang rendah (low-mass) dan mudah patah (frangibly), yang bertujuan untuk navigasi udara;

p. **Obstacle Limitation Surface** adalah rangkaian permukaan ruang udara yang membentuk suatu volume ruang udara didalam dan disekitar operasi bandar udara, yang harus bebas dari obstacle;

q. **Runway strip** adalah suatu daerah atau wilayah tertentu didalam operasi bandar udara yang diperuntukan untuk runway dan stopway;

r. **Safety Management System** adalah manajemen keselamatan di wilayah operasi bandar udara, yang meliputi struktur organisasi, tanggung jawab, prosedur, proses dan sarana serta pengawasan dalam melaksanakan kebijakan keselamatan operasi bandar udara oleh penyelenggara bandar udara;

s. **Taxiway Strip** adalah suatu daerah sebelah kiri dan sebelah kanan dari taxiway, yang berfungsi untuk melindungi pesawat udara yang sedang bergerak;

t. **Unserviceable Arae** adalah bagian dari movement area yang tidak dapat dipergunakan untuk pergerakan pesawat udara;

u. **Work Area** adalah daerah operasi bandar udara yang digunakan sebagai tempat pemeliharaan atau pekerjaan pembangunan/konstruksi sedang berjalan yang dapat membahayakan keselamatan operasi pesawat udara;

1.3 Standard untuk suatu Operasi Bandar Udara

Ketentuan ini dijadikan acuan dalam membuat Standard operasi bandar Udara dan Manual of Standard.

2. SERTIFIKAT OPERASI BANDAR UDARA (*Aerodrome Certification*).

2.1 Umum.

a. Sertifikat operasi bandar udara (*aerodrome certificate*) hanya diberikan kepada penyelenggara bandar udara yang mengoperasikan :

1. bandar udara yang melayani penerbangan ke dan dari luar negeri; atau
2. bandar udara yang mampu menampung pengoperasian pesawat udara dengan kapasitas sama atau lebih 30 tempat duduk atau kapasitas beban angkut sama atau dilebih 5.700 kg;

b. Penyelenggara bandar udara sebagaimana dimaksud pada huruf a. dilarang mengoperasikan bandar udara yang tidak memiliki sertifikat operasi bandar udara (*aerodrome certificate*);
c. Pelanggaran terhadap ketentuan sebagaimana dimaksud pada huruf b. termasuk tindak pelanggaran.

2.2 Permohonan Sertifikat Operasi Bandar Udara (*Aerodrome Certificate*).

a. Permohonan sertifikat operasi bandar udara (*aerodrome certificate*) diajukan secara tertulis oleh Penyelenggara Bandar Udara kepada Direktorat Jenderal Perhubungan Udara;
b. Permohonan sertifikat operasi bandar udara (*aerodrome certificate*) harus mengisi format yang telah disediakan oleh Direktorat Jenderal Perhubungan Udara;
c. Permohonan sertifikat operasi bandar udara (*aerodrome certificate*) harus melampirkan salinan buku pedoman pengoperasian bandar udara (aerodrome manual).
d. Penyelenggara bandar udara yang mengoperasikan bandar udara selain operasi bandar udara sebagaimana dimaksud dalam angka 2.1 huruf a, dapat mengajukan permohonan untuk mendapatkan sertifikat operasi bandar udara (*aerodrome certificate*).

2.3 Pemberian Sertifikat Operasi Bandar Udara (*Aerodrome Certificate*).

a. Direktorat Jenderal Perhubungan Udara akan menerbitkan sertifikat operasi bandar udara (*aerodrome certificate*) sebagaimana dimaksud dalam angka 2.2 selambat-lambatnya 45 hari kerja setelah permohonan diterima secara lengkap.
b. Direktorat Jenderal Perhubungan Udara akan menerbitkan sertifikat operasi bandar udara (*aerodrome certificate*), apabila :
   1. Tersedia fasilitas, peralatan dan pelayanan bandar udara sesuai dengan Manual of Standard;
   2. Tersedia Bandar Udara Operating Procedure yang memadai bagi keselamatan operasi pesawat udara;
   3. Tersedia Bandar Udara Manual;
   4. Direktorat Jenderal Perhubungan Udara mempunyai keyakinan bahwa Penyelenggara Bandar Udara dapat mengoperasikan dan memelihara Bandar Udara dengan baik.
c. Pemegang Bandar Udara harus memiliki dan melaksanakan safety management system.

2.4 Penolakan Sertifikat Operasi Bandar Udara (*Aerodrome Certificate*).

Dalam hal permohonan sertifikat operasi bandar udara (*aerodrome certificate*) sebagaimana dimaksud dalam angka 2.2 ditolak, selambat-lambatnya 45 hari kerja setelah permohonan diterima secara lengkap Direktorat Jenderal Perhubungan Udara harus menyampaikan penolakan secara tertulis beserta alasan penolakannya.

2.5 Sertifikat Operasi Bandar Udara (*Aerodrome Certificate*) dengan Catatan.

a. Direktorat Jenderal Perhubungan Udara dapat memberikan sertifikat operasi bandar udara (*aerodrome certificate*) dengan suatu catatan apabila dipandang perlu untuk kepentingan keselamatan pengoperasian persawat udara.

b. Apabila Direktorat Jenderal Perhubungan Udara memberikan sertifikat operasi bandar udara (*aerodrome certificate*) dengan catatan, harus diberikan alasan secara tertulis kepada penyelenggara bandar udara.

c. Catatan sebagaimana disebutkan pada huruf a, harus dinyatakan langsung di dalam sertifikat operasi bandar udara (*aerodrome certificate*), sebagaimana dimaksud dalam angka 2.3. atau diberitahukan secara tertulis kepada penyelenggara bandar udara.

d. Penyelenggara bandar udara tidak boleh melanggar catatan sebagaimana maksud pada huruf a.

2.6 Masa Berlaku Sertifikat Operasi Bandar Udara (*Aerodrome Certificate*).

sertifikat operasi bandar udara (*aerodrome certificate*) berlaku selama 5 (lima) tahun kecuali Sertifikat Operasi Bandar Udara dibekukan atau Sertifikat Operasi Bandar Udara (Aerodrome Certificate) dicabut.

2.7 Pembekuan atau Pencabutan Sertifikat operasi bandar udara (*Aerodrome Certificate*).

a. Direktorat Jenderal Perhubungan Udara dapat membekukan sertifikat operasi bandar udara (*aerodrome certificate*) apabila penyelenggara bandar udara melanggar ketentuan sebagaimana pada angka 2.5 dalam Keputusan ini.

b. Direktorat Jenderal Perhubungan Udara dapat mencabut sertifikat operasi bandar udara (*aerodrome certificate*) apabila penyelenggara bandar udara melanggar ketentuan sebagaimana pada angka 2.3 dalam Keputusan ini.

c. Selama sertifikat operasi bandar udara (*aerodrome certificate*) dibekukan penyelenggara bandar udara dilarang mengoperasikan bandar udara.

d. Pembekuan dan pencabutan sertifikat operasi bandar udara (*aerodrome certificate*) sebagaimana dimaksud huruf a dan huruf b. dilakukan dengan proses sebagai berikut :

   1. Memberikan peringatan kepada Penyelenggara bandar udara secara tertulis tentang situasi dan fakta penyelenggara bandar udara telah melanggar ketentuan.
   2. Memberikan kesempatan kepada Penyelenggara bandar udara untuk menyampaikan penjelasan atau keterangan dalam jangka waktu paling lama 30 (tiga puluh) hari setelah surat peringatan disampaikan.
   3. Mempertimbangkan segala penjelasan atau keterangan yang diberikan oleh Penyelenggara bandar udara sebagaimana dimaksud butir 2 untuk diambil keputusan.
   4. Apabila setelah waktu 30 (tiga puluh) hari surat peringatan disampaikan tidak mendapat tanggapan dari Penyelenggara bandar udara, Direktorat Jenderal Perhubungan Udara dapat membekukan dan mencabut sertifikat operasi bandar udara (*aerodrome certificate*) bersangkutan.

2.8 Pembatalan Sertifikat Operasi Bandar Udara (*Aerodrome Certificate*) atas Permintaan Penyelenggara bandar udara.

a. Sertifikat operasi bandar udara (*aerodrome certificate*) dapat dibatalkan atas permintaan Penyelenggara bandar udara;

b. Permohonan pembatalan sertifikat operasi bandar udara (*aerodrome certificate*) harus disampaikan secara tertulis oleh Penyelenggara bandar udara kepada Direktorat Jenderal Perhubungan Udara selambat lambatnya 30 (tiga puluh) sebelum tanggal pembatalan dilakukan.

c. Direktorat Jenderal Perhubungan Udara harus menerbitkan surat pembatalan dan menyampaikan kepada Penyelenggara bandar udara.

2.9 Sertifikat Operasi Bandar Udara (*Aerodrome Certificate*) **Tidak Dipindah Tangankan.**
sertifikat operasi bandar udara (*aerodrome certificate*) tidak dapat dipindah tangankan.

2.10 Sertifikat Operasi Bandar Udara (*Aerodrome Certificate*) **Sementara (Temporary Aerodrome Certificate)**.

a. Direktorat Jenderal Perhubungan Udara dapat memberikan sertifikat operasi bandar udara (*aerodrome certificate*) sementara kepada pemohon apabila Direktorat Jenderal Perhubungan Udara yakin bahwa pemohon akan dapat dengan baik mengoperasikan dan melakukan perawatan terhadap bandar udara selama masa berlakunya sertifikat sementara.

b. Sertifikat operasi bandar udara (*aerodrome certificate*) sementara tidak dapat diberikan untuk jangka waktu lebih dari 60 (enam puluh) hari

3. BUKU PEDOMAN PENGOPERASIAN BANDAR UDARA (AERODROME MANUAL)

3.1 Umum.

Penyelenggara Bandar Udara wajib memiliki Buku Pedoman Pengoperasian Bandar Udara (Aerodrome Manual) sesuai persyaratan dalam Bab III Ketentuan ini.

3.2 Format Buku Pedoman Pengoperasian Bandar Udara (Aerodrome Manual).

a. Ketentuan buku pedoman pengoperasian bandar udara sebagai berikut :
   1. ditandatangani oleh Penyelenggara Bandar Udara.
   2. dalam bentuk ketikan atau cetakan.
   3. dijilid dalam bentuk yang mudah untuk memasukkan perubahan dan penggantian.
   4. disediakan sistem :
      a) Penataan perubahan dan penggantian yang telah dilakukan;
      b) Pelaksanaan perubahan dan penggantian kedalam buku pedoman pengoperasian bandar udara;
      c) Rekaman sejarah perubahan dan penggantian yang telah dilakukan.

b. Buku pedoman pengoperasian bandar udara bisa terdiri lebih dari satu dokumen, dengan ketentuan masing-masing dokumen merupakan referensi dari dokumen lain.

c. Rekaman/Copy tambahan dari buku pedoman pengoperasian bandar udara dapat disimpan dalam bentuk rekaman elektronik.

3.3 Penyimpanan atau Pemegang Buku Pedoman Pengoperasian Bandar udara .

Penyelenggara Bandar Udara harus menyediakan buku pedoman pengoperasian bandar udara yang lengkap dan masih berlaku di :

a. Penyelenggara Bandar Udara untuk kepentingan sendiri dan untuk kepentingan pemeriksaan atas permintaan pejabat atau inspektor Direktorat Jenderal Perhubungan Udara;
b. Direktorat Jenderal Perhubungan Udara.

3.4 Informasi dalam Buku Pedoman Pengoperasian Bandar Udara.

a. Buku Pedoman Pengoperasian Bandar Udara sekurang-kurangnya memuat informasi tentang Bandar Udara sesuai ketentuan yang telah diatur dalam Appendix 1 CASR 139, dengan urutan sebagai berikut :
   Bab I Informasi Umum (General Information);
   Bab II Letak Bandar Udara (Aerodrome Site);
   Bab III Aeronautical Information Service (AIS);
   Bab IV Aerodrome Operating Procedures and safety measures;
   Bab V Aerodrome Administration and Safety Management System.
b. Apabila informasi sebagaimana dimakusud huruf a. tidak tersedia atau tidak berlaku di bandar udara tersebut, maka Penyelenggara Badar Udara harus menyatakan keterangan tersebut dalam buku pedoman pengoperasian bandar udara berserta alasannya.
c. Apabila Direktorat Jenderal Perhubungan Udara menerbitkan suatu ketentuan pengecualian (exemption), sebagaimana dimaksud dalam **angka 5 tentang Pengecualian (exemption)**, maka hal tersebut harus dimasukkan kedalam buku pedoman pengoperasian badar udara.
d. Informasi pengecualian sebagaimana dimaksud huruf c sekurang - kurangnya memuat :
   1. Nomor identifikasi yang dialokasikan oleh Direktorat Jenderal Perhubungan Udara untuk masing-masing pengecualian (exemption).
   2. Tanggal mulai berlakunya masing-masing pengecualian (exemption).
   3. Semua kondisi (persyaratan), batasan-batasan serta prosedur yang berkenaan dengan pengecualian (exemption).

3.5 Perubahan Buku Pedoman Pengoperasian Bandar Udara.

a. Penyelenggara Bandar Udara harus melakukan perubahan terhadap buku pedoman pengoperasian bandar udara apabila diperlukan untuk menjaga agar informasi yang disediakan tetap akurat; dan/atau
b. Berdasarkan pemberitahuan secara tertulis dari Direktorat Jenderal Perhubungan Udara untuk melakukan perubahan sesuai juklak (directive), dalam rangka menjaga keakuratan buku pedoman pengoperasian bandar udara.

3.6 Pemberitahuan Perubahan Buku Pedoman Pengoperasian Bandar Udara .

a. Penyelenggara Bandar Udara wajib menyampaikan setiap perubahan buku pedoman pengoperasian bandar udara kepada Direktorat Jenderal Perhubungan Udara secara tertulis selambat-lambatnya 14 (empat belas) hari setelah ditetapkan.
b. Pelanggaran terhadap ketentuan sebagaimana dimaksud pada huruf a. termasuk tindak pelanggaran.

3.7 Pengawas Buku Pedoman Pengoperasian Bandar Udara.

a. Penyelenggara Bandar Udara wajib menunjuk personil atau unit kerja untuk melakukan pengawasan terhadap buku pedoman pengoperasian bandar udara.

b. Personil atau unit kerja sebagaimana dimakusud huruf a. mempunyai tugas :

   1. Memegang dan memelihara 1 (satu) dokumen buku pedoman pengoperasian bandar udara;
   2. Mencatat semua pemegang buku pedoman pengoperasian bandar udara;
   3. Pemutahiran informasi buku pedoman pengoperasian bandar udara dan mendistrbusikan kepada para pemegang rekaman/copy manual.

c. Pelanggaran terhadap ketentuan sebagaimana dimaksud pada huruf a. termasuk tindak pelanggaran.

3.8 Status Buku Pedoman pengoperasian Bandar Udara.

Direktorat Jenderal Perhubungan Udara harus menerima buku pedoman pengoperasian bandar udara beserta perubahan sesuai ketentuan yang berlaku.

4. KEWAJIBAN PENYELENGGARA BANDAR UDARA

4.1 Kepatuhan Terhadap Standar dan Hal Hal yang Sudah Diterapkan (Practice).

Penyelenggara bandar udara harus mematuhi semua ketentuan dalam Manual of Standards dan persyaratan yang disampaikan secara tertulis oleh Direktorat Jenderal Perhubungan Udara.

4.2 Kompetensi Personil Bandar Udara

a. Penyelenggara Bandar Udara harus mempekerjakan personil yang memenuhi kualifikasi dan jumlah yang cukup dalam pengoperasian dan perawatan bandar udara;

b. Personil yang dipekerjakan sebagaimana dimaksud huruf a harus memiliki sertifikat kecakapan.

4.3 Pelatihan bagi Personil Bandar Udara.

Penyelenggara bandar udara harus menjamin bahwa semua personil yang dipekerjakan telah mendapatkan pelatihan yang memadai sesuai Manual of Standards.

4.4 Pejabat Pelaporan (Reporting Officer).

a. Penyelenggara Bandar Udara wajib menunjuk 1 (satu) atau lebih Pejabat Pelapor (reporting officer) untuk melaporkan buku pedoman pengoperasian bandar udara.

b. Pejabat Pelapor sebagaimana dimaksud huruf a, bertugas :

   1. melakukan monitor terhadap service ability bandar udara;
   2. melaporkan kepada Notam office dan Air traffic control semua perubahan yang terjadi atau setiap kejadian di bandar udara sesuai dengan ketentuan angka 4.23.

c. Penyelenggara bandar udara tidak boleh menunjuk seseorang sebagai pejabat pelaporan (reporting officer), bila yang bersangkutan belum diberikan training sesuai ketentuan dalam Manual of Standards Aerodrome.

d. Pelanggaran terhadap ketentuan sebagaimana dimaksud pada **huruf a.** termasuk tindak pelanggaran.

4.5 Pengoperasian dan Perawatan (Aerodrome Operation and Maintenance).

Penyelenggara Bandar Udara harus menjamin bandar udara dioperasikan dan dirawat dengan tingkat perhatian dan ketelitian yang memadai.

4.6 Bandar Udara Manual Procedure.

a. Selain dari ketentuan dan petunjuk yang dikeluarkan oleh Direktorat Jenderal Perhubungan udara, Penyelenggara Bandar Udara harus mengoperasikan dan melakukan perawatan terhadap Bandar Udara sesuai dengan prosedur yang ditetapkan dalam Buku Pedoman Pengoperasian Bandar Udara.

b. Direktorat Jenderal Perhubungan Udara dapat mengarahkan Penyelenggara Bandar Udara untuk mengubah prosedur yang telah ditetapkan dalam Buku Pedoman Pengoperasian Bandar Udara, apabila perlu dilakukan untuk kepentingan keselamatan pengoperasian pesawat udara.

c. Penyelenggara Bandar Udara harus mematuhi arahan yang diberikan Direktorat Jenderal Perhubungan Udara dapat sebagaimana dimaksud huruf b.

4.7 Pemberitahuan Tentang Penyimpangan.

a. Penyelenggara Bandar Udara dapat melakukan perubahan atau penyimpangan terhadap buku pedoman pengoperasian bandar udara, dalam rangka menjamin keselamatan operasi pesawat udara.

b. Perubahan atau penyimpangan buku pedoman pengoperasian bandar udara sebagaimana dimaksud huruf a. wajib dilaporkan secara tertulis kepada Direktorat Jenderal Perhubungan Udara selambat-lambatnya 30 (tiga puluh) hari, terhitung sejak terjadi perubahan atau penyimpangan.

c. Pelanggaran terhadap ketentuan sebagaimana dimaksud pada **huruf b.** termasuk tindak pelanggaran.

4.8 Marka Bandar Udara (Aerodrome Marking).

a. Penyelenggara Bandar Udara harus memberi marka sesuai dengan Manual of Standard pada daerah bandar udara sebagai berikut :
   1. Movement area;
   2. Setiap unserviceable area;
   3. Setiap work area pada atau dekat movement area.

b. Penyelenggara Bandar Udara harus menjamin bahwa semua bandar udara marking dirawat sesuai dengan Manual of Standard.

4.9 Signal Area.

a. Penyelenggara Bandar Udara yang tidak mempunyai pelayanan lalu lintas udara (air traffic control) secara terus menerus, harus menyediakan signal area, sesuai dengan Manual of Standard.

b. Penyelenggara Bandar Udara sebagaimana dimaksud pada huruf a, harus memasang signal area yang memadai, sesuai dengan Manual of Standards.

c. Penyelenggara Bandar Udara sebagaimana dimaksud pada huruf a, harus menjamin bahwa signal area yang dipasang dapat dilihat dengan jelas oleh pesawat udara yang beropersi di bandar udara tersebut.

4.10 Wind Direction Indicator (Umum).

Penyelenggara Bandar Udara harus memasang dan merawat wind direction indicator sekurang-kurangnya 1 (satu) unit, sesuai dengan Manual of Standard Aerodrome.

4.11 Wind Direction Indicator (Persyaratan untuk runway tertentu).

a. Apabila runway pada bandar udara yang digunakan untuk operasi non-precision approach, maka Penyelenggara Bandar Udara wajib menjamin bahwa pada posisi dekat ujung setiap runway tersedia wind direction indicator.

b. Direktorat Jenderal Perhubungan Udara dapat memberikan pengecualian (exemption) pada ketentuan sebagaimana dimaksud huruf a. apabila informasi surface wind yang disampaikan kepada pilot dengan cara :

   1. sistem pengamatan cuaca otomatis, yang:
      a) Selaras (compatible) dengan sistem pengamatan cuaca;
      b) Memberikan informasi surface wind melalui bandar udara weather information broadcast, atau
   2. Pengamat cuaca resmi mempunyai hubungan komunikasi langsung dengan Pilot, atau
   3. Fasilitas resmi lain yang disediakan untuk memberikan unformasi surface wind.

c. Pelanggaran terhadap ketentuan sebagaimana dimaksud pada **huruf a.** termasuk tindak pelanggaran.

4.12 Visual Approach Slope Indicator System.

a. Penyelenggara bandar udara harus menyediakan visual approach slope indicator system sesuai dengan Manual of Standard, apabila runway secara reguler digunakan sebagai approach runway untuk jenis pesawat jet/turbo prop.

b. Apabila dipandang perlu untuk kepentingan keselamatan operasi pesawat udara, Direktorat Jenderal Perhubungan Udara dapat mengarahkan Penyelenggara bandar udara untuk menyediakan visual approach slope indicator system yang diakui, selain yang telah ditetapkan huruf a.

c. Penyelenggara bandar udara harus mematuhi semua arahan Direktorat Jenderal Perhubungan Udara sebagaimana dimaksud huruf b.

4.13 Lighting untuk Daerah Pergerakan (Movement Area).

a. Penyelenggara Bandar Udara yang mengoperasikan bandar udara untuk take off dan landing pesawat udara pada malam hari atau pada keadaan cuaca kurang dari VMC pada siang hari harus menyediakan dan memelihara lighting system pada movement area sesuai ketentuan huruf b, dan huruf c.

b. Lighting system pada bandar udara harus memenuhi persyaratan Manual of Standar atau system lain yang telah mendapatkan approval dari Direktorat Jenderal Perhubungan Udara;

c. Lighting System Bandar Udara terdiri dari :

   1. Lighting untuk rubway, taxiway dan apron yang akan digunakan untuk operasi malam hari atau pada saat cuaca kurang dari VMC.
   2. Lighting wind direction indicator,
   3. Lighting untuk obstacle pada / didalam movement area
   4. Lighting untuk approach, runway dan taxiway apabila aerodrome mempunyai runway yang dioperasikan untuk precision approach category I, II atau III.

4.14 Pemeriksaan Lighting System.

a. Penyelenggara Bandar Udara dilarang mengoperasikan Lighting System Bandar Udara baru sebagaimana dimaksud dalam butir 4.13 huruf c, kecuali telah dilaksanakan hal-hal sebagai berikut:
   1. Pemeriksaan atau pengecekan (flight check) terhadap system; oleh badan resmi; dan
   2. pemeriksaan atau pengecekan terhadap kesesuaian sistem dengan spesifikasi kelistrikan dan Manual of Standard Aerodrome.

b. Apabila pemeriksaan terhadap pemenuhan spesifikasi memerlukan peralatan/instrumentasi survey, penyelenggara Bandar Udara harus memastikan bahwa pemeriksaan dilakukan oleh :
   1. seseorang yang mempunyai kualifikasi sarjana, diploma atau sertifikat dalam bidang survey atau dibidang civil engineering, atau
   2. seseorang yang mempunyai kemampuan dan pengalaman melaksanakan survey dimaksud, dan diakui oleh Direktorat Jenderal Perhubungan Udara.

c. Jenis Lighting system sebagaimana dimaksud huruf a. meliputi :
   1. approach lighting system;
   2. runway lighting system untuk instrument approach runway
   3. visual approach slope indicator system untuk pesawat jet/turbo prop (selain system yang dimaksudkan untuk dipakai secara sementara, tidak lebih dari 30 hari).

4.15 Aerodrome Emengency Committee.

a. Penyelenggara Bandar Udara wajib membentuk Aerodrome Emergency Committee.

b. Aerodrome Emergency Committee sebagaimana dimaksud huruf a, terdiri dari wakil instansi Pemadam Kebakaran, Kepolisian, Instansi Kesehatan/Rumah Sakit atau instansi penanggulangan darurat lainnya yang berkaitan dengan lokasi bandar udara , yang paling memungkinkan untuk diminta bantuannya apabila terjadi keadaan darurat di bandar udara.

c. Pelanggaran terhadap ketentuan sebagaimana dimaksud pada **huruf a.** termasuk tindak pelanggaran.

4.16 Aerodrome Emergency Plan.

a. Aerodrome Emengency Committee sebagaimana dimaksud dalam butir 4.15 wajib menyiapkan Rencana Penanggulangan Keadaan Darurat (erodrome emergency plan).

b. Aerodrome Emergency Plan harus memuat tentang :
   1. Prosedur untuk mengkoordinasikan langkah-langkah atau tindakan-tindakan (respons) dari semua organisasi/unit kerja yang terkait dengan pelayanan keadaan darurat (Aerodrome Emengency);
   2. Hal-hal yang dipersyaratkan Manual of Standards dicantumkan dalam Aerodrome Emergency Plan.

c. Aerodrome Emengency Committee harus meninjau Aerodrome Emergency Plan selambat-lambatya 1 (satu) kali dalam setahun dan membuat perubahan yang diperlukan untuk menjamin bahwa Aerodrome Emergency Plan dapat beroperasi dengan baik.

d. Peninjauan Aerodrome Emergency Plan harus dilakukan dengan berkonsultasi dengan organisasi/unit kerja yang terkait.

e. Setelah keadaan darurat (emergency) terjadi atau setelah latihan penanggulangan keadaan darurat (emergency) dilaksanakan, Penyelenggara Bandar Udara harus mengupayakan agar Aerodrome Emengency Committee melakukan hal hal sebagai berikut:
   1. peninjauan ulang efektifitas langkah-langkah atau tindakan-tindakan (respon) terhadap keadaan darurat di bandar udara.
   2. Penilaian terhadap Emergency Plan apakah sudah cukup memadai untuk menanggulangi keadaan darurat di bandar udara.
   3. Mengambil langkah-langkah korektif yang diperlukan untuk menjamin agar Emergency Plan dapat beroperasi dengan baik.
f. Penyelenggara Bandar Udara harus menjamin bahwa:
   1. Setiap peninjauan ulang terhadap Aerodrome Emergency Plan, harus dibuatkan catatan.
   2. Setiap catatan sebagaimana dimaksud butir 1, harus disimpan sekurang kurangnya 3 (tiga) tahun setelah peninjauan ulang terkait dilakukan.
g. Pelanggaran terhadap ketentuan ini termasuk tindak pelanggaran.

4.17 Pengujian terhadap Emengency Plan.

a. Penyelenggara bandar udara wajib mengadakan pengujian terhadap Emergency Plan dengan cara sebagai berikut :
   1. Latihan dengan skala penuh, sekurang-kurangnya 2 (dua) tahun sekali;
   2. Latihan dengan cara persial, sekurang-kurangnya 1 (satu) kali dalam selang waktu latihan sekala penuh;
b. Pengujian Emergency Plan sebagaimana dimaksud pada butir 1 bertujuan untuk :
   1. mengetahui tingkat koordinasi antara organinasi/unit kerja dalam menghadapi keadaan darurat (Aerodrome Emengency).
   2. mengetahui apakah prosedur dan fasilitas yang disiapkan untuk emergency plan sudah memadai.
b. Apabila keadaan darurat terjadi dalam kurun waktu 6 (enam) bulan sebelum waktunya diadakan diadakan latihan emergency, penyelenggara bandar udara dapat mengajukan permohonan kepada Direktorat Jenderal Perhubungan Udara untuk memperpanjang jangka waktu atau menunda pelaksanaan latihan emergency skala penuh berikutnya.
c. Direktorat Jenderal Perhubungan Udara akan menyetujui permohonan sebagaimana dimaksud huruf b, apabila :
   1. semua organisasi/unit kerja yang terkait dengan pelayanan keadaan darurat (Aerodrome Emengency) memberikan respons yang sesuai dengan ketentuan dalam emergency plan.
   2. Emergency Plan telah memadai dalam mengatasi keadaan darurat sesungguhnya.
d. Apabila ketentuan sebagaimana dimaksud huruf c, dapat dipenuhi, Direktorat Jenderal Perhubungan Udara dapat menunda periode latihan skala penuh sampai akhir masa 2 (dua) tahun terhitung sejak terjadinya keadaan darurat sesungguhnya.
e. Latihan dengan cara persial bertujuan untuk menjamin bahwa segala kekurangan dalam latihan skala penuh telah diperbaiki.
f. Aerodrome Emergency Plan harus memperhatikan prinsip human factor untuk menjamin adanya respons yang optimum dari semua pihak yang terlibat.

4.18 Aerodrome Safety Management System.

a. Penyelenggara bandar udara harus memiliki Aerodrome Safety managerment System sesuai dengan ketentuan Manual of Standard.

b. Aerodrome Safety managerment System sebagaimana dimaksud pada huruf a. mengatur tentang kewajiban semua pengguna bandar udara, termasuk mereka yang melakukan kegiatan secara independen di bandar udara (khusus terkait dengan penerbangan atau aircraft handling), untuk bekerjasama dalam program peningkatan keselamatan dan pengunaan bandar udara secara aman serta ketentuan yang mewajibkan segera melaporkan apabila terjadi suatu accident, incident atau suatu kesalahan yang akan berhubungan dengan keselamatan.

c. Setiap Penyelenggara Bandar Udara selambat - lambatnya pada tanggal ……………………… telah memiliki Aerodrome Safety managerment System.

4.19 Aerodrome Serviceability Inspections.

a. Penyelenggara bandar udara harus melaksanakan aerodrome serviceability inspection secara berkala sesuai dengan Manual of Standard.

b. Aerodrome Safety Inspections adalah suatu inspeksi yang dilakukan terhadap *aerodrome* untuk memastikan bahwa *aerodrome* bersangkutan selamat untuk pengoperasian pesawat udara.

c. Aerodrome Serviceability Inspections harus dilaksanakan juga pada waktu-waktu :
   1. setelah terjadi badai, angin ribut atau cuaca buruk lainnya
   2. apabila Air Traffic Control atau Direktorat Jenderal Perhubungan Udara menghendaki dilakukan, dan
   3. sesegara mungkin setelah terjadinya accident atau incident pesawat udara di bandar udara.

4.20 Safety Audit Internal oleh Penyelenggara Aerodrome.

a. Setiap Penyelenggara bandar udara wajib mengadakan audit internal terhadap Aerdrome Safety Management System sekurang-kurangnya 1 (satu) kali setahun sesuai dengan Manual of Standards atau apabila Direktorat Jenderal Perhubungan Udara memandang perlu;

b. Safety audit internal bertujuan untuk memberikan penilaian terhadap :
   1. validitas dan akurasi dari informasi yang dipublikasikan dalam AIP, dan
   2. relevansi, validitas dan akurasi dari operating procedure dalam Buku Pedoman Pengoperasian Bandar Udara (Aerodrome Manual).

c. Penyelenggara bandar udara harus memastikan bahwa yang melaksanakan audit sebagaimana dimaksud pada huruf a. oleh personil yang mempunyai kemampuan teknis dan pengalaman.

d. Hasil audit internal Aerdrome Safety Management System sebagaimana diaksud pada huruf c, harus disiapkan dan ditanda tangani oleh personil yang melakukan audit dan inspeksi dan disimpan untuk jangka waktu minimum 3 (tiga) tahun.

4.21 Perencanaan dan Pelaksanaan Pekerjaan-Pekerjaan *Aerodrome.*

a. Penyelenggara bandar udara harus memastikan bahwa semua pekerjaan-pekerjaan bandar udara dilaksanakan sedemikian rupa sehingga tidak menimbulkan bahaya pengoperasian pesawat udara atau membingungkan penerbang;

b. Sebelum pekerjaan sebagaimana dimaksud huruf a. tersebut dilaksanakan, Penyelenggara bandar udara harus memenuhi ketentuan dalam Manual of Standards yang berkaitan dengan perencanaan dan persyaratan pemberitahuan yang harus cukup memadai;

4.22 Akses ke Aerodrome.

a. Penyelenggara bandar udara harus mengizinkan setiap personil yang diberi kewenangan oleh Direktorat Jenderal Perhubungan Udara untuk melakukan pemeriksaan atau pengujian terhadap fasilitas, peralatan atau dokumen yang terkait dengan pengoperasian bandar udara guna menjamin keselamatan pengoperasian pesawat udara;

b. Penyelenggara bandar udara harus memberikan kemudahan-kemudahan kepada personil sebagaimana dimaksud huruf a, dalam melakukan pemeriksaan atau pengujian disemua bagian bandar udara.

4.23 Pemberitahuan dan Pelaporan.

a. Penyelenggara bandar udara (*Aerodrome)* harus melaporkan/pemberitahu kepada Direktorat Jenderal Perhubungan Udara, Air Traffic Control dan Operator Penerbang hal-hal penting yang berkaitan dengan keselamatan operasi pesawat udara dalam batas-batas waktu yang diizinkan sesusai dengan Manual of Standards;

b. Hal-hal penting yang berkaitan dengan keselamatan operasi pesawat udara sebagaimana dimaksud pada huruf a. meliputi :

   1. perubahan-perubahan yang terjadi pada kondisi fisik bandar udara;
   2. semua obyek (benda) yang ketinggiannya melewati obstacle limitation surface aerodrome, dan
   3. keberadaan benda-benda penghalang (obstruction), keadaan yang membahayakan atau setiap peristiwa di atau dekat bandar udara yang bisa mempengaruhi keselamatan penerbangan.
   4. setiap penurunan tingkat pelayanan bandar udara dari tingkat yang dipublikasikan dalam AIP atau AIS publication, dan
   5. setiap penutupan suatu bagian dari maneouvering area di bandar udara.

c. Perubahan yang terjadi pada kondisi fisik bandar udara (*aerodrome*) yang direncanakan baik bersifat sementara atau tetap, penyelenggara bandar udara (*aerodrome*) harus melaporkan kepada Direktorat Jenderal Perhubungan Udara, Air Traffic Control dan Operator Penerbang selambat-lambatnya 14 (empat belas) hari sebelum dilakukan perubahan atau pembatasan.

d. Informasi sebagaimana dimaksud pada huruf b harus disampaikan secara tertulis kepada AIS untuk dipublikasikan dalam AIP.

e. Apabila bandar udara (*aerdrome)* bersangkutan bukan merupakan bandar udara (*aerodrome)* yang ruang udaranya dikendalikan (controlled aerodrome), maka laporan atau pemberitahuan sebagaimana dimaksud huruf a. harus disampaikan juga kepada Air Traffic Control unit bandar udara (*aerodrome)* terdekat.

4.24 Pembentukan Obstacle Limitation Surface.

Penyelenggara bandar udara (*Aerodrome*) harus membuat Obstacle Limitation Surface untuk bandar udara (*aerodrome)* bersangkutan, sesuai dengan Manual of Standards.

4.25 Pemantauan Ruang Udara.

a. Penyelenggara bandar udara wajib melakukan pemantauan terhadap ruang udara disekitar bandar udara untuk mengetahui adanya pelanggaran terhadap obstacle limitation surface oleh suatu obyek (bangunan atau struktur lainnya) sesuai dengan Manual of Standards.

b. Penyelenggara bandar udara harus mengambil semua langkah yang diperlukan untuk menjamin bahwa obstacle yang terdapat di bandar udara atau disekitar bandar udara dapat terdeteksi sesegera mungkin.

4.26 Pemberitahuan adanya Obstacle.

Apabila Penyelenggara bandar udara (*Aeodrome)* menyadari akan keberadaan suatu obstacle, harus segera memberitahukan kepada Air Traffic Control dan menyampaikan secara rinci tentang lokasi, ketinggian obstacle dimaksud dan membuat amendemen terhadap runway *declared distance* apabila dimungkinkan.

5. PENGECUALIAN (EXEMPTIONS)

5.1 Direktorat Jenderal Perhubungan Udara dengan pengaturan tertulis dapat mengecualikan (exemp) Penyelenggara bandar udara (*Aerodrome) dari keharusan memenuhi persyaratan spesifik yang terdapat dalam keputusan ini*.

5.2 Sebelum memberikan pengecualian (exemption) sebagaimana dimaksud pada angka 5.1, Direktorat Jenderal Perhubungan Udara harus memperhitungkan dan mempertimbangkan segala aspek yang berhubungan dengan kepentingan keselamatan navigasi udara serta kepatuhan Penyelenggara bandar udara (*Aerodrome*) terhadap pelaksanaan ketentuan atau persyaratan atau prosedur yang ditetapkan.

5.3 Penyelenggara bandar udara (*aerodrome)* harus mematuhi ketentuan atau persyaratan atau prosedur pengecualian (exemp) pengoperasian bandar udara yang telah ditetapkan.

5.4 Apabila Penyelenggara bandar udara (*Aerodrome)* tidak dapat memenuhi ketentuan atau persyaratan atau prosedur sebagaimana ditetapkan dalam Manual of Standard, Direktorat Jenderal Perhubungan Udara dapat memutuskan ketentuan atau persyaratan atau prosedur alternative dengan tingkat keselamatan sama dengan standards atau praktek yang berlaku umum setelah melakukan studi aeronautica.

6. BANDAR UDARA TERDAFTAR (*REGISTERED AERODROME*)

6.1 Umum.

a. Pendaftaran Bandar udara (*Registrasi Aerodrome*) diberikan untuk bandar udara yang mampu melayani pesawat udara dengan kapasitas di bawah 30 tempat duduk atau kapasitas beban angkut dibawah 5.700 kg.

b. Penyelenggara bandar udara sebagaimana dimaksud pada **huruf a**. dilarang mengoperasikan aerodrome yang belum terdaftar dalam Daftar Bandar Udara (*Register Aerodrome*).

c. Pelanggaran terhadap ketentuan sebagaimana dimaksud pada **huruf b.** termasuk tindak pelanggaran.

d. Direktorat Jenderal Perhubungan Udara harus membuat Daftar Bandar Udara (*Register Aerodrome*).

6.2 Permohonan Pendaftaran Bandar Udara (*Registrasi Aerodrome*).

a. Penyelenggara bandar udara sebagaimana dimaksud dalam angka 6.1 mengajukan permohonan Pendaftaran Bandar Udara (*Registrasi Aerodrome*) kepada Direktorat Jenderal Perhubungan Udara sesuai format yang telah disyahkan.

b. Permohonan Pendaftaran Bandar Udara (*Registrasi Aerodrome*) sebagaimana dimaksud pada huruf a. harus melampirkan :
   1. informasi tentang bandar udara sesuai dengan Apendix 3 dalam ketentuan ini.
   2. berita acara pemeriksaan keselamatan (safety inspection) yang dilaksanakan dan ditanda tangani oleh pejabat/personil yang ditugaskan oleh Direktorat Jenderal Perhubungan Udara dan menyatakan bahwa bandar udara bersangkutan memenuhi ketentuan yang telah ditetapkan dan aman untuk pengoperasian pesawat udara.
   3. Organisasi dan Personil Penyelenggara Bandar Udara.

c. Pejabat atau Personil yang ditugaskan oleh Direktorat Jenderal Perhubungan Udara untuk melakukan pemeriksaan dan menandatanggani berita acara harus memenuhi persyaratan yang telah ditetapkan dalam Appendix 5 dalam keputusan ini.

6.3 Pendaftaran Bandar Udara (*Registrasi Aerodrome*).

Apabila penyelenggara bandar udara telah mengajukan permohonan Pendaftaran Bandar Udara (*Registrasi Aerodrome*) sesuai persyaratan sebagaimana dimaksud dalam angka 6.2, Direktorat Jenderal Perhubungan Udara harus :

a. Mencatat/mendaftar bandar udara tersebut dengan memasukkan informasi ke dalam Daftar Bandar Udara (*Register Aerodrome*) sebagaimana dimaksud butir 6.1 huruf d. tentang :
   1. Nama Bandar Udara;
   2. Lokasi bandar udara secara rinci
   3. Nama dan alamat Penyelenggara Bandar Udara.

b. Menyampaikan kepada penyelenggara bandar udara secara tertulis, bahwa bandar udara telah terdaftar;

c. Memerintahkan kepada AIS untuk mempublikasikan dalam AIP rincian registrasi dan informasi tentang bandar udara yang bersangkutan disyaratkan dalam Apendix 3 dalam Keputusan ini.

6.4 Penolakan Pendaftaran Bandar Udara (*Registrasi Aerodrome*).

Dalam hal permohonan Pendaftaran Bandar Udara (*Registrasi Aerodrome*) sebagaimana dimaksud dalam **butir 6.2** ditolak, Direktorat Jenderal Perhubungan Udara harus memberitahukan secara tertulis yang disertai dengan alasan penolakan, selambat-lambatnya 14 hari setelah permohonan diterima secara lengkap.

6.5 Daftar Bandar Udara (*Register Aerodrome*).

a. Direktorat Jenderal Perhubungan Udara harus membuat dan mepertahankan Daftar Bandar Udara (*Register Aerodrome*), dalam suatu format yang disahkan, sesuai ketentuan ini.

b. Direktorat Jenderal Perhubungan Udara harus menyediakan Daftar Bandar Udara (*Register Aerodrome*) untuk diperiksa oleh anggota masyarakat apabila diperlukan dan dengan alasan yang tepat.

c. Direktorat Jenderal Perhubungan Udara harus mempertahankan akurasi Daftar Bandar Udara (*Register Aerodrome*).

d. Direktorat Jenderal Perhubungan Udara harus melakukan pembetulan terhadap informasi dalam Daftar Bandar Udara (*Register Aerodrome*) apabila terdapat kesalahan atau perubahan.

6.6 Masa Berlaku Daftar Bandar Udara (*Register Aerodrome*).

a. Daftar Bandar Udara (*Register Aerodrome*) berlaku selama 5 (lima) tahun Bandar Udara masih beroperasi sesuai ketentuan, standar dan prosedur yang telah ditetapkan dalam Keputusan ini.

b. Daftar Bandar Udara (*Register Aerodrome*) akan dievaluasi oleh Direktorat Jenderal Perhubungan Udara secara berkala setiap 1 tahun sekali atau apabila dipandangan perlu dengan pertimbangan keselamatan pengoperasian pesawat udara.

c. Direktorat Jenderal Perhubungan Udara dapat penundaan atau pembekukan Register Aerodrome apabila pengoperasian bandar udara tidak sesuai dengan ketentuan, standar dan prosedur yang telah ditetapkan dalam Keputusan ini.

6.7 Pembekuan atau Pencabutan Pendaftaran Bandar Udara (*Registrasi Aerodrome*).

a. Direktorat Jenderal Perhubungan Udara dapat membekukan atau mencabut Daftar Bandar Udara (*Register Aerodrome*) apabila penyelenggara bandar udara:
   1. Penyelenggara bandar udara melanggar ketentuan sebagaimana dimaksud dalam butir 5.9 dalam Keputusan ini.
   2. Penyelenggara bandar udara telah gagal memenuhi ketentuan angka 6.9, 6.10, 6.11, 6.12, 6.13 dalam Keputusan ini.

b. Pembekuan atau pencabutan Daftar Bandar Udara (*Register Aerodrome*) sebagaimana dimaksud huruf a. dilakukan dengan dengan proses sebagai berikut :
   1. Memberikan peringatan kepada Penyelenggara Bandar Udara secara tertulis yang memuat tentang situasi dan fakta yang ditemukan pelanggaran ketentuan sebagaimana dalam dimaksud pada huruf a;
   2. Memberikan kesempatan kepada Penyeleggara Bandar Udara untuk menyampaikan penjelasan atau keterangan dalam jangka waktu paling lama 30 (tiga puluh) hari setelah surat peringatan disampaikan.
   3. Mempertimbangkan segala penjelasan atau keterangan yang diberikan oleh Penyelenggara Bandar Udara sebagaimana dimaksud butir 2 untuk diambil keputusan.
   4. Apabila setelah waktu 30 (tiga puluh) hari surat peringatan disampaikan tidak mendapat tanggapan dari Penyelenggara Bandar Udara, Direktorat Jenderal Perhubungan Udara dapat mencabut Pendaftaran Bandar Udara (*Register Aerodrome*).

6.8 Pembatalan Pendaftaran Bandar Udara (*Registrasi Aerodrome)* atas Permintaan Penyelenggara Bandar Udara (*Aerodrome)* .

a. Daftar Bandar Udara (*Register Aerodrome*) dapat dibatalkan atas permintaan Penyelenggara Bandar Udara;

b. Permohonan pembatalan Daftar Bandar Udara (*Register Aerodrome*) harus disampaikan secara tertulis oleh Penyelenggara Bandar Udara kepada Direktorat Jenderal Perhubungan Udara selambat lambatnya 30 (tiga puluh) hari sebelum penyelengara bandar udara menghendaki pembatalan dimaksudkan.

c. Direktorat Jenderal Perhubungan Udara harus menerbitkan surat pembatalan dan melakukan hal-hal sebagai berikut :
   1. memberitahukan lewat NOTAM, dan
   2. menghapus Daftar (*Register*) dan informasi yang terkait tentang Bandar Udara (*Aerodrome*) dimaksud dari AIP.

6.9 Standar Yang Berlaku Untuk Bandar Udara yang Terdaftar (*Registered Aerodrome*).

a. Standar yang berlaku pada bandar udara yang sertifikat (*certified aerodromes*) meliputi:
   1. Sifat-sifat fisik (physical characteristic) dari daerah pergerakan (movement area);
   2. Obstacle Limitation Surface;
   3. Marka aerodrome;
   4. Laghting;
   5. Wind direction indicator;
   6. Signal circle (signal area),
b. Semua standar dalam Manual of Standards untuk Bandar Udara (*Aerodrome)* yang Terdaftar (Regitered)*.*

6.10 Pejabat Pelaporan (Reporting Officer).

a. Penyelenggara Bandar Udara wajib menunjuk 1 (satu) orang atau lebih untuk menjadi Pejabat Pelaporan (Rerporting Officer);
b. Tugas tugas Pejabat Pelaporan (Reporting Officer) sebagaimana dimaksud pada huruf a. adalah:
   1) Melakukan pemantauan (monitor) terhadap kesetiapakaian (serviceability) bandar udara (*aerodrome)*;
   2) Melaporkan kepada NOTAM Office dan Air Traffic Control segala perubahan kondisi, atau segala peristiwa di bandar udara, yang wajib dilaporkan sesuai ketentuan sebagaimana dalam dimaksud angka ... huruf .... butir ....
   3) Penyelenggara Bandar Udara tidak boleh menunjuk seseorang yang belum mendapat pelatihan sesuai Manual of Standards untuk menjadi Pejabat Pelaporan (Reporting Officer)

6.11 Pemberitahuan Perubahan-Perubahan Kondisi Fisik atau lain-lain pada Bandar Udara (*Aerodrome)*

a. Penyelenggara Bandar Udara wajib menyampaikan pemberitahuan kepada NOTAM Office apabila terjadi:
   1) Setiap perubahan baik permanen maupun sementara terhadap kondisi fisik bandar udara (aerodrome), yang bisa mengganggu keselamatan operasi pesawat udara.
   2) Semua peristiwa-peristiwa lainnya yang berkaitan dengan operasi atau pemeliharaan bandar udara (*aerodrome)* yang dapat mengganggu keselamatan operasi pesawat udara.
b. Apabila Bandar Udara (*Aerodrome)* bersangkutan bukan bandar udara (*aerodrome)* yang ruang udara disekitarnya dikendalikan (Controlled Aerodrome), maka harus memberitahukan juga kepada Air Traffic Controller.

6.12 Pemberitahuan tantang perubahan Informasi yang dipublikasikan dalam AIP .

Untuk mempertahankan akurasi Informasi yang dipublikasikan dalam AIP, setiap perubahan pada pendaftaran bandar udara (Aerodrome *Registered)* AIS secara tertulis.

6.13 Pemerikasaan Keselamatan (Safety Inspection).

a. Ketentuan ini berlaku bagi *Aerodrome Registered yang melayani pengoperasian* pesawat udara:
   1. melayani penerbangan umum atau penerbangan carter, dan
   2. mempunyai kapasitas tempat duduk (seating capacity) lebih dari 9 (sembilan) tempat duduk.

b. Direktorat Jenderal Perhubungan Udara harus melakukan pemeriksaan keselamatan bandar udara sekurang-kurangnya 1 (satu) kali dalam setahun.

c. Pejabat atau petugas yang melakukan Pemeriksaan harus menyampaikan laporan atau berita acara pemeriksaan kepada Penyelenggara Bandar Udara yang memuat:
   1. Masalah-masalah yang diatur dalam Apendix 4.
   2. Masalah-masalah yang berkaitan dengan pekerjaan perbaikan yang perlu dilakukan untuk dapat memenuhi standard yang berlaku.

d. Dalam tempo 30 (tiga puluh) hari terhitung sejak menerima laporan/berita acara pemeriksaan, penyelenggara Bandar Udara (*Aerodrom*e) harus menyampaikan kepada Direktorat Jenderal Perhubungan Udara:
   1. rekaman laporan/ berita acara, dan
   2. apabila laporan/ berita acara memuat tentang pekerjaan perbaikan yang perlu dilakukan, penyelenggara wajib menyertakan pernyataan tentang bagaimana dan kapan pekerjaan perbaikan akan dilaksanakan.

7. PELAYANAN PERTOLONGAN KECELAKAAN PENERBANGAN DAN PEMADAMAN KEBAKARAN (PKP-PK).

Sebagai salah satu Negara penanda tangan konvensi Chicago Indonesioa mempunyai kewajiban untuk menyediakan pelayanan Pertolongan Kecelakaan Penerbangan dan Pemadam Kebakaran (PKP-PK) dengan standar yang memadai untuk kelas bandar udara (aerodrome) tertentu , sesuai dengan ketentuan chapter 9.2 Annex 14 Konvensi Chicago.

Untuk memenuhi kewajiban dimaksud, pada Bab ini ditetapkan : bahwa untuk penyelenggara bandar udara yang melayani penerbangan internasional, atau penerbangan domestik dengan tingkat operasi penerbangan tertentu, diwajibkan untuk menyediakan pelayanan Pertolongan kecelakaan Penerbangan dan Pemadam kebakaran (PKP-PK) dan standar yang berlaku penyelenggara bandar udara lain, yang hanya melayani penerbangan domestic dapat menyediakan pelayanan Pertolongan Kecelakaan Penerbangan dan pemadam kebakaran (PKP PK) dengan tingkat pelayanan (level of service) alternative.

7.1 Umum.

a. Ketentuan pada Bab ini berlaku untuk Pelayanan Pertolongan Kecelakaan Penerbangan dan Pemadam Kebakaran (PKP-PK) yang diberikan pada bandar udara (aerodrome) yang melayani penerbangan sipil

b. Ketentuan pada Bab ini menetapkan standar teknis dan operasional bagi pelayanan pertolongan pada kecelakaan penerbangan dan pemadam kebakaran (PKP PK)

c. Ketentuan pada Bab ini tidak berlaku bagi pelayanan pertolongan kecelakaan penerbangan dan pemadam kebakaran (PKP-PK) yang disediakan oleh instansi militer.

7.2 Definisi.

Dalam Bab ini yang dimaksud dengan :.

a. Pelayanan Pertolongan Kecelakaan Penerbangan dan Pemadam Kebakaran yang selanjutnya disebut PKP-PK adalah PKP-PK pada bandar udara (aerodrome).

b. Operasi PKP-PK adalah operasi yang diselenggarakan dalam rangka pelaksanaan tugas dan fungsi pelayanan PKP-PK

c. Penyedia Pelayanan PKP-PK untuk bandar udara (aerodrome) adalah orang atau organisasi yang memberikan pelayanan tersebut di bandar udara (aerodrome) bersangkutan.

d. Kategori bandar udara (aerodrome) adalah suatu tingkatan yang dihitung atau dirumuskan berdasarkan metoda yang ditetapkan dalam chapter 9.2 pada Annex 14 Konvensi Chicago.

e. Manual of Standard adalah suatu dokumen yang terkait dengan pengaturan dalam CASR 139, yang diterbitkan oleh Direktorat Jenderal Perhubungan Udara.

7.3 Tugas dan Fungsi dari PKP-PK.

a. Tugas dari PKP PK pada bandar udara (aerodrome) adalah :

1. Menyelamatkan manusia dan barangnya dari suatu pesawat udara yang mengalami kecelakaan atau kebakaran pada saat take off atau landing, dan ;
2. Mengendalikan dan memadamkan, melindungi manusia dan barangnya yang terancam oleh api atau kebakaran, di bandar udara (aerodrome) baik itu di pesawat udara atau bukan.

b. Ketentuan sebagaimana huruf a tidak menghalangi PKP-PK untuk memberikan pertolongan atau pemadaman kebakaran dtempat lain selain bandar udara (aerodrome), dengan ketentuan prioritas utama tetap pada bandar udara (aerodrome).

7.4 Ketentuan Penyediaan Pelayanan PKP-PK.

Penyedian atau pelayanan PKP-PK di bandar udara (aerodrome) harus mendapat izin dari Direktorat Jenderal Perhubungan Udara.

7.5 Penerbitan Manual of Standard.

Direktorat Jenderal Perghubungan Udara menetapkan Manual of Standard PKP-PK di bandar udara (aerodrome) meliputi :

a. Standar dan kiteria pelayanan PKP-PK

b. Prosedur, sistem dan dokumen pelayanan PKP-PK.

c. Standar fasilitas dan peralatan pelayanan PKP-PK.

d. Standar kecakapan, kualifikasi minimum dan standar training personil pelayanan PKP-PK.

e. Segala hal yang terkait dengan PKP-PK.

7.6 Pengaruh dari Manual of Standard.

a. Apabila Direktorat Jenderal Perhubungan Udara menetapkan suatu cara untuk mematuhi persyaratan yang terdapat dalam Bab ini, maka penyedia jasa PKP PK yang menggunakan cara tersebut dapat dianggap sudah memenuhi / mematuhi persyaratan dimaksud, kecuali yang terlihat adalah kebalikannya.

b. Direktorat Jenderal Perhubungan Udara dapat memeriksa lebih jauh kepatuhan penyedia jasa PKP - PK terhadap persyaratan yang ditetapkan Manual, dalam rangka memutuskan apakah pelayanan yang disediakan sudah cukup memadai atau belum.

7.7 Persyaratan yang harus dipenuhi oleh Penyedia Pelayanan PKP-PK.

Apabila standar yang berlaku menghendaki adanya suatu system atau prosedur bagi PKP PK, maka penyedia jasa harus menjamin bahwa sistem atau prosedur dimaksud tersedia dan diimplentasikan dan digunakan.

7.8 Standard dan Persyaratan Pelayanan PKP-PK.

a. Untuk bandar udara (aerodrome) :
   1. melayani penerbangan internasional
   2. melayani penerbangan domestic yang jumlah penumpang lebih besar 350.000 orang pertahun.
   3. Standard dan Persayaratan Pelayanan PKP-PK untuk bandar udara (Aerodrome) sebagaimana dimaksud butir 1 dan 2 berlaku ketentuan :
      a) Chapter 9 Annex 14 konvensi Chicago
      b) Manual of Standard.

b. Untuk bandar udara (aerodrome) selain bandar udara (aerodrome) sebagaimana dimaksud huruf a, standard dan persyaratan yang berlaku adalah standar dan persyaratan yang ditetapkan oleh Direktorat Jenderal Perhubungan Udara dan dipublikasikan dalam AIP.

c. Ketentuan untuk bandar udara (aerodrome) sebagaimana dimaksud huruf a. jumlah penumpang per tahun yang ditetapkan berdasarkan statistic yang dikeluarkan oleh Direktorat Jederal Perhubungan Udara.

7.9 Perbedaan (inconsistency) antara Manual of Standard dan Chapter 9 Annex 14.

Apabila persyaratan yang ditetapkan pada Manual of Standard, yang diberlakukan pada suatu bandar udara (aerodrome) tidak sama dengan yang ditetapkan dalam chapter 9. Annex 14 Konvensi Chicago, maka yang berlaku adalah persyaratan yang ditetapkan dalam Manual of Standard.

7.10 Pengetahuan, Peralatan dan Keahlian untuk menghadapi bahaya Penerbangan.

Penyedia jasa PKP-PK harus mempunyai pengetahuan, peralatan dan keahlian untuk menghadapi setiap keadaan bahaya yang mungkin timbul pada saat adanya kejadian (incident), kecelakaan (accident), termasuk semua bahaya yang disebutkan dalam Manual of Standard.

7.11 Kewajiban Mempertahankan Pelayanan PKP-PK.

a. Penyedia jasa PKP-PK harus menjamin bahwa pelayanan PKP-PK selalu tersedia selama kurun waktu sebagaimana yang dipublikasikan dalam AIP.

b. Ketentuan sebagaimana dimaksud huruf b. tidak menutup kemungkinan bahwa pada saat aktivitas penerbangan menurun, tingkat pelayanan (level of protection), diturunkan sampai dengan batas yang diijinkan oleh chapter 9. Annex 14 Konvensi Chicago.

7.12 Response Time PKP-PK.

a. PKP-PK harus mampu memenuhi kriteria respons time yang ditetapkan dalam chapter 9 annex 9 Konvensi Chicago.

b. Ketentuan sebagaimana dimaksud huruf a. berlaku bagi PKP-PK yang tidak mengikuti ketentuan Annex 14 Konvensi Chicago

7.13 Bangunan dan Fasilitas Keadaan Darurat (Emergency).

a. Bangunan dan fasilitas pelayanan PKP-PK meliputi:
   1. sebuah gedung / stasiun pemadam (Fire station)
   2. fasilitas komunikasi
   3. fasilitas untuk keperluan perawatan kendaraan dan peralatan
   4. fasilitas pelatihan
   5. fasilitas gudang

b. Apabila pada daerah bandar udara (aerodrome) terdapat perairan dalam jarak 1000 m dari threshold runway, harus tersedia fasilitas rescue boat, tempat penyimpanan dan tempat peluncurannya.

c. Bagunan fire station dan peralatan pelayanan PKP-PK harus sesuai dengan persyaratan yang telah ditetapkan dalam Manual of Standard.

d. Penggantian dan pengisian kembali pasokan air untuk kendaraan PKP-PK harus sesuai dengan ketentuan dalam Manual of Standard.

e. Jalan emergency untuk pelayanan PKP-PK di bandar udara (aerodrome) harus sesuai dengan ketentuan dalam Manual of Satandard.

f. Fasilitas dan bangunan lain yang harus disiapkan dalam pelayanan PKP-PK sebagai berikut:
   1. Suatu lokasi untuk bersiap siap (standby pont) dalam keadaan darurat, untuk memungkinkan kendaraan pemadam untuk mencapai respons time yang disyaratkan dalam Manual of Standard.
   2. Gudang untuk menyimpan persediaan bahan pemadan api.

7.14 Waktu Pelayanan PKP-PK.

a. Penyedia pelayanan PKP-PK harus dipublikasikan dalam AIP tentang waktu pelayanan PKP-PK.

b. Apabila karena suatu alasan (keadaan darurat di aerodrome), pelayanan PKP-PK secara sementara tidak dapat tersedia sesuai ketentuan dalam Bab ini, maka penyedia pelayanan PKP-PK harus menyampaikan kepada NOTAM Office tentang ketersediaan bahan pemadam api dari suatu jenis atau penurunan katagori tingkat pelayanan yang dipersyaratkan serta lama/durasi sampai dengan kembali kepada kondisi pelayanan normal.

c. Kondisi pelayanan PKP-PK sebagaimana dimaksud huruf b, harus dilaporkan kepada Direktorat Jenderal Perhubungan Udara secara tertulis tentang rencara penurunan standar dan pelayanan (waktu penurunan dan ketentuan melebihi ketentuan chapter 9 Annex 14 Konvensi Chicago);

d. Apabila pada bandar udara (aerodrome) yang bersertifikat, maka penyelenggara bandar udara (aerodrome) harus memastikan bahwa suatu prosedur yang disediakan sama buku pedoman pengoperasian bandar udara (aerodrome manual) dan memberitahukan kepada NOTAM office dan Direktorat Jenderal Perhubungan Udara.

7.15 Persediaan Bahan Pemadam Api.

a. Bahan pemadam api yang tersedia di bandar udara (aerodrome) harus sesuai dengan peralatan dan kendaraan yang ada berdasarkan standar yang ditetapkan.

b. Bahan pemadam api dimaksud harus disimpan sekurang kurangnya dalam jumlah minimal sesuai dengan yang ditentukan dalam standar

7.16 Peralatan dan Kendaraan Pemadam.

a. Peralatan dan kendaraan pemadam harus tersedia di bandar udara (aerodrome) sekurang kurangnya .... sesuai dengan standar.

b. Peralatan atau kendaraan sebagaimana dimaksud huruf a harus :

   a. mampu membawa bahan pemadam ke lokasi kebakaran sesuai dengan yang dipersyaratkan.

   b. mempunyai kinerja (performance) sesuai dengan yang dipersyaratkan.

c. Kendaraan pemadam harus membawa suatu peralatan tambahan sesuai dengan yang dipersyaratkan.

d. Setiap kendaraan dan peralatan harus dalam kondisi beroperasi dengan baik.

e. Warna kendaraan harus sesuai dengan yang dipersyaratkan.

f. Penyelenggara pelayanan PKP-PK harus mempertahankan buku petunjuk perawatan (maintenance instruction) untuk setiap kendaraan dan peralatan yang dimiliki termasuk semua informasi yang diperlukan guna memungkinkan personil yang mempunyai kemampuan secara teknis melakukan perawatan, pemantauan kinerja, pelaporan kerusakan, pelaporan kesalahan dan penyimpanan catatan-catatan dari kendaraan atau peralatan.

7.17 Kendaraan dan Peralatan lain.

a. Selain kendaraan dan peralatan pemadam, di aerodrome harus ada kendaraan dan peralatan lain dalam jumlah yang memadai untuk pelaksanaan pelayanan, sesuai dengan standar dan persyaratan yang berlaku.

b. Kinerja kendaraan dan peralatan ini harus sesuai dengan standar dan persyaratan yang berlaku.

c. Kendaraan dimaksud harus membawa peralatan tambahan sesuai dengan standar dan persyaratan yang berlaku.

d. Penyelenggara pelayanan PKP-PK harus mempertahankan buku petunjuk perawatan (maintenance instruction) untuk setiap kendaraan dan peralatan lain yang dimiliki termasuk semua informasi yang diperlukan guna memungkinkan personil yang mempunyai kemampuan secara teknis melakukan perawatan, pemantauan kinerja, pelaporan kerusakan, pelaporan kesalahan dan penyimpanan catatan-catatan dari kendaraan atau peralatan.

7.18 Kendaraan dan Peralatan untuk Lingkungan yang sulit.

a. Apabila pergerakan pesawat udara di bandar udara pada daerah perairan atau rawa-rawa atau daerah sulit lainnya yang cukup luas, maka harus disediakan kendaraan dan peralatan PKP-PK khusus, sesuai tingkat kesulitan dan bahaya yang dihadapi.

b. Kendaraan dan peralatan PKP-PK khusus sebagaimana dimaksud huruf a. harus tersedia dalam jumlah sekurang kurangnya sesuai dengan standar dan persyaratan yang berlaku.

c. Kendaraan dan peralatan PKP-PK khusus sebagaimana dimaksud huruf a. harus berwarna sesuai warna sesuai dengan standar dan persyaratan yang berlaku.

7.19 Komisioning terhadap peralatan tertentu.

Setiap kendaraan dan peralatan PKP-PK yang akan dioperasikan harus mendapat persetujuan dari Direktorat Jenderal Perhubungan Udara setalah memenuhi persyaratan buku pedoman pengoperasian bandar udara dan Manual of Standard.

7.20 Pakaian pelindung dan peralatan.

Untuk Personil Pertolongan Kecelakaan Penerbangan dan Pemadam Kebalaran di bandar udara (aerodrome), harus tersedia :

1) Pakaian pelindung dan jumlah sekurang kurangnya sesuai dengan standar dan persyaratan yang berlaku.
2) Peralatan pelindung lain dalam jumlah dan jenis sesuai dengan standar dan persyaratan yang berlaku.

7.21 Komunikasi.

a. Peralatan komunikasi harus tersedia di bandar udara (aerodrome) dalam jumlah yang memadai pada saat pelaksanaan pelayanan PKP-PK.

b. Kendaraan yang dioperasikan untuk pelayanan PKP-PK harus membawa peralatan komunikasi sesuai dengan standar dan persyaratan yang berlaku.

c. Personil yang mengoperasikan peralatan komunikasi harus memiliki sertifikat sesuai dengan standar dan persyaratan yang berlaku.

d. Pengoperasian alat komunikasi sebagaimana dimaksud huruf a. tidak dibenarkan mengganggu sistem komunikasi pemandu lalulintas udara di bandar udara (aerodrome).

7.22 Peralatan untuk pengujian dan perawatan.

a. Penyedia pelayanan PKP-PK harus mempunyai peralatan dan perkakas sesuai dengan standar dan persyaratan yang berlaku untuk menguji dan melakukan perawatan kendaraan dan peralatan PKP-PK.

b. Apabila standar dan persyaratan yang berlaku sebagaimana dimaksud huruf a. mensyaratkan tambahan suatu peralatan pengujian atau perawatan, maka penyedia pelayanan PKP-PK harus menyediakan peralatan tersebut.

7.23 Komisioning kendaran dan Peralatan baru.

Penyedia pelayanan PKP-PK tidak dibenarkan mengoperasikan kendaraan dan peralatan yang dapat mempengaruhi kualitas atau rate of charge bahan pemadam, kecuali:

a. Kendaraan atau peralatan dimaksud telah disetujui oleh Direktorat Jenderal Perhubungan Udara, setelah spesifikasi memenuhi standar dan persyaratan yang berlaku.
b. Semua pelatihan yang diperlukan bagi para personil telah selesai dan lengkap dilaksanakan.

7.24 Jumlah Personil Operasi.

a. Selama jangka waktu pelayanan PKP-PK diberikan di bandar udara (aerodrome) sebagaimana dicantumkan dalam AIP, harus tersedia cukup personil terlatih untuk mengoperasikan kendaraan dan peralatan yang diperlukan dengan kapasitas penuh.
b. Personil sebagaimana dimaksud pada huruf a. ditempatkan pada posisi dimana memungkinkan PKP-PK dapat memberikan respons sekurang kurangnya sama cepat dengan respons time yang ditetapkan dalam standar dan persyaratan yang berlaku.

7.25 Standar Kesehatan Personil PKP-PK.

a. Personil PKP-PK harus memenuhi standar kesehatan yang ditetapkan dalam Manual of Standard.
b. Kesehatan Personil PKP-PK sebagaimana dimaksud pada huruf a. harus pertahankan dengan suatu system (pemeriksaan secara berlanjut/berkala), sehingga dapat diketahui dengan pasti kondisi kesehatan Personil PKP-PK.

7.26 Kualifikasi dan Pelatihan anggota PKP-PK.

a. Personil PKP-PK harus sudah diberikan pelatihan sekurang kurangnya seseuai dengan standar yang ditetapkan.
b. Sebelum ditugaskan/diberi tanggung jawab secara operasional, mereka juga harus sudah mendapatkan suatu training khusus berkaitan dengan bagaimana menghadapi bahaya yang spesifik berkaiatan dengan penerbangan.
c. Mereka yang dipekerjakan sebagai anggota PKP-PK harus mendapatkan pelatihan yang sesuai untuk membuat mereka mengenal dengan baik situasi/ lingkungan setempat.
d. Untuk menjamin agar para anggota PKP-PK selalu memenuhi standar yang ditetapkan, maka harus ada kegiatan training secara terus menerus dan berlanjut bagi mereka.
e. Apabila pergerakan pesawat udara di bandar udara (aerodrome) bersangkutan ada pada daerah perairan, rawa atau daerah yang sulit yang cukup luas, maka para anggota PKP-PK harus mendapatkan pelatihan yang memadai untuk dapat melaksanakan tugasnya pada lingkungan seperti dimaksud.

7.27 Manual Operasi.

a. Untuk pelayanan PKP-PK di bandar udara (aerodrome) harus tersedia manual operasi yang sesuai dengan Manual of Standard.
b. Manual Operasi sebagaimana dimaksud pada huruf a. harus memuat :
   1. organisasi pelaksana pelayanan PKP-PK;
   2. pembagian tugas dan fungsi masing-masing bagan organisasi;
   3. tugas dan fungsi pelayanan PKP-PK dalam bandar udara Emenrgency Procedure.
c. Manual Operasi harus dijaga agar tetap dalam kondisi up to date

d. Setiap Personil PKP-PK harus mempunyai akses yang mudah untuk mendapatkan satu copy dari Manual Operasi yang up to date
e. Penyedia pelayanan PKP-PK harus memberikan satu copy Manual Operasi beserta segala perubahannya, kepada Direktorat Jenderal Perhubungan Udara.
f. Manual Operasi yang up to date harus ada tersedia pada setiap unit operasi di bandar udara.
g. Penyedia pelayanan PKP-PK harus memenuhi semua persyaratan yang tercantum dalam Manual Operasi.

7.28 Amendemen terhadap Manual Operasi.

a. Penyedia Pelayanan PKP-PK atau atas perintah Direktorat Jenderal Perhubungan Udara dapat melakukan perubahan Manual Operasi PKP-PK sebagaimana dimaksud dalam angka 7.27.
b. ....
c. Penyedia layanan harus mematuhi permintaan dimaksud.

7.29 Perekaman Voice Data.

Penyedia Pelayanan PKP-PK harus menyediakan suatu system perekaman secara elektronik terhadap semua komunikasi lewat radio maupun telepon selama operasi PKP-PK berlangsung sesuai dengan Manual Of Standard.

7.30 Pencatatan Accident dan Incident.

Penyedia Pelayanan PKP-PK harus memiliki sistem mencatat secara rinci setiap kecelakaan (accident) atau kejadian (incident) pesawat udara, kebakaran dalam rangka pengoperasian PKP-PK sesuai dengan Manual of Standard.

7.31 Contingency Plan.

a. Penyedia Pelayanan PKP-PK harus memiliki suatu rencana prosedur untuk dipakai pada saat keadaan darurat yang mengakibatkan atau mungkin dapat mengakibatkan pelayanan keadaan darurat menjadi terhenti atau terganggu sesuai dengan Manual of Standard.
b. Rencana prosedur sebagaimana dimaksud pada huruf a. meliputi :
    1. Langkah yang harus diambil oleh personil PKP-PK.
    2. Kemungkinan suatu pengaturan alternative penyediaan pelayanan (yang terdiri dari pengaturan, pengadaan kendaraan atau suku cadang yang diperlukan).
    3. Prosedur pemeberitahuan.
    4. Prosedur untuk kembali kedalam keadaan pelayanan normal.

7.32 Manajemen Pencatatan/Perekaman.

a. Penyedia Pelayanan PKP-PK harus memiliki suatu system untuk mengumpulkan, memberi index, menyimpan dan mempertahankan rekaman/catatan yang berkaitan dengan pelayanan PKP-PK sesuai dengan Manual of Standard.
b. Rekaman/ Catatan harus meliputi:
    1. Rekaman suara yang dibuat ;
    2. Catatan / rekaman tentang kecelakaan (accident) dan kejadian (kejadian).

c. Rekaman/catatan sebagaimana dimaksud huruf a. harus disimpan untuk jangka waktu 5 (lima) tahun dan untuk suatu catatan tertentu dapat lebih singkat apabila ditetapkan dalam buku pedoman pengoperasian bandar udara.

7.33 Organisasi.

Penyedia Pelayanan PKP-PK harus mempertahankan organisasi sesuai dengan struktur manajemen yang baik dan efektif serta dikaitkan dengan keberadaan dan kondisi pelayanan yang diberikan.

7.34 Sistem untuk ralat / pembetulan untuk suatu kegagalan pelayanan.

Penyedia Pelayanan PKP-PK harus memiliki sistem untuk meralat atau membetulkan suatu kesalahan atau kegagalan yang mengakibatkan terjadi atau mungkin terjadinya suatu penghentian pelayanan atau penurunan standar pelayanan PKP-PK sesuai dengan Manual of Standard.

7.35 Quality Control.

Penyedia Pelayanan PKP-PK harus memiliki suatu system untuk menjamin bahwa pelayanan yang diberikan adalah sesuai dengan persyaratan yang ditetapkan dalam Bab. VII ... sesuai dengan Manual of Standard.

7.36 Manajemen Penggantian.

Penyedia Pelayanan PKP-PK harus memiliki suatu system sesuai dengan Manual of Standard untuk mengatur penggantian terhadap :

a. Peralatan dan prosedur.
b. Hal-hal yang dilakukan dalam pelayanan.
c. Tingkat ataupun jenis pelayanan yang diberikan.
d. Tara cara pemberian pelayanan.

7.37 Manajemen Keselamatan (Safety Management).

Penyedia Pelayanan PKP-PK harus memiliki Safety Management System untuk pelayanan PKP PK, sesuai dengan Manual of Standard, yang meliputi kebijakan, prosedur, dan praktek yang diperlukan untuk pelayanan PKP-PK.

7.38 Organisasi Penyedia Jasa PKP-PK.

a. Penyedia Pelayanan PKP-PK harus menyampaikan kepada Direktorat Jenderal Perhubungan Udara secara tertulis hal-hal sebagai berikut:
   1. Kepala Unit (Manager) PKP-PK.
   2. Struktur organisasi.
   3. Jumlah anggota PKP-PK.
b. Penyedia Pelayanan PKP-PK harus menyampaikan secara tertulis kepada Direktorat Jenderal Perhubungan Udara terhadap perubahan sebagaimana dimaksud huruf a.

7.39 Pemberitahuan tentang perubahan perubahan kepada Direktorat Jenderal Perhubungan Udara.

a. Penyedia Pelayanan PKP-PK harus memiliki suatu prosedur pemberian informasi keselamatan yang terkait dengan perubahan, kesalahan atau pemutusan pemberian pelayanan PKP-PK sesuai dengan Manual of Standard.

b. Prosedur sebagaimana dimaksud huruf a. harus dilaporkan kepada Direktorat Jenderal Perhubungan Udara, AIS dan NOTAM Office.

c. Apabila dalam jangka waktu 24 jam Penyedia Pelayanan PKP-PK tidak dapat melaksanakan atau gagal memberikan pelayanan PKP-PK sesuai dengan standar dan persyaratan dalam ketentuan ini, maka penyedia jasa PKP-PK harus menyampaikan kepada Direktorat Jenderal Perhuibungan Udara secara tertulis, sesegera mungkin tentang:
   1. Alasan tidak dapat melaksanakan atau gagal memberikan pelayanan sesuai dengan standard an persyaratan.
   2. Jangka waktu tidak dapat melaksanakan atau gagal memberikan pelayanan sesuai dengan standard dan persyaratan untuk kembali normal.
   3. Langkah langkah yang telah dan akan diambil oleh Penyedia Pelayanan PKP-PK untuk mengembalikan sesuai dengan standard dan persyaratan (normal).

DIREKTUR JENDERAL PERHUBUNGAN UDARA

CUCUK SURYO SUPROJO
NIP.120089499

APPENDIX – 1

AERODROME MANUAL

1. Umum.

1.1 Bandar Udara yang bersertifikat (certified aerodrome) merupakan data atau informasi yang dijadikan referensi atau pedoman dalam mengoperasikan bandar udara.

1.2 Buku Pedoman Pengoperasian Bandar Udara (Aerodrome Manual) harus memuat tentang :

a. lingkup dan tujuan dari Buku Pedoman Pengoperasian Bandar Udara (*aerodrome manual*);
b. dasar hukum Sertifikat Bandar Udara (aerodrome sertifikat) dan buku pedoman pengoperasian bandar udara (aerodrome manual);
c. status penggunaan bandar udara (aerodrome), termasuk suatu pernyataan yang menunjukkan pemenuhan terhadap ketentuan article 15 dari Chicago Convention, antara lain tentang penggunaan bandar udara (*aerodrome)* yang berlaku sama tanpa ada perbedaan perlakuan.
d. tersedia sistem informasi aeronautica (*aeronautical information system*) dan prosedur penyebaran.
e. sistem pencatatan pergerakan pesawat udara (*system for recording aircraft movement*).
f. tanggung jawag penyelenggara bandar udara (*Aerodrome)*.

2. Data atau Informasi Lokasi Bandar Udara (Aerodrome).

Data atau informasi Lokasi bandar udara (Aerodrome) sekurang-kurangnya memuat tentang :

a. peta bandar udara (*aerodrome)* yang memperlihatkan fasilitas utama bandar udara (*aerodrome)*, termasuk wind direction indicator untuk pengoperasian bandar udara (*aerodrome).*
b. peta bandar udara (aerodrome) yang memperlihatkan batas batas wilayah bandar udara (*aerodrome)*.
c. peta yang memperlihatkan jarak bandar udara (*aerodrom*e) ke kota atau tempat lain yang berpenduduk padat, serta lokasi fasilitas bandar udara (aerodrome) yang ada di luar wilayah bandar udara (*aerodrome)*.
d. sertifikat tanah lokasi bandar udara (*aeroderome)* atau bukti kepemilikan / penguasaan atas tanah lokasi bandar udara (aerodrome) yang disertai peta batas-batas tanah lokasi bandar udara (*aerodrome).*

3. Data atau Informasi untuk dilaporkan kepada Pelayanan Informasi Aeronautika (Aeonautical Indformation Service/AIS).

3.1 Informasi Umum.

Informasi yang tentang bandar udara (*aerodrome)* , yang berisikan data:

a. Nama bandar udara (*aerodrome).*
b. Propinsi daerah lokasi bandar udara (*aerodrome).*

c. Koordinat lokasi bandar udara (aerodrome), yang berupa koordinat dari bandar udara (aerodrome) reference point dalam sistem koordinat WGS 84 .
d. Elevasi bandar udara (aerodrome) dan geoid undulation.
e. Elevasi dari:
   1. Masing-masing threshold dan geoid undulation;
   2. Masing-masing ujung runway; dan
   3. Touch down zone yang tertinggi pada precision approach runway.
f. Aerodrome reference temperature;
g. Aerodrome beacon;
h. Nama penyelenggara bandar udara (*aerodrome)* beserta alamat dan nomor telepon yang bisa dihubungi setiap saat;
i. Informasi lain yang penting , antara lain:
   1. Jam operasi bandar udara (aerodrome).
   2. Ground Service yang tersedia.
   3. Prosedur khusus, bila ada.
   4. Prosedur lokal

3.2 Dimensi Bandar Udara (Aerodrome) dan Informasi yang terkait.

Informasi untuk masing-masing runway :

a. true bearing ranway; runway designation number; panjang; lebar; slope; lokasi displaced Threshold, bila ada; jenis permukaan; jenis runway; dan keberadaan suatu obstacle free zone untuk keperluan precision approach runway.
b. panjang, lebar dan jenis permukaan dari runway strip, runway end safety area dan stopway.
c. jenis permukaan apron beserta tempat parkir pesawat (aircraft stand)
d. panjang clearway dan profil permukaan tanah.
e. visual aids, jenis approach lighting, visual approach slope indicator system, marka dan lighting untuk runway, taxiway dan apron, visual guidance and control aids yang lainnya untuk taxiway dan apron, jenis docking guidance system serta ketersediaan stand by power.
f. lokasi dan frequaensi VOR
g. lokasi dan designation tiap standar taxi route.
h. koordinat geografis dari masing-masing threshold
i. koordinat geografis dari masing-masing tempat parkir pesawat udara (ircraft stand)
j. koordinat geografis dan elevasi puncak dari obstacle yang ada di daerah approach dan climb surface, di daerah circling, dan daerah seputar bandar udara (aerodrome)
k. jenis permukaan daerah perkerasan dan kekuatan daya dukungnya, mengunakan metoda Aircraft Classification Number – Pavement Classification Number (metoda ACN-PCN)
l. lokasi dari tempat Pre-flight altimeter check yang disediakan di apron beserta elevasinya.
m. declare distance; untuk take off run available; take off distance available; accelerate-stop distance available dan landing distance available untuk masing-masing arah runway
n. tatacara pemindahan pesawat udara yang rusak (Disable aircraft removal plan); informasi tentang semua pihak yang terlibat dalam pemindahan pesawat udara yang rusak yang diperlukan oleh koordinator di bandar udara (aerodrome) dan informasi tentang kemampuan bandar udara (aerodrome) untuk memindahkan pesawat yang

rusak, yang dinyatakan dengan kemampuan memindahkan maksimum (pesawat udara yang paling besar) dari peralatan pemindah yang tersedia

o. Pertolongan Kecelakaan Penerbangan dan Pemadam Kebakaran / PKP PK (Rescue and Fire Fighting) – tingkat perlindungan yang tersedia, yang dinyatakan dengan katagori (sesuai ketentuan ICAO annex 14 tentang pelayanan Rescue and Fire Fighting).

4. Prosedur Pengoperasian Bandar Udara (*Aerodrome)* dan tindakan tindakan keselamatan.

4.1 Aerodrome Reporting

Prosedur–prosedur untuk pelaporan perubahan yang terjadi pada informasi yang ditetapkan dalam AIP dan prosedur-prosedur untuk permintaan penerbitan NOTAM, meliputi hal-hal sebagai berikut:

a. Prosedur pembuatan laporan tentang perubahan perubahan yang terjadi, yang dapat mempengaruhi keselamatan operasi pesawat udara, kepada AIS, Air Traffic Service dan Direktorat Jenderal Perhubungan Udara dan membuat catatan tentang perubahan dan pelaporan dimaksud baik selama jam operasi maupun diluar jam operasi

b. Nama/ jabatan serta tugas dan tanggung jawab pejabat/ petugas yang diberi wewenang untuk menangani pelaporan dimaksud, termasuk nomor telepon dari pejabat/ petugas tersebut yang dapat dihubungi baik selama jam operasi maupun diluar jam operasi.

c. Data lengkap dan rinci dari organisasi dan personil yang diberi/ menerima laporan perubahan dimaksud.

4.2 Akses kedalam Aerodrome Movement Area.

Hal-hal penting dalam prosedur yang telah dikembangkan dan yang harus diikuti / dilaksanakan dengan berkoordinasi dengan unit kerja lain yang berwenang untuk mengawasi akses dan mencegah masuknya orang-orang yang tidak berhak, kendaraan, peralatan dan binatang ataupun sesuatu yang lain, yang dapat membahayakan keselamatan operasi pesawat udara kedalam daerah pergerakan (movement area), meliputi hal hal sebagai berikut:

a. Peranan dan kewajiban/ tanggung jawab penyelenggara bandar udara (aerodrome), operator pesawat udara, organisasi security, Direktorat Jenderal Perhubungan Udara dan Departemen/Instansi Pemerintah lain yang terkait

b. Nama-nama dan peran dari personil yang bertanggung jawab untuk menjaga dan mengawasi akses ke dalam movement area beserta nomor telepone yang bisa daipakai untuk menghubungi mereka sepanjang atau diluar jam operasi.

4.3 Aerodrome Emergency Plan

Bagian penting dalam suatu Emengency Plan meliputi sekurang kurangnya hal-hal sebagai berikut:

a. Tata cara untuk menghadapi keadaan ndarurat / emergency yang terjadi di bandar udara (aerodrome) atau dekat diseputar bandar udara (aerodome) yang meliputi keadaan darurat pesawat udara yang sedang terbang, kebakaran bangunan atau gedung, ancaman bom terhadap pesawat udara ataupun terhadap bangunan/

instalasi penting, pembajakan pesawat udara, atau suatu kejadian di kawasan bandar udara, mencakup waktu selama dan sesudah keadaan darurat berlangsung.

b. Pengetesan/ pengujian fasilitas dan peralatan bandar udara (aerodrome) yang dipakai untuk menanggulangi keadaan darurat/ emergency, beserta pengaturan untuk menjaga agar fasilitas dan peralatan dimaksud selalu dalam kaeadaan siap, termasuk jangka waktu/ frekuensi pengetesan/ pengujian.

c. Pengaturan untuk diadakan tinjau ulang (review) dan pengtesan/ pengujian terhadap aerodrome emergency plan

d. Penggerakan/ pengaktifan, pengendalian dan koordinasi organisasi pelayanan darurat yang tergabung dalam emergency plan, unit kerja dan personil pemerintah, baik didalam maupun diluar bandar udara (*aerodrome)*, selama keadaan darurat, termasuk daftar lengkap setiap komponen emergency plan.

e. Pembentukan dan komposisi Aerdrome Emergency Committee, dengan kewajiban/ tanggung jawab fungsional, masing masing (organisasi) anggota sekurang kurangnya sampai dengan penyelenggaraan training, dan persiapan-persiapan lain dalam menghadapi keadaan darurat, antara lain:

f. daftar lengkap dan rinci organisasi pelayanan darurat yang tergabung dalam emergency committee

g. suatu penjabaran dari peranan masing-masing organisasi pelayanan darurat yang terlibat dalam plan

h. respon operasional terhadap keadaan darurat, meliputi akses kedalam bandar udara (*aerodrome)* dan lokasi-lokasi tempat berkumpul (assembly areas)

i. respon terhadap panggilan local stand-by

j. respon terhadap panggilan emergency penuh

k. pengaturan untuk kembali kepada status operasi normal kembali setelah keadaan darurat

l. penunjukan pimpinan operasi lapangan (on-scene commander), untuk keseluruhan operasi keadaan darurat.

4.4 Pertolongan Kecelakaan Pesawat Udara dan Pemadam Kebakaran (Aerodrome Rescue and Fire Fighting Service).

Informasi tentang fasilitas, peralatan, personil dan prosedur untuk memenuhi persyaratan pemadam kebakaran (Fire Fighting), meliputi nama dan peranan personil yang bertanggung jawab terhadap pelayanan pertolongan kecelakaan penerbangan dan pemadam kebakaran di bandar udara (*aerodrome).*

4.5 Pemeriksan/ inspeksi terhadap daerah pergerakan (movement area) dan Obstacle Limitation Surface.

Prosedur-prosedur untuk Inspeksi Keselamatan pada daerah pergerakan (movement area) dan Obstacle Limitation Suface meliputi sekurang-kurangnya sebagai berikut:

a. Pengaturan dilaksanakannya inspeksi rutin dan khusus terhadap daerah pergerakan selama dan sesudah jam operasi.

b. Pengaturan dilakukannya test friksi terhadap runway dan pengukuran kedalaman air pada runway dan taxi way.

c. Rincian tenggang waktu (interval) pelaksanaan inspeksi dan waktu dilaksanakannya inspeksi;

d. Pengaturan tentang penggunaandan penyimpanan log book dan tempat penyimpanan log book dimaksud;

e. Check list inspeksi yang rinci.
f. Pengaturan untuk dapat berkomunikasi dengan pengatur lalu lintas udara (ATC) selama inspeksi
g. Pengaturan tentang pelaporan hasil inspeksi dan test untuk tindak lanjut yang cepat guna menjamin adanya perbaikan terhadap kondisi yang tidak safe.
h. Nama dan peranan dari personil yang bertanggung jawab melaksanakan inspeksi beserta nomor telepon yang bersangkutan untuk dapat dihubungi selama dan sesudah jam operasi bandar udara (*aerodrome*.)

4.6 Alat Bantu Visual (Visual Aids) dan Sistem Kelistrikan (Electrical System)

Prosedur penting untuk inspeksi dan pemeliharaan bandar udara (*aerodrome)* lighting (termasuk obstacle lighting), rambu, dan sistem kelistrikan bandar udara (aerodrome electrical system), termasuk stand by power supply, secara rinci meliputi hal-hal sebagai berikut:

a. Pengaturan pelaksanaan inspeksi selama atau diluar jam operasi normal bandar udara (*aerodrome)*, beserta check list untuk semua inspeksi.
b. Penyelenggaraan pencatatan hasil inspeksi dan pengujian, dan tindak lanjut berupa perbaikan terhadap kekurangan-kekurangan yang ditemukan
c. Penyelenggaraan kinerja pelaksanaan pemeliharaan rutin dan darurat.
d. Pengaturan penyediaan stand- by power atau kalau ada cara khusus yang lain, untuk menghadapi kegagalan sistem baik secara parsial maupun total.
e. Nama dan peranan personil yang bertanggung jawab melakukan inspeksi dan pemeliharaan terhadap aerodrome lghting system, beserta nomor telepon yang bersangkutan untuk dapat dihubungi selama dan sesudah jam operasi bandar udara (*aerodrome)*.

4.7 Pemeliharaan Daerah Pergerakan (Movement area)

Prosedur, fasilitas dan peralatan yang dipergunakan untuk melaksanakan perawatan daerah pergerakan sekurang-kurangnya meliputi hal hal sebagai berikut:

a. Penyelenggaraan perawatan daerah perkerasan
b. Penyelenggaraan perawatan daerah tanpa perkerasan
c. Penyelenggaraan perawatan runway strip, taxiway strip dan
d. Penyelenggaraan perawatan sistem drainase bandar udara (aerodrome).

4.8 Penyelenggaraan Aerodrome Work Safety.

Uraian dari prosedur-prosedur perencanaan dan pelaksanaan pekerjaan bandar udara (*aerodrome)* secara aman/ selamat (termasuk pekerjaan-pekerjaan yang mungkin harus dikerjakan secara mendadak), di dalam atau di luar lingkungan movement area, dan yang mungkin melewati/menembus ketinggian obstscle limitation surface adalah meliputi rincian sebagai berikut :

a. Persiapan suatu rancangan untuk mengidentifikasi daerah-daerah pada bandar udara (aerodrome) yang terkena/mendapat giliran dikerjakan pada setiap tahapan pekerjaan, dan langkah-langkah yang mesti diambil untuk meyakinkan bahwa standar keselamatan terpenuhi.
b. Penyelenggaraan komunikasi dengan Asir Traffic Control dan dengan pesawat udara bila diianggap perlu, selama pelaksanaan pekerjaan.

c. Nama serta peranan dari personil dan organisasi yang bertanggung jawab terhadap perencanaan dan pelaksanaan pekerjaan, nomor telepon masing-masing yang bersangkutan, dan pengaturan hubungan komunikasi dengan mereka setiap saat.
d. Pengaturan pemberitahuan kepada operator pesawat udara dan pengguna bandar udara (*aerodrome)*, tentang rencana pekerjaan dan nomor telepon para operator dan pengguna bandar udara (*aerodrome)* dimaksud, untuk dapat dihubungi setiap saat selama dan sesudah jam operasi.
e. Daftar distribusi dari rencana pekerjaan (Work Plan)

4.9 Manajemen Operasi Apron.

Manajemen Apron meliputi prosedur pengaturan parkir pesawat udara, yang terdiri dari:

a. Pengaturan antara pemandu lalulintas udara dan manajemen apron
b. Pengaturan terhadap alokasi tempat parkir pesawat udara dan pemberitahuannya kepada operator pesawat udara (perusahaan penerbangan)
c. Pengaturan tentang memulai start engine, dan mendapatkan ijin (clearance) untuk mulai push-back
d. Inventarisasi dan uraian tentang *activation* dan *deactivation* visual docking guidance system yang dipergunakan *di bandar udara (aerodrome*)
e. Marshalling service
f. Leader (van) service atau Follow me service
g. Nama beserta peranan dan nomor telepon pejabat/ personil yang bertanggung jawab atas perencanaan dan pelaksanaan pengaturan parkir pesawat udara.

4.10 Manajemen Keselamatan Apron (Apron Safety Management).

Prosedur-prosedur yang termasuk dalam manajemen keselamatan apron antara lain meliputi:

a. Perlindungan terhadap jet blast
b. Pengawasan terhadap pelaksanaan safety precaution pada saat kegiatan refuelling
c. Penyapuan apron
d. Pembersihan apron
e. Penyelenggaraan pelaporan incident dan accident di apron
f. Penyelenggaraan audit terhadap pemenuhan/ kepatuhan para personil yang bekerja di apron akan aturan keselamatan

4.11 Pengawasan/ Pengaturan Kendaraan di Sisi udara.

Prosedur-prosedur yang berlaku untuk pengawasan/ pengaturan kendaraan darat di daerah pergerakan (movement area) adalah meliputi:

a. Aturan berlalulintas (prosedur pergerakan kendaraan), dan sarana penegakan aturan dimaksud
b. Tata cara untk memberi instruksi dan menguji para pengemudi, terkait dengan aturan berlalulintas dimaksud.
c. Tata cara untuk menerbitkan ijin kendaraan dan ijin mengemudi untuk operasi di sisi udara
d. Sarana dan tata cara memaksakan kepatuhan / pemenuhan terhadap ketentuan/ aturan
e. Nama, peranan dan nomor telepon dari pejabat/ personil yang bertanggung jawab terhadap pengawasan/ pengaturan kendaraan di di nsisi udara.

4.12 Manajemen Bahaya Hewan liar (Wildlife Hazard Management).

Prosedur yang berlaku untuk berhadapan dengan masalah bahaya yang ditimbulkan oleh keberadaan burung-burung atau hewan liar lain di atau dekat bandar udara (*aerodrome)* terhadap operasi pesawat udara, meliputi:

a. Penyelenggaraan pemeriksaan terhadap adanya bahaya yang ditimbulkan oleh burung-burung atau hewan liar lain.
b. Melakukan pengawasan atau menghilangkan adanya bahaya yang ditimbulkan oleh adanya burung-burung dan binatang liar lain
c. Nama dan peranan pejabat/ personil yang bertanggung jawab terhadap urusan bahaya yang ditimbulkan oleh keberadaan burung–burung dan hewan liar lain, beserta nomor telepon yang bersangkutan untuk dapat dihubungi baik pada jam operasi maupun sesudah jam operasi.

4.13 Pengawasan terhadap Obstacle (Obstacle Control).

Prosedur-prosedur yang berkaitan dengan pengawasan terhadap obyek-obyek dalam bandar udara (*aerodrome)* maupun disekitar bandar udara (*aerodrome)* yang berpotensi untuk menjadi atau yang sudah merupakan obstacle, yang berpengaruh terhadap keselamatan ataupun efisiensi operasi *aerodrome,* meliputi sekurang kurangnya :

a. Melakukan pemantauan terhadap obstacle limitation surface dan take off surface chart type A terkait adanya obstacle.
b. Melakukan pemantauan terhadap tumbuhnya bangunan bangunan tinggi dalam batas horisontal dari obstacle limitation surface.
c. Melakukan pengawasan terhadap obstacle atau obyek yang potensial menjadi obstacle dalam wilayah bandar udara (*aerodrome)* .
d. Melakukan pengawasan/pengaturan terhadap pengembangan bangunan baru diseputar bandar udara (*aerodrome)* dengan melakukan kerjasama antara penyelenggara bandar udara (*aerodrome)*, Direktorat Jenderal Perhubungan Udara serta Pemerintah Daerah setempat dan organisasi lain terkait, sehubungan dengan pemberian ijin terhadap bangunan yang mungkin mengganggu obstacle limitation surface.
e. Menyampaikan kepada Direktorat Jenderal Perhubungan Udara tentang jenis/ sifat dan lokasi obstacle, tentang adanya tambahan baru obstacle atau tentang pembongkaran obstacle untuk mendapatkan penanganan bila perlu, termasuk amendmen terhadap publikasi dalam AIP
f. Prosedur untuk melakukan pemantauan terhadap obyek baru atau perkembangan bangunan-bangunan didaerah daerah yang ditunjuk oleh pembuat instrumen approach procedure, bagi bandar udara (*aerodrome)* yang mempunyai instrument approach procedure.
g. Nama, peranan dan nomor telepon dari pejabat/ personil yang bertanggung jawab atas Pengawasan terhadap Obstacle (Obstacle Control)

4.14 Pemindahan pesawat udara yang rusak.

Prosedur-prosedur yang berlaku untuk kegiatan pemindahan pesawat udara yang rusak pada atau dekat daerah pergerakan, meliputi hal hal rinci sebagai berikut:

a. Peranan dari penyelenggara bandar udara (*aerodrome)* dan pemegang sertifikat registrasi pesawat udara

b. Pengaturan tentang hubungan dengan pemandu lalulintas udara dan organisasi yang bertanggung jawab terhadap penyelidikan kecelakaan pesawat udara
c. Pengaturan untuk mendapatkan peralatan dan personil yang akan dipergunakan untuk melakukan pemindahan pesawat udara dimaksud.
d. Nama-nama dan peranan pejabat/ personil yang bertanggung jawab terhadap penyelenggaraan pemindahan pesawat udara yang rusak, beserta nomor telepon yang bersangkutan untuk dapat dihubungi selama atau sesudah jam operasi bandar udara (*aerodrome)*

4.15 Penanganan barang/ bahan berbahaya.

Bagian-bagian dari prosedur untuk penanganan yang aman bagi barang-barang/ bahan-bahan yang berbahaya (namun tidak termasuk yang diklasifikasikan sebagai barang/bahan berbahaya untuk diangkut dengan pesawat udara) di bandar udara (*aerodrome)*, meliputi hal hal sebagai berikut:

a. Nama-nama, nomor telepon dan peranan dari pejabat/ personil yang menerima dan menangani barang-barang berbahaya dimaksud.
b. Penyediaan suatu lokasi khusus di bandar udara (*aerodrome)* untuk disiapkan menjadi tempat penyimpanan bahan cair yang mudah terbakar (meliputi bahan bakar untuk pesawat udara) dan semua barang/ bahan berbahaya lain.
c. Tata cara/ metoda yang diikuti dalam kegiatan penyerahan, penyimpanan, pembagian/ pengisian dan penanganan barang/ bahan dimaksud

4.16 Operasi visibility rendah.

Isi dari prosedur-prosedur yang dipakai untuk mengatur kegiatan darat disuatu bandar udara (aerodrome) yang melakukan operasi pada visibility rendah yang diijinkan, meliputi hal hal sebagai berikut:

a. Pengaturan tentang pengukuran visibility sepanjang runway, dan melaporkan hasilnya kepada pemandu lalulintas udara, bila diperlukan
b. Penyelenggaraan pengaturan dan mengurangi seminimal mungkin kendaraan yang bergerak didalam daerah pergerakan (movement area), selama jangka waktu operasi visibility rendah
c. Penyelenggaraan inspeksi terhadap runway selama jangka waktu pelaksanaan operasi visibility rendah
d. Nama dan peranan pejabat/ personil yang bertanggung jawab terhadap pelaksanaan operasi visibility rendah beserta nomor telepon yang bersangkutan untuk dapat dihubungi sepanjang jam operasi atau sesudah jam operasi bandar udara (*aerodrome)*

4.17 Perlindungan terhadap lokasi radar dan alat bantu navigasi.

Bagian-bagian dari prosedur untuk perlindungan lokasi radar dan alat bantu navigasi yang terletak di bandar udara (*aerodrome)*, untuk menjamin agar kinerjanya tidak menurun, adalah melputi:

a. Melakukan pengawasan terhadap aktifitas yang dilakukan di dekat instalasi radar maupun instalasi alat bantu navigasi.

b. Berkonsultasi dan meminta kepada pihak yang melaksanakan instalasi alat bantu navigasi, agar memasang alat/ tanda peringatan akan adanya radiasi microwave yang berbahaya.

c. Pemeliharaan tanah/ lingkungan disekitar instalasi radar maupun alat bantu navigasi.

5. Penyelenggaraan Bandar Udara (*Aerodrome)* dan Aerodrome Safety Management System.

5.1 Penyelenggaraan Bandar Udara (Aerodrome).

Bagian-bagian prosedur untuk penyelenggaraan bandar udara (*aerodrome)* adalah meliputi hal hal sebagai berikut:

a. Struktur organisasi beserta bagan organisasi yang memperlihatkan nomenklatur jabatan dan nama pejabat yang menempati posisi bersangkutan.

b. Posisi manajemen yang bertanggung jawab terhadap operasi dan pemeliharaan bandar udara (*aerodrome)*, termasuk tanggung jawab keuangan

c. Data lengkap (contact detail) pejabat/ personil utama yang bertanggung jawab terhadap operasi bandar udara (*aerodrome)* dan tugas tugas keselamatan

d. Data lengkap (contact detail) pajabat/ personil yang bertugas sebagai Pengawas Manual (manual cotroller)

5.2 Komite Bandar Udara (Aerrodrome Committees).

Bagian penting dari massing masing komite yang dibentuk untuk mengatur atau membantu pengoperasian bandar udara (aerodrome) yang tercakup dalam buku pedoman pengoperasian (manual), sekurang-kurangnya meliputi hal-hal sebagai berikut:

a. Nama komite dan identifikasi beserta data lengkap (contact detail) dari :
   1. Pimpinan komite
   2. Anggota eksekutif senior lainnya

b. Kerangka Acuan, atau dokumen tentang hak dan kewajiban anggota komite, atau yang sejenisnya

c. Jadual pertemuan.

5.3 Additional Mandatory Requirements.

Semua hal hal yang terkait dengan persyaratan (condition), pengecualian (exemptions), arahan, instruksi, laporan audit, dan lain lainnya dari Direktorat Jenderal Perhubungan Udara mengenai masalah keselamatan antara lain pembentukan/ pendirian, manajemen, operasi atau masalah perawatan bandar udara (*aerodrome)*.

5.4 Sistem Keselamatan Bandar Udara (Aerodrome Safety System).

Bagian bagian penting dari Sistem Manajemen Keselamatan yang dibuat untuk memastikan bahwa semua persyaratan keselamatan dapat dipenuhi/ diikuti, dan untuk mencapai perbaikan secara terus menerus dalam kinerja keselamatan, meliputi hal hal sebagai berikut:

a. Kebijakan dalam hal keselamatan, prosedur tentang manajemen keselamatan, manajemen akuntabilitas mengenai proses operasional dan perawatan.

b. Struktur atau organisasi system manajemen keselamatan (Safety management System/ SMS) meliputi penentuan/ pengisian staf (personil), penentuan peranan kelompok atau individu dan tanggung jawab dalam masalah–masalah keselamatan serta adanya kelanjutan pemantauan keselamatan.

c. Pengembangan strategi dan perencanaan Sistem Manajemen Keselamatan dan penyediaan metoda/ tata cara (meliputi identifikasi bahaya dan penilaian resiko) untuk mengawasi suatu resiko agar serendah mungkin, sementara semua standar yang dimuat dalam manual of standard ataupun semua standar lain yang berlaku, aturan atau perundangan tetap dapat diikuti/ dipatuhi
d. Penerapan Sistem Manajemen Keselamatan yang meliputi penggunaan fasilitas/ peralatan, metoda dan prosedur untuk suatu penyampaian yang efektif dari berita-berita keselamatan dan pemberlakuan (enforcement) persyaratan–persyaratan keselamatan
e. Usaha usaha yang dilakukan untuk peningkatan keselamatan dan pencegahan kejadian/ kecelakaan
f. Investigasi, analisis dan pelaporan tentang suatu kejadian/kecelakaan, keluhan, kerusakan, kesalahan, perbedaan perbedaan , dan kegagalan
g. Tersedianya dokumentasi untuk semua fasilitas yang terkait dengan keselamatan (dijamin bahwa data tersimpan dalam keadaan lengkap dan berlaku / current), juga dokumentasi untuk masalah opersional dan perawatan, yang meliputi informasi tentang disain dan konstruksi daerah perkerasan untuk pergerakan pesawat udara, aeronautical lighting, dengan cara sedemikian, untuk dapat dengan cepat dan memudahkan pencarian data, termasuk peta peta apabila diperlukan.
h. Aktifitas yang berkaitan dengan pelatihan dan kecakapan staf/ personil dalam bidang keselamatan.
i. Memasukkan dan membelakukan persyaratan persyaratan keselamatan kedalam kontrak kerja di bandar udara (aerodrome), dan
j. Evaluasi dan pemantauan terhadap kinerja Sistem Manajemen Keselamatan, yang meliputi; audit keselamatan internal, peninjauan quality control terhadap keselamatan

DIREKTUR JENDERAL PERHUBUNGAN UDARA

<u>CUCUK SURYO SUPROJO</u>
NIP.120089499

Appendix 2

AERODROMES

Format permohonan untuk mendapatkan Sertifikat Operasi Bandar Udara (Aerodrome Certificate)

Permohonan untuk mendapatkan Sertifikat Operasi Bandar Udara (Aerodrome sertificate) :

1. Data/ informasi dari Pemohon:
   Nama Lengkap : ....
   Alamat : ....
   Jabatan : ....
   Nomor telepon : ....
   Fax. : ....
   E.Mail. : ....
2. Data/ informasi tentang letak Bandar Udara (Aerodrome)
   Nama bandar udara (Aerodrome) : ....
   Uraian tentang Lahan (dan kepemilikannya) : ....
   Koordinat Geografis ARP : ....
   Arah dan jarak ke kota atau ke daerah hunian terdekat : ....
3. Apakah pemohon merupakan pemilik dari lahan letak bandar udara (aerodrome) ?
   a. Ya.
   b. Tidak
   Apabila tidak, perlu penjelasan sebagai berikut:
   - ✓ Rincian mengenai hak yang dipunyai/ dipegang berkaitan dengan lahan letak Bandar Udara (aerodrome),
   - ✓ Nama dan alamat dari pemilik lahan letak bandar udara (aerodrome) beserta bukti tertulis yang menyatakan bahwa telah ada ijin untuk menggunakan lahan letak dimaksud untuk dijadikan bandar udara (aerodrome).
4. Tunjukkan pesawat udara terbesar yang direncanakan untuk beroperasi di Bandar Udara (aerodrome)................
5. Apakah bandar udara (aerodrome) dipergunakan untuk pengoperasian angkutan udara umum?
   a. Ya.
   b. Tidak
6. Hal–hal penting yang harus dicantumkan dalam Sertifikat Operasi Bandar Udara (Aerodrome Certificate)
   Nama Bandar Udara (Aerodrome) : ....
   Penyelenggrara Bandar Udara (Aerodrome) : ....
   (Atas nama penyelenggara bandar udara (Aerodrome) tercantum diatas *), dengan ini mengajukan permohonan untuk mendapatkan serifikat untuk mengoperasikan bandar udara (aerodrome) bersangkutan.
   *) Coret yang tidak perlu

Tanda tangan : ....
Kewenangan saya untuk bertindak atas nama pemohon adalah ....

Nama orang yang
Membuat pernyataan; ....
Tanggal: ..../ ..../ ....

Informasi:

a. Satu copy dari Buku Pedoman Pengoperasian Bandar Udara (Aerodrome manual), yang disiapkan sesuai dengan aturan dan memenuhi keperluan untuk menampung pengoperasian pesawat udara seperti yang direncanakan, wajib menjadi lampiran dari permohonan
b. Permohonan harus disampaikan ke kantor Direktorat Jenderal Perhubungan Udara
c. Bukti bukti tertulis(berupa dokumentasi) yang mendukung permohonan, bisa jadi akan diminta untuk dilampirkan.

DIREKTUR JENDERAL PERHUBUNGAN UDARA

CUCUK SURYO SUPROJO
NIP.120089499

Appendix 3

AERODROMES

Persyaratan untuk Pendaftaran Bandar Udara (Registrasi Aerodrome).

1. Bagan Bandar Udara (Aerodrome diagram)

   Bagan Bandar Udara (Aerodrome) harus menampilkan data-data sebagai berikut:

   a. Lay out runway, dengan nomor runway (runway designation), dan panjang runway dalam meter.
   b. Lay out taxiway dan apron
   c. Lokasi aerodrome reference point
   d. Loklasi wind direction indicators
   e. Elevasi bandar udara (aerodrome) di titik tertinggi pada permukaan runway (landing surface)
   f. Arah (dalam magnetic bearing) dan jarak kekota atau daerah pusat hunian terdekat.

2. Informasi Bandar Udara (Aerodrome)

   Informasi mengenai bandar udara (Aerodrome) harus meliputi:

   a. Penyelenggaraan Administrasi Bandar Udara (Aerodrome Administration), yang berisikan informasi tentang:
      1) Nama bandar udara (Aerodrome)
      2) Nama penyelenggara bandar udara (aerodrome) beserta alamat dan nomor telepon yang bisa dihubungi setiap saat
      3) Koordinat (latitude and longitude) dari aerodrome reference point
      4) Status bandar udara (Aerodrome), apakah umum atau khusus (public or private)
      5) Biaya penggunaan bandar udara (aerodrome)
      6) Nama dan contact detail dari personil yang ditunjuk untuk menjadi pejabat pelaporan (reporting officer) bandar udara (aerodrome).
   b. Runways, yang memuat informasi bagi masing –masing runway, tentang hal hal sebagai berikut:
      1) Runway reference code number, untuk approach dan take off area yang sudah disurvey
      2) Lebar dan slope runway
      3) Lebar runway strip (grade and overall)
      4) Declared Distances dan supplementary take off distance
      5) Kekuatan perkerasan (pavement strength rating)
   c. Aerodrome Lighting

      Untuk masing-masing runway yang dipergunakan pada malam hari, informasi yang harus disediakan adalah sebagai berikut:
      1) Runway edge light, apakah intensitasnya low; medium ataukah high intencity.
      2) Apakah tersedia Approach lighting
      3) Apakah yang tersedia T-VASIS, atau PAPI lighting system
      4) Apakah ada Aerodrome beacon
      5) Apakah tersedia Stand by power ataukah portable lighting
      6) Informasi tentang lighting lain yang tersedia.

d. Pelayanan Darat (Gound Sevices).

Informasi yang mesti tersedia untuk para penerbang adalah sebagai berikut:

1) Jenis bahan bakar pesawat udara yang tersedia dan contact detail suplayernya.
2) Contact detail untuk local weather information
3) Informasi lengkap tentang sistem komunikasi universal.

e. Prosedur khusus.

Informasi tentang prosedur khusus yang ada yang perlu diperhatikan dan diikuti oleh para penerbang

f. Pemberitahuan.

Informasi tentang masalah keselamatan local, yang meliputi:

1) Adanya obstacle ataupun bahaya lain (termasuk binatang atu burung)
2) Pembatasan-pembatasan bagi penggunaan taxiway ataupun apron
3) Kegiatan-kegiatan lain yang sedang berlaku di bandar udara (antara lain, kegiatan aerosport)

DIREKTUR JENDERAL PERHUBUNGAN UDARA

CUCUK SURYO SUPROJO
NIP.120089499

Appendix 4

AERODROMES

Masalah masalah yang dihadapi dalam inspeksi keselamatan (safety inspection)

1. Bagian-bagian Bandar Udara (Aerodrome).
   Diperiksa apakah bagian-bagian yang berkaitan dengan bandar udara (aerodrome) sebagai berikut, yang dipublikasikan dalam AIP atau diberikan kepada operator sudah benar
   a. bagian-bagian lokasi bandar udara (aerodrome)
   b. nama dan alamat penyelenggara bandar udara (aerodrome)
   c. bagian bagian daerah pergerakan (movement area)
   d. rincian runway distance available
   e. bagian bagian aerodrome lighting
   f. rincian tentang ground service
   g. pemberitahuan tentang kondisi dan prosedur khusus

2. Prosedur Pengoperasian Bandar Udara (Aerodrome Operating Procedure).
   Diperiksa untuk memastikan apakah Prosedur Pengoperasian Bandar Udara sudah memuat masalah masalah sebagai berikut:
   a. Pencatatan (recording) tentang Aerodrome Inspection
   b. Pencatatn tentang pemberitahuan yang disampaikan kepada NOTAM office dan AIS atau kepada operator perusahaan penerbangan
   c. Pencatatan tentang pekerjaan-pekerjaan di bandar udara (aerodrome works)

3. Pejabat pelaporan (Reporting Officer).
   Dipastikan bahwa personil yang ditunjuk sebagai pejabat pelaporan (Reporting Officer), adalah mereka yang cakap dan mampu melaksanakan tugas-tugas pejabat pelaporan (reporting Officer)

4. Uraian bagian bagian Daerah Pergerakan (Movement area).
   Diperiksa hal hal sebagai berikut:
   a. Dimensi dan kondisi permukaan runway, taxiway dan apron
   b. Aerodrome lighting, termasuk back-up lighting dan obstacle lighting
   c. Wind direction indicator dan penerangannya.
   d. Marka dan rambu bandar udara (aerodrome)
   e. Obstacle Limitation Surface yang berlaku di bandar udara (aerodrome)
   f. Radio komunikasi dua arah (two- way radios), baik yang hand held maupun yang dipasang dikendaraan, yang diupergunakan penyelenggara bandar udara (aerodrome) di daerah pergerakan (movement area)
   g. Peralatan yang dipergunakan untuk mengusir/ menghalau burung
   h. Pemagaran bandar udara (aerodrome).

DIREKTUR JENDERAL PERHUBUNGAN UDARA

CUCUK SURYO SUPROJO
NIP.120089499

Appendix 5

AERODROMES.

1. Persyaratan bagi personil yang melaksanakan Pemeriksaan Keselamatan Bandar Udara (Aerodrome Safety Inspection).
2. Penyelenggara bandar udara (aerodrome), suatu badan usaha yang bergerak dibidang kebandar udaraan, atau perorangan, dapat menghajukan permohonan kepada Direktorat Jenderal Perhubungan Udara untuk mandapatkan ijin penunjukan (approval), untuk melaksanakan pemeriksaan keselamatan bandar udara (Aerodrome Safety Inspection).
3. Direktorat Jenderal Perhubungan Udara dapat memberikan ijin penunjukan (approval) kepada penyelenggara bandar udara (aerodrome), badan usaha kebandar udaraan atau perorangan untuk melakukan pemeriksaan keselamatn bandar udara (aerodrome safety inspection), apabila personil yang diajukan oleh penyelenggara bandar udara (aerodrome) atau oleh badan usaha kebandar udaraan maupun perorangan dimaksud:
   a. mempunyai/ memenuhi kualifikasi sebagai berikut:
      1) 1). ijasah sarjana (dari perguruan tinggi yang baik), diploma atau sertifikat dalam bidang teknik sipil, bidang survey atau bidang yang terkait, dan pengetahuan yang cukup berkenaan dengan CASR 139 beserta Standarnya, peratuarn dan regulasi yang berlaku bagi pengoperasian dan perawatan bandar udara (aerodrome).
      2) 2). kualifikasi lain, pengetahuan ataupun pengalaman yang dianggap dapat menunjang pelaksanaan pemeriksaan keselamatan bandar udara (aerodrome safety inspection).
   b. Dapat melaksanakan tugas-tugas pemeriksaan di bandar udara (aerodrome) dengan baik, apabila kemudian ijin penunjukan (approval) diberikan.
4. Ijin penunjukan (approval) berlaku untuk masa 5 (lima) tahun, kecuali dicabut atau dibatalkan oleh Direktorat Jenderal Perghubungan Udara, sebelum masa laku tersebut.
5. Ijin penunjukan tidak berlaku dalam masa penundaan/ pembatalan sementara/ skorsing, akan tetapi masa/ periode penundaan dianggap sebagai bagian dari masa berlaku yang 5 tahun.
6. Direktorat Jenderal perhubungan Udara dapat menunda atau membatalkan ijin penunjukan (approval) yang diberikan kepada perorangan maupun kepada badan hukum, dengan pemberitahuan tertulis, apabila personil yang ditunjuk tidak dapat atau tidak dapat lagi melakukan pekerjaan pemerikasaan keselamatan di bandar udara (aerodrome safety inspection) secara baik dan benar.

DIREKTUR JENDERAL PERHUBUNGAN UDARA

CUCUK SURYO SUPROJO
NIP.120089499

LAMPIRAN I
PERATURAN DIREKTUR JENDERAL PERHUBUNGAN UDARA
NOMOR : SKEP/76/VI/2005
TANGGAL : 20 JUNI 2005

BUKU 2

PETUNJUK TEKNIS PENGOPERASIAN BANDAR UDARA
(*MANUAL of STANDARD / MoS)*

1. INTRODUCTION.

1.1. General.

1.1.1 Background.

1. Aerodrome safety is a vital link in aviation safety. Providing facilities and maintaining operating environments that are safe for aircraft activities achieve aerodrome safety. By complying with the prescribed standards and procedures and taking a pro-active safety management approach in the operation of their aerodromes, aerodrome operators can demonstrate that they have discharged their safety obligations to their clients who, ultimately, are the traveling public.

2. This document, titled: 'Manual of Standards - Part 139 Aerodromes', hereafter referred to as the MOS, is made in pursuant to Civil Aviation Safety Regulations CASR Part 139. CASR Part 139 sets out the regulatory regime of aerodromes used by aeroplanes conducting air transport operations under CASR Part 121 and Part 135. The regulatory regime provides aerodromes to be certified *or registered*. This MOS sets out the standards and operating procedures for aerodromes used in air transport operations.

3. Under CASR Part 121, aeroplanes with 30 or fewer passenger seats can also conduct air transport operations from uncertified or *unregistered* aerodromes, provided certain specified facilities at those aerodromes are to the required standard. Accordingly, some of the standards in this MOS are also relevant to uncertified *and unregistered* aerodromes.

4. To complement CASR Part 135, a separate chapter has been provided to specify the standards and procedures for aerodromes intended only for small aeroplanes (those with 9 or fewer passenger seats or in the case of freight operations, not exceeding 5,700 kg MTOW) conducting air transport operations.

5. In addition to this MOS, specifications and procedures that do not reach the regulatory level and information of an educational or advisory nature may be issued in the form of Advisory Circulars.

6. Aerodrome standards will change from time to time to meet identified safety needs, technological changes and changes in international standards and practices. It is recognised that there may be difficulties and limitations in applying new standards to existing aerodrome facilities and installations. This aspect is addressed in some detail in Chapter 2.

7. Standards are identified by the words 'must' or 'shall'. Appendices and tables form part of the main document and have the same status as the primary text. This MOS may also require standards from other documents to be followed. In this case, the referred standards become part of this MOS.

8. In some circumstances, the uniform application of a particular standard or procedure may not be possible or necessary. Such a standard or procedure will be phrased such as "if practicable", "where physically practicable", "where determined necessary" or similar words. Whilst such phrases may imply compliance is not mandatory, aerodrome operators need to provide justification for non-compliance and the final authority as to the applicability of the standard to a particular aerodrome facility or procedure rests with the regulating authority.

9. Where there is flexibility in compliance with a specification, words such as "should" or "may" are used. This does not mean that the specification can be ignored, but it means that there is no need to seek DGAC approval if an aerodrome operator chooses to adopt an alternate means to achieve a similar outcome.

10. This MOS includes standards and procedures relating to the prevention of inadvertent entry of animals and people to the movement area. Those standards and procedures are intended for aviation safety only. This MOS does not specifically address aviation security, i.e. the safeguarding against acts of unlawful interference, and that subject matter is under the purview of another section of the Department.

11. Where it is necessary to provide factual or background information, explanation or references, or to provide a means of achieving compliance, the information is provided in the form of a "note". A note does not constitute part of a standard.

12. Cross-referencing of standards within the MOS is not provided. The Table of Contents provides a ready reference to all the standards.

1.1.2 Document Set.

1. The document hierarchy consists of:

   a. the Law of the Republic of Indonesia Number 15 of 1992 on Aviation (Aviation Act);

   b. relevant Civil Aviation Safety Regulations (CASRs);

   c. the Manual of Standards (MOS); and

   d. Advisory Circulars (ACs).

2. The Aviation Act establishes the broad intent of the government of the Republic of Indonesia with regard to regulation of civil aviation.

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

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

5. In the event of any perceived disparity of meaning between MOS and CASRs, primacy of intent is to be with the CASRs.

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

7. Advisory Circulars (AC) are intended to provide recommendations and guidance to illustrate a means, but not necessarily the only means, of complying with the Manual of Standards Part 139 - Aerodromes. AC may explain certain regulatory requirements by providing interpretive and explanatory materials. It is expected that service providers will document internal actions in their own operational manuals to put into effect practices drawn from advisory or guidance material.

1.1.3 Differences Between ICAO Standards and those in MOS.

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

1.1.4 Differences Published in AIP.

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

1.1.5 MOS Documentation Change Management.

1. This document is issued and amended under the authority of the Director General.

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

   a. technical areas within DGAC;
   b. ATS service providers and staff;
   c. aviation industry service providers, such as aerodrome operators or airlines and their staff; and
   d. interested consultants, auditors and others.

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

   a. ensure safety;
   b. ensure standardisation;
   c. respond to changed DGAC standards;
   d. respond to ICAO prescription; or
   e. accommodate new initiatives or technologies.

1.1.6 Related Documents.

These standards should be read in conjunction with:

1. ICAO Annex 4 Aeronautical Charts;
2. ICAO Annex 14 Aerodromes (Vol 1);
3. ICAO Annex 15 Aeronautical Information Services;
4. ICAO Doc 9157/AN901: Aerodrome Design Manuals (all parts);
5. Federal Aviation Administration (FAA) Advisory Circular 150/ 5300 -13

1.2. Definitions.

1. Aerodrome A defined area on land or water (including any buildings, installations, and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft.

2. Aerodrome beacon Aeronautical beacon used to indicate the location of an aerodrome from the air.

3. Aerodrome elevation The elevation of the highest point of the landing area.

4. Aerodrome reference point The designated geographical location of an aerodrome.

5. Aerodrome reference temperature The monthly mean of the maximum daily temperature for the hottest month of the year (the hottest month being that which has the highest monthly mean temperature.)

6. Aerodrome traffic density See Paragraph 9.1.1.2(b).

7. Aerodrome works Construction or maintenance works carried out at an aerodrome, on or adjacent to the movement area, that may create obstacles or restrict the normal take-off and landing of aircraft.

8. Aeronautical beacon An aeronautical ground light visible at all azimuths, either continuously or intermittently, to designate a particular point on the surface of the earth.

9. Aeronautical ground light Any light specially provided as an aid to air navigation, other than a light displayed on an aircraft.

10. Aeronautical study An investigation of a problem concerned with some phase of flight, and aimed at identifying possible solutions and selecting the one most acceptable from the point of view of flight safety.

11. Aeroplane reference field length The minimum field length required for take-off at maximum certificated take-off mass, sea level, standard atmospheric conditions, still air and zero runway slope, as shown in the appropriate aeroplane flight manual prescribed by the certificating authority or equivalent data from the aeroplane manufacturer. Field length means balanced field length for aeroplanes, if applicable, or take-off distance in other cases.

12. Aircraft classification number (ACN) A number expressing the relative effect of an aircraft on a pavement for a specified standard subgrade category.

13. Aircraft parking position A designated area on an apron intended to be used for parking an aircraft. Also known as an aircraft stand.

14. Airside The movement area of an aerodrome, adjacent terrain and buildings or portions thereof, access of which is controlled.

15. Apron A defined area on a land aerodrome intended to accommodate aircraft for the purposes of loading or unloading passengers, mail or cargo, fuelling, parking, or maintenance.

16. Apron management service A service provided to regulate the activities and the movement of aircraft and vehicles on the apron.

17. Balanced field length A field length where the distance to accelerate and stop is equal to the take-off distance of an aeroplane experiencing an engine failure at the critical engine failure recognition speed (V1).

18. Barrette Three or more aeronautical ground lights closely spaced in a transverse line so that from a distance they appear as a short bar of light.

19. Capacitor discharge light A lamp in which high-intensity flashes of extremely short duration are produced by the discharge of electricity at high voltage through a gas enclosed in a tube.

20. Clearway A defined area at the end of the take-off run available on the ground or water under the control of the aerodrome operator, selected or prepared as a suitable area over which an aeroplane may make a portion of its initial climb to a specified height.

21. Critical aeroplane The aeroplane or aeroplanes identified from among the aeroplanes the aerodrome is intended to serve as having the most demanding operational requirements with respect to the determination of movement area dimensions, pavement bearing strength and other physical characteristics in the design of aerodromes.

22. Critical obstacle The obstacle within the take-off climb area and/or the approach area, which subtends the greatest vertical angle when measured from the inner edge of the take-off climb surface and/or the approach surface.

23. Cross-wind component The surface wind component at right angles to the runway centerline.

24. Declared distances :

    a. Take-off run available (TORA). The length of runway declared available and suitable for the ground run of an aeroplane taking off.
    b. Take-off distances available (TODA). The length of the takeoff run available plus the length of the clearway, if provided.
    c. Accelerate-stop distance available (ASDA). The length of the take-off run available plus the length of the stopway, if provided.
    d. Landing distance available (LDA). The length of runway which is declared available and suitable for the ground run of an aeroplane landing.

25. Dependent parallel approaches Simultaneous approaches to parallel or near-parallel instrument runways where radar separation minima between aircraft on adjacent extended runway centre lines are prescribed.

26. Displaced threshold A threshold not located at the extremity of a runway.

27. Effective intensity The effective intensity of a flashing light is equal to the intensity of a fixed light of the same colour, which will produce the same visual range under identical conditions of observation.

28. Elevation The vertical distance of a point or a level, on or affixed to the surface of the earth, measured from the mean sea level.

29. Fixed light A light having constant luminous intensity when observed from a fixed point.

30. Frangible object An object of low mass designed to break, distort or yield on impact so as to present the minimum hazard to aircraft.

31. Hazard beacon An aeronautical beacon used to designate a danger to air navigation.

32. Holding bay A defined area where aircraft can be held, or bypassed, to facilitate efficient surface movement of aircraft.

33. Independent parallel approaches Simultaneous approaches to parallel or near-parallel instrument runways where radar separation minima between aircraft on adjacent extended runway centre lines are not prescribed.

34. Independent parallel departures Simultaneous departures from parallel or near-parallel instrument runways.

35. Instrument approach procedures The procedures to be followed by aircraft in letting down from cruising level and landing at an aerodrome. (A series of predetermined manoeuvres by reference to flight instruments for the orderly transfer of an aircraft from the beginning of the initial approach to a landing, or to a point from which a landing may be made.)

36. Instrument meteorological conditions (IMC) Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, less than the minimum specified for visual meteorological conditions.

37. Instrument runway One of the following types of runway intended for the operation of aircraft using instrument approach procedures:

    a. Non-precision approach runway. An instrument runway served by visual aids and a radio aid providing at least directional guidance adequate for a straight-in approach with a published minimum descent altitude, also known as landing minima for a particular radio aid or a combination of radio aids.

    b. Precision approach runway, category I. An instrument runway served by ILS or MLS and visual aids intended for operations with a decision height not lower than 60 m (200 ft) and either a visibility not less than 800 m or a runway visual range not less than 550 m.

    c. Precision approach runway, category II. An instrument runway served by ILS or MLS and visual aids intended for operations with a decision height lower than 60 m (200 ft) but not lower than 30 m (100 ft) and a runway visual range not less than 350 m.

    d. Precision approach runway, category III. An instrument runway served by ILS or MLS to and along the surface of the runway and:

        1) intended for operations with a decision height lower than 30 m (100 ft), or no decision height and a runway visual range not less than 200 m.

        2) intended for operations with a decision height lower than 15 m (50 ft), or no decision height and a runway visual range less than 200 m but not less than 50 m.

        3) intended for operations with no decision height and no runway visual range limitations.

    Note : *Visual aids need not necessarily be matched to the scale of non-visual aids provided. The criterion for the selection of visual aids is the conditions in which operations are intended to be conducted.*

38. Intermediate holding position A designated holding position intended for traffic control at which taxiing aircraft and vehicles shall stop and hold until further clearance to proceed, when so instructed by the aerodrome control tower.

39. Joint user aerodromes An aerodrome under the control of a part of the Defence Force in respect of which a formal memorandum is in force to facilitate civil aircraft operations.

40. Landing area That part of a movement area intended for the landing or take-off of aircraft.

41. Light failure A light shall be deemed to be unserviceable when the main beam average intensity is less than 50% of the value specified in the appropriate figure showing the isocandela diagram. For light units where the designed main beam average intensity is above the value shown in the isocandela diagram, the 50% value shall be related to that design value. (When assessing the main beam, specified angles of beam elevation, toe-in and beam spread shall be taken into consideration).

42. Lighting system reliability The probability that the complete installation operates within the specified tolerances and that the system is operationally usable.

43. Maneuvering area That part of the aerodrome to be used for the take-off, landing and taxiing of aircraft, excluding aprons.

44. Marker An object displayed above ground level in order to indicate an obstacle or delineate a boundary.

45. Marking A symbol or group of symbols displayed on the surface of the movement area in order to convey aeronautical information.

46. Mass The terms mass and weight used in this MOS have the same meaning.

47. MAUM Maximum all up mass.

48. MTOW Maximum take-off weight.

49. Movement Either a take-off or a landing by an aircraft.

50. Movement area That part of the aerodrome to be used for the take-off, landing and taxiing of aircraft, consisting of the maneuvering area and the apron(s).

51. Near parallel runways Non-intersecting runways whose extended centre lines have an angle of convergence/divergence of 15 degrees or less.

52. Non-instrument runway A runway intended for the operation of aircraft using visual approach procedures.

53. Non-precision approach runway See Instrument runway.

54. Notices to airmen (NOTAMs) A notice issued by the NOTAM office containing information or instruction concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to persons concerned with flight operations.

55. Obstacles All fixed (whether temporary or permanent) and mobile objects, or parts thereof, that are located on an area intended for the surface movement of aircraft or that extend above a defined surface intended to protect aircraft in flight.

56. Obstacle free zone (OFZ) The airspace above the inner approach surface, inner transitional surfaces, balked landing surfaces, and that portion of the strip bounded by these surfaces, which is not penetrated by any fixed obstacle other than a low mass and frangible mounted one required for air navigation purposes.

57. Obstacle limitation surfaces (OLS) A series of planes associated with each runway at an aerodrome that defines the desirable limits to which objects may project into the airspace around the aerodrome so that aircraft operations at the aerodrome may be conducted safely.

58. Pavement classification number (PCN) A number expressing the bearing strength of a pavement for unrestricted operations by aircraft with ACN value less than or equal to the PCN.

59. Precision approach runway See Instrument runway.

60. Primary runway(s) Runway(s) used in preference to others whenever conditions permit.

61. Radio aids Also known as non-visual aids. These aids may consist of NDB, VOR, VOR/DME or GPS.

62. Runway A defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft.

63. Runway end safety area (RESA) An area symmetrical about the extended runway centre line and adjacent to the end of the runway strip primarily intended to reduce the risk of damage to an aeroplane undershooting or overrunning the runway.

64. Runway holding position A designated position intended to protect a runway, an obstacle limitation surface, or an ILS/MLS critical/sensitive area at which taxiing aircraft and vehicles shall stop and hold, unless otherwise authorized by the aerodrome control tower.

65. Runway guard light A light system intended to caution pilots or vehicle drivers that they are about to enter an active runway.

66. Runway strip A defined area including the runway, and stopway if provided, intended:

    a. to reduce the risk of damage to aircraft running off a runway; and
    b. to protect aircraft flying over it during take-off or landing operations.

67. Runway visual range (RVR) The range over which the pilot of an aircraft on the centre line of the a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line.

68. Segregated parallel operations Simultaneous operations on parallel or near-parallel instrument runways in which one runway is used exclusively for approaches and the other runway is used exclusively for departures.

69. Shoulders An area adjacent to the edge of a pavement so prepared as to provide a transition between the pavement and the adjacent surface.

70. Signal circle An area on an aerodrome used for the display of ground signals.

71. Stopway A defined rectangular area on the ground at the end of the take-off run available prepared as a suitable area in which an aircraft can be stopped in the case of an abandoned take-off.

72. Switch-overtime (light) The time required for the actual intensity of a light measured in a given direction to fall from 50% and recover to 50% during a power supply changeover, when the light is being operated at intensities of 25% or above.

73. Take-off runway A runway intended for take-off only.

74. Taxi-holding position See definition of runway holding position and intermediate holding position.

75. Taxiway A defined path on a land aerodrome established for the taxiing of aircraft and intended to provide a link between one part of the aerodrome from another, including:

    a. Aircraft parking position taxilane. A portion of an apron designated as a taxiway and intended to provide access to aircraft parking positions only.
    b. Apron taxiway. A portion of a taxiway system located on an apron and intended to provide a through taxi route across the apron.
    c. Rapid exit taxiway. A taxiway connected to a runway at an acute angle and designed to allow landing aeroplanes to turn off at higher speeds than are achieved on other exit taxiways thereby minimizing runway occupancy times.

76. Taxiway intersection A junction of two or more taxiways.

77. Taxiway strip An area including a taxiway intended to protect an aircraft operating on the taxiway and to reduce the risk of damage to an aircraft accidentally running off the taxiway.

78. Threshold The beginning of that portion of the runway usable for landing.

79. Time limited works Aerodrome works that may be carried out if normal aircraft operations are not disrupted and the movement area can be restored to normal safety standards in not more than 30 minutes.

80. Touchdown zone The portion of a runway, beyond the threshold, where it is intended landing aeroplanes first contact the runway.

81. Usability factor The percentage of time during which the use of a runway or system of runways is not restricted because of cross-wind component.

82. Visibility The ability, as determined by atmospheric conditions and expressed in units of distance, to see and identify prominent unlit objects by day and prominent lit objects by night.

83. Visual aids May consist of T-VASIS, PAPI, runway markings and runway lights.

84. Visual meteorological conditions (VMC) Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, equal or better than specified minima.

85. Weight The terms weight and mass used in this MOS have the same meaning.

2. LICATION OF STANDARDS TO AERODROMES

2.1. Legislative Background and Applicability.

1. Civil Aviation Safety Regulations CASR Part 121 and Part 135 require aeroplanes conducting air transport operations to operate from aerodromes meeting the requirements of CASR Part 139.

2. CASR Part 139-71 requires aerodrome operators to comply with standards and procedures relating to aerodromes used in air transport operations. The standards and procedures are set out in this document titled 'Manual of Standards Part 139 - Aerodromes' are applicable equally to operators of land aerodromes, which are either certified *or registered*. Operating procedures for certified *and registered* aerodromes differ and are set out in separate Chapters.

3. Under CASR Part 121 and Part 135, operators of aeroplanes with fewer than 30 passenger seats may also conduct air transport operations to aerodromes that are not certified *or registered*, provided specified aerodrome facilities and reporting arrangements meet appropriate standards. As aerodrome safety standards and procedures are specified in this MOS, the appropriate sections will accordingly also be applicable to those uncertified *or unregistered* aerodromes used in air transport operations.

2.2. Standard Changes and Existing Aerodrome Facilities.

1. Standards are subject to change from time to time. In general, unless specifically directed by DGAC, subject to Paragraph 2.1.2.3, existing aerodrome facilities do not need to be immediately modified in accordance with the new standards until the facility is replaced or upgraded to accommodate a more demanding aircraft.

2. Unless otherwise directed by DGAC, an existing facility that does not meet the standard specified in this Manual must continue to comply with the standard that was applicable to it.

3. At a certified aerodrome, an existing aerodrome facility that does not comply with this MOS must be identified and recorded in the Aerodrome Manual and must include the date or period when that facility was first introduced or last upgraded and an indication from the aerodrome operator of a plan or timescale to bring the facility in compliance with the MOS. As part of a DGAC audit, evidence to demonstrate efforts to implement a plan or timescale may be required.

4. This MOS applies to a new facility that is brought into operation, and to an existing facility that is being replaced or improved. Subject to agreement by the DGAC, changes to an existing facility of a minor or partial nature may be exempted.

2.3. Exemptions to Standards.

1. An exemption granted to an existing facility continues to apply until its expiry date.

2. Application for new exemptions must be supported, in writing, by cogent reasons including, where appropriate, an indication of when compliance with the current standards can be expected.

3. Those standards which include phrases such as "if practicable", "where physically practicable", etc., still require an exemption to standards when aerodrome operators wish to take advantage of the non-practicability of full compliance.

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

2.4. Conflict with Other Standards.

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

2.5. Using ICAO Aerodrome Reference Code to Specify Standards.

1. Indonesia has adopted the International Civil Aviation Organisation (ICAO) methodology of using a code system, known as the Aerodrome Reference Code, to specify the standards for individual aerodrome facilities that are suitable for use by aeroplanes within a range of performances and sizes. The code is composed of two elements: element 1 is a number related to the aeroplane reference field length; and element 2 is a letter related to the aeroplane wingspan and outer main gear wheel span. A particular specification is related to the more appropriate of the two elements of the code or to an appropriate combination of the two code elements. The code letter or number within an element selected for design purposes is related to the critical aeroplane characteristics for which the facility is provided. There could be more than one critical aeroplane, as the critical aeroplane for a particular facility, such as a runway, may not be the critical aeroplane for another facility, such as the taxiway.

2. The code number for element 1 shall be determined from column 1 of the table below. The code number corresponding to the highest value of the aeroplane reference field lengths for which the runway is intended is to be selected.

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

3. The code letter for element 2 shall be determined from column 3 of the table below. The code letter, which corresponds to the greatest wingspan, or the greatest outer main gear wheel span, whichever gives the more demanding code letter of the aeroplanes for which the facility is intended is to be selected.

4. Information of the Aerodrome Reference Code number for each runway at the aerodrome shall be provided for publication in AIP Indonesia. For certified aerodromes, information of the Aerodrome Reference Code letter for each runway and taxiway shall be set out in the Aerodrome Manual.

5. Unless otherwise agreed by DGAC, aerodrome operators must maintain the runways and taxiways in accordance with the applicable standards set out in this MOS for the notified aerodrome reference code for that runway or taxiway.

Aerodrome Reference Code				
Code element 1		**Code element 2**		
Code number	Aeroplane reference field length	Code letter	Wing span	Outer main gear wheel span
1.	Less than 800 m	A	Up to but not including 15 m	Up to but not including 4.5 m
2.	800 m up to but not including 1200 m	B	15 m up to but not including 24 m	4.5 m up to but not including 6 m
3.	1200 m up to but not including 1800 m	C	24 m up to but not including 36 m.	6 m up to but not including 9 m
4.	1800 m and over	D	36 m up to but not including 52 m	9 m up to but not including 14 m
		E	52 m up to but not including 65 m	9 m up to but not including 14 m
		F	65 m up to but not including 80 m	14 m up to but not including 16 m

Table 2.1-1: Aerodrome Reference Code

2.6. Aerodrome Reference Codes and Aeroplane Characteristics.

1. A list of representative aeroplanes, chosen to provide an example of each possible aerodrome reference code number and letter combination, is shown in Table 2.1-2.

2. For a particular aeroplane the table also provides data on the aeroplane reference field length (ARFL), wingspan and outer main gear wheel span used in determining the aerodrome reference code. The aeroplane data aeroplane's performance characteristics should be obtained from information published by the aeroplane manufacturer.

AEROPLANE TYPE	**REF CODE**	**AEROPLANE CHARACTERISTICS**					
		ARFL (m)	**Wingspan (m)**	**OMGWS (m)**	**Length (m)**	**MTOW (kg)**	**TP (Kpa)**
DHC-2 Beaver	1A	381	14.6	3.3	10.3	2490	240
Beechcraft:							
58 (Baron)	1A	401	11.5	3.1	9.1	2449	392
100	1A	628	14.0	4.0	12.2	5352	-

Britten Norman Islander	1A	353	14.9	4.0	10.9	2850	228
Cessna:							
172	1A	272	10.9	2.7	8.2	1066	-
206	1A	274	10.9	2.6	8.6	1639	-
310	1A	518	11.3	3.7	9.7	2359	414
404	1A	721	14.1	4.3	12.1	3810	490
Partenavia P68	1A	230	12.0	2.6	9.4	1960	-
Piper:							
PA 31 (Navajo)	1A	639	12.4	4.3	9.9	2950	414
PA 34	1A	378	11.8	3.4	8.7	1814	-
Beechcraft 200	1B	592	16.6	5.6	13.3	5670	735
Cessna:							
208A (Caravan)	1B	296	15.9	3.7	11.5	3310	-
402C	1B	669	13.45	5.6	11.1	3107	490
441	1B	544	15.1	4.6	11.9	4468	665
DHC 6 Twin Otter	1B	695	19.8	4.1	15.8	5670	220
Dornier 228-200	1B	525	17.0	3.6	16.6	5700	-
DHC-7	1C	689	28.4	7.8	24.6	19505	620
DHC-5E	1D	290	29.3	10.2	24.1	22316	-
Lear Jet 28/29	2A	912	13.4	2.5	14.5	6804	793
Beechcraft 1900	2B	1098	16.6	5.8	17.6	7530	-
CASA C-212	2B	866	20.3	3.5	16.2	7700	392
Embraer EMB110	2B	1199	15.3	4.9	15.1	5670	586
ATR 42-200	2C	1010	24.6	4.9	22.7	16150	728
Cessna 550	2C	912	15.8	6.0	14.4	6033	700
DHC-8:							
100	2C	948	25.9	8.5	22.3	15650	805
300	2C	1122	27.4	8.5	25.7	18642	805
Lear Jet 55	3A	1292	13.4	2.5	16.8	9298	-
IAI Westwind 2	3A	1495	13.7	3.7	15.9	10660	1000
Canadair:							
CL600	3B	1737	18.9	4.0	20.9	18642	1140
CRJ-200	3B	1527	21.21	4.0	26.77	21523	1117
Cessna 650	3B	1581	16.3	3.6	16.9	9979	1036
Dassault-Breguet: Falcon 900	3B	1515	19.3	5.3	20.2	20640	1300
Embraer EMB 145	3B	1500	20	4.8	29.9	19200	-
Fokker F28-2000	3B	1646	23.6	5.8	29.6	29480	689
Shorts SD3-60	3B	1320	22.8	4.6	21.6	11793	758
Bae:							
Jetstream 31	3C	1440	15.9	6.2	14.4	6950	448
Jetstream 41	3C	1500	18.3	-	19.3	10433	-
146-200	3C	1615	26.3	5.5	26.2	42185	1138
146-300	3C	1615	26.3	5.5	31.0	44225	945
Bombardier Global Express	3C	1774	28.7	4.9	30.3	42410	=
Embraer EMB 120	3C	1420	19.8	7.3	20.0	11500	828
McDonnell							
Douglas:	3C	1204	28.8	5.8	19.6	14100	358
DC-3	3C	1551	28.5	6.0	31.8	45360	972
DC9-20							
Fokker:							
F27-500	3C	1670	29.0	7.9	25.1	20412	540
F28-4000	3C	1640	25.1	5.8	29.6	32205	779
F50	3C	1760	29.0	8.0	25.2	20820	552
F100	3C	1695	28.1	5.0	35.5	44450	920
SAAB SF-340	3C	1220	21.4	7.5	19.7	12371	655
Airbus A300 B2	3D	1676	44.8	10.9	53.6	142000	1241
Airbus A320-200	4C	2058	33.9	8.7	37.6	72000	1360

Boeing:							
B717-200	4C	2130	28.4	6.0	37.8	51710	-
B737-200	4C	2295	28.4	6.4	30.6	52390	1145
B737-300	4C	2749	28.9	6.4	30.5	61230	1344
B737-400	4C	2499	28.9	6.4	36.5	63083	1400
B737-800	4C	2256	35.8	6.4	39.5	70535	-
McDonnell							
Douglas:	4C	2134	28.5	6.0	37.8	48988	-
DC9-30	4C	2553	32.9	6.2	45.1	72575	1390
DC9-80/MD80							
Airbus:							
A300-600	4D	2332	44.8	10.9	54.1	165000	1260
A310-200	4D	1845	43.9	10.9	46.7	132000	1080
Boeing:							
B707-300	4D	3088	44.4	7.9	46.6	151315	1240
B757-200	4D	2057	38.0	8.7	47.3	108860	1172
B767-200ER	4D	2499	47.6	10.8	48.5	156500	1310
B767-300ER	4D	2743	47.6	10.8	54.9	172365	1310
McDonnell							
Douglas:	4D	3179	45.2	7.6	57.1	158757	1365
DC8-63	4D	3170	50.4	12.6	55.4	251744	1276
DC10-30	4D	2207	51.7	12.0	61.2	273289	1400
MD11							
Lockheed:							
L1011-100/200	4D	2469	47.3	12.8	54.2	211378	1207
Tupolev TU154	4D	2160	37.6	12.4	48.0	90300	-
Airbus:							
A 330-200	4E	2713	60.3	12.0	59.0	230000	1400
A 330-300	4E	2560	60.3	12.0	63.6	230000	1400
A 340-300	4E	2200	60.3	12.0	63.7	253500	1400
Boeing:							
B747-SP	4E	2710	59.6	12.4	56.3	318420	1413
B747-300	4E	3292	59.6	12.4	70.4	377800	1323
B747-400	4E	3383	64.9	12.4	70.4	394625	1410
B777-200	4E	2500	60.9	12.8	63.73	287800	1400

Table 2.1-2: Aerodrome reference codes and aeroplane characteristics

2.7. Providing for Future Larger Aeroplanes.

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

2. For master planning of aerodromes the appropriate aeroplane and aeroplane characteristics are to be selected. This MOS has included ICAO Code F specifications for aerodrome facilities intended for aeroplanes larger than B 747 wide body jets.

2.8. Non-instrument and Instrument Runways.

1. Runways are classified as non-instrument (also known as visual or circling approach) and instrument runways. Instrument runways are further categorised as: non-precision, precision Category I, Category II, and Category IIIA, IIIB and IIIC.

2. Aerodrome operators must liaise with the DGAC before initiating any changes to the runway classification or instrument category as such a change will involve changes to the standards of a number of aerodrome facilities.

3. This MOS contains specifications for precision approach runways category II and III, for aerodrome facilities intended for aeroplanes with Reference Code numbers 3 and 4 only. No specification is prescribed for code 1 or 2 precision approach runways, as it is unlikely that such facilities will be required. Aerodrome operators are to liaise with the DGAC should there be a need to provide precision approach category II or III runway facilities for Reference Code 1 or 2 aeroplanes.

2.9. Non-precision Approach Runways.

1. A non-precision approach runway is defined in Chapter 1. Non-precision approach procedures are currently designed by DGAC and are published in the AIP Indonesia.

2. Straight-in or runway aligned procedures are identified by the runway number in the title of the approach chart (e.g. RWY 18 GPS or RWY 08 VOR/DME). Non-runway aligned approach procedures will not have the runway number in the title (e.g. GPS-S, GPS-N or NDB).

3. The results of accident enquiries have demonstrated that straight-in approaches are much safer than circling approaches, especially at night. With the advent of GPS, non-precision approach (NPA) runways can be provided without any ground based navigation aid. Aerodrome operators of non-instrument runways may upgrade their runways to NPA runways wherever it is practicable to do so. However, the benefit of having an NPA runway can only be realised if the runway meets the applicable NPA standards. These include:

   a. increased runway strip width (can be compensated by increase in MDA);
   b. increased inner horizontal, conical and approach obstacle limitation surfaces to be surveyed for obstacles;
   c. spacing of runway edge lights; and
   d. the availability of the wind direction indicator, near the threshold, if possible, or an alternate method for obtaining wind information such as an automatic weather information service.

4. Before an NPA procedure is published the procedure designer has to arrange for the design to be commissioned by flight check. Besides checking the operational aspect of the design, the flight check will also validate the adequacy of the runway, visibility of the wind direction indicator and clearances from all existing obstacles. An NPA procedure is only approved for publication when all requirements are met. Otherwise direction on the use of the procedure may be annotated on the chart, including in the worst case a direction that straight-in landing is not permitted.

3. APPLYING FOR AN AERODROME CERTIFICATE.

3.1 Introduction.

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

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

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

4. Before submitting an application, the applicant must prepare an Aerodrome Manual, in accordance with the requirements set out in CASR Part 139. The standards to meet the requirements are set out in various chapters in this Manual of Standards (MOS). The initial application must be made on the form attached at Appendix 1 of this manual. The completed form shall be returned to the DGAC office, together with a copy of the Aerodrome Manual.

3.2 Processing an Aerodrome Certificate Application.

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

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

3. As part of the certification process, DGAC staff or other authorized persons may carry out inspection or testing of any aspect of the aerodrome or require substantiation of any information provided by the applicant. However, it should be clearly understood that the DGAC inspection or testing procedures may use a sampling process. DGAC activity does not absolve the applicant from the responsibility to provide accurate information.

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

3.3 Granting of an Aerodrome Certificate.

1. Before an aerodrome certificate is granted, DGAC needs to be satisfied that:

   a. the aerodrome physical characteristics and facilities are in compliance with relevant standards or are adequate for aeroplane safety;
   b. the aerodrome operating procedures proposed by the applicant and set out in the Aerodrome Manual are appropriate and adequate for the expected level of aircraft activities at the aerodrome;
   c. there are sufficient experienced trained or qualified personnel to conduct the safety functions of the aerodrome; and
   d. the aerodrome operator is aware of the aerodrome safety functions and can be expected to properly operate the aerodrome.

2. Aerodrome certificates are granted on the condition that the aerodrome will, at all times, be in compliance with applicable regulations and standards. CASR Part 139.29 also empowers DGAC to attach additional conditions to a certificate to take account of particular circumstances of the aerodrome.

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

3.4 Maintenance and Control of Aerodrome Manual.

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

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

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

3.5 Initiating NOTAM for a newly Certified Aerodrome.

The DGAC officer or inspector responsible for the certification process will prepare and forward to the NOTAM Office a permanent NOTAM setting out all the aerodrome information which will be included in AIP, including the effective date when the aerodrome is certified.

4. APPLYING TO REGISTER AN AERODROME.

4.1. Introduction.

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

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

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

3. DGAC's aerodrome registration process only addresses the aviation safety aspect of the aerodrome. It is the responsibility of the applicant to ensure that use of the site as an aerodrome is in compliance with other requirements. The aerodrome registration does not absolve the applicant from observing such requirements.

4.2. Approving a Registration Application.

1. Registration is approved on the condition that:

   a. the aerodrome meets appropriate standards;
   b. the aerodrome operator has the capacity to properly maintain the aerodrome; and
   c. the reporting officer has been trained to the standards detailed in Chapter 10.

2. When the application is approved, DGAC will prepare and forward to the NOTAM Office a permanent NOTAM setting out all the aerodrome information which will be included in. DGAC will also confirm, to the applicant, in writing, that the aerodrome is or will be registered, together with a copy of the NOTAM message.

1. Particulars of the Applicant.

Full Name	:	....					
Address	:	....					
Postcode	:	....					
Position	:	....	Signature :	....	Date	:	....
Phone	:	....	Mobile :	....	Fax	:	....

2. Particulars of the Aerodrome Site

Aerodrome Name	:	....
Real Property Description	:	....
Geographical Coordinates of the ARP	:	Lat : .... Long : ....
Bearing and Distances from Nearest Town or Populous Area	:	....

3. Is the Applicant the Owner of the Aerodrome Site?

Yes : .... No : ....

If No, provide :
- a) Details of rights held in relation to the site; and
- b) Name and address of the owner of the site and written evidence to show that permission has been obtained for the site to be used by the applicant as an aerodrome

Note : *The application must be accompanied by a report prepared by an approved confirming that the information provided on this page is accurate and that the aerodrome meets the applicable safety standards.*

4. Aerodrome data If not applicable, insert N/A *(aerodrome data must be derived in accordance with Chapter 5 standards)*

a. Aerodrome diagram – Provide a diagram to depict the following :
1. runway layout, their magnetic bearing and length in metres;
2. taxiways and aprons;
3. aerodrome reference point;
4. wind direction indicators, both lit and unlit;
5. elevation of the aerodrome (the highest point on the landing surface);
6. for instrument runway, the elevation of the mid-point of each threshold;
7. magnetic bearing and distance to the nearest city, town or population centre.

b. Aerodrome administration

Name of aerodrome operator : ....
Address : ....
Telepon : .... (O/H) .... (A/H)
Is this aerodrome open to public ? Y/N
Landing Charges : Y/N
If Yes, please specify : ....
Aerodrome Reporting Officer(s); name and telephone contact details ....

c. Runway details. For each runway, provide the following:
Runway designation: .... Runway reference code ....
TORA........................ TODA ....ASDA .... LDA ....
Runway width............ Runway slope .... Runway strip width .... (graded) .... (O/A)
Pavement ....(surface type) Rating: .... (ACN/PCN) or
.... (max aircraft weight and tyre pressure)

d. Aerodrome lighting. For each runway equipped with lighting, provide the following:
Runway designation: .... Runway edge lights: ....
Standby power: Y/N Portable lights: Y/N PAL: Y/N if yes PAL frequency: ....
Any other lighting, specify

e. Ground services: information on services available to visiting pilots:
Fuel type:................. Supplier: .... Tel: .... (A/H)
If more than one fuel supplier, detail: ....

f. Special procedures : ....
g. Notices : ....

4.3. Maintenance of Registration.

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

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

3. Registration may be suspended if DGAC is not satisfied with:

   a. the accuracy of aerodrome information provided;
   b. the on-going maintenance of the aerodrome; or
   c. the ability of the reporting officer to conduct on-going aerodrome serviceability inspection and reporting functions.

   Notes : 1. *Keeping records of aerodrome serviceability inspections, aerodrome works and NOTAMS issued will assist in demonstrating that the aerodrome has been operated properly*.
   2. Standards for ongoing operations and maintenance of a registered aerodrome are specified in Chapter 12.

4. Registration may be cancelled:

   a. on request of the aerodrome operator; or
   b. by DGAC after the aerodrome registration was suspended and the identified safety concerns are not corrected to the satisfaction of DGAC, within an acceptable period.

4.4. Aerodrome Safety Inspection Report.

Operators of registered aerodromes are required to have an Aerodrome Safety Inspection Report prepared by a DGAC inspector or an approved person as specified in the regulations. This inspection and report must be done either annually, or at a longer interval as agreed by DGAC

5. AERODROME INFORMATION FOR AIP

5.1. General.

5.1.1 Introduction.

1. Aerodrome information is to be published in the Aeronautical Information Publication (AIP0 - Indonesia. CASR Part 139 requires the applicant of an aerodrome certificate to provide information relating to the aerodrome for publication in AIP. This information must be included in the applicant's Aerodrome Manual.

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

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

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

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

5.1.2 Aerodrome information to be provided for a certified aerodrome.

1. Aerodrome diagram. An aerodrome diagram must be provided to illustrate, as appropriate:

   a. layout of runways, taxiways and apron(s);
   b. nature of the runway surfaces;
   c. designations and length of runways;
   d. designations of the taxiways, where applicable;
   e. location of illuminated and non-illuminated wind direction indicators;
   f. location of the aerodrome reference point;
   g. the direction and distance to the nearest town;
   h. location of terminal buildings; and
   i. location of helipads.

2. Aerodrome operation. This must include:

   a. name, address, telephone and facsimile numbers of the aerodrome operator; including after hours contacts;
   b. aerodrome usage, public or private;
   c. aerodrome charges, where notification is desired.

3. Aerodrome location. This information must include;

   a. name of aerodrome;
   b. World Aeronautical Chart number, if known;
   c. latitude and longitude, based on the aerodrome reference point;
   d. magnetic variation;
   e. time conversion-universal time coordinated (UTC) plus local time difference;
   f. 'W' location code indicator, if known;
   g. aerodrome elevation;
   h. currency of Type A charts, if provided.

4. Movement area. Must include for each runway designation;

   a. aerodrome reference code number;
   b. runway bearings-in degrees *magnetic*;
   c. runway length and surface type;
   d. runway pavement strength rating;
   e. runway and runway strip width;
   f. runway slope;
   g. runway declared distances, *and STODA*.
   h. elevation of the mid point of runway threshold, for instrument runways.

5. Lighting systems. This information must include;

   a. lighting systems for runways;
   b. approach lighting system;
   c. visual approach slope indicator system;
   d. aerodrome beacon;
   e. lighting systems for taxiways; and
   f. any other lighting systems.

6. Navigation aids. Details of any navigation aid provided by the aerodrome operator.

7. Rescue and fire-fighting services. The category of aerodrome-based rescue and fire-fighting services provided by DGAC or the aerodrome operator.

8. Ground services. This information must include:

   a. fuel suppliers and their contact details, including after hours;
   b. automatic weather information broadcast if provided by aerodrome operator; and
   c. any other services available to pilots.

9. Special procedures. Include any special procedures unique to the aerodrome, which pilots need to be advised.

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

5.1.3 Standards for Determining Aerodrome Information.

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

   a. bitumen seal;
   b. asphalt;
   c. concrete;
   d. gravel;
   e. grass; or
   f. natural surface.

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

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

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

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

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

6. Aerodrome elevation. Must be at the highest point of the landing area, above mean sea level. Aerodrome elevation must be reported in feet, based on the Indonesian Orthometric system datum to an accuracy of one foot.

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

8. Pavement strength.

a. Aircraft less than 5,700 kg maximum take-off mass. The bearing strength of a pavement intended for aircraft of 5700 kg mass or less, must be made available by reporting the following information:

1) maximum allowable aircraft mass; and
2) maximum allowable tyre pressure.

b. Aircraft greater than 5,700 kg maximum take-off mass. Report the bearing strength of pavements intended for aircraft greater than 5,700 kg mass, in accordance with the Aircraft Classification Number/Pavement Classification Number (ACN/PCN) system; reporting all of the following information:

1) the pavement classification number (PCN);
2) pavement type for ACN-PCN determination;
3) subgrade strength category;
4) maximum allowable tyre pressure category; and
5) evaluation method.

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

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

1) pavement type for ACN-PCN determination.

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

2) subgrade strength category.

Subgrade strength category :	Code
High strength: characterised by a K value of 150 MN/m3 and representing all K values above 120 MN/m3 for rigid pavements, and by CBR 15 and representing all CBR values above 13 for flexible pavements.	A
Medium strength: characterised by a K value of 80 MN/m3 and representing a range in K of 60 to 120 MN/m3 for rigid pavements, and by CBR 10 and representing a range in CBR of 8 to 13 for flexible pavements.	B
Low strength: characterised by a K value of 40 MN/m3 and	C

representing a range in K of 25 to 60 MN/m3 for rigid by CBR 6 and representing a range in CBR of 4 to 8 for flexible pavements.	
Ultra low strength: characterised by a K value of 20 MN/m3 and representing all K values below 25 MN/m3 for rigid pavements, and by CBR 3 and representing all CBR values below 4 for flexible pavements.	D

3) maximum allowable tyre pressure category.

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

4) evaluation method.

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

d. Examples of pavement strength reporting.

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

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

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

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

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

9. Runway width. Determine the physical width of each runway, and provide the information in whole numbers of metres.

10. Runway width. Determine the physical width of each runway, and provide the information in whole numbers of metres.

11. Runway strip width. For non instrument runways, provide the full width of graded strip. For an instrument runway, provide the full width of runway strip which must include the graded portion and the flyover portion; in whole numbers of metres.

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

13. Declared distances.

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

    b. The following distances in metres with feet equivalent shown in brackets, must be determined for each runway direction.
        1) take off run available (TORA);
        2) take off distance available (TODA);
        3) accelerate-stop distance available (ASDA);
        4) landing distance available (LDA);

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

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

           TORA = Length of RW

        2) Take-off distance available (TODA) is defined as the distance available to an aeroplane for completion of its ground run, lift-off and initial climb to 35 ft. This will normally be the full length of the runway plus

the length of any CWY. Where there is no designated CWY, the part of the runway strip between the end of the runway and the runway strip end is included as part of the TODA. Each TODA must be accompanied by an obstacle clear take-off gradient expressed as a percentage.

TODA =TORA + CWY

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

ASDA = TORA + SWY

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

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

Note: See Section 5.2 for illustrations of declared distances.

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

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

16. Survey of take-off area.

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

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

17. Intersection departure take-off distances available.

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

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

18. Threshold elevation. For instrument runways, provide the elevation of the mid point of each runway threshold. The threshold elevation must be measured in feet, to an accuracy of one foot, based on the Indonesian Orthometric system datum.

19. Threshold elevation. For instrument runways, provide the elevation of the mid point of each runway threshold. The threshold elevation must be measured in feet, to an accuracy of one foot, based on the Indonesian Orthometric system datum.

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

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

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

Abbreviation	Meaning
SDBY PWR AVBL	Standby power available.
PTBL	Portable or temporary lights (flares or battery).
LIRL	Low intensity runway lights (omnidirectional, single stage of

	intensity).
MIRL	Medium intensity runway lights (omnidirectional, three stages of intensity).
HIRL	High intensity runway lights (unidirectional, five or six stages of intensity; lower intensity stages may be omnidirectional).
RTIL	Runway threshold identification lights (flashing white).
RCLL	Runway centre line lights.
RTZL	Runway touchdown zone lights.
AL	Approach lights (other than high intensity).
HIAL-CAT 1	High intensity approach lights-CAT I.
HIAL-CAT 11 or 111	High intensity approach lights-CAT II or III.
SFL	Sequenced flashing lights.
T-VASIS	T-pattern visual approach slope indicator system.
AT-VASIS	Abbreviated (single side) T-pattern visual slope approach slope indicator system.
PAPI	PAPI visual approach slope indicator system.
ABN	Aerodrome beacon with colour and flashing rate.
HIOL	High intensity obstacle lights (flashing white).
MIOL	Medium intensity obstacle lights (flashing red).
LIOL	Low intensity obstacle lights (steady red).
Taxiways	Centreline lights are green and edge lights are blue.

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

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

24. Notices. Significant local data may include the following:

a. animal or bird hazard;
b. aircraft parking restrictions;
c. aerodrome obstacles in the circuit area;
d. aircraft to avoid overflying certain areas such as mine blasting areas; and
e. other aviation activity such as ultra light, or glider operations in the vicinity.

5.1.4 Obstacle Data.

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

5.2. Illustration of Declared Distances.

5.2.1 Introduction.

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

2. Declared distances are a combination of the runway (i.e. full strength pavement) with any provided stopway and/or clearway.

5.2.2 Calculation of Declared Distances.

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

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

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

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

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

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

5.2.3 Obstacle-free Take-off Gradient.

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

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

5.2.4 Critical Obstacle.

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

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

5.2.5 Declared Distances for Intersection Departures.

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

6. PHYSICAL CHARACTERISTICS

6.1 General.

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

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

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

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

5. The standards for aerodromes used by aircraft operating under CASR Part 135 are set out in Chapter 13.

6. The standards in this Chapter are intended for the planning and construction of new aerodrome facilities. Where an existing facility does not meet these standards, DGAC may approve the use of such facilities by an aircraft larger than that which the facilities are designed for, with, or without, operational restrictions on the aircraft operator.

6.2 Runway.

6.2.1 Location of Runway Threshold.

The threshold of a runway must be located:

1. if the runway's code number is 1, not less than 30 metres after; or

2. in any other case, not less than 60 metres after,

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

Note : *If obstacles infringe the approach surface, operational assessment may require the threshold to be displaced. The obstacle free approach surface to the threshold is not to be steeper than gradient specified for the appropriate type and code of runway as specified in Chapter 7*

6.2.2 Length of Runway.

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

6.2.3 Runway Width.

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

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

Note : 1. [a] Runway width may be reduced to 15 m or 10 m depending on the restrictions placed on small aeroplane operations. See Chapter 13.
2. Operations may be permitted for an aircraft to land on, or take off from, a runway whose width is less or greater than the minimum width applicable to the aeroplane code letter. Such permissions will be determined by DGAC from an aeronautical study.

Table 6.2-1: Minimum runway width.

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

6.2.4 Runway Turning Area.

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

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

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

6.2.5 Parallel Runways.

1. Where parallel runways are to be provided the aerodrome operator should consult with DGAC in regard to airspace and air traffic control procedures associated with operations on multiple runways.

2. Where parallel, non-instrument runways are provided for simultaneous use, the minimum separation distance between the runway centrelines must not be less than :
   a. 210 m where the higher code number of the two runways is 3 or 4;
   b. 150 m where the higher code number of the two runways is 2; and
   c. 120 m where the code number of each of the two runways is 1.

3. Where parallel instrument runways are intended for simultaneous use, the minimum distance between the runway centrelines must not be less than:
   a. for independent parallel approaches, 1,035 m;
   b. for dependent parallel approaches, 915 m;
   c. for independent parallel departures, 760 m; and
   d. for segregated parallel operations, 760 m.

6.2.6 Runway Longitudinal Slope.

1. The overall runway slope, defined by dividing the difference between the maximum and minimum elevation along the runway centreline by the runway length, must not be more than:
   a. if the runway's code number is 3 or 4 — 1%; or
   b. if the runway's code number is 1 or 2 — 2%.

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

a. if the runway's code number is 4 — 1.25%; or
b. if the runway's code number is 3 — 1.5%; or
c. f the runway's code number is 1 or 2 — 2%.

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

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

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

5. If slope changes cannot be avoided, the change in longitudinal slope between any two adjoining parts of a runway must not be more than:
   a. if the runway's code number is 3 or 4 — 1.5%; or
   b. if the runway's code number is 1 or 2 — 2%.

6. The transition from one longitudinal slope to another must be accomplished by a vertical curve, with a rate of change not more than:
   a. if the runway's code number is 4 — 0.1% for every 30 m (minimum radius of curvature of 30,000 m); or
   b. if the runway's code number is 3 — 0.2% for every 30 m (minimum radius of curvature of 15,000 m); or
   c. if the runway's code number is 1 or 2 — 0.4% for every 30 m (minimum radius of curvature of 7,500 m).

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

7. The distance between the points of intersection of two successive longitudinal slope changes must not be less than the greater of the following:
   a. 45 m; or
   b. the distance in metres worked out using the formula:
   c. $D = k (|S1 - S2| + |S2 - S3|)/100$, where 'k' is:
      1) if the runway's code number is 4 — 30,000 m; or
      2) if the runway's code number is 3 — 15,000 m; or
      3) if the runway's code number is 1 or 2 — 5,000 m; and

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

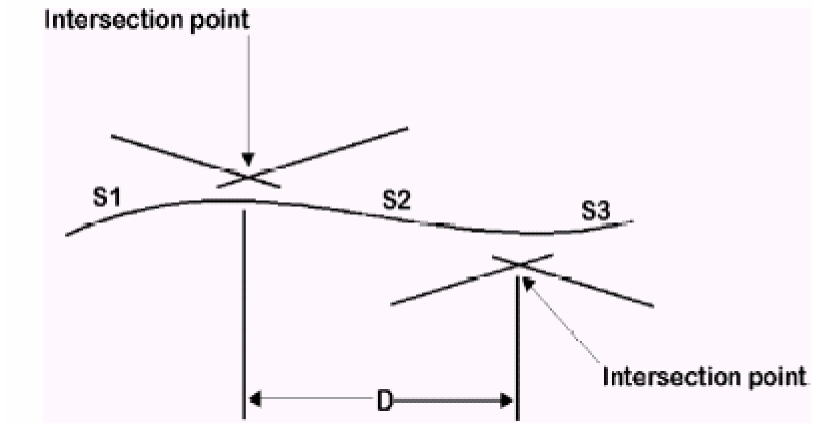


Figure 6.2-1

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

6.2.7 Runway Sight Distance.

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

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

Table 6.2-3: Runway line of sight

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

6.2.8 Transverse Slopes on Runways.

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

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

Table 6.2-4: Runway transverse slope

6.2.9 Runway Surface.

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

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

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

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

   a. If a runway surface cannot meet the standards of Paragraph 6.2.9.1, a surface treatment must be provided. Acceptable surface treatments include grooving, porous friction course and bituminous seals.
   b. The runway surface standards for grass or natural runways and gravel runways are the same as those for runways intended for small aeroplanes as set out in Chapter 13.

6.2.10 Runway Bearing Strength.

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

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

6.2.11 Runway Shoulders.

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

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

3. If a runway is 30 m wide and is used by aeroplanes seating 100 passengers or more, shoulders must be provided and the total width of the runway and its shoulders must not be less than 36 m.

6.2.12 Characteristics of Runway Shoulders.

Runway shoulders must:

1. be of equal width on both sides;

2. slope downwards and away from the runway surface;

3. be resistant to aeroplane engine blast erosion;

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

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

6.2.13 Transverse Slope on Runway Shoulder.

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

6.2.14 Surface of Runway Shoulder.

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

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

6.2.15 Provision of Runway Strip.

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

6.2.16 Composition of Runway Strip.

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

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

2. if the runway is an instrument runway — a graded area around the runway and stopway and an area, known as the 'fly-over area', outside the graded area. Technically the 'flyover area' is the ungraded component in total runway strip width.

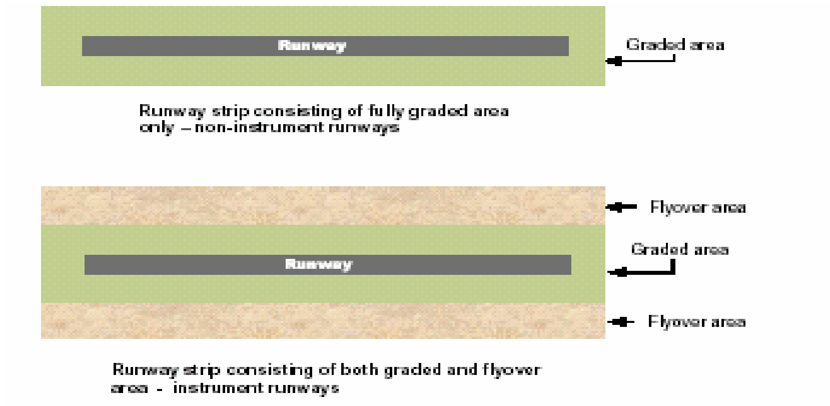


Figure 6.2-2: Composition of Runway Strip

6.2.17 Runway Strip Length.

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

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

2. in any other case — 60 m.

6.2.18 Runway Strip Width.

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

Aerodrome reference code	Runway strip width
1 a b	60 m
2 c	80 m
3 (where the runway width is 30 m)	90 m
3, 4 (where the runway width is 45 m or more)	150 m

a. Runway strip width may be reduced to 30 m depending on the restrictions placed on small aeroplane operations. See Chapter 13.
b. Runways used at night are required to have a runway strip with a minimum width of 80 m.
c. Runways used in daylight by aeroplanes not exceeding 5,700 kg may have a runway strip with a minimum width of 60 m.

Table 6.2-5: Graded runway strip width

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

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

a. Where it is not practicable to provide the full 150 m width of runway strip, a minimum 90 m wide graded only strip may be provided where the runway is used by up to and including code 3C aeroplanes, subject to landing minima adjustment.
b. Where it is not practicable to provide the full runway strip width, a minimum 150 m wide graded only strip may be provided, subject to landing minima adjustments.

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

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

Aerodrome Reference Code	Overall Runway Strip Width
1 or 2	150 m
3 or 4	300 m

Notes :
1. Where it is not practicable to provide the full runway strip width, a lesser strip width may be provided subject to landing minima adjustments. However, the standard width of the graded area must be provided.
2. For precision approach runways code 3 and 4, it is recommended that an additional width of graded runway strip be provided. In this case, the graded width extends to a distance of 105 m from the runway centreline, except that the width is gradually reduced (over a distance of 150 m) to 75 m from the runway centreline at both ends of the strip, for a length of 150 m from the runway ends as shown in Figure 6.2-3.

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

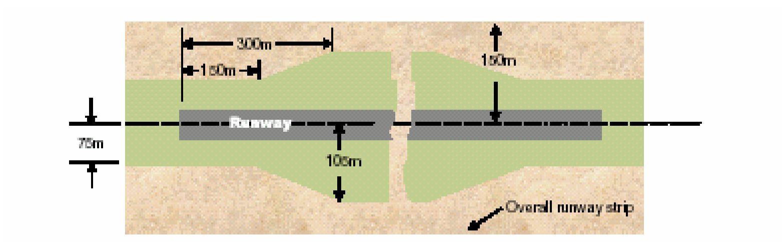


Figure 6.2-3: Runway Strip for Precision Approach Runways

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

6.2.19 Longitudinal Slope on Graded Area of Runway Strip.

As far as practicable the longitudinal slope along the graded area of the runway strip must not be more than:
1. if the runway code number is 4 —1.5%;
2. if the runway code number is 3 — 1.75%;
3. if the runway's code number is 1 or 2 — 2.0%.

6.2.20 Longitudinal Slope Changes on Graded Area of Runway Strip.

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

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

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

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

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

6.2.22 Runway Strip Transverse Slope.

1. The transverse slope of the graded area of the runway strip must not be more than:
   a. if the runway's code number is 3 or 4 — 2.5%; and
   b. f the runway's code number is 1 or 2 — 3%.

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

3. No part of a fly-over area, or any object on it, must project through a plane:
   a. that starts along each outer side of the graded area; and
   b. has an upward slope away from the graded area of more than 5%.

6.2.23 Surface of Graded Area of Runway Strip.

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

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

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

4. The standards for the surface of runway strips are the same as those for runway strips intended for small aeroplanes set out in Chapter 13.

6.2.24 Objects on Runway Strips.

1. A runway strip must be free of fixed objects, other than visual aids for the guidance of aircraft or vehicles:
   a. within 77.5 m of the centre line of a precision approach category I, II or III runway, whose code number is 4 and the code letter is F; or
   b. within 60 m of the centre line of a precision approach category I, II or III runway, whose code number is 3 or 4; or
   c. within 45 m of the centre line of a precision approach category I runway, whose code number is 1 or 2.

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

6.2.25 Runway End Safety Area (RESA).

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

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

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

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

6.2.26 Dimensions of RESA.

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

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

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

6.2.27 Slopes on RESA.

1. The downward longitudinal slope of a RESA must not be more than 5%.
2. The transverse slope of a RESA must not be more than 5% upwards or downwards.
3. Transition between different slopes is to be as gradual as practicable.
4. No part of the RESA must project above the runway's approach or take-off climb surfaces.

6.2.28 Objects on RESA.

1. A RESA must be free of fixed objects, other than visual or navigational aids for the guidance of aircraft or vehicles.
2. All fixed objects permitted on a RESA must be of low mass and frangibly mounted.
3. A RESA must be free of mobile objects that may endanger aircraft when the runway is being used for landing or taking off.

6.2.29 Bearing Strength of RESA.

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

Note : *It is recommended that areas abutting the runway ends should be provided with a compacted gravel pavement with a depth at the runway end equal to half the depth of the runway pavement, tapering to natural surface, the length of the taper being adjusted according to the bearing capacity of the natural surface. For areas beyond the gravel surface and outside the runway strip, graded but non-compacted natural surface with a grass cover is preferred. Hard pans should be broken up*.

6.2.30 Clearways.

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

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

6.2.31 Location of Clearways.

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

6.2.32 Dimensions of Clearways.

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

2. The width of a clearway must not be less than:
    a. If the runway's code number is 3 or 4 150 m;
    b. If the runway's code number is 2 -80 m; and
    c. If the runway's code number is 1 60 m.

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

6.2.33 Slopes on Clearways.

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

1. is perpendicular to the vertical plane containing the runway centreline; and
2. passes through a point located on the runway centreline at the end of the take-off run available.

6.2.34 Objects on Clearways.

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

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

6.2.35 Stopways.

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

6.2.36 Dimensions of Stopways.

1. Any decision to provide a length of stopway is an economic decision for the aerodrome operator, but any stopway provided must be located so that it is contained in, and finishes at least 60 m before the end of, the runway strip.

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

6.2.37 Surface of Stopway.

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

6.2.38 Stopway Slopes and Slope Changes.

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

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

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

6.2.39 Bearing Strength of Stopway.

1. The bearing strength of a stopway must be able to support at least one single pass of the critical aircraft, without causing structural damage to the aircraft.

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

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

   a. for aircraft having a maximum take-off mass in excess of 68,000 kg, any unsealed stopway must not be included in the calculation of the accelerated stop distance available;
   b. for aircraft having a maximum take-off mass between 36,300 kg and 68,000 kg, a maximum length of 60 m must be included in the calculation of the accelerated stop distance available; and
   c. for aircraft having a maximum take-off mass not exceeding 36,300 kg, a length of stopway not exceeding 13% of the runway length may be included in the calculation of the accelerated stop distance available.

6.3 Taxiway.

6.3.1 Taxiway Width.

The width of a straight section of a taxiway must not be less than the width determined using Table 6.3-1.

Code Letter	Minimum Taxiway Width (Straight Sections)
A	7.5 m
B	10.5 m
C	18 m a
D	23 m b
E	23 m
F	25 m
a. If the taxiway is only intended to serve aircraft with a wheelbase of less than 18 m, the width may be reduced to 15 m. b. If the taxiway is only intended to serve aircraft with an outer main gear span of less than 9 m, the width may be reduced to 18 m.	

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

6.3.2 Taxiway Edge Clearance.

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

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

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

6.3.3 Taxiway Curves.

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

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

Table 6.3-3: Radii for taxiway curves

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

6.3.4 Taxiway Longitudinal Slope.

1. The longitudinal slope along any part of a taxiway must not be more than:
   a. if the taxiway's code letter is C, D, E or F — 1.5%; and
   b. if the taxiway's code letter is A or B — 3.0%.

2. If slope changes cannot be avoided, the transition from one longitudinal slope to another must be accomplished by a vertical curve, with a rate of change not more than:
   a. if the taxiway's code letter is C, D, E or F — 1.0% per 30 m (minimum radius of curvature of 3,000 m); and
   b. if the taxiway's code letter is A or B — 1.0% per 25 m (minimum radius of curvature of 2,500 m).

6.3.5 Taxiway Transverse Slope.

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

a. if the taxiway's code letter is C, D, E or F — 1.5%; and
b. if the taxiway's code letter is A or B — 2.0%.

6.3.6 Taxiway Sight Distance.

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

Code Letter	Minimum Line Of Sight
A	150 m from 1.5 m above taxiway
B	200 m from 2 m above taxiway
C, D, E or F	300 m from 3 m above taxiway

Table 6.3-4: Standard for taxiway line of sight

6.3.7 Taxiway Bearing Strength.

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

6.3.8 Taxiway Shoulders.

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

6.3.9 Width of Taxiway Shoulders.

1. The width of shoulders on each side of the taxiway must not be less than:
   a. if the taxiway's code letter is F — 17.5 m; or
   b. if the taxiway's code letter is E — 10.5 m; or
   c. if the taxiway's code letter is D — 7.5 m; or
   d. if the taxiway's code letter is C — 3.5 m.

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

6.3.10 Surface of Taxiway Shoulders.

The taxiway shoulders must be:

a. if the taxiway is used by jet-propelled aircraft — resistant to engine blast erosion; and
b. if the taxiway is intended to serve a wide body jet, such as a Boeing 747 aeroplane or similar aircraft whose engines overhang the shoulders — sealed to a width of at least 3 metres on both sides of the taxiway.

6.3.11 Taxiway Strips.

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

6.3.12 Width of Taxiway Strip.

The width of the taxiway strip along the length of the taxiway on each side of the centre line of the taxiway must not be less than:
a. if the taxiway's code letter is F — 57.5 m; or
b. if the taxiway's code letter is E — 47.5 m; or
c. if the taxiway's code letter is D — 40.5 m; or
d. if the taxiway's code letter is C — 26 m; or
e. if the taxiway's code letter is B — 21.5 m; or
f. if the taxiway's code letter is A — 16.25 m.

6.3.13 Width of Graded Area of Taxiway Strip.

The width of the graded area of a taxiway strip on each side of the centre line of the taxiway must not be less than:
a. if the taxiway's code letter is F - 30 m; or
b. if the taxiway's code letter is E - 22 m; or
c. if the taxiway's code letter is D - 19 m; or
d. if the taxiway's code letter is C or B - 12.5 m; or
e. if the taxiway's code letter is A - 11 m.

6.3.14 Slope of Taxiway Strip.

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

   a. if the taxiway's code letter is C, D, E or F — 2.5%; or
   b. if the taxiway's code letter is A or B — 3%;
   c. measured relative to the transverse slope of the adjacent taxiway surface.

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

3. The part of a taxiway strip outside the graded area must not have an upward slope away from the taxiway of more than 5.0%, measured relative to the horizontal.

6.3.15 Objects on Taxiway Strip.

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

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

6.3.16 Taxiways on Bridges.

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

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

6.3.17 Taxiway Minimum Separation Distances.

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

a. the centre line of a parallel runway; or
b. the centre line of a parallel taxiway; or
c. a building, structure, vehicle, wall, plant, equipment, parked aeroplane or road, must not be less than the distances determined using Table 6.3-5.

To precision approach runway centre line	Code letter					
Runway code number	A	B	C	D	E	F
1	82.5 m	87 m	93 m	-	-	-
2	82.5 m	87 m	93 m	-	-	-
3	157.5 m	162 m	168 m	176 m	-	-
4	-	-	168 m	176 m	182.5 m	190 m
To non-precision approach runway centre line	Code letter					
Runway code number	A	B	C	D	E	F
1	52.5 m	57 m	63 m	-	-	-
2	52.5 m	57 m	63 m	-	-	-
3	82.5 m	87 m	93 m	176 m	-	-
4	-	-	93 m	176 m	182.5 m	190 m
To non-instrument runway centre line	Code letter					
Runway code number	A	B	C	D	E	F
1	37.5 m	42 m	48 m	-	-	-
2	47.5 m	52 m	58 m	-	-	-
3	52.5 m	57 m	63 m	101 m	-	-
4	-	-	93 m	101 m	107.5 m	115 m
To another axiway centre line	Code letter					
	A	B	C	D	E	F
	23.75 m	33.5 m	44 m	66.5 m	80 m	97.5 m
To Paragraph 6.3.17.1(c) object	Code letter					
	A	B	C	D	E	F
	16.25 m	21.5 m	26 m	40.5 m	47.5 m	57.5 m

Table 6.3-5: Taxiway minimum separation distance

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

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

6.4 Holding Bays, Runway-Holding Positions, Intermediate Holding Positions and Road-Holding Positions.

6.4.1 Introduction.

For the purpose of this Section :

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

b. a runway-holding position is a designated position on a taxiway entering a runway;
c. an intermediate holding position is a designated position on a taxiway other than at a taxiway entering a runway; and
d. a road-holding position is a designated position at which vehicles may be required to hold before crossing a runway.

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

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

   a. A runway-holding position or positions must be established:
   b. on a taxiway, at the intersection of a taxiway and a runway; or
   c. at an intersection of a runway with another runway where the aircraft is required to be held.

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

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

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

A holding bay, runway-holding position, intermediate holding position or road-holding position must not be placed where an aircraft or vehicle using it:
a. infringes the inner transitional surface of a precision approach runway or, in other cases, the graded area of the runway strip; or
b. interferes with the operation of radio navigation aids.

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

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

2. For a precision approach runway the distance in Table 6.4-1 may be reduced by 5 metres for every metre by which the elevation of the runway-holding position is lower than the elevation of the runway threshold, contingent upon not infringing the inner transitional surface.

Code Number	Type of runway				
	Non-Instrument	Non-Precision Approach	Precision Category I	Precision Category II or III	Take-off
1	30 m	40 m	60 m	-	30 m
2	40 m	40 m	60 m	-	40 m
3	75 m a	75 m a	90 m b	105 m c	75 m a
4	75 m	75 m	90 m	105 m c	75 m

a. If the runway's code is 3A, 3B or 3C, the minimum distance is 45 m.
b. If the runway's code is 3A, 3B or 3C, the minimum distance is 75 m.
c. May be reduced to 90 m up to 300 m from the runway end.

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

6.5 Aprons.

6.5.1 Location of Apron.

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

6.5.2 Separation Distances on Aprons.

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

Code letter for aircraft	From centre line of aircraft parking position taxilane to object	From wing tip of aircraft on aircraft parking position to object
A	12.0 m	3.0 m
B	16.5 m	3.0 m
C	24.5 m	4.5 m
D	36.0 m	7.5 m
E	42.5 m	7.5 m*
F	50.5 m	7.5 m*

* The minimum separation distance is 10 metres if free moving parking is used.

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

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

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

6.5.3 Slopes on Aprons.

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

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

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

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

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

6.5.4 Apron Bearing Strength.

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

6.5.5 Apron Road.

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

6.6 Jet Blast.

6.6.1 General.

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

6.6.2 Jet Blast and Propeller Wash Hazards.

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

a. Passengers and main public areas, where passengers have to walk and people are expected to congregate — 60 km/h
b. minor public areas, where people are not expected to congregate — 80 km/h;
c. public roads — 50 km/h where the vehicular speed may be 80 km/h or more, and — 60 km/h where the vehicular speed is expected to be below 80 km/h.

d. personnel working near an aeroplane — 80 km/h ;
e. apron equipment — generally not in excess of 80 km/h;
f. light aeroplane parking areas — desirably 60 km/h and not greater than 80 km/h;
g. buildings and other structures — not exceeding 100 km/h.

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

6.7 Glider Facilaties.

6.7.1 Location of Glider Runway Strips.

1. Where the physical characteristics of the site allow it, and where the expected number of powered aircraft operations does not exceed 5,000 per annum, the glider runway strip may be located within an existing runway strip.
2. Subject to DGAC's approval, glider operations may be carried out from runways normally used by powered aircraft.

6.7.2 Dimensions of Glider Runway Strips.

1. Where it is located outside an existing runway strip, the width of a glider runway strip must not be less than 60 m, and must be of sufficient length for the glider operations.
2. If contra-circuit directions are to be approved and fully independent operations conducted, the separation distance between the centreline of the two glider runway strips must not be less than 120 m.
3. Where a glider runway strip is to be located either wholly or partly within an existing runway strip, it must have a length which is sufficient for glider operations, and a width of not less than 37.5 m measured :
   a. where there is flush-mounted lighting or no runway lighting, from the existing runway edge, as shown in Figure 6.7-1 below; and
   b. where there is elevated runway lighting, or where physical features such as stone filled rubble drains, steep or rough shoulders exist, from three metres clear of the runway lights or such physical features, as shown in the Figure 6.7-1 below.

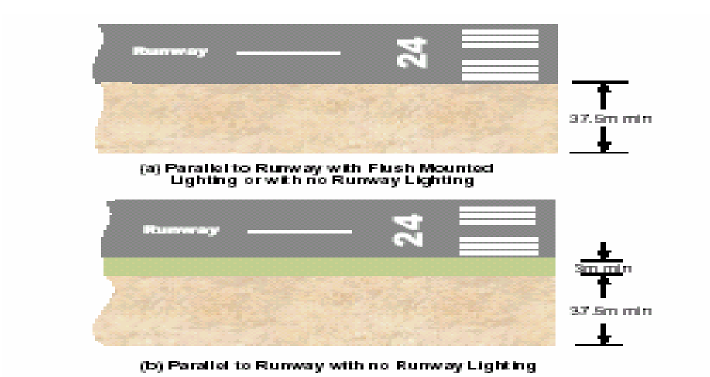


Figure 6.7-1

6.7.3 Glider Parking Areas.

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

6.7.4 Glider Runway Strip Serviceability.

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

6.7.5 Glider Runway Strip Standards.

1. The glider runway strip must be established in accordance with the following standards:
   a. where a glider runway strip is located within an existing runway strip for powered aircraft, it must conform with the powered aircraft runway strip existing grades and levels; and
   b. where the glider runway strip is located outside an existing runway strip for powered aircraft, it must conform to the runway strip standards for aeroplane landing areas.

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

6.7.6 Notification of Glider Facilities and Procedures.

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

7. OBSTACLE RESTRICTION AND LIMITATION

7.1 GENERAL.

7.1.1 Introduction.

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

2. An obstacle is defined as:
   a. any object that stands on, or stands above, the specified surface of an obstacle restriction area which comprises the runway strips, runway end safety areas, clearways and taxiway strips; and
   b. any object that penetrates the obstacle limitation surfaces (OLS), a series of surfaces that set the height limits of objects, around an aerodrome.

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

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

7.1.2 Obstacle Restriction.

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

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

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

7.1.3 Obstacle Limitation.

1. An aerodrome operator must establish the OLS applicable to the aerodrome.
   Note : *A description and illustration of the obstacle limitation surfaces is provided in Section 7.3.*

2. The following OLS must be established for a non-instrument runway, a non-precision approach runway and a precision approach runway category I:
   a. conical surface;
   b. inner horizontal surface;
   c. approach surface;
   d. transitional surface; and
   e. take-off climb surface if the runway is meant for take-off.

3. The following OLS must be established for a precision approach runway category II or III:

   a. outer horizontal surface, if so directed by DGAC;
   b. conical surface;
   c. inner horizontal surface;
   d. approach surface;
   e. inner approach surface;
   f. transitional surface;
   g. inner transitional surface;
   h. baulked landing surface; and
   i. take-off climb surface if the runway is meant for take-off.

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

OLS & Dimensions (in meters and percentages)	Runway Classification									
	Non – Instrument				Instrument					
					Non-Precision			Precision		
	Code No.				Code No			I Code No		II- III Code No
	1*	2	3	4	1,5	3	4	1,2	3,4	3,4
OUTER HORIZONTAL										
Height (m)									150	150
Radius (m)									15000	15000
CONICAL										
Slope	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Height (m)	35	55	75	100	60	75	100	60	100	100
INNER HORIZONTAL										
Height (m)	45	45	45	45	45	45	45	45	45	45
Radius (m)	2000	2500	4000	4000	3500	4000	4000	3500	4000	4000
APPROACH										
Length of inner edge (m)	60	80	159°	150	90	150	300°	150	300	300
Distance from threshold (m)	30	60	60	60	60	60	60	60	60	60
Divergence each side	10%	10%	10%	10%	15%	15%	15%	15%	15%	15%
First section length (m)	1600	2500	3000	3000	2500	3000	3000	3000	3000	3000
Slope	5%	4%	3,33%	2,5%	3,33%	3,33%	2%	2,5%	2%	2%
Second section length (m)	-	-	-	-	-	3600°	3600	12000	3600	3600
Slope	-	-	-	-	-	2,5%	2,5%	3%	2,5%	2,5%
Horizontal section length (m)	-	-	-	-	-	8400°	8400	-	8400	8400
Total length (m)	1600	2500	3000	3000	2500	15000°	15000	15000	15000	15000
INNER APPROACH										
Width (m)								90	120	120
Distance from threshold (m)								60	60	60
Length (m)								900	900	900
Slope								2,5%	2%	2%
TRANSITIONAL										
Slope	20%	20%	14,3%	14,3%	20%	14,3%	14,3%	14,3%	14,3%	14,3%
INNER TRANSITIONAL										
Slope								40%	33,3%	33.3%
BAUL KED LANDING										
Length of inner edge (m)								90	120	120
Distance from threshold (m)								°	1800	1800
Divergence each side								10%	10%	10%
Slope								4%	3,3%	3,3%

Table 7.1-1: OLS Specification for Approach Runways

All distances are measured horizontally unless otherwise specified.

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

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

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

c. No actual ground survey required unless specifically required by procedure designer. Procedure designer will use topographical maps and tall structure databank to determine Approach area up to this distance needs to be monitored for new obstacles. Refer to procedure designer's advice on significant high ground or tall structure that needs monitoring.

d. Distance to end of runway strip.

e. Or to the end of the runway strip, whichever is less.

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

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

Table 7.1-2: Take-off runways

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

a. All dimensions are measured horizontally unless otherwise specified.

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

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

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

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

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

7.1.4 Procedures for Aerodrome Operators to Deal with Obstacles.

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

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

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

3. Information on any new obstacle must include:
   a. the nature of the obstacle — for instance structure or machinery;
   b. distance and bearing of the obstacle from the start of the take-off end of the runway, if the obstacle is within the take-off area, or the ARP;
   c. height of the obstacle in relation to the aerodrome elevation; and
   d. if it is a temporary obstacle — the time it exists as an obstacle.

7.1.5 Objects Outside the OLS.

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

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

7.1.6 Objects That Could Become Obstacles.

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

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

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

3. Marking and lighting of obstacles.

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

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

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

5. Fences or levee banks. A fence or levee bank that penetrates the OLS must be treated as an obstacle.
   Note : *See Chapter 5 in regard to reporting of fences and levee banks.*

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

   a. removed, if appropriate; or
   b. marked and/or lit.

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

7.1.7 Monitoring of Obstacles Associated with Instrument Runways.

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

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

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

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

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

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

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

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

3. For the approach area beyond the first section, existing topographical maps should provide general obstacle data for determining minimum altitude purposes. Accordingly, unless specifically requested by the procedure designer, no actual ground survey of obstacles within the area is necessary.

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

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

7.1.9 Obstacle Protection for Curved Take-Off.

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

7.2 Aerodrome Obstacle Charts.

7.2.1 Type A Charts.

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

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

3. The obstacle data to be collected and the manner of presentation of the Type A chart must be in accordance with the standards and procedures set out in ICAO Annex 4.
   Note : *A Type A chart meeting the accuracy requirements of Annex 4 is adequate.*

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

5. At aerodromes with no international operations but used by aircraft above 5,700 kg engaged in air transport operations, the decision to prepare Type A charts, or discrete obstacle information instead of a Type A chart, is a matter for the aerodrome operator to be made in conjunction with the relevant airline.
   Note : *Refer to AC… 'Guidelines for the provision of obstacle information for take-off flight planning purposes'.*

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

7. Where a Type A chart has been prepared and issued, the take-off flight area must be monitored and any changes to the Type A chart information must immediately be communicated to all users of the Type A chart.
   Notes :
   1. *Changes to the Type A chart information but not to OLS takeoff climb surface does not require NOTAM action.*
   2. *Where the change to Type A chart information is also the subject of NOTAM action, additional separate advice to Type A chart holders is not necessary.*

8. A distribution list of current Type A chart holders must be maintained in the Aerodrome Manual.

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

7.2.2 Type B Charts.

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

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

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

3. The decision to prepare a Type B chart must be made in consultation with DGAC.

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

7.2.3 Type C Charts.

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

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

3. Where prepared, the Type C charts may be produced using one of the following methods:
   a. a complete Type C chart in accordance with the standards and procedures set out in ICAO Annex 4; or
   b. based on an actual survey meeting the order of accuracy requirements of Annex 4, produce a list containing all significant obstacles above a nominal obstacle height; or
   c. based on topographical maps, where available, meeting the order of accuracy requirements of Annex 14, produce a list containing all significant obstacles above a nominal obstacle height.

7.3 Obstacle Limitation Surfaces.

7.3.1 General.

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

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

2. The OLS comprises some or all of the following:

   a. outer horizontal surface;
   b. conical surface;
   c. inner horizontal surface;
   d. approach surface;
      inner approach surface;
   e. transitional surface;
   f. inner transitional surface;
   g. baulked landing surface; and
   h. take-off climb surface.

7.3.2 Description of OLS.

1. Reference Elevation Datum.

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

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

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

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

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

3. Conical Surface.

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

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

4. Inner Horizontal Surface.

The inner horizontal surface is a horizontal plane at a specified height above the reference elevation datum extending to an outer boundary comprising :

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

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

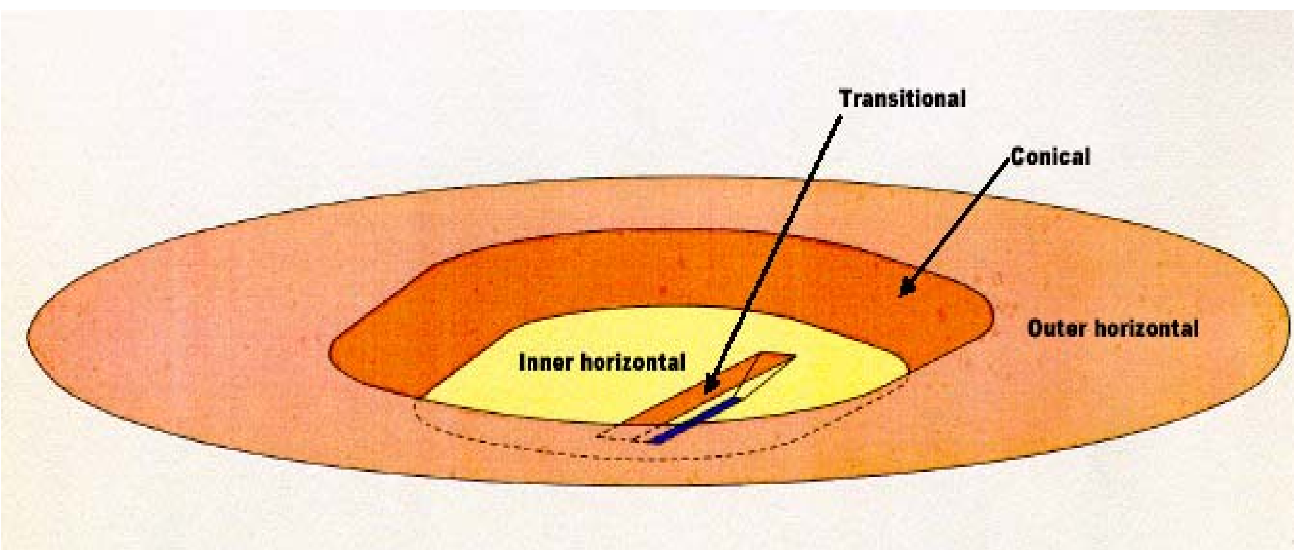


Figure 7.3-1: Relationship of outer horizontal, conical, inner horizontal and transitional surfaces

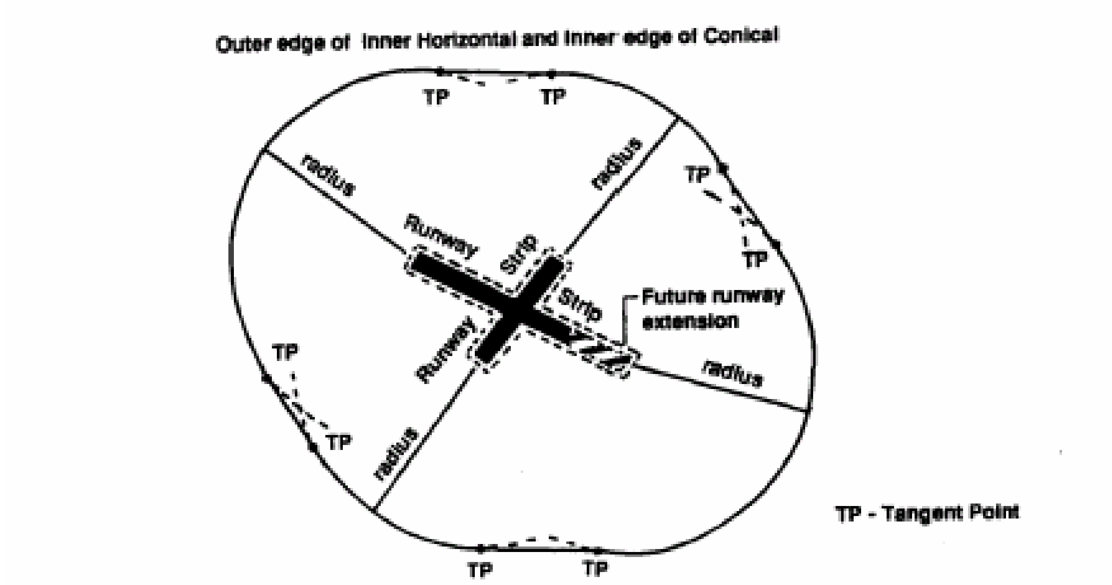


Figure 7.3-2: Boundary of inner horizontal surface

5. Approach Surface.

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

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

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

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

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

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

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

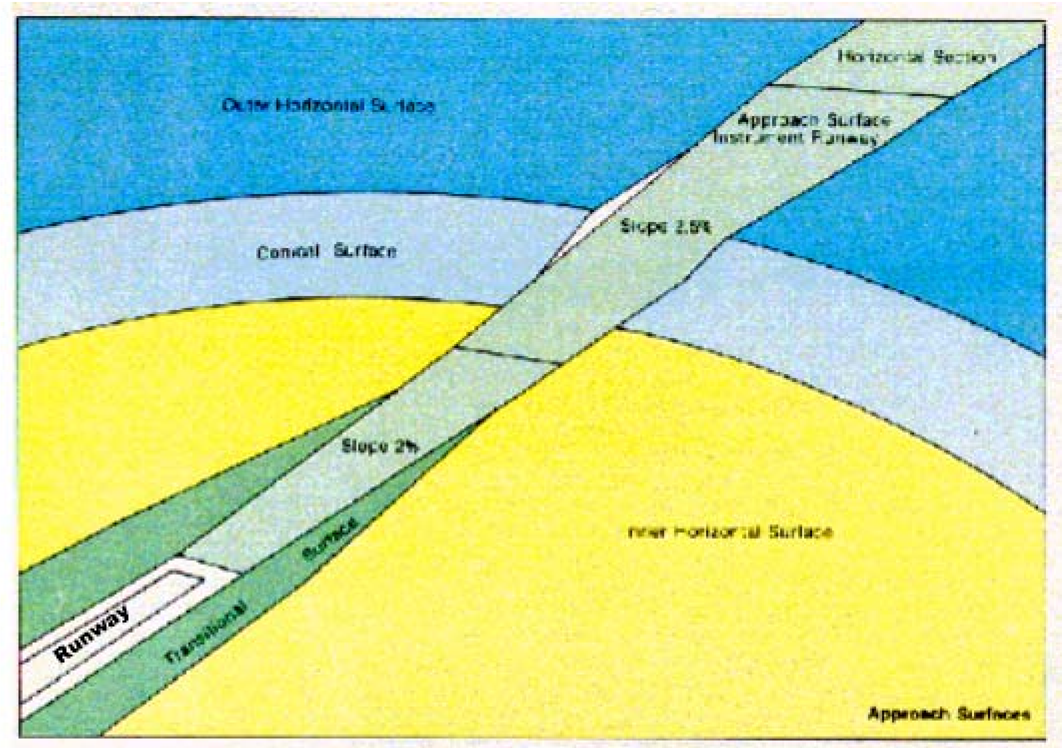


Figure 7.3-3: Approach surface for an instrument approach runway

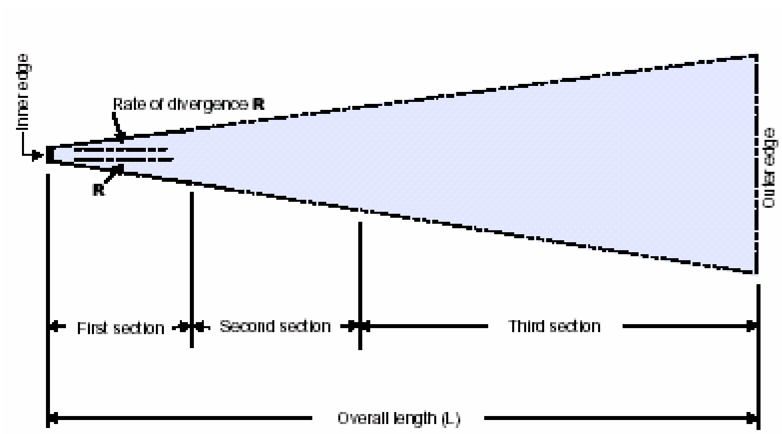


Figure 7.3-4: Plan view of approach surface

6. Transitional Surface.

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

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

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

- along the side of the approach surface, equal to the elevation of the approach surface at that point; and
- along the side of the runway strip, equal to the nearest point on the centreline of the runway or stopway.

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

7. Obstacle-Free Zone.

The inner approach, inner transitional and baulked landing surfaces together define a volume of airspace in the immediate vicinity of a precision approach runway, which is known as the obstacle-free zone. This zone must be kept free from fixed objects, other than lightweight frangibly mounted aids to air navigation that must be near the runway to perform their function, and from transient objects such as aircraft and vehicles when the runway is being used for precision approaches.

8. Inner Approach Surface.

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

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

9. Inner Transitional Surface.

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

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

      - along the side of the inner approach and baulked landing surface, equal to the elevation of the particular surface at that point;
      - along the runway strip, equal to the elevation of the nearest point on the centreline of the runway or stopway.

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

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

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

   f. The transitional surface should be used for building height control.

10. Baulked Landing Surface

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

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

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

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

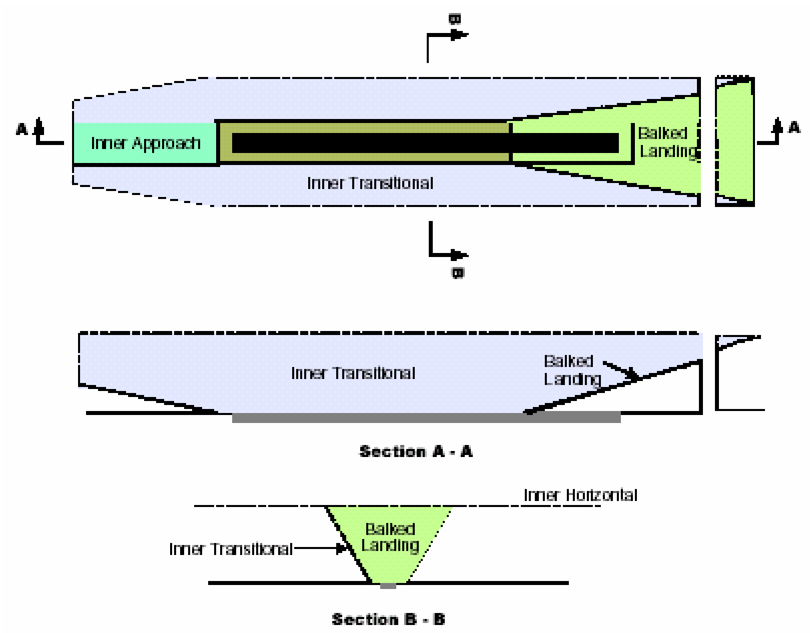


Figure 7.3-5: Inner approach, inner transitional and baulked landing obstacle limitation surfaces

11. Take-Off Climb Surface

a. The take-off climb surface is an inclined plane (or other shape in the case of curved take-off) located beyond the end of the runway or clearway.

b. The origin of the take-off climb surface is the inner edge of a specified length, located at a specified distance from the end of the runway or the clearway. The plane from the inner edge slopes upward at a specified rate, with the two sides of the plane originating from the ends of the inner edge concurrently diverging uniformly outwards at a specified rate, to a specified final width, and continuing thereafter at that width for the remainder of the specified overall length of the take-off climb surface until it reaches the outer edge which is horizontal and perpendicular to the take-off track.

c. The elevation of the inner edge is to be equal to the highest point on the extended runway centreline between the end of the runway and the inner edge, except that when a clearway is provided the elevation is to be equal to the highest point on the ground on the centreline on the clearway.

d. The slope of the take-off climb surface is to be measured in the vertical plane containing the centreline of the runway.

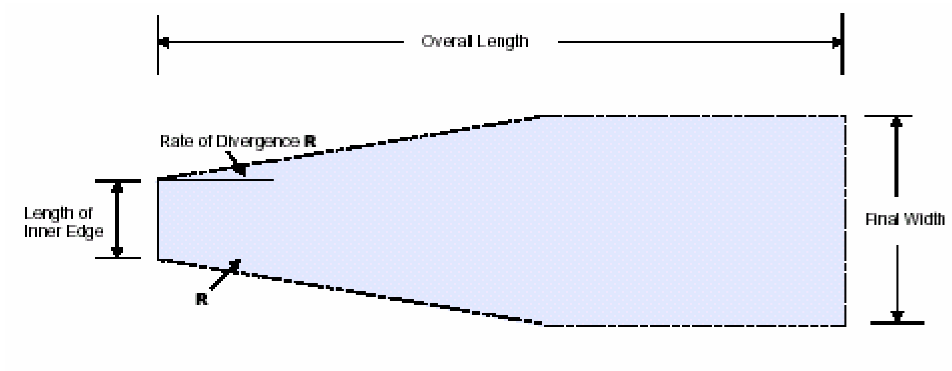


Figure 7.3-6: Plan view of take-off climb surface

7.4 Principles of Shielding.

7.4.1 General.

1. A new obstacle located in the vicinity of an existing obstacle which has been assessed and deemed to be shielded may be considered as not being a hazard to aircraft.

2. Unless specifically directed by DGAC, a shielded obstacle does not require removal, lowering, marking or lighting and should not impose any additional restrictions to aircraft operations.

3. The DGAC shall assess and determine whether an obstacle is shielded. The aerodrome operator is to notify DGAC of the presence of all obstacles.

4. Only existing permanent obstacles may be considered in assessing shielding of new obstacles.

7.4.2 Shielding Principles.

1. In assessing whether an existing obstacle shields an obstacle, DGAC will be guided by the principles of shielding detailed below.

2. Obstacles penetrating the approach and take-off climb surfaces.

   a. An existing obstacle within the approach and take-off climb area is called the critical obstacle. Where a number of obstacles exist closely together, the critical obstacle is the one which subtends the greatest vertical angle measured from the appropriate inner edge.

   b. As illustrated below, a new obstacle may be assessed as not imposing additional restrictions if:
      - o when located between the inner edge end and the critical obstacle, the new obstacle is below a plane sloping downwards at 10% from the top of the critical obstacle toward the inner edge;
      - o when located beyond the critical obstacle from the inner edge end, the new obstacle is not higher than the height of the permanent obstacle;
      - o where there is more than one critical obstacle within the approach and take-off climb area, and the new obstacle is located between two critical obstacles, the height of the new obstacle is not above a plane sloping downwards at 10% from the top of the next critical obstacle.

3. Obstacles penetrating the inner and outer horizontal and conical surfaces. The new obstacle may be accepted if it is in the vicinity of an existing obstacle, and does not penetrate a 10% downward sloping conical shaped surface from the top of the existing obstacle, i.e. the new obstacle is shielded radially by the existing obstacle.

4. Obstacles Penetrating the Transitional Surfaces. A new obstacle may be assessed as not imposing additional restrictions if it does not exceed the height of an existing obstacle that is closer to the runway strip and the new obstacle is located perpendicularly behind the existing obstacle relative to the runway centre line.

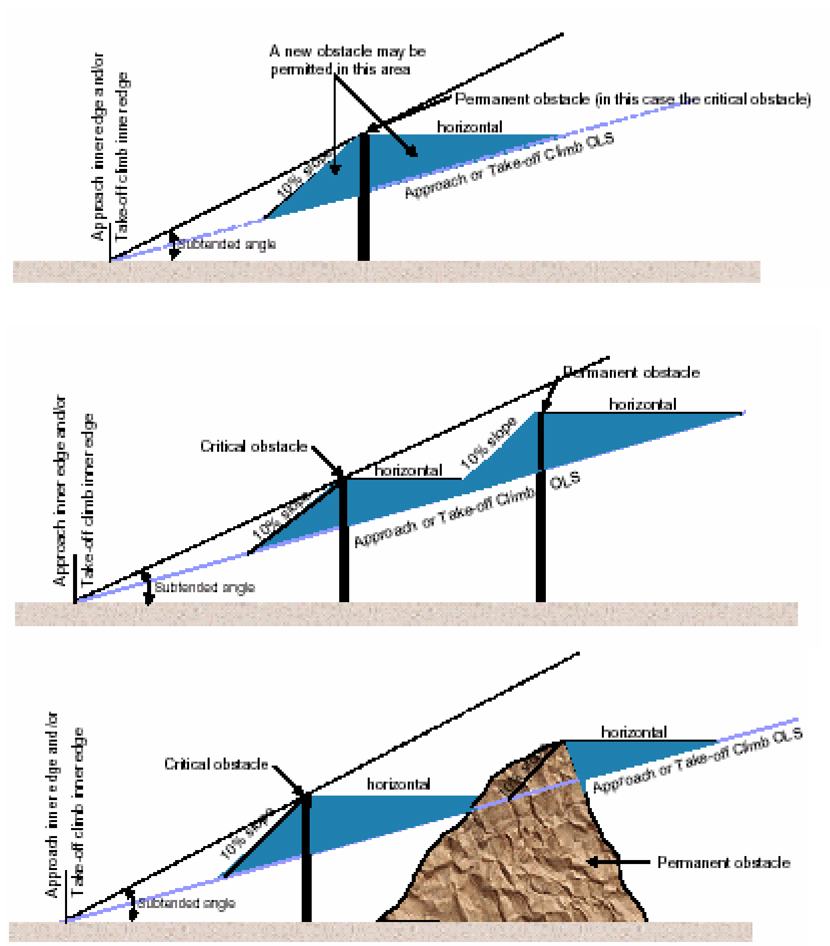


Figure 7.4-1: Shielding of obstacles penetrating the approach and take-off climb surfaces.

8. VISUAL AIDS PROVIDED BY AERODROME MARKINGS, MARKERS, SIGNALS AND SIGNS

8.1 General.

8.1.1 Introduction.

1. This Chapter specifies the standards for markers, markings, signals and signs. Visual aids not conforming to these standards must not be used unless approved by DGAC, in writing.

2. Although the specifications given here are in metric measurements, existing visual aids, which were made to Imperial measurements, may continue to be used until replacement is required for other reasons. However, new visual aids must be made and located in accordance with the metric measurements.

8.1.2 Closed Aerodrome.

All markers, markings and signs on a closed aerodrome must be obscured or removed, except for unserviceability markers or markings, where required.

Note : *A closed aerodrome is one that has been permanently withdrawn from service or decommissioned, not one that is temporarily unavailable or unserviceable.*

8.1.3 Colours.

Colours used should conform to the Australian Standard AS 2700-1996, entitled "Colour Standards for General Purposes", in accordance with the following:

Colour	AS Colour Code	AS Colour Name
Blue	B41	Blue Bell
Green	G35	Lime Green
Orange	X15	Orange
Red	R13	Signal Red
Yellow	Y14	Golden Yellow
White	N14	White
Black	N61	Black

Table 8.1-1: Standard colours

8.1.4 Visibility.

1. Markings must be clearly visible against the background upon which they are placed. Where required, on a surface of light colour, a contrasting black surround must be provided; on a black surface, a contrasting white surround must be provided.

2. Where provided, the width of surround colour must ensure an adequate visibility contrast. In the case of line markings, the width of surround on either side of the marking must not be less than half the line width. In the case of block markings, (e.g. threshold markings, runway markings or similar) the width of the surrounding contrast colour must be at least 10 centimetres.

8.2 Markers.

8.2.1 Introduction.

1. Markers must be lightweight and frangible and may be either cones or gables. Other forms of markers to identify extensive work areas may be used, subject to DGAC agreement. When displayed, they must be secured against movement by wind, propeller blast and jet engine efflux in a manner that does not cause damage to an aircraft.

2. Cones used as runway markers must have a height of 0.3 m and a base diameter of 0.4 m. All other cone markers must be 0.5 m in height, with a base diameter of 0.75 m. Cone markers must be painted in the following colours:

Marker Colour

Marker	Colour
Runway marker	white
Taxiway marker	yellow
Apron edge marker	yellow
Runway strip marker	white
Helicopter apron edge marker	blue
Unserviceability marker	white, with central 25 cm **red band**
Runway strip marker (displaced threshold.)	split white and suitable background colour

3. Gable markers must be 3 m long, 0.9 m wide, and 0.5 m high; painted white.

4. Fluorescent orange PVC cones or 'witches' hats' approximately 0.5 m high, may be used to convey visual information about aerodrome works to the works organisation. Witches hats must not be used to convey information to pilots about changes to the movement area. For marking any part of a movement area standard cones must be used.

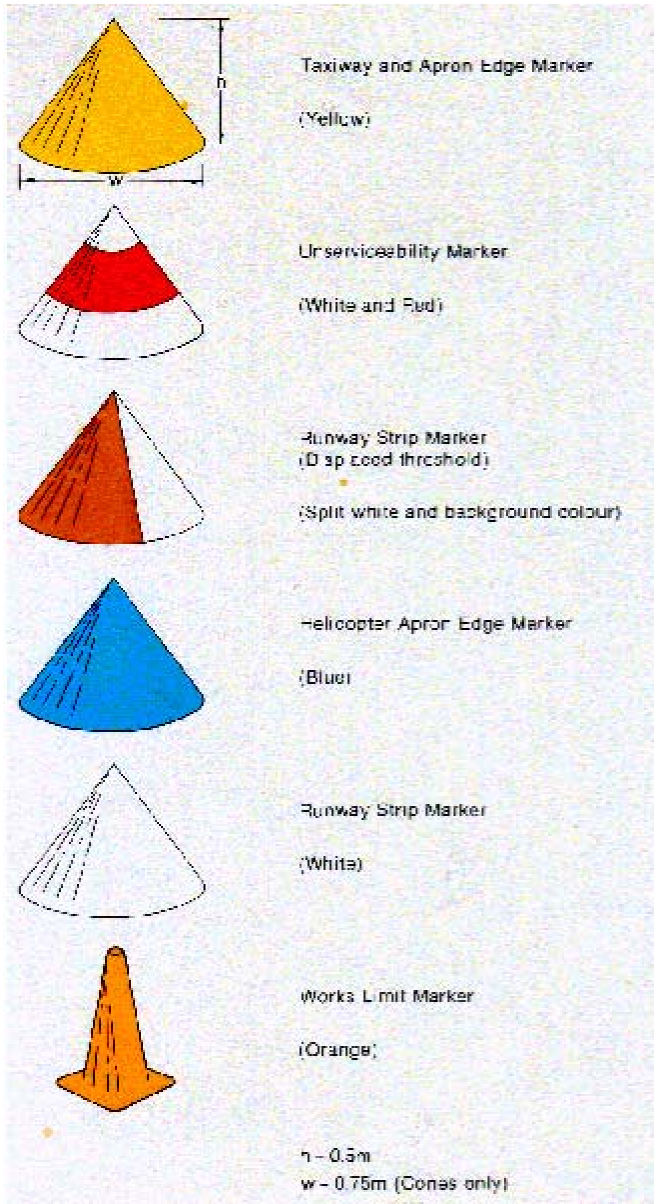


Figure 8.2-1: Cone markers

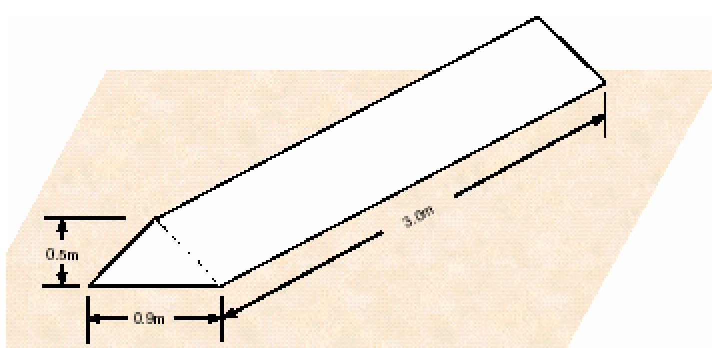


Figure 8.2-2: Gable marker

8.2.2 The Use of Markers on a Runway Strip.

1. Where the limits of the graded portion of a runway strip need to be defined, runway strip markers must be placed along the edges of the graded portion of the runway strip.

2. Runway strip markers must be white, and may be gable, cone or flush. Gable markers are preferred, and flush markers must only be used where runway strips overlap. The spacing of gable or cone side strip markers must not exceed 180 m or 90 m respectively, as shown below.

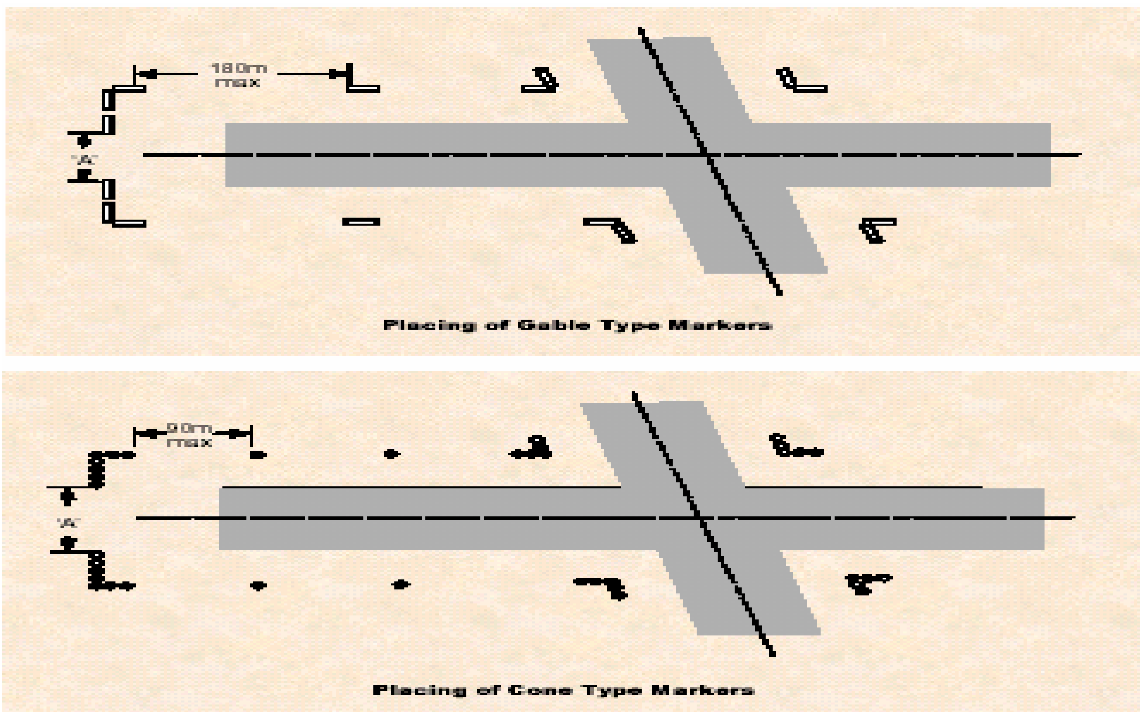


Figure 8.2-3: Runway strip markers

Width of graded strip	Dimension 'A'
30 m	10 m minimum
45 m	20 m minimum
60 m	20 m minimum
90 m	30 m minimum
150 m	60 m minimum

3. With prior approval by DGAC, 200 litre (44 gallon) steel drums or tyres may be used as runway strip markers at aerodromes used by aeroplanes with not more than 9 passenger seats (See Chapter 13), provided that steel drums be cut in half along their length and placed on the ground open side down. Drum and tyre

runway strip markers must be painted white. The use of these markers is not approved on a certificated aerodrome.

8.2.3 The Use of Markers on an Unsealed Runway.

1. On unsealed runways, runway markers must be provided along both sides of the runway where there is a lack of contrast between the runway and runway strip, and the whole of the runway strip is not maintained to normal runway grading standards. The longitudinal spacing of runway markers must not exceed 90 m.

2. Runway markers may be replaced by runway strip markers if the whole of the runway strip is maintained to normal runway grading standard. The thresholds must be marked either by normal threshold markings or runway cone markers in a pattern similar to that prescribed for runway strip ends.

3. Where an unsealed runway has a permanently displaced threshold at one end, two sets of strip markers must be provided at that end. Each set must be bi-coloured. The set associated with the permanently displaced threshold is to be painted so that the half facing the direction of approach (the first direction) appears white. The other half must be painted to match the background, and be inconspicuous to a pilot operating in the other direction (the second direction). Markers associated with the runway strip end are to appear white in the second direction and inconspicuous in the first direction.

4. The bi-coloured end markers associated with the displaced threshold must be cones; those associated with the runway strip end may be cones or gables.

8.2.4 The Use of Markers on an Unsealed Taxiway.

1. Where the edges of unsealed taxiways or graded taxiway strips might not be visually clear, taxiway edge markers must be provided to show pilots the edge of trafficable taxiways.

2. Where provided, the taxiway markers must be yellow cones and must be spaced to enable pilots to clearly delineate the edge of the unsealed taxiway.

8.2.5 The Use of Markers on an Unsealed Apron.

1. Where the edges of unpaved aprons might not be visually clear to pilots, apron edge markers must be provided.

2. Where provided, the apron edge markers must be yellow cones and must be spaced to enable pilots to clearly delineate the edge of the unsealed apron area.

8.3 Runway Markings.

8.3.1 General.

1. Runway markings must be white on all concrete, asphalt or sealed runway surfaces. Pre-runway-end markings must be yellow.

2. At runway intersections, markings of the more important runway must take precedence over, or interrupt the markings of, the other runway. At an intersection with a taxiway, the runway markings, except for runway side strip markings, must interrupt the taxiway markings.

3. To reduce the risk of uneven braking action, care must be taken that markings produce a non-skid surface of similar coefficient of friction to the surrounding surface.

8.3.2 Pre-runway-end Markings.

1. Pre-runway-end markings are used where an area exceeding 60 m in length before the runway end, has a sealed, concrete or asphalt surface, which is not suitable for normal aircraft usage.

2. Marking must consist of yellow chevrons, spaced 30 m apart, comprising lines 0.9 m wide and angled 45 degrees to the runway centreline. The markings must terminate at the runway end marking.

3. This area will not normally be used for landing or take-off. If declared as a stopway, an aircraft stopping on the runway due to an abandoned take-off from the other direction only may use the area. Use of such areas for inclusion in accelerate-stop declared distances can cause confusion for pilots and operators, and may be declared only if the stopway can be included in an area of runway strip and with prior approval of DGAC.

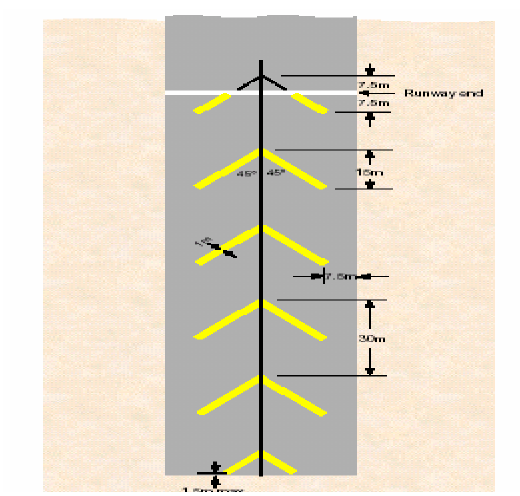


Figure 8.3-1: Pre-runway-end markings

8.3.3 Runway Centreline Markings.

1. Runway centreline markings must be provided on all sealed, concrete or asphalt runways, to provide directional guidance during landing or take-off. Runway centreline marking may be omitted in the case of 18 m wide runways where side stripe markings are provided.

2. Runway centreline marking must consist of a line of uniformly spaced gaps and white stripes as shown in Figure 8.3-2 below. The combined length of a stripe and a gap (G) must be not less than 50 m and not more than 75 m. The length of each stripe must be at least equal to the length of each gap, or 30 m, whichever is greater. The first stripe is to commence 12 m from the runway designation number as shown below.

3. The width (W) of the runway centreline marking must be:
   a. 0.3 m on all non-instrument runways, and instrument non-precision approach runways where the code number is 1 or 2;
   b. 0.45 m on
      - instrument non-precision approach runways where the code number is 3 or 4; and
      - category I precision approach runways; and
   c. 0.9 m on category II and category III precision approach runways.

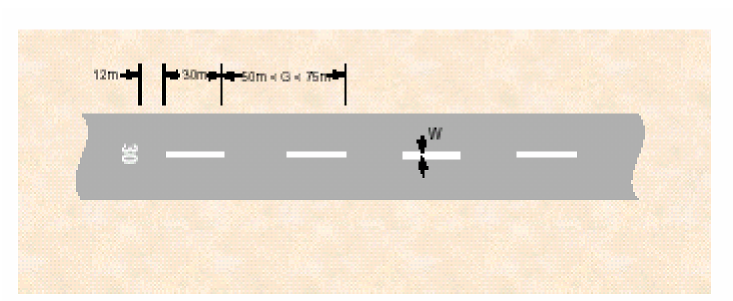


Figure 8.3-2: Runway centreline markings

8.3.4 Runway Designation Markings

1. Runway designation markings must be provided at the thresholds of all sealed, concrete or asphalt runways, and as far as practicable, at the thresholds of an unpaved runway.

2. Runway designation marking must consist of a two-digit number. The number is derived from the magnetic bearing of the runway centreline, when viewed from the direction of approach, rounded to the nearest 10 degrees.

3. If a bearing becomes a single digit number, a '0' is to be placed before it. If a bearing becomes a three digit number, the last '0' digit is to be omitted. For parallel runways, appropriate letters L (left), C (centre) or R (right) must be added to the two-digit number.

4. The number selected for a runway designation marking must be acceptable to DGAC. When two or more runway ends have designations which may be

confusing, either on the same or a nearby aerodrome, DGAC will determine the designations to be used.

5. The shape and dimensions of the numbers and letters to be used as runway designation markings are shown in Figure 8.3-3. The location of the marking on the runway is also shown.

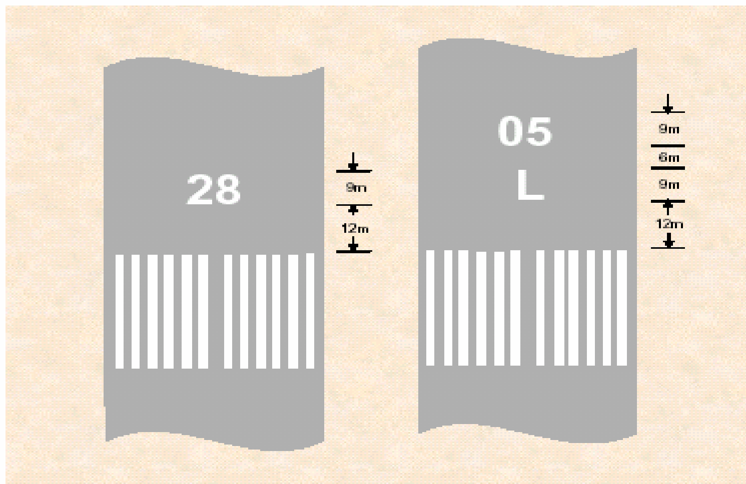


Figure 8.3-3: Runway designation markings

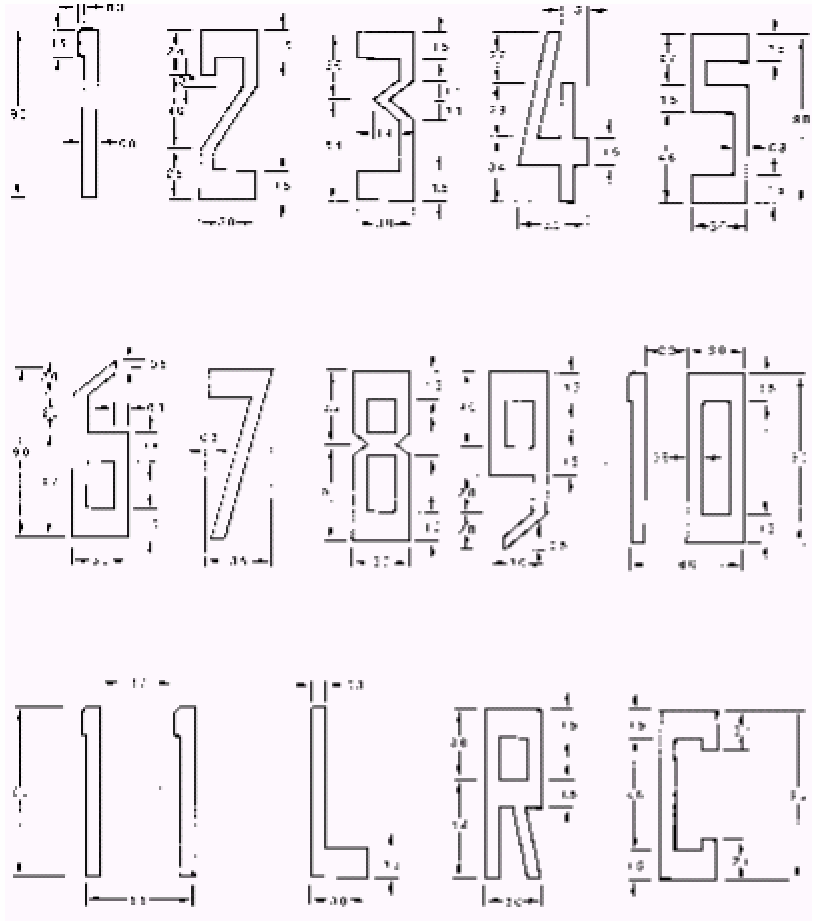


Figure 8.3-4: Shape and dimensions of runway numbers and letters

8.3.5 Runway End Markings

Runway end markings must be provided on all sealed, concrete or asphalt runways as shown below. The marking is a white line, 1.8 m wide, extending the full width of the runway. Where the threshold is located at the end of the runway, the runway end marking will coincide with the corresponding part of the threshold marking.

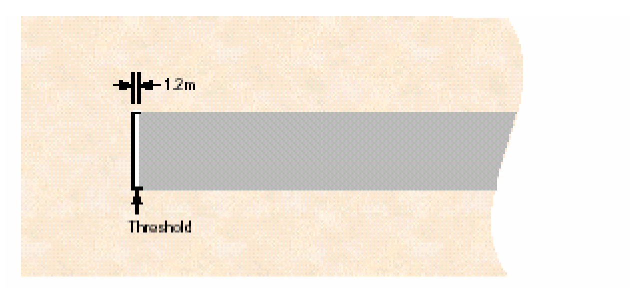


Figure 8.3-5: Runway end marking

8.3.6 Runway Side-stripe Markings

1. Runway side-stripe markings must be provided at the edge of all sealed, concrete or asphalt runways to delineate the width of the runway. Except where broken for taxiways and other runways, runway side-stripe markings must consist of one continuous white line.

2. The width of each runway side-stripe marking shall be 0.3 m, except for:
   a. non precision approach runways where the code letter is 3 or 4, and all precision approach category I runways, where the width shall be 0.45 m; and
   b. precision approach category II or III runways where the width shall be 0.9m.

3. The distance between outer edges of the side-stripes must be equal to the width of the runway. The side-stripes must be parallel to the runway centreline and extend along the full length of the runway that is available for aircraft take-off or landing manoeuvres, excluding taxying, except that the side-stripe markings must not extend across intersecting runways or taxiways.

4. For a runway with no sealed shoulders, the side-stripe markings may be omitted if there is distinct contrast between the runway edges and the surrounding terrain.

5. The runway side-stripe marking shall be used to mark the edges of a runway turning node.

8.3.7 Runway Aiming Point Markings

1. An aiming point marking shall be provided at each approach end of a paved instrument runway where the code number is 2, 3 or 4.

2. An aiming point marking shall commence no closer to the threshold than the distance indicated in Table 8.3-1, except that on a runway equipped with a visual approach slope indicator system the beginning of the marking shall be co-incident with the visual approach slope origin.

   Note : *For the purpose of locating a marking, the origin of the visual approach slope may be considered to be aligned with the wing bar lights of a TVASIS or PAPI installation.*

3. An aiming point marking shall consist of two stripes painted white. The dimensions and lateral spacing shall be as indicated in Table 8.3-1. Where touchdown zone marking is provided the lateral spacing between aiming point and touchdown zone markings shall be equal.

Location And Dimensions	**Landing Distance Available**			
	Less than 800 metres	800 m up to but not including 1200 m	1200 m up to but not including 2400 m	2400 m or more
Distance from threshold to beginning of marking	150 m	250 m	300 m	400 m

Length of stripe [a]	30 – 45 m	30 – 45 m	45 – 60 m	45 – 60 m
Width of stripe	4 m	6 m	6 – 10 m [b]	6 – 10 m [b]
Lateral spacing between inner sides of stripes	6m [C]	9m [C]	18 – 22.5 m	18 – 22.5 m
[a] The greater dimensions of the specified ranges are to be used when increased conspicuity is required [b] The lateral spacing may be varied within thee limits to minimize the contamination by rubber deposits [c] These figures are deduced in reference to the outer main gear span.				

Table 8.3-1: Location and dimensions of aiming point marking

8.3.8 Runway Touchdown Zone Markings

8.3.8.1 Runway touchdown zone markings shall be provided at approach ends of all sealed, concrete or asphalt runways 30 m wide or greater.

8.3.8.2 Runway touchdown zone markings are comprised of pairs of white rectangular markings displayed equally about the runway centreline with the number of pairs related to the landing distance available or if applicable, the distance between the thresholds, as described in Table 8.3-2.

Landing Distance Available Or Distance Between Thresholds	Pairs Of Markings
Less than 900 m	1
900 m up to but not including 1200m	2
1200 m up to but not including 1500 m	3
1500 m up to but not including 2400 m	4
2400m or more	6

Table 8.3-2 Touchdown zone marking spaces

8.3.8.3 A touchdown zone marking shall conform to pattern a shown in figure n.nn. The installation of a marking conforming to pattern B is not to proceed without prior approval from DGAC.

8.3.8.4 For pattern A markings the individual rectangular markings shall be not less than 22.5 m long and 3 m wide. The lateral spacing between the inner sides of the rectangles shall be equal to that of the aiming point marking where provided. If an aiming point marking is not provided, the lateral spacing between the inner sides of the rectangles shall correspond to the lateral spacing specified for an aiming point marking in Table 8.3-1

8.3.8.5 The pairs of markings shall be provided at a longitudinal spacing of 150 metres beginning from the threshold except that pairs of markings coincident with, or falling within 50 meters of, an aiming point marking shall be omitted.

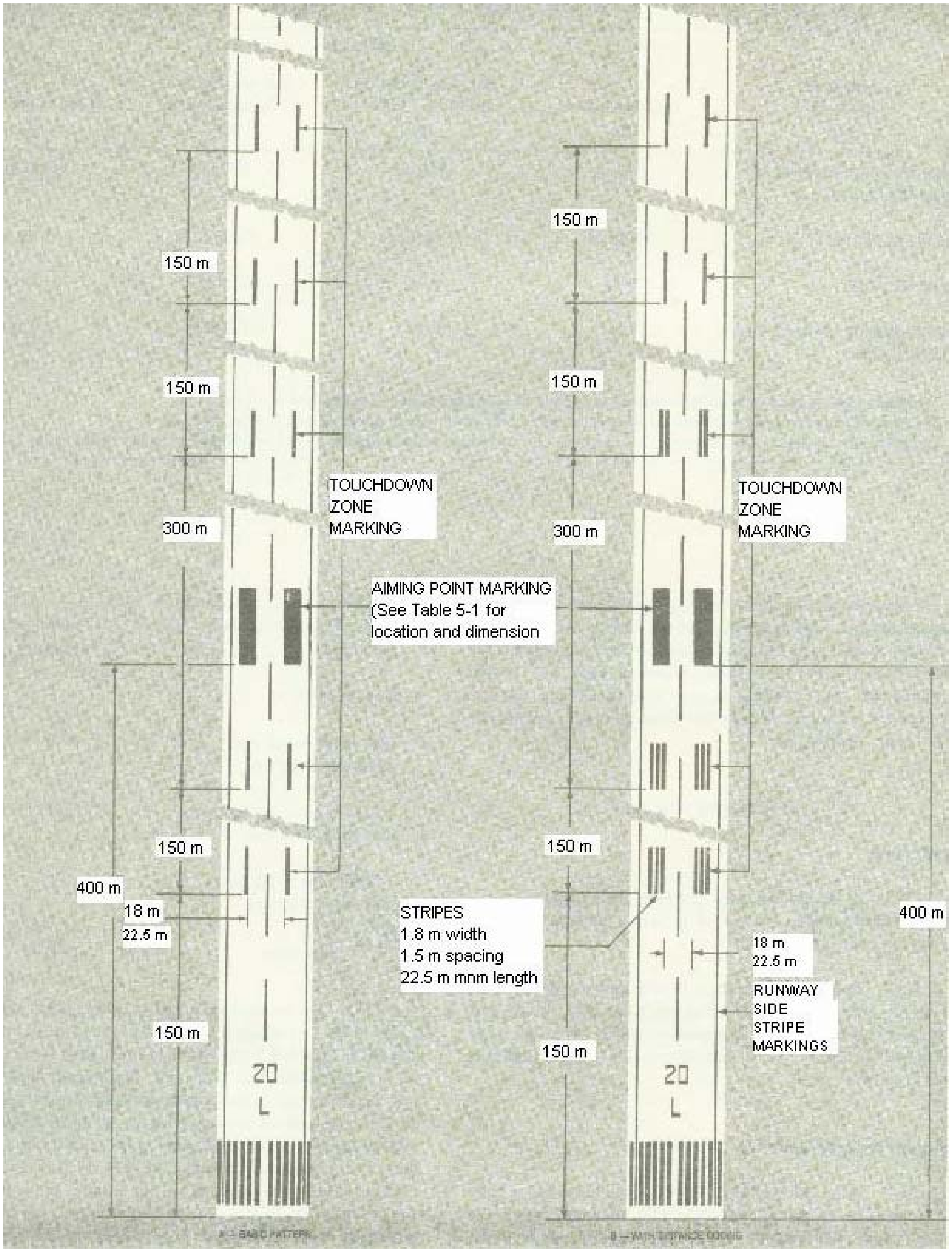


Figure 8.3-7: Runway fixed distance and touch down zone markings

8.3.9 Runway Threshold Markings

1. The permanent, or permanently displaced, threshold must be indicated by a white transverse line, 1.8 m wide extending the full width of the runway at the location of the threshold, and white 'piano key' markings, consisting of adjacent, uniformly spaced, 30 m long stripes of specified width as shown in Figure 8.3-8.

2. Where practicable, this marking must also be used to indicate permanent or permanently displaced thresholds at gravel and natural surface runways.

3. Where the normal threshold marking is not practicable runway markers may be used to delineate the ends of an unsealed runway.

4. Information on the location of thresholds is provided in Chapter 6 of this Manual.

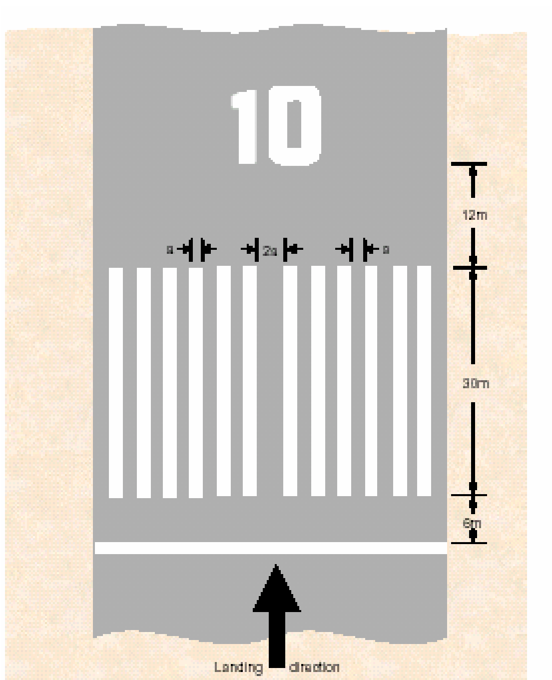


Figure 8.3-8: Runway threshold markings

Runway Width (Metres)	Number Of Stripes	Width Of Stripe And Space (A) (Metres)
15,18	4	1.5
23	6	1.5
30	8	1.5
45	12	1.7
60	16	1.7

8.3.10 Runway End Markings

1. Runway end markings must be provided on all sealed, concrete or asphalt runways and is treated as a component of the threshold marking. The marking is a transverse white stripe, 1.8 m wide, extending the full width of the runway. The marking is required for thresholds established at the runway end and permanent displaced thresholds.

2. Where the threshold is displaced for periods in excess of 30 days, but not permanently, the width of the runway end marking stripe may be reduced to 1.2 metres.

8.3.11 Temporarily Displaced Threshold Markings

1. Whenever a permanent threshold is temporarily displaced, a new system of visual cues must be provided, which may include provision of new markings, obscuring and alteration of existing markings, and the use of DGAC approved Runway Threshold Identification Lights (RTILs).

2. Where a threshold is temporarily displaced less than 300 m from the end of the runway, there is no additional survey requirement for obstacles. However where this distance is exceeded, the aerodrome operator must refer the matter to DGAC.

3. Where a permanent threshold on any runway serving international air transport operations is displaced the location of the new threshold must be identified by the system of temporary markings specified below, and RTILs are to be installed.

4. Where practicable, RTILs should also be used for displaced thresholds on runways not serving international air transport aircraft. When used, unless otherwise directed by DGAC, the requirements to use Vee bar markers are waived.

5. Where the permanent threshold is to be displaced for more than 30 days, the temporary threshold must comprise a white line, 1.2 m wide, across the full width of the runway at the line of the threshold, together with adjacent 10 m long arrowheads, comprising white lines 1 m wide. The existing centerline markings between the two thresholds must be converted to arrows as shown below. The permanent threshold marking and associated runway designation number must be obscured and a temporary runway designation number provided 12 m beyond the new threshold. The number of arrow markings used is to be commensurate with the width of the runway.

   Note : *Where the runway fixed distance and touch down zone markings can cause confusion with the new threshold location those markings may also be obscured.*

6. Where the permanent threshold is to be displaced for more than 5 days, but not more than 30 days, or by more than 450 m, the new location must be indicated by suitable bar markers painted white and positioned on each side of the runway,

together with flush, white, arrow markings, as shown. The existing threshold markings must be obscured. For runways more than 18 m wide, or accommodating air transport aircraft, 2 bar markers and 2 arrow markings must be provided on each side of the runway. In other cases, a single bar and arrow on each side of the runway is acceptable.

7. Where a threshold is to be temporarily displaced for 5 days or less, and the displacement is less than 450 m, the new threshold location must be indicated by the same bar and vee markers but the permanent threshold markings may be retained.

8. Where a threshold at an air traffic controlled aerodrome is to be temporarily displaced for 5 days or less, and the displacement is more than 450 m, the new threshold location is to be indicated by the above markings but the permanent threshold markings may be retained.

9. Markings of typical threshold and displaced thresholds are illustrated in the following six figures.

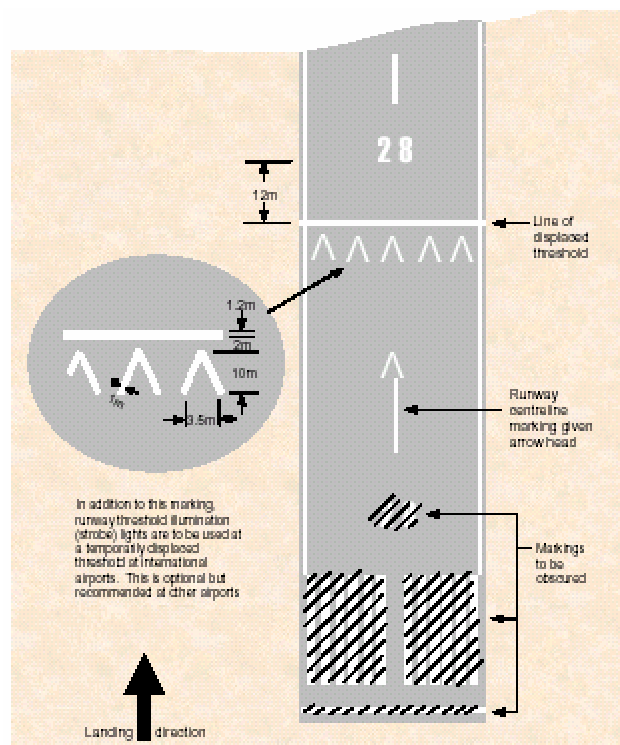


Figure 8.3-9: Temporarily displaced threshold markings (more than 30 days)

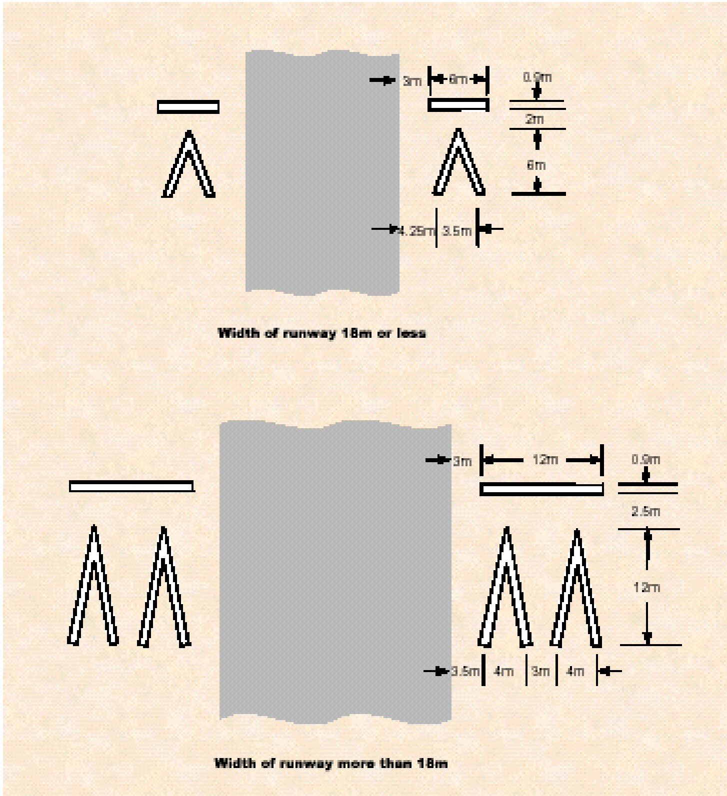


Figure 8.3-10: Temporarily displaced threshold markings (less than 30 days)

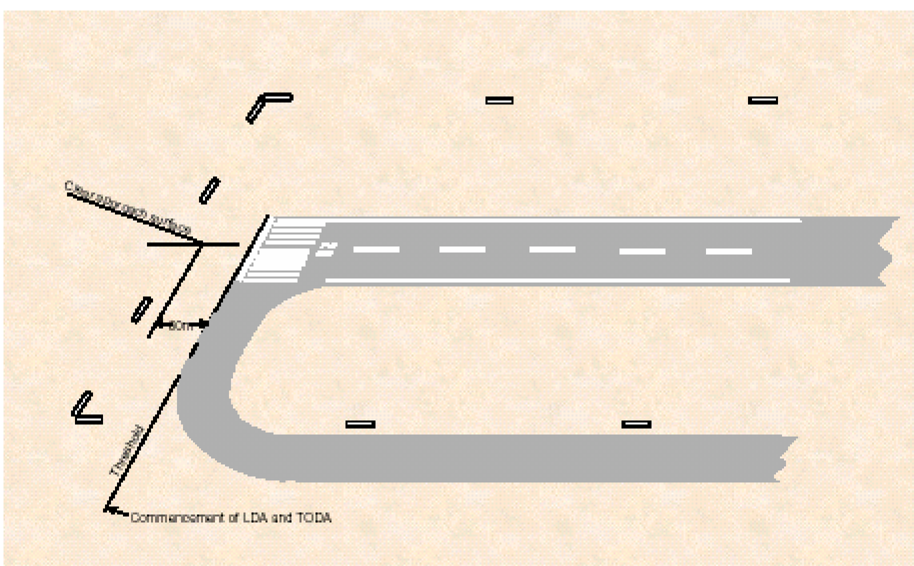


Figure 8.3-11: Markings for a typical runway with the threshold at the runway end

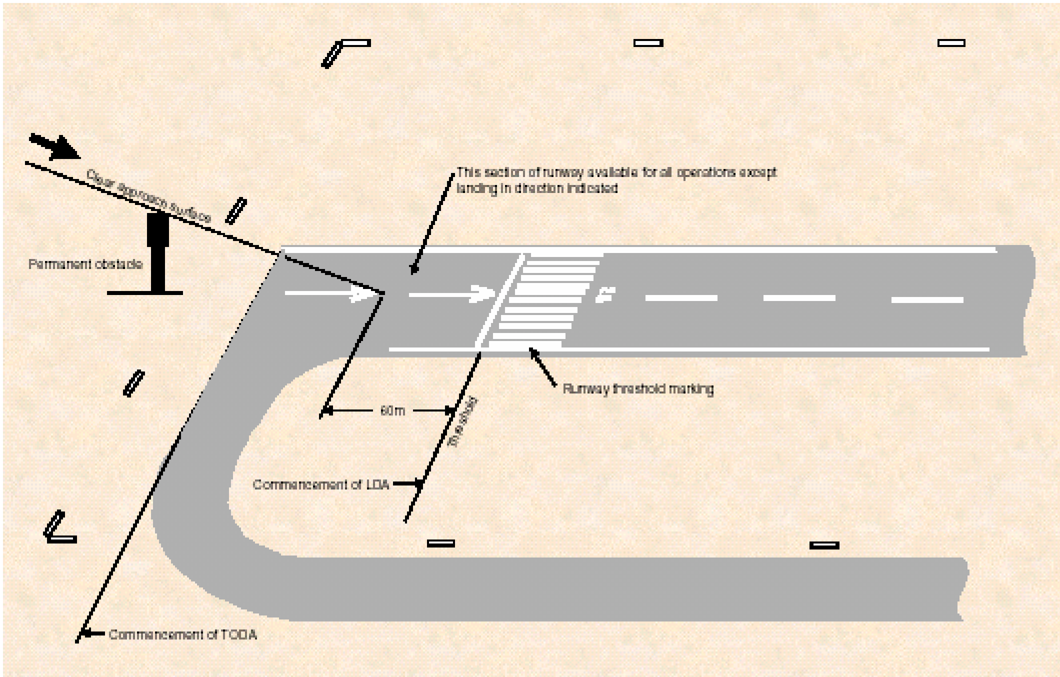


Figure 8.3-12: Markings for a typical runway with a permanently displaced threshold

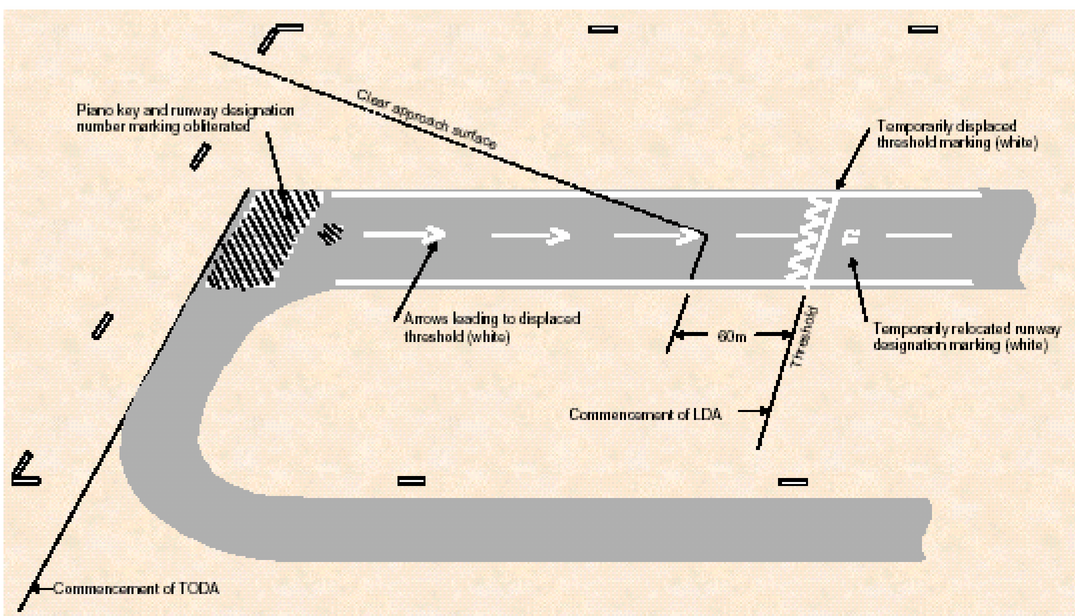


Figure 8.3-13: Markings for a temporarily displaced threshold due to obstacle infringement of the approach surface for a period in excess of 30 days

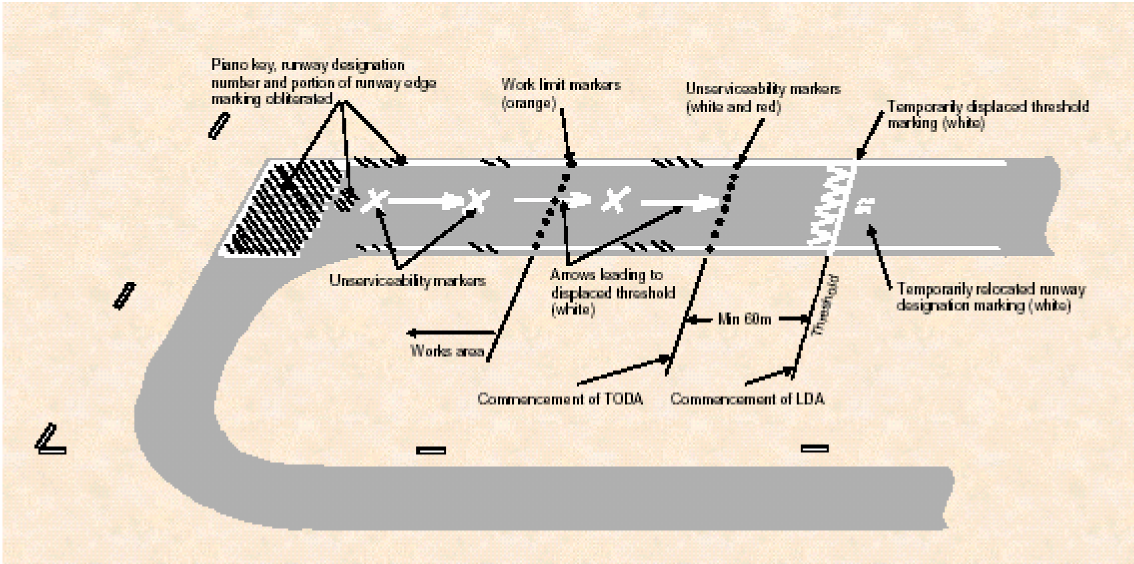


Figure 8.3-14: Markings for a temporarily displaced threshold due to works on the runway for a period in excess of 30 days

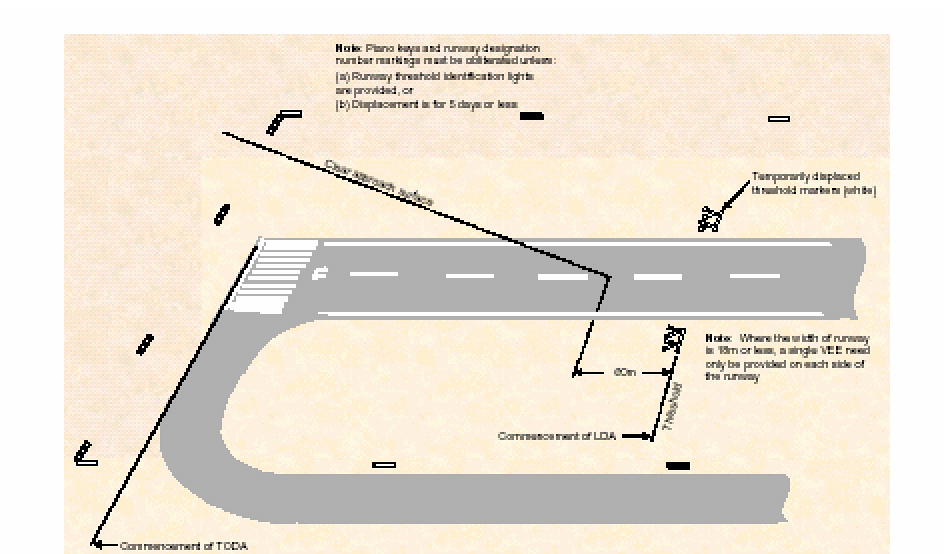


Figure 8.3-15: Markings for a temporarily displaced threshold due to obstacle infringement of approach surface for a period of 5 days or less and a displacement of less than 450 m

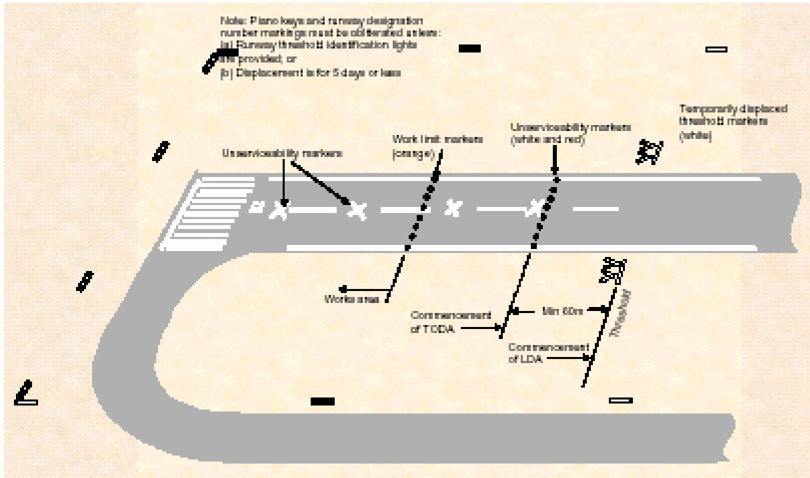


Figure 8.3-16: Markings for a temporarily displaced threshold due to works in progress on runway for a period of 5 days or less and a displacement of less than 450 m

8.4 Taxiway Markings

8.4.1 Introduction

Taxiway markings must be provided on all asphalt, sealed or concrete taxiways, as specified below. Taxiway and other taxi-guidance markings must be painted yellow.

8.4.2 Taxi Guideline Markings

1. Taxi guideline markings must be provided on all asphalt, sealed or concrete taxiway surfaces, in the form of a continuous yellow line 0.15 m wide. On straight sections, the guideline must be located in the centre of the taxiway. On curved taxiways, the guideline must be located parallel to the outer edge of the pavement and at a distance of half of the taxiway width from it; i.e. the effect of any fillet widening at the inner edge of a curve is ignored. Where a taxi guideline marking is interrupted by another marking such as a taxi-holding position marking, a gap of 0.9 m must be provided between the taxi guideline marking and any other marking.

2. The same form of taxi guideline marking must be used on aprons as detailed below, under 'Apron Markings'.

3. Taxi guidelines on runways must not merge with the runway centreline, but run parallel to the runway centreline for a distance (D), not less than 60 m beyond the point of tangency where the runway code number is 3 or 4 and 30 m where the code number is 1 or 2. The taxi guideline marking must be offset from the runway centreline marking on the taxiway side, and be 0.9 m from the runway centrelines of the respective markings.

Note: Markings with non-compliant separations do not have to be brought into compliance until the next remarking of the pavement.

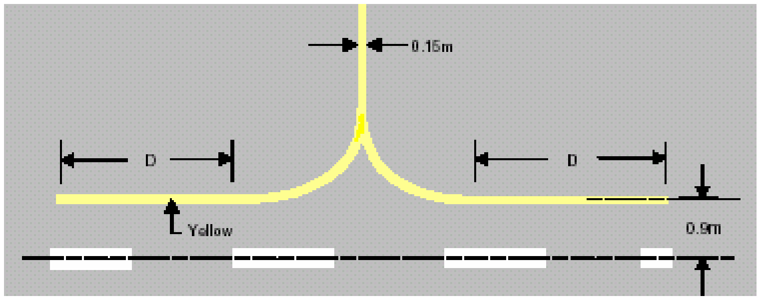


Figure 8.4-1: Taxi guideline markings meeting runway centreline markings

8.4.3 Runway Holding Position Markings

1. Runway holding position markings must be provided on all asphalt, sealed or concrete taxiways wherever these join or intersect with a runway. Standards for the location of runway holding positions are specified in Chapter 6.

2. Runway holding positions must be marked using the Pattern A or Pattern B runway holding position markings, shown in Figure 8.4-2, as appropriate.

3. Pattern A marking must be used at an intersection of a taxiway and a non-instrument, non-precision or precision approach Category I runway, and precision approach Category II or III runway where only one runway holding position is marked. Pattern A must also be used to mark a runway/runway intersection, where one of the runways is used as part of a standard taxi route.

4. Pattern B marking must be used where two or three runway holding positions are provided at an intersection of a taxiway with a precision approach runway. The marking closest to the runway must be the Pattern A marking; the marking(s) further from the runway must be Pattern B.

5. Where increased conspicuity of the Pattern A and Pattern B runway-holding position markings is required, DGAC may require that the runway-holding position markings must be increased in size as indicated in Figure 8.4-3.

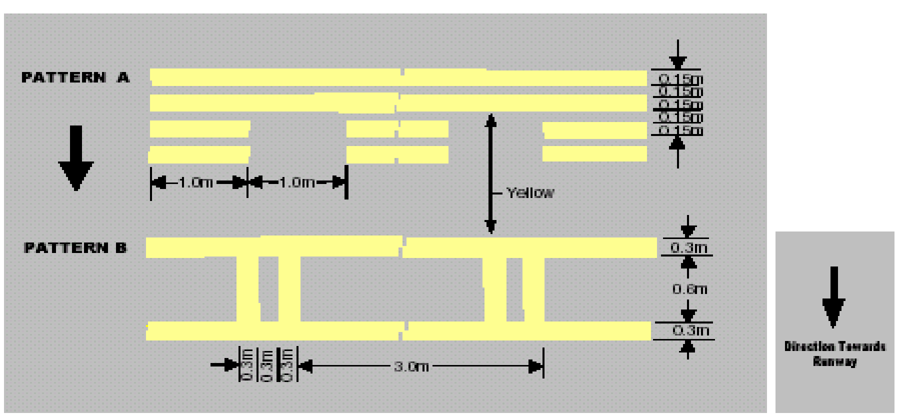


Figure 8.4-2: Pattern A and Pattern B runway-holding position markings

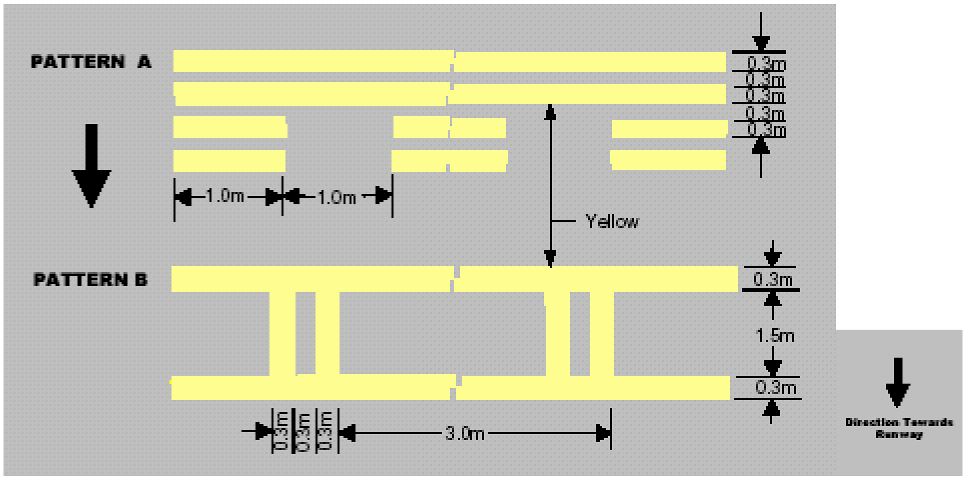


Figure 8.4-3: Pattern A and Pattern B runway-holding position markings — increased conspicuity

8.4.4 Intermediate Holding Position Markings

1. Intermediate holding position markings must be provided on all asphalt, sealed or concrete taxiway intersections or on any location of a taxiway where air traffic control requires the aircraft to hold. The intermediate holding position marking must be located in accordance with the standards specified in Chapter 6.

2. Intermediate holding position marking must consist of a single yellow broken line, 0.15 m wide, extending across the full width of the taxiway at right angles to the taxi guideline. Lines and gaps must each be 1.0 m long, as shown below:

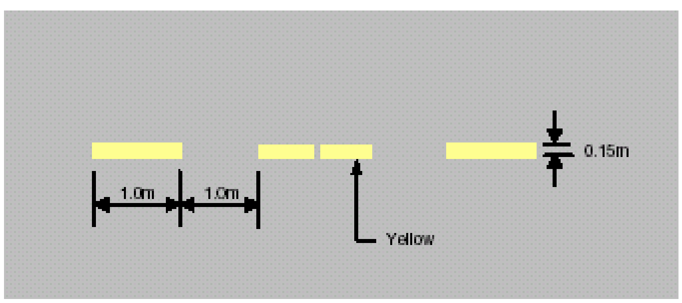


Figure 8.4-4: Intermediate holding position markings

8.4.5 Taxiway Edge Markings

8.4.5.1 Taxiway edge markings must be provided for paved taxiways where the edges of full strength pavement are not otherwise visually clear. Markings must consist of two continuous 0.15 m wide yellow lines, spaced 0.15 m apart and located at the taxiway edge, as shown below.

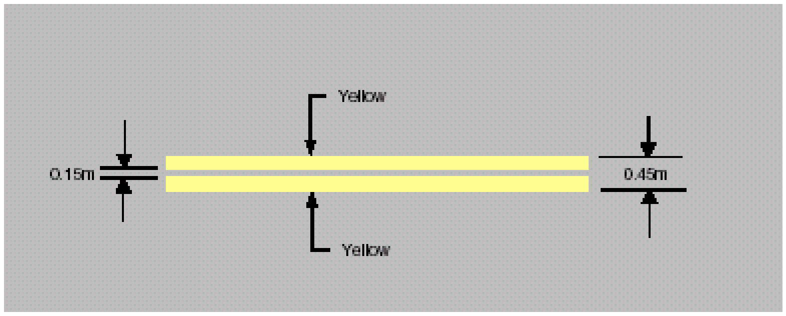


Figure 8.4-5: Taxiway edge markings

Note : *Whilst not mandatory, the additional provision of transverse or herringbone stripes on the sub strength surface has been found to be of assistance in avoiding the possibility for confusion on which side of the edge marking the sub strength pavement is located. This additional marking is an acceptable means of compliance with these standards.*

8.4.6 Holding Bay Markings

Holding bay markings must be provided on all sealed, asphalt or concrete holding bays. Holding bay markings must comprise taxi guideline markings and intermediate holding position markings as shown in Figure 8.4-6. Markings must be located so that aircraft using the holding bay are cleared by aircraft on the associated taxiway by at least the distance specified in Chapter 6. The holding position marking must be painted in accordance with the intermediate holding position marking, unless that is also a runway holding position, in which case the Pattern A runway holding position marking applies.

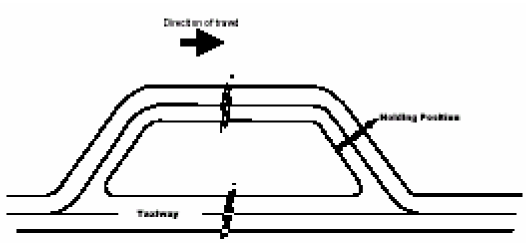


Figure 8.4-6: Holding bay markings

8.4.7 Taxiway Pavement Strength Limit Markings

1. These markings are used at the entrance of a taxiway of low strength pavement where the aerodrome operator decides to impose a weight limitation, for example, 'Max 5,700 kg'.

2. Where the taxiway pavement strength limit marking is provided, as shown in Figure 8.4-7, the letters and numbers must be painted yellow, must be 2.0 m in height, 0.75 m in width, with 0.15 m line width and at 0.5 m spaces. The marking must be readable from aircraft on the full strength pavement.

3. Edge markings of the associated main taxiway or apron, or the side stripe markings of the runway, must be interrupted across the width of the low strength taxiway entrance.

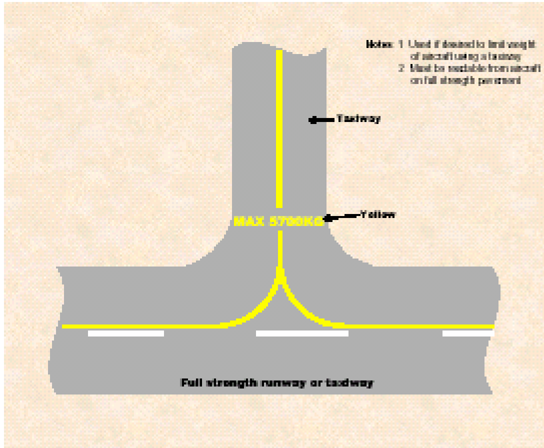


Figure 8.4-7: Taxiway pavement-strength limit markings

8.5 Apron Markings

8.5.1 Introduction

1. Aprons accommodating aircraft of 5,700 kg Maximum All Up Mass (MAUM) and above, must be provided with taxi guidelines and primary aircraft parking position markings. Where the apron may be occupied by these and lighter aircraft at the same time, the aerodrome operator must also provide secondary aircraft parking position markings on the apron for the lighter aircraft.

2. Where aprons accommodate only aircraft of less than 5,700 kg MAUM, there is no mandatory requirement for taxi guidelines nor for marked aircraft parking positions. In these cases, the aerodrome operator may decide whether to provide markings, or to allow random parking.

3. The design of apron markings must ensure that all relevant clearance standards are met, so that safe manoeuvring and the precise positioning of aircraft is achieved. Care must be taken, to avoid overlapping markings.

8.5.2 Apron Taxi Guideline Markings

1. Apron taxi guideline markings must be of the same form as those used on the taxiway. The design of taxi guidelines on aprons is dependent on whether the aircraft is being directed by a marshaller or the pilot.

2. Where aircraft are to be directed by a marshaller, the 'nose wheel position principle' shall apply; that is, the taxi guideline is designed so that when the aircraft nose wheel follows the taxi guideline, all the required clearances are met.

3. Where aircraft are to be guided by the pilot, the 'cockpit position principle' shall apply; that is the taxi guideline is designed so that when a point on the centreline of the aircraft midway between the pilot and the co-pilot seats (or in the case of a single pilot aircraft, in the centre of the pilot seat) follows the taxi guideline, all the required clearances are met.

4. Where there is a change in aircraft position control between the pilot and the marshaler, the taxi guideline must convert from one principle to the other. At aerobridges, the taxi guideline must be designed using the cockpit position principle.

5. Where an aircraft designator is required to cover several aircraft types and there is insufficient space for the marking, an abbreviated version of the designator may be used. As examples, the abbreviated designator for an A330-200 may be A332, Bae 146-200 may be B462, and B737-800 may be B738. ICAO Document 8643 provides a comprehensive list of aircraft designators.

8.5.3 Apron Edge Markings

1. Must be provided where the limit of high strength pavement cannot be distinguished from the surrounding area, and aircraft parking is not restricted to fixed parking positions. Where marking is required, the apron edge must be identified by 2 continuous yellow lines 0.15 m wide, spaced 0.15 m apart.

2. The edge of gravel, grass or other natural surface aprons must be identified by cones, spaced at a maximum distance of 60 m and painted yellow except for dedicated helicopter aprons which must be light blue.

8.5.4 Parking Clearance Line

1. Parking clearance lines may be provided at an aircraft parking position to depict the area that must remain free of personnel, vehicles and equipment when an aircraft is taxiing (or being towed) into position or has started engines in preparation for departure.

2. Parking clearance lines may also be provided on light aircraft aprons with random parking, where it is desired to limit the parking to particular areas.

3. The parking clearance line must comprise a continuous red line 0.10 m or, if desired, 0.20 m wide. Where required, a continuous yellow or white line 0.10 m wide on either side can enhance the parking clearance line. The words 'PARKING CLEARANCE' must be painted in yellow on the side where the light aircraft are parked, and readable from that side. These words must be repeated at intervals not exceeding 50 m, using letters 0.3 m high, located 0.15 m from the line, as shown below.

Figure 8.5-1: Parking clearance line

8.5.5 Aircraft Type Limit Line

Where adjoining portions of pavement cannot accommodate the same aircraft type, information to this effect must be provided, marking the boundary of the restricted pavement. The marking must consist of a broken yellow line, comprising strips 3 m long and 0.3 m wide, separated by 1 m spaces. The designator must be 0.15 m above the line, in letters and numbers 0.5 m high. The marking is to be repeated at intervals not exceeding 50 m.

NO

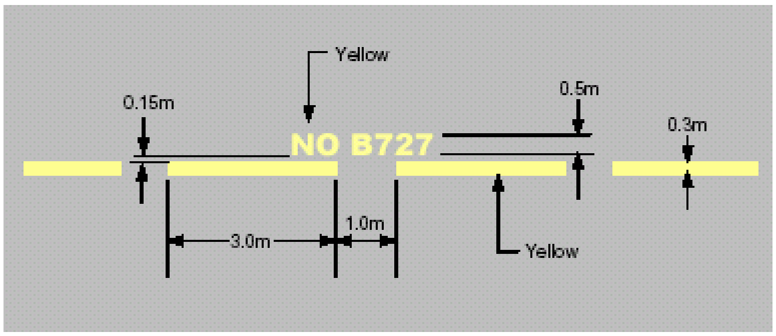


Figure 8.5-2: Aircraft type limit line

8.5.6 Parking Weight Limit Line

Where adjoining portions of pavement cannot accommodate the same aircraft weight, this must be signified by marking an aircraft weight limitation on the weaker pavement. The marking must consist of a broken yellow line, comprising strips 3 m long and 0.3 m wide, separated by 1 m spaces. The designator must be 0.15 m above the line, in letters and numbers 0.5 m high. The marking is to be repeated at intervals not exceeding 50 m.

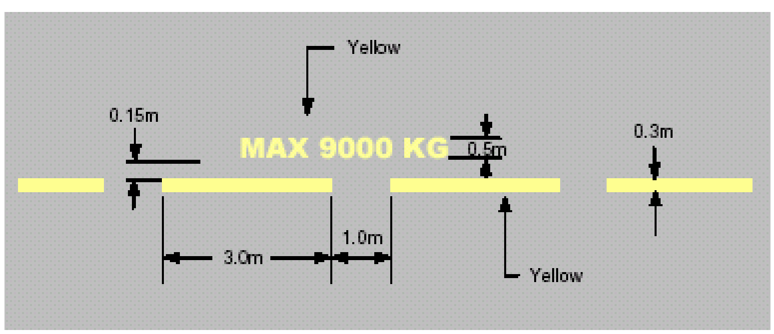


Figure 8.5-3: Parking weight limit line

8.5.7 Leased Area Line

Where the aerodrome operator wishes to identify leased areas on a sealed, concrete or asphalt apron, the marking must consist of a 0.15 m solid line, painted lime green.

8.5.8 Equipment Clearance Line

Equipment clearance lines must be used on congested aprons to assist service vehicles keep clear of manoeuvring aircraft. This marking must consist of red stripes, 1 m long and 0.15 m wide, separated by 1 m gaps. The designation 'EQUIPMENT CLEARANCE' must be painted on the side of the line occupied by the equipment and readable from that side. The designation must be repeated along the line at intervals of not more than 30 m. Letters must be 0.3 m high, 0.15 m from the line, painted red.

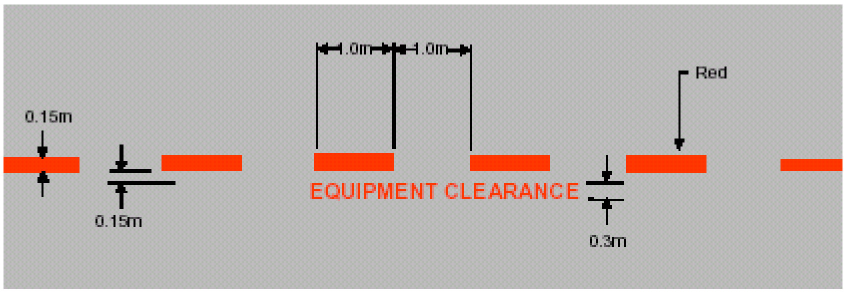


Figure 8.5-4: Equipment clearance line

8.5.9 Equipment Storage Markings

1. Equipment storage markings must consist of a continuous red painted line, 0.1 m wide.

2. The words 'EQUIPMENT STORAGE' must be painted in red on the side where equipment is stored, and readable from that side. Letters must be 0.3 m high and 0.15 m from the line, as shown below. This marking must be repeated at intervals not exceeding 50 m along the boundary.

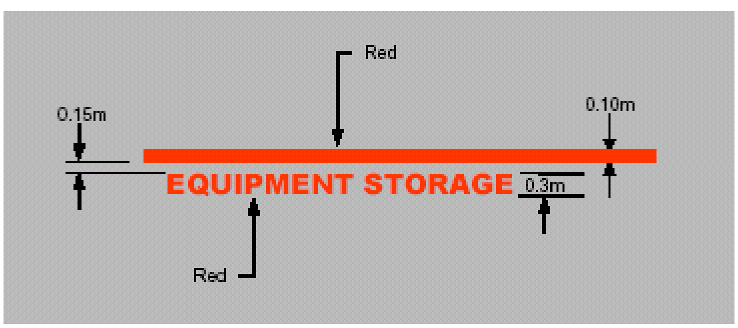


Figure 8.5-5: Equipment storage and apron road marking

8.5.10 Apron Service Road Markings

1. Roads on apron areas must be marked to keep vehicle traffic clear of aircraft and taxiways, and to minimise the risk of vehicle-to-vehicle accidents.

2. Each lane of an apron service road must be of a minimum width to accommodate the widest vehicle in use at that location, e.g. emergency vehicles or ground support equipment.

3. The apron service road marking must consist of a continuous white painted line, 0.1 m wide.

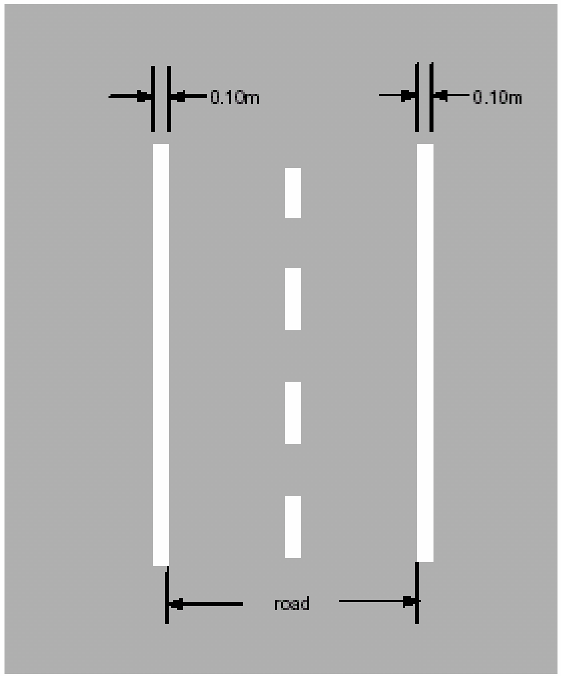


Figure 8.5-6: Apron service road

4. Where a service road is located adjacent to taxiing aircraft the side marking must be shown with a continuous double white line. This indicates DO NOT CROSS. Each continuous white line must be 0.1 m wide. The separation between the two continuous white lines must not be less than 0.05 m.

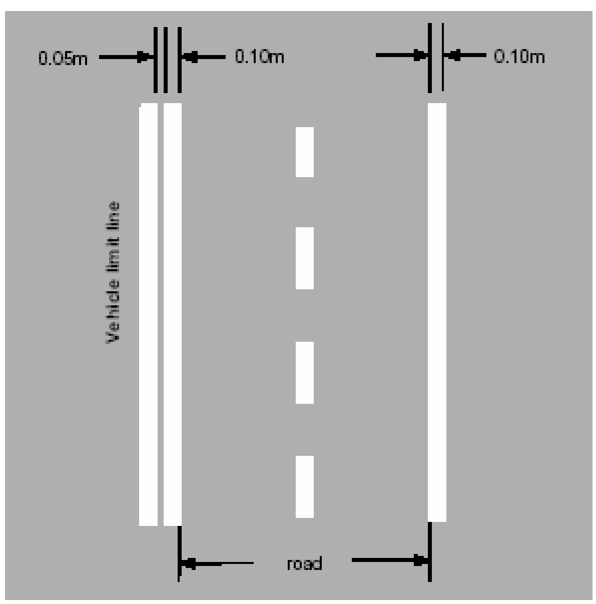


Figure 8.5-7: Apron service road alongside a vehicle limit line

5. Where a service road crosses a taxiway or apron taxilane, the service road marking may be presented in a zipper pattern. Each segment of the zipper is not to be more than 50 cm in length. This type of edge marking makes the road more conspicuous to the pilots of aircraft operating on the taxiway or taxilane

8.5.11 Aircraft Parking Position Markings

1. The aerodrome operator must mark all aircraft parking positions for use by aircraft of 5,700 kg MAUM and above, on concrete, sealed or asphalt apron surfaces.

2. Aircraft parking positions are classified as primary or secondary positions. Primary positions are designed for normal apron demand, whereas secondary positions either provide alternative positions for use during abnormal circumstances, or allow a larger number of smaller aircraft to beparked.

3. Aircraft parking position markings comprise lead-in lines, primary parking position markings, secondary parking position markings, lead-out lines and designation markings.

8.5.12 Lead-in Line

1. Lead-in lines must be provided to each aircraft parking position on all sealed, concrete and asphalt aprons with aircraft parking position markings.

2. Lead-in lines to primary aircraft parking positions must be continuous, 0.15 m wide and painted yellow; they have the same characteristics as a taxi guideline.

3. At a secondary parking position, the lead-in line must be marked by a series of solid yellow circles 0.15 m in diameter, spaced at 1 m intervals. Where an abrupt change in direction occurs the line must be solid for a distance of 2 m before and after the turn.

8.5.13 Taxi Lead-in Line Designation

1. Designation must be provided where an apron has more than one marked aircraft parking position. Taxi lead-in line designation markings must be located at the beginning of each diverging taxi guideline or lead-in line; aligned so that they can be seen by the pilot of an approaching taxiing aircraft. There are three types of taxi lead-in line designations:
   a. parking position number designation;
   b. aircraft type limit designation; and
   c. aircraft weight limit designation.

2. The parking position number designation indicates the aircraft parking position to which the line leads. Where a lead-in line leads to several positions, the designation must include the first and last numbers of the positions served. For instance, a guideline leading to the six positions numbers 1 to 6, is shown as 1–6. The designations must comprise characters 2 m high, painted yellow, as shown in Figure 8.5-8.

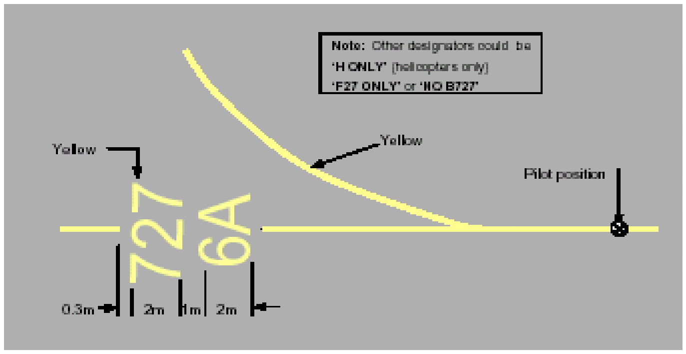


Figure 8.5-8: Parking position number designation

3. The aircraft type limit designations indicate which parking positions are capable of accommodating particular aircraft types. The designation must be painted in yellow characters 2 m high, with 0.3 m spacing from the lead-in line, as shown in Figure 8.5-9. Appropriate aircraft type limit designations must be provided at the lead-in line for each position to which restrictions apply. Where a diverging lead-in line leads to an apron parking position suitable only for helicopters; the designation 'H ONLY' must be provided.

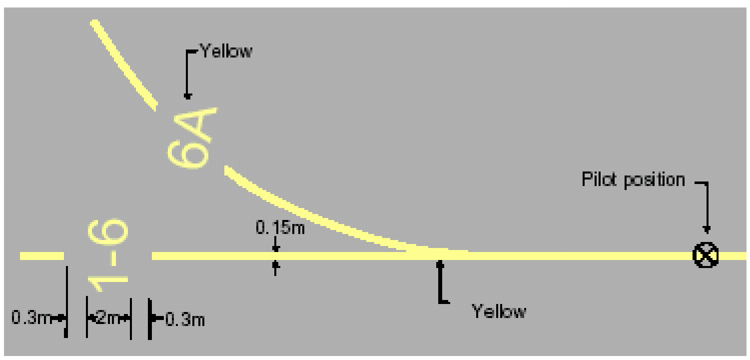


Figure 8.5-9: Aircraft type limit designation

4. The aircraft weight limit designations inform pilots of a weight limitation to a parking position. They specify the maximum weight allowable in the form, '9,000 kg'. The designation must be painted in yellow characters 2 m high, separated by 0.3 m spaces from the lead-in line, as shown in Figure 8.5-10

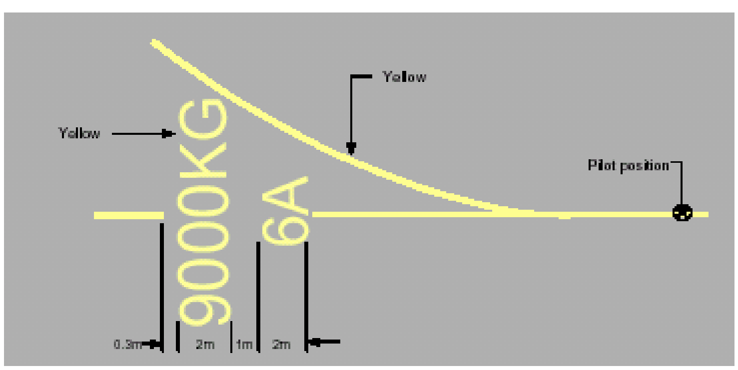


Figure 8.5-10: Aircraft upper weight limit designation

8.5.14 Pilot Turn Line

Where required, a pilot turn line must be placed at right angles to the lead-in line, located on the left side as viewed by the pilot, and must be 6 m long, 0.3 m wide and painted yellow. The aircraft type designation must be painted in yellow letters, 1 m high and spaced 0.15 m below the bar, facing the direction of incoming aircraft. The designation must be offset from the lead-in line as follows:

Aircraft code letter	Offset
C	5 m
D	10 m
E	10 m

Table 8.5-1

8.5.15 Primary Aircraft Parking Position Markings

Primary aircraft parking position markings comprise two straight yellow lines; the alignment line must be 0.15 m wide, and shows the required orientation of the parked aircraft. The stop line must be 0.3 m wide, and shows the pilot or marshaller the point at which the aircraft is to be stopped. The position of the stop line depends on whether the aircraft is under the control of the apron marshaller or the pilot.

8.5.16 Marshaller Stop Line

1. The stop line must be located where the aircraft nose wheel is to stop; and on the right hand side of, and at right angles to, the alignment line, as seen by the marshaller facing the incoming aircraft.

2. The aircraft type designation must be yellow, in letters 0.3 m high, and spaced 0.15 m below the stop line. The lettering must be legible to the marshaller facing the incoming aircraft, as shown below.

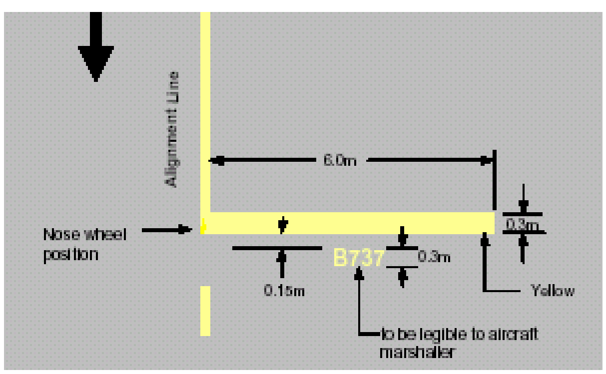


Figure 8.5-11: Marshaller stop line

8.5.17 Pilot Stop Line

1. If required, a pilot stop line must be located so that when the aircraft is stopped, the line is immediately to the left of the pilot. The pilot stop line must be 6 m long and offset from the alignment line as follows:

2. Where aircraft of all codes are to be accommodated at the one parking position, the offset for code letter C must be used and the marking extended in length to 11 m.

Reference Code Letter	Offset X
C	5 m
D	10 m
E	10 m

Table 8.5-2

3. The aircraft type designation must be written in yellow letters 1 m high and spaced 0.15 m below the pilot stop line, as shown below.

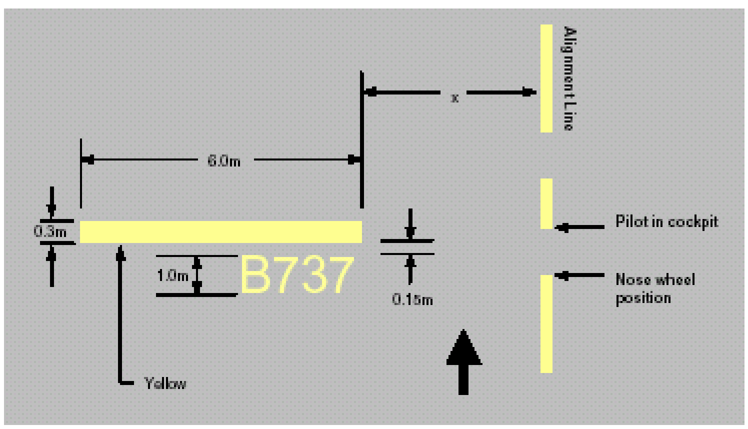


Figure 8.5-12: Pilot stop line (no marshaller)

8.5.18 Alignment Line

The alignment line must extend from the location of the nose wheel in the parked position, backwards under the body of the aircraft for a distance 'X' in Table 8.5-3. The line must also extend forward, commencing at a point 3 m past the most forward nose wheel position and extending for a distance 'Y', in the table. A 1 m long section of the alignment line must be placed in the centre of the 3 m gap, as shown in Figure 8.5-13.

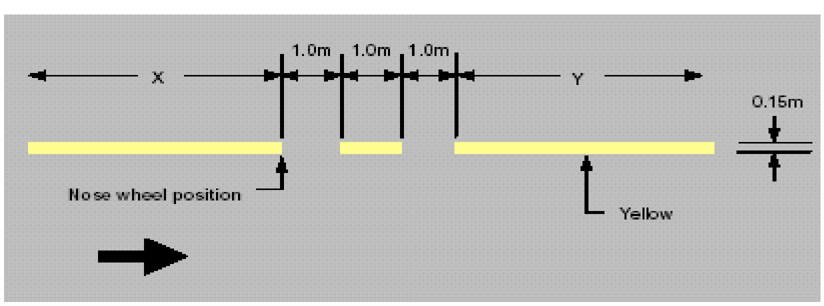


Figure 8.5-13: Alignment line

Reference Code Letter	Distance Y	Distance X
A & B	9 m	5 m
C, D & E	18 m	10 m

Table 8.5-3

8.5.19 Secondary Aircraft Parking Position Markings

These alternative markings are used during abnormal circumstances, or to allow a larger number of smaller aircraft to use the same apron area as a smaller number of larger aircraft using the primary positions. Secondary markings may be either keyhole markings or triangle markings, painted yellow, except where the secondary position markings overlap the primary position markings. In the latter case, the markings must be painted white.

8.5.20 Keyhole Marking

1. Where the secondary position is designed for aircraft with wingspan 15 m or greater, it must be identified with a keyhole marking, comprising an alignment line oriented in the desired alignment, and a terminating ring; with a parking position designator, as shown in Figure 8.5-14.

   Note : *For aircraft having a wingspan of 15 m or greater:*
   a. *Nose wheel position is centre of the circle.*
   b. *Use white paint if likely to be confused with primary position markings.*

2. The marking must be located so that the centre of the ring is at the final nose wheel position. Where required, any aircraft type or weight limit designation must be located at the commencement of the associated dotted lead-in line.

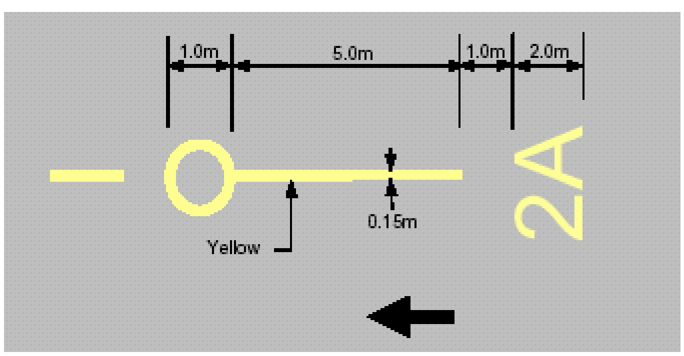


Figure 8.5-14: Keyhole marking

8.5.21 Triangle Marking

Where the secondary position is designed for aircraft with a wingspan of less than 15 m, it must be identified with a triangle marking comprising an alignment line, and a triangle, as shown in Figure 8.5-15. The triangle must be so located that its centre is the final nose wheel position.

Note : *For aircraft having a wingspan less than 15 m:*
a. Nose wheel position is centre of triangle.
b. Use white paint if necessary to avoid confusion with primary marking.

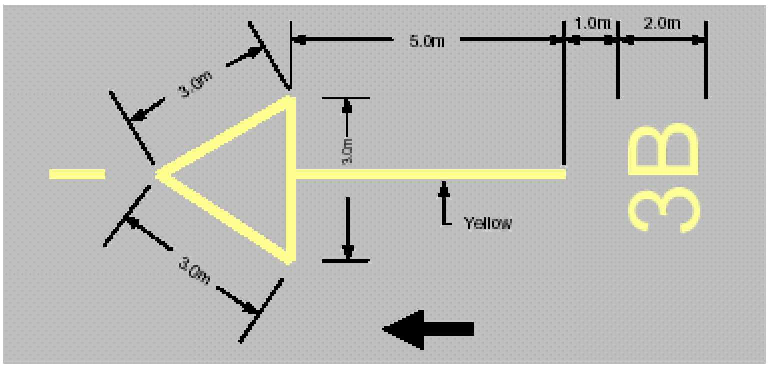


Figure 8.5-15: Triangle marking

8.5.22 Lead-out Line

1. Must comprise a broken line, painted yellow; stripes 1 m long and 0.15 m wide, spaced at 1 m intervals. The lead-out line must commence from the alignment line at least 3 m from the nose wheel position, as shown in Figure 8.5-16.

2. The lead-out line must extend to a point from where the pilot can clearly see the taxi guideline. If arrow indicators are inserted, the first arrow must be at least 15 m from the alignment line, with subsequent arrows at 30 m spacing.

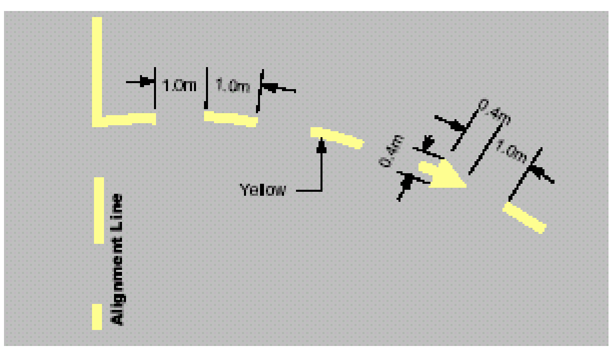


Figure 8.5-16: Lead-out line

8.5.23 Designation Markings

Designation markings are used to provide supplementary information, on all asphalt, sealed and concrete aprons where there is more than one aircraft parking position. Primary parking positions must be numbered sequentially with no omissions. Secondary positions must be identified with the same numbers as the associated primary position, together with an alphabetical suffix.

8.5.24 Aircraft Parking Position Designation

1. The parking position designation must be located adjacent to the parking position, either on the ground or on the aerobridge, and be visible to the pilot.

2. For fixed wing aircraft, the position designation, marked on the ground, must be placed 4 m forward of the nose wheel position and 5 m to the left, as viewed by the pilot. The designation must be yellow, and consist of characters 1 m high in a 2 m inside diameter ring of 0.15 m line thickness, as shown in Figure 8.5-17.

3. At aerobridge positions, the aerobridge designation must be the same as the associated parking position designation. The size of the position designation must not be less than the legend and face size specified in Table 8.6-1.

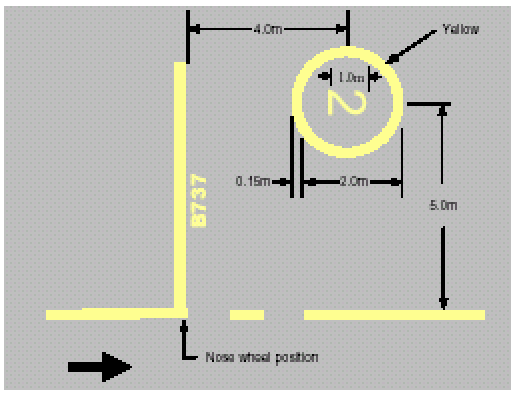


Figure 8.5-17: Aircraft parking position designation

4. An illustration showing a combination of all the aircraft parking position markings at an aircraft parking position is shown in Figure 8.5-18.

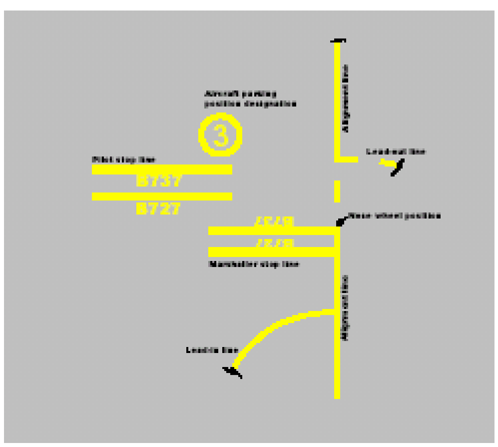


Figure 8.5-18: Aircraft parking position markings

8.5.25 Designation Characters for Taxi and Apron Markings

8.5.25.1 All letters and numbers used in designations for taxi and apron markings must conform in style and proportion to the following illustrations. Actual dimensions must be determined in proportion to the overall height standard for each specific designator. The grid spacing used in the following illustrations is 0.20 m.

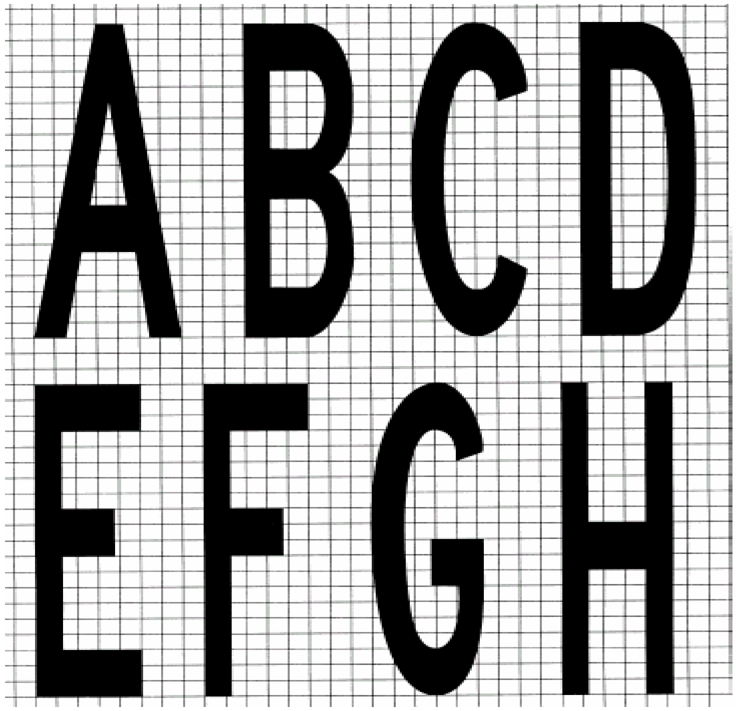


Figure 8.5-19: Letters and numbers used in designations for taxiway and apron markings

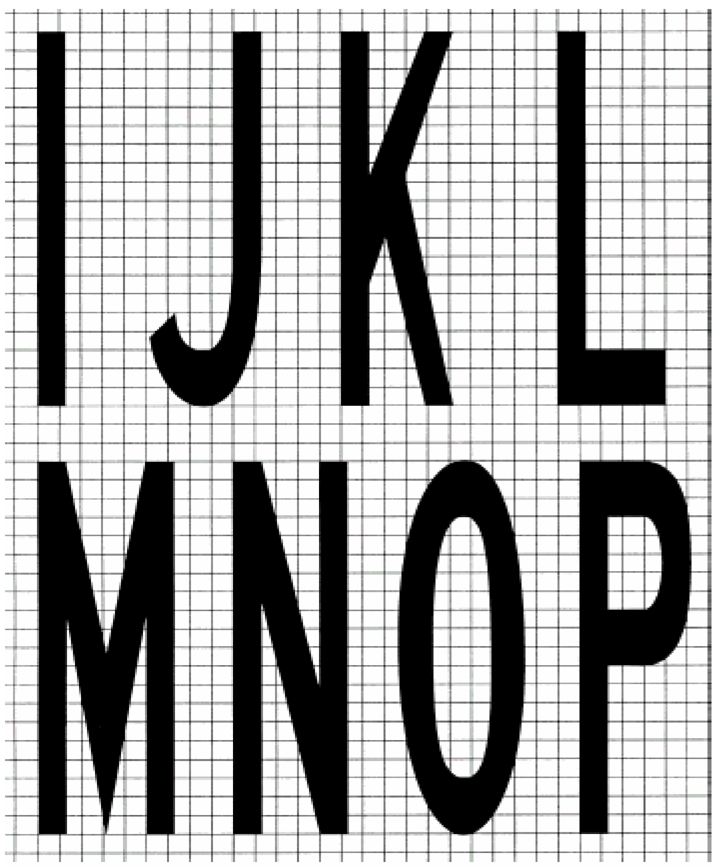


Figure 8.5-20: Letters and numbers used in designations for taxiway and apron

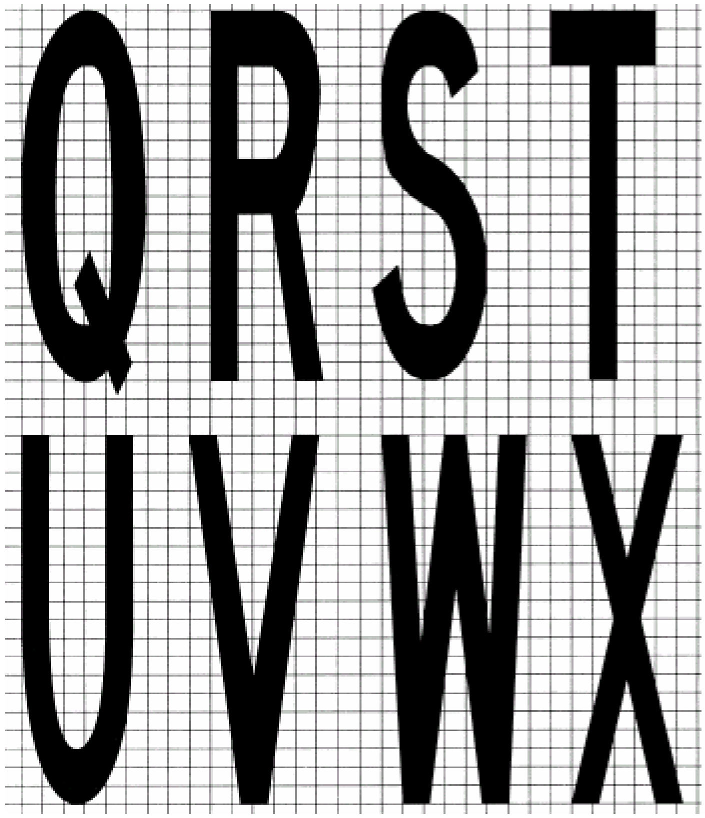


Figure 8.5-21: Letters and numbers used in designations for taxiway and apron markings

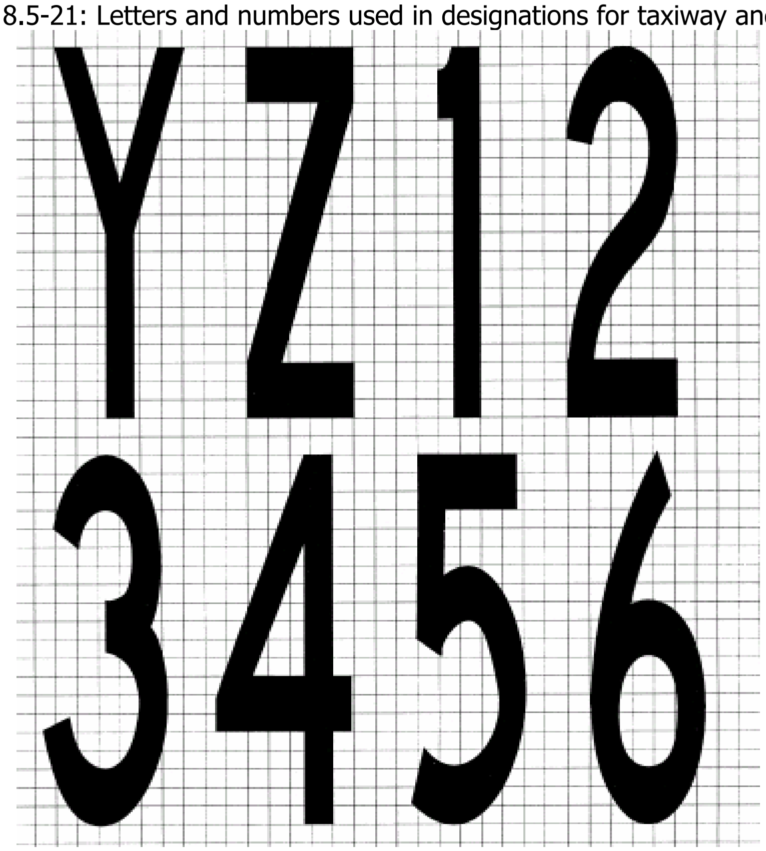


Figure 8.5-22: Letters and numbers used in designations for taxiway and apron markings

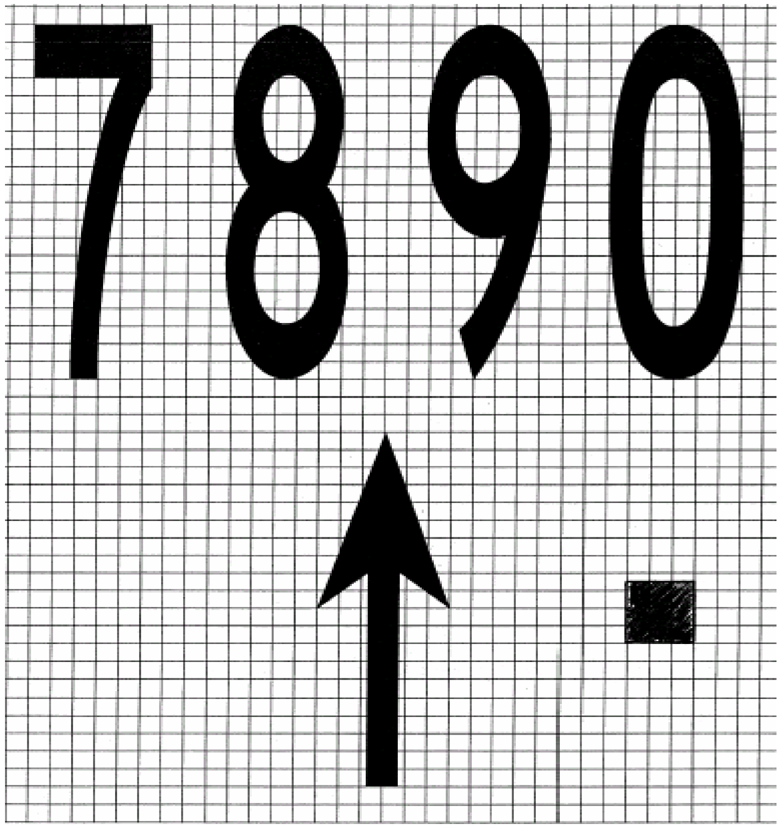


Figure 8.5-23: Letters and numbers used in designations for taxiway and apron markings

8.5.26 Tug operator Guidance Marking

Tug operator guidance marking must be provided on aprons where aircraft are being pushed back by tugs.

8.5.27 Aircraft Push-back Lines

The push-back line must be a broken line, painted white, comprising stripes 1 m long and 0.15 m wide, spaced at 1 m intervals. The line must be based on the required path of the nose wheel of the design aircraft. Where the line is used for tug operations with aircraft of reference code letter C, D and E, the 10 m before the tow bar disconnect point must be straight.

8.5.28 Tug Parking Position Lines

The tug parking position line marking must be provided at aerobridges and other power-in/push-out aircraft parking positions, to ensure parked tugs are clear of incoming aircraft. The marking must consist of a red line 0.10 m wide in the shape of a U, 3.5 m by 1.0 m commencing 3 m from the nose of the critical aircraft, as illustrated, below.

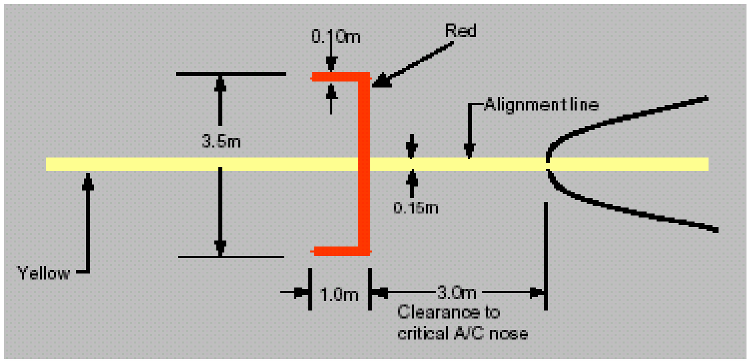


Figure 8.5-24: Tug parking position line

8.5.29 Towbar Disconnect Markings

The towbar disconnect point shown in Figure 8.5-25 must be located at the point of disconnection and must consist of a white line, 1.5 m long and 0.15 m wide, located on the left side of the taxi guideline or push-back line, as viewed from the tug, touching the guideline and at right angles to it.

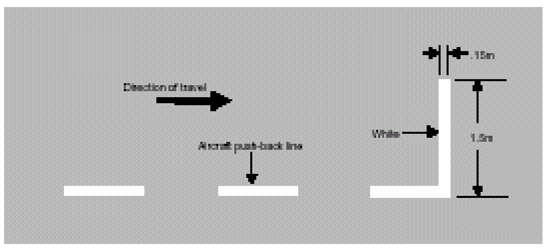


Figure 8.5-25: Towbar disconnect marking

8.5.30 Push-back Limit Markings

Push-back limit markings must comprise two parallel white lines at right angles to and symmetrical about the push back line. The marking must be 1 m long, 0.15 m wide and lines 0.15 m apart, as shown below.

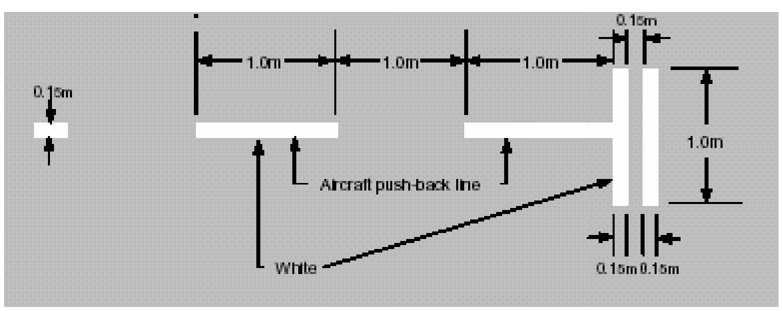


Figure 8.5-26: Push-back limit marking

8.5.31 Push-back Alignment Bars

Push-back alignment bars are provided to assist tug operators to align an aircraft correctly at the end of the push-back manoeuvre. The marking must be a broken white line, comprising stripes 1 m long and 0.15 m wide, spaced at 1 m intervals, for a length of 30 metres, aligned in the desired direction. The marking must commence 3 m past the tow disconnect marking, as shown below.

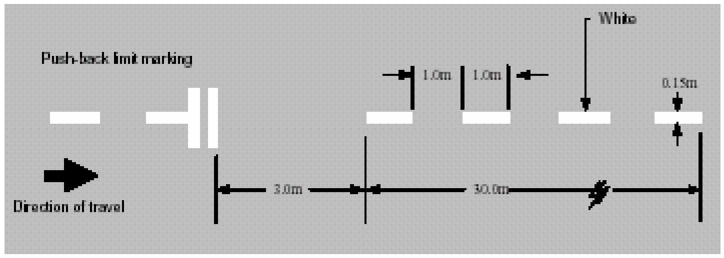


Figure 8.5-27: Push-back alignment line

8.5.32 Passenger Path Markings

1. Where provided, passenger path markings are provided to assist the orderly movement of passengers embarking or disembarking. Passenger path markings must be provided in accordance with the pattern and colour of the relevant State Road Authority pedestrian crossing marking standards. The width of the passenger pathway is to be commensurate with the expected pedestrian traffic.

2. The following diagram illustrates a typical layout for a pedestrian crossing.

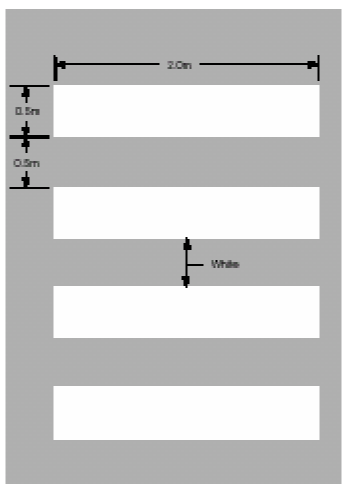


Figure 8.5-28: Pedestrian crossing

8.5.33 Typical Apron Markings

The following Figure 8.5-29 illustrates an apron with typical apron markings.

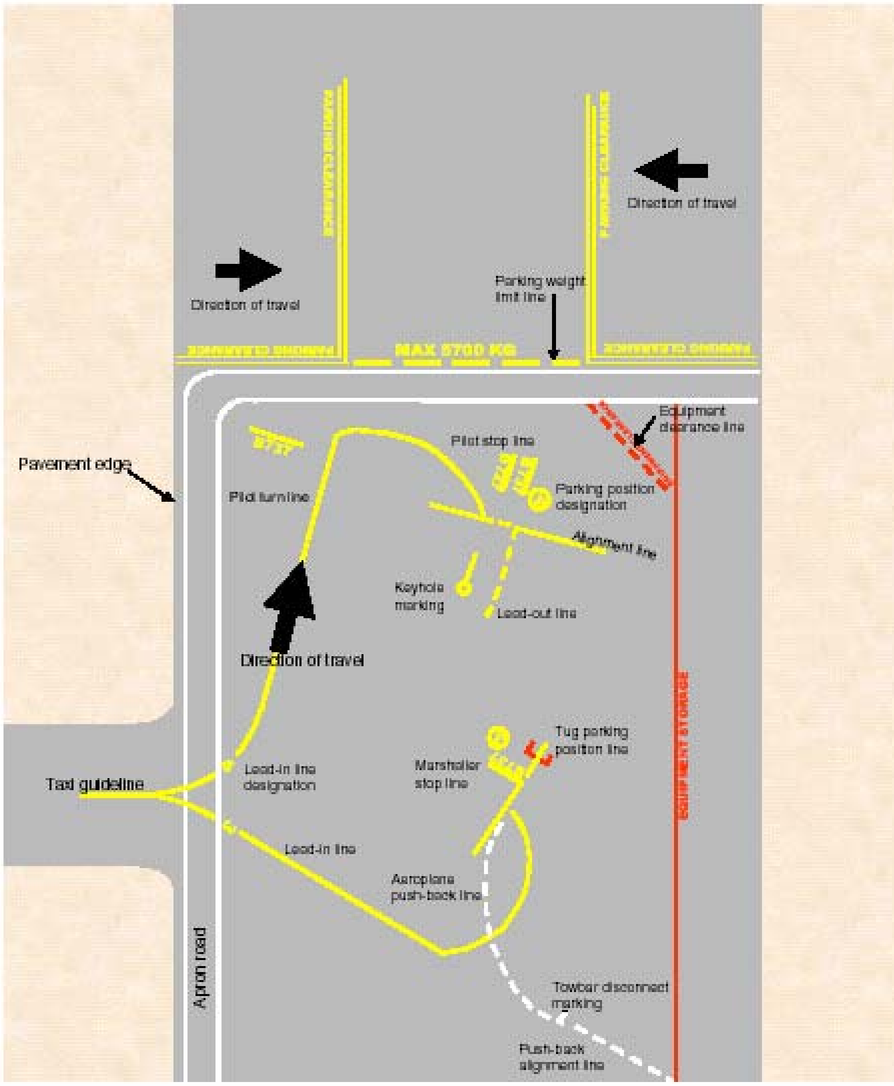


Figure 8.5-29: Typical apron markings

8.6 Movement Area Guidance Signs (MAGS)

8.6.1 Introduction

1. Signs that convey messages that must be obeyed by pilots are known as mandatory instruction signs. These signs must have white lettering on a red background.

2. Signs that convey messages of information are known as information signs. These signs must have either black lettering on a yellow background, or yellow lettering on a black background.

3. Mandatory signs must be provided at international aerodromes, and at other aerodromes that have air traffic control and for which DGAC determines these are required for safety reasons.

4. Aerodrome operators will consult with airlines and with Air Traffic Control, on the need for MAGS with information. Notwithstanding this, MAGS with information must be provided at aerodromes where taxiway intersection departures are promulgated in the AIP.

8.6.2 Naming of taxiways

The following convention must be used in the naming of taxiway location signs:

a. a single letter must be used, without numbers, to designate each main taxiway;
b. the same letter must be used throughout the length of taxiway, except where a turn of 90 degrees or more is made to join a runway, a different letter may be assigned to that portion of taxiway after the turn;
c. for each intersecting taxiway, a different single letter must be used;
d. to avoid confusion, letters I, O and X must not be used, letter Q should only be used where unavoidable;
e. at aerodromes where the number of taxiways are or will be large, alphanumeric designators may be used for short intersecting taxiways. Successive intersecting taxiways must use the same letter, with sequential numbers. If sequential numbers are not practicable, due to geometry of the taxiway system, all pilot-used taxiway plans (aerodrome charts) must include advice as to the missing designators;
f. the use of letters and numbers must be easily comprehensible. Should it ever be necessary to use double-digit alphanumeric designators, care must be taken to ensure the numbers used in the taxiway designation cannot in any way be confused with the runway designations.

8.6.3 Dimensions, Location and Lettering

1. Signs must be located to provide adequate clearance to passing aircraft. The depth and width of the signboard is dependent on the location of the sign, the size of the characters and the length of message conveyed.

2. Where MAGS are provided only on one side of the taxiway, they must be located on the pilots' left side unless this is impracticable. Where MAGS are to be read from both directions, they must be oriented so as to be at right angles to the taxi guideline. Where MAGS are to be read in one direction only, they should be oriented so as to be at 75 degrees to the taxi guideline.

8.6.4 Sign Size and Location Distances, Including Runway Exit Signs

1. Sign size and location distances must be in accordance with Table 8.6-1.

Sign Height (Mm)					Perpendicular Distance From Defined Taxiway Pavement Edge To Near Side Of Sign	Perpendicular Distance From Defined Runway Pavement Edge To Near Side Of Sign
Code Number	Type	Legend	Face (min)	Installed (max)		
1 or 2 a	I	200	400	700	5 - 11 m	3 - 10 m
1 or 2	M	300	600	900	5 - 11 m	3 - 10 m
3 or 4 a	I	300	600	900	11 - 21 m	8 - 15 m
3 or 4	M	400	800	1100	11 - 21 m	8 - 15 m
a For runway exit signs, use the mandatory size.						
I - Information sign type, M - Mandatory instruction sign type.						

Table 8.6-1

2. The stroke width of letters and arrows must be.

Legend height	Stroke width
200 mm	32 mm
300 mm	48 mm
400 mm	64 mm

3. The form and proportion of the letters, numbers and symbols used on movement area guidance signs must be in accordance with Figure 8.6-1 to Figure 8.6-7. The grid spacing used in the following illustrations is 0.20 m.

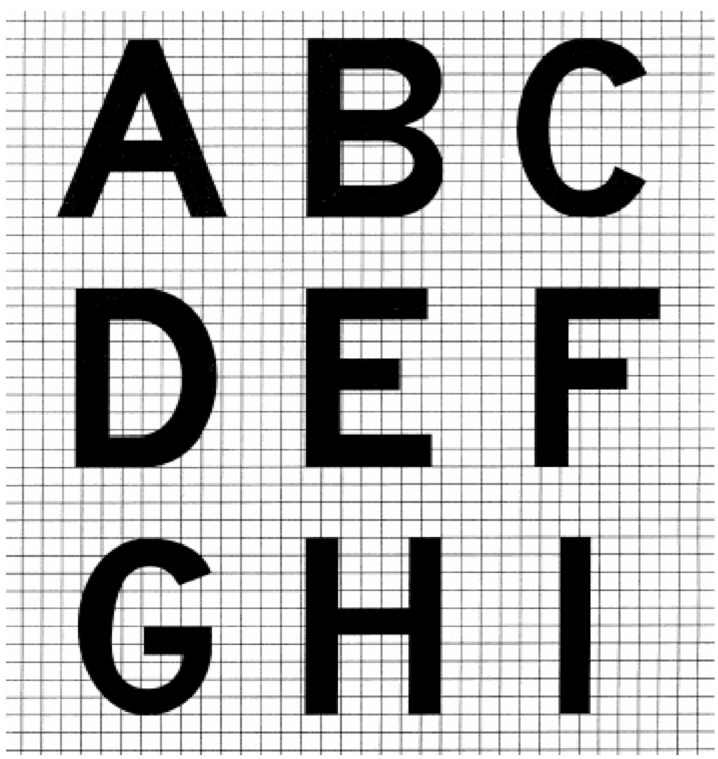


Figure 8.6-1:
Form and proportion of letters, numbers and symbols used on Movement Area Guidance Signs

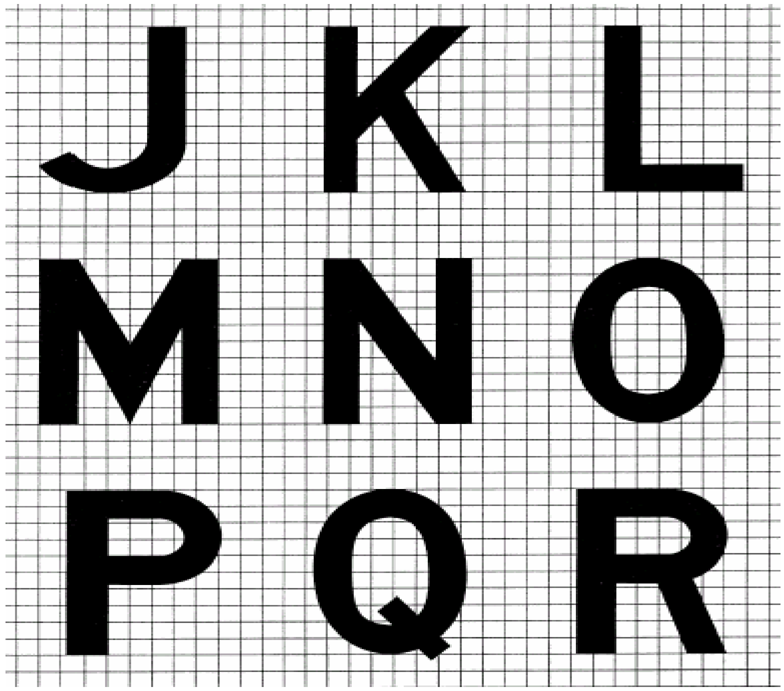


Figure 8.6-2:
Form and proportion of letters, numbers and symbols used on Movement Area Guidance Signs

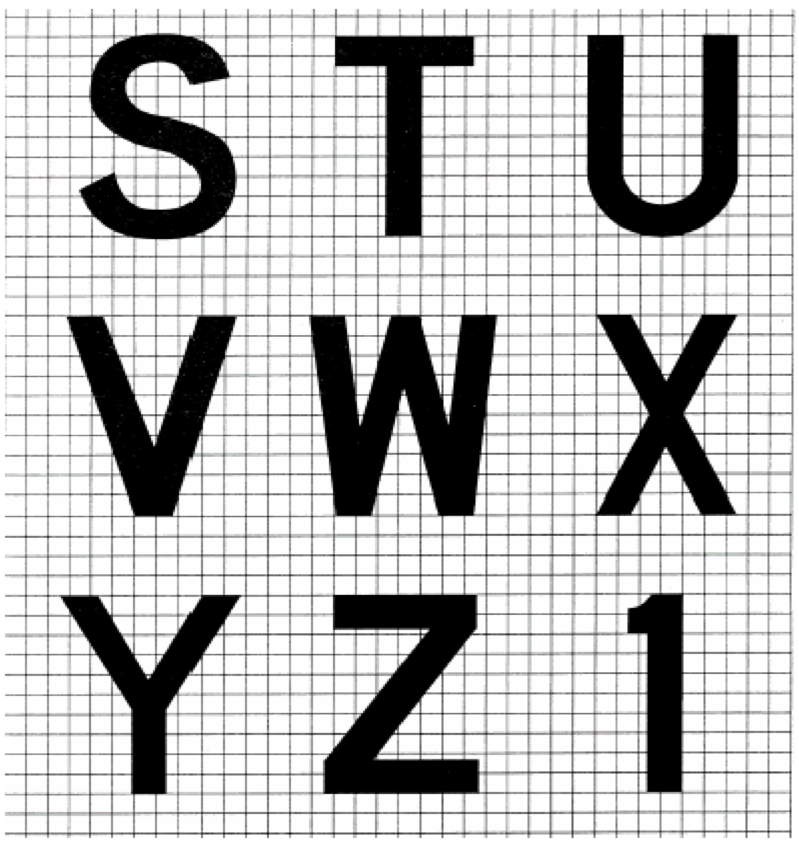


Figure 8.6-3:
Form and proportion of letters, numbers and symbols used on Movement Area Guidance Signs

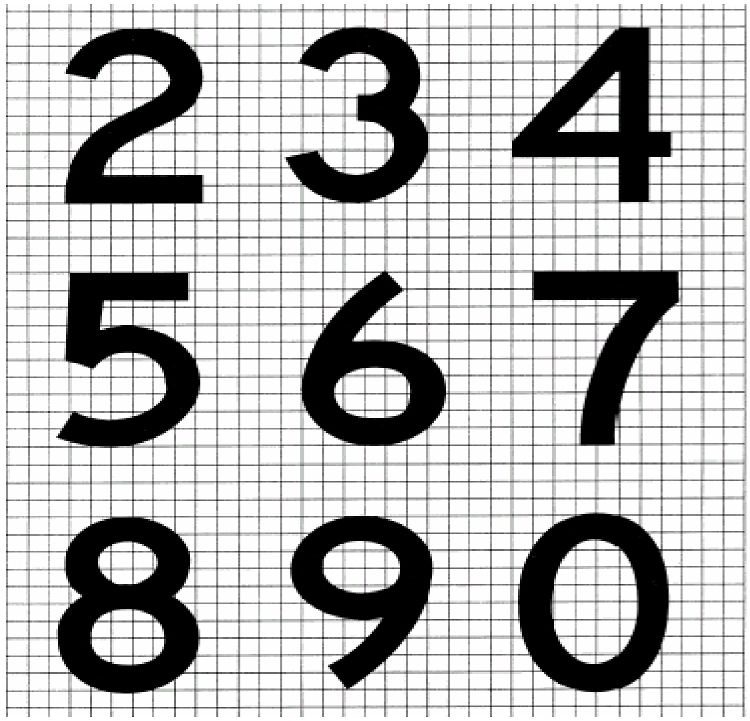


Figure 8.6-4:
Form and proportion of letters, numbers and symbols used on Movement Area Guidance Signs

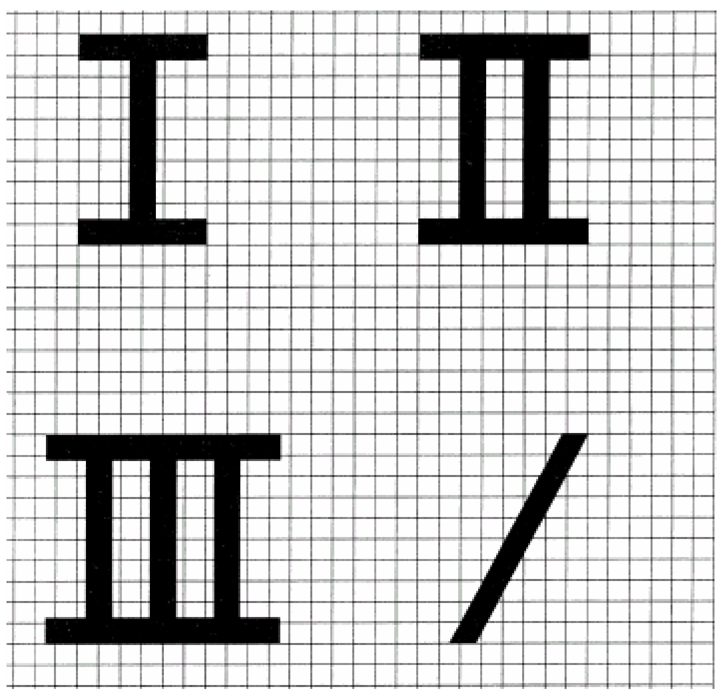
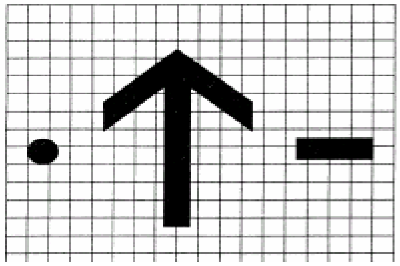
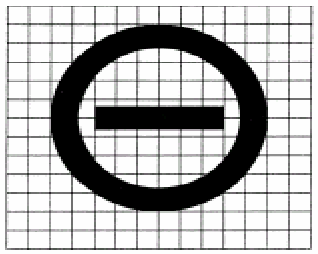


Figure 8.6-5:
Form and proportion of letters, numbers and symbols used on Movement Area Guidance Signs



Note 1.— The arrow stroke width, diameter of the dot, and both width and length of the dash shall be proportioned to the character stroke widths.

Note 2.— The dimensions of the arrow shall remain constant for a particular sign size, regardless of orientation.



NO ENTRY sign

Figure 8.6-6:
Form and proportion of letters, numbers and symbols used on Movement Area Guidance Signs

a) Letter to letter code number

Preceding Letter	Following Letter: B, D, E, F, H, I, K, L, M, N, P, R, U	Following Letter: C, G, O, Q, S, X, Z	Following Letter: A, J, T, V, W, Y
	Code number		
A	2	2	4
B	1	2	2
C	2	2	3
D	1	2	2
E	2	2	3
F	2	2	3
G	1	2	2
H	1	1	2
I	1	1	2
J	1	1	2
K	2	2	3
L	2	2	4
M	1	1	2
N	1	1	2
O	1	2	2
P	1	2	2
Q	1	2	2
R	1	2	2
S	1	2	2
T	2	2	4
U	1	1	2
V	2	2	4
W	2	2	4
X	2	2	3
Y	2	2	4
Z	2	2	3

b) Numeral to numeral code number

Preceding Numeral	Following number: 1, 5	Following number: 2, 3, 6, 8, 9, 0	Following number: 4, 7
	Code number		
1	1	1	2
2	1	2	2
3	1	2	2
4	2	2	4
5	1	2	2
6	1	2	2
7	2	2	4
8	1	2	2
9	1	2	2
0	1	2	2

c) Space between characters

Code No.	Letter Height (mm) 200	300	400
	Space (mm)		
1	48	71	96
2	38	57	76
3	25	38	50
4	13	19	26

d) Width of letter

Letter	Letter height (mm) 200	300	400
	Width (mm)		
A	170	255	340
B	137	205	274
C	137	205	274
D	137	205	274
E	124	186	248
F	124	186	248
G	137	205	274
H	137	205	274
I	32	48	64
J	127	190	254
K	140	210	280
L	124	186	248
M	157	236	314
N	137	205	274
O	143	214	286
P	137	205	274
Q	143	214	286
R	137	205	274
S	137	205	274
T	124	186	248
U	137	205	274
V	152	229	304
W	178	267	356
X	137	205	274
Y	171	257	342
Z	137	205	274

e) Width of numeral

Letter	Numeral height (mm) 200	300	400
	Width (mm)		
1	50	74	98
2	137	205	274
3	137	205	274
4	149	224	298
5	137	205	274
6	137	205	274
7	137	205	274
8	137	205	274
9	137	205	274
0	143	214	286

INSTRUCTIONS

1. To determine the proper SPACE between letters or numerals, obtain the code number from table a or b and enter table c for that code number to the desired letter or numeral height.
2. The space between words or groups of characters forming an abbreviation or symbol should be equal to 0.5 to 0.75 of the height of the characters used except that where an arrow is located with a single character such as 'A →', the space may be reduced to not less than one quarter of the character of the height in order to provide a good visual balance.
3. Where the numeral follows a letter or vice versa use Code 1.
4. Where a hyphen, dot, or diagonal stroke follows a character or vice versa use Code 1.

Figure 8.6-7:
Form and proportion of letters, numbers and symbols used on Movement Area Guidance Signs

4. The face width of a sign must provide on either side of the legend a minimum width equal to half the height of the legend. In the case of a single letter sign, this width must be increased to the height of the legend. In all cases, the face width of a mandatory instruction sign provided on one side of a taxiway only, must not be less than:
   a. 1.94 m where the code number is 3 or 4; and
   b. 1.46 m where the code number is 1or 2.

8.6.5 Structural

MAGS must be lightweight and frangibly mounted. They must be constructed so as to withstand a wind velocity of up to 60 m/sec without sustaining damage. Mountings must be constructed so as to fail, for frangibility requirements, under a static load not exceeding 8 kPa distributed over the sign face.

8.6.6 Illumination

1. All MAGS, except those where internal illumination is provided, must be made of retro-reflective class one material. Illumination must be provided to all mandatory instruction signs and information signs meant for use by code 4 aircraft. Illumination is optional for information signs intended to serve Code 1, 2 or 3 aircraft; however, if the location of a sign is such that the retro-reflectiveness is ineffective, illumination must be provided. Both external or internal illumination is acceptable, but care must be taken, to prevent dazzle.

2. The average sign luminance must be as follows:

   a. where operations are conducted in runway visual range of less than 800 m, the average sign luminance must be at least:

Red	30 cd/m^2
Yellow	150 cd/m^2
White	300 cd/m^2

   b. where operations are conducted at night, in runway visual range of 800 m or greater, average sign luminance must be at least :

Red	10 cd/m^2
Yellow	50 cd/m^2
White	100 cd/m^2

3. The luminous ratio between red and white elements of a mandatory sign must not be less than 1:5 and not greater than 1:10.

4. The average luminance of the sign must be calculated in accordance with ICAO Annex 14, Volume 1, Appendix 4, Figure 4.1. This procedure is set out in Section 8.7*.*

5. In order to achieve uniformity of signal, luminance values must not exceed a ratio of 1.5:1 between adjacent grid points. Where the grid spacing is 7.5 cm, the ratio between luminance values of adjacent grid points must not exceed a ratio of 1.25:1. The ratio between the maximum and minimum luminance value over the whole sign face must not exceed 5:1.

6. Signs must have colours red, white, yellow and black, that comply with the relevant recommendations in ICAO Annex 14, Volume 1, Appendix 1, for externally illuminated signs, retro-reflective signs and transilluminated signs, as appropriate.

8.6.7 MAGS with Mandatory Instructions

MAGS with mandatory instructions include runway designation signs, category I, II or III holding position signs, runway-holding position signs, Aircraft NO ENTRY signs, vehicular STOP signs and runway/runway intersection signs.

8.6.8 Runway Designation Signs

1. A runway designation sign, as illustrated in Figure 8.6-8, must be provided at a runway/taxiway intersection, where a pattern 'A' runway holding position marking is provided. Only the designation for one end of the runway must be shown where the taxiway intersection is located at or near that end of the runway. Designations for both ends of the runway, properly orientated with respect to the viewing position of the sign, must be shown where the taxiway is located elsewhere.

2. A taxiway location sign must be provided alongside the runway designation sign, in the outboard (farthest from the taxiway) position.

3. A runway designation sign must be provided at least on the left side of a taxiway facing the direction of approach to the runway. Where practicable, a runway designation sign is to be provided on each side of the taxiway.

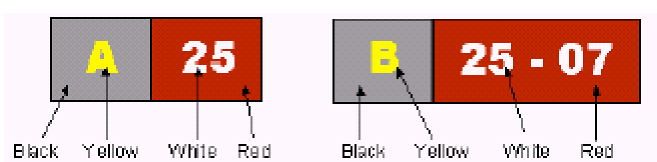


Figure 8.6-8: Runway designation signs with taxiway location sign

8.6.9 Category I, II or III Runway Designation Signs

Where a pattern 'B' taxi-holding position marking is provided, the sign, as shown below, must be provided on each side of the taxiway.

Figure 8.6-9: Category I runway-holding position sign

8.6.10 Runway Holding Position Sign

Runway-holding position signs must be provided at a taxiway location other than an intersection where the air traffic control has a requirement for aircraft to stop, such as entry to an ILS sensitive area. The sign is a taxiway designation sign, but with white lettering on a red background.

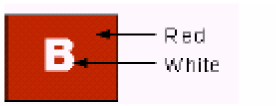


Figure 8.6-10: Mandatory runway-holding position sign

8.6.11 Aircraft NO ENTRY Sign

A NO ENTRY sign, consisting of a white circle with a horizontal bar in the middle, on a red background, must be provided at the entrance of an area to which entry is prohibited. Where practicable, a NO ENTRY sign must be located on each side of the taxiway.

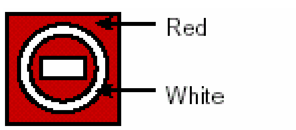


Figure 8.6-11: Aircraft NO ENTRY sign

8.6.12 Vehicular STOP Signs

Where required, vehicular 'STOP' signs can be provided at road/taxiway intersections, road holding positions, or entrance to ILS sensitive areas. This sign should be the same as a local road traffic sign. In addition, the vehicular holding position should be marked in accordance with local traffic pavement marking. See also Section 6.4 for provision and location of a road-holding position.

8.6.13 Runway/Runway Intersection Signs

1. These are runway designation signs, which must be provided on each side of the runway used in LAHSO, to identify the intersecting runway ahead. The sign must show the designation of the intersecting runway, oriented with respect to the viewing position of the sign, and separated by a dash. For example, '15-33' indicates the runway threshold '15' is to the left, and '33' is to the right. Signs are to be located at the Hold Short Line which must be at least 75 m from the centreline of the intersecting runway.

2. The overall height of the sign above the ground, and offset from the edge of the runway pavement, must be such as to provide at least 300 mm clearance between the top of the sign and any part of the most critical aircraft using the runway when the outer edge of the wheel of the aircraft is at the runway pavement edge.

8.6.14 MAGS with Information

MAGS with information include taxiway location signs, direction signs, destination signs, take-off run available signs, runway exit signs, distance to go signs, and, where required, LAHSO distance to go signs.

8.6.15 Taxiway Location Signs

A location sign is normally provided in conjunction with a direction sign or a runway designation sign.

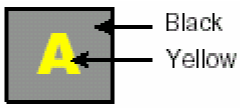


Figure 8.6-12: Taxiway location sign

8.6.16 Direction Signs

1. Each taxiway direction must be indicated by an arrow, as shown below. The sign must have black letters with yellow background. A direction sign must be complemented by a location sign, except where the taxiway designation is adequately displayed by previous location signs along the taxiway.

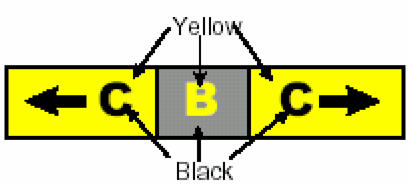


Figure 8.6-13: Direction/location/direction sign

2. At a taxiway/taxiway intersection, information signs must be located prior to the intersection and in line with the taxiway intersection marking.

8.6.17 Destination Signs

1. Destination signs must have black letters on yellow background, as shown below. They advise pilots of facilities on, or near, the movement area. This sign must not be co-located with a location or direction sign.

Figure 8.6-14: Destination sign

2. Examples of common sign text used for destination signs are set out below:

Sign text	Meaning
RAMP or APRON	General parking, servicing and loading area
PARK or PARKING	Aircraft parking area
CIVIL	Civilian areas of joint-use aerodromes
MIL	Military area of a joint-use aerodrome.
CARGO	Freight or cargo handling area.
INTL	International areas
DOM	Domestic areas
RUNUP	Engine run-up areas
AC	Altimeter check point
VOR	VOR check point
FUEL	Fuel or service area
HGR	Hangar or hangar area

8.6.18 Take-off Run Available Sign

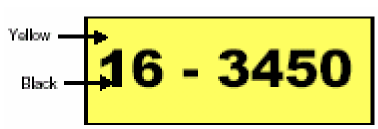
The take-off run available sign indicates to pilots the length of take-off run available from a particular taxiway, where intersection departures are available. This sign is provided to allow pilots to have final reassurance that they are at the correct take-off location:

a. where the take-off point is close to the start of a runway, the sign is to show the designation of the take-off runway, and the take-off run available in metres, as shown in Figure 8.6-15.

b. where the take-off point is not close to the start of the runway, the sign is to show the take-off run available in metres, plus an arrow, appropriately located and orientated, indicating the direction in which that take-off run is available, as shown in Figure 8.6-16.

c. where intersection departures are available in both directions from the position, two signs, one for each direction of take-off, are required.

d. the take-off run available signs are to be located abeam the runway-holding position on the entry taxiway. Where one take-off run available sign is provided, it is to be located on the left hand side of the taxiway. Where take-off is available in both directions, the two signs are to be located one on each side of the taxiway, corresponding to the direction of take-off. Take-off run available signs must not obscure a pilot's view of any mandatory instruction signs.



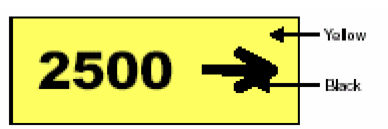


Figure 8.6-15: Take off run available sign Figure 8.6-16 Take-off run available sign

8.6.19 Runway Exit Signs

1. Runway exit signs, as shown below, advise pilots of the designation and direction of a taxiway from which they can exit. Must be provided for a runway used in LAHSO, except when used only by Performance Category A aircraft, as defined in the AIP. For this purpose, Non-jet aircraft below 5,700 kg may be regarded as Category A aircraft.

2. The sign must consist of black lettering on a yellow background, with a black arrow outboard of the taxiway designator, or to the right of the designator for exits to the right, and to the left for exits to the left.

3. The runway exit sign must be located on the same side of the exit taxiway, 60 m prior to the exit junction where the runway code number is 3 or 4 and 30 m where the runway code number is 1 or 2.

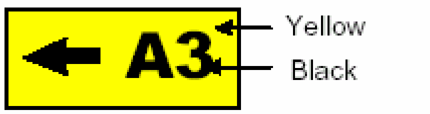


Figure 8.6-17: Runway exit sign

8.7 Wind Direction Indicators

8.7.1 Requirements

1. CASR Part 139 requires the aerodrome operator to install and maintain at least one wind direction indicator at the aerodrome. DGAC may issue directions requiring additional wind direction indicators to be provided.

2. If a straight-in landing off an instrument approach is permitted at any runway, Part 139, subject to Paragraph 8.7.1.3, requires a wind direction indicator be provided at the threshold of that runway. Subject to 8.7.1.3, CASR 139 also requires that non-precision approach runways be provided with a wind direction indicator at the threshold of a runway, except that for runways 1200 metres or less in length, one centrally located wind indicator is acceptable if it is visible from the parking area and both approaches.

3. Paragraph 8.7.1.2 does not apply to a runway if surface wind information is passed to the pilots of aircraft approaching the runway through:
   a. an automatic weather observing system that:
      - o is compatible with the Bureau of Meteorology weather observing system, and
      - o provides surface wind information through an aerodrome weather information broadcast, or (b) an approved observer having a communication link with pilots through which timely information about surface wind may be clearly passed to them; or
   b. any other approved means of providing surface wind information.

4. A wind direction indicator must be located so as to be visible from aircraft that are in flight or aircraft that are on the movement area.

5. A wind direction indicator must be located so as to be free from the effects of air disturbance caused by buildings or other structures.

6. A wind direction indicator provided at the threshold of a runway must be located:

   a. except if it is not practicable to do so, on the left hand side of the runway as seen from a landing aircraft; and

   b. outside the runway strip; and

   c. clear of the transitional obstacle limitation surface.

7. If practicable to do so, a wind direction indicator provided at the threshold of a runway must be located 100 metres upwind of the threshold.

8.7.2 Standards

1. A wind direction indicator must consist of a tapering fabric sleeve attached to a pole 6.5 m above the ground.

2. The sleeve must be 3.65 m long and taper uniformly from 900 millimetres in diameter to 250 millimetres in diameter.

3. The wide end must be mounted on a rigid frame to keep the end of the sleeve open and attached to the pole so as to allow it to move around freely.

4. The fabric of the primary wind direction indicator must be white and that of any additional wind direction indicator must be:
   a. yellow; if it is not intended to be illuminated at night; or
   b. if it is intended to be illuminated at night; either white, or another colour that is clearly visible when illuminated.

   Note : *Natural or synthetic fibres having weight range of at least 270 to 275 g/m2 have been used effectively as wind indicator sleeve material.*

5. The primary wind direction indicator must be located in the centre of a circle 15 m in diameter, coloured black and bordered:

   a. by a white perimeter 1.2 m wide; or

   b. by a ring of 15 equally spaced white markers each with a base not less than 0.75 m in diameter.

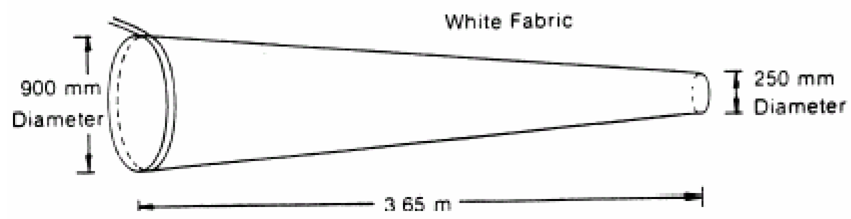


Figure 8.7-1: Wind Direction Indicator

6. For the illumination of wind direction indicators see Chapter 9.

8.8 Ground Signals

8.8.1 Signal Areas

A signal area must be:

a. metres in diameter
b. black,
c. bordered by:
   - a white border 1 metre wide; or
   - equally spaced white markers, each with a base not less than 0.75 m in diameter; and
d. not more than 15 m from the wind direction indicator, or, if applicable, the primary wind direction indicator. The primary wind direction indicator is located closest to the apron of the aerodrome.

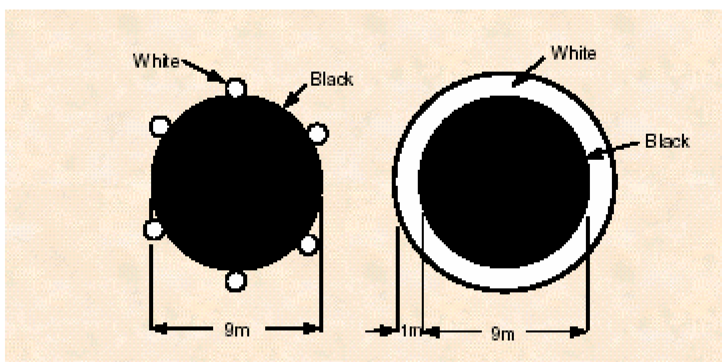


Figure 8.8-1: Signal Area

8.8.2 Ground Signals in Signal Area

1. A 'total unserviceability' signal must be displayed in a signal area when an aerodrome is closed to landing aircraft.

2. A 'total unserviceability' signal must consist of 2 white strips not less than 0.9 m wide and 6 m long, bisecting each other at right angles.

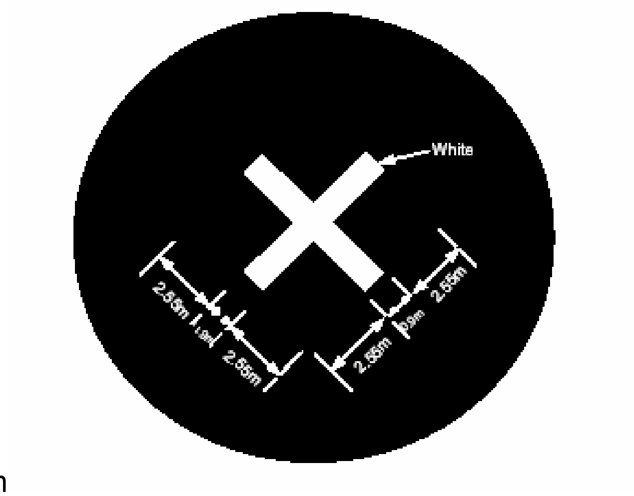
3. A 'restricted operations' signal must be displayed in the signal area at an aerodrome with more than one type of surface on its movement area, if aircraft are only to use:

a. the sealed runways, taxiways and aprons; or
b. the gravel runways; where there are no sealed runways, taxiways and aprons.

4. For the purposes of Paragraph 8.8.2.3:

a. a sealed runway, taxiway or apron is one whose surface is wholly or mainly sealed; and.
b. a gravel runway, taxiway or apron is one whose surface is wholly or mainly gravel.
c. the 'restricted operations' signal must consist of 2 white circles 1.5 m in diameter, connected by a white cross bar 1.5 m long and 0.4 m wide.
d. a 'glider operations' signal, must consist of a white strip 5 m long and 0.4 m wide crossed at right angles by 2 strips 0.4 m wide and 2.5 m long, each being 1.05 m from the closest end of the horizontal strip, as shown below.

2.55m



0.9m

Figure 8.8-2: Total unserviceability signal

White

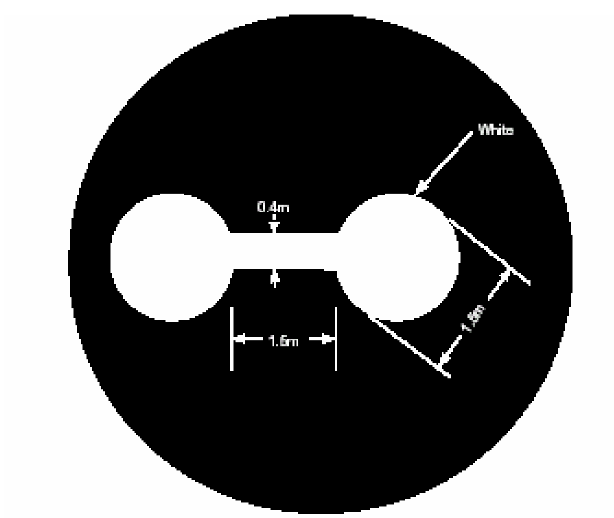
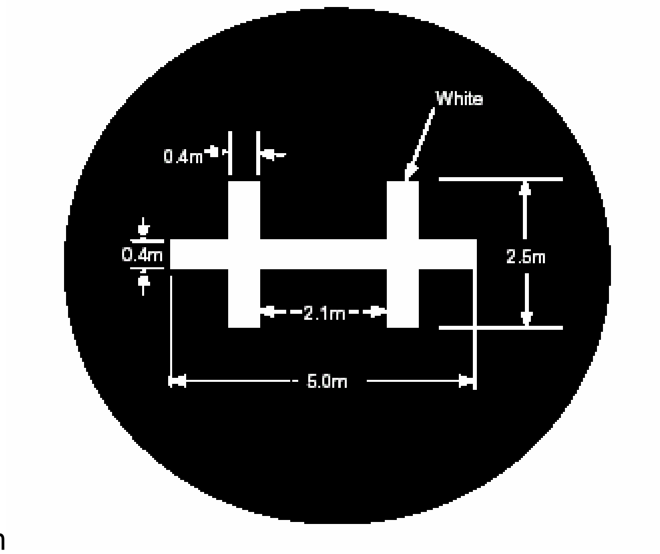


Figure 8.8-3: Restricted operations signal

2.5m 0.4m

0.4m
5.0m



2.1m

Figure 8.8-4: Glider operations signal

8.9 Marking of Unserviceable and Work Areas

8.9.1 Introduction

This section identifies the markings used on unserviceable areas of runways, taxiways, aprons and holding bays and markers used to mark the boundary of unserviceable areas and limit of work areas.

8.9.2 Marking of Unserviceable Areas on Runways, Taxiways and Aprons

1. An unserviceability marking or closed marking must be used to indicate any part of a runway, which is not to be used by aircraft. The marking must comprise a white cross placed on the unserviceable portion of the runway.

2. An unserviceability marking may also be used to indicate any part of a taxiway or apron, which is not to be used by aircraft. The preferred way of marking an unserviceable part of taxiway or apron is by the placement of unserviceable markers at the entrance to that area or around the unserviceable area.

3. There are two types of unserviceability markings, shown in Figure 8.9-1 and Figure 8.9-2. Unless otherwise approved by DGAC, the larger marking is to be used when marking a runway.

4. Unserviceability marking is not required for time-limited works.

5. Unless otherwise approved by DGAC, the larger marking must be used on Code 3 and 4 runways when the whole or part of the runway is permanently closed, or closed to aircraft operations for more than 30 days. Markings must be displayed at each end of the unserviceable runway, and also in the intermediate area, at intervals of less than 300 m.

6. The larger making should be used at an aerodrome with multiple and parallel code 3 runways, when one or more runways, or part of a runway is closed for more than 30 days. Where provided, the markings must be displayed in accordance with Paragraph 8.9.2.5.

7. In other cases of runway unserviceability, if DGAC approval is given and markings in accordance with the larger configuration are not used, then the smaller marking must be used. The smaller markings must be displayed at each end of the unserviceable area and in the intermediate area at intervals of not more than 200 m.

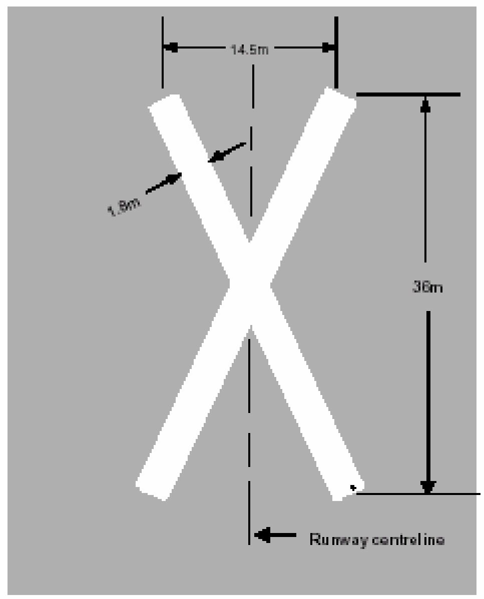


Figure 8.9-1: Unserviceability (closed runway) marking

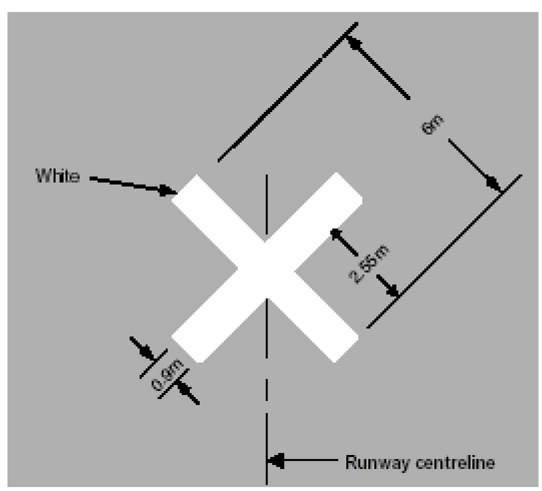


Figure 8.9-2: Unserviceability marking

8.9.3 Use of Unserviceability Markers

1. Unserviceability markers are shown in Figure 8.2-1. They must consist of a white standard cone with a horizontal red stripe, 25 cm wide around its centre, half way up the cone, so as to provide three bands of colour, white-red-white.

2. Unserviceability markers must be displayed wherever any portion of a taxiway, apron or holding bay is unfit for the movement of aircraft but is still possible for aircraft to bypass the area safely.

8.9.4 Works Limit Markers

1. Works limit markers, shown in Figure 8.2-1, where used, must be spaced at intervals marginally less than the smallest track of the plant or vehicles operating within the work area.

2. Other forms of work limit markers may be used for works on apron and other areas provided they are not a hazard to aircraft and other airside vehicles operating in the vicinity of the works area.

8.10 Obstacle Markings

8.10.1 General

1. Fixed objects, temporary and permanent, which extend above the obstacle limitation surfaces but are permitted to remain or objects which are present on the movement area are regarded as obstacles, and must be marked. The aerodrome operator must submit details of such obstacles to DGAC, for hazard assessment and particular requirements for marking and lighting. The relevant information must be included in the Aerodrome Manual.

2. DGAC may permit obstacles to remain unmarked;
   a. when obstacles are sufficiently conspicuous by their shape, size or colour;
   b. when obstacles are shielded by other obstacles already marked; or
   c. when obstacles are lighted by high intensity obstacle lights by day.

8.10.2 Marking of Obstacles

1. A structure must be marked when more than 150 m higher than the surrounding terrain. Surrounding terrain means the area within 400 m of the structure. Structures above 90 m may need to be marked, and inconspicuous structures 75 m above ground level should also be marked. Fixed objects on the aerodrome movement area, such as ILS buildings, must be marked as obstacles.

2. Obstacles other than wires and cables, must be painted in a pattern of contrasting colours which also contrast with the background, as agreed and set out in the Aerodrome Manual. Orange and white or red and white are normally used.

3. Obstacles with unbroken surfaces more than 4.5 m by 4.5 m size, must be painted in a chequered pattern of lighter and darker squares or rectangles, with sides no less than 1.5 m and no more than 3 m long, as shown in Figure 8.10-1. The corners of the obstacle must be painted in the darker colour.

4. Obstacles more than 1.5 m size in one direction and less than 4.5 m in the other, or any lattice obstacle greater than 1.5 m in size in both directions, must be marked with alternating contrasting bands of colour, with the ends painted in the darker colour, as shown in Figure 8.10-2. The bands must be perpendicular to the longest dimension and have a width approximately 1/7 of the longest dimension or 30 m, whichever is less.

5. Obstacles with any dimension less than 1.5 m, except for masts, poles and towers described in Paragraph 8.10.2.6, must be painted in a solid contrasting colour.

6. Masts, poles and towers must be marked in contrasting bands with the darker colour at the top, as shown in Figure 8.10-3. The bands must be perpendicular to the longest dimension and have a width approximately 1/7 of the longest dimension or 30 m, whichever is less.

7. Fence posts which are determined to be obstacles, must be painted in a single conspicuous colour, normally white.

8. Wires or cable obstacles must be marked using three-dimensional coloured objects such as spheres and pyramids, etc; of a size equivalent to a cube with 600 mm sides, spaced 30 m apart.

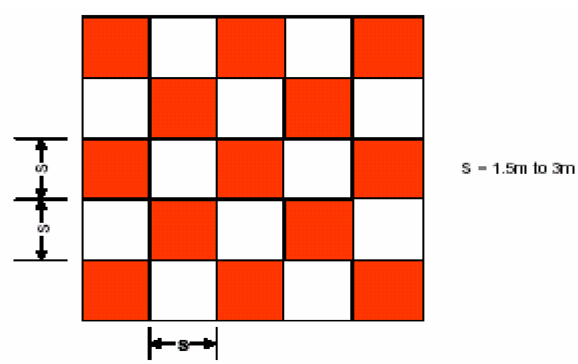


Figure 8.10-1: Marking of square face obstacle

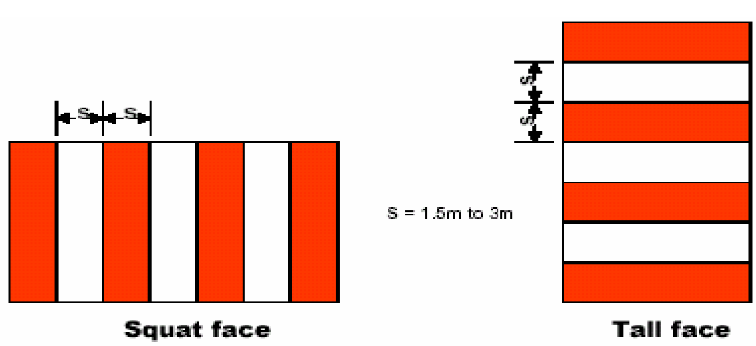


Figure 8.10-2: Marking of squat or tall face objects

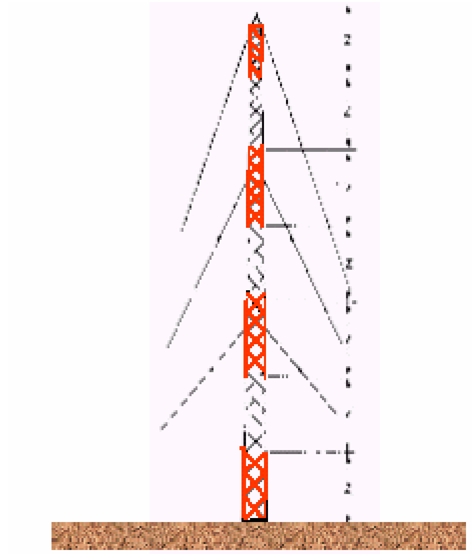


Figure 8.10-3: Marking of mast, pole and tower

8.10.3 Marking of Temporary and Transient Obstacles

1. Temporary and transient obstacles may be required by DGAC to be marked. Fixed temporary obstacles should be marked as described above for permanent obstacles. Where this is not practicable the use of unserviceability cone markers and/or flags is acceptable to delineate the shape and size of the obstacle so that it is clearly visible from any line of approach likely to be used by an aircraft.

2. Flags used for marking fixed temporary obstacles must be not less than 0.6 m square. They must be either orange or orange and white, split diagonally. Where orange merges with the background, another conspicuous colour must be used.

8.10.4 Marking of Vehicles

1. A vehicle used regularly on the manoeuvring area by day should be painted a single conspicuous colour, preferably yellow or orange. Where so painted, it does not require additional marking.

2. Vehicles not painted yellow or orange must be marked, either by using either:
   a. a vehicle warning light in accordance with Paragraph 9.19.1; or
   b. flags.

3. Flags must be not less than 0.9 m square and consist of an orange and white chequered pattern, each square of which must have sides not less than 0.3 m. Where orange merges with the background, another colour that contrasts with the background must be used.

8.11 Helicopter Areas on Aerodromes

8.11.1 Introduction

At aerodromes used by both helicopters and fixed wing aircraft, specific markings must be provided on facilities for the exclusive use of helicopters.

8.11.2 Helicopter Landing and Lift-off Area Markings

Where a specific area, other than the runway, is provided for the landing and lift-off of helicopters, the area must be marked by a circle, painted white, with an inside radius of 6 m and a line width of 1 m. A white 'H' marking must be provided, located centrally within the circle, aligned with the orientation of the helicopter landing direction. The dimensions of the H marking must be 6 m high and 3 m wide, with a line width of 1 m.

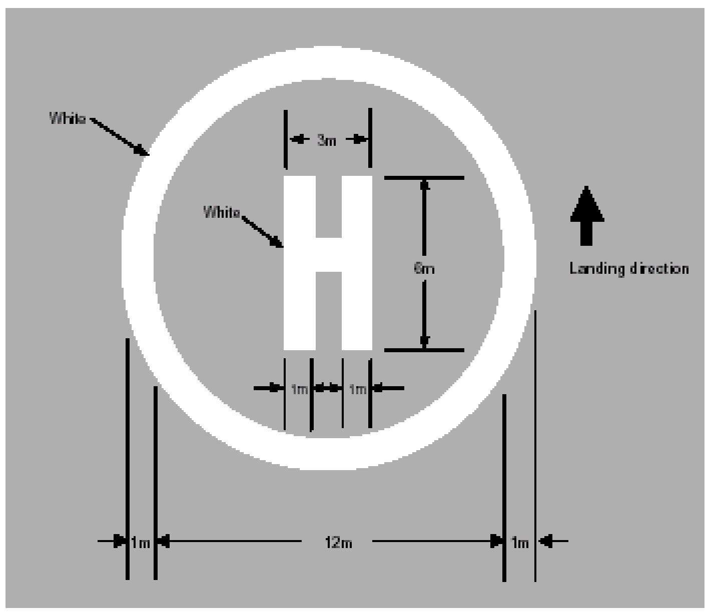


Figure 8.11-1: Helicopter landing and lift-off marking

8.11.3 Helicopter Apron Markings

Helicopter apron markings comprise taxi guidelines, lead-in lines and helicopter parking position markings. Markings for taxi guidelines and lead-in lines to dedicated helicopter parking positions must be the same as for fixed wing aircraft.

8.11.4 Helicopter Parking Position Markings

1. Where a dedicated helicopter parking position is provided on a sealed, concrete or asphalt apron, it must be marked with the letter 'H', painted yellow, 4 m high, 2 m wide with line width 0.7 m. The marking must conform to the shape and proportions shown in Figure 8.11-2.

2. The letter H must be located centrally in the parking position and aligned with the desired orientation of the helicopter when parked. This marking also serves as the parking position designator.

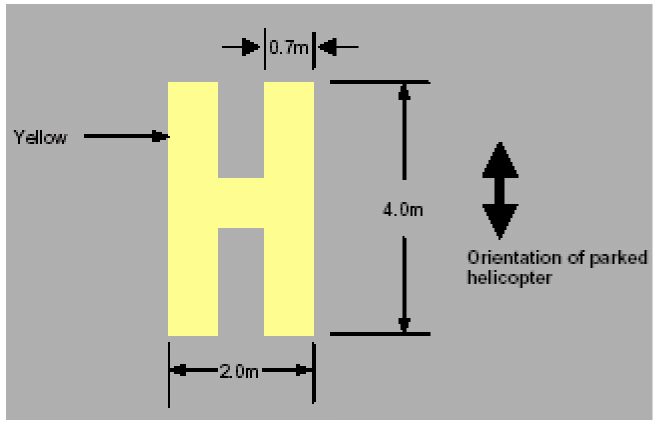


Figure 8.11-2: Helicopter parking position marking

8.11.5 Helicopter Taxi Guideline Designation

1. Designation must be provided where a taxi guideline leads to a parking position reserved for helicopters only. Where an apron contains both fixed wing and dedicated helicopter parking positions, taxi guidelines leading to dedicated helicopter parking positions must be marked with a 2 m high, yellow designator 'H', at their divergence from the aircraft taxi guideline, as shown in Figure 8.11-3.

2. These designations must be located and oriented in such a way that they can be seen by the critical aircraft 15 m away on the taxi guideline.

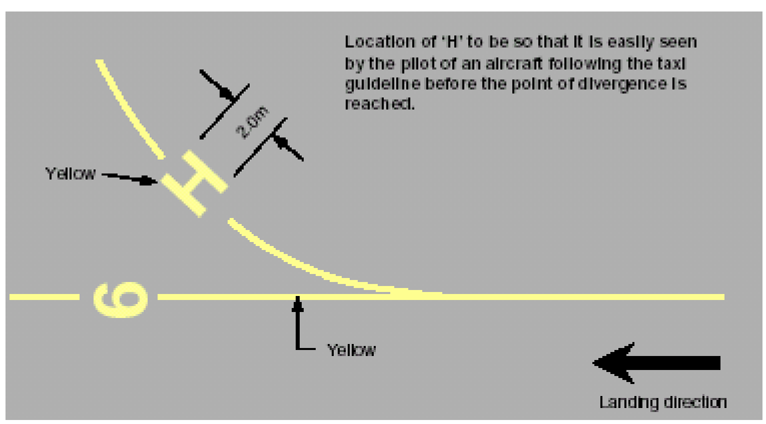


Figure 8.11-3: Helicopter taxi guideline designator

8.11.6 Helicopter Parking Position Numbers

Parking position numbers must be provided when there is more than one helicopter parking position on an apron. All parking positions must be numbered above, and below the helicopter parking position marking. Numbers must be 2 m high, painted yellow, as illustrated in Figure 8.11-4.

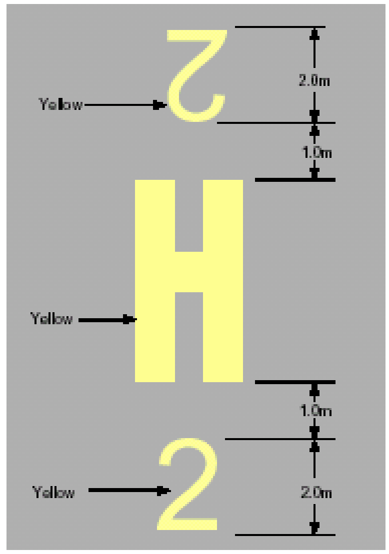


Figure 8.11-4: Helicopter parking position number

8.11.7 Helicopter Apron Edge Markings

1. Apron edge markings must be provided when it is necessary to clearly define areas allocated specifically for helicopter parking.

2. On sealed, concrete or asphalt aprons, the edge marking must consist of two continuous lines 0.15 m wide, 0.15 m apart, painted light blue. Additionally, the words 'HELICOPTER ONLY' must be painted in yellow, along the edge marking, outside the helicopter apron, and legible to pilots of approaching aircraft. The letters must be 0.5 m high, located 0.15 m from the helicopter apron edge marking. These words must be spaced at intervals not exceeding 50 m, along the helicopter apron edge marking, as shown below.

3. On gravel or natural surfaces, the apron must be marked using light blue cones; spaced at a minimum of 30 m, and a maximum of 60 m, apart.

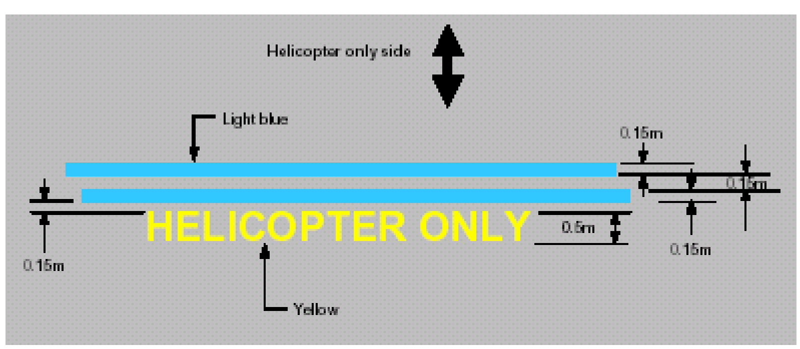


Figure 8.11-5: Helicopter apron edge markings

8.12 Marking of Glider Runway Strips on an Aerodrome

1. When gliding operations are being conducted at an aerodrome, a signal consisting of a double white cross must be displayed in the signal circle. Details of the signal are illustrated in Figure 8.12-4, below.

2. Where the glider runway strip is located wholly or partly within an existing runway strip for powered aircraft, the width of the glider runway strip must be fixed on the one side by the edge of the runway for powered aircraft, and on the other by the existing runway strip markers adjusted as necessary, as shown below in Figure 8.12-1 and Figure 8.12-2.

3. Where a glider runway strip is located outside an existing runway strip for powered aircraft, the glider runway strip must be marked with boundary markers of a conspicuous colour other than white, as shown in Figure 8.12-3.

4. Where an end of a glider runway strip is not alongside the end of an existing runway strip for powered aircraft, an additional white double cross on a black background must be displayed 20 m in front of the glider strip end markers, as shown in Figure 8.12-2 and Figure 8.12-3.

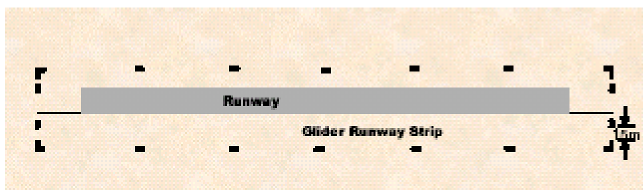


Figure 8.12-1:
Glider runway strip taking up the full length of powered aircraft runway strip
(no signal required)

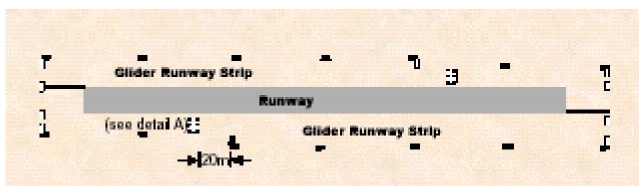


Figure 8.12-2:
Glider runway strip taking part of the powered aircraft runway strip

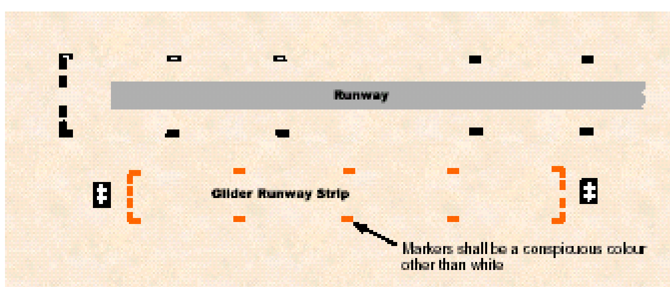
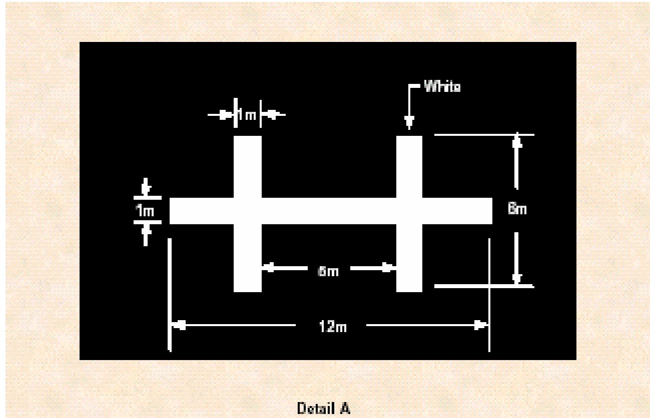


Figure 8.12-3:
Glider runway strip outside an existing powered aircraft runway strip

6m1m



9. VISUAL AIDS PROVIDED BY AERODROME LIGHTING

9.1 General

9.1.1 Application and Definitions

1. Existing installed lighting systems must be operated and maintained in accordance with existing procedures. The standards in this Chapter do not apply to an existing lighting facility until :

   a. the light fittings of a lighting system are being replaced with fittings of a different type. In this case a lighting system means lights on a section of taxiway (not all taxiways), lights on a threshold (not all thresholds) etc.
   b. the facility is upgraded;
   c. there is a change in the category of either:
   d. aerodrome layout; or
   e. aerodrome traffic density; or
   f. in exceptional circumstances, DGAC determines that in the interest of safety, a lighting facility has to meet the standards of this Chapter.

2. For aerodrome lighting purposes, words used in this Chapter have the following meaning:

   a. Aerodrome layout. This means the number of runways, taxiways and aprons at an aerodrome provided with lighting, and is divided into the following categories:

      o Basic – an aerodrome with one runway, with one taxiway to one apron area;
      o Simple – an aerodrome with one runway, having more than one taxiway to one or more apron areas;

- o Complex – an aerodrome with more than one runway, having many taxiways to one or more apron areas.

b. Aerodrome traffic density. This means the number of aircraft movements in the mean busy hour, and is divided into the following categories:

- o Light – not greater than 15 movements per runway or typically less than 20 total aerodrome movements;
- o Medium – 16 to 25 movements per runway or typically between 20 to 35 total aerodrome movements;
- o Heavy – 26 or more movements per runway or typically more than 35 aerodrome movements.

Notes : *1. The number of movements in the mean busy hour is the arithmetic mean over the year of the number of movements in the daily busiest hour.*
2. Either a take-off or a landing constitutes a movement.

c. Upgrade of a facility. A facility is deemed to be upgraded if anything is changed to allow it to:

- o accommodate aeroplanes from a higher reference code, such as from code 2 to code 3 runway or code 3 to code 4;
- o be used by aeroplanes flying under different approach conditions, such as:
  1. from non-instrument to non-precision instrument;
  2. from non-precision instrument to precision instrument;
  3. from precision category I to category II or III.

d. Practicable. This term is used to allow DGAC acceptance of variation to a standard due to insurmountable difficulties in the way of full compliance. If an aerodrome operator believes that compliance with a standard is impracticable, the onus rests with that operator to demonstrate the impracticability to the satisfaction of the DGAC.

9.1.2 Standardisation of Aerodrome Lighting

1. It is important, for pilot recognition and interpretation of aerodrome lighting systems, that standard configurations and colours be used. The pilot always views the aerodrome lighting systems in perspective, never in plan, and has to interpret the guidance provided, while travelling at high speed, sometimes with only a limited segment of the lighting visible. As time will be limited to see and react to visual aids, particularly in the lower visibilities, simplicity of pattern, in addition to standardisation, is extremely important.

2. Pilot visual workload is best moderated by standardisation, balance and integrity of elements. A ragged system with many missing lights can break the pattern

from the pilot's eye position, restricted as that position is by cockpit cut-off angles and possibly by patchy fog or other conditions.

3. For some aerodrome lighting systems, historic usage in various countries has resulted in more than one system being endorsed by ICAO. In these circumstances, DGAC may have endorsed some, but not all, ICAO systems for use in Indonesia.

4. Those systems not included in the MOS are not endorsed by DGAC for use in Indonesia. Pilot training gives pilots familiarity with Indonesian standard systems, but not with those systems that are not Indonesian standard. It is important that aerodrome owners do not introduce non-endorsed or non-standard aerodrome lighting systems.

5. If the aerodrome owner has any doubts about a new system for their aerodrome, they are to check with DGAC before proceeding.

9.1.3 Lighting in the Vicinity of an Aerodrome

An existing or proposed non-aeronautical ground light in the vicinity of an aerodrome, which, by reason of its intensity, configuration or colour, might endanger the safety of aircraft, must be notified to the relevant DGAC office for a safety assessment. In general, vicinity of the aerodrome can be taken as within a 6 km radius of the aerodrome. Within this 6 km area, the following specific areas are the most likely to cause problems to aircraft operations:

a. for a code 4 instrument runway – within a rectangular area the length of which extends at least 4500 m before each threshold and the width of which is at least 750 m either side of the extended runway centreline;
b. for a code 2 or 3 instrument runway, within an area with the same width as (a) with the length extending to at least 3000 m from the threshold;
c. for other cases, within the approach area.

Notes : *1. Aerodrome operators should liaise with local electricity and planning authorities, so that they can be alerted of lighting proposals in the vicinity of their aerodromes. Proposals for lighting roadways are particularly of concern.*
2. Section 9.21 provides advice to lighting designers when planning lighting installations in the vicinity of an aerodrome.

9.1.4 Minimum Lighting System Requirements

1. At an aerodrome available for night operations, at least the following facilities must be provided with appropriate lighting:

   a. runways, taxiways and aprons intended for night use;
   b. at least one wind direction indicator;

c. if an obstacle within the applicable OLS area of the aerodrome is determined by DGAC as requiring obstacle lighting, the obstacle lighting.

Note : *In the case of taxiways used only by aeroplanes of code A or B, taxiway reflective markers may be used in lieu of some taxiway lighting.*

2. Where any approach end of a runway is intended to serve jet-propelled aeroplanes engaged in air transport operations, that approach end must be provided with an approved visual approach slope indicator system, in accordance with Paragraph 9.9.1. Additionally DGAC may direct a runway to be provided with a visual approach slope indicator system if the circumstances surrounding the aerodrome require such an aid for aircraft safety purposes.

3. To avoid confusion at an aerodrome with more than one visual approach slope indicator system, the same type of approach slope indicator system must be used, in accordance with Paragraph 9.9.1.7.

4. A runway intended to serve Category I, II or III precision approach operations must be provided with an approach lighting system, where physically practicable, in accordance with the standards set out in this Chapter.

5. Movement area guidance signs intended for use at night must be illuminated in accordance with the standards set out in Chapter 8.

6. In certain circumstances additional lighting systems (e.g. aerodrome beacons, visual docking guidance systems and runway threshold identification lights) may be required at some aerodromes. Where provided, they shall be in compliance with the standards set out in this Chapter.

9.1.5 Primary Source of Electricity Supply

1. Unless it is impracticable to do so, except for Paragraph 9.1.5.3 below, an aerodrome lighting system must be an electrically connected installation, with the primary source of electric power supplied by the local electricity supply authority.

2. Where the power supply of an aerodrome lighting system has to be derived from a source other than the normal reticulated electricity supply, a note to that effect shall be included in AIP.

3. If, at an aerodrome intended for use by aircraft with less than 10 passenger seats engaged in air transport operations, power supply cannot be supplied by normal reticulated electricity, the supply may be derived from stand-alone generators or solar charged batteries.

9.1.6 Electrical Circuitry

1. Where they are electrically connected, aerodrome ground lighting, which includes runway, taxiway, approach, visual approach slope indicator and MAGS lighting circuits must be by means of the series current system.

   Note : *Inter-leaf circuitry is recommended for aerodromes intended for precision approach operations. Guidance on this may be found in ICAO Aerodrome Design Manual Part 5.*

2. Feeder cables and series isolating transformers must be installed below ground, being:
   a. directly buried; or
   b. in pits, ducts or similar receptacles.

   Note : *Section 9.22 provides information on the use of unarmoured cables on an aerodrome.*

3. Other electrical equipment and wiring, except for a light or light fitting, must not be installed above ground level in the manoeuvring area.

9.1.7 Secondary Power Supply

1. Secondary power supply means electricity power supply that is connected to the load automatically on the failure of the primary power source. This maybe derived by either of the following:

   a. independent public power, which is a source of power supplying the aerodrome service from a substation other than the normal substation through a transmission line following a route different from the normal power supply route and such that the possibility of a simultaneous failure of the normal and independent public power supplies is extremely remote; or
   b. generators, batteries etc. from which electric power can be obtained.

2. Secondary power must be provided to at least one runway at an aerodrome intended for category I precision approach operations, which would allow the operation of the following lighting systems:

   a. approach lighting;
   b. visual approach slope indicator;
   c. runway edge;
   d. runway threshold;
   e. runway end;
   f. essential taxiway and runway guard lights;
   g. apron; and
   h. obstacles, if any, lighting of which has been determined by DGAC as essential for the safety of aircraft operations.

Note : *Not applicable in general to off-aerodrome obstacle lighting, the lighting availability status of which is subject to aerodrome operator monitoring.*

3. In addition to Paragraph 9.1.7.2 above, for an aerodrome intended for Cat II and III precision approach operations, the secondary power must be adequate for the lighting of the following:

   a. runway centreline lights;
   b. touchdown zone lights; and
   c. all stop bars.

9.1.8 Switch-over Time

The time interval between failure of the normal source of power and the complete restoration of the service following switch-over to secondary power is not to exceed, for:

a. Precision Approach Cat I visual aids – 15 seconds.

b. Precision Approach Cat II and III visual aids;
   - o essential obstacle lights - 15 seconds.
   - o essential taxiway lights - 15 seconds.
   - o all other visual aids - 1 second.

c. Runways meant for take-off in RVR conditions less than a value of 800 m;
   - o essential obstacle lights - 15 seconds.
   - o essential taxiway lights - 15 seconds.
   - o runway edge lights, where runway center line lights are provided - 15 seconds.
   - o runway edge lights, where runway center line lights are not provided - 1 second.
   - o runway end lights - 1 second.
   - o runway center line lights - 1 second.
   - o all stop bars - 1 second.

9.1.9 Standby Power Supply

Note : *Operational credit is given to a runway lighting system notified in AIP as provided with standby power or portable lighting. This is because when a flight is planned to land at night at an aerodrome with electric runway lighting, provision must be made for flight to an alternate aerodrome unless the destination aerodrome has standby power, or portable runway lights are available and arrangements have been made for a responsible person to be in attendance.*

1. For lighting to be notified in AIP as provided with standby power, the standby power supply may be either secondary power or standby generators which are manually activated.

2. Where the activation of the standby power is not automatic, procedures must be established to facilitate the introduction of standby power as soon as possible when the need arises.

Notes : *1. For non-automatic activation the actual time required for activation of standby power should be notated in AIP.*
2. The procedures should allow standby power to be provided within 15 minutes of demand.

9.1.10 Portable Lighting

1. Portable lights may comprise liquid fuel-burning flares or lamps, or battery powered electric lights.

2. When an aerodrome is notified in AIP as provided with portable lighting, the portable lights must be kept in a state of readiness and serviceable condition with clean glasses, and appropriate persons must be trained such that the lights can be deployed and put into operation without delay, when the need arises.

   Note : *Due to the time required to deploy portable lights, the AIP entry should include a notation that prior notice is required.*

3. The portable lights must be placed at the same spacing as installed lights.

   Note : *To allow speedy deployment, the locations of the portable lights should be clearly marked, and the surface appropriately treated and maintained.*

4. When required, they must be lit or switched on at least 30 minutes before the estimated time of arrival.

   Note : *The portable lights should be so deployed such that an aircraft can land into the wind.*

5. For aircraft departing, the portable lights must be lit or switched on at least 10 minutes before the time of departure and to be retained for at least 30 minutes after take off, or if air-ground communications do not exist, for at least one hour after take-off, in case the aeroplane needs to return to the aerodrome.

9.1.11 Light Fixtures and Supporting Structures

1. All aerodrome light fixtures and supporting structures must be of minimum weight while being fit for the function, and frangible.

Note : *ICAO Aerodrome Design Manual Part 4 provides guidelines on frangibility for visual aids.*

2. Supporting structures for approach lights also need to be of minimum weight and frangible, except that, in that portion of the approach lighting system beyond 300 m from the runway threshold:

   a. where the height of a supporting structure exceeds 12 m, the frangibility requirement need apply to the top 12 m only; and
   b. where a supporting structure is surrounded by non-frangible objects, only that part of the structure that extends above the surrounding objects need be frangible.

3. Where an approach light fixture or supporting structure is not in itself sufficiently conspicuous, it is to be suitably marked.

9.1.12 Elevated and Inset Lights

1. Elevated lights must be frangible and sufficiently low to preserve clearance for propellers and the engine pods of jet aircraft. In general, they should not be more than 360 mm above the ground.

2. Elevated lights, in general, are preferable to inset lights, because they provide a larger aperture from which light signals can be seen. Elevated lights must be used in all cases except:

   a. where the use of inset lights is specified in this Chapter, or
   b. where it is not practicable to use elevated lights.

   Note : *Elevated lights are not practicable on pavements where aircraft or vehicles travel or in areas subject to significant jet blast.*

3. Inset lights, also known as in-pavement lights, must not:

   a. be constructed with sharp edges;
   b. project more than 25 mm above the surrounding surface at locations where the lights will not normally come into contact with aircraft wheels, such as threshold lights, runway end lights and runway edge lights;
   c. project more than 13 mm above the surrounding surface at locations which will normally come into contact with aircraft wheels, such as runway centreline lights, touch down zone lights and taxiway centerline lights.

4. The maximum surface temperature attained by an inset light must not exceed 160°C over a period of 10 minutes, if operating at maximum intensity while covered by an aircraft wheel.

5. The standard colour of the casings of elevated light units is yellow.

9.1.13 Colour of Light Shown

1. The colour of the light shown must be in accordance with the applicable standard specified in Section 9.2.

2. To ensure uniformity of visual appearance, light fittings using different filter technology must not be mixed (e.g. dichroic filters, other absorption filters, light emitting diode (LED), etc.) in such a way as to create inconsistency in either light colour or intensity when viewed by pilots from a moving aircraft on a runway or taxiway.

9.1.14 Light intensity and Control

1. At an aerodrome with an air traffic service (ATS), the following lighting systems, if provided, must be equipped with an intensity control so that the ATS can select light output to suit ambient conditions and avoid dazzling pilots:

   a. approach lighting system;
   b. approach slope guidance system;
   c. runway edge, threshold and end lights;
   d. runway centreline lights;
   e. runway touchdown zone lights;
   f. taxiway lights.

2. Intensity must be capable of being varied in 5 or 6 stages, for the following systems:

   a. approach lighting systems
   b. visual approach slope indicator systems;
   c. high intensity runway edge, threshold and end lights;
   d. runway centreline lights;
   e. runway touchdown zone lights.

3. Intensity must be capable of being varied in at least 3 stages, for medium intensity runway edge, threshold and end lights.

4. If a runway is equipped with both high and medium intensity runway edge lighting, the 3 lowest intensity stages shall be provided by the medium intensity system.

5. For taxiway lights:

   a. Taxiway centreline lights with a main beam average intensity of the order of 50 cd or less, 3 stages of intensity control will normally be sufficient.
   b. Taxiway centreline lights with main beam average intensity of the order of 100 cd or greater will normally require more than 3 stages of intensity control, or alternatively to have the maximum light output permanently reduced by fixing the maximum intensity stage at less than 100% of the

rated output of the light. One hundred percent output of these lights has been found to be too bright for normal conditions.

c. Taxiway edge lights do not normally require separate intensity control. It is common for taxiway edge lights to be installed on the same electrical circuit as the low or medium intensity runway edge lights, and to be controlled by the runway light control.

d. Intensity must be reduced from each successive stage to an order of 25-33%. This is based on the fact that a change of that magnitude is required for the human eye to detect that a change has occurred. For 6 stages of intensities, they should be of the order of: 100%, 30%, 10%, 3%, 1% and 0.3%.

e. At an aerodrome where the lighting is provided with intensity settings but the ATS does not provide 24 hour coverage and the operator leaves the lights turned on all night, the recommended stage of intensity which provides adequate illumination but will not dazzle pilots is stage 2.

Note : *Guidance on selecting series currents for various intensity stages for some airport lighting systems is given in the Table 9.1-1 below. The guidance is only applicable to systems installed to the industry standard of 6.6 amps series current giving 100% intensity, except where noted otherwise in the Table*.

6. Where lighting systems are operated by ATS such systems shall be monitored automatically so as to provide an immediate indication of :

a. those lighting systems that are on;
b. the intensity of each lighting system;
c. any fault in a lighting system;
d. and such information is to be automatically relayed to the operator position

7. At an aerodrome with Low Intensity Runway Edge Lighting Systems, in accordance with Paragraph 9.10.1.1(a), the light fittings used must be in compliance with Paragraph 9.10.6. However, it is permissible with these systems, at commissioning, to adjust and then set the system current to a value other than the rated current value. This is to enable the actual light output of the light units to be set to a suitable light level to match the specific conditions of the particular aerodrome, to harmonise with the intensity of visual approach slope indicators if present, and minimise the likelihood of dazzling pilots. Where the system current is set to a value other than the rated current, the actual value of current set must be recorded in the Aerodrome Manual.

Lighting System	**Nominal Minimum Intensity At Rated Output**	**Stage**					
		6	**5**	**4**	**3**	**2**	**1**
Runway Edge Lights, Low Intensity	100 cd						100% 6.6 A

Runway Edge Lights, Medium Intensity	300 cd typical				100% 6.6 A	30% 5.4 A	10% 4.5 A
Runway Edge Lights, High Intensity	10,000 cd	100% 6.6 A	30% 5.4 A	10% 4.5 A			
Approach Lights	20,000 cd	100%	25%	6.5%	2%	0.5%	0.12%
o 12.5A/6.6A series isolating transformer		12.5 A	9.5 A	7.5 A	6.2 A	5.0 A	4.0 A
o 6.6A/6.6A series isolating transformer		6.6 A	5.3 A	4.3 A	3.6 A	3.2 A	3.0 A
Runway Centreline lights	5,000 cd	100% 6.6 A	25% 5.2 A	8% 4.4 A	2.5% 3.8 A	0.8% 3.3 A	0.25% 3.0 A
Runway Touchdown Zone lights	5,000 cd	100% 6.6 A	25% 5.2 A	8% 4.4 A	2.5% 3.8 A	0.8% 3.3 A	0.25% 3.0 A
Taxiway Centreline lights	50 cd				100% 6.6 A	40% 5.5 A	16% 4.8 A
PAPI	15,000 cd red light	100% 6.6 A	30% 5.5 A	10% 4.8 A	3% 3.85 A	1% 3.4 A	0.3% 3.0 A
T-VASIS	See Section 9.9 Paragraph 9.9.3.11.						

Table 9.1-1:
Guidance on selecting series line currents for various intensity stages

Notes : *1. All values are for the Industry Standard system of 6.6A series current for full rated light output, (except Approach Lights using 12.5 A/6.6 A series isolating transformers), and would not be relevant for lighting systems installed to other electrical parameters*

2. The current values are true root mean square (RMS) amperes.

3. The intensity percentages are approximate only. At the higher Stages (5 and 6) it is more important to maintain the intensity ratio to runway edge lights as given in paragraphs 9.8.1.2 and 9.11.1.4. At the lower intensity stages, as used during good visibility conditions, maintaining those intensity ratios tends to result in glare for pilots, and so lower ratios are suggested.

9.1.15 Commissioning of Lighting Systems

1. Commissioning means the formal process by which the performance of the lighting system is confirmed by DGAC, or a qualified person, as meeting the specifications. Qualified person in this case means:

   a. For ground check of compliance with electrical specifications and DGAC standards — electrical engineer or licensed electrician.

      Note : *Evidence supplied by authoritative source that the light units are in compliance with the standards is acceptable*.

   b. For flight checking of compliance with operational specifications — organisation approved by DGAC as having the competency to conduct commissioning flight checks.

2. All aerodrome lighting systems must be commissioned by ground check before they are brought into use.

3. The ground check of a visual approach slope indicator system must include verification of vertical and horizontal angles of light signal changes by a person having civil engineering or surveying qualification and experience.

4. The commissioning of the following lighting systems, in addition to the ground check, must include flight checks of:

   a. approach lighting system;
   b. runway lighting system for instrument runways;
   c. visual approach slope indicator system :
      - used by jet propelled aeroplanes engaged in air transport operations; or
      - installed on DGAC direction, in accordance with 9.9.1.1(b);

5. For a visual approach slope indicator system specified in 9.1.15.4, that is provided for temporary use only, for example due to a temporary displaced threshold, or during works in progress, the requirement for a flight check may be waived by DGAC.

6. For those systems specified in 9.1.15.4, the aerodrome operator shall as necessary forward duly certified ground check and flight check reports to DGAC. If DGAC is satisfied with the reports, DGAC will approve the issue of a permanent NOTAM. Information for a visual approach slope indicator system to be included in the permanent NOTAM includes.

   a. runway designation;
   b. type of system, and for AT-VASIS and PAPI systems, the side of runway, as seen by approaching pilot, that the aid is installed;
   c. where the axis of the system is not parallel to the runway centreline, the angle of displacement and the direction of displacement, i.e. left or right;
   d. approach slope; and
   e. minimum eye height over threshold, for the on-slope signal.

7. For those systems not specified in Paragraph 9.1.15.4, the aerodrome operator must use the duly certified ground check as sufficient evidence of compliance with standards to initiate a permanent NOTAM.

8. At any time after commissioning, DGAC may direct the ground checking and/or the flight checking of a lighting system specified in Paragraph 9.1.15.4, following substantial changes to the system, or on receipt of adverse reports on the performance of the system from pilots or aircraft operators. Examples of substantial changes to the system include :

   a. removal and replacement of 50% or more of the light fittings, at the same time, of an approach or runway lighting system;
   b. removal and replacement of one or more light units of a PAPI system;
   c. removal and replacement of two or more light units, at the same time, of an AT-VASIS system; and
   d. removal and replacement of the receiver unit from a PAL.

Note : *Before a runway is opened for night use, the status of obstacles need to be assessed for obstacle lighting purposes, particularly if the obstacles are within 3 km of the aerodrome.*

9.2 Colours for Aeronautical Ground Lights

9.2.1 General

1. The following specifications define the chromaticity limits of colours to be used for aerodrome lighting.

2. The chromaticities are expressed in terms of the standard observer and coordination system adopted by the International Commission on Illumination (CIE).

9.2.2 Chromaticities

The chromaticities of aerodrome lights must be within the following boundaries:
CIE Equation (see Figure 9.2-1).

1. Red

   a. Purple boundary y = 0.980 - x
   b. Yellow boundary y = 0.335

2. Yellow

   a. Red boundary y = 0.382
   b. White boundary y = 0.790 - 0.667x
   c. Green boundary y = x - 0.120

3. Green

   a. Yellow boundary y = 0.726 - 0.726x
   b. White boundary x = 0.650y (except for visual docking guidance systems)
   c. White boundary x = 0.625y - 0.041 (for visual docking guidance systems)
   d. Blue boundary y = 0.390 - 0.171x

4. Blue

   a. Green boundary y = 0.805x + 0.065
   b. White boundary y = 0.400 - x
   c. Purple boundary x = 0.600y + 0.133

5. White.

a. Yellow boundary x = 0.500
b. Blue boundary x = 0.285
c. Green boundary y = 0.440 and y = 0.150 + 0.640x
d. Purple boundary y = 0.050 + 0.750x and y = 0.382

6. Variable White

a. Yellow boundary x = 0.255 + 0.750y and x = 1.185 - 1.500y
b. Blue boundary x = 0.285
c. Green boundary y = 0.440 and y = 0.150 + 0.640x
d. Purple boundary y = 0.050 + 0.750x and y = 0.382

9.2.3 Discrimination Between Coloured Lights

1. If there is a requirement to discriminate yellow and white from each other, they must be displayed in close proximity of time or space as, for example, by being flashed successively from the same beacon.

2. If there is a requirement to discriminate yellow from green or white, as for example with exit taxiway centreline lights, the 'y' co-ordinate of the yellow light must not exceed a value of 0.40.

   Note : *The limits of white have been based on the assumption that they will be used in situations in which the characteristics (colour, temperature) of the light source will be substantially constant.*

3. The colour variable white is intended to be used only for lights that are to be varied in intensity, e.g. to avoid dazzling. If these lights are to be discriminated from yellow lights, the lights must be designed and operated so that:

   a. the 'x' co-ordinate of the yellow is at least 0.050 greater than the 'x' co-ordinate of the white; and

   b. the disposition of the lights is such that the yellow lights are displayed simultaneously and in close proximity to the white lights.

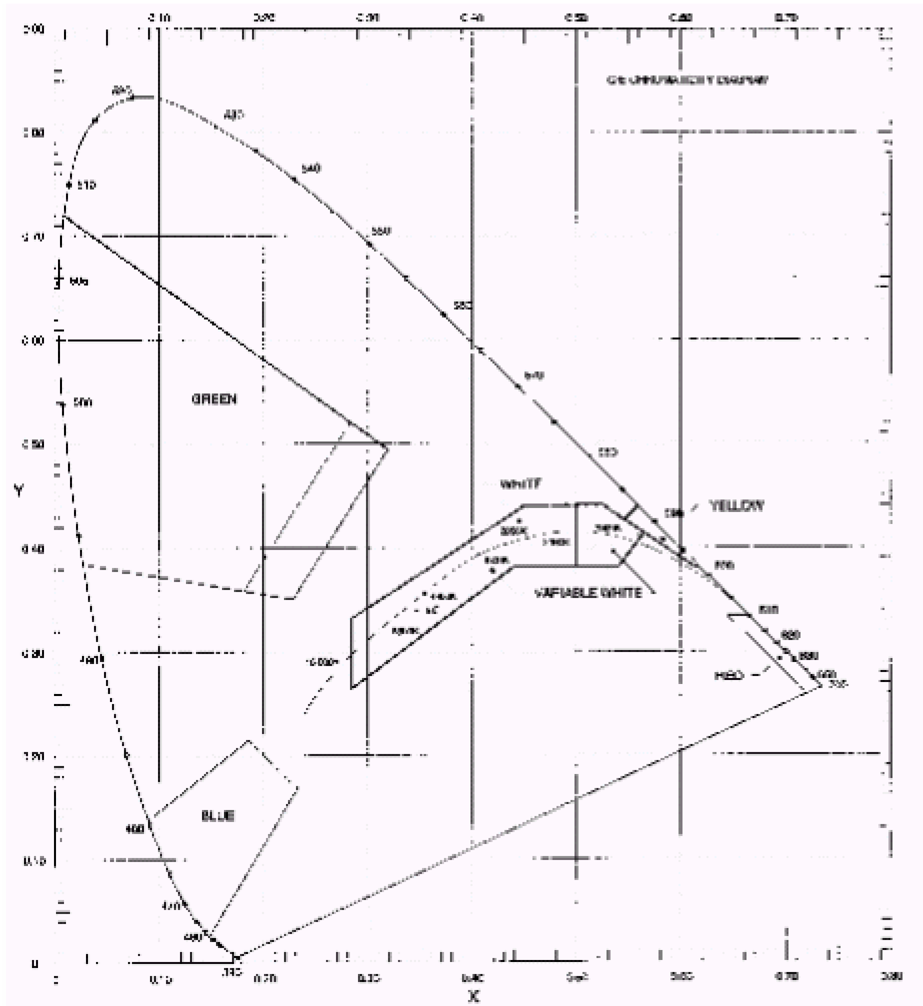


Figure 9.2-1: Colours for aeronautical ground lights

9.3 Obstacle Lighting

9.3.1 General

1. If DGAC determines that an object or a proposed object that intrudes into navigable airspace requires, or will be required to be provided with, obstacle lighting, the responsibility for the provision and maintenance of obstacle lighting on a building or structure rests with the owner of the building or structure. Within the limits of the obstacle limitation surfaces of an aerodrome, responsibility for the provision and maintenance of obstacle lighting on natural terrain or vegetation, where determined necessary for aircraft operations at the aerodrome, rests with the aerodrome operator.

2. In general, an object in the following situations would require to be provided with obstacle lighting unless DGAC, in an aeronautical study, assesses it as being shielded by another lit object or that it is of no operational significance:

   a. for a runway intended to be used at night:

      - if the object extends above the take-off climb surface within 3000 m of the inner edge of the take-off climb surface;
      - if the object extends above the approach or transitional surface within 3000 m of the inner edge of the approach surface;
      - if the object extends above the applicable inner, conical or outer horizontal surfaces;
      - if the object extends above the obstacle protection surface of the T-VASIS or PAPI installed at the aerodrome;
      - a vehicle or other mobile objects, excluding aircraft, on the movement area, except aircraft service equipment and vehicles used only on aprons;
      - obstacles in the vicinity of taxiways, apron taxiways or taxilanes, except that obstacle lights are not to be installed on elevated ground lights or signs in the movement area.

   b. outside the obstacle limitation surfaces of an aerodrome, if the object is or will be more than 110 m above ground level.

3. Owners of tall buildings or structures below the obstacle limitation surfaces, or less than 110 m above ground level, may, of their own volition, provide obstacle lighting to indicate the presence of such buildings or structures at night. To ensure consistency and avoid any confusion to pilots, the obstacle lighting provided needs to conform to the standards specified in this Chapter.

4. In circumstances where the provision of obstacle marking is impracticable, obstacle lighting may be used during the day in lieu of obstacle marking.

9.3.2 Types of Obstacle Lighting and Their Use

1. Three types of lights are used for lighting obstacles. These are low intensity, medium intensity and high intensity lights, or a combination of such lights.

2. Low intensity obstacle lights are steady red lights and are to be used on non extensive objects whose height above the surrounding ground is less than 45 m.

   Note : A group of trees or buildings is regarded as an extensive object.

3. Medium intensity obstacle lights are to be used either alone or in combination with low intensity lights, where:

a. the object is an extensive one;
b. the top of the object is 45 m or more above the surrounding ground; or
c. DGAC determines that early warning to pilots of the presence of the object is desirable.

4. There are three types of medium intensity obstacle lights:

   a. Flashing white light. Likely to be unsuitable for use in environmentally sensitive locations, and near built-up areas. May be used in lieu of obstacle markings during the day to indicate temporary obstacles in the vicinity of an aerodrome, for example construction cranes, etc. and are not to be used in other applications without specific DGAC agreement.
   b. Flashing red light, also known as a hazard beacon. Is suitable for all applications, and is extensively used to mark terrain obstacles such as high ground.
   c. Steady red light. May be used where there is opposition to the use of a flashing red light, for example in environmentally sensitive locations.

5. High intensity obstacle lights are flashing white lights used on obstacles that are in excess of 150 m in height. As high intensity obstacle lights have a significant environmental impact on people and animals, it is necessary to consult with interested parties about their use. High intensity obstacle lights may also be used during the day, in lieu of obstacle markings, on obstacles that are in excess of 150 m in height, or are difficult to be seen from the air because of their skeletal nature, such as towers with overhead wires and cables spanning across roads, valleys or waterways.

9.3.3 Location of Obstacle Lights

1. One or more obstacle lights are to be located as close as practicable to the top of the object. The top lights are to be arranged so as to at least indicate the points or edges of the object highest above the obstacle limitation surface.

2. In the case of a chimney or other structure of like function, the top lights are to be placed sufficiently below the top (nominally 1.5 m to 3 m) so as to minimise contamination by smoke, etc.

3. In the case of a tower or antenna structure to be provided with high intensity obstacle lights, and the structure has an appurtenance such as a rod or antenna extending greater than 12 m above the structure, and it is not practicable to locate the high intensity obstacle light on top of the appurtenance, the high intensity obstacle light is to be located at the highest practicable point and, if practicable, have a medium intensity obstacle light (flashing white) mounted on the top.

4. In the case of an extensive object or a group of closely spaced objects, top lights are to be displayed at least on the points or edges highest in relation to the obstacle limitation surfaces, so as to indicate the general definition and extent of the objects. If two or more edges are at the same height, the edge nearest the

runway threshold is to be lit. Where low intensity lights are used, they are to be spaced at longitudinal intervals not exceeding 45 m. Where medium intensity lights are used, they are to be spaced at longitudinal intervals not exceeding 900 m, and at least three are to be displayed on one side of the extensive obstacle to indicate a line of lights.

5. When the obstacle limitation surface concerned is sloping and the highest point above the obstacle limitation surface is not the highest point of the object, additional obstacle lights are to be placed on the highest part of the object.

6. When the top of the obstacle is more than 45 m above the level of the surrounding ground or the elevation of the tops of nearby buildings (when the obstacle is surrounded by buildings), the top lights are to be medium intensity lights. Additional low intensity lights are to be provided at lower levels to indicate the full height of the structure. These additional lights are to be spaced as equally as possible, between the top lights and ground level or the level of tops of nearby buildings, as appropriate. The spacing between the lights is not to exceed 45 m.

7. Where high intensity obstacle lights are used on an object other than a tower supporting overhead wires or cables, the spacing between the lights is not to exceed 105 m. Where the high intensity obstacle lights are used on a tower supporting wires or cables, they are to be located on three levels:

   a. at the top of the tower;
   b. at the lowest level of the catenary of the wires or cables; and
   c. at approximately midway between the two levels.

   Note : In some cases this may require the bottom and middle lights to be located off the tower.

8. The number and arrangement of lights at each level to be marked is to be such that the obstacle is indicated from every angle of azimuth. Where a light is shielded in any direction by an adjacent object, the light so shielded may be omitted but additional lights may be required in such a way so as to retain the general definition of the obstacle.
9. Illustrations of typical lighting of obstacles are shown below.

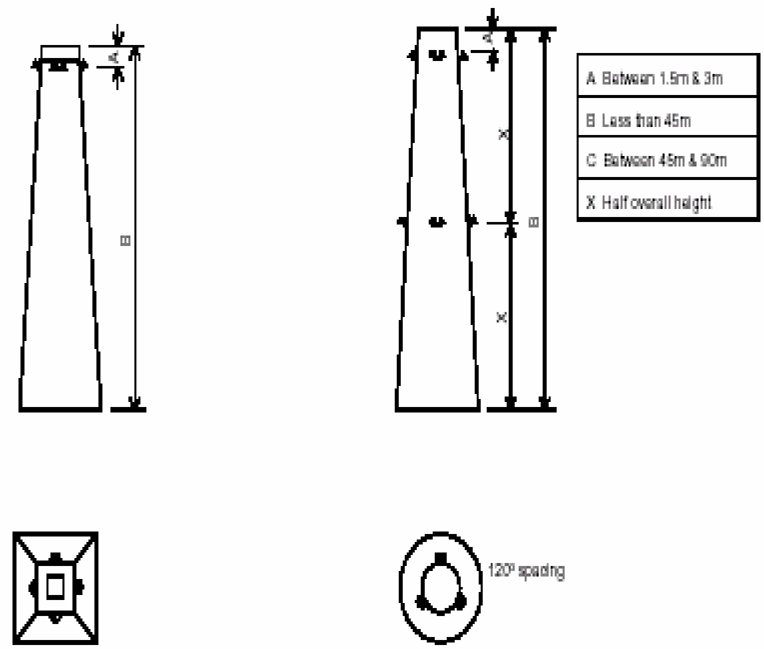


Figure 9.3-1: Typical lighting of tall obstructions

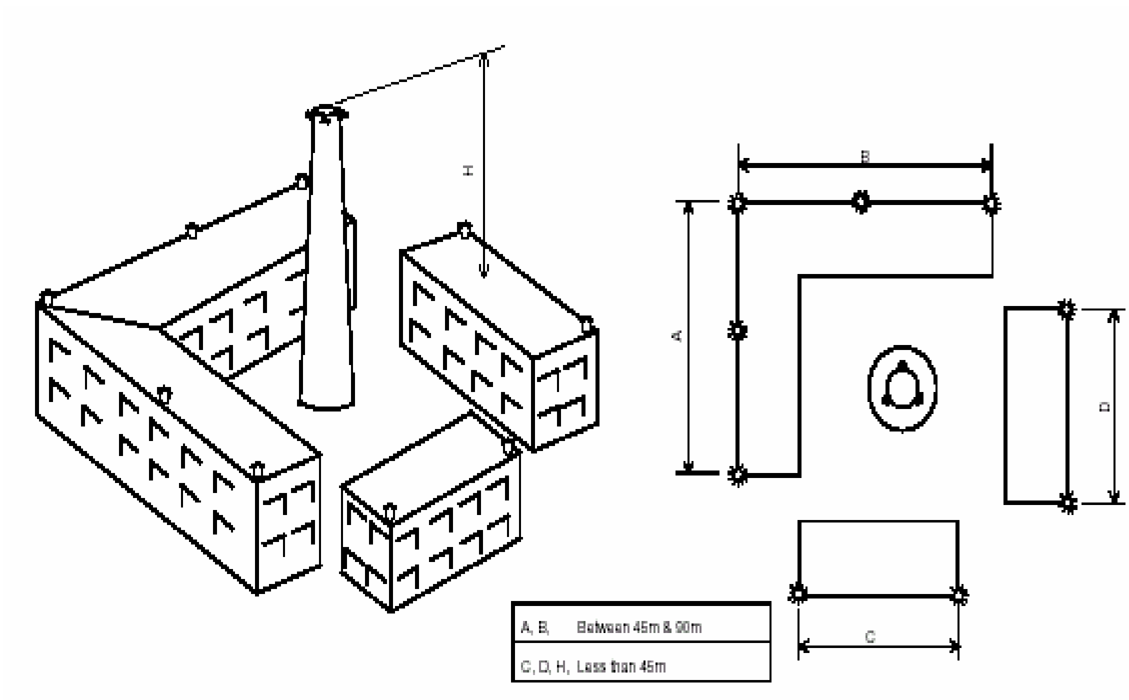


Figure 9.3-2: Typical lighting of a group of obstructions

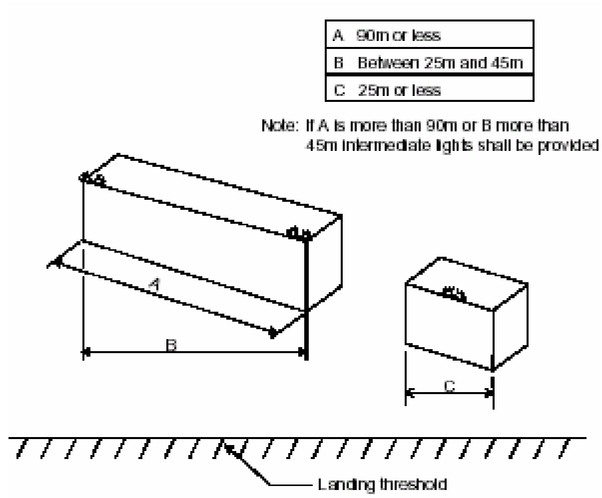


Figure 9.3-3: Typical lighting of horizontally extended obstructions

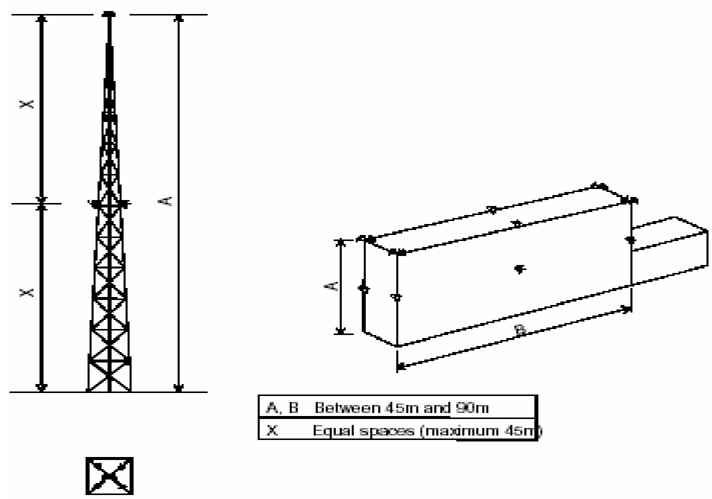


Figure 9.3-4: Typical lighting of towers and large obstructions

9.3.4 Natural Obstacles

Natural obstacles such as terrain and vegetation are normally extensive and the need for obstacle lighting will be assessed by DGAC on an individual case basis. Where required, obstacle lights are to be provided as follows:

a. if the obstacle is located within the approach area, the portion of the obstacle which is within the approach area is to be treated in the same manner as man-made obstacles for the provision of obstacle lights;
b. if the obstacle is located outside the approach area, it is to be marked by sufficient number of lights on the highest and most prominent features, so placed that the obstacle can be readily identified.

9.3.5 Temporary Obstacles

At night and in poor visibility conditions, temporary obstacles in the approach area or on the movement area are to be marked with permanent or temporary red obstacle lights. The lights are to be so arranged that they clearly mark the height, limits and extent of the obstacle.

9.3.6 Characteristics of Low Intensity Obstacle Lights

1. Low intensity obstacle lights, for general applications, are to have the following characteristics:

   a. fixed lights showing red;
   b. a horizontal beam spread that results in 360° coverage around obstacle;
   c. a peak intensity of 100 cd minimum;
   d. a vertical beam spread (to 50% of peak intensity) of 10°;
   e. a vertical distribution with 100 cd minimum at +6° and +10° above the horizontal; and
   f. not less than 10 cd at all elevation angles between –3° and +90° above the horizontal.

2. Low intensity obstacle lights, used to indicate taxiway obstacles or unserviceable areas of the movement area, are to have a peak intensity of 10 cd minimum.

9.3.7 Characteristics of Medium Intensity Obstacle Lights

1. Medium intensity obstacle lights are to be flashing or steady red lights or flashing white lights, visible in all directions in azimuth.

2. The frequency of flashes is to be between 20 and 60 flashes per minute.

3. The peak effective intensity is to be 2,000 θ25% cd with a vertical distribution as follows:

   a. vertical beam spread is to be 3πminimum (beam spread is defined as the angle between two directions in a plane for which the intensity is equal to 50% of the lower tolerance value of the peak intensity);
   b. at -1πelevation, the intensity is to be 50% minimum and 75% maximum of lower tolerance value of the peak intensity; and
   c. at 0πelevation, the intensity is to be 100% minimum of the lower tolerance value of the peak intensity.

4. Where the flashing white light is used in lieu of obstacle marking during the day to indicate temporary obstacles in the vicinity of an aerodrome, in accordance with Paragraph 9.4.2.4(a), the peak effective intensity is to be increased to 20,000 θ25% cd when the background luminance is 50 cd/m² or greater.

9.3.8 Characteristics of High Intensity Obstacle Lights

1. High intensity obstacle lights are flashing white lights.

2. The effective intensity of a high intensity obstacle light located on an object other than a tower supporting overhead wires or cables is to vary depending on background luminance as follows:

   a. 200,000 ±25% cd effective intensity at a background luminance of above 500 cd/m² (day);
   b. 20,000 ±25% cd effective intensity at a background luminance of between 50-500 cd/m² (dusk or dawn);
   c. 2,000 ±25% cd effective intensity at a background luminance of below50 cd/m² (night).

3. The effective intensity of a high intensity obstacle light located on a tower supporting overhead wires or cables is to vary depending on background luminance as follows:

   a. 100,000 ±25% cd effective intensity at a background luminance of above 500 cd/m² (day);
   b. 20,000 ±25% cd effective intensity at a background luminance of between 50-500 cd/m² (dusk or dawn);
   c. 2,000 ±25% cd effective intensity at a background luminance of below 50 cd/m² (night).

4. High intensity obstacle lights located on an object other than a tower supporting overhead wires or cables are to flash simultaneously at a rate between 40-60 flashes per minute.

5. High intensity obstacle lights located on a tower supporting overhead wires or cables are to flash sequentially; first the middle light, second the top light, and last the bottom light. Cycle frequency is to be 40 - 60 per minute and the intervals between flashes of lights are to approximate the following ratios:

Flash Interval Between:	**Ratio Of Cycle Time**
middle and top light	1/13
top and bottom light	2/13
bottom and middle light	10/13

Table 9.3-1

6. To minimise environmental impact, unless otherwise directed by DGAC, the installation setting angles for high intensity obstacle lights are to be.

Height Of Light Unit Above Terrain	**Angle Of The Peak Of The Beam Above The Horizontal**
greater than 151 m AGL	0°
122 m to 151 m AGL	1°
92 m to 122 m AGL	2°
less than 92 m AGL	3°

Table 9.3-2

9.3.9 Floodlighting of Obstacles

1. Where the installation of normal obstacle lights is deemed impracticable or undesirable for aesthetic or other reasons, floodlighting of obstacles may be an acceptable alternative. However, floodlighting is not to be used unless with the concurrence of the relevant DGAC office.

2. In general, floodlighting is not suitable if:

   a. the structure is skeletal as a substantially solid surface or cladding with satisfactory reflectance properties are required; or
   b. there is high background lighting level.

3. The floodlighting colour is to be white. Illumination of the obstacle is to cover all directions of azimuth over the full height portion of the obstacle which needs to be illuminated and is to be uniform around the circumferences of the obstacle.

4. The minimum level of luminance is to be 5 cd/m² at all points.

   Note : *Based on a reflectance factor of 50% for white paint, this would require illuminance of at least 10 lux. For concrete with typical reflectance factor of 40%, the required illuminance would be at least 12.5 lux. Materials with reflectance factors less than 30% are unlikely to be suitable for floodlighting*.

5. The light fittings are to be spaced evenly around the structure, at not more than 120° with at least two fittings at each location. At each location the fittings are to be on separate circuits and separately fused.

9.3.10 Ongoing Availability of Obstacle Lights

1. It is important that obstacle lights provided are in working condition when they are required to be on. The owners of obstacle lights needs to establish a pro-active maintenance program to minimise light outage.

2. For obstacle lights located within the obstacle limitation surface area of the aerodrome, the aerodrome operator is to establish a monitoring program, which is to include:

   a. visual observation of the obstacles lights at least once every 24 hours (see note); and
   b. where a medium or high intensity obstacle light is located such that it is not readily observable visually:

      o establish a procedure whereby such a light would be visually monitored within every 24 hour period; or
      o install an automatic visual or audio alarm indicator at an aerodrome location generally occupied by aerodrome personnel.

Note : *At smaller aerodromes with a low level of night aircraft operations, this period may be extended with the agreement of DGAC*.

3. For obstacles located within the obstacle limitation surface area of the aerodrome, in the event of an obstacle light outage, the aerodrome operator is to:

   a. notify DGAC immediately if the obstacle light has been determined by DGAC as being a requirement for aircraft operations;
   b. in any case, initiate NOTAM action to advise pilots of such light outage;
   c. liaise with the owner of the obstacle light to effect a speedy repair.

4. For obstacles located outside the obstacle limitation surface area of an aerodrome, the owners of the lights need to establish a program to monitor the lights and report light failures. The reporting point for obstacle light failure is normally DGAC or ATC When an obstacle light is unserviceable, the matter needs to be reported immediately to DGAC or ATC so that a NOTAM warning pilots of the light outage can be initiated.

9.4 Aerodrome Beacons

9.4.1 General

1. An aerodrome beacon is to be provided if it is determined by DGAC that such a visual cue is operationally necessary.

2. The following factors will be used in determining operational necessity:

   a. whether the aerodrome is intended to be used at night by aircraft navigating predominantly by visual means;
   b. the type and quantity of air traffic;
   c. the presence of other visual or radio aids;
   d. whether the location is subject to frequent periods of reduced visibility;
   e. whether it is difficult to locate the aerodrome from the air due to surrounding lights or terrain.

3. Where provided, the aerodrome beacon is to be located on or adjacent to the aerodrome in an area of low ambient background lighting. In addition, the aerodrome beacon is to be sited so that it is neither shielded by obstacles nor dazzling to a pilot making an approach to land.

4. At international aerodromes or aerodromes in built-up areas, the aerodrome beacon is to show two flashes, one white and the other coloured, so that they produce alternate white and colour flashes. For land aerodromes, the colour is to be green, for water aerodromes, the colour is to be yellow.

5. At other locations, white flashes only is satisfactory.

6. The frequency of total flashes must be from 20 to 30 per minute.

Note : *Older beacons with a frequency of flashes in the range of 12 to 20 per minute are acceptable, until the next replacement or upgrade of the beacon.*

7. The light from the beacon is to be visible from all angles of azimuth.

8. The light intensity distribution of the aerodrome beacon must be in accordance with Table 9.5-1:

Elevation Angle (Indegrees)	**Minimum Effective Intensity Of White Flashes (In Candelas)**
1 to 2	25 000
2 to 8	50 000
8 to 10	25 000
10 to 15	5 000
15 to 20	1 000

Table 9.5-1: Aerodrome beacon light intensity distribution

9. The effective intensity of colour flashes is to be not less than 0.15 times the intensity of the white flashes at the corresponding angle of elevation.

10. Where provided, information on the colour coding, flash rate and location (if not in the immediate vicinity of the aerodrome) of the aerodrome beacon is to be published in the aerodrome AIP entry.

9.5 Illuminated Wind Direction Indicator

9.5.1 General

1. At an aerodrome intended for night use, at least one wind direction indicator is to be lit.

2. If a WDI is provided in the vicinity of a runway threshold to provide surface wind information for pilots engaged in instrument straight-in approach and landing operations, and such operations are to be conducted at night, then the wind direction indicator is to be lit.

3. The illumination of a wind direction indicator is to be achieved by providing floodlighting from above by means of:

    a. four 200W 240 V tungsten filament general purpose lamps in either vertical elliptical industry reflectors, or round deep bowl reflectors, between 1.8 m and 2.2 m above the mid-height of the sleeve mounting, and between 1.7 m and 1.9 m radial distance from the axis of rotation of the wind sleeve; or

b. eight 120 W 240V PAR 38 flood lamps in reflectorless fittings, between 1.8 m and 2.2 m above the mid height of the wind sleeve mounting, and between 1.7 m and 1.9 m radial distance from the axis of the rotation of the wind sleeve; or

c. some other method of floodlighting which produces lighting equivalent to what would be provided under sub Paragraph 9.6.1.3(a) or 9.6.1.3(b), with accurate colour rendering and no perceptible warm-up or restrike delay.

4. The floodlighting is to be aimed and shielded so as to:

   a. not cause any glare or distraction to pilots; and
   b. uniformly illuminate the maximum swept area of the wind sleeve.

   Note : *A uniformity ratio in the horizontal plane through the mid height of the wind cone of not more than 4:1 (average to minimum) will be satisfactory.*

5. If only one wind direction indicator is lit at an aerodrome and there are two or more lit runways, control of the lighting of the wind direction indicator is to be incorporated in the runway lighting control for each runway, so that energising any runway lighting system will automatically energise the lighting of the wind direction indicator.

6. Where more than one wind direction indicator can be lit, control of the lighting of each wind direction indicator is to be incorporated in the runway lighting control for the operationally related runway.

7. If the electricity supply to a wind direction indicator is provided from a runway lighting circuit for which intensity control is provided, a uniform intensity is required for the wind direction indicator irrespective of the intensity setting of the runway lighting.

9.6 Approach Lighting Systems

9.6.1 Simple Approach Lighting System

A simple approach lighting system is a lighting system intended for a non-instrument or a non-precision approach runway. Standards for this system are not included in this Chapter as there is no operational credit for such systems.

Note : *Standard runway edge and threshold lights, supplemented by a visual approach slope indicator system have been found adequate for non-instrument and non-precision approach runways.*

9.6.2 Precision Approach Category I Lighting System

1. Where physically practicable, a precision approach Category I lighting system is to be provided to serve a Category I precision approach runway.

2. A precision approach Category I lighting system is to consist of a row of lights on the extended centreline of the runway extending, wherever possible, over a distance of 900 m prior to the threshold, with rows of lights forming 5 crossbars, as shown in Figure 9.6-1 below.

   Note : 1. The installation of an approach lighting system of less than 900 m in length may result in operational limitations on the use of the runway.
   2. Existing lights spaced in accordance with imperial system measurements are deemed to comply with comparable metric system measurements.

3. The lights forming the centreline are to be placed at longitudinal intervals of 30 m with the innermost light located 30 m from the threshold. Each centreline light position is to consist of a single light source in the innermost 300 m of the centreline, two light sources in the central 300 m of the centreline, and three light sources in the outer 300 m of the centreline, to provide distance information.

4. The lights forming the centreline light positions in the central 300 m and the outer 300 m of the centreline are to be spaced at 1.5 m apart.

5. The lights forming the 5 crossbars are to be placed at 150 m, 300 m, 450 m, 600 m and 750 m from the threshold. The lights forming each crossbar are to be as nearly as practicable in a horizontal straight line at right angles to, and bisected by, the line of the centreline lights. The lights of the crossbar are to be spaced so as to produce a linear effect, except that gaps may be left on each side of the centreline. The lights within each bar on either side of the centreline are to be uniformly spaced at intervals of not more than 2.7 m. The outer ends of the crossbars are to lie on two straight lines that converge to meet the runway centreline 300 m from the threshold.

6. The system is to lie as nearly as practicable in the horizontal plane passing through the threshold, provided that:

   a. no object other than an ILS antenna is to protrude through the plane of the approach lights within a distance of 60 m from the centreline of the system; and
   b. no light other than a light located within the central part of a crossbar, or a centreline light position, may be screened from an approaching aircraft.

7. Any ILS antenna protruding through the plane of the lights is to be treated as an obstacle and marked and lighted accordingly.

8. The centreline and crossbar lights of a precision approach Category I lighting system are to be fixed lights showing variable white.

9. The lights are to be in accordance with the specifications of Section 9.7, Figure 9.7-1.

9.6.3 Precision Approach Category II and III Lighting System

1. A precision approach Category II and III lighting system is to be provided to serve a Category II or III precision approach runway.

2. From paragraphs 9.7.3.8 and 9.7.3.9 below, it is implicit that where Category II and III approach lights are provided, touchdown zone lights must also be provided.

3. A precision approach Category II and III lighting system is to consist of a row of lights on the extended centreline of the runway extending, wherever possible, over a distance of 900 m from the runway threshold. In addition, the system is to have two side rows of lights, extending 270 m from the threshold, and 5 crossbars, at 150 m, 300 m, 450 m, 600 m and 750 m from the threshold, as shown in Figure 9.6-2.

   Note : *The length of 900 m is based on providing guidance for operations under Cat I, II and III conditions. Reduced lengths may support Cat II and III operations but may impose limitations on Cat I operations.*

4. The lights forming the centreline lights are to be placed at longitudinal intervals of 30 m with the innermost light located 30 m from the threshold.

5. The centreline for the first 300 m from the threshold is to consist of either:
   a. barrettes of five lights, uniformly spaced at intervals of 1 m; or
   b. single light sources where the threshold is displaced 300 m or more.

6. Beyond 300 m from the threshold, each centreline light position is to consist of two light sources in the central 300 m of the centreline and three light sources in the outer 300 m of the centreline.

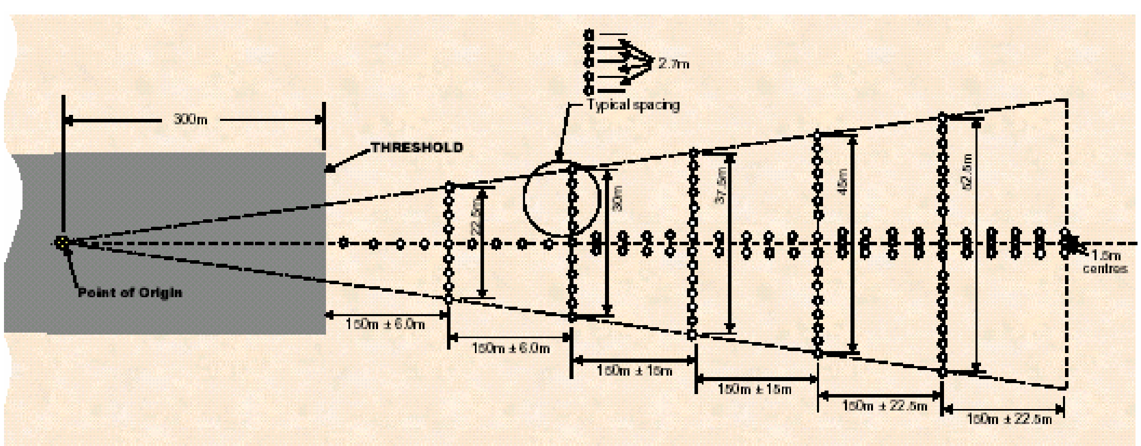


Figure 9.6-1: Illustration of a Category I approach lighting system

7. Where the centreline light position is either two or three light sources, the lights are to be spaced at 1.5 m apart.

8. The lights forming the side rows are to be placed on each side of the centreline. The rows are to be spaced at 30 m intervals, with the first row located 30 m from the threshold. The lateral spacing (or gauge) between the innermost lights of the side row is to be not less than 18 m nor more than 22.5 m, and preferably 18 m, but in any event is to be equal to that of the touchdown zone light barrettes.

9. The length of a side row barrette and the uniform spacing between its lights are to be equal to those of the touchdown zone light barrettes. (See Paragraph 9.9.25.4).

10. The crossbar provided at 150 m from the threshold is to fill in the gaps between the centreline and side row lights.

11. The crossbar provided at 300 m from the threshold is to extend on both sides of the centreline lights to a distance of 15 m from the centreline.

12. The crossbars provided at 450 m, 600 m, and 750 m from the threshold are to have the outer ends of the crossbars lie on two straight lines that converge to meet the runway centreline 300 m from the threshold. The lights are to be spaced so as to produce a linear effect, except that gaps may be left on each side of the centreline.

13. The lights forming the crossbars are to be uniformly spaced at intervals of not more than 2.7 m.

14. The system is to lie as nearly as practicable in the horizontal plane passing through the threshold, provided that:

    a. no object other than an ILS antenna is to protrude through the plane of the approach lights within a distance of 60 m from the centreline of the system; and
    b. no light other than a light located within the central part of a crossbar, or a centreline light position, may be screened from an approaching aircraft.

15. Any ILS antenna protruding through the plane of the lights is to be treated as obstacle and marked and lighted accordingly.

16. The centreline and crossbar lights of a precision approach Category II and III lighting system are to be fixed lights showing variable white.

17. The side row barrettes are to be fixed lights showing red. The intensity of the red light is to be compatible with the intensity of the white light.

18. The lights are to be in accordance with the specifications of Section 9.7, Figure 9.7-1 and Figure 9.7-2.

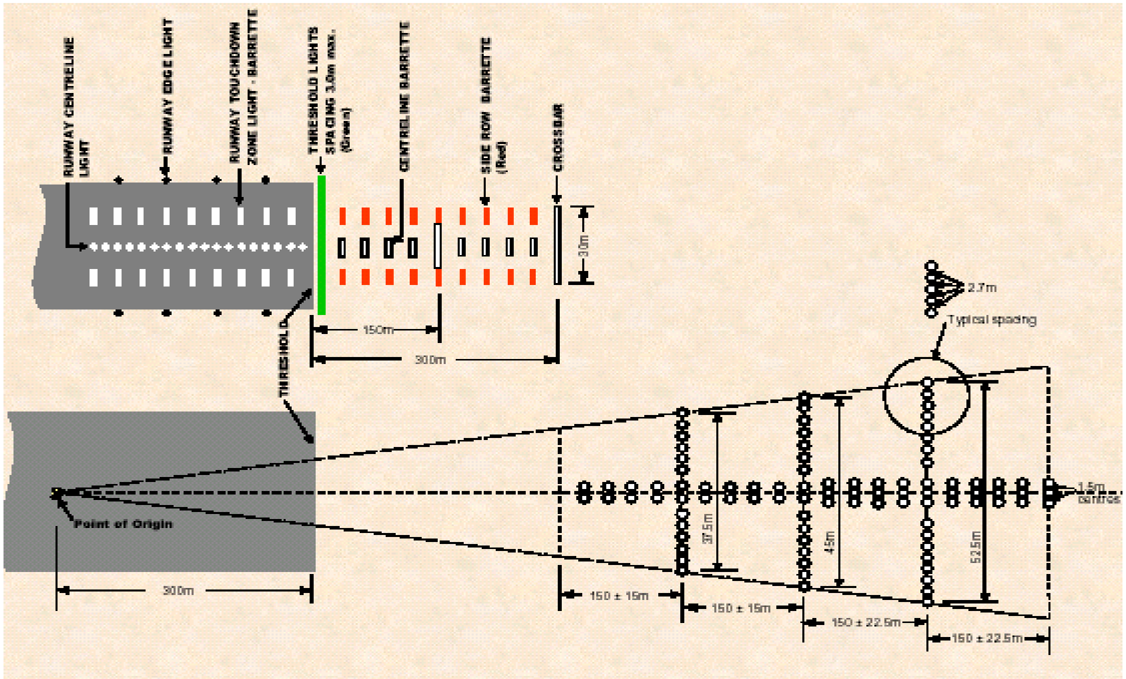


Figure 9.6-2: Illustration of category II and III approach lighting system

9.7 Isocandela Diagrams of Approach Lighting

9.7.1 Collective Notes

1. Except for Paragraph 9.11.1.4, the collective notes for Section 9.11 apply to this Section.

2. **Average intensity ratio.** The ratio between the average intensity within the ellipse defining the main beam of a typical new light and the average intensity of the main beam of a new runway edge light is to be as follows:
   a. Figure 9.8-1 Approach centreline and crossbars — 1.5 to 2.0 (white light)
   b. Figure 9.8-2 Approach side row — 0.5 to 1.0 (red light)

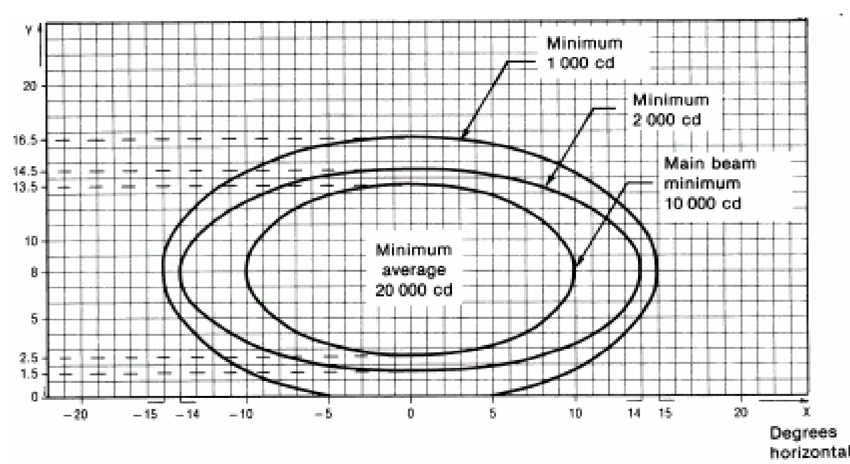


Figure 9.7-1: Isocandela diagram for approach centreline light and cross bars (white light)

Note : 1. Curves calculated on formula $\frac{x^2}{a^2}+\frac{y^2}{b^2}$ 쨀1

a	10	14	15
b	5.5	6.5	8.5

2. Vertical setting angles of the lights must be such that the following vertical coverage of the main beam will be met:

Distance From Threshold	Vertical Main Beam Coverage
Threshold to 315 m	0º – 11º
316 m to 475 m	0.5º – 11.5º
476 m to 640 m	1.5º – 12.5º
641 m and beyond	2.5º – 13.5º (as illustrated above)

3. Lights in crossbars beyond 22.5 m from the centre line must be toed-in 2 degrees. All other lights must be aligned parallel to the centre line of the runway.
4. See collective notes at Paragraph 9.8.1.

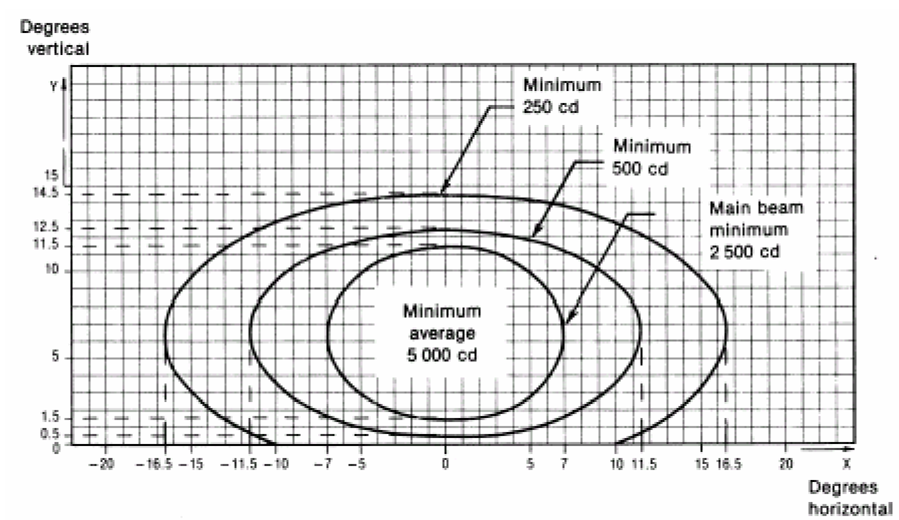


Figure 9.7-2: Isocandela Diagram for approach side row light (red light)

Note : 1. Curves calculated on formula $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

a	7.0	11.5	16.5
b	5.0	6.0	8.0

2. Toe-in 2 degrees
3. Vertical setting angles of the lights must be such that the following vertical coverage of the main beam will be met:

Distance From Threshold	Vertical Main Beam Coverage
Threshold to 115 m	0.5º – 10.5º
116 m to 215 m	1.0º – 11º
216 m and beyond	1.5º – 12.5º
641 m and beyond	21.5º – 11.5º (as illustrated above)

4. See collective notes at Paragraph 9.8.1.

9.8 Visual Approach Slope Indicator Systems

9.8.1 General

1. A visual approach slope indicator system shall be provided to serve the approach to a runway, whether or not the runway is served by electronic approach slope guidance, where one of the following applies:

   a. The runway is regularly used by jet-propelled aeroplanes engaged in air transport operations.
   b. DGAC directs that visual approach slope guidance be provided, because it has determined that such a visual aid is required for the safe operation of aircraft.

2. In making a determination that visual approach slope guidance is required, DGAC will take into account the following:

   a. The runway is frequently used by other jet-propelled aeroplanes, or other aeroplanes with similar approach guidance requirements.

   b. The pilot of any type of aeroplane may have difficulty in judging the approach due to:

      o inadequate visual guidance such as is experienced during an approach over water or featureless terrain by day or in the absence of sufficient extraneous lights in the approach area by night;
      o misleading approach information such as that produced by deceptive surrounding terrain, runway slope, or unusual combinations of runway width, length and light spacing;
      o a displaced threshold.

   c. The presence of objects in the approach area may involve serious hazard if an aeroplane descends below the normal approach path, particularly if there are no non-visual or other visual aids to give warning of such objects.

   d. Physical conditions at either end of the runway present a serious hazard in the event of an aeroplane undershooting or overrunning the runway.

   e. Terrain or prevalent meteorological conditions are such that the aeroplane may be subjected to unusual turbulence during approach.

3. DGAC may direct that a visual approach slope indicator system be provided for temporary use only, for example due to a temporary displaced threshold, or during works in progress.

4. The following visual approach slope indicator systems are approved for use in Indonesian civil aerodromes:

a. T-VASIS;
b. AT-VASIS;
c. Double sided PAPI; and
d. PAPI.

5. The standard installations must be:

   a. At international aerodromes, T-VASIS, or double sided PAPI. Where this is impracticable, an AT-VASIS or PAPI is acceptable.
   b. At aerodromes other than international aerodromes, AT-VASIS or PAPI, except where (c) below applies.
   c. At aerodromes where DGAC has determined that additional roll guidance is required, and/or high system integrity is necessary, TVASIS or double sided PAPI.
   d. AT-VASIS and PAPI must be installed on the left side of the runway, unless this is impracticable.

6. Where a T-VASIS is to be replaced by a PAPI, a double-sided PAPI must be provided.

7. Where more than one visual approach slope indicator system is provided at an aerodrome, to avoid confusion, the same type of approach slope indicator system must be used at each end of a runway. If there is more than one runway, the same type of approach slope indicator system must be used on all runways of similar reference code number.

8. Where a visual approach slope indicator system is provided for temporary use only, in accordance with 9.8.1.3, then 9.8.1.7 need not apply.

9. The choice of T-VASIS or PAPI is a matter between the aerodrome operator and airline operators using the runway. For capital city runways used by a range of medium and large jet aeroplanes, T-VASIS would be a better visual aid.

10. A visual approach slope indicator system must not be brought into service until it is appropriately commissioned and approved by DGAC.

9.8.2 Obstacle Assessment Surface

1. An obstacle assessment surface (OAS) must be surveyed and assessed for obstacles for each end of the runway where a T-VASIS, AT-VASIS or PAPI is to be provided. Standards of OAS are as follows and an OAS is illustrated below:

   a. Baseline: Width 150 m, coincident with the existing baseline for the approach surface;
   b. Slope: 1.9º;
   c. Splay: 7.5º outwards, commencing from the ends of the baseline;
   d. Length: 9 km from the baseline.

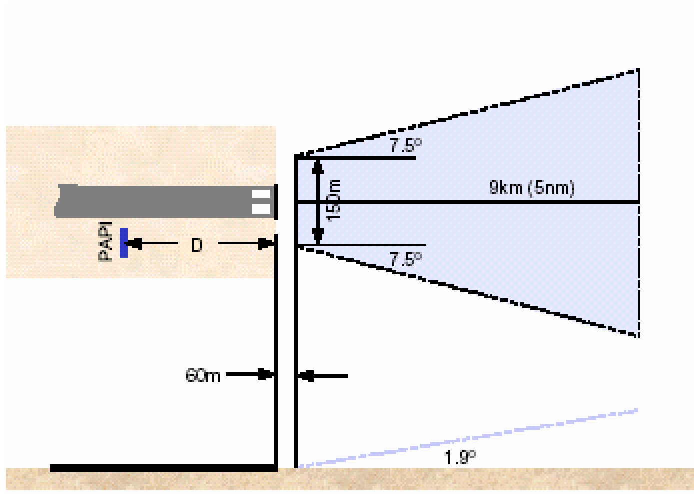


Figure 9.8-1: Illustration of an Obstacle Assessment Surface for 3° approach slope

2. The aerodrome operator must check any penetration by, or proximity to, objects such as radio masts, buildings etc. and terrain, of the Obstacle Assessment Surface as specified in Paragraph 9.8.2.1. Where one or more obstacles are found, or where high ground lies close to the approach path, DGAC must be requested to conduct an aeronautical study to determine whether the obstacle(s) or terrain could adversely affect the safety of aircraft operations.

3. Where practicable, objects above the assessment surface must be removed, except where DGAC determines that the object would not adversely affect the safety of operations.

4. If the study determines that safety could be adversely affected, and it is not practicable to remove the object, then one or more of the following measures should be undertaken:

   a. suitably raise the approach slope of the system – to a maximum of 3.3° where the runway is used by jet propelled aeroplanes, or 4° for other aeroplanes: the OAS slope can then be raised by the same amount, e.g. for a 3.3° slope the OAS can become 2.2° instead of 1.9°;
   b. reduce the azimuth spread so that the obstacle is outside the confines of the beam;
   c. displace the axis of the system and its associated OAS by up to 5°;
   d. suitably displace the threshold; and
   e. if (d) is impracticable, suitably displace the system upwind of the threshold to provide an increase in threshold crossing height equal to the height of the obstacle penetration.

9.8.3 T-VASIS and AT-VASIS

1. A T-Visual Approach Slope Indicator System (T-VASIS) is a set of lights so arranged that the pattern seen by the pilot varies according to his position (up or down, left or right) relative to the desired approach path. Where installed in the runway strip, it provides the pilot with visual cues about his or her actual descent path relative to the desired descent path.

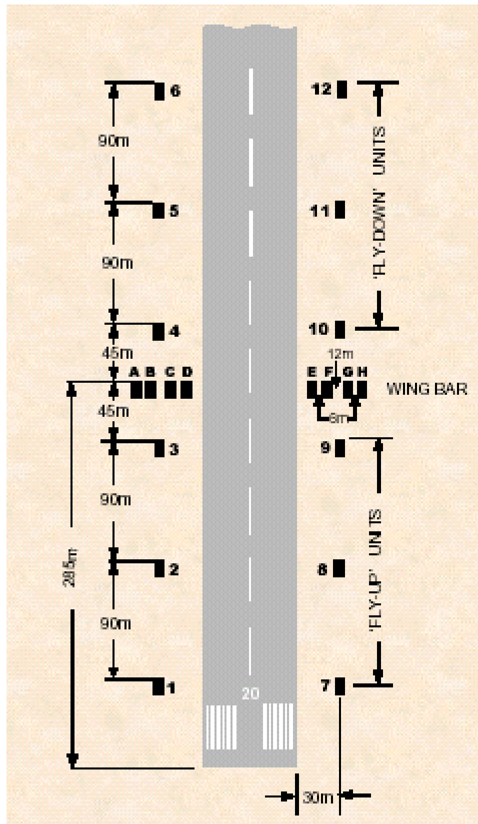


Figure 9.8-2: T-VASIS Layout

2. A T-VASIS must consist of twenty light units symmetrically disposed about the runway centreline in the form of two wing bars of four light units each, with bisecting longitudinal lines of six lights, and laid out as shown in Figure 9.8-2.

3. An AT-VASIS must consist of ten light units arranged on one side of the runway in the form of a single wing bar of four light units with a bisecting longitudinal line of six lights.

4. The light units must be constructed and arranged in such a manner that the pilot of an aeroplane during an approach will:

   a. When above the correct approach slope, see an inverted white 'T' pattern comprising the white wing bar(s) lights, and one, two or three white 'fly-down' lights, the more fly-down lights being visible, the higher the pilot is above the correct approach slope.

b. When on the correct approach slope, see a line of white wing bar(s) lights.

c. When below the correct approach slope, see a white 'T' pattern comprising the white wing bar(s) lights and one, two or three white 'flyup' lights, the more fly-up lights being visible the lower the pilot is below the correct approach slope; and when well below the correct approach slope, see a red 'T' pattern with the wing bar(s) and the three fly-up lights showing red.

5. Siting a T-VASIS or AT-VASIS.

The siting of a T-VASIS or AT-VASIS must be such that:

a. The light units must be located as shown in Figure 9.8-2, subject to the tolerances given in Table 9.8-1.

b. The light units forming the wing bars, or the light units forming a flydown or a fly-up matched pair, must be mounted so as to appear to the pilot of an approaching aeroplane to be substantially in a horizontal line. The light units must be mounted as low as possible and must befrangible.

6. Characteristics of the T-VASIS light units.

The characteristics of the TVASIS light units must be such that:

a. The system must be suitable for both day and night operations.

b. A suitable intensity control must be provided to allow adjustments to meet the prevailing conditions and to avoid dazzling the pilot during approach and landing.

c. The light distribution of the beam of each light unit must be of fan shape showing over a wide arc in azimuth in the approach direction. The wing bar light units shall produce a beam of white light from 1° 54′ vertical angle up to 6° vertical angle and a beam of red light from 0° to 1° 54′ vertical angle. The fly-down light units must produce a beam of white light extending from an elevation of 6° down to approximately the approach slope, where it must have a sharp cut-off. The fly-up light units must produce a beam of white light from approximately the approach slope down to 1° 54′ vertical angle and a beam of red light below 1° 54′ vertical angle. The angle of the top of the red beam in the wing bar units and fly-up units may be increased to provide obstacle clearance.

d. The colour transition from white to red must be so as to appear to an observer at a distance of not less than 300 m, to occur over a verticalangle of not more than 15′. Immediately below this transition sector the intensity of the completely red beam must not be less than 15% of theintensity of the completely white beam immediately above the transition sector.

e. The beam of light produced by the light units must show through an angle of at least 1° 30′ above and below the approach slope both by day and by night and in azimuth through not less than 10° by day and not less than 15° by night. The effective visual range of the light units in clear weather must be at least 7.4 km over the above angles.

Notes : 1. Past practice in Indonesia has been to increase the night azimuth to 30°.
2. Where obstacles infringe into this wider azimuth, the obstacles should be removed where practicable. Alternatively, the azimuth spread may be suitably restricted.

f. The light units must be so designed that deposits of condensation, dirt, etc. on optically transmitting or reflecting surfaces must interfere to the least possible extent with the light signals and must in no way affect the elevation of the beams or the contrast between the red and white signals. The construction of the light units must be such as to minimize the probability of the slots being wholly or partially blocked by snow or ice where these conditions are likely to be encountered

7. Approach slope and elevation settings of light beams.

The approach slope and elevation settings of light beams must be such that:

a. An approach slope that is operationally satisfactory is to be selected for each runway. The standard approach slope is 3º (1:19 nominal), and with an eye height over threshold of 15 m.

b. When the runway on which a T-VASIS is provided is equipped with an ILS, the siting and elevation of the light units must be such that the TVASIS approach slope is compatible with the ILS glide path. A T-VASIS eye-height over the threshold 1 m higher than the ILS glide path has been found to satisfy most aeroplanes.

c. The light beams from the corresponding light units on opposite sides of the runway must have the same recognition angle. The fly-up and flydown light units of the 'T' must appear with uniform steps as the approach slope changes.

d. The elevation of the beams of the wing bar light units on both sides of the runway must be the same. The elevation of the top of the beam of the fly-up light unit nearest to each wing bar, and the bottom of the beam of the fly-down light unit nearest to each wing bar, must be equal and must correspond to the approach slope. The cut-off angle of the top of the beams of successive fly-up units shall decrease by 5′(±½′) of arc in angle of elevation at each successive unit away from the wing bar. The cut-in angle of the bottom of the beam of the fly-down light units must increase by 7′(±½′) of arc at each successive unit away from the wing bar.

e. The elevation setting of the top of the red light beams of the wing bar and fly-up light units must be such that, during an approach, the pilot of an aeroplane, to whom the wing bar and three fly-up units are visible, would clear all objects in the approach area by a safe margin, if any such light did not appear red.

8. Clearance from movement areas.
Light unit must not be sited closer than 15 m from the edge of the runway. Light units should be sited at least 15 m from the edge of a taxiway but should circumstances require units to be closer than this distance the particular case should be referred to DGAC.

9. System Dimensions.

Tabulated below are system dimensions, with allowable tolerances. These values apply to design, installation and subsequent maintenance:

Item	**Standard**	**Allowable Tolerance**
Eye height over threshold	15 m 1,²	+1 m –3 m
Approach slope 3	3° (1: 19 nominal)	
Distance of longitudinal line of light units from runway edge 4	30 m	±3 m
Leg light unit spacing	45 m 90 m	±4.5 m ±9 m
Clearance from pavements	15 m 5	
Alignment of each light unit	Parallel to runway centreline	±1°
Light units in a wing bar Fronts of light units Height of light units	 Aligned Aligned	 ±25 mm ±25 mm
Levelling of light units	Level	To the accuracy of the precision engineers level. 6

1. When the runway on which a T-VASIS is provided is equipped with an ILS, the siting and elevations
2. of the TVASIS shall be such that the visual approach slope conforms as closely as possible to the Glide Path of the ILS.
3. A T-VASIS eye height over threshold 1 m higher than the ILS Glide Path satisfies most aircraft.
4. The use of a different approach slope requires prior approval from DGAC.
5. The edge of the runway is defined as the distance from the runway centreline, which is half the nominal width of the runway and ignores sealed shoulders.
6. A minimum clearance between any part of a T-VASIS light unit (but not the foundation slab) and an adjacent runway or taxiway pavement.
7. This includes end-for-ending the level to ensure no inaccuracy of the instrument.

Table 9.8-1

10. The aerodrome operator must ensure that the immediate surround of each unit is kept free of grass. Tall grass immediately in front of the light unit could provide conflicting light signals. Grass growing near to the box on any side could result in the fine settings being disturbed during power mowing operations.

11. Current settings.

The following information is provided for guidance only of aerodrome operators. For existing installations, the recommended lamp current, the approximate series current and approximate light intensities are shown in Table 9.8-2 and Table 9.8-3.

Intensity Stage	Lamp Current	Series Circuit Current	Light Unit Intensity
6	6.2 amps	6.2 amps	80,000 cd
5	5.0 amps	5.0 amps	20,000 cd
4	4.0 amps	4.0 amps	5,000 cd
3	2.4 amps	6.1 amps	450 cd
2	2.05 amps	5.2 amps	140 cd
1	1.65 amps	4.2 amps	50 cd
Note : For intensity stage 6, experiments have shown that lamp current down to 6.05 amps did not adversely affect visual acquisition from the 4 NM range in bright sunlight conditions. Hence if preservation of lamp life is desired, reduction of lamp current for stage 6 down to 6.05 amps is acceptable.			

Table 9.8-2: Using 021027.8 (V1/418) Day Lamps and 020946-1 (V1/312) Night Lamps

Intensity stage	Lamp Current	Series Circuit Current	Light Unit Intensity
6	6.85 amps	5.4 amps	80,000 cd
5	5.65 amps	4.5 amps	20,000 cd
4	4.8 amps	3.8 amps	5,000 cd
3	2.4 amps	6.1 amps	450 cd
2	2.05 amps	5.2 amps	140 cd
1	1.65 amps	4.2 amps	50 cd
Note : For intensity stage 6, experiments have shown that lamp current down to 6.35 amps did not adversely affect visual acquisition from the 4 NM range in bright sunlight conditions. Hence if preservation of lamp life is desired, reduction of lamp current for stage 6 down to 6.35 amps is acceptable.			

Table 9.8-3: Using 020975.2 (V1/353) Day Lamps (with 074315.4 (Y9/1846) transformer) and 020946-1 (V1/312) Night Lamps

9.8.4 Precision Approach Path Indicator (PAPI) system

1. The PAPI system must consist of a row, also termed 'wing bar', of 4 equally spaced sharp transition multi-lamp (or paired single lamp) units. The system must be located on the left side of the runway, as viewed by an aircraft approaching to land, unless it is impracticable to do so.

2. The PAPI system must be sited and adjusted so that a pilot making an approach will:

   a. when on or close to the approach slope, see the two units nearest the runway as red and the two units farthest from the runway as white;

b. when above the approach slope, see the one unit nearest the runway as red and the three units farthest from the runway as white; and when further above the approach slope, see all the units as white;
c. when below the approach slope, see the three units nearest the runway as red and the unit farthest from the runway as white; and when further below the approach slope, see all the units as red.

3. Where it is impracticable to install the PAPI on the left side of the runway, and it has been installed on the right, the usual order of the light units must be reversed, so that the on-slope indication is still given by the two units nearest the runway showing red.

4. Where a double-sided PAPI is provided, indications seen by the pilot must be symmetrical.

5. Siting a PAPI. The following requirements are applicable to the siting of a PAPI:

a. The light units must be located as in the basic configuration illustrated in Figure 9.8-3, subject to the installation tolerances given therein.
b. The light units forming a wing bar must be mounted so as to appear to a pilot of an approaching aeroplane to be substantially in a horizontal line. The light units must be mounted as low as possible and must be frangible.

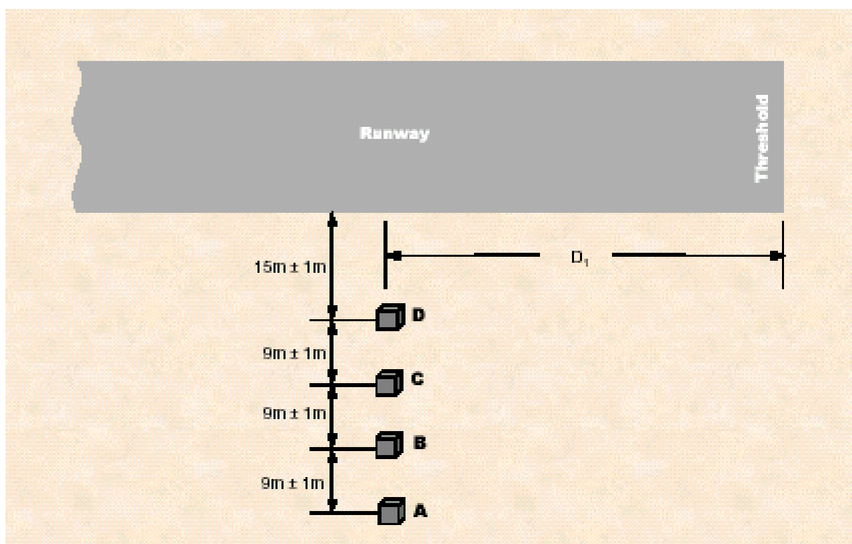


Figure 9.8-3: Siting of PAPI Light Units

Notes : 1. The edge of the runway is defined as the distance from the runway centreline, which is half the nominal width of the runway and ignores sealed shoulders.
2. In the case of runways where the row of edge lights is located beyond the standard 3 m specified in 9.10.5.1, for example those runways in accordance with the Note following 9.10.5.1, or those in accordance with 9.10.5.2, the PAPI should be located with the inner light unit 13 ±1 m from the line of the edge lights, rather

than 15±1 m from the runway edge. (The reason for this is because reducing the spacing between PAPI in usable range of the system.) In the case of the Note following 9.10.5.1, when the runway edge lights are relocated to the standard location, the PAPI should also be relocated to the standard location.

6. Characteristics of the PAPI light units.

The characteristics of the PAPI light units must be such that :

a. The system must be suitable for both day and night operations.
b. The colour transition from red to white in the vertical plane must be such that as to appear to an observer, at a distance of not less than 300 m, to occur within a vertical angle of not more than 3'.
c. At full intensity the red light must have a Y co-ordinate not exceeding 0.320.
d. The light intensity distribution of the light units must be as shown in Figure 9.8-4.
e. Suitable intensity control must be provided to allow adjustment to meet the prevailing conditions and to avoid dazzling the pilot during approach and landing.
f. Each light unit must be capable of adjustment in elevation so that the lower limit of the white part of the beam may be fixed at any desired angle of elevation between 1°30' and at least 4°30' above the horizontal.
g. The light units must be so designed that deposits of condensation, snow, ice, dirt, etc., on optical transmitting or reflecting surfaces must interfere to the least possible extent with the light signals and must not affect the contrast between the red and white signals and the elevation of the transition sector.

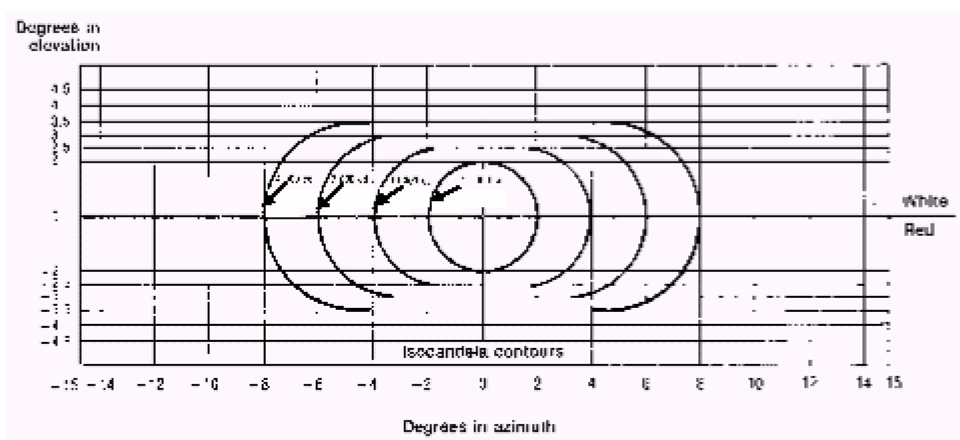


Figure 9.8-4: Light intensity distribution of PAPI

Note : 1. These curves are for minimum intensities in red light.
2. The intensity value in the white sector of the beam is no less than 2 and may be as high as 6.5 times the corresponding intensity in the red sector.

7. Approach slope and elevation setting of light units. The requirements for the approach slope and elevation setting of light units are:

   a. The approach slope, as defined in Figure 9.8-5, must be appropriate for use by the aeroplanes using the approach. The standard approach slope is 3°.
   b. When the runway on which a PAPI is provided is equipped with an ILS, the siting and elevation of the light units must be such that the PAPI approach slope conforms as closely as possible with the ILS glide path.
   c. The angle of elevation settings of the light units in a PAPI wing bar must be such that, during an approach, the pilot of an aeroplane observing a signal of one white and three reds will clear all objects in the approach area by a safe margin. See 9.8.2.4(a) concerning the raising of the approach slope.
   d. The azimuth spread of the light beam must be suitably restricted where an object located outside the obstacle assessment surface of the PAPI system, but within the lateral limits of its light beam, is found to extend above the plane of the obstacle assessment surface and an aeronautical study indicates that the object could adversely affect the safety of operations. The extent of the restriction must be such that the object remains outside the confines of the light beam.
   e. Where a double-sided PAPI is provided, corresponding units must be seen at the same angle so that the signals of each wing bar change symmetrically at the same time.

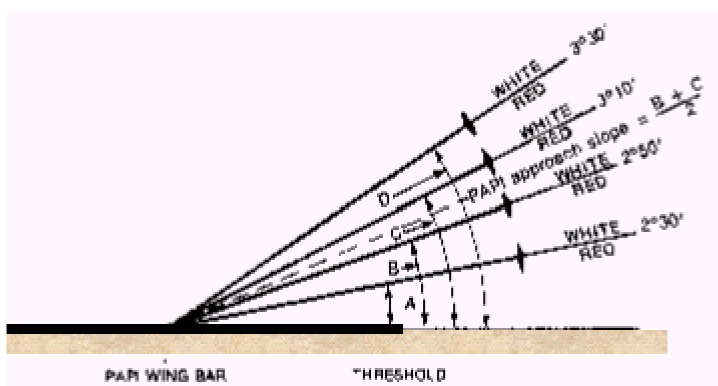


Figure 9.8-5: Light beams and angle of elevation setting for PAPI 3° approach slope

8. Determining PAPI wing bar distance from threshold
   a. The optimum distance of PAPI wing bar from the runway threshold is determined by:
      - the requirement to provide adequate wheel clearance over the threshold for all types of aircraft landing on the runway;
      - the operational desirability that PAPI is compatible with any nonvisual glide path down to the minimum possible range and height; and

- any difference in elevation between the PAPI units and the runway threshold.

b. The distance of the PAPI units from the threshold may have to be modified from the optimum after consideration of:
   - the remaining length of runway available for stopping the aircraft; and
   - obstacle clearance.

c. Table 9.8-4 specifies the standard wheel clearance over the threshold for the most demanding amongst the aircraft regularly using the runway, for four aircraft eye-to-wheel height groups. Where practicable, the standard wheel clearance shown in column (2) must be provided.

d. Where the landing run may be limited, especially at smaller aerodromes, a reduction in wheel clearance over the threshold may be more acceptable than a loss of landing distance. The special minimum wheel clearance shown in column (3) may be used in such a situation, if an aeronautical study indicates such reduced clearances to be acceptable. As guidance, these wheel clearances are unlikely to be acceptable where there are objects under the approach near the threshold, such as approach light supporting structures, boundary fences, roads, etc.

e. The final location of the units is determined by the relationship between the approach angle, the difference in levels between threshold and the units, and the minimum eye height over the threshold (MEHT). The angle M used to establish the MEHT is 2′ of arc less than the setting angle of the unit which defines the lower boundary of the on-slope indication, i.e. unit B, the third unit from the runway. See Figure 9.8-6.

f. Where a PAPI is installed on a runway not equipped with an ILS, the distance D1 shall be calculated to ensure that the lowest height at which a pilot will see a correct approach path indication provides the wheel clearance over the threshold specified in Table 9.8-4 for the most demanding amongst aeroplanes regularly using the runway.

g. Where a PAPI is installed on a runway equipped with an ILS, the distance D1 shall be calculated to provide the optimum compatibility between the visual and non-visual aids for the range of eye-to-antenna heights of the aeroplanes regularly using the runway.

h. If a wheel clearance greater than that that specified in 9.8.4.8(f) is required for specific aircraft, this can be achieved by increasing D1.

i. Distance D1 shall be adjusted to compensate for differences in elevation between the lens centres of the light units and the threshold.

j. PAPI units must be the minimum practicable height above ground, and not normally more than 0.9 m. All units of a wing bar should ideally lie in the same horizontal plane; however, to allow for any transverse slope, small height differences of no more than 50 mm between light units are acceptable. A lateral gradient not greater than 1.25% can be accepted provided it is uniformly applied across the units.

Eye-To-Wheel Height Of Aeroplane In The Approach Configuration A	Standard Wheel Clearance (Metres) B	Special Minimum Wheel Clearance (Metres) C, D
Up to but not including 3 m	6	3
3 m up to but not including 5 m	9	4
5 m up to but not including 8 m	9	5
8 m up to but not including 14 m	9	6

a. a In selecting the eye-to-wheel height group, only aeroplanes meant to use the system on a regular basis shall be considered. The most demanding amongst such aeroplanes shall determine the eye-to-wheel height group.

b. b Where practicable, the standard wheel clearance shown in column (2) shall be provided.

c. c The wheel clearance may be reduced to not less than those in column (3) with specific agreement of DGAC, where an aeronautical study indicates that such reduced wheel clearances are acceptable.

d. d Where the Special Minimum wheel clearance is provided at a displaced threshold it shall be ensured that the corresponding Standard wheel clearance specified in column (2) will be available when an aeroplane at the top end of the eye-to-wheel height group chosen overflies the extremity of the runway.

Table 9.8-4: Wheel clearance over threshold for PAPI

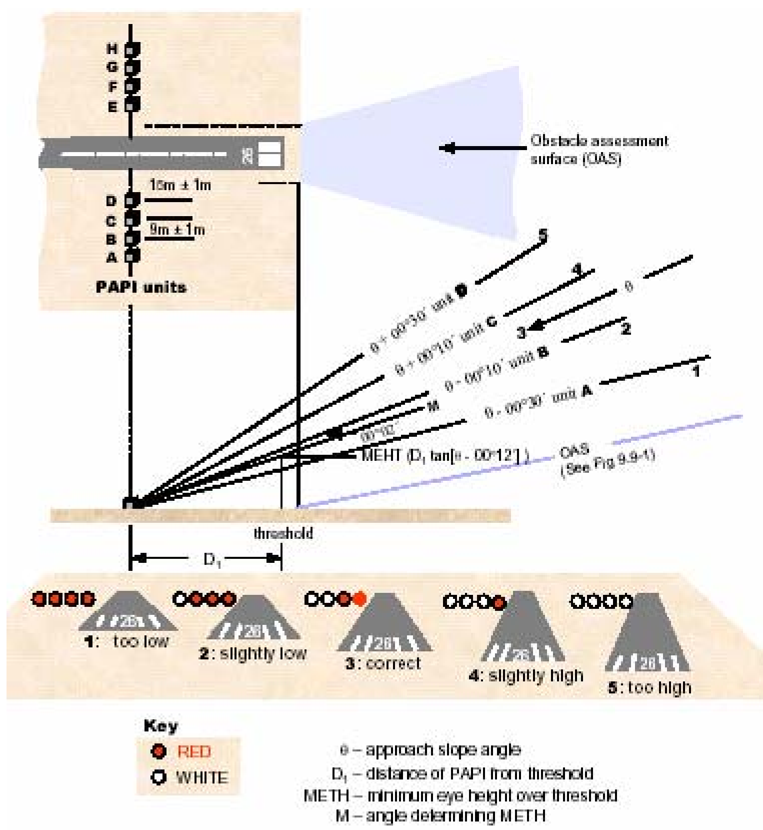


Figure 9.8-6: The arrangement of a PAPI system and the resulting display

9. Procedure for Establishing the Distance of the PAPI Wing Bar from the Runway Threshold

   a. Decide on the required approach slope. The standard approach slope is 3°.

   b. On runways where no ILS is installed, refer to Table 9.8-4 to determine the aeroplane eye-to-wheel group and the wheel clearance to be provided at the threshold. The MEHT, which provides the appropriate wheel clearance over the threshold, is established by adding the approach configuration eye-to-wheel height of the most demanding amongst the aircraft regularly using the runway to the required threshold wheel clearance.

   c. The calculation of the nominal position of the PAPI is made on the assumption that the PAPI units are at the same level as the runway centreline adjacent to them, and this level, in turn, is the same as that of the runway threshold. The nominal distance of the PAPI is derived by multiplying the required MEHT by the cotangent of the angle M in Figure 9.8-6.

   d. Where there is a difference in excess of 0.3 m between the elevation of the runway threshold and the elevation of unit B at the nominal distance from the threshold, it will be necessary to displace the PAPI from its nominal position. The distance will be increased if the proposed site is lower than the threshold and will be decreased if it is higher. The required displacement is determined by multiplying the difference in level by the cotangent of the angle M.

   e. Where a PAPI is installed on a runway equipped with an ILS, the distance D1 must be equal to that between the threshold and the effective origin of the ILS glide path, plus a correction factor for the variation of eye-to-antenna heights of the aeroplanes concerned. The correction factor is obtained by multiplying the average eye-to-antenna height of those aeroplanes by the cotangent of the approach angle. The PAPI is then aimed at the same angle as the ILS glide slope. Harmonization of the PAPI signal and the ILS glide path to a point closer to the threshold may be achieved by increasing the width of the PAPI on-course sector from 20' to 30'. However, the distance D1 must be such that in no case will the wheel clearance over the threshold be lower than specified in column (3) of Table 9.8-4.

9.9 Runway Lighting

9.9.1 Types of Runway Edge Lighting Systems

A runway edge lighting system may be of the following type:

a. low intensity – a single intensity lighting system suitable for a noninstrument runway or a non-precision approach runway. This is provided at an aerodrome where there is no appropriate person, suchas an air traffic controller, certified air/ground radio operator, or similar, to adjust the intensity settings of the lights;

b. medium intensity – a 3-stage intensity lighting system suitable for a non-instrument runway or a non-precision approach runway. This is provided to enhance the lighting system particularly in marginal weather conditions. This system cannot be used at an aerodrome that does not have air traffic services or similar personnel.

Note : *This requirement is for controlling light intensity during the landing phase. This section is not to be confused with lighting systems controlled by a photo-electric cell which can provide Day, Twilight and Night intensity settings based on ambient conditions*.

c. high intensity – a 5 or 6 stage intensity lighting system which is suitable for precision approach runways. This system cannot be used at an aerodrome that does not have air traffic services or similar personnel.

9.9.2 Runway Edge Lights

1. Runway edge lights must be provided for a runway intended for use at night or for a precision approach runway intended for use by day or night.

2. Runway edge lighting must meet the following operational requirements:

   a. for every runway intended for use at night, omnidirectional lights meeting the characteristics requirements of 9.9.6 shall be provided to cater for both visual circling after an instrument approach to circling minima, and circuits in VMC;

   b. for a precision approach runway, in addition to (a) above, unidirectional lights meeting the characteristics requirements of 9.9.7, and 9.9.8, if applicable, shall also be provided.

   Note : *Successful past practice has been for separate light fittings, one to satisfy the omnidirectional characteristic, and another to satisfy the unidirectional characteristic, to be provided.*

9.9.3 Location of Runway Edge Lights

Runway edge lights must be placed along both sides of the runway, in two parallel straight rows equidistant from the centreline of the runway, commencing one-light spacing from the threshold and continuing to one-light spacing from the runway end.

9.9.4 Longitudinal Spacing of Runway Edge Lights

1. The longitudinal spacing of runway edge lights must be uniform and be:

   a. for an instrument runway, 60 m +0 / -5 m;
   b. for a non-instrument runway, 90 m ± 10 m, or 60 m +0 / -5 m if there is an intention to upgrade the runway to an instrument runway at some time in the future.
   c. for non-precision instrument runways intended to be used in visibility conditions of 1.5 km or greater, where existing edge lights are spaced at 90 m ±10 m, it is acceptable to retain this spacing until the next replacement or improvement of the edge lighting system. (This situation typically arises from an existing non-instrument runway being upgraded to a non-precision instrument runway, but without re-installing the runway edge lights to the 60 m +0 / -5 m standard.)

   Note :
   1. With GPS technology, virtually any runway can become an instrument runway. Accordingly, it is recommended that any new runway edge lights should be spaced in accordance with Paragraph 9.9.4.1(a)
   2. Existing lights spaced in accordance with previous standards of 200 ft or 300 ft imperial measurements may exceed 60 m or 100 m respectively. They are deemed to comply with the standards of this Paragraph, until the next replacement or upgrade of the edge lighting system.

2. Where the runway is a non-instrument or a non-precision instrument runway, and it is intersected by other runways or taxiways:
   a. within 600 m of the threshold, lights may be spaced irregularly, but not omitted, and
   b. more than 600 m from the threshold, lights may be spaced irregularly or omitted, but no two consecutive lights may be omitted; provided that such irregular spacing or omission does not significantly alter the visual guidance available to a pilot using the runway.
   c. Runway edge lights must not to be omitted on a precision approach runway.
   d. Where a runway edge light cannot be omitted, inset runway edge lights must be provided in place of elevated lights.
   e. Unless a light is omitted or displaced in accordance with Paragraph 9.9.4.2, a runway edge light must be aligned with a light on the opposite side of the runway.

9.9.5 Lateral Spacing of Runway Edge Lights

1. Subject to Paragraph 9.9.5.2, runway edge lights must be placed along the edges of the area declared for use as the runway or outside the edges of the area at a distance of not more than 3 m.

   Note : *Existing edge lights located beyond 3 m from the edge of runway as a result of a reduction in the declared runway width do not need to be relocated until they are being replaced*.

2. If the width of a runway is less than 30 m in width, the runway edge lights must be placed as if the runway is 30 m in width, and in accordance with Paragraph 9.9.5.1.

3. If a runway is provided with both low or medium intensity and high intensity runway light units, the row of high intensity light units shall be placed closer to the runway centreline. The two rows of light units are to be parallel, separated by a distance of at least 0.5 m.

9.9.6 Characteristics of Low and Medium Intensity Runway Edge Lights

1. Low intensity and medium intensity runway edge lights must be fixed omni-directional lights that show variable white. Elevated omni-directional lights must have light distribution that is uniform for the full 360° horizontal coverage. Where elevated lights are impracticable and inset lights are used, the photometric characteristics of the inset lights are to be as close as practicable to those of the elevated lights.

2. The minimum light intensity for low intensity runway edge lights is to be in accordance with Section 9.11, Figure 9.11-1. The main beam, between 0º and 7º above the horizontal, is to have a minimum average intensity of not less than 100 cd, and a maximum average intensity of not more than 200 cd.

3. Low intensity runway edge lights are to have a single intensity for all lights in the same runway lighting system.

4. The minimum light intensity for medium intensity runway edge lights is to be in accordance with Section 9.11, Figure 9.11-2. The main beam, between 0º and 7º above the horizontal, is to have a minimum average intensity of not less than 200 cd, and a maximum average intensity of not more than 600 cd.

9.9.7 Characteristics of High Intensity Runway Edge Lights

1. High intensity runway edge lights must be fixed unidirectional lights with the main beam directed towards the threshold.

2. High intensity runway edge light beam coverage shall be toed in towards the runway as follows:

a. 3.5° in the case of a 30-45 m wide runway;
b. 4.5° in the case of a 60 m wide runway.

3. High intensity runway edge lights must show variable white except for those located within 600 m from the runway end which must show yellow.

4. The minimum light intensity for high intensity runway edge lights that show variable white is to be in accordance with Section 9.11
   a. Figure 9.11-3 for 30 m to 45 m wide runways; and
   b. Figure 9.11-4 for 60 m wide runways.

5. The minimum light intensity for high intensity runway edge lights that show yellow is the standard set out in Figure 9.11-3 or Figure 9.11-4, whichever is applicable, multiplied by 0.4.

9.9.8 Use of Bidirectional or Back-to-back Light Fittings

On a runway where high intensity edge lights are intended to be used from either direction, separate high intensity runway edge light fittings may be provided back-to-back, or bi-directional light fittings with the correct toe-in angle built in, may be used.

9.9.9 Runway Threshold Lights

Runway threshold lights must be provided on a runway that is equipped with runway edge lights.

9.9.10 Location of Runway Threshold Lights

Runway threshold lights must be located in a straight line at right angles to the centreline of the runway and :

a. when the threshold is at the extremity of a runway – as near to the extremity as possible and not more than 3 m outside, or 1 m inside of the extremity; or
b. when the threshold is a displaced threshold – at the displaced threshold with a tolerance of ± 1 m.

9.9.11 Pattern of Low Intensity and Medium Intensity Runway Threshold Lights

1. Low and medium intensity runway threshold lights are to consist of:
   a. 2 omnidirectional lights, one at each end of the threshold and in line with the runway edge lights; and
   b. 6 unidirectional lights at equal intervals between the 2 omnidirectional lights.

2. The 6 unidirectional lights are to be inset lights if:
   a. the threshold is a permanently displaced threshold; or
   b. the threshold is also equipped with high intensity threshold lights; or
   c. it is impractical for elevated lights to be installed.

3. Aerodromes used predominantly for training and general aviation, may choose to use an alternative pattern of low intensity or medium intensity runway threshold lights.

4. The alternative pattern is not suitable for aerodromes used predominantly by aircraft having a take-off weight greater than 5,700 kg, nor is it suitable for aerodromes where commercial air transport jet propelled aeroplanes operate.

5. The alternative pattern consists of:
   a. 6 elevated lights arranged in 2 groups of 3 equally spaced lights, with the distance between the 2 groups equal to half the lateral distance between the 2 rows of runway edge lights; and.
   b. The outer lights on either side shall be omnidirectional green lights, and the inner 4 lights shall be unidirectional green lights (or bi-directional green/red lights when the same light fittings are used for runway end lights).

9.9.12 Pattern of High Intensity Runway Threshold Lights

High intensity runway threshold lights must consist of:

a. 2 unidirectional lights, one at each end of the threshold and in line with the row of runway edge lights; and
b. unidirectional lights uniformly spaced between the 2 outer lights, at intervals of not more than 3 m. These lights must be inset lights.

9.9.13 Characteristics of Low Intensity and Medium Intensity Runway Threshold Lights

Low intensity and medium intensity runway threshold lights must have the following characteristics:

a. the outermost light on each side must be a fixed omnidirectional light showing green;
b. the inner lights must be fixed unidirectional lights showing green in the direction of approach over not less than 38° or more than 180° of azimuth;
c. the light distribution in the direction of approach must be as close as practicable to that of the runway edge lights;
d. the intensity of the green lights must be in the range of 1 to 1.5 times the intensity of the runway edge lights.

Note : *Older installations with the intensity of green light in the range of 0.5 to 1 times the intensity of the runway edge lights are acceptable, until the next replacement or upgrade of the runway and/or threshold lighting system*.

9.9.14 Characteristics of High Intensity Runway Threshold Lights

High intensity runway threshold lights must be fixed lights showing green in the direction of approach with a minimum light intensity in accordance with Section 9.11, Figure 9.11-5.

9.9.15 Additional Lighting to Enhance Threshold Location

1. Threshold Wing Bars:

   a. On a precision approach runway, if it is operationally required that an increase in the conspicuity of the threshold at night be provided, the threshold may be provided with threshold wing bars.

   b. Where provided, threshold wing bars must be symmetrically disposed on either side of the threshold:
      - each wing bar is to consist of 5 lights at 2.5 m apart;
      - at right angles to the runway centreline; and
      - with the inner most light of each wing bar aligned with the row of runway edge lights on that side of the threshold.

2. Characteristics of Threshold Wing Bars:

   a. Threshold wing bars must have the following characteristics:
      - be fixed unidirectional lights showing green in the direction of approach; and
      - the minimum light intensity is to be in accordance with Section 9.11, Figure 9.11-6.

   b. If it is impracticable to use elevated lights, inset lights may be used, however, inset and elevated lights must not be used in the same threshold wing bar.

3. Runway Threshold Identification Lights:

   a. At an aerodrome where it is difficult to locate a runway threshold from the air during the day such as in the case of a displaced threshold or an aerodrome with complex runway/taxiway layout in the vicinity of the threshold, runway threshold identification lights may be required.

      Note : *Runway threshold identification lights may also assist pilot acquisition of a threshold during twilight hours and at night. During these periods the lights need to be controlled such that an approaching pilot will not be dazzled by the flashing lights.*

   b. Runway threshold identification lights must be provided, during the day, to mark a temporarily displaced threshold of a runway serving international jet propelled aeroplanes conducting air transport operations.

      Note : *Runway threshold identification lights may also be used to mark the temporarily displaced thresholds of other runways. When used, the need for temporarily displaced threshold V-bar markings is normally waived.*

4. Location of runway threshold identification lights.

   Because of their nature and use, runway threshold identification lights can have more flexibility in their installation location than other visual aids. Advantage can be taken of this particularly when they are provided on temporary displaced thresholds, to site them clear of existing facilities, and works areas.

5. Where provided, one light unit shall be on each side of the runway, equidistant from the runway centreline, on a line perpendicular to the runway centreline. The optimum location of the light units shall be 12 to 15 m outside each line of runway edge lights, and in line with the threshold. The light units may be located laterally up to 20 m from the line of runway edge lights and longitudinally up to 12 m prior to the threshold. Each light unit shall be a minimum of 12 m from the edge of taxiways and runways. The elevation of both light units shall be within 1 m of a horizontal plane through the runway centreline, with the maximum height above ground not exceeding 1 m.

6. Characteristics of runway threshold identification lights.

   Runway threshold identification lights must have the following characteristics :

   a. be flashing lights;
   b. the light flashes are synchronised with a normal flash rate of 100-120 per minute;
   c. the colour of the lights is white;
   d. a minimum range in bright sunlight of approximately 7 km; and
   e. the beam axis of each light unit shall be aimed 15° outward from a line parallel to the runway centreline and inclined at an angle of 10° above the horizontal.

   Note: L-849 A and E light units specified in FAA AC 150/5345-51 '*Specification for Discharged -Type of Flashing Light Equipment*' are xenon strobe type of lights suitable for use as runway threshold identification lights.

7. Temporarily displaced threshold lights for use at night. Temporarily displaced threshold lights must be provided at night to identify the new threshold location when the threshold of a runway is temporarily displaced.

8. Location of temporarily displaced threshold lights.

   Temporarily displaced threshold lights must be provided on each side of the runway:

   a. in line with the displaced threshold
   b. at right angles to the runway centreline; and
   c. with the innermost light on each side aligned with the row of runway edge lights on that side of the threshold.

9. Characteristics of temporarily displaced threshold lights.

Temporarily displaced threshold lights must have the following characteristics:

a. each side must consist of 5 lights except that 3 lights per side is sufficient if the runway width is 30 m or less;
b. the lights must be spaced at 2.5 m apart;
c. the innermost light of each side must be a fixed omnidirectional light showing green in all angles of azimuth;
d. the outer 4 or 2 lights, as appropriate, of each side must be fixed unidirectional lights showing green in the direction of approach, over not less than 38° or more than 180° of azimuth;
e. the light distribution in the direction of approach must be as close as practicable to that of the runway edge lights;
f. the light intensity must be as close as practicable to 1.5 times, and not less than, that of the runway edge lights.

Note : *Temporary displaced threshold lights are associated only with low intensity or medium intensity runway lighting systems. They are not associated with high intensity runway lighting systems. If a precision approach runway has the threshold temporarily displaced, it renders ILS unavailable for precision approaches, which changes the runway to a non-precision or non-instrument runway.*

10. Runway lighting before a displaced threshold.

a. If the part of runway located before a displaced threshold is available for aircraft use, i.e. for take-offs, and landings from the opposite direction, runway edge lights in this part of runway must:
   o show red in the direction of approach to the displaced threshold; and
   o show white in the opposite direction, or yellow as appropriate for a precision approach runway.
b. The intensity of the red runway edge lights required under Paragraph 9.9.15.10(a) must not be less than one-quarter, and not more than one-half, that of the white runway edge lights.
c. Runway edge lights may be bi-directional light fittings or separate light fittings installed back to back.
d. If the portion of runway before a displaced threshold is closed to aircraft operations, all the runway lights thereon must be extinguished.

9.9.16 Runway End Lights

Runway end lights must be provided on a runway equipped with runway edge lights.

9.9.17 Location of Runway End Lights

Runway end lights must be located in a straight line at right angles to the runway centreline, and:

a. when the runway end is at the extremity of the runway – as near to the extremity as possible and not more than 3 m outside, or 1 m inside the extremity;
b. when the runway end is not at the extremity of the runway – at the runway end, with a tolerance of ± 1 m; and
c. with respect to taxiways intended for exiting the runway, be located such that any aircraft exiting the runway willnot be required to cross the row of red lights comprising the runway end lights.

Note : *The universally accepted convention in aerodrome lighting is that a pilot is never required to cross a row of red lights*.

9.9.18 Pattern of Runway End Lights

The pattern of runway end lights must consist of:
a. 6 lights spaced at equal intervals between the rows of runway edge lights; or
b. if the runway is provided with the alternative threshold light pattern, the threshold pattern.

9.9.19 Characteristics of Low and Medium Intensity Runway End Lights

1. Low intensity and medium intensity runway end lights must have the following characteristics:
   a. the lights must be fixed unidirectional showing red in the direction of the runway over not less than 38° or more than 180° of azimuth;
   b. the intensity of the red light must not be less than one-quarter, and not more than one-half, that of the runway edge lights;
   c. the light distribution in the direction of the runway must be as close as practicable to that of the runway edge lights.

2. Low intensity and medium intensity runway end lights must be inset lights if:
   a. the runway is also equipped with high intensity runway end lights; or
   b. it is impracticable for elevated lights to be installed.

3. If the runway end coincides with the runway threshold, bidirectional light fittings may be used or separate light fittings installed back to back.

9.9.20 Characteristics of High Intensity Runway End Lights

High intensity runway end lights must have the following characteristics:

a. the lights must be inset, fixed unidirectional showing red in the direction of the runway; and
b. the minimum light intensity must be in accordance with Section 9.11, Figure 9.11-7.

9.9.21 Runway Turning Area Edge Lights

1. Where an aircraft turning area is provided on a runway, the edge of the turning area must be provided with blue edge lights if the runway is provided with edge lights.

2. Runway turning area edge lights must be located not less than 0.6 m, and not more than 1.8 m, outside the edge of the turning area.

3. If the beginning of the splay into a runway turning area is more than 10 m from the previous runway edge light, a blue edge light must be located where the turning area commences.

4. Turning area edge lights must be provided to mark any change of direction along the side of the turning area.

5. When a side of the turning area is longer than 30 m, equally spaced blue edge lights must be provided along that side, with spacing not exceeding 30 m.

6. Runway turning area edge lights must have the same characteristics as taxiway edge lights, in accordance with Paragraph 9.13.15.

9.9.22 Stopway Lights

1. Stopway lights must be provided on a stopway that is longer than 180 m and is intended for night use.

2. Stopway lights must be located along both sides of the stopway in line with the runway edge lights and up to the stopway end.

3. The spacing of stopway lights must be uniform and not more than that of the runway edge lights, with the last pair of lights located at the stopway end.

4. The stopway end must be further indicated by at least 2 stopway lights at equal intervals across the stopway end between the last pair of stopway lights.

5. Stopway lights must have the following characteristics:

   a. the lights must be fixed and unidirectional showing red in the direction of the runway, and not visible to a pilot approaching to land over the stopway;
   b. the light distribution in the direction of the runway must be as close as possible to that of the runway edge lights; and
   c. the intensity of the red light must not be less than one quarter,

9.9.23 Runway Centreline Lights

1. Runway centreline lights must be provided on a precision approach runway Category II or III.

   Note : *Provision of runway centreline lights on a precision approach runway Category I where the width between the runway edge lights is greater than 50 m is recommended.*

2. Runway centreline lights must be located from the threshold to the end at longitudinal spacing of approximately:
   a. 15 m on a runway intended for use in runway visual range conditions less than a value of 300 m; and
   b. 30 m on a runway intended for use in runway visual range conditions of 300 m or greater.

3. The runway centreline lights may be offset by not more than 0.6 m from the true runway centreline, for maintenance of runway marking purposes.

4. The offset shall be on the left hand side of the landing aircraft, where practicable. Where the runway is used in both directions, the direction from which the majority of landings will take place shall prevail.

5. Runway centreline lights must be inset, fixed lights showing white from the threshold to a point 900 m from the runway end. From 900 m to 300 m from the runway end, the light pattern is to be two red lights followed by two white lights. For the last 300 m before the runway end, the lights must show red.

   Note : *The double red and white alternating light arrangement is for interleaving circuitry, to ensure that failure of part of the electrical system does not result in a false indication of the runway distance remaining*.

6. The light intensity and distribution of runway centreline lights must be in accordance with:
   a. Section 9.11, Figure 9.11-8 — for 30 m spacing;
   b. Section 9.11, Figure 9.11-9 — for 15 m spacing.

9.9.24 Runway Touchdown Zone Lights

1. Runway touchdown zone lights must be provided for a runway intended for precision approach Category II or III operations.

2. From paragraphs 9.7.3.8 and 9.7.3.9 above, it is implicit that touchdown zone lights must be provided where Category II and III approach lights are provided.

3. Runway touchdown zone lights must extend from the threshold for a distance of 900 m. The lighting is to consist of a series of transverse rows of lights, or barrettes, symmetrically located on each side of the runway centreline.

4. Each barrette must consist of three light units at 1.5 m apart. The innermost light of each barrette must be at 9 m from the true runway centreline.

5. The first pair of barrettes must be located at 60 m from the threshold. Subsequent barrettes must be spaced longitudinally at 60 m apart.

6. Runway touchdown zone lights must be inset, fixed unidirectional lights showing variable white.

7. Runway touchdown zone lights must be in accordance with Section 9.11, Figure 9.11-10.

9.9.25 Photometric Characteristics of Runway Lights

1. Section 9.11, Figure 9.11-11 shows the method of establishing the grid points for calculating the average intensity of low and medium intensity runway lights for non-instrument and instrument non-precision approach runways.

2. Section 9.11, Figure 9.11-12 shows the method of establishing grid points for calculating the average intensity of high intensity approach and runway lights for precision approach runways.

3. The average light intensity of the main beam of a light is calculated by:
   a. establishing grid points in accordance with the method shown in Section 9.11, Figure 9.11-11 or Figure 9.11-12, whichever is applicable.
   b. measuring the light intensity values at all grid points within and on the perimeter of the rectangle or ellipse representing the main beam;
   c. calculating the arithmetic average of the light intensity values as measured at those grid points.

4. The maximum light intensity value measured on or within the perimeter of the main beam must not to be more than three times the minimum light intensity value so measured.

9.9.26 Installation and Aiming of Light Fittings

The following points must be followed in the installation and aiming of light fittings:

a. the lights are aimed so that there are no deviations in the main beam pattern, to within 1/2° from the applicable standard specified in this Chapter;
b. horizontal angles are measured with respect to the vertical plane through the runway centreline;
c. when measuring horizontal angles for lights other than runway centreline lights, the direction towards the runway centreline is to be taken to be positive;
d. vertical angles specified are to be measured with respect to the horizontal plane.

9.9.27 Illustrations of Runway Lighting

Section 9.10 contains illustrations of runway lighting.

9.10 Isocandela Diagrams of Runway Lighting

9.11.1 Collective Notes

1. The ellipses in each figure are symmetrical about the common vertical and horizontal axes.

2. Figure 9.10-1 to Figure 9.10-10 show the minimum allowable light intensities. The average intensity of the main beam is calculated by establishing the grid points as shown in Figure 9.10-11 or Figure 9.10-12, as appropriate, and using the intensity values measured at all grid points located within and on the perimeter of the ellipse representing the main beam. The average value is the arithmetic average of light intensities measured at all considered grid points.

3. No deviations are acceptable in the main beam pattern when the lighting fixture is properly aimed.

4. Average intensity ratio. The ratio between the average intensity within the ellipse defining the main beam of a typical new light and average light intensity of the main beam of a new runway edge light is to be as follows:

Figure 9.10-1	Low intensity runway edge lights	1.0 (white light)
Figure 9.10-2	Medium intensity runway edge lights	1.0 (white light)
Figure 9.10-3	High intensity runway edge lights (where the width of runway is 30-45 m)	1.0 (white light)
Figure 9.10-4	High intensity runway edge lights (where the width of runway is 60 m)	1.0 (white light)
Figure 9.10-5	High intensity threshold lights	1.0 to 1.5 (green light)
Figure 9.10-6	High intensity threshold wing bar lights	1.0 to 1.5 (green light)
Figure 9.10-7	High intensity runway end lights	0.25 to 0.5 (red light)
Figure 9.10-8	High intensity runway centerline lights (longitudinal spacing 30 m)	0.5 to 1.0 (white light)
Figure 9.10-9	High intensity runway centerline lights (longitudinal spacing 15 m)	0.5 to 1.0 for CAT III (white light) 0.25 to 0.5 for CAT I, II (white light)
Figure 9.10-10	Runway touchdown zone lights	0.5 to 1.0 (white light)

5. The beam coverages in the figures provide the necessary guidance for approaches down to an RVR of the order of 150 m and take-off to an RVR of the order of 100 m.

6. Horizontal angles are measured with respect to the vertical plane through the runway centreline. For lights other than centreline lights, the direction towards the runway centreline is considered positive. Vertical angles are measured with respect to the horizontal plane.

7. The light units are to be installed so that the main beam is aligned within one half degree of the specified requirement.

8. On the perimeter of and within the ellipse defining the main beam, the maximum light intensity is not to be greater than three times the minimum light intensity value measured.

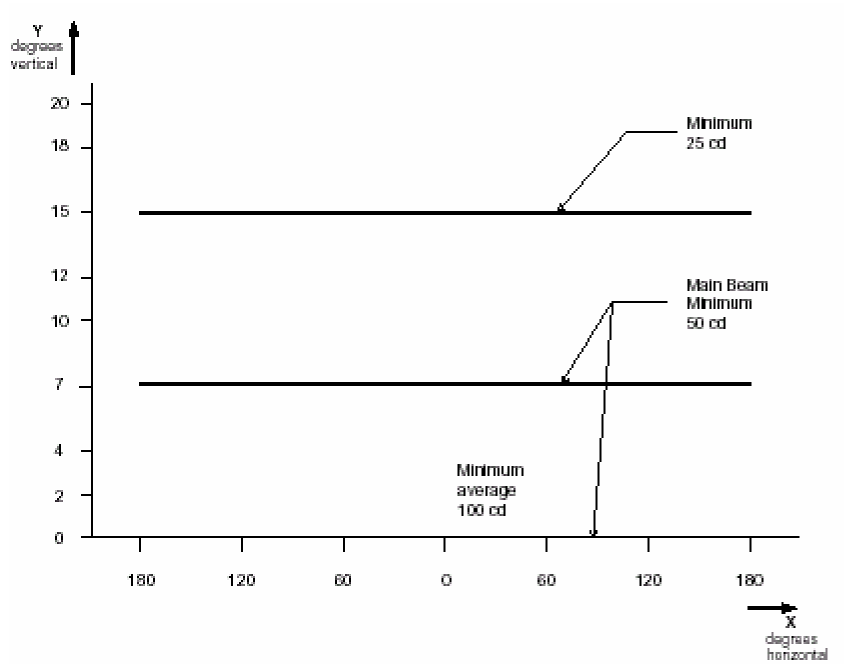


Figure 9.10-1: Isocandela Diagram for Omnidirectional Runway Edge Light – Low Intensity Runway Lighting System

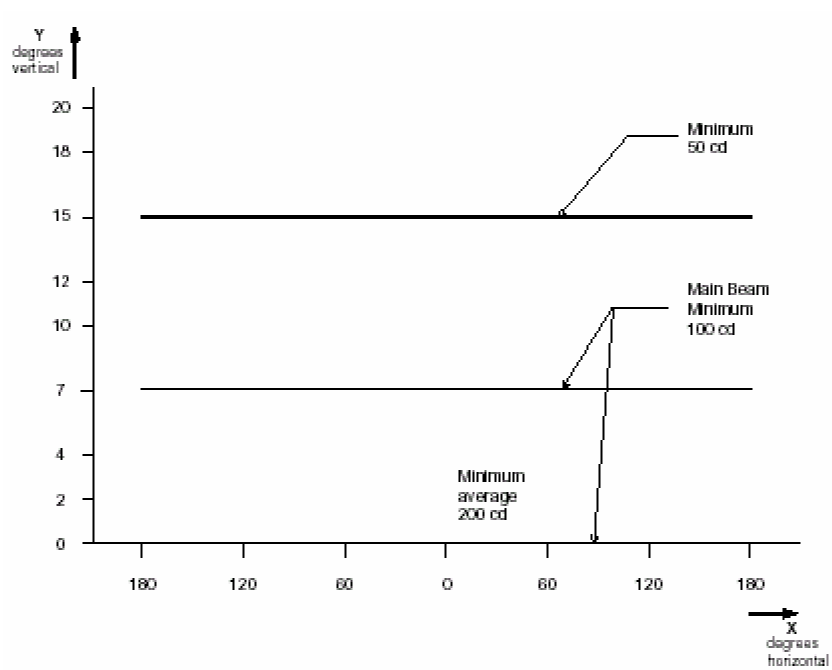


Figure 9.10-2: Isocandela Diagram for Omnidirectional Runway Edge Light – Medium Intensity Runway Lighting System

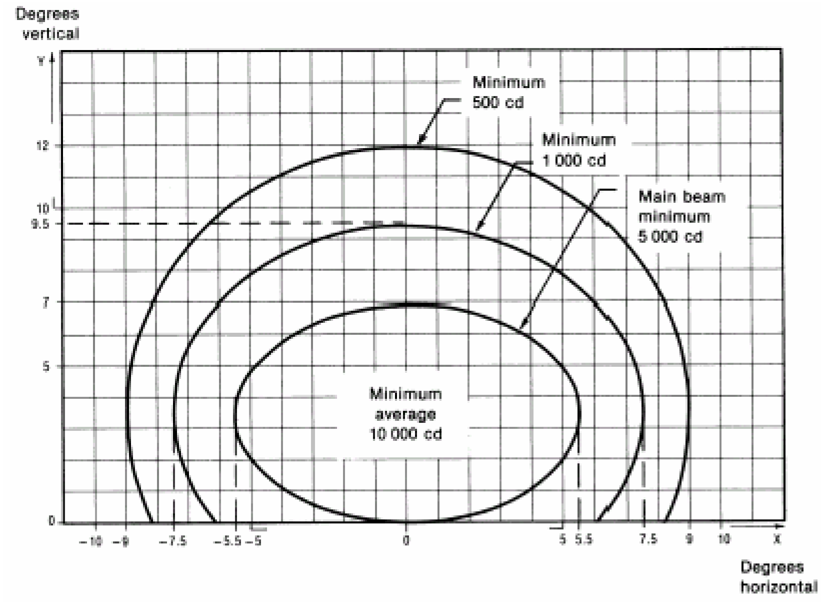


Figure 9.10-3: Isocandela Diagram for High Intensity Runway Edge Lights where the Width of the Runway is 30 to 45 metres (White Light)

Note : 1. Curves calculated on formula $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

a	5.5	7.5	9.0
b	3.5	6.0	8.5

2. Toe-in 3.5º
3. For yellow light multiply values by 0.4
4. See collective notes at Paragraph 9.10.1 for Figure 9.10-1 to Figure 9.10-10.

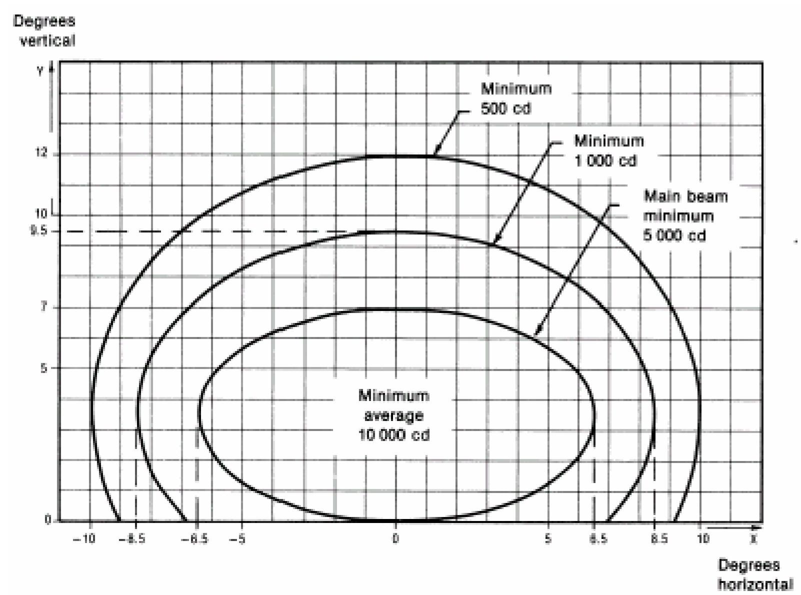


Figure 9.10-4: Isocandela Diagram for High Intensity Runway Edge Lights where the Width of the Runway is 60 m (White Light)

Note : 1. Curves calculated on formula $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

a	6.5	8.5	10.0
b	3.5	6.0	8.5

2. Toe-in 4.5º
3. For yellow light multiply values by 0.4
4. See collective notes at Paragraph 9.10.1 for Figure 9.10-1 to Figure 9.10-10.

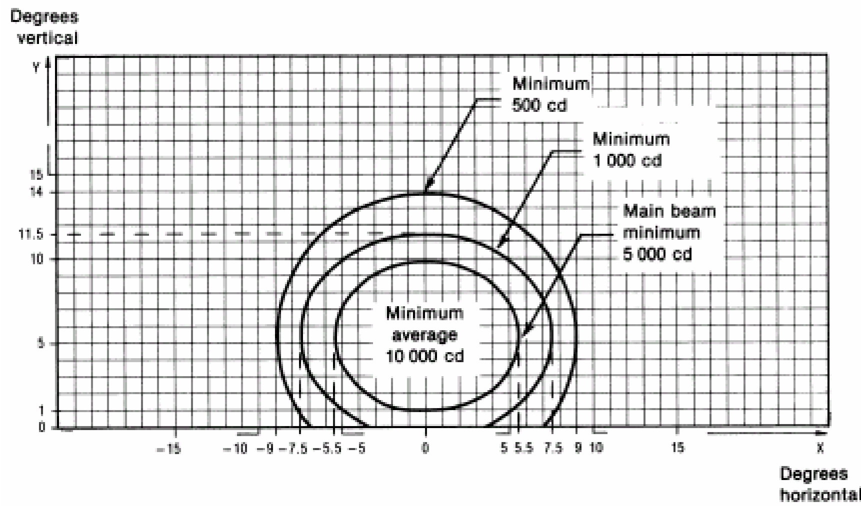


Figure 9.10-5:
Isocandela Diagram for High Intensity Threshold Lights (Green Light)

Note : 1. Curves calculated on formula $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

a	5.5	7.5	9.0
b	4.5	6.0	8.5

2. Toe-in 3.5º
3. See collective notes at Paragraph 9.10.1 for Figure 9.10-1 to Figure 9.10-10.

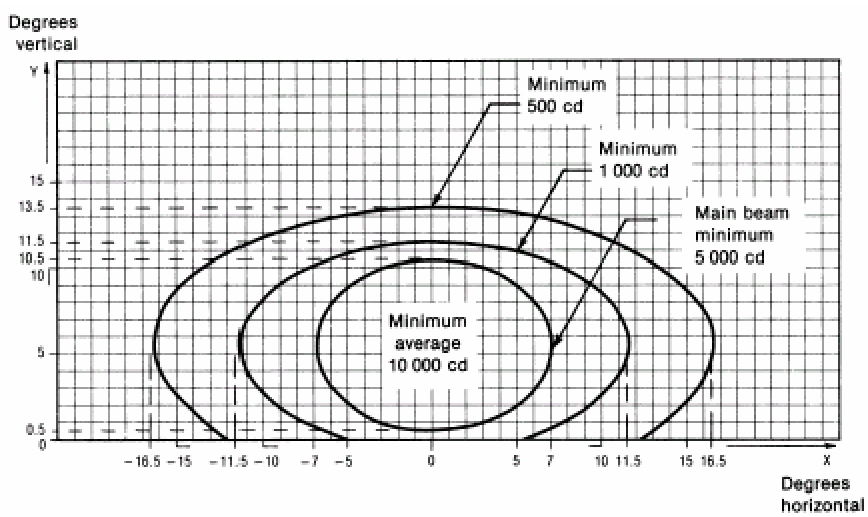


Figure 9.10-6:
Isocandela Diagram for High Intensity Threshold Wing Bar Lights (Green Light)

Notes : 1. Curves calculated on formula $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

a	7.0	11.5	16.5
b	5.0	6.0	8.0

2. Toe-in 2º
3. See collective notes at Paragraph 9.10.1 for Figure 9.10-1 to Figure 9.10-10.

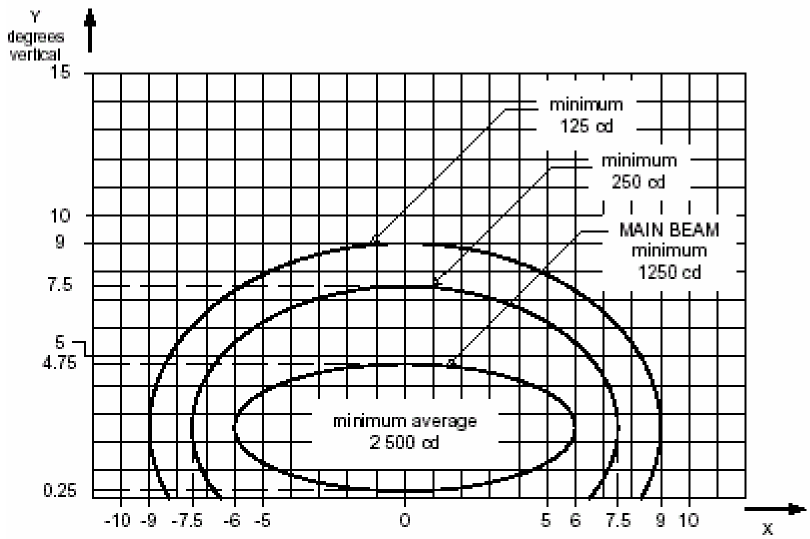


Figure 9.10-7:
Isocandela Diagram for High Intensity Runway End Lights (Red Light)

Notes : 1. Curves calculated on formula $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

a	6.0	7.5	9.0
b	2.25	5.0	6.5

2. See collective notes at Paragraph 9.10.1 for Figure 9.10-1 to Figure 9.10-10.

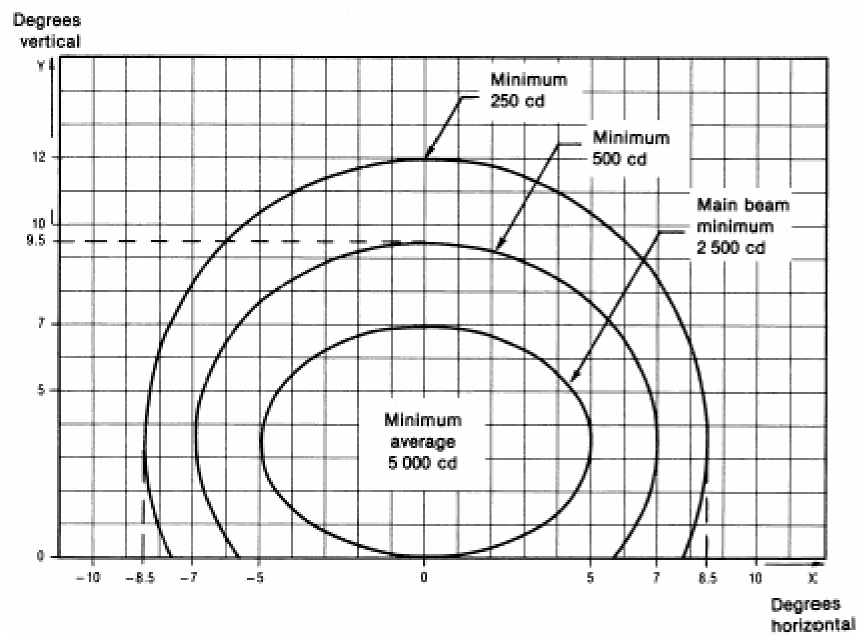


Figure 9.10-8: Isocandela Diagram for High Intensity Runway Centreline Lights with 30 m Longitudinal Spacing (White Light)

Notes : 1. Curves calculated on formula $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

a	5.5	7.5	9.0
b	3.5	6.0	8.5

2. For red light multiply values by 0.15
3. See collective notes at Paragraph 9.10.1 for Figure 9.10-1 to Figure 9.10-10.

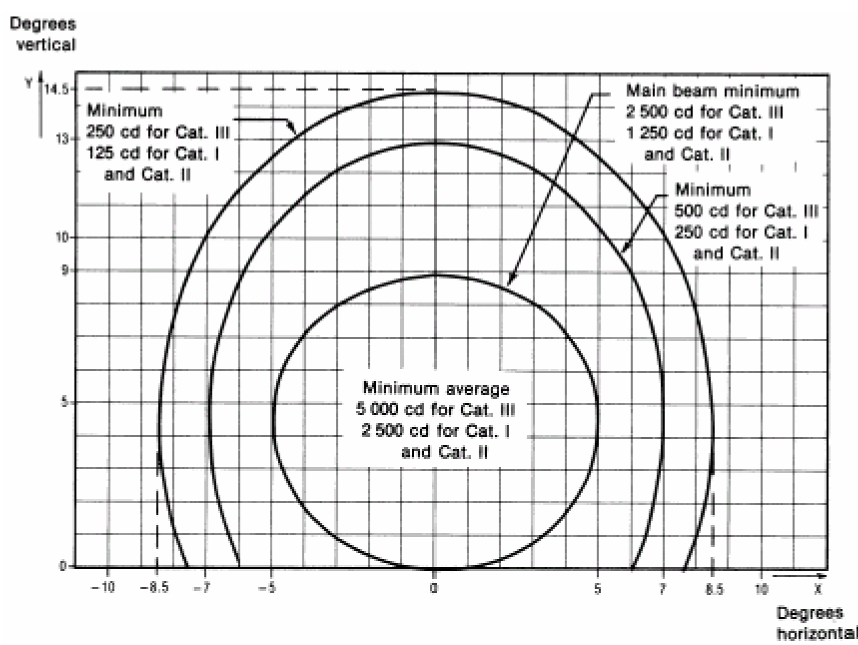


Figure 9.10-9: Isocandela Diagram for High Intensity Runway Centreline Lights with 15 m Longitudinal Spacing (White Light)

Notes : 1. Curves calculated on formula $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

a	5.0	7.0	8.5
b	4.5	8.5	10

2. For red light multiply values by 0.15
3. See collective notes at Paragraph 9.10.1 for Figure 9.10-1 to Figure 9.10-10.

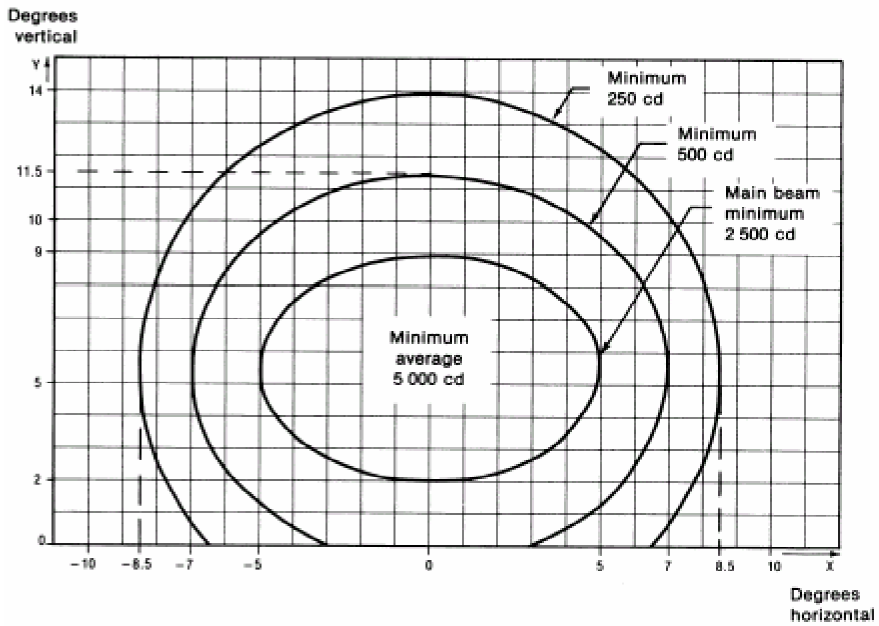


Figure 9.10-10:
Isocandela Diagram for Runway Touchdown Zone Lights (White Light)

Notes : 1. Curves calculated on formula $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

a	5.0	7.0	8.5
b	3.5	6.0	8.5

2. Toe-in 4º
3. See collective notes at Paragraph 9.10.1 for Figure 9.10-1 to Figure 9.10-10.

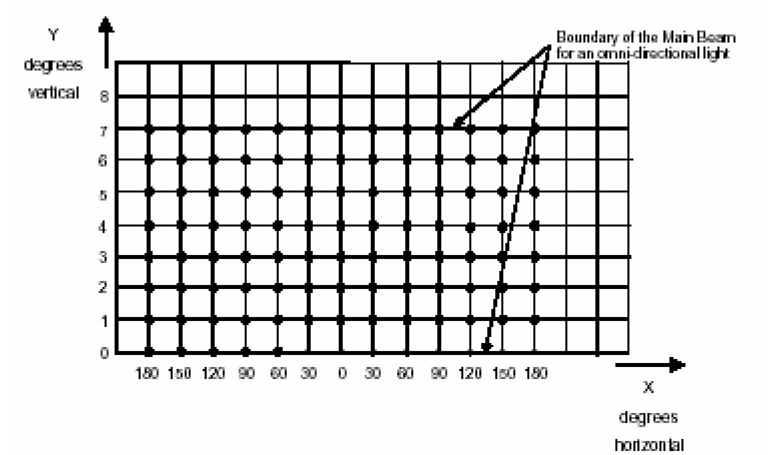


Figure 9.10-11: Method of Establishing Grid Points to be used for the Calculation of Average Intensity of Runway Lights specified by Figure 9.10-1 and Figure 9.10-2

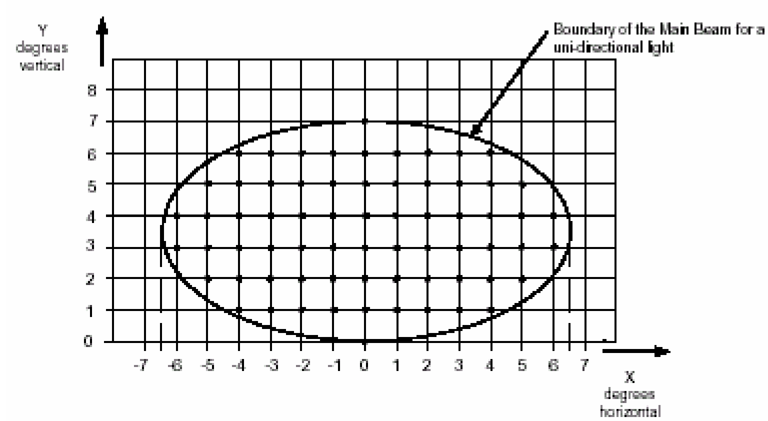


Figure 9.10-12: Method of Establishing Grid Points to be used for the Calculation of Average Intensity of Runway Lights specified by Figure 9.10-3 to Figure 9.10-10

9.11 Illustrations of Runway Lighting

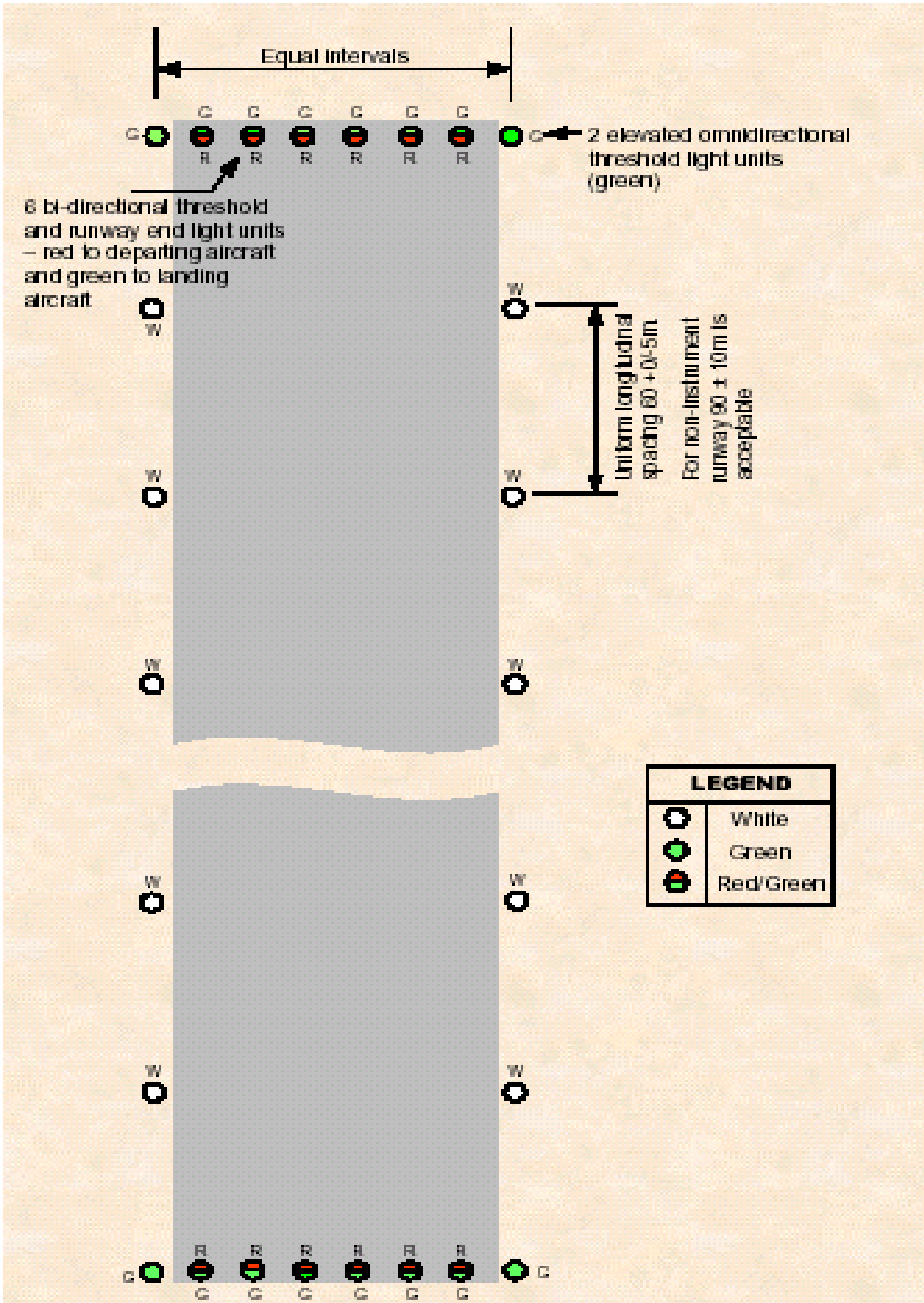


Figure 9.11-1: Runway Edge Lights, Threshold Lights and Runway End Lights Low and Medium Intensity for Non-Instrument and Non-Precision Approach Runways

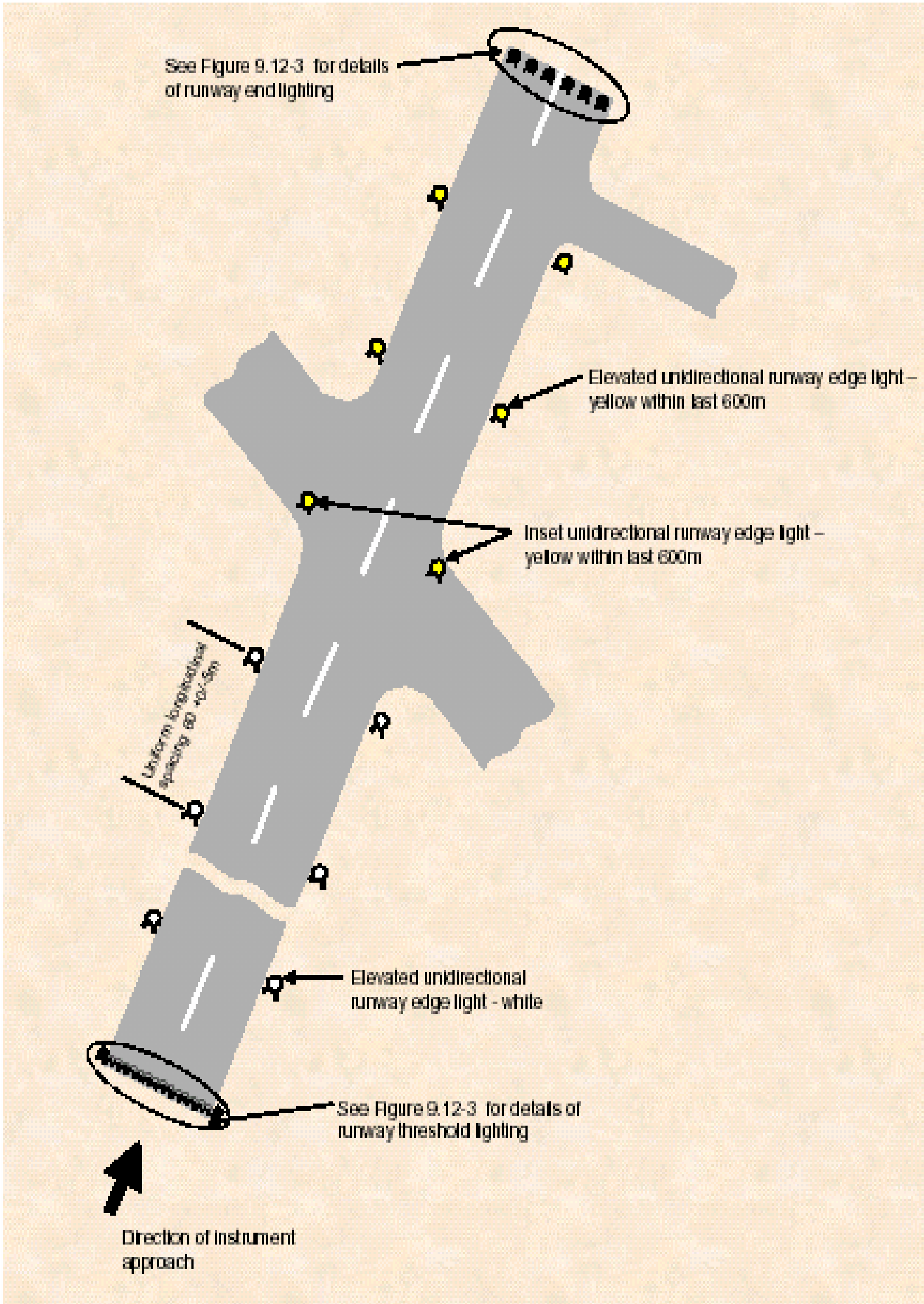


Figure 9.11-2: Runway Edge Lights High Intensity for Precision Approach Runways

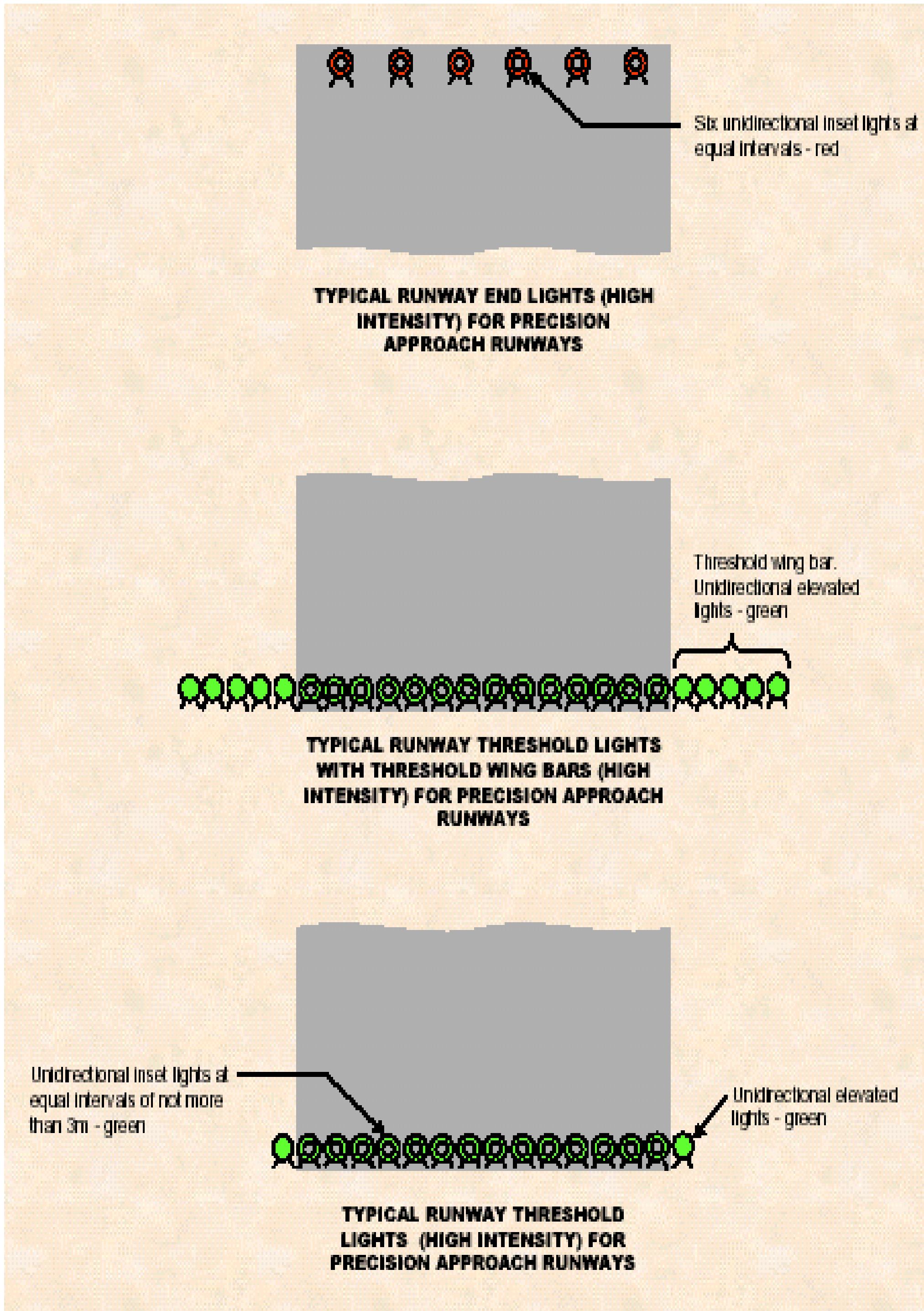


Figure 9.11-3: Typical Runway Threshold and Runway End Lights High Intensity for Precision Approach Runways

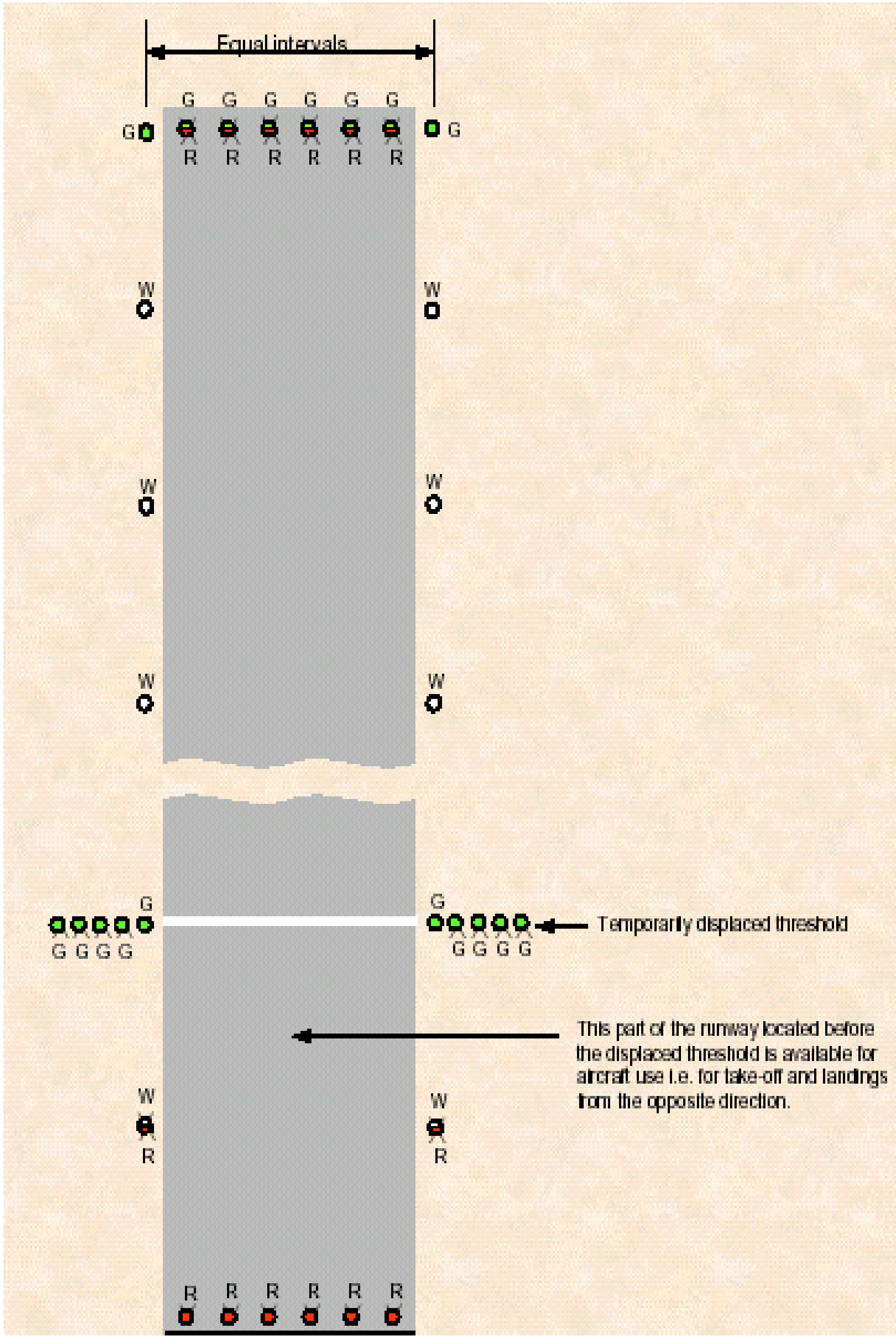


Figure 9.11-4: Typical Temporarily Displaced Threshold

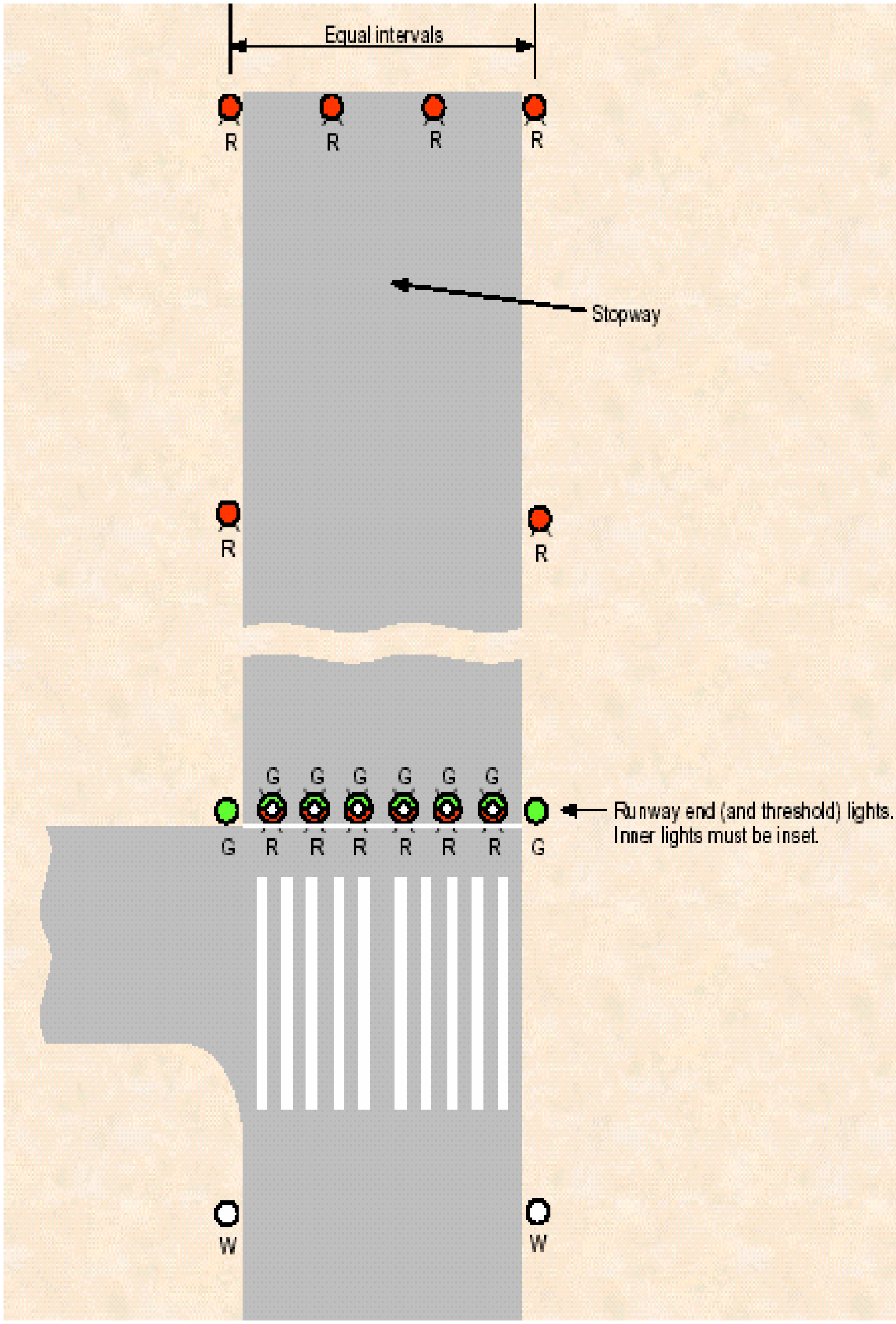


Figure 9.11-5: Typical Stopway Lights

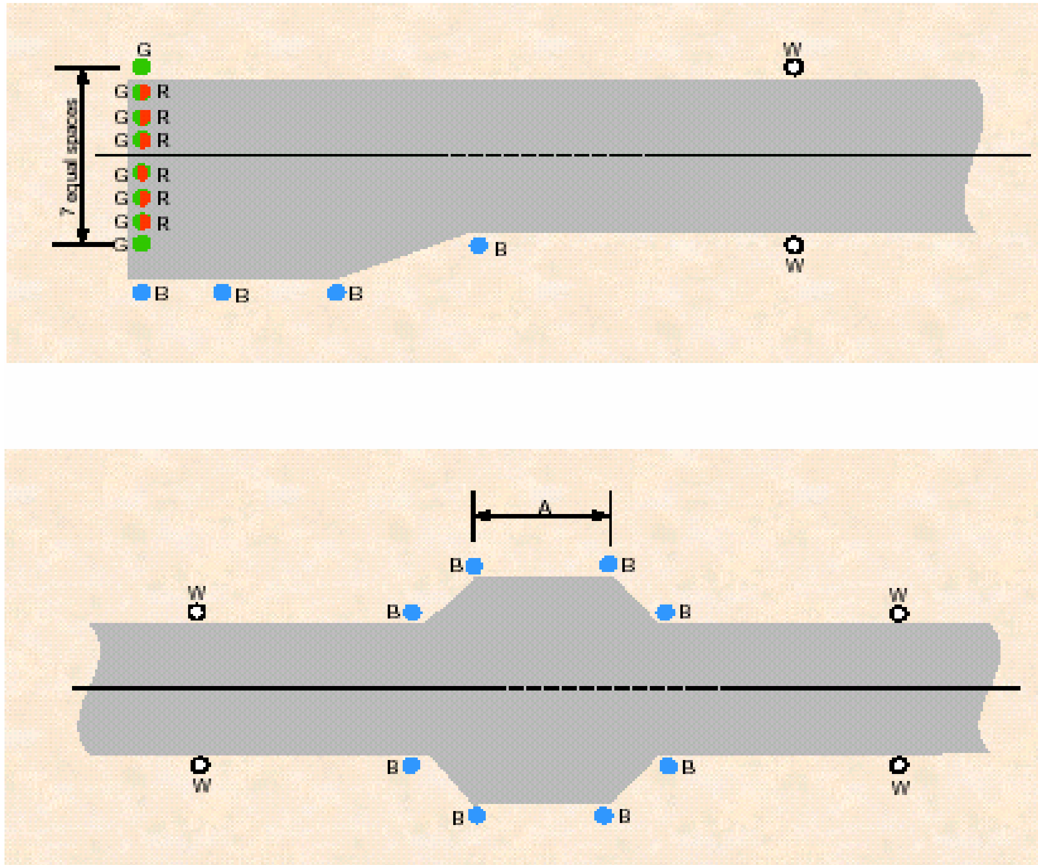


Figure 9.11-6: Typical Turning Area Edge Lights

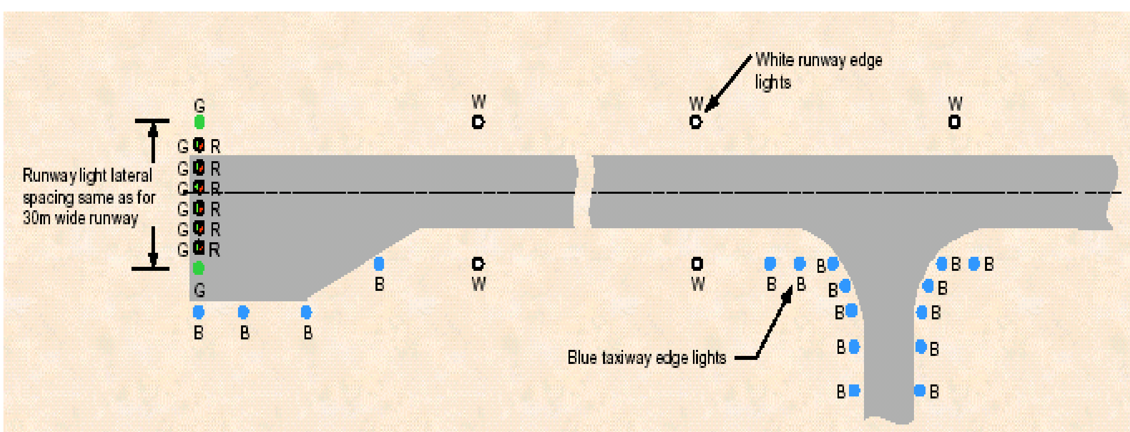


Figure 9.11-7: Typical Light Layout Where Runway Pavement is 23 m or 18 m wide

9.12 Taxiway Lighting

9.12.1 Provision of Taxiway Centreline Lights

1. Taxiway centreline lights must be provided on a taxiway intended for use in conjunction with an associated runway when the runway is used in precision approach Category II or III conditions. Where the aerodrome traffic density is light and taxiway edge lights and centreline markings provide adequate guidance, DGAC may permit that taxiway centreline lighting not be provided.

2. Taxiway centreline lights must be provided on a taxiway intended for use in conjunction with an associated runway when the runway is used in precision approach Category I conditions. Where the aerodrome layout is simple, or the aerodrome traffic density is light and taxiway edge lights and centreline markings provide adequate guidance, DGAC may permit that taxiway centreline lighting not be provided.

3. Taxiway centreline lights must be used on a rapid exit taxiway.

4. Taxiway centreline lights may be used in other cases, if the aerodrome operator chooses. At aerodromes where the layout is complex, the use of taxiway centreline lights would be beneficial for surface movement guidance.

9.12.2 Provision of Taxiway Edge Lights

1. Except for Paragraphs 9.12.3.1 and 9.12.4.1, taxiway edge lights must be provided at the edges of taxiways and holding bays intended for use at night and not provided with centreline lights.

2. Where additional visual cues are required to delineate apron edges at night, taxiway edge lights may be used. Examples of where this requirement may occur include, but are not limited to:
   a. aprons where taxi guidelines and aircraft parking position marking are not provided;
   b. aprons where apron floodlighting provides inadequate illumination at the edge of the apron; and
   c. where the edge of the apron is difficult to distinguish from the surrounding area at night.

9.12.3 Taxiway Markers

For code letter A or B taxiways, reflective taxiway edge markers may be used instead of taxiway centreline or edge lights, or to supplement taxiway lights. However, at least one taxiway from the runway to the apron must be provided with taxiway lighting.

9.12.4 Apron Taxiway Lighting

Taxiway lights are not required for an apron taxiway if the apron taxiway is illuminated by apron floodlighting meeting the standards specified in Section 9.16.

9.12.5 Use of Different Types of Taxiway Lights

1. As far as practicable, the provision of taxiway lights shall be such that taxying aircraft do not need to alternate between taxiway centreline and edge lights.

2. Where additional guidance is required to delineate taxiway edges, taxiway edge lights may be used to supplement taxiway centreline lights. When provided, taxiway edge lights must comply with Paragraphs 9.12.13 to 9.12.15. This may occur at, but is not limited to:
   a. rapid exit taxiways;
   b. taxiway curves;
   c. intersections;
   d. a narrower section of taxiway.

9.12.6 Control of Lights on Taxiways

1. At an aerodrome with Air Traffic Service, taxiway lights with an average intensity within the main beam of more than 20 candela must be provided with intensity control in accordance with Paragraph 9.1.14.6, to allow adjustment of the lighting to suit ambient conditions.

2. If it is desired to illuminate only standard taxi routes during certain period of operations, for example during low visibility operations, the taxiway lighting may be designed to allow taxiways in use to be lit and those not in use to be unlit.

3. Where a runway forming part of a standard taxi-route is provided with runway lighting and taxiway lighting, the lighting systems must be interlocked to preclude the possibility of simultaneous operation of both forms of lighting.

9.12.7 Location of Taxiway Centreline Lights

Taxiway centreline lights must be located on the centreline of the taxiway or uniformly offset from the taxiway centreline by not more than 0.3 m.

9.12.8 Spacing of Taxiway Centreline Lights

Note : *1. The longitudinal spacing of centreline lights that will provide satisfactory guidance to pilots on curved sections of taxiway, including exit taxiways and fillets at intersections, is influenced by the width of the light beam from the centreline light fittings.*

2. There is no need to replace existing lights, or change the spacing of existing lights. The longitudinal spacing and photometric specifications herein are meant for all new taxiway centreline lights, and for replacement of existing light fittings with light fittings in compliance with ICAO standards.

1. Except for Paragraphs 9.12.8.2 and 9.12.9.1, the longitudinal spacing of taxiway centreline lights on a straight section of taxiway must be uniform and not be more than the values specified in Table 9.12-1 below:

Type	General	Last 60 M Before A Runway Or Apron
Taxiways used in conjunction with a non-instrument, non-precision, or a precision approach Category I runway	60 m	15 m
Taxiways used in conjunction with a precision approach Category II runway	30 m	15 m
Taxiways used in conjunction with a precision approach Category III runway	15 m	7.5 m

Table 9.12-1 Maximum spacing on straight sections of taxiway

2. For the purpose of taxiway centreline lighting, a straight section of taxiway that is less than 180 metres in length is considered a short straight taxiway. Taxiway centreline lights on a short straight section of taxiway must be spaced at uniform intervals of not more than 30 m.

3. In the case of an entry taxiway, the last light must not be more than 1 m outside the line of runway edge lights.

4. When a taxiway changes from a straight to a curved section, the taxiway centreline lights must continue on from the preceding straight section at a uniform distance from the outside edge of the taxiway.

5. The longitudinal spacing of taxiway centreline lights on a curved section of taxiway must be uniform and be not more than the values specified in Table 9.12-2.

Type	On curve with radius of 400 m or less	On curve with radius greater than 400 m	On straight section before and after the curve
Taxiways used in conjunction with a noninstrument, non-precision, or a precision approach Category I or II runway	15 m See Note	30 m	No special requirement. Use same spacing as on the rest of the straight section.
Taxiways used in conjunction with a precision approach Category III runway	5 m	15 m	Same spacing as on the curve is to extend for 60 m before and after the curve
Note: At a busy or complex taxiway intersection where additional taxiing guidance is desirable, closer light spacing down to 7.5 m should be used.			

Table 9.12-2: Maximum spacing on curved sections of taxiway

9.12.9 Location of Taxiway Centreline Lights on Exit Taxiways

Taxiway centreline lights on exit taxiways, other than rapid exit taxiways, must:

a. start at the tangent point on the runway;
b. have the first light offset 1.2 m from the runway centreline on the taxiway side; and
c. be spaced at uniform longitudinal intervals of not more than 7.5 m.

9.12.10 Location of Taxiway Centreline Lights on Rapid Exit Taxiways

1. Taxiway centreline lights on a rapid exit taxiway must:
   a. start at least 60 m before the tangent point;
   b. on that part of taxiway parallel to the runway centreline, be offset 1.2 m from the runway centreline on the taxiway side; and
   c. continue at the same spacing to a point on the centreline of the taxiway at which an aeroplane can be expected to have decelerated to normal taxying speed.

2. Taxiway centreline lights on a rapid exit taxiway must be spaced at uniform longitudinal intervals of not more than 15 m.

9.12.11 Characteristics of Taxiway Centreline Lights

1. Taxiway centreline lights are to be inset, fixed lights showing green on:
   a. a taxiway other than an exit taxiway; and
   b. a runway forming part of a standard taxi-route.

2. Taxiway centreline lights on exit taxiways, including rapid exit taxiways, must be inset, fixed lights:
   a. showing green and yellow alternately, from the point where they begin to the perimeter of the ILS or MLS critical area or the lower edge of the inner transitional surface, which ever is further from the runway; and
   b. showing green from that point onwards.

3. When viewed from the runway, the exit taxiway light nearest the perimeter or the lower edge of the inner transitional surface, whichever is further, must show yellow.

4. Where the taxiway centreline lights are used for both runway exit and entry purposes, the colour of the lights viewed by a pilot of an aircraft entering the runway must be green. The colour of the lights viewed by a pilot of an aircraft exiting the runway is to be green and yellow alternately. See Figure 9.15-1.

9.12.12 Beam Dimensions and Light Distribution of Taxiway Centreline Lights

1. The beam dimensions and light distribution of taxiway centreline lights must be such that the lights are visible only to pilots of aircraft on, or in the vicinity of, the taxiway.

2. The light distribution of the green taxiway centreline lights in the vicinity of a threshold must be such as not to cause confusion with the runway threshold lights.

3. On a taxiway intended for use in conjunction with a non-instrument, non-precision or a precision approach Category I or II runway, taxiway centerline lights must comply with the specifications set out in Section 9.14, Figure 9.14-1 or, whichever is applicable.

4. On a taxiway that is intended for use in conjunction with a precision approach Category III runway, the taxiway centreline lights must comply with the specifications set out in Section 9.14, Figure 9.14-3, Figure 9.14-4 or Figure 9.14-5, whichever is applicable.

Notes : *1* *Light units meeting the intensity standards of Figure 9.14-3, Figure 9.14-4 and Figure 9.14-5, are specifically designed for use in low visibility conditions. For the normal range of visibilities experienced most of the time, these lights, if operated on maximum intensity, would cause dazzle to pilots. If these lights are installed, it may be necessary to provide additional intensity control stages, or otherwise limit the maximum intensity at which they can be operated.*

2 *Very high intensity taxiway light units are also available. These lights can have main beam intensities of the order of 1800 cd. These lights are unsuitable for use without specific prior approval from DGAC*

9.12.13 Location of Taxiway Edge Lights

1. Taxiway edge lights must be located along both sides of the taxiway, with edge lights along each edge located opposite the corresponding lights along the other edge, except as allowed for in Paragraph 9.12.13.2.

2. A taxiway light may be omitted if it would otherwise have to be located on an intersection with another taxiway or runway.

3. Taxiway edge lights must be located outside the edge of the taxiway, being:

   a. equidistance from the centreline except where asymmetric fillets are provided; and

   b. as close as practicable to 1.2 m from the taxiway edge, but no further than 1.8 m, or nearer than 0.6 m.

4. Where a taxiway intersects a runway, the last taxiway edge lights should be aligned with the line of runway edge lights, and must not encroach beyond the line of runway edge lights into the area outlined by the runway edge lights.

9.12.14 Spacing of Taxiway Edge Lights

1. Spacing of taxiway edge lights must be in accordance with Figure 9.12-1 below:

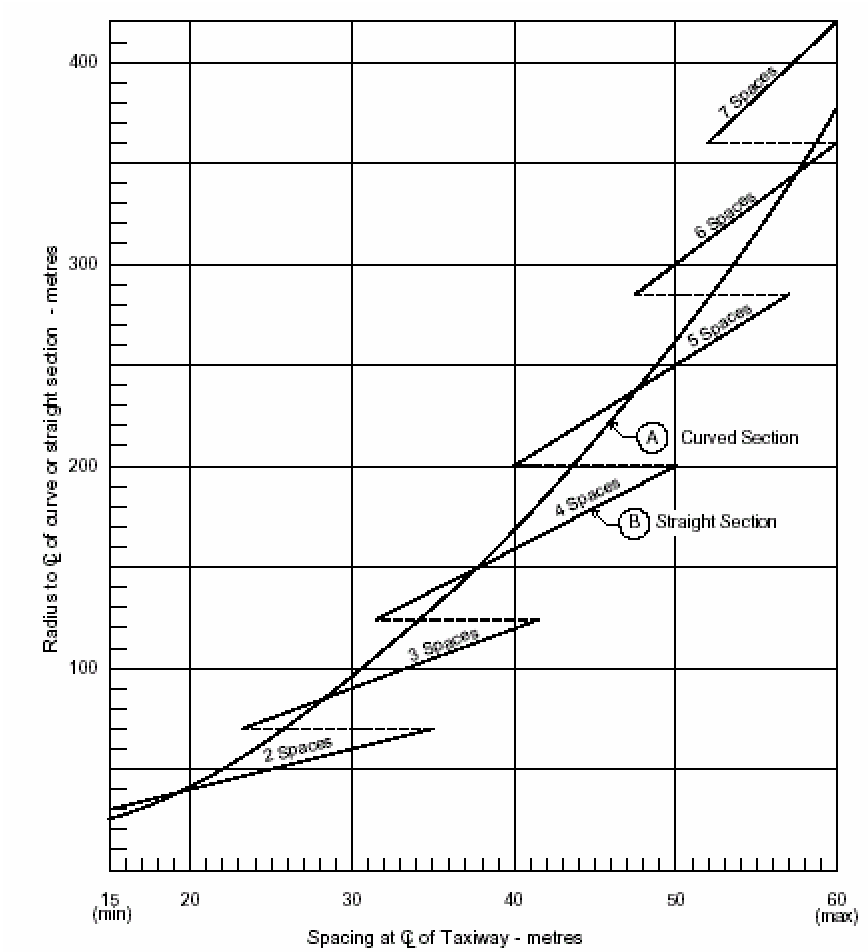


Figure 9.12-1: Longitudinal Spacing for Taxiway Edge Lights

2. On a curved section of taxiway, the edge lights must be spaced at uniform longitudinal intervals in accordance with Curve A in Figure 9.12-1 above.

3. On a straight section of taxiway, the edge lights must be spaced at uniform longitudinal intervals, not exceeding 60 m, in accordance with Curve B in Figure 9.12-1 above.

4. Where a straight section joins a curved section, the longitudinal spacing between taxiway edge lights must be progressively reduced, in accordance with Paragraphs 9.12.14.5 and 9.12.14.6, over not less than 3 spacings before the tangent point.

5. The last spacing between lights on a straight section must be the same as the spacing on the curved section.

6. If the last spacing on the straight section is less than 25 m, the second last spacing on the straight section must be no greater than 25 m.

7. If a straight section of taxiway enters an intersection with another taxiway, a runway or an apron, the longitudinal spacing of the taxiway edge lights must be progressively reduced over not less than 3 spacings, before the tangent point, so that the last and the second last spacings before the tangent point are not more than 15 m and 25 m respectively.

8. The taxiway edge lights must continue around the edge of the curve to the tangent point on the other taxiway, the runway or apron edge.

9. Taxiway edge lights on a holding bay or apron edge are to be spaced at uniform longitudinal intervals not exceeding 60 m, and in accordance with Curve B in Figure 9.12-1.

9.12.15 Characteristics of Taxiway Edge Lights

1. Taxiway edge lights must be fixed omnidirectional lights showing blue. The lights must be visible:
   a. up to at least 30° above the horizontal; and
   b. at all angles in azimuth necessary to provide guidance to the pilot of an aircraft on the taxiway.

2. At an intersection, exit or curve, the lights must be shielded, as far as is practicable, so they cannot be seen where they may be confused with other lights.

3. The peak intensity of the blue edge lights must not be less than 5 candela.

9.12.16 Provision of Runway Guard Lights

Note : *Runway guard lights are sometimes colloquially referred to as 'wig wags'. The effectiveness of this lighting system has been successfully proven in a number of countries and this lighting system has been adopted by ICAO as a standard. Provision of runway guard lights will bring aerodrome lighting in line with international practices.*

1. Runway guard lights must be provided at the intersection of a taxiway with a precision approach runway if stop bars are not provided at the intersection, and the runway is:
   a. a precision approach Category I runway where the traffic density is heavy; or
   b. a precision approach Category II or III runway.

2. Runway guard lights must be used at all taxiways which allow access onto the runway. Where possible, they should be introduced at all taxiways at the same time. If they are introduced in stages, adequate provision must be made to ensure that there is no chance of confusion.

Note : *Where a taxiway is used for exit only and cannot be used for entry to the runway, runway guard lights are not required.*

9.12.17 Pattern and Location of Runway Guard Lights

1. There are two standard configurations of runway guard lights:
   a. Configuration A (or Elevated Runway Guard Lights) has lights on each side of the taxiway, and
   b. Configuration B (or In-pavement Runway Guard Lights) has lights across the taxiway.

2. Configuration A is the configuration to be installed in all cases, except that Configuration B, or both Configuration A and B, must be used where enhanced conspicuity of the taxiway/runway intersection is needed, for example;
   a. on complex taxiway intersections with a runway; or
   b. where holding position markings do not extend straight across the taxiway; or
   c. on a wide-throat taxiway where the Configuration A lights on both sides of the taxiway would not be within the normal field of view of a pilot approaching the runway guard lights.

3. Configuration A runway guard lights must be located on both sides of the taxiway, at the runway holding position closest to the runway, with the lighting on both sides:
   a. equidistant from the taxiway centreline; and
   b. not less than 3 m, and not more than 5 m, outside the edge of the taxiway.

4. Configuration B runway guard lights must be located across the entire taxiway, including fillets, holding bays, etc. at the runway holding position closest to the runway, with the lights spaced at uniform intervals of 3 m.

9.12.18 Characteristics of Runway Guard Lights

1. Configuration A runway guard lights must consist of two pairs of elevated lights showing yellow, one pair on each side of the taxiway.

   Note : To enhance visual acquisition :
   a. the centreline of lights in each pair should be separated by a horizontal distance that is not less than 2.5 times, and not more than 4 times, the radius of the individual lantern lens;
   b. each light should be provided with a visor to minimize extraneous reflection from the optical surfaces of the lanterns;
   c. the visors and the face of the light fitting surrounding the lantern lens should be black to minimise reflection and provide enhanced contrast;
   d. where additional isolation of the signal is required from the background, a black target board may be provided around the sides and top of the face of the light fitting.

2. Configuration B runway guard lights must consist of inset lights showing yellow.

3. The performance of Configuration A runway guard lights must comply with the following:
   a. the lights in each pair are to be illuminated alternately at between 30 and 60 cycles per minute;
   b. the light suppression and illumination periods of each light in a pair are to be of equal and opposite duration;
   c. the light beams are to be unidirectional and aimed so that the beam centres cross the taxiway centreline at a point 60 m prior to the runway holding position;
   d. the effective intensity of the yellow light and beam spread are to be in accordance with the specifications in Section 9.14, Figure 9.14-6.

4. The performance of Configuration B runway guard lights must comply with the following:
   a. adjacent lights are to be alternately illuminated and alternate lights are to illuminate in unison;
   b. the lights are to be illuminated between 30 and 60 cycles per minute and the light suppression and illumination periods are to be equal and opposite in each light;
   c. the light beam is to be unidirectional and aligned so as to be visible to the pilot of an aeroplane taxying to the holding position.
   d. the effective intensity of the yellow beam and beam spread are to be in accordance with the specifications in Section 9.14, Figure 9.14-3.

9.12.19 Control of Runway Guard Lights

Runway guard lights are to be electrically connected such that all runway guard lights protecting a runway can be turned on when the runway is active, day or night.

9.12.20 Provision of Intermediate Holding Position Lights

Intermediate holding position lights must be provided at the following locations :

a. the runway holding position on a taxiway serving a runway equipped for night use when runway guard lights and/or stop bars are not provided;

b. the holding position of a holding bay, where the holding bay is intended to be used at night;

c. at taxiway/taxiway intersections where it is necessary to identify the aircraft holding position; and

d. a designated intermediate holding position on a taxiway intended to be used at night.

Note : *provision of intermediate holding position lights for (c) and (d) is based on local air traffic control procedures requirements.*

9.12.21 Pattern and Location of Intermediate Holding Position Lights

1. On a taxiway equipped with centreline lights, the intermediate holding position lights must consist of at least 3 inset lights, spaced 1.5 m apart, disposed symmetrically about, and at right angles to, the taxiway centreline, located not more than 0.3 m before the intermediate holding position marking or the taxiway intersection marking, as appropriate.

2. On a taxiway equipped with edge lights, the intermediate holding position lights must consist of 1 elevated light on each side of the taxiway, located in line with the taxiway edge lights and the runway holding position marking, intermediate holding position marking or taxiway intersection marking, as appropriate.

9.12.22 Characteristics of Intermediate Holding Position Lights

1. Inset intermediate holding position lights must:
   a. be fixed, unidirectional lights showing yellow;
   b. be aligned so as to be visible to the pilot of an aircraft approaching the holding position;
   c. have light distribution as close as practicable to that of the taxiway centreline lights.

2. Elevated intermediate holding position lights must:
   a. be fixed, omnidirectional lights showing yellow;
   b. have light distribution as close as practicable to that of the taxiway edge lights.

9.12.23 Stop Bars

1. A stop bar must be provided at every runway holding position serving a runway when it is intended that the runway will be used in Cat II or III conditions, if operational procedures at the aerodrome do not restrict the number of aircraft on the manoeuvring area to one at a time during Cat II or III conditions.

   Note : *As stop bars require direct ATC control, an aerodrome operator needs to consult with ATC before planning for their introduction.*

2. Where provided, the control mechanism for stop bars must meet the operational requirements of the Air Traffic Service at that aerodrome.

9.12.24 Location of Stop Bars

1. A stop bar must:
   a. be located across the taxiway on, or not more than 0.3 m before, the point at which it is intended that traffic approaching the runway stop;
   b. consist of inset lights spaced 3 m apart across the taxiway;
   c. be disposed symmetrically about, and at right angles to, the taxiway centreline.

2. Where a pilot may be required to stop the aircraft in a position so close to the lights that they are blocked from view by the structure of the aircraft, a pair of elevated lights, with the same characteristics as the stop bar lights, must be provided abeam the stop bar, located at a distance of at least 3 m from the taxiway edge sufficient to overcome the visibility problem.

9.12.25 Characteristics of Stop Bars

1. A stop bar must be unidirectional and show red in the direction of approach to the stop bar.

2. The intensity and beam spread of the stop bar lights must be in accordance with the applicable specifications in Section 9.14, Figure 9.14-1 to Figure 9.14-5.

3. Selectively switchable stop bars must be installed in conjunction with at least three taxiway centreline lights (extending for a distance of at least 90 m from the stop bar) in the direction that it is intended for an aircraft to proceed from the stop bar.

4. The lighting circuit must be designed so that:
   a. stop bars located across entrance taxiways are selectively switchable;
   b. stop bars located across taxiways used as exit taxiways only are switchable selectively or in groups;
   c. when a stop bar is illuminated, any taxiway centreline lights immediately beyond the stop bar are to be extinguished for a distance of at least 90 m; and
   d. with control interlock and not manual control, when the centreline lights beyond the stop bar are illuminated the stop bar is extinguished and vice versa.

9.12.26 Taxiway Edge Markers

Where used in lieu of taxiway edge lights on a taxiway with code letter A or B, taxiway edge markers must be provided at least at the locations where taxiway edge lights would otherwise have been provided.

9.12.27 Characteristics of Taxiway Edge Markers

1. Taxiway edge markers must be retro-reflective blue.

2. The surface of a taxiway edge marker as viewed by the pilot must be a rectangle with a height to width ratio of approximately 3:1 and a minimum viewing area of 150 cm^2.

3. Taxiway edge markers must be lightweight, frangible and low enough to preserve adequate clearance for propellers and for the engine pods of jet aircraft.

9.12.28 Taxiway Centreline Markers

Taxiway centreline markers may be used on sections of the taxiway as a supplement to taxiway edge markers or taxiway edge lights, e.g. on curves or intersections. When used, taxiway centreline markers must not be spaced greater than the spacing for centreline lights.

9.12.29 Characteristics of Taxiway Centreline Markers

1. Taxiway centreline markers must be retro-reflective green.

2. The marker surface as viewed by the pilot must be a rectangle and must have a minimum viewing surface of 20 cm^2.

3. Taxiway centreline markers must be able to withstand being run over by the wheels of an aircraft without damage either to the aircraft or to the markers themselves.

9.12.30 Photometric Characteristics of Taxiway Lights

1. The average intensity of the main beam of a taxiway light is calculated by:
   a. establishing the grid points in accordance with the method shown in Section 9.14, Figure 9.14-7;
   b. measuring the light intensity values at all grid points located within and on the perimeter of the rectangle representing the main beam;
   c. calculating the arithmetic average of the light intensity values as measured at those grid points.

2. The maximum light intensity value measured on or within the perimeter of the main beam must not be more than three times the minimum light intensity values so measured.

9.12.31 Installation and Aiming of Light Fittings

The following points must be followed in the installation and aiming of light fittings:

a. the lights are aimed so that there are no deviations in the main beam pattern, to within ½° from the applicable standard specified in this Chapter;
b. horizontal angles are measured with respect to the vertical plane through the taxiway centreline;
c. when measuring horizontal angles for lights other than taxiway centreline lights, the direction towards the taxiway centreline is to be taken to be positive;
d. vertical angles specified are to be measured with respect to the horizontal plane.

9.12.32 Illustrations of Taxiway Lighting

Section 9.15: contains illustrations of taxiway lighting.

9.13 Isocandela Diagrams for Taxiway Lights

9.13.1 Collective Notes to Figures

1. Figure 9.13-1 to Figure 9.13-5 show candela values in green and yellow for taxiway centreline lights and red for stop bar lights.
2. Figure 9.13-1 to Figure 9.13-5 show the minimum allowable light intensities. The average intensity of the main beam is calculated by establishing grid points as shown in Figure 9.13-7, and using the intensity values measured at all grid points located within and on the perimeter of the rectangle representing the main beam. The average value is the arithmetic average of the light intensities measured at all considered grid points.
3. No deviations are acceptable in the main beam when the lighting fixture is properly aimed.
4. Horizontal angles are measured with respect to the vertical plane through the taxiway centreline except on curves where they are measured with respect to the tangent to the curve.
5. Vertical angles are measured from the longitudinal slope of the taxiway surface.
6. The light unit is to be installed so that the main beam is aligned within one half degree of the specified requirement.
7. On the perimeter of and within the rectangle defining the main beam, the maximum light intensity value is not to be greater than three times the minimum light intensity measured.

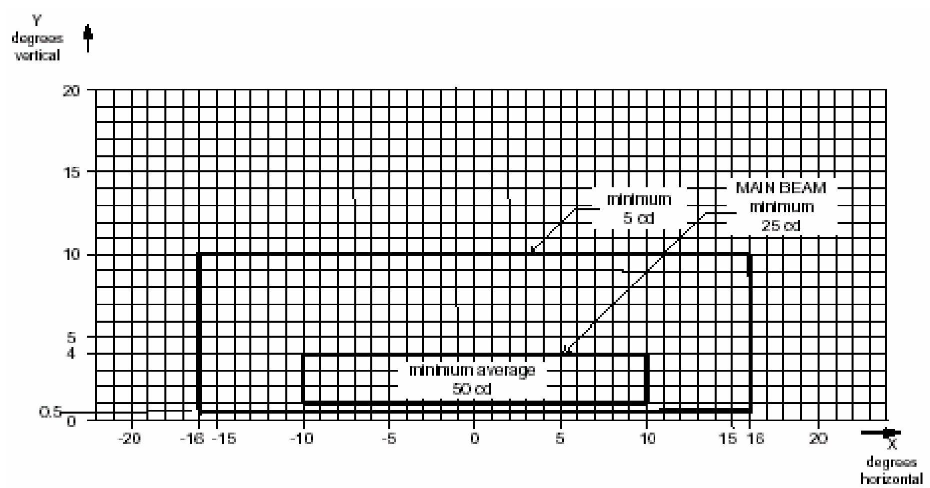


Figure 9.13-1: Isocandela diagram for Taxiway Centreline Lights, and Stop Bar Lights on Straight Sections of Taxiways intended for use in conjunction with a Non-Precision or Precision Approach Category I or II Runway

Notes : 1. The intensity values have taken into account high background luminance, and possibility of deterioration of light output resulting from dust and local contamination.

2. Where omnidirectional lights are used they must comply with the vertical beam spread.
3. See the collective notes at Paragraph 9.14.1 for these isocandella diagrams.

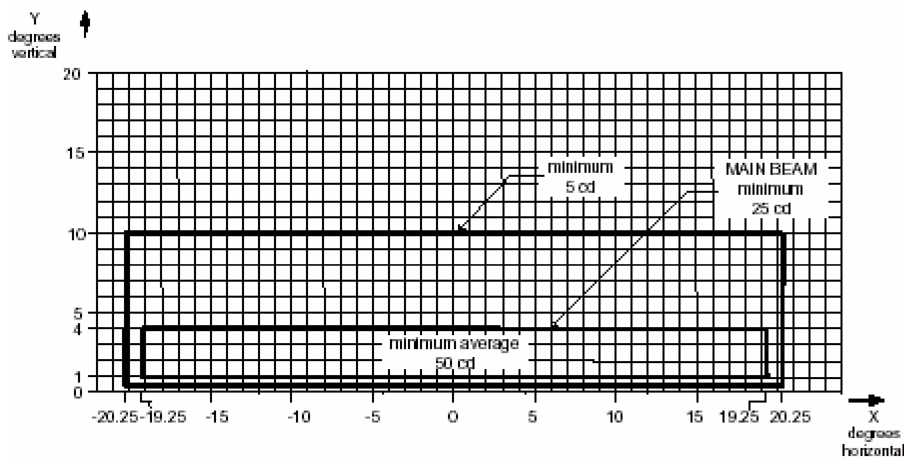


Figure 9.13-2: Isocandela Diagram for Taxiway Centreline Lights, and Stop Bar Lights on Curved Sections of Taxiways intended for use in conjunction with a Non-Precision or Precision Approach Category I or II Runway

Notes : 1. The intensity values have taken into account high background luminance, and possibility of deterioration of light output resulting from dust and local contamination.
2. Lights on curves to have light beam toed-in 15.75º with respect to the tangent of the curve.
3. These beam coverages allow for displacement of the cockpit from the centreline up to distance of the order of 12 m as could occur at the end of curves.
4. See collective notes at Paragraph 9.14.1 for these isocandela diagrams.

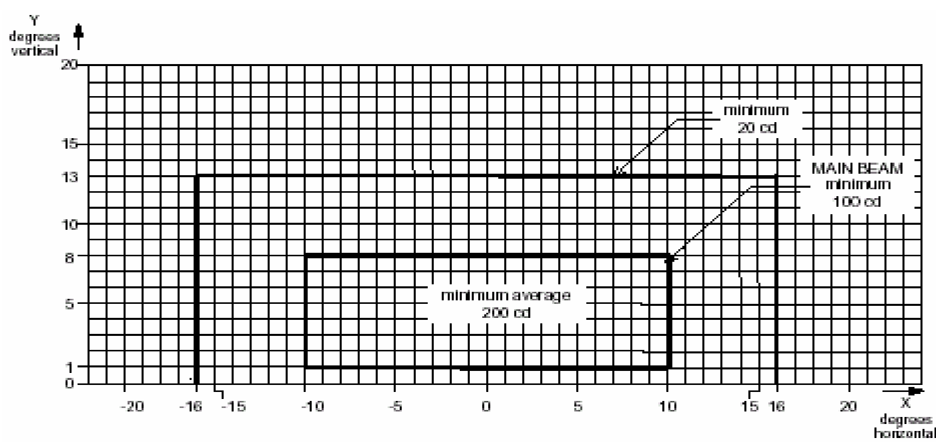


Figure 9.13-3: Isocandela Diagram for Taxiway Centreline Lights, and Stop Bar Lights, on Taxiway intended for use in conjunction with a Precision Approach Category III Runway — for use on straight sections of taxiway where large offsets can occur. Also for Runway Guard Lights Configuration B.

Notes : 1. These beam coverages are suitable for a normal displacement of the cockpit from the centreline of up to 3 m.
2. See collective notes at Paragraph 9.14.1 for these isocandela diagrams.

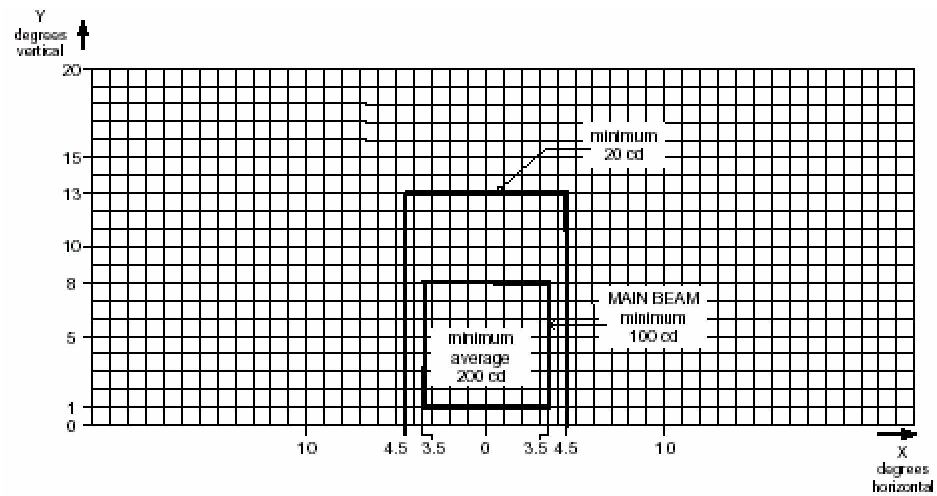


Figure 9.13-4: Isocandela Diagram for Taxiway Centreline Lights, and Stop Bar Lights, for Taxiways intended for use in conjunction with a Precision Approach Category III Runway – for use on straight sections of taxiway where large offsets do not occur

Notes : 1. These beam coverages are suitable for a normal displacement of the cockpit from the centreline of up to 3 m.
2. See collective notes at Paragraph 9.14.1 for these isocandella diagrams.

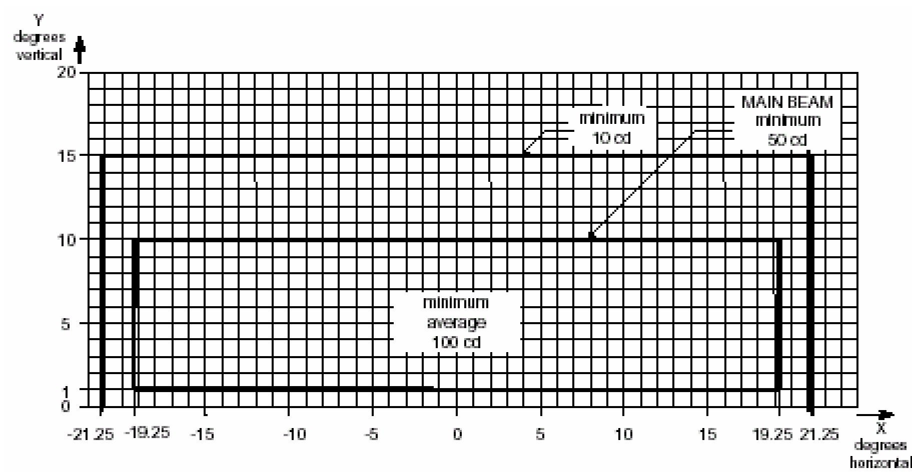


Figure 9.13-5: Isocandela Diagram for Taxiway Centreline Lights, and Stop Bar Lights, for Taxiways intended for use in conjunction with a Precision Approach Category III Runway — for use on curved sections of taxiway

Notes : 1. Lights on curves to have light beam toed-in 15.75º with respect to the tangent of the curve.
2. See collective notes at Paragraph 9.14.1 for these isocandella diagrams.

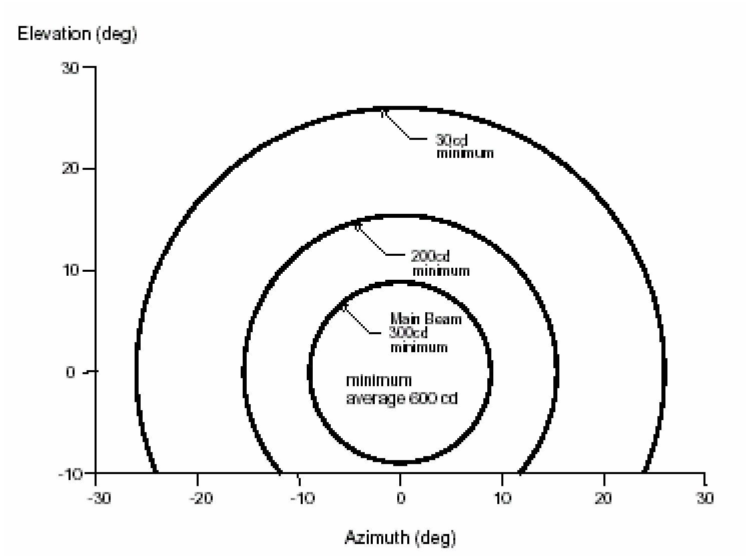


Figure 9.13-6: Isocandela Diagram for Each Light in Runway Guard Lights. Configuration A.

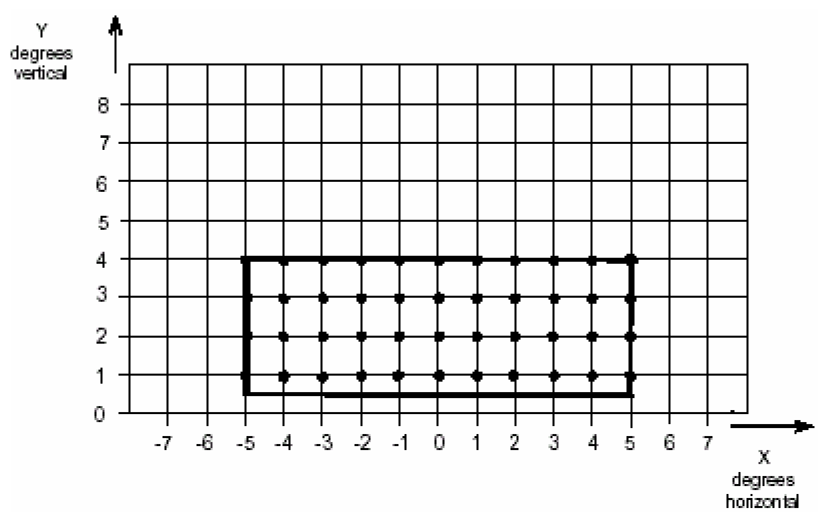


Figure 9.13-7: Method of Establishing Grid Points to be used for
Calculation of Average Intensity of Taxiway Centreline Lights and Stop Bar Lights

9.14 Illustrations of Taxiway Lighting

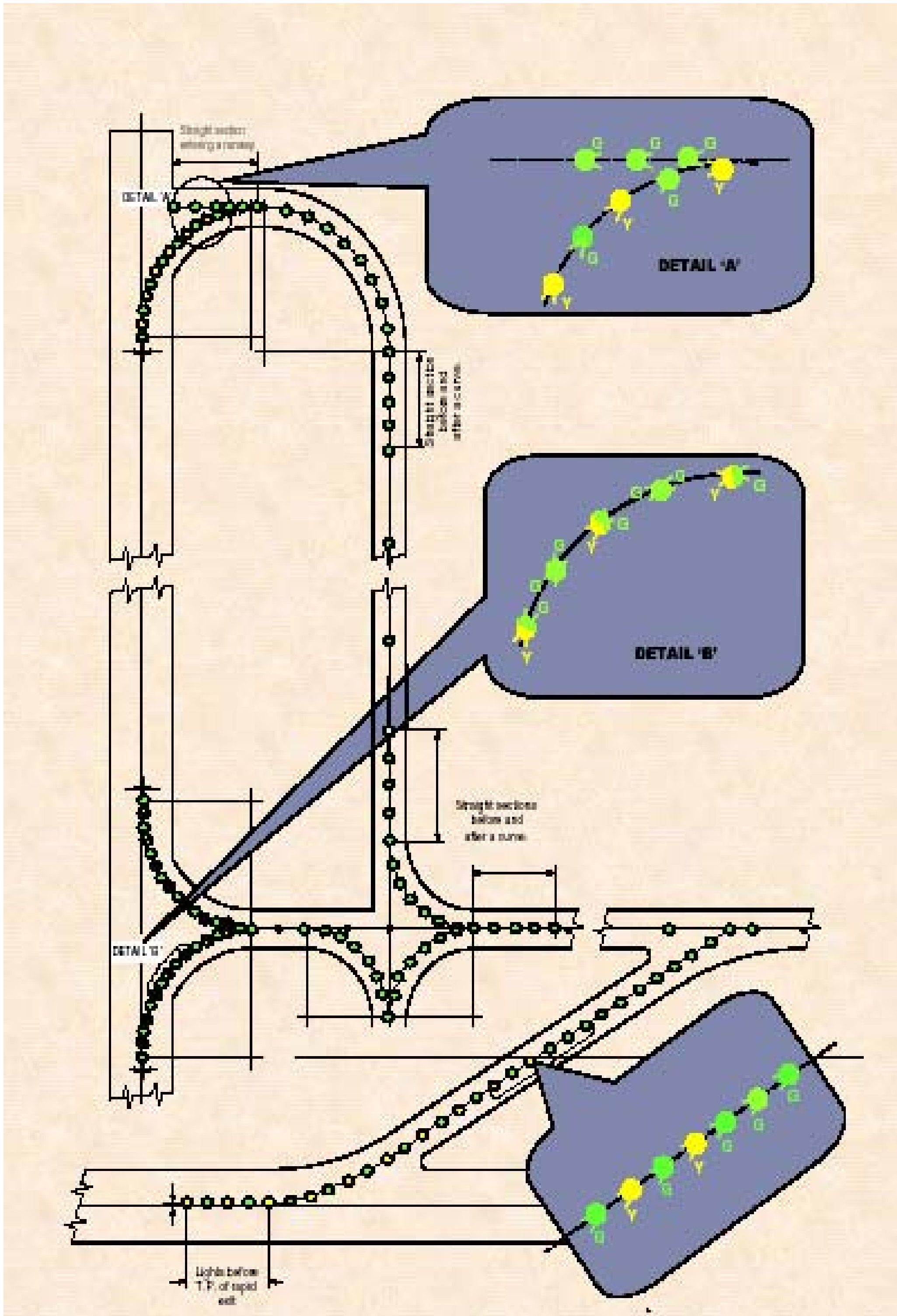


Figure 9.14-1: Typical Taxiway Centreline Lights Layout

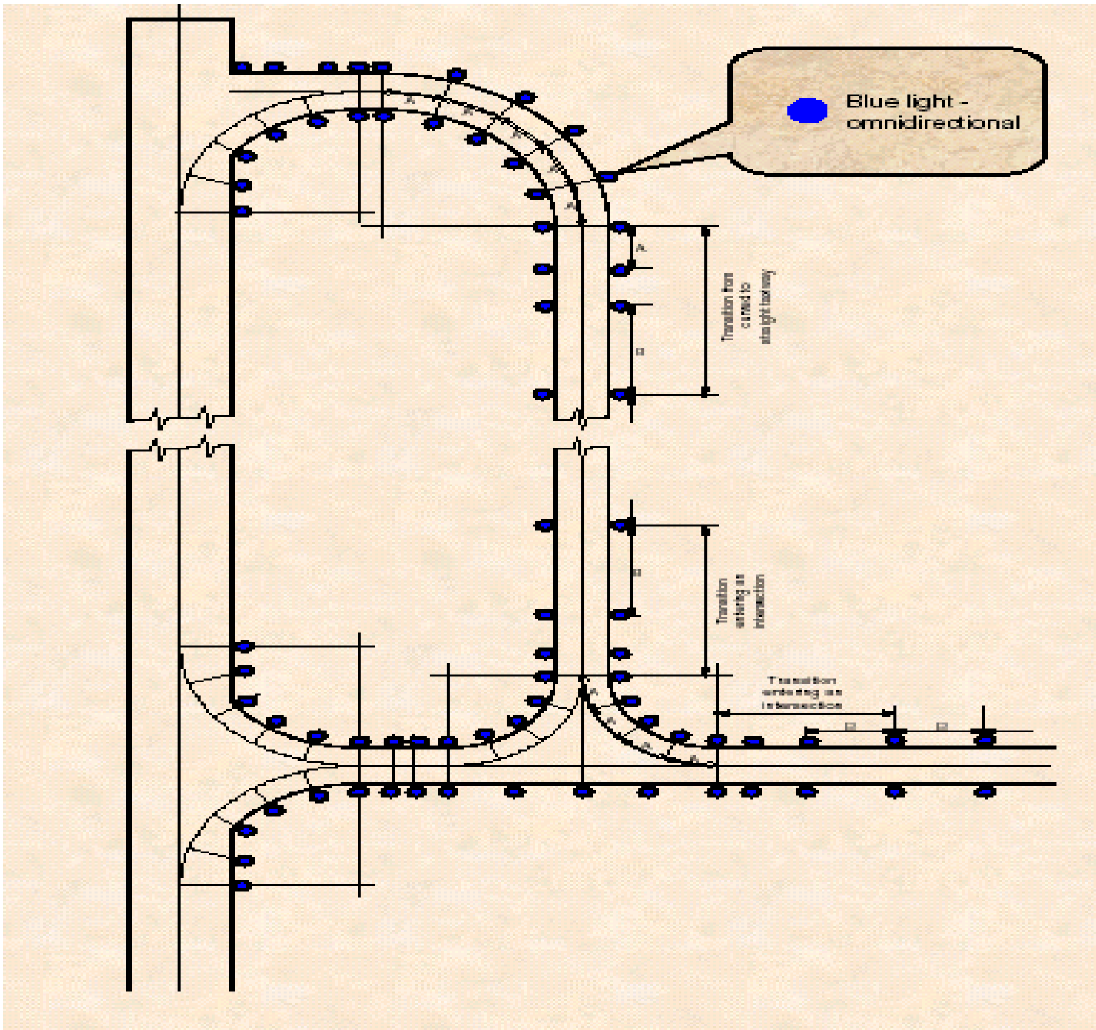


Figure 9.14-2: Typical Taxiway Edge Lights Layout

9.15 Apron Floodlighting

9.15.1 Introduction

Note : This Section will use aeroplane size as the criterion for illuminance specification.

1. ICAO establishes only one apron floodlighting standard. For the purpose of this Section, aeroplanes bigger than code 3C are treated as larger aeroplanes. Code 3C aeroplanes and aeroplanes smaller than code 3C are treated as smaller aeroplanes.

2. An existing floodlighting system on an apron currently used by larger aeroplanes which does not meet the specifications of this Section does not need to be replaced until the system is due for replacement, or until determined by DGAC based on a significant change in the usage of the apron by larger aeroplanes.

9.15.2 Provision of Apron Floodlighting

Apron floodlighting, in accordance with this Section, must be provided on an apron, or the part of an apron, and on a designated isolated aircraft parking position, intended for use at night.

9.15.3 Location of Apron Floodlighting

1. Apron floodlighting must be located so as to provide adequate illumination on all the apron service areas that are intended for use at night.

2. If an apron taxiway is not provided with taxiway lighting, then it must be illuminated by the apron floodlighting in accordance with either 9.15.4.3(b) or 9.15.4.4(b).

3. Apron floodlights must be located and shielded so that there is a minimum of direct or reflected glare to pilots of aircraft in flight and on the ground, air traffic controllers, and personnel on the apron.

   Note : *See also Section 9.21 in regard to upward component of light*.

4. An aircraft parking position must receive, as far as practicable, apron floodlighting from two or more directions to minimise shadows.

   Note : *For apron floodlighting purpose, an aircraft parking position means a rectangular area subtended by the wing span and overall length of the largest aircraft that is intended to occupy that position.*

5. Apron floodlighting poles or pylons must not penetrate the obstacle limitation surfaces.

9.15.4 Characteristics of Apron Floodlighting

1. To minimise the chance of an illuminated rotating object such as a propeller appearing stationary, at major aerodromes, the apron floodlighting is to be distributed across the phases of a three-phase power supply system to avoid a stroboscopic effect.

2. The spectral distribution of apron floodlights must be such that the colours used for aircraft marking connected with routine servicing, and for surface and obstacle marking, can be correctly identified. Monochromatic lights must not to be used.

3. The average illuminance of an apron intended for larger aeroplanes must be :

   a. at an aircraft parking position:
      - o for horizontal illuminance – 20 lux with a uniformity ratio (average to minimum) of not more than 4 to 1; and

- o for vertical illuminance – 20 lux at a height of 2 m above the apron in the relevant parking direction, parallel to the aeroplane centreline;

b. at other apron areas, horizontal illuminance at 50 per cent of the average illuminance on the aircraft parking position with a uniformity ratio (average to minimum) of not more than 4 to 1.

Note : The uniformity ratio between the average of all values of illuminance, measured over a grid covering the relevant area, and the minimum illuminance within the area. A 4:1 ratio does not necessarily mean a minimum of 5 lux. If an average illuminance of say 24 lux is achieved, then the minimum should be not less than 24/4 = 6 lux.

4. The average illuminance of an apron intended to be used only by smaller aeroplanes must be at least as follows :

a. at an aircraft parking position:
- o for horizontal illuminance – 5 lux with a uniformity ratio (average to minimum) of not more than 4 to 1; and
- o for vertical illuminance – 5 lux at a height of 2 m above the apron in the relevant parking direction, parallel to the aeroplane centreline;

b. at other apron areas, horizontal illuminance graded to a minimum of 1 lux at the apron extremities or 2 lux for apron edge taxiways which do not have taxiway lights.

5. A dimming control may be provided to allow the illuminance of an aircraft parking position on an active apron that is not required for aircraft use to be reduced to not less than 50 per cent of its normal values.

6. For aprons used by larger aeroplanes, the apron floodlighting must :

a. be included in the aerodrome secondary power supply system; and
b. be capable, following a power interruption of up to 30 seconds, of being re-lit and achieving not less than 50 per cent of normal illuminance within 60 seconds.

7. If existing floodlights cannot meet the requirement of paragraph 9.15.4.7, auxiliary floodlighting must be provided that can immediately provide at least 2 lux of horizontal illuminance of aircraft parking positions. This auxiliary floodlighting must remain on until the main lighting has achieved 80 per cent of normal illuminance.

9.16 Visual Docking Guidance Systems

9.16.1 Provision of Visual Docking Guidance Systems

1. A visual docking guidance system must be provided at an apron aircraft parking position equipped with a passenger loading bridge, where the characteristics of the passenger loading bridge require precise positioning of an aircraft.

2. The provisions of this Section do not, of themselves, require the replacement of existing installations. When existing installations are to be replaced due to obsolescence, facility upgrade, change of apron layout, change of passenger loading bridge, change of aircraft category, change of operational requirements, or similar reasons, all new and/or replacement visual docking guidance systems must comply with this Section.

9.16.2 Characteristics of Visual Docking Guidance Systems

1. The system must provide both azimuth and stopping guidance.

2. The azimuth guidance unit and the stopping position indicator must be adequate for use in all weather, visibility, background lighting, and pavement conditions for which the system is intended, both by day and night, but must not dazzle the pilot.

   Note : *Care is required in both the design and on-site installation of the system to ensure that reflection of sunlight, or other light in the vicinity, does not degrade the clarity and conspicuity of the visual cues provided by the system.*

3. The azimuth guidance unit and the stopping position indicator must be of a design such that:
   a. a clear indication of malfunction of either or both is available to the pilot; and
   b. they can be turned off.

4. The azimuth guidance unit and the stopping position indicator must be located in such a way that there is continuity of guidance between the aircraft parking position markings, the aircraft stand manoeuvring guidance lights, if present, and the visual docking guidance system.

5. The accuracy of the system must be adequate for the type of loading bridge and fixed aircraft servicing installations with which it is to be used.

6. The system must be usable by all types of aircraft for which the aircraft parking position is intended, preferably without selective operation.

7. If selective operation is required to prepare the system for use by a particular type of aircraft, then the system must provide an identification of the selected aircraft type to both the pilot and the system operator as a means of ensuring that the system has been set properly.

9.16.3 Azimuth Guidance Unit - Location

1. The azimuth guidance unit must be located on or close to the extension of the parking position centreline ahead of the aircraft so that its signals are visible from the cockpit of an aircraft throughout the docking manoeuvre and aligned for use at least by the pilot occupying the left seat.

2. Systems with azimuth guidance aligned for use by the pilots occupying both the left and right seats are acceptable.

9.16.4 Azimuth Guidance Unit - Characteristics

1. The azimuth guidance unit must provide unambiguous left/right guidance which enables the pilot to acquire and maintain the lead-in line without over controlling.

2. When azimuth guidance is indicated by colour change, green must be used to identify the centreline and red for deviations from the centreline.

9.16.5 Stopping Position Indicator - Location

1. The stopping position indicator must be located in conjunction with, or sufficiently close to, the azimuth guidance unit so that a pilot can observe both the azimuth and stop signals without turning the head.

2. The stopping position indicator must be usable at least by the pilot occupying the left seat.

3. Systems with stopping position indicator usable by the pilots occupying both the left and right seats are acceptable.

9.16.6 Stopping Position Indicator - Characteristics

1. The stopping position information provided by the indicator for a particular aircraft type must account for the anticipated range of variations in pilot eye height and/or viewing angle.

2. The stopping position indicator must show the stopping position of the aircraft for which the guidance is being provided, and must provide closing rate information to enable the pilot to gradually decelerate the aircraft to a full stop at the intended stopping position.

3. The stopping position indicator must provide closing rate information over a distance of at least 10 m.

4. When stopping guidance is indicated by colour change, green must be used to show that the aircraft can proceed and red to show that the stop point has been reached except that for a short distance prior to the stopping point a third colour may be used to warn that the stopping point is close.

9.16.7 Parking Position Identification Sign

1. A parking position identification sign must be provided at an aircraft parking position equipped with a visual docking guidance system.

2. A parking position identification sign must be located so as to be clearly visible from the cockpit of an aircraft prior to entering the parking position.

3. A parking position identification sign is to consist of a numeric or alphanumeric inscription, in white on a black background. The inscription is to be outlined in neon tubing for illumination at night. Experience has shown that green neon tubing illumination has proved satisfactory.

9.16.8 Notification of Type of Aircraft Docking Guidance Systems

1. Due to the large variety of different type of visual docking guidance systems to be found in operation at aerodromes, information on particular types installed is published in aeronautical information publications, for use by pilots.

2. Aerodrome operators must notify DGAC of the details of their aircraft docking guidance system intended for use for International operations.

3. The information to be provided is to include:
   a. type of visual docking guidance system;
   b. descriptive information, including illustrations where appropriate, for any type of system not currently described in AIP Indonesia; and
   c. parking positions at which the system is installed.

4. Initial and subsequent notification must be in accordance with Chapter 5, Aerodrome Information for AIP and Chapter 10, Operating Standards for Certified Aerodromes. The visual docking guidance system information must also be recorded in the Aerodrome Manual.

9.17 Lighting Associated with Closed and Unserviceable Areas

9.17.1 Closed Runway or Taxiway

1. When a runway or taxiway, or portion thereof is closed, all aerodrome lighting thereon is to be extinguished. The lighting is to be electrically isolated or disabled, to prevent inadvertent activation of the lights.

   Note : *1. Restricted operation of the lights is permissible for maintenance or related purposes.*
   2. It is acceptable for short time periods, to cover lights with an opaque cover provided that:

- *the cover is firmly attached to the ground, so that it cannot be unintentionally dislodged, and*
- *the cover, and its means of attachment to the ground, do not pose a hazard to aircraft, and do not constitute an object that is not lightweight and frangible.*

2. Where a closed runway, taxiway, or portion thereof, is intercepted by a useable runway or taxiway which is used at night, unserviceability lights are to be placed across the entrance to the closed area at intervals not exceeding 3 m.

9.17.2 Unserviceable Areas

1. When any portion of a taxiway, apron, or holding bay is unfit for movement of aircraft, but it is still possible for aircraft to bypass the area safely, and the movement area is used at night, unserviceability lights are to be used.

2. The lights are to be placed at intervals sufficiently close so as to delineate the unserviceable area and, in any case, must not be more than 7.5 m apart.

9.17.3 Characteristics of Unserviceability Lights

1. Unserviceability lights are to be steady red lights.

2. The lights are to have an intensity sufficient to ensure conspicuity considering the intensity of the adjacent lights and the general level of illumination against which they would normally be viewed. In no case is the intensity to be less than 10 cd of red light.

9.18 Other Lights on an Aerodrome

9.18.1 Vehicle Warning Lights

1. Vehicle warning lights, as required by 10.9.2, are provided to indicate to pilots and others the presence of moving vehicles or mobile plant on the movement area.

2. A vehicle warning light or lights must be mounted on the top of the vehicle, so as to provide 360° visibility.

3. The lights must be amber/yellow/orange, and be flashing or rotating of a type acceptable to DGAC.

   Note : *International experience has shown the following specification to be particularly suitable. Yellow light, with a flash rate of between 60 and 90 flashes per minute, with a peak intensity of between 40 cd and 400 cd, a vertical beam spread of 12°, and with the peak intensity located at approximately 2.5° vertical.*

4. For emergency or security vehicles not dedicated to aerodrome use, vehicle warning lights complying with the local traffic code are acceptable for on aerodrome operation.

9.18.2 Works Limit Lights

1. Works limit lights are provided to indicate to persons associated with the works organisation the limit of the works area.
2. Works limit lights must be portable, amber/yellow/orange lights of a standard type commercially available as works warning lights. Alternatively they may be liquid fuel lanterns with amber/yellow/orange lenses.

9.18.3 Road and Car Park Lighting

1. DGAC does not regulate the lighting of roads and car parks, other than ensuring compliance with Paragraph 9.1.3.

2. Where road and car park lighting is required on an aerodrome, the aerodrome operator is advised to consult with the relevant local road authority.

9.19 Monitoring, Maintenance and Serviceability of Aerodrome Lighting

9.19.1 General

1. The aerodrome operator must monitor and maintain all lights and lighting systems associated with the aerodrome visual ground aids, both day and night, on a continuing basis for correctness and so that they are easily seen. Monitoring of lighting systems such as T-VASIS, PAPI and approach lighting must be carried out in accordance with the frequencies and procedures set out in the Aerodrome Manual. Other aerodrome lights must be monitored during the daily serviceability inspections and they must be switched on for this purpose.

2. Grass areas around lights must be maintained such that the lights are not in any way obscured. Lights must be kept free from dirt so as not to degrade their colour and conspicuousness. Damage to lights, including loss or degradation of light must be made good.

9.19.2 Reporting of Aerodrome Lighting Outage

1. Any aerodrome light outage detected must be fixed as soon as is practicable. The specifications below are intended to define the maintenance performance levels objectives. They are not intended to define whether the lighting system is out of service. Nor are they meant to condone outage but are intended to indicate when lighting outage must be notified to the NOTAM Office. The specifications must be used as triggers for NOTAM action to advise pilots of actual outage, unless the outage can be rectified before the next period of use.

2. For details of the raising of NOTAMs refer to Section 10.3.

3. A light is deemed to be on outage when the main beam is out of its specified alignment or when the main beam average intensity is less than 50 per cent of the specified value. For light units where the designed main beam average intensity is above the specified value, the 50 per cent value shall be related to that design value.

   Note : *For existing installations where the design main beam average intensity values are unknown and/or unobtainable, the 50 per cent value shall be related to the specified value.*

4. A flashing or occulting light is deemed to be on outage when:
   a. the light ceases to flash or occult; or
   b. the frequency and/or duration of flash is outside the specified range by a factor of 2 to 1 or greater; or
   c. within a 10 minute period, more than 20% of flashes fail to occur.

5. A lighting system is deemed to be on outage when-
   a. in the case of a lighting system comprising less than 4 lights (e.g. intermediate holding position lights or runway threshold identification lights), any of the lights are on outage;
   b. in the case of a lighting system comprising 4 or 5 lights (e.g. wind direction indicator lights or runway guard lights), more than 1 light are on outage;
   c. in the case of a lighting system comprising 6 to 13 lights (e.g. threshold lights), more than 2 lights are on outage, or 2 adjacent lights are on outage;
   d. in the case of a lighting system comprising more than 13 lights, more than 15% of the lights are on outage, or two adjacent lights are on outage.

   Note : *A lighting system here means lights used to illuminate a particular facility, e.g. all the lights used to mark a threshold or runway end, runway edge lights on a runway, taxiway lights on a length of taxiway between intersections, a T-VASIS or a PAPI system.*

6. For a T-VASIS, the outage standards take into account both the number of outage lamps within a light unit, and also the number of light units within the T-VASIS system. The standards are:

   a. A T-VASIS light unit is deemed on outage when 3 or more lamps in the electrical (day) circuit are on outage, or when any of the lamps in the electrical (night) circuit is on outage.

   b. A T-VASIS system is deemed on outage when:
      o bar units — more than 2 light units or two adjacent light units are on outage;
      o fly-up units — more than 1 light unit are on outage;
      o fly-down units — more than 1 light unit are on outage.

   c. An AT-VASIS system is deemed on outage when:

- o bar units — more than 1 light unit is on outage,or
- o fly-up units — any light unit is on outage,or
- o fly-down units — any light unit is on outage.

d. Whenever a red filter has deteriorated such that it does not produce the correct colour light beam, is missing or is damaged, all the lamps within the affected light unit must be extinguished until the red filter is rectified. The affected light unit is included as an outage light unit when applying (b) or (c) above.

7. For a PAPI, the outage standards take into account both the number of lamps on outage within a light unit, and also the number of light units within the PAPI system. The standards are:

a. A PAPI light unit is deemed on outage when more than 1 lamp in a 3-or more lamp light unit is on outage, or any lamp in a less-than-3-lamp light unit is on outage.

b. Whenever a red filter has deteriorated such that the correct colour is not showing, is missing or is damaged; all the lamps associated with that filter must be extinguished until the red filter is rectified. The affected lamps are included in outage when determi9ning (a) above.

c. A double-sided PAPI system (i.e. 8 light units) is:
- o deemed on outage but useable when all light units in one bar are fully functioning, and any light units in the other wing bar are on outage The system may remain in use but a NOTAM must be issued detailing the number of lights on outage and on which side the outage has occurred; and
- o deemed on outage when one or more lights in each wing bar is on outage. The double-sided PAPI must be extinguished until the system is rectified.

d. A single-sided PAPI system (i.e. 4 light units) is deemed on outage when any light unit is on outage. The PAPI system must be extinguished until the deficiency is rectified.

8. At an aerodrome where the lighting system is provided with interleaf circuitry, the lighting system is deemed to be on outage when any one of the circuits fails.

9.20 Lighting in the Vicinity of Aerodromes

9.20.1 Introduction

The Directorate General of Air Communication (DGAC) may require lights which may cause confusion, distraction or glare to pilots in the air, to be extinguished or modified.

Ground lights may cause confusion or distraction by reason of their colour, position, pattern or intensity of light emission above the horizontal plane.

9.20.2 General Requirement

1. Advice for the guidance of designers and installation contractors is provided for situations where lights are to be installed within a 6 km radius of a known aerodrome. Lights within this area fall into a category most likely to be subjected to the provisions of the regulation 94 of CAR 1988. Within this large area there exists a primary area which is divided into four light control zones: A, B, C and D. These zones reflect the degree of interference ground lights can cause as a pilot approaches to land.

2. he primary area is shown in Figure 9.20-1. This drawing also nominates the intensity of light emission above which interference is likely. Lighting projects within this area should be closely examined to see they do not infringe the provision of regulation 94 of CAR 1988.

3. he fact that a certain type of light fitting already exists in an area is not necessarily an indication that more lights of the same type can be aded to the same area.

4. Even though a proposed installation is designed to comply with the zone intensities shown in Figure 9.20-1, designers are advised to consult with DGAC as there may be overriding factors which require more restrictive controls to avoid conflict.

9.20.3 Light Fittings

1. Light fittings chosen for an installation should have their isocandela diagram examined to ensure the fitting will satisfy the zone requirements. In many cases the polar diagrams published by manufacturers do not show sufficient detail in the sector near the horizontal, and therefore careful reference should be made to the isocandela diagram.

2. For installations where the light fittings are selected because their graded light emission above horizontal conform with the zone requirement, no further modification is required.

3. For installations where the light fitting does not meet the zone requirements,then a screen should be fitted to limit the light emission to zero above the horizontal. The use of a screen to limit the light to zero above the horizontal is necessary to overcome problems associated with movement of the fitting in the wind or misalignment during maintenance.

9.20.4 Coloured Lights

Coloured lights are likely to cause conflict irrespective of their intensity as coloured lights are used to identify different aerodrome facilities. Proposals for coloured lights should be referred to the Authority for detailed guidance.

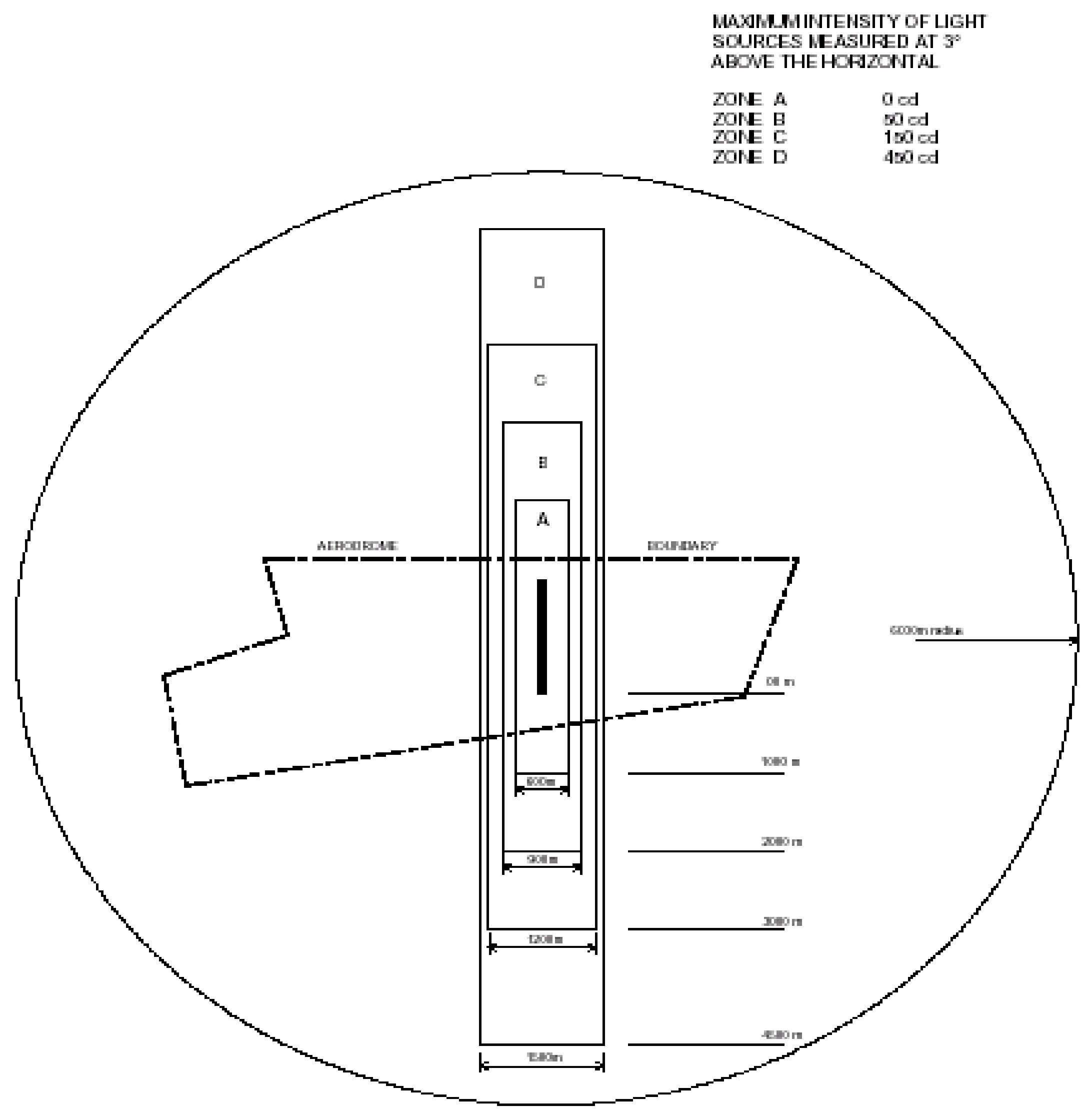


Figure 9.20-1: Maximum lighting intensitie.

10. OPERATING STANDARDS FOR CERTIFIED AERODROMES.

10.1 General.

10.1.1 Introduction.

1. This Chapter sets out the standards to be incorporated in operating procedures at certified aerodromes, including those procedures to be documented in the aerodrome manual.

2. This Chapter also contains information on aerodrome Safety Management System (SMS). As prescribed in CASR Part 139, SMS will be applicable at certified aerodromes with effect from November 2005. All aerodrome operators are encouraged to adopt SMS as early as possible but until such time as specified in the regulations, adoption of SMS is voluntary.

3. The standards are to be applied in a manner commensurate with the type and level of aircraft activities at the particular aerodrome. For example, Section 10.17 on low visibility operations, may not apply to all aerodromes.

10.1.2 Aerodrome Manual and Aerodrome Operating Procedures.

1. As an integral part of the certification process, an aerodrome manual must be prepared setting out a range of information and operating procedures specified in CASR Part 139. Although the certification process does not involve a separate approval process for the aerodrome manual, the information contained in the manual must be acceptable to DGAC.

2. The aerodrome manual must be in a format that can be readily updated.

3. The contents of the aerodrome manual may be presented in a single compiled document or in a number of separate documents. For example, at major aerodromes, the aerodrome emergency plan and the airside vehicle control handbook may each be a large stand-alone publication. Where this is the case, the aerodrome manual must effectively integrate the component publications by appropriate references.

4. An up-to-date copy of all components of the aerodrome manual must be kept at the business premises of the aerodrome operator and made available for DGAC audit purposes.

10.1.3 Training of Aerodrome Personnel Involved with Safety Functions.

1. Persons engaged to perform the reporting functions, including aerodrome serviceability inspections, and other safety functions must be adequately trained for the job

2. With regard to aerodrome certification, DGAC is primarily concerned with the competency of persons involved with aerodrome safety functions. Essential competencies will include:

   a. inspect and report on the physical characteristics and conditions of the aerodrome;
   b. inspect and report on aerodrome lighting systems;
   c. inspect and report on the OLS;
   d. initiating a NOTAM;
   e. use of radio, and
   f. supervise the safety of aerodrome works.

3. There are no mandatory provisions which regulate private training organisations or aerodrome operator training initiatives but aerodrome operators must be able to demonstrate that persons carrying out aerodrome safety functions have had the appropriate training and experience to undertake those functions

   Note : *Guidance on the training of aerodrome personnel can be found in the associated Advisory Circular.*

10.1.4 Aerodrome Safety Management System (SMS).

1. In line with international practice, SMS will be introduced at certified aerodromes. Certified aerodromes will be required to have an operating safety management system by 24 November 2005.

2. Safety culture and ongoing commitment of senior management are essential ingredients for a successful SMS, along with the setting of safety objectives, clear responsibilities, ongoing hazard identification and reporting, training and performance measurement.

   Note : *An Advisory Circular will be prepared to provide guidelines on the preparation of a SMS. It is important to appreciate, each aerodrome SMS will be similar but different as each will relate to site-specific situations and management structures. Aerodromes differ due to differences in size, complexity and types of operation.*

3. The SMS does not necessarily generate a need for an additional set, or duplication of documents. The SMS requirements should complement the procedures set out in the aerodrome manual.

10.2 Inspecting and Reporting Aerodrome Serviceability.

10.2.1 General.

1. Whilst aerodrome serviceability inspections are essentially visual checks, the process must include appropriate remedial actions where there is an immediate affect on the safety of aircraft operations. If the identified fault cannot be

remedied before the next aircraft operations, then the matter must be reported to the NOTAM office. Examples of this type of remedial action include replacement of broken light lenses, lamp replacement or removal of debris from the movement area.

2. The operator of a certified aerodrome is required to arrange for aerodrome serviceability inspections to be carried out each day, after a natural phenomena such as severe wind or rain storm, earthquake, or when requested by air traffic control or by DGAC.

3. Subject to DGAC agreement, the frequency of inspections may be reduced to not less than 2 per week at aerodromes with low numbers of traffic movements.

4. Aerodrome reporting is the notification of changes to the published aerodrome information or any other occurrence or emergency affecting the availability of the aerodrome and safety of aircraft using the aerodrome. The occurrences may be known beforehand, as planned aerodrome works, or discovered during an inspection of the aerodrome or obstacle limitation surfaces.

5. Particulars of the procedures for carrying out serviceability inspections, including the use of a checklist, and for reporting any changes to aerodrome information or for requesting the issue of a NOTAM are to be included in the aerodrome manual.

10.2.2 Significant Objects.

Any significant object found in the course of the inspection, including aircraft parts which may have fallen from the aircraft, or the remains of birds which may have been struck by an aircraft, must be reported immediately to Air Traffic Control, where appropriate, and to the National Transportation Safety Committee (NTSC)

10.2.3 Surface Conditions of the Movement Area, Including the Presence of Water.

The inspection must check for the presence of:

a. ponding;
b. cracking or spalling;
c. rubber build up;
d. surface irregularities;
e. damage caused by spillage of corrosive fluids;
f. pipe drain faults particularly in fine grain non cohesive subgrades, in high rainfall areas;
g. scour or erosion ditches;
h. termite mounds or other ground obstacles obscured by long grass;
i. soft ground, particularly in combination with surface roughness and slipperiness; and
j. any other sign of pavement distress which has the potential to develop quickly into a hazardous situation.

10.2.4 Aerodrome Markings, Lightings, Wind Direction Indicators and Ground Signals.

The inspection must check for:

a. loss of visibility of markers and markings;
b. use of incorrect markers and markings;
c. any disturbance to level and alignment of lights;
d. visual light intensity check; does a light stand out less bright than others in the same system?
e. discoloured or dirty lenses;
f. outage lamps, incorrect lamps fitted, or lamps fitted wrongly;
g. the condition of the frangibility of light bases;
h. exposed edges around footings and other aerodrome installations;
i. damage to wind indicator assembly or mounting; and
j. damage to wind indicator sleeve fabric, or loss of conspicuous colour.

10.2.5 Cleanliness of the Movement Area.

The inspection must check for:

a. foreign objects, such as aircraft fastening devices and other parts,
b. mechanics tools, small items of equipment and personal items;
c. debris, such as sand, loose rocks, concrete, wood, plastic, pieces of tyre and mud; and
d. with particular vigilance during and after construction activity, where vehicles and plant travel over unpaved areas under wet conditions.

10.2.6 Obstacles Infringing the Take-off, Approach and Transitional Surfaces.

The aerodrome operator must have procedures in place and equipment available to enable inspection personnel to identify objects protruding through the OLS. Equipment should include appropriate instrumentation, such as:

a. a hand held clinometer;
b. 'sighting plane' installations; or
c. formal survey equipment.

10.2.7 Birds or Animals on, or in the Vicinity of, the Movement Area.

The inspection must include:

a. the condition of aerodrome fencing, particularly in critical areas;
b. climatic or seasonal considerations, such as the presence of birds at certain times of the year, or related to the depth of water in drainage ponding areas;
c. possible shelter provided by aerodrome infrastructure such as buildings, equipment and gable markers;
d. bird hazard mitigating procedures incorporated in the environmental management procedures for the aerodrome;

e. off-airport attractors like animal sale yards, picnic areas, aeration facilities and waste disposal or landfill areas, and
f. use of harassment procedures where appropriate.

10.2.8 Empirical Assessment of the Bearing Strength of Unrated Runway Pavements and Runway Strips.

1. The bearing strength of a runway strip will only be required to be assessed where an unsealed runway is not marked and the whole of the runway strip is available for aircraft operations.

2. Whilst discretion and judgement together with local knowledge, will always form part of empirical assessment of bearing capacity, appropriate test procedures must be in place for the practical guidance of persons making the assessment. Simple test procedures can be devised such as those involving:

   a. use of a crowbar when a dry surface may conceal a soft unserviceable base;
   b. the back of a pick, in the hands of someone with practical pavement experience; or
   c. a suitably laden utility or truck to simulate the wheel loads of user aircraft.

10.2.9 Currency of NOTAMs.

Daily serviceability inspection must include checking any outstanding NOTAM for the aerodrome. Check that the contents of the NOTAM, particularly the effective period(s) are still current.

10.2.10 Aerodrome Fencing.

The inspection must check for damaged fences, open gates and signs of attempted entry by either animals or humans.

10.2.11 Inspection Logbooks.

The aerodrome operator must maintain aerodrome inspection logbooks for recording the date and time of each aerodrome serviceability inspection, the results of each inspection and any action taken. Logbooks must be retained for at least *2* years.

10.3 Initiating a NOTAM.

10.3.1 Introduction

1. A NOTAM is used to inform pilots and aircraft operators of significant changes to the aerodrome that may impact on aircraft operations. This is one of the most important aerodrome safety functions, so the process and procedures for initiating NOTAMs must be clearly set out in the Aerodrome Manual and all the persons involved must be fully informed and trained. A NOTAM may be originated and cancelled by an authorised officer or a relevant DGAC officer.

2. For changes to navigation aids, ATC frequencies or special procedures, NOTAM may be originated by a relevant services provider or a DGAC officer. Where a navigation aid is owned and maintained by the aerodrome operator, a NOTAM to notify changes to its status may be originated by the nominated reporting officer.

10.3.2 Changes Reported to NOTAM Office

1. Where a change in the aerodrome condition requires a NOTAM to be issued, the nominated reporting officer must send the notification to the NOTAM Office (NOF) by FAX or by telephone. Telephone advice must be confirmed in writing as soon as possible.

2. The following occurrences must be reported to the NOTAM Office:

   a. changes (temporary or permanent) in the published aerodrome information including additional changes to current permanent NOTAMs;
   b. aerodrome works affecting runways or the obstacle limitation surfaces, including time-limited works that require more than 10 minutes to re-instate to serviceable order;
   c. unserviceable portions of the runway or failure in aerodrome lighting or obstacle lighting;
   d. temporary obstacles to aircraft operations;
   e. a significant increase in, or concentration of birds or animals on or in the vicinity of the aerodrome;
   f. changes in excess of 0.05% of the published gradient data;
   g. emergence of new obstacles;
   h. when a radio navigation aid or landing aid owned by the aerodromeoperator is unserviceable or returned to service;
   i. when an Aerodrome Frequency Response Unit owned by the aerodrome operator is unserviceable or returned to service; and
   j. any other significant event which affects the safety of aircraft using the aerodrome.

3. Reporting to NOTAM Office must be carried out as expeditiously as possible. If all the relevant information cannot be provided at once, the matter must still be reported, and subsequent details can be issued by further NOTAM. When in doubt, err on the side of safety.

   Note : *To avoid overloading the NOTAM system, non-safety critical failures are not normally reported. For example, runway strip condition is not normally reported. Similarly, if a section of taxiway or apron is unserviceable, including some of the taxiway lighting or apron floodlighting being unserviceable, the area should be appropriately marked and lit, but the unserviceability does not normally need to be reported. If, however, the aerodrome only has one taxiway, and it is unserviceable, or only one apron, and the entire apron is unserviceable, it would be appropriate to notify these occurrences by NOTAM.*

4. In reporting changes for NOTAM action, the aerodrome operator must submit a report which includes:

   a. aerodrome name;
   b. the aerodrome facility affected and details of unserviceability;
   c. reason for change;
   d. start time and expected end time of the unserviceability; and
   e. daily duration or time schedule of the unserviceability, where applicable.

   Note : *Use of a form with standard headings will assist reporting. A sample aerodrome report form is shown in Section 10.4.*

5. After making a request to the NOF for a NOTAM, the reporting officer must obtain a copy of the subsequent NOTAM, in order to check the accuracy and to keep a record of its issue.

   Note : *To illustrate how changes to aerodrome information are communicated to pilots, some examples of NOTAMs are given in Section 10.5. This Section also provides a listing of general word abbreviations and phrase contractions to minimise the length of aerodrome NOTAMs.*

10.3.3 Time-Limited NOTAM

A NOTAM which is not a permanent NOTAM is 'time limited'. A time-limited NOTAM will have an expected and declared ending time, and will lapse automatically.

10.3.4 Permanent NOTAM

A PERM NOTAM is originated in respect to permanent changes to aerodrome operational information published in AIP. This information is passed to the NOTAM office, which will issue the NOTAM and further pass the information on to AIS. AIS will incorporate the changes in the following edition of AIP. The NOTAM is cancelled when the information is duly published in AIP.

10.3.5 Making Changes to Aerodrome Information Published in AIP

For changes to AIP information which does not have an immediate impact on aircraft operations, the changes are not to be notified to NOF. Instead the aerodrome operator must notify AIS directly in writing of such changes. Example: change of a fuel supplier.

10.3.6 Bird or Animal Hazard Warning

At aerodromes where a standing caution is included in AIP for a bird or animal hazard, NOTAM must only be initiated where there is a significant increase of birds or animals. The NOTAM must provide specific information on species, period of concentration, likely location and flight path.

10.3.7 New or Upgraded Visual Aids

Any AIP amendment that introduces a new visual aid, or the upgrading of an existing aid, must be referred to the appropriate DGAC for clearance purposes. Certain visual aids have to be commissioned or flight checked before being brought into operational use.

10.3.8 Changes to Type A Chart Information

Changes to Type A Chart information are not notified through NOTAM, however, AIP must refer to the latest edition of the Type A Chart. Aerodrome operators must provide an amendment service for the Type A Chart information directly to holders of the charts.

10.3.9 Follow up Actions

The aerodrome operator must also ensure that the Aerodrome Manual is amended to reflect changes other than temporary changes.

10.3.10 Record Keeping

Aerodrome operators must maintain a logbook showing details of all reports and check subsequent NOTAM or changes to AIP for accuracy, and keep a copy of reports and NOTAM with the logbook.

10.4 Sample Aerodrome Report Form.

Aerodrome Report Form
Notification of Changes to Serviceability of a Certified Aerodrome

To : NOTAM Office Phone : .... Fax : ....
AERODROME : ....
Date : ....
TIME (UTC preferred) : .... UTC . WST . CST . EST

Purpose of Report : PROVIDE NEW INFORMATION DETAILED BELOW
EXTEND PREVIOUS ADVICE (NOTAM No ....) . Date: ....
CANCEL PREVIOUS ADVICE (NOTAM No ....) . Date ....

Period of Validity : Permanent or Temporary **NOTAM** *(Delete one)*
FROM (date/time) ....

TO (date/time) .... Estimated. (if finish time uncertain) (*temporary NOTAM only*)
Note : If time estimated, contact NOTAM OFFICE at least 2 hours before estimated duration time and advise if NOTAM is to be extended or cancelled
Daily duration or time schedule *(if applicable)*
FROM (date/time) ....
O (date/time) ....

Text (*For example of text see Section 10.5*)

Please fax copy of NOTAM to originator Fax No. ....

This report confirms previous telephone advice Contact Number : Ph .... Fax ....

Signed .... Date/Time ....
Reporting Officer (Print Name) ....

DGAC advised by: Phone . Fax . E-mail . Not advised

For NOTAM Office only
NOTAM No. C .... Initials ....

10.5 Examples of NOTAM and Listing of Abbreviations.

10.5.1 Examples.

To illustrate how changes to aerodrome information are communicated to pilots, some examples of NOTAM are given below.

10.5.1.2 Time-limited Work.

C0174/91 NOTAMN
a. MARYBOROUGH 0174/91 (AD) 9106140900
b. 9106211000
c. 9106211600
d. RWY 17/35 WIP. MAE WILL CLR IF OPRT INDICATED.

10.5.1.3 Explanations of NOTAM Format.

C0174/91 — the NOTAM number;
NOTAMN — a NOTAM containing new information;
a. Maryborough — name of aerodrome;

   AD — information relating to aerodromes, or facilities thereon, including approach and landing aids, and the existence or removal of hazards or obstructions.

   9106140900 — year/date/time of issue of NOTAM, in ten figures UTC, representing year, month, day, hour and minutes (Note, the year may be omitted)

b. 9106211000 — commencement of occurrence;
c. 9106211600 — cessation of occurrence and notification;
d. 1000/1600 — periods of activity within the period specified in Fields B and C;
e. The text of the NOTAM expressed as concisely as possible.

10.5.1.4 Major works in accordance with Method of Working Plan (MOWP)

1. C0943/91 NOTAMN.
   a. PERTH 0943/91 (AD) 9105200600
   b. 9105222300
   c. 9105270800 EST
   d. RWY 06/24 NOT AVBL DUE WIP. REF MOWP 4/1987 ACT STAGE 1.
2. C0056/91 NOTAMN.
   a. COOLANGATTA 0056/91 (AD) 9106101002
   b. 9106121100
   c. 9106140600
   d. RWY 14/32 NOT AVBL DUE WIP. REF MOWP QRO 86/7 ACT STAGE3.

3. C0934/95 NOTAMN.
    a. MACKAY C0934/95 (AD) 9505200600
    b. 9506032200
    c. 9506100600
    d. 2200/0600 DAILY
    e. RWY 06/24 WIP. REF MOWP 4/1993 AMENDMENT 3. 360M N END NOT AVBL.

4. C0935/95 NOTAMN.
    a. MACKAY C0935/95 (AD) 9505200600
    b. 9506032200
    c. 9506040600
    d. 2200/0600 DAILY
    e. RWY 18/36 WIP. REF MOWP 4/1993 AMENDMENT 3. (followed by lengthy text of NOTAM).

10.5.1.5 Unserviceable movement areas.

1. C0639/91 NOTAMN
    a. KINGAROY 0639/91 (AD) 9107272100
    b. 9107272100
    c. 9108010600 EST
    d. RWY 05/23 AND TWY PARL RWY 16/34 NOT AVBL DUE SOFT WET SFC. RWY 16/34 AVBL.

2. C0021/91 NOTAMN
    a. WONDAI 0021/91 (AD) 9103232200
    b. 9103232200
    c. 9103290600 EST
    d. RWY 18/36 AMD. LEN. 140M S END NOT AVBL DUE ROUGH SFC. THR 36 DISP 200M. RWY 18 TORA 1264 (4146) TODA 1464 (4802) ASDA 1264 (4146) LDA 1264 (4146) RWY 36 TORA 1264 (4146) TODA 1324 (4343) ASDA 1264 (4146) LDA 1204 (3949)

10.5.1.6 Surface bearing capacity. If the surface or part of the manoeuvring area is not serviceable for heavy aircraft a weight restriction may be imposed to allow light aircraft to operate.

C0281/91 NOTAMN
a. TARA 0281/91 (AD) 9108160400
b. 9108160400
c. 9108230600 EST
d. AD NOT AVBLTO ACFT ABV 1930 KG MTOW. DUE SOFT WET SFC.

10.5.1.7 Apron areas. These are not part of the manoeuvring area and therefore should not normally be the subject of NOTAM, but a NOTAM may be issued at minor aerodromes to indicate temporary parking arrangements.

C0256/91 NOTAMN
a. MERIMBULA 0256/91 (AD) 9108280500
b. 9108280500
c. 9108292600 EST
d. APRON CLOSED DUE WIP. LOAD UNLOAD ON RWY. RWY NOT AVBL WHEN ACFT STANDING THEREON. PILOTS SHOULD MAKE PROVISION FOR ALTN.

10.5.1.8 Obstacle information

1. A permanent NOTAM to amend changes to declared distances owing to change in height of critical obstacle (trees).

   C0166/95 NOTAMN
   a. COOLANGATTA CO166/95 (AD) 9501210200
   b. 9501210200
   c. PERM
   d. AMD RWY 14 GRADIENTS RWY 14 TORA 2042 (6698) TODA 2102 (6895) ASDA 2042 (6698) LDA 2042 (6698) AMD AIP DATED 12 SEP 96.

2. A temporary NOTAM to advise of a crane within the OLS area.

   C0073/91 NOTAMN
   a. COOLANGATTA 0073/91 (AD) 9104200700
   b. 9104200700
   c. 9106210600 EST
   d. RWY 14/32 TEMPO TEMP OBST CRANE. 300FT AMSL BRG 076 MAG 2 NM FROM SE END OF RWY 14/32. INFRINGES HZS.

10.5.1.9 Runway Lighting Out of Service

C0091/91 NOTAMN
a. RICHMOND 0091/91 (AD) 9108510420
b. 9108162200
c. 9108192200
d. RWY LGT NOT AVBL.

10.5.1.10 Temporary or Permanent Withdrawal of Aerodrome Certificate

1. C0037/91 NOTAMN
   a. MOROWA 0037/91 (AD) 9109251035
   b. 9109251035
   c. 9109260600
   d. AD CERTIFICATE SUSPENDED.

2. C0048/91 NOTAMN
   a. TURKEY CREEK 0048/91 (AD) 9103272218
   b. 9103272220
   c. PERM
   d. AD CERTIFICATE CANCELLED.

10.5.2 General Word Abbreviations and Phrase Contractions to Minimise Message Length of Aerodrome NOTAMs

Words and Phrases Abbreviation
April APR
Abbreviated 'T' Visual Approach Slope Indicator System AT-VASIS
Abbreviated Visual Approach Slope Indicator System A-VASIS
Abeam ABM
About ABT
Above Aerodrome level AAL
Above ground level AGL
Above mean sea level AMSL
Accelerate-stop distance available ASDA
Accept or accepted ACPT
Active, activated, activity ACT
Actual time of arrival ATA
Actual time of departure ATD
Addition or additional ADDN
Adjacent ADJ
Advise ADZ
Aerodrome AD
Aerodrome Diagrams ADDGM
Aerodrome beacon ABN
Aerodrome control or aerodrome control tower TWR
Aerodrome Frequency Response Unit AFRU
Aerodrome obstruction chart AOC
Aerodrome reference point ARP
Aeronautical Information Circular AIC
Aeronautical Information Publication AIP
Aeronautical Information Service AIS
After....(time or place) AFT
Again AGN
Air Traffic Control (in general) ATC
Air traffic services ATS
Aircraft ACFT
Aircraft classification number ACN
Airport AP
Airway AWY
All-up-weight AUW
Alternate (Aerodrome) ALTN
Alternate or alternating (light alternates in colour) ALTN
Altimeter sub-scale setting to obtain elevation or altitude QNH
Altitude ALT
Amend(ed) AMD
Amendment (AIP Amendment) AMDT
Approach APCH
Approach lighting system ALS

Approximate(ly) APRX
Arrange ARNG
Arrive, or arrival ARR
As soon as possible ASAP
Asphalt ASPH
Associated with ASSW
Attention ATTN
Aircraft landing area (OR Authorised landing area) ALA
Authorised or authorisation AUTH
Automatic terminal information service ATIS
Auxiliary AUX
Available AVBL
Average AVG
Aviation gasoline AVGAS
Azimuth AZM
Beacon (aeronautical ground light) BCN
Bearing BRG
Becoming BECMG
Before BFR
Below BLW
Between BTN
Blue B
Boundary BDRY
Braking BRKG
Broken BKN
Building BLDG
By way of.. VIA
Calibration CLBG
Callsign (used to request a callsign) CSGN
Category CAT
Caution CTN
Celsius (Centigrade) C
Centreline C/L
Centimetre CM
Centre (runway) C
Change frequency to... CF
Channel CH
Check CK
Civil CIV
Clear, cleared to, clearance CLR
Clearway CWY
Close or closed or closing CLSD
Code number (runway) CN
Commissioned CMSD
Common Traffic Advisory Frequency CTAF
Communications COM
Completion or completed or complete CMPL
Concrete CONC

Condition COND
Confirm(ing) or I confirm CFM
Conical surface COS
Construction or constructed CONST
Contact CTC
Continue(s) or continued CONT
Continuous day and night service H24
Continuous(ly) CONS
Co-ordinated Universal Time UTC
Correction or correct or corrected COR
Cover or covered or covering COV
Cross X
Crossbar (of approach lighting system) XBAR
Crossing XNG
Customs CUST
Danger or dangerous DNG
Decommissioned DCMSD
Degrees DEG
Delay or delayed DLA
Depart or departure DEP
Departure and Approach procedures DAP
Depth DPT
Destination DEST
Deteriorate, deteriorating DTRT
Deviation or deviated DEV
Direct DCT
Displaced DISP
Distance DIST
Distance measuring equipment DME
Divert or diverting or diversion DIV
Docking DOCK
Document DOC
Domestic DOM
Doppler VOR DVOR
Duration DUR
During DRG
Dust DU
Dust storm DS
East north-east ENE
East or east longitude E
East south-east ESE
Eastbound EB
Effective operational length EOL
Elevation ELEV
Emergency EMERG
Enroute Supplement Indonesia (AIP) ERSA
En route ENRT
Engine ENG

Equipment EQPT
Estimate or estimated EST
Estimated/estimating time of arrival ETA
Estimated/estimating time of departure ETD
Every EV
Except EXC
Exercises or exercising or to exercise EXER
Expect(ed)(ing) EXP
Expected approach time EAT
Extend(ed)(ing) EXTD
February FEB
Facility, facilities FAC
Facsimile transmission FAX
Feet (dimensional unit) FT
Field FLD
First FST
Flares FLR
Flight FLG
Flight information service FIS
Flight service (in general) FS
Flight service centre FSC
Flight service unit FSU
Flight plan (domestic) PLN
Fluctuating, fluctuation, fluctuated FLUC
Fly or flying FLY
Fog FG
Follow(s), following FLW
Forecast FCST
Frequency FREQ
Frequent FRQ
Friday FRI
From FM
General GEN
General Aviation AWK or PVT
General Aviation Aerodrome Procedures GAAP
Glide path GP
Glider GLD
Glider flying GLY
Gradual(ly) GRADU
Gravel GRVL
Green G
Ground GND
Hazard beacon HBN
Haze HZ
Heading HDG
Heavy HVY
Height or height above HGT
Helicopter HEL

Helicopter Landing Site HLS
Hertz (cycles per second) HZ
High intensity approach lighting HIAL
High intensity obstacle lights HIOL
High intensity runway lighting HIRL
Higher HYR
Hold(ing) HLDG
Homestead HS
Horizontal surface HZS
Hour HR
International standard atmosphere ISA
Immediate(ly) IMT
Immigration IMM
Improve(ment), improving IMPR
Inbound INBD
Information INFO
Inner marker IM
Inoperative INOP
Install or installed or installation INSTL
Instrument INSTR
Instrument approach and landing charts IAL
Instrument approach chart IAC
Instrument flight rule IFR
Instrument landing system ILS
Instrument meteorological conditions IMC
Intensify(ing) INTSF
Intensity INTST
Intermittent(ly) INTER
International INTL
International Civil Aviation Organisation ICAO
Interrupt(ion)(ed) INTRP
Intersection INT
Isolated ISOL
January JAN
July JULY
June JUNE
Jet barrier JBAR
Jet stream JTST
Kilogram KG
Kilometres KM
Kilometres per hour KMH
Kilopascals KPA
Kilowatts KW
Knots KT
Landing LDG
Landing direction indicator LDI
Landing distance available LDA
Latitude LAT

Leave or leaving LVE
Left (runway identification) L
Length LEN
Level LVL
Light or lighting LGT
Lighted LGTD
Limited LTD
Local mean time LMT
Local, locally, location, located LOC
Localiser LLZ
Low intensity obstacle lights LIOL
Low intensity runway lights LIRL
Longitude LONG
Magnetic MAG
Magnetic bearing QDR
Magnetic orientation of runway QFU
Magnetic variation VAR
Maintain(ed)(ing) MNTN
Maintenance MAINT
Mandatory Broadcast Zone MBZ
Manual MAN
Marker radio beacon MKR
Maximum MAX
Maximum brakes release weight MBRW
Maximum landing weight MLW
Maximum take off weight MTOW
Maximum tyre pressure MTP
Mean sea level MSL
Medical MED
Medium intensity obstacle lights MIOL
Medium intensity runway lights MIRL
Megahertz MHZ
Men and equipment MAE
Message MSG
Method of working plan MOWP
Metres (preceded by figures) M
Metres per second MPS
Microwave landing system MLS
Mid-point (related to RVR) MID
Middle marker MM
Military MIL
Minimum MNM
Minimum eye height over threshold (VASI system) MEHT
Minimum obstacle clearance (required) MOC
Minus MS
Minutes MIN
Miscellaneous MISC
Missed approach point MAPT

Mist BR
Moderate(ly) MOD
Modification CHG
Monitor(ed and ing) MNT
Mountain MT
Move(d)(ment), moving MOV
Nautical mile NM
Navigation NAV
Near or over large town CIT
Next NXT
Night NGT
Night visual flight rule NV
Non scheduled commercial transport CHTR
No SAR action required NOSAR
No change NC
No or negative or permission not granted or that is not correct NEG
No specific working hours HX
Non-directional radio beacon NDB
None or nothing NIL
North north-east NNE
North north-west NNW
North or north latitude N
North-west NW
Northbound NB
NOTAM Office NOF
Not before NBFR
Notice to airmen NOTAM
Number NR
Open(ed)(ing) OPN
Obscure OBSC
Observe(d), observation OBS
Obstacle OBST
Obstacle clearance altitude/height OCA/H
Obstacle clearance limit OCL
Obstruction OBSTR
Occasional(ly) OCNL
Occulting (light) OCC
On request O/R
On top OTP
Operate, operator, operative, operating, operational OPR
Operation OPRT
Operations OPS
Outbound OUBD
Outer marker OM
Overhead OHD
Parallel PARL
Parking PRKG
Passengers PAX

Passing PSG
Pavement classification number PCN
Performance PER
Persons on board POB
Pilot activated lighting PAL
Plus PS
Position PSN
Power PWR
Precision approach path indicator PAPI
Prior notice required PN
Probable, probability PROB
Procedure PROC
Procedures for air navigation services PANS
Provisional PROV
Public Holidays PH
Quadrant(al) QUAD
Radial RDL
Radius RAD
Ragged RAG
Rain RA
Rapid or rapidly RAPID
Reach or reaching RCH
Read back RB
Recent (to qualify other abbreviations) RE
Reference REF
Reference datum height (for ILS) RDH
Registration REG
Remarks RMK
Report(ed)(ing)(ing point) REP
Requested REQ
Require RQ
Requirements RQMNTS
Reroute RERTE
Rescue and Fire Fighting Services RFFS
Rescue Coordination Centre RCC
Rescue Sub Centre RSC
Restriction RESTR
Return to service RTS
Return(ed)(ing) RTN
Review REV
Route RTE
Runway RWY
Runway centreline RCL
Runway centreline light RCLL
Runway edge light REDL
Runway end light RENL
Runway lead in lighting system RLLS
Runway strip RWS

Runway surface condition RSCD
Runway threshold light RTHL
Runway touchdown zone light RTZL
Runway visual range RVR
Rules of the air and air traffic services (associated with AIP) RAC
Sand SA
Sandstorm SS
Scattered SCT
Scheduled SKED
Scheduled commercial air transport S
Search and Rescue SAR
Second(ary) SRY
Secondary surveillance radar SSR
Seconds SEC
Sector SECT
Service available during scheduled hours of operation HS
Service available to meet operational requirements HO
Service(ing), served SER
Serviceable SVCBL
Severe SEV
Short take-off and landing STOL
Showers SH
Simple approach lighting system SALS
Simultaneous(ly) SIMUL
Simultaneous Runway Operations SIMOPS
Slow(ly) SLW
Smoke FU
Snow SN
South or south latitude S
South south-east SSE
South south-west SSW
South-east SE
South-west SW
Southbound SB
Special series NOTAM (message type designator) SNOWTAM
Sport aviation SPA
Standard STD
Standard instrument arrival STAR
Standard instrument departure SID
Standard departure clearance SDC
Standby SDBY
Start of TORA (take-off run available) SOT
Start of climb SOC
Station STN
Stationary STNR
Status STS
Stop-end(related to RVR) END
Stopway SWY

Stopway light STWL
Straight in approach STA
Subject to SUBJ
Sunrise SR
Sunrise to sunset HJ
Sunset SS
Sunset to sunrise HN
Supplement (AIP Supplement) SUP
Supplementary take-off distance STODA
Surface SFC
Surface movement control SMC
Surface movement radar SMR
'T' visual approach slope indicator system T-VASIS
Take-off TKOF
Take-off distance available TODA
Take-off run available TORA
Taxiing guidance system TGS
Taxiing or taxi TAX
Taxiway TWY
Taxiway link TWYL
Technical reason TECR
Telephone TEL
Temperature T
Temporary TEMPO
Terminal area surveillance radar TAR
Terminal control area TMA
Threshold THR
Threshold crossing height TCH
Through THRU
Thunderstorm TS
Thursday THU
Time-limited WIP (work in progress) TLW
Time search action required SARTIME
To be advised TBA
Tornado TDO
Touchdown zone TDZ
Track TR
Traffic TFC
Transitional surface TNS
Trend or tending to TEND
Tropical cyclone TC
True bearing QTE
Turbulence TURB
Type of aircraft TYP
Typhoon TYPH
UHF tactical air navigation aid TACAN
Ultra high frequency (300-3000 MHz) UHF
Unable UNA

Unable to approve UNAP
Unlimited UNL
Unserviceable U/S
Until TIL
Until advised by UAB
Until further notice UFN
Upper limits UL
VHF omni-direction radio range VOR
Variable VRB
Vertical VER
Vertical take-off and landing VTOL
Very high frequency (30-300 MHz) VHF
Very important person VIP
Very low frequency (3-30 kHz) VLF
Vicinity VCY
Visibility VIS
Visual approach slope indicator system VASIS
Visual en route chart VEC
Visual flight rules VFR
Visual meteorological conditions VMC
Visual terminal chart VTC
Warning WRNG
We agree or it is correct OK
Weaken(ing) WKN
Weather WX
Weight WT
West north-west WNW
West or west longitude W
West south-west WSW
White W
Widespread WID
Wind direction indicator WDI
Wind shear WS
With effect from, or effective from WEF
Within WI
With immediate effect, or effective immediately WIE
Without WO
Work in progress WIP
World Aeronautical Chart (1:1,000,000) WAC
Yards YD
Yellow caution zone (runway lighting) YCZ
Yes, or affirm, or affirmative, or that is correct AFM
Yours YR

10.6 Appointment of Reporting Officers.

10.6.1 General

1. The aerodrome operator must appoint suitably trained person(s) as the nominated reporting officer(s). The nomination(s) must be notified in writing to the NOTAM office and DGAC.

2. Persons other than employees of the aerodrome operator may, with appropriate training and experience, also be appointed as aerodrome reporting officers.

10.6.2 Reporting Officer Qualifications

Aerodrome operators must ensure that any person carrying out the reporting function has been suitably trained and has the following attributes:

a. a sound knowledge of the physical characteristics of the aerodrome movement area, the aerodrome obstacle limitation surfaces, aerodrome markings, lighting and ground signals and essential aerodrome safety equipment;
b. an understanding of the aerodrome information included in AIP;
c. the ability to carry out a serviceability inspection of the aerodrome;
d. a knowledge of the aerodrome emergency procedures; and
e. a knowledge of the NOTAM system and the ability to carry out aerodrome reporting procedures.

10.6.3 What to Report

1. Aerodrome operators must advise the NOTAM Office of the following occurrences:
   a. changes (temporary or permanent) in the published runway information including further changes to information contained in current permanent NOTAMs;
   b. aerodrome works affecting runways or the obstacle limitation surfaces, including time-limited works that require more than 10 minutes to restore normal safety standards;
   c. outage of aerodrome lighting or obstacle lighting beyond specified limits;
   d. temporary obstacles to aircraft operations;
   e. a significant increase in, or concentration of birds or animals on or near the aerodrome which is a danger to aircraft;
   f. changes in excess of 0.05% of the published gradient data;
   g. emergence of new obstacles;
   h. when a radio navigation aid owned by the aerodrome operator, or landing aid is unserviceable or returned to service; or
   i. any other event which affects the safety of aircraft using the aerodrome.

2. Reporting must be carried out as soon as possible after a reportable occurrence is observed, giving as much detail as is available. Where necessary, subsequent additional detail can be reported as it becomes available for further NOTAM to be issued. Where applicable, ATC must be advised of the unserviceability and the intention to initiate a NOTAM.

3. Aerodrome operators must provide as much notice as possible of aerodrome works which will affect airline schedules.

10.6.4 Monitoring Activities Outside Aerodrome

The reporting function must also include monitoring activities outside but in the vicinity of the aerodrome which may result in hazards to aircraft operations. This includes:

a. developments which may become obstacles;
b. land planning and use which may attract birds; and
c. installation of lighting systems which may create confusion to pilots at night.

10.7 Aerodrome Emergency Planning.

10.7.1 Introduction

1. The aerodrome operator must establish and chair an Aerodrome Emergency Committee (AEC), including agencies on and off the aerodrome that could assist in an emergency. The AEC must develop the Aerodrome Emergency Plan (AEP), including procedures for coordinating the responses of assisting agencies.

2. Currency and adequacy of the AEP must be reviewed at least once every twelve months.

3. Full scale emergency exercises must be carried out at least once every two years, commensurate with the size and scale of operations at the airport, unless the emergency plan was activated for a major emergency within the two-year period. A partial exercise is to be conducted in the intervening year.

4. AEP must include organisational and procedural arrangements for responding to at least the following emergencies:
   a. aircraft crash;
   b. local standby and full emergency;
   c. bomb scare;
   d. disabled aircraft;
   e. hazardous material incident;
   f. fire and natural disaster; or
   g. medical emergency.

5. The AEP must clearly define the activation sequence including call out arrangements for Local Standby and Full Emergency. For instance, Local Standby does not require a response from off-aerodrome agencies whereas a Full Emergency does. The activation plan will detail the Action Required for each type of emergency.

6. The aerodrome operator must produce a grid map (or maps) of the aerodrome and its immediate vicinity, to include detailed location of primary and secondary access gates. The grid map is to be made available to all responding agencies.

7. DGAC does not regulate AEP responding agencies and how they conduct their functions. It is the responsibility of the AEC to ensure that the level and availability of emergency equipment and services are adequate for the aerodrome.

8. At those aerodromes located near water, the AEP must include as far as practicable, arrangements for water rescue.

Note : See Section 10.8 for content guidelines for AEP.

10.7.2 Records

Records of reviews and exercises including real emergencies must be kept and retained for at least 3 years.

10.7.3 Disabled Aircraft Removal

1. The Disabled Aircraft Removal Plan (DARP) must include a list of equipment and personnel that would be available for timely aircraft recovery and removal.

2. The Plan must identify a coordinator designated to implement the DARP, when necessary.

3. The Plan must be based on the characteristics of the aircraft that may normally be expected to operate at the aerodrome.

10.8 Guidelines for Aerodrome Emergency Plans

10.8.1 General

1. Aerodrome emergency planning is the process of preparing an aerodrome to cope with an emergency occurring at the aerodrome or in its vicinity. The objective of the planning is to ensure a timely and effective response to an emergency, particularly in respect of saving lives and maintaining aircraft operations.

2. Examples of aerodrome emergencies are: crash (aircraft accident), bomb scare, disabled aircraft, spillage of hazardous material, fire and natural disaster.

3. The aerodrome emergency plan should be commensurate with the scale and type of aircraft operations, the surrounding geography and other activities conducted at the aerodrome. With the assistance of the Aerodrome Emergency Committee, the aerodrome certificate holder should plan for the worse type of emergency situations that might conceivably occur with respect to size, location, timing and weather.

4. Examples of agencies that could be of assistance in responding to aerodrome emergencies are:

a. on-aerodrome agencies: air traffic services units, rescue and fire fighting units, airport administration, aircraft operators, security services; and
b. off-aerodrome agencies: fire brigades, police, medical and ambulance services, hospitals, military forces, National Transport Safety Committee (ATSC), emergency services, transport authorities, volunteer rescue services, welfare agencies, Government authorities (Customs, Health, Immigration, etc), maritime services and refuelling agents.

5. The off-aerodrome responding agencies will have been established to deal with most, if not all, emergency situations occurring in the community. Therefore the aerodrome emergency procedures should have the highest degree of similarity with the procedures used in the community generally.

6. The best understanding of the procedures is achieved through taking part in the planning process and the most workable procedures are the ones derived by those who have to carry them out. Therefore in the development of the procedures, certificate holders should seek the maximum possible involvement of responding agencies and obtain their endorsement of the procedures so developed.

10.8.2 Medical Subcommittee

On larger aerodromes it is usual to delegate the preparation of the medical plan to a sub-committee. When established, the medical sub-committee should:

a. plan the deployment of medical personnel called to an aircraft emergency;
b. develop procedures for triage, emergency treatment and movement of casualties; and
c. nominate a co-ordinator of crash site medical resources.

10.8.3 Testing Facilities and Reviewing Roles

1. Facilities used in the responses by the various agencies including communications systems should be tested at intervals not exceeding one year.

2. Individual participants in the aerodrome emergency plan should be encouraged to continuously review their roles (for example on a particular day each month) to ensure that they know their responsibilities and that all the information in the plan is current. It is important that all personnel who may be required to act in an emergency should develop the correct mental attitude to aerodrome emergency planning. To that end and in spite of their self-evident nature, it is worthwhile noting that the salient lessons to be gained from those who have experienced an airport emergency are that:

   a. people do best in an emergency what they have been trained to do;
   b. emergencies happen with little or no warning; and
   c. emergencies happen to anybody.

10.8.4 Aerodrome Emergency Exercises

1. The minimum frequency of full-scale aerodrome emergency exercises of two years has been set after considering international practice.

2. Speciality emergency exercises aimed at testing and reviewing the response of individual responding agencies, such as rescue and fire fighting services, as well as parts of the emergency plan, such as the communications system, should be held at more frequent intervals than the full-scale exercise.

3. Aerodrome certificate holders shall conduct partial or 'table-top' exercises involving the Aerodrome Emergency Committee annually between the full scale exercises, provided such exercises do not conflict with the speciality exercises.

4. Experience to be gained from exercises should be shared by inviting other aerodrome certificate holders to attend as observers. Operators of major aerodromes should notify the relevant pilot and cabin attendant staff associations of each planned emergency exercise to enable representatives of those organisations to observe the exercise and participate in the review should they so desire.

10.8.5 Emergency Operations Centre and Mobile Command Post

1. A fixed emergency operations centre and a forward mobile command post shall be available for use in an emergency. The fixed emergency operations centre should be a part of the aerodrome facilities and be used to co-ordinate and direct the overall response to the emergency. The location of the emergency operations centre should be clearly identified in the plan. The forward mobile command post should be an easily recognisable structure capable of being moved rapidly to the scene of an emergency, when required, and should be used to control the on-scene agencies responding to the emergency.

2. The aerodrome emergency plan should clearly set out the discrete roles of the emergency operations centre and the forward command post, highlighting the physical location of the emergency co-ordinator.

10.8.6 Definitions of Command, Control, and Coordination

1. The definitions of 'command', 'control', and 'co-ordination' which should be used in the context of aerodrome emergency planning are given below.

2. Command. 'Command' is the direction of members and resources of an organisation in the performance of the organisation's role and tasks. Authority to command is established in legislation or by agreement with an organisation. Command relates to organisations and operates vertically within organisations.

3. Control. ‘Control’ is the overall direction of activities. Authority for control is established in legislation or in an emergency plan and carries with it the responsibility for tasking and co-ordinating other organisations in accordance with the needs of the situation. In this context, tasking means telling people what to do, but not how to do it. Control relates to situations and operates horizontally across organisations.

4. Coordination. ‘Coordination’ is the bringing together of organisations and elements to ensure effective counter-emergency responses, and is primarily concerned with the systematic acquisition and application of resources (organisation, manpower and equipment) in accordance with the requirements imposed by the threat or impact of an emergency. Coordination relates primarily to resources and operates:
   a. vertically within an organisation as a function of the authority to command; and
   b. horizontally across organisations as a function of the authority to control.

10.8.7 Role of the Police

1. As soon as any police presence is established at the scene of an aerodrome emergency or exercise, the senior police officer is required to assume overall co-ordination of the agencies responding to the emergency. The person who initially assumes co-ordination of the situation should hand over to police when they arrive.

2. The police may be required to account for all people on board a crashed aircraft. In discharging this function it will normally be necessary to secure the crash site area and impose control over persons entering and leaving the site.

3. The police may also be given the responsibility of guarding any aircraft wreckage on behalf of NTSC.

10.9 Control of Airside Access Including Vehicle Control

10.9.1 Introduction

1. Particulars of the procedures for preventing unauthorised entry into the movement area, including the arrangements for controlling airside access, and airside vehicle control, are to be included in the aerodrome manual.

2. At aerodromes catering for air transport operations by aircraft of more than 30 passenger seats, a fence or other suitable barrier must be provided where practicable, around the movement area of the aerodrome.

10.9.2 Airside Vehicle Control

1. Vehicles and ground equipment operated airside must be maintained in a sound mechanical and roadworthy condition, so as to prevent avoidable breakdowns and spillage of fuels, lubricants and hydraulic fluids.

2. In the case of major international aerodromes, or aerodromes with significant levels of vehicular traffic, the aerodrome operator must introduce and maintain a permit system for approval of airside vehicle operations.

3. In the case of major international aerodromes, or aerodromes with significant levels of vehicular traffic, the aerodrome operator must establish speed limits for vehicles on the movement area and a regime to enforce them.

4. Vehicles must not be driven under an aircraft or within 3 m of any part of an aircraft except when required for the servicing of aircraft.

5. Vehicles operating on the movement area by day must be marked in accordance with 8.10.4.

6. Vehicles operating on the movement area at night,or in conditions of poor visibility, must display dipped headlights and must be lit with vehicle warning lights.

10.9.3 Airside drivers

1. Drivers operating vehicles on the airside must be trained and competent to do so.

2. Any person operating vehicles and ground equipment, must:

   a. hold an appropriate licence to operate,
   b. know the terminology used to describe, and be familiar with airside areas,
   c. understand the significance of aerodrome signs and markings, and
   d. where appropriate, be competent in the use of radio communications equipment, and understand radio instructions.

10.10 Aerodrome Works Safety

10.10.1 Introduction

1. The operator of a certified aerodrome must arrange aerodrome works so as not to create any hazard to aircraft or confusion to pilots. The aerodrome manual must include particulars of the procedures for planning and safely carrying out aerodrome works.

2. Aerodrome works may be carried out without the closure of the aerodrome, provided safety precautions are adhered to.

3. Aerodrome works may be carried out in the following manner:

   a. where the works are of a nature that they will disrupt aircraft operations, they must be carried out under a proper plan called the method of working plan; and
   b. where works are of a maintenance nature they must be carried out as time-limited works.

4. Where a threshold is required to be temporarily displaced for more than 300 m, due to aerodrome works, the matter must be referred to the relevant DGAC office to assess the operational significance of that displacement.

10.10.2 Method of Working Plans

1. At an aerodrome used by aircraft of more than 5,700 kg maximum take-off weight, unless the aerodrome is closed during aerodrome works, or the work is of an emergency nature, the aerodrome operator must not carry out aerodrome works, other than time-limited works, without a Method of Working Plan (MOWP) prepared for those works.

2. The MOWP must set out the arrangements for carrying out those works.

3. An MOWP must be prepared in accordance with Section 10.11 to this Chapter.

4. When preparing a MOWP, an aerodrome operator must consult:
   a. commercial air transport operators using the aerodrome;
   b. Air Traffic Control; and
   c. if the MOWP may affect its operations, the Rescue and Fire Fighting Service unit at the aerodrome;

   so as to ensure the safety of aircraft operations at the aerodrome.

5. The aerodrome operator must give a copy of the MOWP, and any alteration thereof, to DGAC as soon as possible after the MOWP is prepared or altered.

6. Aerodrome works, for which a MOWP is required, must be carried out in accordance with the arrangements set out in the MOWP and any subsequent alteration.

7. An MOWP is not required, if the aerodrome operator closes the aerodrome to aircraft operations while aerodrome works are being carried out. DGAC, commercial air transport operators and all organisations and persons likely to be affected by the closure must be given reasonable notice of intention to close the aerodrome.

8. The operator must not close the aerodrome to aircraft operations due to aerodrome works, unless a NOTAM giving notice of the closure has been issued at least14 days before closure takes place.

9. An MOWP is not required for emergency aerodrome works carried out to repair unforeseen damage to part of the manoeuvring area, or to remove an obstacle, or if the works do not require any restrictions to aircraft operations. Where practicable, a NOTAM, giving the time and date of the commencement of the works must be issued, as early as possible, but preferably not less than 48 hours before commencement of the works.

10.10.3 Time-Limited Works

1. Aerodrome works may be carried out as time-limited works if normal aircraft operations are not disrupted, the movement area can be restored to normal safety standards in no more than 30 minutes, including the removal of any obstacle created by those works.

2. Time-limited works include the following works:

    a. maintenance of markings and lights;
    b. grass mowing;
    c. rolling surfaces;
    d. sweeping pavements;
    e. minor repairs to pavements; and
    f. surveys and inspections.

3. A person must not commence time-limited works that require more than 10 minutes to restore normal safety standards to the movement area and remove obstacles, unless a NOTAM has been issued not less than 24 hours before the commencement, giving the date and time of commencement and the time required to restore normal safety standards.

10.10.4 Restrictions on Carrying Out Time-Limited Works

1. Subject to paragraph 10.10.4.2 time-limited works must not be carried out at night or if visibility is less than 5 kilometres.

2. Paragraph 10.10.4.1 does not apply if it is authorised by Air Traffic Control at a controlled aerodrome or in other cases if normal safety standards can be promptly restored so as to allow an aircraft operation to take place without delay.

10.10.5 Restoration of Normal Safety Standards

1. Time-limited works must be stopped and normal safety standards restored, when required to allow an aircraft operation to take place.

2. All reasonable measures must be taken to complete the restoration of normal safety standards not less than 5 minutes before the scheduled or notified time of an aircraft operation.

10.10.6 Resumption of Aerodrome Works

1. At an uncontrolled aerodrome, works that have been stopped to allow the restoration of normal safety standards may be resumed:
   a. if stopped for an aircraft arrival, immediately after the arrival, if the safety of the aircraft is not endangered by the resumption; or
   b. if stopped for an aircraft departure, 15 minutes after the departure has taken place; or
   c. if stopped for an aircraft arrival that does not take place; 30 minutes after the time scheduled or notified for the arrival (when a new ETA is established).

2. At a controlled aerodrome, Air Traffic Control may, at the request of the aerodrome operator, vary the time limits set out in paragraph 10.10.6.1 for restoring normal safety standards or resuming aerodrome works. A variation under this paragraph is subject to such conditions as Air Traffic Control may impose.

10.10.7 Management and Control of Aerodrome Works

1. An aerodrome operator must ensure that aerodrome works are carried out in accordance with the standards in this Chapter.

2. An aerodrome operator must appoint a person in writing as a works safety officer for the purpose of ensuring the safe conduct of aerodrome works.

3. Before appointing a person as a works safety officer, the aerodrome operator must be satisfied that the person is able to perform the functions of a works safety officer set out in Section 10.12.

4. A works safety officer must be present at all times if aerodrome works are being carried out and the aerodrome is open to aircraft operations. For time limited work, a dedicated safety officer is not required if one of the persons conducting the work activity is competent to be a work safety officer

5. An aerodrome operator must take all reasonable measures to ensure that the works organisation carries out aerodrome works in a manner that will ensure the safety of aircraft operations.

6. Persons, vehicles, plant and equipment required for carrying out aerodrome works, must not be permitted to enter the movement area or remain on it, except for the purpose of carrying out those works.

7. Procedures for entering works areas must be stated in the MOWP.

8. The operator must allow access to works areas only along routes shown in the MOWP.

10.10.8 Markers, Markings and Lights

1. Aerodrome markers, markings and lights required for, or affected by, aerodrome works must be installed, altered or removed in accordance with the appropriate standards.

2. Parts of the movement area that are unserviceable as a result of aerodrome works being carried out must be marked and lit in accordance with the appropriate standards.

3. All obstacles created as a result of aerodrome works being carried out must be marked and lit in accordance the appropriate standards in Chapter 8.

4. Vehicles and plant used in carrying out aerodrome works must be marked in ccordance with paragraph 8.10.4.

5. In addition to paragraph 10.10.8.4 requirements, vehicles and plant used in carrying out aerodrome works at night must be lit in accordance with paragraph 9.19.1.

10.10.9 Communication Equipment

1. At a controlled aerodrome, a vehicle used by a works safety officer while supervising aerodrome works must be equipped with a radio for two-way communication with Air Traffic Control.

2. For the purpose of communication with Air Traffic Control, each vehicle used by a works safety officer must be given a call sign.

3. Any vehicle or plant that is not:
   a. marked or lit in accordance with Paragraph 10.10.8; or
   b. if applicable, equipped with a two-way radio may only be used in carrying out aerodrome works if it is:
      - o used under the direct supervision of the works safety officer; or
      - o used only within the limits of appropriately marked and lit ` work areas.

10.10.10 Completion

On the completion of aerodrome works and the restoration of normal safety standards to the movement area, the aerodrome operator must cancel any NOTAM issued to advise of those works.

10.10.11 Pavement Overlay Works

1. 10.10.11.1 At the end of an overlay work session, when the runway is to be returned to an operational status, the new and old runway surfaces must not be left with an abrupt vertical surface of more than 25 mm. This will normally require the provision of a temporary ramp between the new and the old surfaces.

2. 10.10.11.2 The longitudinal slope of the temporary ramp described in paragraph 10.10.11.1, measured with reference to the existing runway surface or previous overlay course, must be:
   a. 0.5 to 1.0 per cent for overlays up to and including 5 cm in thickness; and
   b. not more than 0.5 per cent for overlays more than 5 cm in thickness.

3. 10.10.11.3 Where practicable, the direction of pavement overlay must proceed from one end of the runway toward the other end so that based on runway utilization most aircraft operations will experience a down ramp.

4. 10.10.11.4 Where practicable, the entire width of the runway must be overlaid during each work session. Where the entire width of the runway cannot be overlaid during a work session, then at least the central two-third width of the runway is to be overlaid. In this case, a temporary transverse ramp of between 0.8 and 1.0 per cent must be provided between the edge of the new overlay surface and the existing runway surface or previous overlay course; when the difference in level exceeds 25 mm.

5. 10.10.11.5 Before a code 3 or 4 runway being overlaid is returned to temporary service, a runway center-line marking conforming to the specifications in Chapter 8 must be provided.

10.10.12 Works on Runway Strips

1. Works on runway strips must be carried out in the shortest possible time, and where undertaken within 23 m of the edge of the runway or runway shoulder:
   a. works must only be undertaken on one side of the runway at any one time;
   b. the works area at any one time must not exceed 9 square metres, except for machine cut trenches, not exceeding a width of 100 mm and length of 280 m;
   c. materials such as gravel, signs and lights, etc left within this part of the runway strip, must not exceed one half metre in height above ground. Any material likely to be affected by propeller wash or jet blast, must be removed; and
   d. plant and vehicles must vacate this area when the runway is in use.

2. Where works are undertaken on a runway strip between 23 m from the edge of the runway or runway shoulder and the edge of the graded runway strip, similar restriction must be applied within this area of the runway strip, as for paragraph 10.10.12.1 above, except that the works area may extend up to an area of 18 square metres at any one time, and the height of materials may extend up to one metre.

3. Where works are to be undertaken in the vicinity of navigational or landing aids located within the runway strips, care must be taken to ensure that neither the works nor vehicles or plant associated with the works, may affect the performance of the aids.

10.11 Method of Working Plans

10.11.1 Introduction

The MOWP must be presented in sections in the following sequence:

a. title page
b. works information
c. restrictions to aircraft operations
d. restrictions to works organisation
e. administration
f. authority
g. drawings
h. distribution list.

10.11.2 Title Page

1. Each MOWP must be given a reference number, consisting of the code used to identify the aerodrome in the AIP Indonesia, the last two digits of the year and the number given to the MOWP by the aerodrome operator.

2. MOWPs issued in relation to the same aerodrome must be numbered consecutively in the order of their issue.

3. The MOWP number, the date of issue, and the date and number of any amendment are to be set out in the top right hand corner of the title page.

4. The title must indicate the location of the work and give a short description of the project, for instance "[name of aerodrome]: runway 07/25 repairs".

5. The date of approval of the MOWP, the date of commencement and the date of expiry of the MOWP, and the date of completion of the works are to be set out on the title page.

6. The title page must include a list of the sections of the MOWP.

10.11.3 Works Information

The MOWP must:

a. include an outline of the full scope of the works and state whichaerodrome facilities are affected.
b. provide the planned date and time of commencement, the duration of each stage and the time of completion.
c. contain the following sentence:

"The actual date and time of commencement will be advised by a NOTAM, to be issued not less than 48 hours before work commences".

10.11.4 Restrictions to Aircraft Operations and Issue of NOTAMs

1. This section of the MOWP must 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.

2. This section of the MOWP must state each restriction and each aircraft type affected by that restriction.

10.11.5 Work Stages

1. Any restrictions to aircraft operations on the manoeuvring area, or in the approach and take-off areas must be listed and shown on drawings of each stage of the works.

2. 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 must be included.

3. The table must 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 NOTAMs for the information of a pilot before a flight.

10.11.6 Emergencies and Adverse Weather

The MOWP must outline details, if any, of special arrangements to be made during works if emergencies or adverse weather conditions occur.

10.11.7 NOTAMs

The full text of all planned NOTAMs associated with the aerodrome works must be included.

10.11.8 Restrictions to Works Organisations

The MOWP must provide any restrictions on the organisation carrying out of aerodrome works and requirements for the restoration of normal safety standards.

10.11.9 Personnel and Equipment

When personnel and equipment are required to vacate the movement area for certain operations, specific mention of this fact must be made, for example: "All personnel and equipment will clear runway strip 11/29 for all operations by aircraft larger than CASA212".

10.11.10 Access

1. 10.11.10.1 The MOWP must identify the routes to and from the works area and the procedures for entering the works areas within the movement area.

2. 10.11.10.2 Particulars of routes to and from the works area must be shown in drawings attached to the MOWP.

10.11.11 Aerodrome Markers, Markings and Lights

Details of arrangements for the installation, alteration and removal of aerodrome markers, markings and lights in the work areas and other areas affected by the aerodrome works must be shown in drawings attached to the MOWP.

10.11.12 Protection of Electrical Services

The MOWP must set out procedures for ensuring that electrical services and control cables are not damaged.

10.11.13 Special Requirements

The MOWP must provide details of any special requirements arising during or on completion of aerodrome works, for example, arrangements for leaving pavement surfaces swept and clean before evacuation of the works area.

10.11.14 Administration

1. 10.11.14.1 The MOWP must provide the name of the project manager appointed by the aerodrome operator and the means of contact, including the means outside normal working hours.

2. 0.11.14.2 The MOWP must provide the names of the works safety officer or officers appointed by the aerodrome operator and the means of contact, including the means outside normal working hours.

3. 10.11.14.3 The MOWP must provide the name of the works organiser (where appropriate) and the means of contact, including the means outside working hours.

10.11.15 Authority

1. 10.11.15.1 Each MOWP must contain the following statement: "All works will be carried out in accordance with the MOWP".

2. 10.11.15.2 Each MOWP must set out its expiry date, and any alteration of that date.

3. 10.11.15.3 Each MOWP must be signed, immediately after paragraph 10.11.15 (this paragraph), by the aerodrome operator or the project manager.

10.11.16 Drawings

Drawings must be attached, which provide a visual reference for each stage of the works. The drawings must contain specific details such as works area, restrictions to aircraft, location of radio navigational aids, exact location of visual ground 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 electrical services and control cables which may be disturbed during the works.

10.11.17 Distribution List

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

a. the project manager,
b. the works safety officer;
c. the aerodrome security manager, if any;
d. the works organiser;
e. the DGAC aerodrome inspector;
f. ATC and the Rescue and Fire Fighting Service Unit for the aerodrome;
g. the air transport aircraft operators using the aerodrome at which the aerodrome works are to be carried out; and
h. fixed-base operators using the aerodrome at which the aerodrome works are to be carried out.

10.12 Functions of a Works Safety Officer

10.12.1 Works Safety Officer

The Works Safety Officer performs the following responsibilities.

a. Ensure the safety of aircraft operations in accordance with the standards for aerodrome works and the applicable MOWP;
b. Ensure that, where applicable, the aerodrome works are notified by issue of a NOTAM and that the text of each NOTAM is exactly as set out in the applicable MOWP;
c. Supply the air-traffic controller, on a daily basis, with whatever information is necessary to ensure the safety of aircraft operations;
d. Discuss with the works organisation, on a daily basis, any matters necessary to ensure 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 Paragraph 10.10.8, and the applicable MOWP;
f. Ensure that the 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 works area;

g. Ensure that all other requirements of the directions and MOWP relating to vehicles, plant, equipment and materials are complied with;
h. Ensure that access routes to work areas are in accordance with the applicable MOWP and clearly identified and that access is restricted to these routes;
i. Ensure that excavation is carried out in accordance with the MOWP and, in particular, so as to avoid damage or loss of calibration to any underground power or control cable associated with a precision approach and landing system or any other navigational aid;
j. Report immediately to the air-traffic controller and the aerodrome operator any incident, or damage to facilities, likely to affect air-traffic control 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 air-traffic controller 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 to ensure the safety of aircraft operations;
n. Ensure that the movement area is safe for normal aircraft operations following removal of vehicles, plant, equipment and personnel from the works area;
o. In the case of time-limited works, ensure that the works area is restored to normal safety standards not less than 5 minutes before the time scheduled or notified for an aircraft movement; and
p. Ensure that floodlighting or any other lighting required for carrying out aerodrome works is shielded so as not to represent a hazard to aircraft operations.

10.13 Aircraft Parking

10.13.1 Introduction

1. This Section is applicable only at aerodromes where apron congestion is a problem.

2. The aerodrome operator must include in the aerodrome manual particulars of the procedures for aircraft parking control, on those aprons, to ensure the safety of aircraft during ground manoeuvring.

10.13.2 Apron Congestion

Appropriate apron safety procedures must be developed by the aerodrome operator in conjunction with relevant organisations such as the airlines, ground handlers and caterers and monitored for compliance on a regular basis. Written agreements and contracts are useful components of congestion mitigation measures.

10.13.3 Apron Safety Management

1. Aerodrome operators must ensure that, irrespective of who is responsible for aircraft parking, procedures are in place and documented for aircraft docking, ground servicing, engine start and push back operations.

2. Apron safety management procedures must:
   a. ensure that people involved are appropriately trained and experienced; and
   b. ensure that people engaged in these activities are provided with appropriate equipment such as communications, high visibility garments and fire extinguishing equipment suitable for at least initial intervention in the event of a fuel fire.

3. If apron operational activities are undertaken by organisation(s) other than the aerodrome operator, then the aerodrome operator must ensure the apron safety management procedures are followed.

Note : *The USA National Fire Protection Association (NFPA) standards for fire extinguishers at aircraft parking positions may be reviewed at http://www.nfpa.org/catalog/home/index.asp*

10.14 Bird and Animal Hazard Management

1. The aerodrome operator must monitor and record, on a regular basis, the presence of birds or animals on or in the vicinity of the aerodrome. Monitoring personnel must be suitably trained for this purpose.

2. Where regular monitoring confirms existence of a bird or animal hazard to aircraft operations, or when DGAC so directs, the aerodrome operator must produce a bird or animal hazard management plan, which would be included as part of the Aerodrome Manual.

3. The management plan must be prepared by a suitably qualified person such as an ornithologist or a biologist, etc.

4. The management plan must address:
   a. hazard assessment, including monitoring action and analysis;
   b. pilot notification;
   c. liaison and working relationships with land use planning authorities;
   d. on-airport bird and animal attractors which provide food, water or shelter;
   e. suitable harassment methods; and
   f. an ongoing strategy for bird and animal hazard reduction, including provision of appropriate fencing.

5. The bird and animal hazard management plan must be reviewed for effectiveness, on a regular basis, at least as part of each technical inspection.

6. Where the presence of birds or animals is assessed as constituting an ongoing hazard to aircraft, the aerodrome operator must notify the AIS in writing, to include an appropriate warning notice in the ERSA.

7. Where a bird or animal hazard is assessed as acute, of short term or seasonal nature, additional warning must be given to pilots by NOTAM.

10.15 Pavement Maintenance

10.15.1 Pavement Cleanliness

1. 10.15.1.1 All paved runway, taxiway and apron surfaces must be kept clear of foreign objects or debris that may cause damage to aircraft.
2. 10.15.1.2 All runways, taxiways and apron pavement used by air transport jet aircraft with reference code numbers 3 or 4, must be cleaned of foreign objects on a regular basis.

10.15.2 Runway Surface Friction

1. The aerodrome operator must maintain runways with sealed, asphalt or concrete surfaces, in accordance with the surface texture standards specified in Chapter 6.
2. The Aerodrome Technical Inspection of runway surfaces must confirm that the texture standard is being met.

   Note : *DGAC may require testing of part or whole of the runway surface to validate the technical inspection report, including use of continuous friction measuring equipment*.

3. From January 2006, certificated international aerodromes with runways serving code 4 jet aeroplanes, conducting international air transport operations, will be required to use an ICAO accepted continuous friction measuring device with self-wetting features to measure the friction level of the runway.
4. Runways must be evaluated when first constructed or after resurfacing to determine the wet runway surface friction characteristics.
5. Friction measurements must be taken at intervals that will ensure identification of runways in need of maintenance or special surface treatment before the surface conditions deteriorate further. The time interval between measurements will depend on factors such as aircraft type and frequency of usage, climatic conditions, pavement type, and maintenance requirements.
6. When conducting friction tests on wet runways there is a drop in friction with an increase in speed. However, as the speed increases, the rate at which the friction is reduced becomes less. The macro texture of the surface affects the relationship between friction and speed. Therefore a speed high enough to reveal these friction/speed variations should be used. It is desirable, but not mandatory, to test the friction characteristics of a paved runway at more than one speed.
7. The results of measurements will be used as follows:
   a. to verify the friction characteristics of new or resurfaced sealed, asphalt or concrete surfaced runways, using the *Design objective for new surface* values in Table 10.15-1.

b. if the measured friction level falls below the relevant *Maintenance planning level* values in Table 10.15-1, the aerodrome operator must initiate appropriate corrective maintenance action to improve the friction.

c. if the measured friction level falls below the relevant *Minimum friction level* values in Table 10.15-1, the aerodrome operator must promulgate by NOTAM, that the runway pavement falls below minimum friction level when wet. Additionally, corrective maintenance action must be taken without delay. This requirement applies when friction characteristics for either the entire runway or a portion thereof are below the minimum friction level.

Table 10.15-1:
Friction Values for Continuous Friction Measuring Devices

Test Equipment	Test Tyre Tyre Pressure (kPa)	Test Speed (km/h)	Test Depth (mm)	Design Objective For New Surface	Maintenance Planning Level	Minimum Friction Level
Mu-meter trailer	A 70 A 70	65 95	1.0 1.0	0.72 0.66	0.52 0.38	0.42 0.26
Skiddometer trailer	B 210 B 210	65 95	1.0 1.0	0.82 0.74	0.60 0.47	0.50 0.34
Surface friction tester vehicle	B 210 B 210	65 95	1.0 1.0	0.82 0.74	0.60 0.47	0.50 0.34
Runway friction tester vehicle	B 210 B 210	65 95	1.0 1.0	0.82 0.74	0.60 0.54	0.50 0.41
TATRA friction tester vehicle	B 210 B 210	65 95	1.0 1.0	0.76 0.67	0.57 0.52	0.48 0.42
GRIPTESTER trailer	C 140 C 140	65 95	1.0 1.0	0.74 0.64	0.53 0.36	0.43 0.24

10.15.3 Deterioration of Runway Grooves

When a runway pavement surface has been grooved, the aerodrome operator should periodically check the condition of the runway grooves in accordance with the US Federal Aviation Administration (FAA) advice set out in the FAA Advisory Circular AC 150/5320-12C. The Advisory Circular states that when 40 per cent of the grooves in the runway are equal to or less than 3mm in depth and/or width for a distance of 457m, the effectiveness of the grooves for preventing hydroplaning will have been considerably reduced. The aerodrome operator should take immediate corrective action to reinstate the 6 mm groove depth and/or width.

10.15.4 Surface Irregularities

1. Aerodrome operators must maintain the surface of paved runways in a condition such as to preclude excessive bouncing, pitching, vibration or other difficulties with control of aircraft.

Note : *Reports of actual aircraft performance will be used to determine compliance.*

2. Paved runway surfaces should be maintained so that standing water is neither formed nor retained. Birdbath depressions should be repaired at the earliest opportunity.

10.15.5 Standards for Natural and Gravel Surface Runways

The surface of natural and gravel surface runways and runway strips must be maintained to the physical standards outlined in Chapter 13.

Note : *A rough surface, in combination with a soft, wet surface, is particularly hazardous for aircraft operations*.

10.16 Maintenance Around Navigational Aids

1. Aerodrome operators must document procedures for the maintenance of the areas around navigation aids serving the aerodrome. This would include navigational aids located on or off the aerodrome, either owned by the aerodrome operator or by other service providers.

2. The arrangements for ground maintenance around these installations must include details of consultation with the telecommunication service provider to avoid interference with operation of the aid.

3. Ground maintenance carried out around navigational aids must be in accordance with the agreement with the telecommunications service provider.

4. If there is no agreed specification with the telecommunications service provider, ground maintenance around new facilities is to be in accordance with manufacturers instructions, and for pre-existing facilities where manufacturers instructions are not available, in accordance with the following:
   a. elimination of grass at the base of towers, fence lines and foundation of buildings, for a distance of 500 mm;
   b. fenced areas to be kept free of grass, shrubs or other growth exceeding 300 mm in height; and
   c. within fenced areas, or at unfenced sites within the aerodrome boundary:
      - VOR installations, the height of grass within a radius of 150 m from the antenna is not to exceed 600 mm;
      - ILS localiser with a 7-element antenna, the height of grass in the area of 90 m radius behind the antenna and the area 180 m by 90 m wide in front of the antenna is not to exceed 150 mm;
      - ILS localiser with a 12-element antenna, the height of grass in the rectangular area extending to 90 m either side of the antenna and from 30 m behind to 300 m in front of the antenna (or to the runway end if closer) is not to exceed 150 mm;
      - NDB or DME installations, the height of grass over the area covering the tower(s), the earth mat, buildings, and access road, together with a 5 m margin, is not to exceed 150 mm;

d. The maintained areas described above must not be otherwise used or treated, for example by ploughing or cropping

5. Ground maintenance procedures around navigational aids must include the provision and enforcement of appropriate signage.

10.17 Aerodrome Safety Procedures During Low Visibility Operations

1. At an aerodrome where low visibility operations are conducted, the aerodrome operator must establish procedures for the management of ground activities during low visibility operations.

2. Aerodrome safety procedures must address the alerting procedure, and details of the ground operations procedure involving people, vehicles, removal of unnecessary people from airside, physical check of lighting installations and warning devices such as signage.

3. Where the visibility operations are determined by manual measurement of RVR, the aerodrome safety procedures must include:
   a. methods for the measurement and timely reporting of RVR;
   b. location of the runway observing positions; and
   c. requirements and training of personnel selected for RVR observer duties.

10.18 Aerodrome Technical Inspections

1. Aerodrome technical inspections must be carried out in accordance with the requirements of the regulations.

2. Aerodrome technical inspections must be carried out at intervals of not more than 12 months and when required as a result of the findings of the aerodrome serviceability inspections.

3. Parts of an aerodrome technical inspection may be carried out at different times from the other parts. Each part of the technical inspection must be carried out at intervals of not more than 12 months.

4. The technical inspection should identify any shortcomings, or areas for improvement.

5. The technical inspection must include a plan(s) for corrective action.

6. DGAC audit activity will include follow-up on the progress achieved on previous reports and plans for corrective action.

11. STANDARDS FOR OTHER AERODROME FACILITIES

11.1 General

11.1.1 Introduction

This Chapter contains standards on aspects of aerodrome design and operations that are not covered elsewhere in this Manual.

11.1.2 Standards For Siting and Clearance Areas for Airways Facilities on Airports

1. Airways facilities at an airport permit the safe navigation of aircraft within the airspace of an airway, and include navigation aids along the airway and for approach and landing at aerodromes, communication facilities, meteorological facilities and ATC facilities.

2. The airways facilities for the safe, efficient operation of aircraft in the terminal area surrounding an airport and on the airport manoeuvring area need, in most instances, to be located on or at the perimeter of the aerodrome. Some of these facilities, in particular the precision approach facilities, must be positioned in precise geometric relativity to runways or runway centerline extensions. Most facilities have associated site clearance areas surrounding the site location to ensure proper operation of the facility.

3. The standards herein set out:
   a. The general requirement for sites, and the specific site and clearance area dimensions (for those types of facilities for which it is possible to specify such), for existing facilities; and
   b. The responsibilities of the aerodrome operator for preservation of sites and their clearance areas for planned or existing facilities.

   Note : *Many of these facilities are provided and maintained by DGAC. Aerodrome operators should also liaise with DGAC on the technical requirements of individual airways facilities*.

4. For new facilities follow the manufacturers instructions.

5. Airways facilities at an aerodrome may include any or all of the following:
   a. navigation aid facilities
      - ILS
      - DME
      - VOR
      - NDB
   b. radar sensor sites
   c. air/ground and point-to-point communications systems including radio bearer systems and satellite communications sites
   d. air traffic services centres
   e. fire stations (and satellite fire station); and
   f. ATC towers.

11.1.3 General Siting Requirements

1. The siting criteria define the minimum requirements for uncompromised performance of each facility. Non-compliance or infringement of the site criteria and associated clearance areas does not always result in a particular facility being unserviceable or unsafe, but the functions may be degraded. Such degradation may, however, necessitate the facilities removal from service in some instances. Any potential infringement by the aerodrome operator to the criteria for existing or planned facilities is to be referred to Airservices Australia by the aerodrome operator.

2. The general requirements for airways facilities are a finite site for their physical installation, i.e. shelters, foundations, towers, antennae plus a reasonable service area around the physical features. In many instances, there is also a requirement for a clearance zone around this space, in some instances relatively extensive, for the purposed of ensuring transmission of electromagnetic waves without interference from extraneous sources, or for the purpose of unimpeded vision in the cases of ATC towers or RFFS stations.

3. The responsibilities of the aerodrome operator in complying with the requirements of this standard include:

   a. the controls on the erection of structures, e.g. buildings, hangars, fences, roads within specified distances and height limitations, of existing or planned airways facilities;
   b. control on vehicles or aircraft entering, traversing or parking within specified clearance areas; and
   c. ensuring that Airservices Australia is consulted on the effect of proposed aerodrome works or developments on the airways facilities. Even temporary construction works such as stockpiling of materials may have an effect, particularly on precision approach aids.

11.1.4 Navigation Aid Facilities

1. The location of the radio navigation aids is largely determined by the air route or approach path on which they are to be used. They cannot normally be moved without some consequential change to or restriction placed on the approach path or air route.

2. These facilities are not to be compared with radio, television or mobile radio facilities. Except for NDBs, radio navigation aids are more complex in terms of the transmitting equipment, the antenna design and the electromagnetic fields which are created about them. The accuracy of the paths defined by a particular navigation aid is determined not only by the transmitting facility but is largely dependent on the reflection of its signals from the objects about the facility; the terrain, vegetation, buildings, power lines, aircraft, other vehicles, fences, ditches, etc. In designing a facility, the position of these objects is taken into account. For example, sites are chosen so that these objects will provide least signal degradation; the vegetation is cleared, the ground levelled in key areas, and power lines may be moved or buried.

3. For the facility to remain a useful part of the airways system, these environmental characteristics have to be maintained and any proposals for change need to be carefully examined.

4. The development constraints set out herein provide guidance to activity and development restrictions in the vicinity of radio navigation aids. In cases where a proposed or planned development is of a significant size, unusual nature or exceeds these restrictions Airservices Australia is to be consulted and written approval obtained before the commencement of any such developments or activities.

11.1.5 VOR Facilities

1. Vehicle movements. Aerodrome roadways, taxiways, public roads, tramways and railways shall not be closer than a 300 m radius. Vehicles used by aerodrome maintenance staff are not to be parked within a 300 m radius.

2. Restricted area. All unauthorised personnel and vehicles must be kept clear of the facility within a 300 m radius. Wooden signs or wooden fencing only may be used to clearly define the restricted area. The movement of vehicles between the VOR building and VOR antenna is prohibited.

3. Site maintenance. Grass and scrub within 150 m of the site must be mown or cut regularly. Grass cutting equipment is not to be parked within a 300 m radius of the VOR building.

4. Services. All cables (e.g. power and telephone) are to be placed underground within 300 m radius of a VOR facility. Cables can be run above the ground from 300 m to 600 m radius from a VOR, if they are aligned radially to the VOR.

5. Clearance zone. No structure, building, trees, fences, towers or power lines is permitted within 600 m radius of the VOR if they will extend above an elevation angle of one degree as seen from the VOR site.

11.1.6 DME Facilities

1. Vehicle movements. No restriction.

2. Restricted area. No restricted areas.

3. Site maintenance. There is no requirement for grass or scrub clearing, however, trees within a radius of 300 m must not be allowed to grow above the height of the DME antenna mounting point on the DME mast.

4. Services. Overhead LV power and control lines are allowable in the vicinity of the DME site provided the clearance requirements of Paragraph 11.1.7.5 are met. Overhead 2 kV-22 kV HV lines must be at least 400 m distant, while HV lines in excess of 22 kV must be at least 1 km distant from the DME antenna system.

5. Clearance zone. Small structures, small buildings, overhead lines and fences are allowable adjacent to the DME antenna location within a 600 m radius, providing that they do not project above the mounting point of the DME antenna to the DME mast.

6. Larger obstructions such as multi-storey buildings, hangers, bridges, etc, may interfere with DME system performance and any proposal to erect large structures above a one degree elevation angle as seen from the DME antenna within a 5 km radius from the DME antenna location may affect the performance of the system.

11.1.7 Instrument Landing System

1. General. There are several components on an instrument landing system: the localiser, glide path, inner, middle and outer markers, remote monitor and locator beacons. The component facilities perform specific functions and are separately located on the approach path to and alongside the runway they serve. Different siting requirements and restrictions to access and movement apply to each site.

2. Services. Within the site areas all power and control cables must be laid underground.

3. Construction. No construction or variation to access is permitted within the critical or sensitive areas without the prior approval of CASA.

4. Aircraft. Aircraft shall not enter or remain within a critical area whilst the ILS is in use. This condition may be varied if part of an approved procedure.

5. Vehicles and Plant. Vehicles and plant shall not enter nor remain within a critical or sensitive area whilst the ILS is in use.

6. Vehicles operating within the critical area may cause the equipment to automatically shut down. During activities which require access to the critical area, e.g. mowing, the ILS shall be removed from service.

7. Road Use. Approval may be granted for the use of constructed roadways where the type and size of vehicle has been assessed and determined to be acceptable.

8. Access Control. Access to the critical area shall be controlled by the responsible ATC officer.

9. Signs. Signs shall be provided to delineate the boundaries of the critical area.

10. Critical/Sensitive Areas. The occurrence of interference to ILS signals is dependant on the total environment around the ILS antennas, and antenna characteristics. The environment, for the purpose of developing protective zoning criteria, can be divided into two types of area, the critical areas and the sensitive areas.

11. The critical area is an area of defined dimensions about the localiser andglide path where vehicles, including aircraft, will cause unacceptable disturbances to the ILS performance.

12. The sensitive area is an area extending beyond the critical area where the parking and/or movement of vehicles, including aircraft, may affect the ILS performance.

11.1.8 Localiser

1. Site. The localiser antenna is located on the extended centreline of the runway typically 400 m from the stop-end

2. The localiser shelter is generally located 90 m to the side of the antenna system.

3. Critical area. The critical area for a localiser extends 90 m either side of the runway centreline commencing from 10 m behind the localiser antenna and extending forward to a point of 360 m in front of the antenna (see Figure 11.1-1).

4. Sensitive area. The sensitive area commences at the localiser antenna origin and extends forward in a sector ±10 degrees of the runway centreline. Within this sector obstructions shall be less than 0.5 degrees elevation, when measured from ground level at the antenna base (see Figure 11.1-1).

5. Site preparation. The critical area shall be prepared to have a lateral gradient of not greater than ±1%, longitudinal gradient of not grater than ±1% and shall be graded smooth to within ±75 mm of design levels.

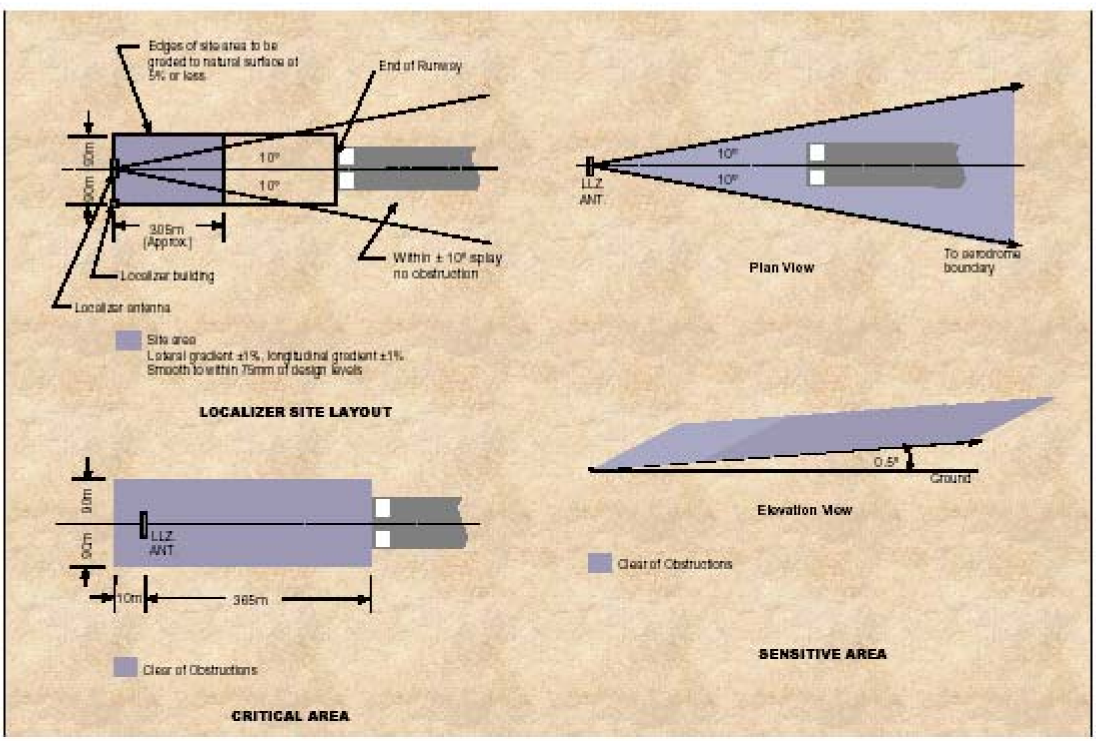


Figure 11.1-1: ILS localizer site preparation and restrictions

11.1.9 Glide Path

1. Site. Normal practice is to install the glide path system for a threshold crossing height of 15 m, with a path angle of 3 degrees. The glide path tower should be situated on the non-taxiway side of the runway approximately 300 m back set from the threshold and between 150 m to 175 m from the runway centreline.

2. The special earth mat laid between the glide path antenna and the monitor pick-ups must be inspected at regular intervals. Growth of grass is to be prevented by applying weed killer as necessary.

3. Critical area. The critical area for a glide path extends 700 m forward of the antenna and either side of a line, parallel to the runway centreline, which passes through the antenna tower (See Figure 11.1-2).

4. Sensitive area. The sensitive area includes the critical area plus an area bounded by lines at ±30 degrees to a ray commencing at the antenna and extending parallel to the runway centreline towards the threshold. An allowance of 0.5 degrees elevation is permitted for constructions outside the critical area (See Figure 11.1-1).

5. Remote monitors. Remote monitors are a non-executive monitor of the localiser located in the far field, typically in the area of the middle marker.

6. The sensitive area is detailed in Figure 11.1-3.

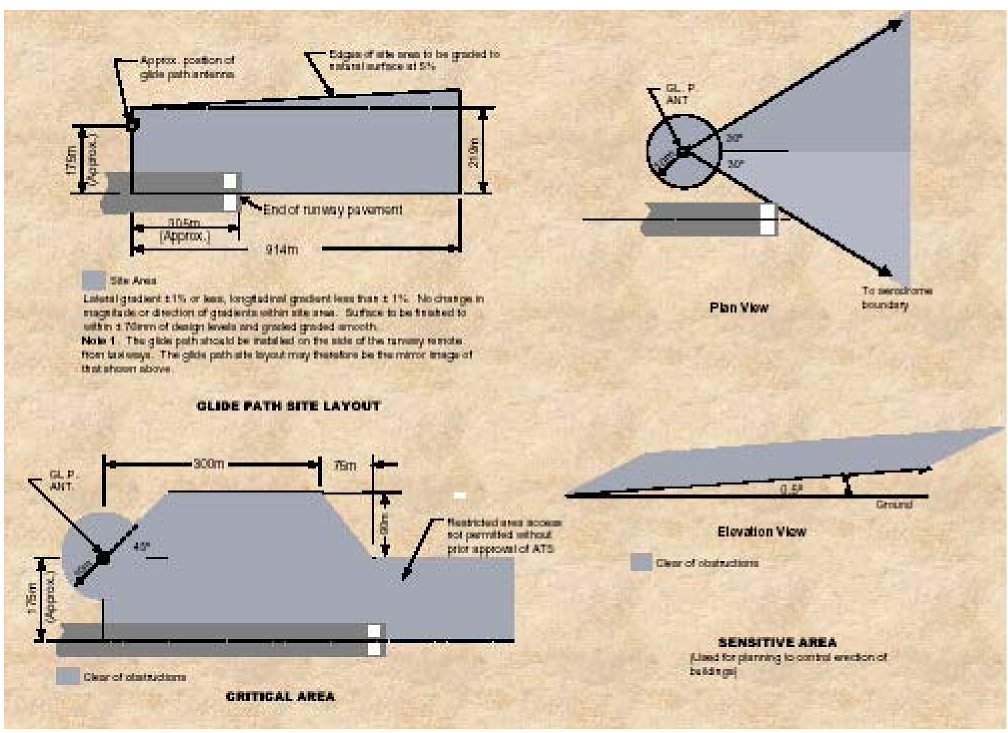


Figure 11.1-2: ILS Glide path site preparation and restrictions

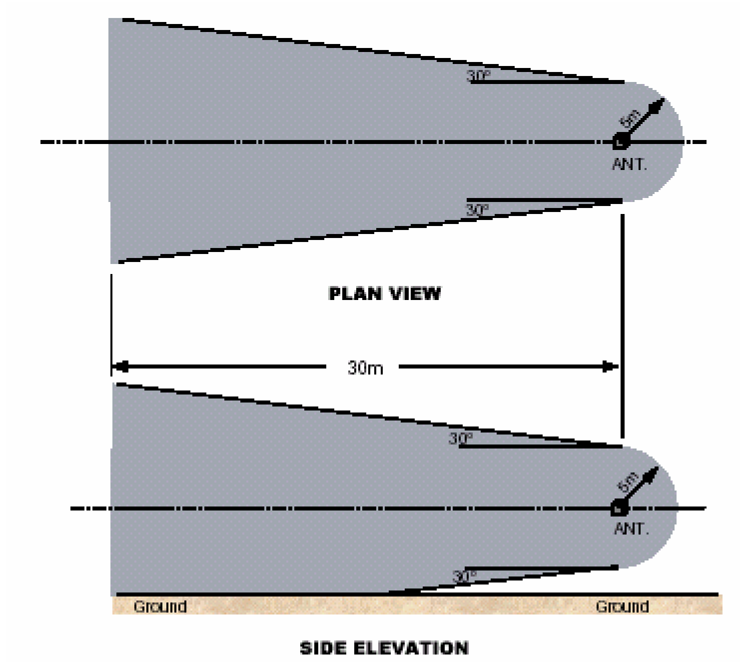


Figure 11.1-3: ILS Remote monitor antenna sensitive area

11.1.10 Marker Beacons

1. Inner marker. The inner marker should be located between 75 m and 450 m from the threshold and not more than 30 m from the extended centreline of the runway. Care must be taken in siting the inner marker to avoid interference between it and the middle marker.

2. Middle marker. The middle marker should be located 1050 ±150 m from the landing threshold at the approach end of the runway, and not more than 75 m from the extended centreline of the runway.

3. Outer marker. The outer marker should be located 3.9 nautical miles from the threshold of the runway. If this distance is unsuitable, it may be located between 3.5 and 6 nautical miles from the threshold. If the marker is situated off the extended runway centreline, it should be not more than 75 m from it.

4. Obstructions. Buildings, power or telephone lines, or clumps of trees should not extend above an elevation angle of 30 degrees from a point 1.5 m above ground level at the location of the marker beacon antenna.

5. Vehicular movement. No special requirements.

6. Services. Within 15 m of the antenna, all power and telephone lines are to be laid underground. Beyond this distance any overhead construction should meet the obstruction limits as above.

7. Electrical interference. No requirements.

8. Restricted area. No special requirements.

9. Maintenance of site. Grass, shrubs, etc., should be kept cut to a reasonable level, e.g. less than 0.6 m. Trees on the site should not be allowed to infringe the obstruction limits as above.

11.1.11 Locator Beacons

All requirements as for non-directional beacons below.

11.1.12 Non-Directional Beacons (NDB)

1. Obstructions. The immediate surrounding area within a radius of 150 m of the antenna should be free of buildings exceeding 2.5 m in any dimension, vegetation should be kept below a height of 0.6 m. Small buildings of substantially non-metallic construction extending less than 2.5 m in any dimension may be erected no closer than 60 m to the antenna.

2. Overhead power and telephone lines serving the NDB should be kept at least 150 m clear of the antenna. Steel towers and masts should subtend elevation angles less than 3 degrees measured from ground level at the centre of the NDB antenna system.

3. Vehicular movements. With the exception of authorised vehicles no vehicleshall approach the antenna within a distance closer than 60 m.

4. Services. Power and telephone cables should be underground to a depth of 0.45 m within 150 m of the antenna.

5. Restricted area. No special requirements. Where necessary, fencing should be provided to keep cattle and horses clear of the earthmat area.

6. Site maintenance. No special requirement other than to keep undergrowth from exceeding a height of 0.6 m and to maintain a neat appearance of the site. Ploughing is not permitted over any portion of the earthmat area. Grazing of sheep is permissible but cattle and horses must be kept clear.

11.1.13 Radar Sensor Sites

1. Site requirements. The site requirement for existing types of radar sensors is a rectangular area about 50 m by 40 m, including sufficient space for a crane to manoeuvre and an antenna maintenance pad.

2. For new sites, the above dimensions may be reduced, depending on whether or not standby power generation are co-located. However, the antenna maintenance space in which a crane can manoeuvre may be the limiting factor.

3. Clearance requirements. Radar transmission clearance requirement are intended to prevent the following:

   a. Holes in the coverage by new constructions blocking line of sight between radar and aircraft. Any construction, which geometrically intrudes above the existing skyline as seen by the radar, will have an affect.
   b. Interference with near fields of the antenna, which may disturb the antenna pattern in the far field. This applies within 500 m of most radars.
   c. Diffraction and bending of signals by edges and thin objects which can cause incorrect radar determined location, loss or confusion of radar tracks etc. Likely hazards in this regard are poles such as lighting poles.
   d. Reflections of the radar signals from fixed or mobile surfaces. Reflections cause aircraft to appear on radar screens in more than one location.

4. The following clearance requirements are to be maintained:

   a. No intrusion within 1 km of the radar into a height surface 5 m below the bottom of the antenna. No intrusion between the radar and the possible location of any desired targets, i.e. roughly speaking above 0.5 degrees elevation at any distance.
   b. No metallic or other electrical reflective surfaces anywhere which subtend an angle of more than 0.5 degrees when viewed from the radar, eg. fences, power lines, tanks as well as many buildings. All overhead power lines within 1 km must be aligned radially from the radar or be located at least 10 degrees below horizontal from the antenna.
   c. No radio interference emitters within 2 km having any component of transmission in the radar bands, eg. welders and electrical transmission lines. No electrical transmission lines within following specified distances:

Line Capacity	**Distance**
2 kV – 22 kV	400 m
22 kV – 110 kV	1 km
above 110 kV	2 km

Table 11.1-1

   d. Other electronic equipment may be affected by the radar transmissions. Such equipment should not be located where the radars may interfere with their performance

5. Precautions against Exposure of Personnel to Radio Frequency Radiation from Radar Systems. The primary surveillance radar transmitters on airports radiate high power beams of radio frequency energy. In close proximity to a surveillance radar antenna, the electromagnetic field strengths within the transmitted radar beam may be such that persons could be subjected to radiation exposure levels in excess of the safe limits specified in Australian Standard 2772. Airport staff is therefore to be cautioned against approaching any location within a 500 m radius of a primary radar antenna and which is between 5 m below and 50 m above the horizontal level of the bottom of the antenna.

11.1.14 Communication Facilities

1. Site requirements. The physical site requirements will vary significantly depending on the type of communications facility, and it is therefore not possible to specify a general requirement (other than for Satellite ground station sites).

2. Clearance requirements. Reliable VHF/UHF communications require a clear line-of-sight path between the base station and aircraft and vehicles using the facilities. The construction of buildings, towers, etc. may prevent reliable communications.

3. Satellite Ground Stations. The site requirement is a square area of dimension 25 m by 25 m. The clearances required around satellite ground stations are shown in Figure 11.1-4.

4. Rescue and Fire Stations. Location of airport fire stations (or satellite fire stations) involves compliance with MOS 139 subpart H requirements on RFFS response times, and therefore generally need to be reasonably centrally located with respect to runway configurations. See MOS 139H for details.

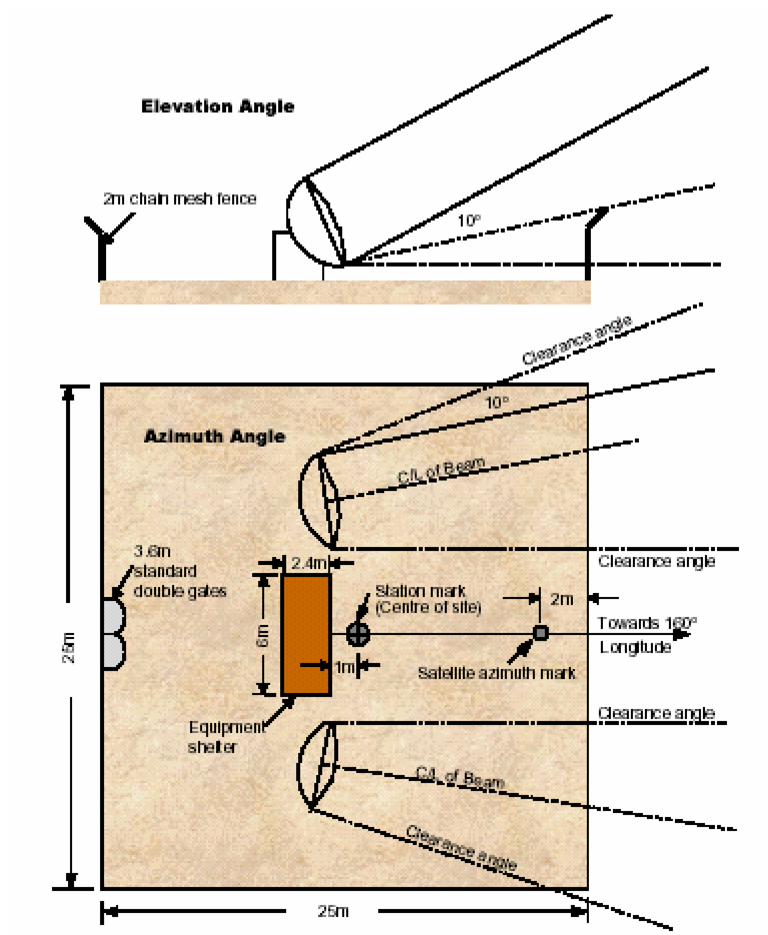


Figure 11.1-4: Communications Satellite Ground Station Manned Centre Site

11.1.15 Ground Earthing Points

1. Where required, the provision of a ground earthing points must be made in agreement with the fuelling agent.

2. Where ground earthing points are provided, the resistance to earth must not exceed 10,000 ohms.

3. Where ground earthing points are provided, they must be maintained in accordance with the procedures set out in paragraphs 11.1.17.1 to 11.1.19.1.

Note : Civil Aviation Order Section 20.9 titled '*Air Service Operations - Precautions in Refuelling, Engine and Radar Ground Operations*' also contains information on ground earthing points.

11.1.16 Testing of Ground Earthing Points

1. Each ground earthing point must be tested for its electrical resistance, both as part of the initial installation (or any replacement), six months after the installation (or any replacement), and also thereafter as part of the Aerodrome Technical Inspection.

2. Where testing shows that the earthing points are sound, they must be marked with a 15 cm diameter circle, painted white.

11.1.17 Inspection of Ground Earthing Points

The ground earthing points must be inspected as part of the quarterly technical inspection to ensure that :

a. the ground earthing point is firmly connected to the earthing rod and seated on the pavement;
b. the earthing rod is firmly embedded in the ground;
c. the fins used for making electrical connections are free from dirt, grease paint, or any other substances; and
d. no ground earthing points have been buried or removed.

11.1.18 Remedial Action

When the resistance to earth exceeds 10,000 ohms and the ground earthing point cannot immediately be repaired or replaced, the head of the ground earthing point must either be removed or marked with a 15 cm diameter circle, painted red, to show it cannot be used.

11.1.19 Compass Swinging Site

1. Aircraft compass calibration may be conducted by using approved compass calibration equipment or by aligning an aircraft on known magnetic headings for the purpose of determining the degree of error in the magnetic compass, commonly referred to as '*swinging the compass*'. The latter method must only be conducted at a suitable compass swinging site.

2. Guidance information for the establishment of a compass swinging site is provided in the Advisory Circular (AC).

11.1.20 Light Aircraft Tie-Down Facilities

1. Light aircraft tie-down facilities may be provided to secure aeroplanes against possible damage if they are blown off their apron parking position by strong winds.

2. Where provided, tie down facilities must be of adequate strength for the aircraft type being secured. The design of the tie-down facilities should be determined in consultation with an engineering consultant or manufacturer. The tie-down facilities should ideally be fixed to the ground using embedded anchors, and not left loose on the apron surface where they could create an FOD problem.

12. OPERATING STANDARDS FOR REGISTERED AERODROMES

12.1 General

12.1.1 Introduction

1. Unlike a certified aerodrome where the aerodrome operating procedures are regulated through an aerodrome manual, the procedures for a registered aerodrome are simpler.

2. The operator of a registered aerodrome is required to:
   a. Ensure that the aerodrome operational information, which has been provided and published in AIP, is current;
   b. When it is not, promptly advise pilots, through the NOTAM system of changes which may affect aircraft operations; and
   c. Submit to DGAC an aerodrome safety inspection report, conducted by an approved person, annually or at a timing as agreed by DGAC.

3. To ensure that the aerodrome information provided is current, the aerodrome facilities must be maintained to the standard when the aerodrome was registered or if a facility is upgraded to a new standard, to that standard.

4. To be able to promptly advise changes, operators of registered aerodromes need to have personnel and procedures to conduct timely serviceability inspections, identify changed circumstances and make reports.

5. Although formal documentation of all facets of aerodrome operations are not required, it is in the interest of the operator of a registered aerodrome to be able to demonstrate that he or she is discharging the duty of care in providing a safe facility for aircraft operations. To avoid confusion and misunderstanding, all arrangements regarding aerodrome safety functions must be in writing.

6. If a registered aerodrome fails to meet safety requirements, DGAC may suspend or cancel the registration. DGAC staff may conduct scheduled or unscheduled inspections of the aerodrome to assess whether a registered aerodrome meets safety requirements.

7. The standards and procedures of this Chapter are intended to assist operators of registered aerodromes to meet on-going aerodrome safety requirements.

12.1.2 Aerodrome Reporting Officer

1. The operator of a registered aerodrome must have in place, experienced or appropriately trained persons, known as reporting officers, to carry out the aerodrome safety functions. Attributes required include:

   a. Knowledge of the standards that the aerodrome has to be maintained to;

b. Maturity and responsibility to ensure reliance on the conduct of regular serviceability inspections of the safety elements of the aerodrome;

c. Having the written and oral communication skills to initiate NOTAM or to communicate aerodrome condition status to ATC, pilots and other aerodrome users.

2. Reporting officers are normally directly employed by the operator of the aerodrome. However, at an aerodrome where aerodrome operator's employees may not be available at all times, other persons may be nominated as reporting officers, for example the local agent of the airline during the period of operations conducted by the airline concerned. Before entrusting the reporting function to a person, the aerodrome operator must ensure that the person is trained and has the appropriate attributes.

3. Reporting officers must be provided with appropriate radios in their vehicles so they can maintain a listening watch of aircraft activities on and in the vicinity of the aerodrome during working hours.

12.1.3 Aerodrome Serviceability Inspections

1. Aerodrome serviceability inspections are visual checks of elements of the aerodrome which may impact on aircraft safety. A checklist of contents of the inspection must be developed, commensurate with the size and complexity of the aerodrome.

2. The checklist must encompass at least the following items:
   a. Surface condition of the movement area, including cleanliness
   b. Surface condition of the runway, particularly the usability of unsealed pavements in wet conditions;
   c. Markings, markers, wind direction indicators and aerodrome lighting systems;
   d. Any obstacle which may infringe the approach, take-off, transitional and inner-horizontal surfaces;
   e. Animal or bird activities on and in the vicinity of the aerodrome;
   f. Checking of fences or other devices that prevent persons and vehicles getting on the movement area; and
   g. Checking the currency of any outstanding NOTAM initiated.

Note : Elements of matters to be checked for are similar to those detailed in Chapter 10: Section 10.2.

12.1.4 Frequency of Serviceability Inspection

1. At an aerodrome with daily air transport operations, serviceability inspections must be carried out daily, and prior to before the scheduled operations.

2. Additional serviceability inspections must be conducted after significant weather phenomena such as strong wind gust or heavy rain.

3. At an aerodrome without daily regular public transport operations, serviceability inspections must be conducted before each air transport operation or not less than 2 per week, whichever is more.

12.1.5 Record of Inspections and Remedial Actions

1. The operator of a registered aerodrome must maintain an inspection logbook to demonstrate that inspections have been carried out. Beside recording the inspections, the logbook should also record significant aerodrome upgrading or remedial works.

2. The logbook must be kept for at least 12 months or the agreed period of the aerodrome safety inspection, whichever is longer. The logbook must be made available to any DGAC authorised person conducting inspection of the aerodrome and to any person who conducts the annual or periodic safety inspection.

12.1.6 Reporting Changes

1. Where a change in the aerodrome conditions requires a NOTAM to be issued this must be done in accordance with Section 10.3.

   Note : A copy of sample Aerodrome Report Form to the NOTAM Office is shown in Section 12.2.

2. Record of NOTAM initiated should be kept for at least a year or the agreed period of safety inspection, whichever is longer.

12.1.7 Aerodrome Works

1. Aerodrome works must be arranged so as not to create any hazard to aircraft or confusion to pilots.

2. Aerodrome works may be carried out without closing the aerodrome provided safety precautions are adhered to.

3. Where aerodrome works are carried out without closing the aerodrome, the aerodrome works safety procedures specified in Chapter 10: Section 10.7 for certified aerodromes are equally applicable to registered aerodromes.

12.1.8 Safety Inspection Report

1. 12.1.8.1 1CASR Part 139 requires a registered aerodrome used by aircraft, with more than 9 passenger seats, to prepare and submit to DGAC annually, or at a periodicity as agreed by DGAC, a safety inspection of the aerodrome. Matters to be addressed in the report are also prescribed in the regulations.

2. The report must provide a true picture of the state of the aerodrome in its compliance with applicable standards. Where corrective action or necessary improvements are identified, the aerodrome operator must provide a statement of how the corrective action or improvements would be addressed.

3. For aerodromes used by aircraft with not more than 9 passenger seats, the approach and taker-off area would still need to be checked on a regular basis, preferably at least once a year for tree growth or new tall objects. Where another obstacle may become the critical obstacle and affect the published take-off gradient or the threshold location, the checking should be conducted by a person with appropriate technical expertise.

12.2. Sample Aerodrome Report Form.

form 1122 08/2002 MOS—Part 139—aerodrome report form Page 1 of 1
Aerodrome Report Form
Notification of Changes to Serviceability of a Certified Aerodrome

To: NOTAM Office Phone Fax

AERODROME: ....
Date .... / .... / 20 .... TIME (UTC preferred) UTC . WiB . WIT . WIT .

Purpose of Report PROVIDE NEW INFORMATION DETAILED BELOW .
CANCEL PREVIOUS ADVICE (NOTAM No ....) . Date: ....
EXTEND PREVIOUS ADVICE (NOTAM No ....) . Date: ....

Period of Validity **Permanent / Temporary NOTAM** *(Delete one)*
FROM (date/time) .... TO (date/time) .... Estimated . (if finish time uncertain)
(*temporary NOTAM only*)

Note: If time estimated, contact NOTAM OFFICE at least 2 hours before estimated duration time and advise if NOTAM is to be extended or cancelled.

Daily duration or time schedule *(if applicable*)

FROM (date/time) .... TO (date/time) ....

Text (*For example of text see Section 10.5*)

Please fax copy of NOTAM to originator Fax No. ....
This report confirms previous telephone advice. . Contact Numbers Ph ....
Fax ....

Signed .... Date/Time .... Reporting Officer (Print Name) ....
DGAC Office advised by: Phone . Fax . E-mail . Not advised .

For NOTAM Office only:

NOTAM No. C .... Initials .... date/time ....

13. STANDARDS FOR AERODROMES INTENDED FOR SMALL AEROPLANES CONDUCTING AIR TRANSPORT OPERATIONS UNDER CASR 135

13.1 General

13.1.1 Introduction

1. Pursuant to CASR Part 139, this Chapter sets out the standards for aerodromes used in CASR 135 operations. CASR 135 requires holders of Air Operator's Certificates (AOCs) when conducting air transport operations in aeroplanes with maximum take-off weight not exceeding 5700 kg, to operate from an aerodrome which meets the standards of CASR Part 139.

2. Pursuant to CASR 135, the responsibility of ensuring that an aerodrome is in compliance with CASR Part 139 standards rests with the holder of the AOC. This responsibility cannot be transferred even though some or all of the functions of the aerodrome may be delegated to another person, such as the owner or operator of the aerodrome.

3. Notwithstanding Paragraph 13.1.1.2, persons providing aerodrome facilities or services to aircraft operations have a duty of care to provide a safe facility or service. Unless an aerodrome is certified *or registered,* DGAC does not regulate the operator of the aerodrome. However, activities of the aerodrome operator may be subject to DGAC scrutiny as part of the audit of the AOC holder's compliance with regulations.

13.1.2 Aerodrome Standards

1. The required physical dimensions and obstacle limitation surfaces (OLS) are set out in Table 13.1-1.

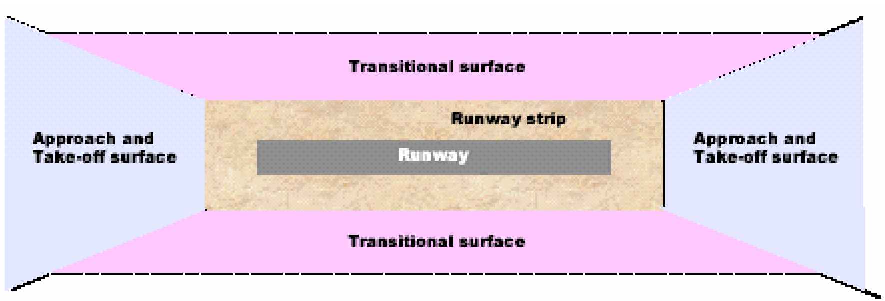


Figure 13.1-1: Obstacle limitation surfaces

Runway And Obstacle Limitation Surfaces	Aeroplanes Not Exceeding 5,700 Kg – By Night	Aeroplanes Exceeding 2,000 Kg But Not Exceeding 5,700 Kg – By Day	Aeroplanes Not Exceeding 2,000 Kg By Day In Cross- Wind Not Exceeding 5 Knots—For Occasional Use Only
Runway and strip			
Runway width	18 m	15 m	10 m
Runway strip width o graded	45 m, 80 m if practicable	45 m,60 m if practicable	30 m
o ungraded	80m	60 m	60 m
Runway longitudinal slope	2%	2%	2%
Runway transverse slope	2.5%	2.5%	2.5%
Runway strip transverse slope	2.5%	2.5%	2.5%
Approach and take-off surfaces			
Length of inner edge	80 m	60 m	30 m
Distance of inner edge before threshold	60 m	30 m	30 m
Divergence, each side	10%	10%	10%
Length of surface	2500 m	1600 m	900 m
Slope	4%	5%	5%
Transitional surface			
Slope (to 45 m height)	20%	20%	20%
Inner horizontal surface			
Height	45 m	45 m	45 m
Radius from runway strip	2,500 m	2,000 m	2,000 m

Table 13.1-1: Standards for physical dimensions and obstacle limitation surfaces

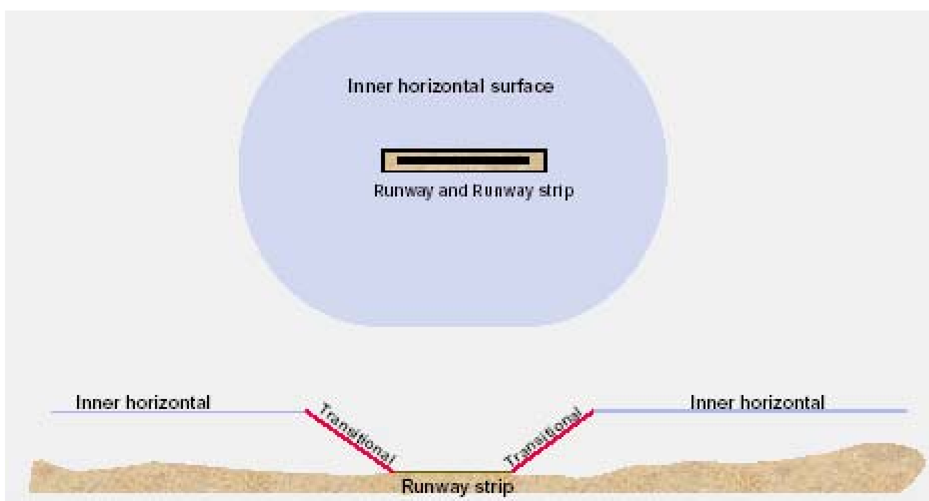


Figure 13.1-2: OLS cross-section

2. Obstacles. Where an aeroplane operation is affected by the presence of obstacles, the matter needs to be brought to the attention of the DGAC, which will determine obstacle marking and lighting requirements and any operational limitations.

3. Runway length. The runway length requirement varies depending on aircraft type and local geography. It is necessary to ensure that the runway length provided is adequate for the most demanding aeroplane (not necessarily operating to maximum take-off weight) that the aerodrome is intended to serve.

4. Clearways and stopways. If a clearway or stopway is provided to supplement the runway length, it must be provided in accordance with the standards for clearways and stopways specified in Chapter 6.

13.1.3 Aerodrome Markings

1. Aerodrome markings or markers must be provided. Sealed surfaces are normally marked by paint markings and unsealed surfaces by markers.

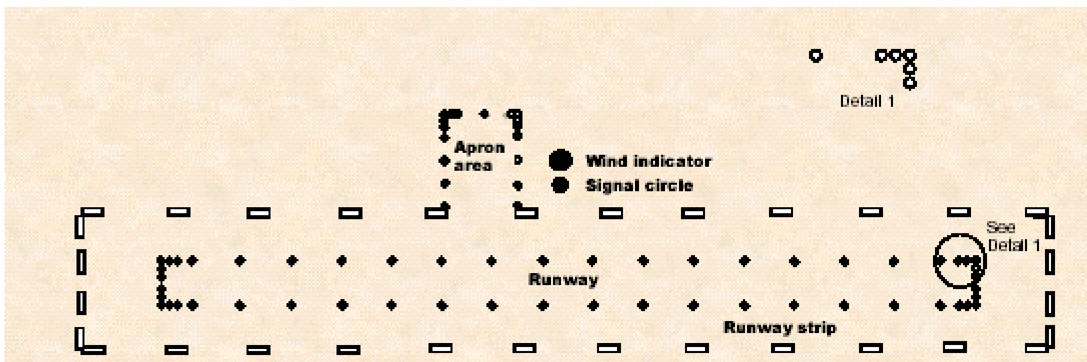


Figure 13.1-3: Aerodrome markings

2. For a sealed runway, the runway thresholds must be painted in accordance with Paragraph 8.3.8. A runway centreline marking is not required on runways that are 18 m wide or less. White painted runway side stripes, 0.3 m wide, should be provided if there is a lack of contrast between the runway surface and the surrounding area.

3. On unsealed runways, where the runway strip is not maintained to normal grading standards, the runway must be marked using edge markers, except that runway edge markers may be omitted if the full width of the runway strip is maintained suitable for aeroplane operations and the runway strip is marked using strip markers. Where the runway is not provided with edge markers, the threshold locations need to be marked appropriately in the shape of a U.

4. For both sealed and unsealed runways, the runway strip should also be marked by using cones, gable markers, tyres, or 200 litre drums cut in half along their length and placed with the open side down, or something similar. These runway strip markers should be white in colour.

Note : *Runway cone markers should have a 0.4 m base diameter and be 0.3 m in height. Runway strip cone markers should have a 0.75 m base diameter and be 0.5 m in height. Gable markers should be 3 m in length*.

5. Cone or similar size markers need to be spaced not more than 90 m apart. Gable or similar size markers need to be spaced not more than 180 m apart.

6. Where the edges of unsealed taxiways or aprons may not be visually clear to pilots, markers may be provided in accordance with section 8.2

13.1.4 Aerodrome Lighting

1. Where a runway is intended for night operations, the runway must be provided with runway edge lighting, spaced laterally at 30m apart, and longitudinally at approximately 90 m apart. The edge lights on each side must present two parallel straight rows equidistance from the runway centreline. The lights indicating runway ends must be at right angles to the centreline.

2. Where there is no permanent electricity supply lights of white colour, powered by generators, batteries or similar may be used. Liquid fuelled flares may also be used. Preferrably only one type of light source should be used for any particular installation.

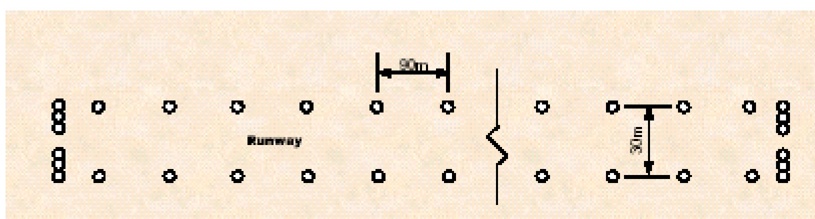


Figure 13.1-4: Aerodrome lighting

13.1.5 Wind Direction Indicators

1. The standard wind direction indicator (WDI) is a tapering fabric sleeve (wind sock), 3.65 m long and white in colour. It must be located such that it is clearly visible from the air. It must also be located clear of the 1:5 (20%) transitional surface.

2. If the aerodrome is intended for night operations, the wind direction indicator must be provided with illumination.

3. To enhance direction indication, the WDI must be located within a circular area 15 m in diameter, appropriately blackened or provided with a contrasting colour, and bounded by 15 equally spaced white markers.

13.1.6 Ground Signal and Signal Area

1. A ground signal area, consisting of a circle, blackened or provided with contrasting colour of 9 m in diameter marked by 6 equally spaced white markers must be provided near the wind direction indicator for the purpose of displaying ground signals to pilots.

2. Marking of unserviceability of aerodrome. A white cross with each arm 6 m in length and 0.9 m in width must be displayed on the signal circle when the aerodrome is closed to aircraft operations.

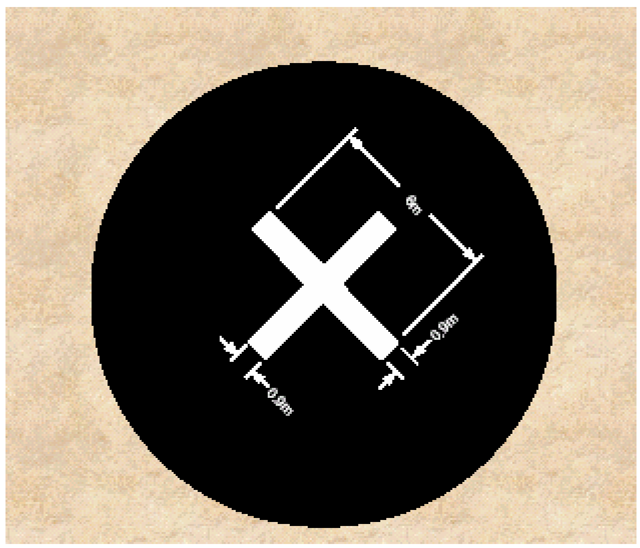


Figure 13.1-5: Total unserviceability marking

13.1.7 Runway and Runway Strip Conditions

1. The surface of the runway and runway strip need to be maintained to minimise adverse effects on aeroplane operations, as follows:

Surface	Runway	Runway strip
Sealed surface	After compaction, the surface is to be swept clean of loose stones	N/A
Height of grass		
짹Sparse	450 mm	600 mm
짹Medium	300 mm	450 mm
짹Dense	150 mm	300 mm
Size of loose stones		
짹Isolated stones on natural surface	25 mm	50 mm
짹Constructed gravel surface	50 mm	75 mm
짹Surface cracks	40 mm	75 mm

Table 13.1-2

2. The surface of the unsealed runway must not have irregularities, which would adversely affect the take-off and landing of an aircraft.

Note : *An empirical test for runway riding quality is to drive a stiffly sprung vehicle such as a medium size utility or unladen truck along the runway at not less than 65 kph. If the ride is uncomfortable, then the surface needs to be graded and levelled.*

13.1.8 Aerodrome Serviceability Reporting

1. If the aerodrome is not provided with an NOTAM service, the AOC holder needs to establish, in concert with the aerodrome operator, a reporting system such that the pilot can be notified of any changes to the aerodrome serviceability status, preferably before embarking on the journey.

2. The aerodrome operator has a duty of care to provide information that is as accurate as possible. This would require physical inspection of the aerodrome, ideally before the departure of the airline's aeroplane from its base aerodrome, but always before the arrival of the aeroplane. To maintain the accuracy of the aerodrome serviceability status, it is essential that the aerodrome be inspected after strong wind or rain. The information provided should include:

   a. runway surface condition: dry, wet, soft, or slippery;

   b. runway strip condition: any obstruction, undue roughness, visibility of markers;

   c. wind direction indicator: if torn or obstructed;

   d. approach and take-off areas: if there are objects close to or above the obstacle surfaces;

   e. other hazardous condition or object known to the aerodrome operator, e.g. animal or bird hazard.

3. If the aerodrome is not published in AIP, the AOC holder's Operations Manual should indicate clearly the aerodrome operator's contact details for serviceability status reports.

   Note : *It is important that the person performing the inspection and reporting duties has a working knowledge of the aerodrome safety requirements and understands clearly his or her responsibilities.*

4. For unsealed landing areas, serviceability is often affected by rain. Where the aerodrome is deemed too wet for aeroplane operations, the aerodrome operator needs to display the unserviceability signal, and notify the airlines accordingly. When in doubt, always err on the side of safety.

DIREKTUR JENDERAL PERHUBUNGAN UDARA

CUCUK SURYO SUPROJO
NIP. 120089499

For unsealed landing areas, serviceability is often affected by rain. Where the aerodrome is deemed too wet for aeroplane operations, the aerodrome operator needs to display the unserviceability signal, and notify the airlines accordingly. When in doubt, always err on the side of safety.

Untuk area landing yang tidak dilapisi, pelaksanaan serviceability sering sekali dipengaruhi oleh hujan. Pada saat bandar udara ditetapkan terlalu basah untuk operasional pesawat udara, Penyelenggara bandar udara perlu menanyangkan signal unserviceability dan selanjutnya operator pesawat udara pada saat mengalami keragu-raguan utama-kan keselamatan penerbangan

LAMPIRAN II
PERATURAN DIREKTUR JENDERAL PERHUBUNGAN UDARA
NOMOR : SKEP/76/VI/2005
TANGGAL : 20 JUNI 2005

PEDOMAN BAGI PERSONIL DIREKTUR JENDERAL PERHUBUNGAN UDARA DALAM MELAKUKAN AUDIT BANDAR UDARA UNTUK MENDAPATKAN SERTIFIKAT

LAMPIRAN II
PERATURAN DIREKTUR JENDERAL PERHUBUNGAN UDARA
NOMOR : SKEP/76/VI/2005
TANGGAL : 20 JUNI 2005

FORMAT – A

PROSEDUR PENGOPERASIAN BANDAR UDARA (INSTRUKSI STAF (SI) 139-01)

FORMAT – A

1. Daftar Chek Audit Untuk Sertifikasi Operasi Bandar Udara (Aerodrome)
   Hal-hal penting pada saat memverifikasi suatu proses :
   a. Kecukupan infrastruktur yang tersedia dan bagaimana dukungannya terhadap proses.
   b. Bagaimana audit memantau kinerja proses dan membuat perbaikan?
   c. Sudahkan organisasi menunjuk orang yang bertanggungjawab dan kompeten untuk memastikan bahwa prosesnya tetap tepat dan mutakhir?
   d. Apakah ada orang yang berkompeten yang memiliki otoritas yang tepat untuk mengubah proses?
   e. Apakah orang yang terlibat telah dilatih secara tepat?

   Pada saat mengidentifikasi suatu ketidaksesuaian (non-compliance) dengan regulasi, lihatlah jauh dari sekedar apa yang terjadi saat ini dan tanya: (Mengapa? dan Siapa?)
   Apa yang menyebabkan hal ini terjadi? Apa sejarahnya?
   Faktor yang lebih luas apa yang terlibat, dan bagaimana mereka saling berkait dalam rangkaian kejadian yang membawa pada kondisi yang memungkinkan ketidaksesuaian terjadi ?

2. Daftar Chek Audit Untuk Casr Part 139 – Aerodrome.
   a. Persyaratan umum buku pedoman pengoperasian bandar udara (manual aerodrome);
   b. Informasi tentang lokasi bandar udara (aerodrome);
   c. Informasi yang harus diberitahukan ke AIS;
   d. Prosedur operasi bandar udara (aerodrome) :
      1. Pelaporan bandar udara (aerodrome);
      2. Akses ke area pergerakan;
      3. Rancangan gawat darurat di bandar udara (aerodrome);
      4. Layanan Pemadam Kebakaran dan Rescue aerodrome;
      5. Inspeksi area pergerakan dan area dengan batasan obstacle;
      6. Visual aid dan sistem kelistrikan;
      7. Pemeliharaan area pergerakan;
      8. Keselamatan kerja di bandar udara (aerodrome);
      9. Manajemen operasi apron;
      10. Manajemen keselamatan apron;
      11. Kontrol kendaraan airside;
      12. Manajemen obstacle binatang liar;
      13. Kontrol obstacle;
      14. Rancangan Strategi Pemindahan Pesawat Terbang Rusak;
      15. Penanganan material berbahaya;
      16. Operasional dengan daya pandang rendah;
      17. Administrasi bandar udara (aerodrome);
      18. Sistem Manajemen Keselamatan bandar udara (Aerodrome);
      19. Fasilitas bandar udara (aerodrome).

DAFTAR CHEK AUDIT – MANUAL AERODROME, INFORMASI UMUM

Aktivitas dan Tujuan		Ref. CASR – MOS	Status	Komentar
1.	Apakah operator aerodrome memiliki copy yang lengkap dan terkini serta disimpan di bandar udara (aerodrome)? a. Apakah dalam bentuk cetak ? b. Apakah operator memberikan copy yang lengkap dan terkini kepada DGAC ? c. Apakah copy milik operator dapat dilihat oleh orang yang diotorisasi pada saat jam kerja normal ?	CASR 139.41 (1) CASR 139.41 (1) CASR 139.41 (2) CASR 139.41 (3)		
2.	Apakah manual berisikan lebih dari 1 dokumen ? a. Jika ya, apakah ada referensi-lintas antardokumen yang tepat ? b. Apakah copy lainnya disimpan dalam bentuk elektronik ?	CASR 139.43 (2) CASR 139.43 (2) CASR 139.43 (3)		
3.	Apakah DGAC menerima manual tersebut ?	CASR 139.55		
4.	Apakah bagian yang diabaikan disertai dengan alasan mengapa tidak dapat diterapkan ?	CASR 139.47		
5.	Apakah rincian hal-hal yang menjadi perkecualian dimasukkan ?	CASR 139.47 (3)		
6.	Apakah rincian kondisi-kondisi dimasukkan ?	CASR 139.47(3)(c)		
7.	Apakah buku pedoman memasukkan prosedur yang memastikan bahwa manual akan diamandemen kapan pun dibutuhkan untuk memastikan keakuratannya ?	CASR 139.49 (1)		
8.	Apakah buku pedoman memasukkan prosedur yang memastikan bahwa buku pedoman akan berkesesuaian dengan arahan yang mungkin akan diberikan oleh DGAC untuk mengamandemen buku pedoman ?	CASR 139.47 (2)		
9.	Apakah buku pedoman memasukkan prosedur yang memastikan bahwa operator akan memberitahukan DGAC dalam bentuk tertulis dalam tempo 14 hari jika ada amandemen ?	CASR 139.51 (1)		
10.	Apakah ada satu orang tertentu yang ditunjuk sebagai pengontrol buku pedoman ?	CASR 139.53		
11.	Apakah buku pedoman memiliki rincian dari petugas yang memegang copy ? dan prosedur yang memastikan bahwa manual yang telah dimutakhirkan telah didistribusikan ke seluruh pemegang ?	CASR 139.53 (3)(a) CASR 139.53 (3)(b)		
12.	Dapatkah seorang pembaca memberitahukan kapan perubahan pada buku pedoman telah dilakukan?	CASR 139.43 (1)		
13.	Dapatkah seorang pembaca memberitahukan bahwa buku pedoman sudah dimutakhirkan?	CASR 139.43 (1)		
14.	Adakah prosedur yang memastikan bahwa jika ada penyimpangan dari buku pedoman yang dibuat untuk memastikan keselamatan pesawat terbang akan dilaporkan ke DGAC dalam tempo 30 hari?	CASR 139.83		

Catatan : *Rincian pada daftar di atas menyajikan kandungan minimum buku pedoman pengoperasian bandar udara. Masing-masing operator harus menyesuaikan isi buku pedoman mereka untuk mencerminkan kerumitan dan lingkungan operasional bandar udara (aerodrome).*

DAFTAR CHEK AUDIT – BUKU PEDOMAN PENGOPERASIAN BANDAR UDARA (MANUAL AERODROME), INFORMASI TENTANG LOKASI BANDAR UDARA (AERODROME)

Aktivitas dan Tujuan	Ref. CASR - MOS	Status	Komentar
1. Apakah buku pedoman pengoperasian bandar udara berisikan data yang relevan di Section 2 tentang lokasi bandar udara (aerodrome) ?	CASR 139.47 (1)(b)		
2. Apakah Section 2 dari manual berisikan : a. Suatu rencana bandar udara yang menunjukkan fasilitas utama termasuk indikator angin ? b. Suatu rencana yang menunjukkan batas bandar udara (aerodrome) ? c. Suatu rencana yang menunjukkan jarak bandar udara (aerodrome) dari kota atau daerah berpenduduk padat terdekat dan posisi bandar udara (aerodrome) ? d. Lokasi fasilitas dan peralatan bandar udara di luar batas bandar udara (aerodrome) ?	CASR 139 appendix 1, section 2 MOS 5.1.2.1 MOS 5.1.2.1 (g)		
3. Apakah Section 2 dari manual berisikan : a. Rincian sertifikat tanah dari lokasi bandar udara (aerodrome) atau b. Rincian pemindahan kuasa (mis: perjanjian leasing) properti tempat bandar udara (aerodrome) berlokasi	CASR 139 appendix 1, section 2		

Daftar Chek Audit – buku pedoman pengoperasian bandar udara (manual Aerodrome), Informasi yang harus diberitahukan ke AIS

Apakah buku pedoman berisikan informasi berikut?
Dapatkah operator bandar udara (aerodrome) memverifikasinya?
Apakah informasi dalam manual berhubungan dengan data AIP yang dipublikasikan?

Aktivitas dan Tujuan	Ref. CASR - MOS	Status	Komentar
Subsection 3.1 Informasi Umum : CASR 139 Appendix 1, Subsection 3.1			
1. Nama bandar udara	Clause (a)		
2. Kota atau daerah di mana bandar udara (aerodrome) berlokasi	Clause (a)		
3. Koordinat geografis titik referensi bandar udara (aerodrome) (WGS 84)	Clause (d)		
4. Elevasi bandar udara dan geoid undulation	Clause (e)		
5. Elevasi dari masing-masing threshold dan geoid undulation	Clause (f)		
6. Elevasi ujung runway dan ketinggian atau kedalaman titik yang signifikan di sepanjang runway	Clause (f)		
7. Elevasi tertinggi zona touch down untuk suatu runway pendaratan yang tepat	Clause (f)		
8. Temperatur referensi bandar udara (aerodrome)	Clause (g)		
9. Rincian beacon di bandar udara (aerodrome)	Clause (h)		
10. Nama operator bandar udara (aerodrome) dan alamat serta nomor telepon yang dapat digunakan untuk menghubungi operator setiap saat	Clause (i)		
11. Informasi setempat : a. Jam operasi, jika dapat diterapkan b. Jasa ground yang tersedia c. Prosedur khusus jika ada d. Tindakan pencegahan setempat jika ada	Clause (j)		
Subsection 3.2 Dimensi bandar udara (Aerodrome) dan informasi terkait: CASR 139 Appendix 1, Subsection 3.2			

1. Bearing sebenarnya dari setiap runway dan nomor runway			
2. Derajat variasi magnetik, tanggal informasi dan perubahan tahunan			
3. Panjang, lebar dan kemiringan masing-masing runway			
4. Lokasi dari displaced threshold jika ada			
5. Koordinat geografis dari masing-masing threshold			
6. Jenis permukaan runway			
7. Jenis runway (instrument, non-instrument)			
8. Zona bebas obstacle yang tersedia (runway instrumen yang dapat diterapkan)			
9. Dimensi dan jenis permukaan untuk RESA dan stopway			
10. Panjang, lebar dan jenis permukaan runway yang digrading dan runway strip			
11. Dimensi, profil ground dan jenis permukaan dari clearway jika ada			
12. Jenis perkerasan permukaan dan rating kekuatannya dalam PCN System			
13. Declared distance runway untuk setiap runway			
14. Jarak interseksi take-off untuk masing-masing runway jika ada			
15. Panjang, lebar dan jenis permukaan serta sistem penomoran taxiway			
16. Kekuatan perkerasan taxiway dalam sistem PCN			
17. Lokasi dan penetapan rute standard taxy			
18. Koordinat geografis dari titik centreline taxiway			
19. Jenis permukaan apron, kekuatan perkerasan dan nomor parkir pesawat terbang			
20. Koordinat geografis untuk tempat parkir pesawat terbang			
21. Rincian Aerodrome Obstacle Chart Type A			
22. Kategori RFFS bandar udara (aerodrome)			
23. Lokasi dan frekuensi dari chekpoint VOR			
24. Lokasi dan elevasi dari posisi altimeter pre-flight			
Subsection 3.1 (lanjutan)			
1. Koordinat geografis dan elevasi tertinggi untuk setiap obstacle signifikan di area approach dan take-off climb, di area perputaran dan di sekitar bandar udara (aerodrome).			
2. Informasi koordinator bandar udara (aerodrome) untuk rencana perbaikan pesawat terbang rusak, dan pernyataan kemampuan untuk memindahkan pesawat terbang besar yang rusak dengan menggunakan peralatan yang ada di bandar udara.			
Subsection 3.2 Informasi tentang sistem visual aid CASR 139 Appendix 1, Subsection 3.2, clause (a)(vi)			
1. Jenis penerangan runway, jika ada, untuk setiap runway			
2. Jenis penerangan approach			
3. Sistem indikator kemiringan approach secara visual untuk setiap runway, jika ada			
4. Apakah penerangan portabel tersedia dan didaftar?			
5. Jenis penerangan untuk taxiway			
6. Jenis penerangan untuk apron			
7. Kontrol visual dan alat bantu petunjuk lainnya untuk runway, taxiway dan apron			
8. Rincian sistem pemberian marka untuk elemen runway, taxiway dan apron			
9. Ketersediaan sumber daya cadangan, rancangan pemindahan daya dan waktu pengubahan daya			
10. Penjabaran sistem petunjuk docking visual di apron yang digunakan oleh pesawat terbang untuk operasional internasional, dan posisi parkir pesawat terbang di mana sistem tersebut dipasang			

Catatan :	*Lihat ICAO Annex 15 untuk spesifikasi elemen data dan tingkat akurasi yang disyaratkan untuk elemen data aeronautika.*

DAFTAR CHEK AUDIT – BUKU PEDOMAN PENGOPERASIAN BANDAR UDARA (MANUAL AERODROME), PROSEDUR PELAPORAN BANDAR UDARA (AERODROME)

Aktivitas dan Tujuan	Ref. CASR – MOS	Status	Komentar
Buku Pedoman Pengoperasian Bandar Udara (Manual Aerodrome)			
1. Apakah buku pedoman berisikan rincian rancangan untuk pelaporan tentang adanya perubahan yang dapat mempengaruhi operasi pesawat terbang kepada AIS dan jasa lalu lintas udara setempat?	CASR 139.77 CASR 139.115		
2. Dan untuk pencatatan pelaporan perubahan selama dan di luar jam kerja normal operasional bandar udara (aerodrome)?	CASR App1, 4.1(a)		
3. Apakah memasukkan rincian contact person dan organisasi yang mendapat laporan adanya perubahan?	CASR App1, 4.1(c)		
4. Dan nama petugas pelapor yang bertanggungjawab melaporkan perubahan dan nomor telepon untuk menghubunginya selama dan sesudah jam kerja?	CASR App1, 4.1(b)		
5. Dan proses yang memastikan bahwa petugas pelapor telah dilatih sesuai dengan MOS?	MOS 10.1.3.1		
6. Dan rancangan untuk melaporkan perubahan informasi bandar udara (aerodrome) yang diterbitkan dalam AIP kepada AIS dan CASA?			
7. Dan untuk memastikan bahwa pemberitahuan ke AIS adalah dalam bentuk tertulis?	CASR 149.115(3)		
8. Dan prosedur untuk menerbitkan NOTAM?	MOS 10.2.1.5		
9. Termasuk NOTAM untuk perubahan temporer atau permanen pada kondisi fisik bandar udara yang dapat mempengaruhi keselamatan pesawat terbang?	CASR 139.115(2)		
10. Dan kejadian lainnya yang berkaitan dengan operasional atau pemeliharaan bandar udara (aerodrome0 yang dapat mempengaruhi keselamatan pesawat terbang?	MOS 10.2.1.4		
11. Dan rancangan penyimpanan catatan atau laporan yang dibuat?			
Penyimpanan Catatan			
1. Daftar dokumen yang dichek			
2. Apakah operator menyimpan catatan sesuai dengan Buku Pedoman Pengoperasian Bandar Udara (manual aerodrome) ?			
3. Apakah tersedia catatan pelatihan terhadap petugas?			
Fasilitas			
1. Apakah tersedia staf dan sumberdaya yang cukup dan tepat?	CASR 139.73(1)		
2. Apakah petugas pelapor telah dilatih sesuai dengan Buku Pedoman Pengoperasian Bandar Udara (manual aerodrome) ?	CASR 139.77(4)		
Prosedur			
1. Apakah laporan ke AIS dibuat sesuai dengan buku pedoman manual atau perubahan dalam kondisi fisik bandar udara (aerodrome) ? Dan untuk perubahan pada informasi yang diterbitkan ? Dan untuk obstacle?	CASR 139.115(3)		
2. Apakah laporan dibuat oleh petugas yang ditunjuk dalam buku pedoman?			
3. Apakah rincian contact person sesuai dengan yang ada di buku pedoman ?			
4. Apakah para staff sadar akan persyaratan keselamatan terkait dengan pelaporan ?			
5. Apakah ada kondisi dan perkecualian yang harus dituruti ?			
Chek Produk			
Apakah kondisi lapangan mendukung kebenaran NOTAM yang ada atau yang terakhir?			

Umpan Balik			
Apakah insiden berkaitan dengan pelaporan diketahui, dilaporkan dan ditindaklanjuti?			

DAFTAR CHEK AUDIT – BUKU PEDOMAN PENGOPERASIAN BANDAR UDARA (MANUAL AERODROME), AKSES KE AREA PERGERAKAN BANDAR UDARA (AERODROME)

Aktivitas dan Tujuan	Ref. CASR - MOS	Status	Komentar
Buku Pedoman Pengoperasian Bandar Udara			
1. Apakah buku pedoman berisikan informasi-informasi tentang pencegahan masuk tanpa otorisasi dari orang, kendaraan, peralatan, tumbuhan atau binatang, atau benda-benda lain yang dapat membahayakan keselamatan pesawat terbang, ke area pergerakan?	MOS 10.9.1.1		
2. Apakah juga memasukkan rincian dari rancangan pengontrolan akses ke airside?	MOS 10.9.1.1		
3. Dan nama serta peran petugas yang bertanggungjawab untuk mengontrol akses ke area pergerakan dan nomor telepon untuk menghubungi mereka selama dan setelah jam kerja?	CASR App1, 4.1(b)		
4. Penyimpanan Catatan			
5. Daftar dokumen yang dichek			
6. Apakah operator melakukan pencatatan sesuai dengan buku pedoman pengoperasian bandar udara (manual aerodrome) ?			
7. Fasilitas			
8. Apakah tersedia petugas dan sumberdaya dalam jumlah cukup dan tepat?	MOS 10.9.2.1		
9. Apakah sarana pengontrolan fisik di lokasi sesuai dengan buku pedoman pengoperasian bandar udara (manual aerodrome) ?	MOS 10.9.1.1		
10. Prosedur			
11. Apakah rancangan pengontrolan akses ke airside sesuai dengan buku pedoman?			
12. Apakah petugas yang menjalankan fungsi ini sesuai dengan buku pedoman ?	MOS 10.1.3		
13. Apakah petugas sadar akan persyaratan keselamatan berkaitan dengan masuk tanpa ijin?	MOS 10.1.3.2		
14. Apakah ada kondisi atau perkecualian yang harus dituruti?			
15. Chek Produk			
16. Apakah kontrol airside yang telah diobservasi menunjukkan hal yang efektif dan sesuai dengan buku pedoman ?			
17. Umpan Balik			
18. Apakah kejadian masuk tanpa ijin selalu diketahui, dilaporkan dan ditindaklanjuti?			

DAFTAR CHEK – BUKU PEDOMAN PENGOPERASIAN BANDAR UDARA (MANUAL AERODROME), RANCANGAN KEADAAN DARURAT BANDAR UDARA (AERODROME)

Aktivitas dan Tujuan	Ref. CASR - MOS	Status	Komentar
Buku Pedoman Pengoperasian Bandar Udara			
1. Apakah buku pedoman (manual) berisikan rincian anggota komite gawat darurat di bandar udara (aerodrome) dan rincian kontak untuk masing-masing anggota?	CASR 139.99(1) CASR App1, 4.3(e)(i)		
2. Apakah komite juga memasukkan perwakilan dari semua layanan gawat darurat yang kemungkinan akan dihubungi untuk bantuannya dalam suatu keadaan gawat darurat?	CASR 139.99(3)		
3. Apakah berisikan suatu penjabaran tugas dari setiap organisasi jasa gawat darurat yang terlibat dalam rancangan?	CASR App1, 4.3(e)(i)		
4. Dan rincian dari aktivasi, kontrol dan koordinasi organisasi jasa	CASR		

	gawat darurat selama suatu keadaan darurat?	139.101(2)(a)		
5.	Dan fasilitas gawat darurat bandar udara serta rancangan untuk membuat mereka selalu dalam kondisi siap?	CASR App1, 4.3(b)		
6.	Dan respon operasional terhadap suatu keadaan darurat termasuk rancangan-rancangan akses ke bandar udara (aerodrome) dan area asembly?	CASR App1, 4.3(e)(iii)		
7.	Dan respon terhadap panggilan lokal untuk bersiap?	CASR App1, 4.3(e)(iv)		
8.	Dan respon terhadap panggilan kondisi darurat penuh?	CASR App1, 4.3(e)(v)		
9.	Dan rancangan untuk mengembalikan bandar udara (aerodrome) ke status operasional setelah keadaan darurat?	CASR App1, 4.3(e)(vi)		
10.	Bagaimanakah bentuk rancangan untuk suatu review periodik (paling tidak sekali setahun) setelah berkonsultasi dengan organisasi yang diacu dalam rencana?	CASR 139.101(3)		
11.	Dan rancangan untuk mereview keadaan darurat sebenarnya atau sekedar latihan sesegera mungkin dan sepraktis mungkin untuk mengukur kecukupan rancangan tersebut dan untuk selanjutnya mengambil tindakan?	CASR 139.101(5)		
12.	Dan menyimpan catatan dari setiap review paling tidak selama 3 tahun?	CASR 139.101(6)		
13.	Apakah buku pedoman memasukkan rancangan untuk menguji rancangan keadaan darurat di bandar udara (aerodrome) dengan uji coba skala penuh paling tidak setiap 2 tahun sekali?	CASR 139.103(1)		

AERODROME CERTIFICATION PROSEDUR

Aktivitas dan Tujuan		Ref. CASR - MOS	Status	Komentar
1.	Dan rancangan untuk memastikan bahwa pengujian tersebut menguji koordinasi layanan gawat darurat dan kecukupan dari prosedur serta fasilitas yang disediakan dalam rancangan?	CASR 139.101(5)		
2.	Apakah buku pedoman (manual) memasukkan rancangan untuk penundaan suatu uji coba jika keadaan darurat yang sebenarnya terjadi?	CASR 139.103(2)		
3.	Apakah buku pedoman (manual) mengamati prinsip-prinsip faktor manusia?	CASR 139.103(6)		
4.	Apakah buku pedoman memasukkan rancangan untuk uji coba secara parsial pada tahun di antara dua tahun uji coba skala penuh?	CASR 139.103(5)		
Penyimpanan Catatan				
1.	Daftar dokumen yang dichek			
2.	Apakah operator menyimpan catatan sesuai dengan buku pedoman pengoperasian bandar udara (manual aerodrome) ?	CASR 139.101(b)		
Fasilitas				
Apakah tersedia staf dan sumberdaya yang cukup dan tepat?		MOS 10.8.3		
Prosedur CASR 139 Appendix 1, Subsection 4.3				
1.	Apakah keanggotaan saat ini dan rancangan kontak dari Aerodrome Emergency Committee sesuai dengan buku pedoman?			
2.	Apakah frekuensi pertemuan telah sesuai dengan buku pedoman?			
3.	Apakah semua badan penting yang berpartisipasi/merespon cukup terwakili?			
4.	Apakah AEP telah direview dengan mengacu pada buku pedoman (manual) ?			
5.	Apakah AEP diuji dengan mengacu pada buku pedoman (manual) ?			

6. Apakah copy dari AEP didistribusikan dengan mengacu pada buku pedoman (manual) ?			
7. Apakah para staf paham akan persyaratan keselamatan pada rancangan keadaan darurat?			
8. Apakah ada kondisi atau perkecualian yang harus dituruti?			
Chek Produk			
1. DGAC mungkin tidak menghadiri uji coba AEP. Jika dipertimbangkan perlu untuk menghadiri, pengecekan harus dilakukan sebagai suatu uji coba dalam rangka pengamatan. 2. Dalam kasus lainnya, chek produk berikut dapat dilakukan dengan mengacu pada catatan yang disimpan operator.			
3. Apakah uji coba direncanakan sesuai dengan buku pedoman (manual) ?			
4. Tanggal latihan terakhir?			
5. Apakah badan-badan yang berkaitan hadir?			
6. Apakah tujuan yang tepat juga diuji?			
7. Apakah kegiatan tanya jawab dilakukan sesuai dengan buku pedoman (manual) ?			
8. Apakah amandemen yang tepat dilakukan terhadap AEP?			
Umpan Balik			
Apakah insiden berkaitan dengan keadaan darurat di bandar udara (aerodrome) diketahui, dilaporkan dan ditindaklanjuti?			

DATA CHEK AUDIT – MANUAL AERODROME, AERODROME RESCUE AND FIRE FIGHTING SERVICE (RFFS)

Aktivitas dan Tujuan	Ref. CASR - MOS	Status	Komentar
Buku Pedoman Pengoperasian Bandar Udara			
1. Apakah dalam buku pedoman dimasukkan prosedur untuk pemenuhan kebutuhan RFFS, termasuk informasi tentang fasilitas, peralatan, petugas dan kendaraan?	CASR 139. CASR App1		
2. Apakah proses penentuan kategori dicantumkan dengan jelas? 3. Apakah kategori yang ditentukan sesuai dengan standard-standard untuk persyaratan internasional atau domestik?	CASR 139.		
4. Apakah ada ketentuan yang dibuat untuk lingkungan permukaan yang sulit?	CASR App1		
5. Apakah ada ketentuan yang dibuat untuk cakupan kategori pada periode dimana operasional mengalami pengurangan frekuensi?	CASR 139.		
6. Apakah buku pedoman memberikan informasi tentang jumlah air yang tersedia untuk pembuatan foam dan bahan komplemen?	CASR App1		
7. Dan apakah jumlah foam yang tersedia di kendaraan proporsional dengan jumlah air yang tersedia?	CASR App1		
8. Apakah buku pedoman (manual) memberikan informasi tentang tujuan operasional?	CASR App1		
9. Apakah buku pedoman (manual) memberikan informasi tentang persyaratan pelatihan: a. Persyaratan awal pemadam kebakaran b. Pelatihan berkelanjutan? c. Live fire drills? d. Pressure fed fuel fires?	CASR App1		
10. Apakah pelatihan memiliki komponen kinerja manusia dan koordinasi tim?	CASR App		
11. Apakah buku pedoman (manual) menyediakan ketentuan-ketentuan pakaian pelindung dan alat bantu pernapasan yang			

tepat bagi para petugas?			
Penyimpanan Catatan			
1. Daftar dokumen yang dichek	CASR 139.		
2. Apakah petugas yang menyimpan catatan sesuai dengan buku pedoman pengoperasian bandar udara (manual aerodrome) dan/atau Fire Service Manual SOP?			
Fasilitas			
1. Apakah tersedia staf dan sumberdaya yang cukup dan tepat?	MOS 1		
2. Apakah stasiun pemadam kebakaran cukup untuk menampung semua kendaraan dan peralatan?			
3. Apakah akses dari stasiun pemadam kebakaran ke area pergerakan bebas hambatan dan langsung?			
4. Apakah penampungan air statis ditempatkan di lokasi yang strategis?			
5. Apakah tersedia jalan akses dari ujung runway ke perimeter bandar udara/pagar pengaman (crash road)?			
6. Apakah disediakan fasilitas yang mempertimbangkan kondisi permukaan yang sulit?			
7. Apakah sistem komunikasi sesuai dan efektif?			
8. Apakah sistem alarm kebakaran sesuai dan bekerja baik?			
9. Apakah jumlah kendaraan RFFS cukup?			
Prosedur			
1. Apakah prosedur saat ini yang dirinci di buku pedoman dapat diverifikasi?			
2. Apakah prosedur untuk pelatihan mencukupi?			
3. Apakah disediakan prosedur untuk pengujian peralatan?			
4. Apakah waktu tanggap aktual dapat diverifikasi dari test aktual?			
5. Apakah sistem komunikasi diuji sesuai dengan buku pedoman (manual) ?			
6. Apakah sistem alarm diuji untuk serviceability?			
7. Apakah prosedur pemeliharaan sesuai bagi kendaraan, peralatan dan fasilitas bangunan?			
Chek Produk			
Apakah inspeksi lapangan terhadap fasilitas RFFS serta catatan yang ada menyatakan adanya keselarasan dengan prosedur yang berlaku?			
Umpan Balik			
Apakah insiden dan kecelakaan yang berkaitan dengan RFFS diketahui, dilaporkan dan ditindaklanjuti?			

DAFTAR CHEK AUDIT – MANUAL AERODROME, INSPEKSI AREA PERGERAKAN DAN PERMUKAAN YANG DIBATASI OBSTACLE

Aktivitas dan Tujuan	Ref. CASR - MOS	Status	Komentar
Buku Pedoman Pengoperasian Bandar Udara			
1. Apakah di dalam buku pedoman ada prosedur untuk inspeksi keselamatan area pergerakan dan permukaan dibatasi obstacle?	CASR App1, 4.5 MOS 10.2.6		
2. Apakah di dalam buku pedoman terdapat rancangan untuk melakukan inspeksi serviceability selama atau sesudah jam kerja?	CASR 139.107(2) CASR App1, 4.5(a)		
3. Apakah termasuk di dalamnya rancangan untuk mengukur gesekan runway?	CASR App1, 4.5(b)		
4. Apakah termasuk di dalamnya rancangan untuk pengukuran kedalaman air?	CASR App1, 4.5(b)		
5. Apakah termasuk di dalamnya rincian interval pelaksanaan inspeksi?			
6. Dan waktu saat inspeksi dilakukan?	MOS 10.2.1		

7.	Dan rancangan penyimpanan logbook inspeksi?	CASR App1, 4.5(d)		
8.	Dan tempat dimana logbook disimpan?	CASR App1, 4.5(d)		
9.	Dan rincian daftar chek inspeksi serviceability?	CASR App1, 4.5(e)		
10.	Dan suatu proses untuk memastikan bahwa interval, waktu dan isi dari inspeksi sesuai dengan CASR dan MOS?			
11.	Dan suatu proses untuk memastikan bahwa inspeksi dilakukan oleh petugas yang dilatih dengan baik?	MOS 10.1.3.1		
12.	Dan rancangan komunikasi dengan kontrol lalu lintas udara pada saat inspeksi (jika memungkinkan)?	CASR App1, 4.5(f)		
13.	Dan rancangan pelaporan hasil dari inspeksi?	CASR App1, 4.5(g)		
14.	Dan rancangan untuk melakukan tindak lanjut dengan cepat untuk memastikan perbaikan kondisi yang tidak aman?	CASR App1, 4.5(g)		
15.	Dan rancangan untuk memastikan bahwa jika suatu fasilitas dianggap membutuhkan inspeksi teknis maka hal tersebut akan dilakukan?	CASR App1, 4.5(h)		
16.	Dan nama serta peran dari petugas yang bertanggungjawab melakukan inspeksi dan nomor telepon untuk menghubungi mereka selama dan setelah jam kerja?			
Penyimpanan Catatan				
1.	Daftar dokumen yang dichek			
2.	Apakah operator meyimpan catatan sesuai dengan buku pedoman pengoperasian bandar udara (manual aerodrome) ?			
3.	Apakah operator menyimpan catatan pelatihan karyawan?	MOS 10.1.3.3		
Fasilitas				
1.	Apakah tersedia petugas dan sumberdaya yang cukup dan tepat?			
2.	Apakah inspeksi dilakukan oleh petugas yang disebutkan dalam buku pedoman ?	MOS 10.1.3.1		
3.	Apakah orang tersebut dilatih dengan benar sesuai dengan MOS?			
Prosedur				
1.	Apakah inspeksi serviceability dilakukan pada saat dan setelah jam kerja sesuai dengan buku pedoman (manual) ?			
2.	Apakah waktu dan frekuensi inspeksi sesuai dengan buku pedoman (manual) ?			
3.	Apakah logbook disimpan sesuai dengan buku pedoman (manual) ? (chek lokasi dan format).	MOS 10.2.11		
4.	Apakah daftar chek digunakan sesuai dengan buku pedoman (manual) ?	MOS 10.2.15		
5.	Apakah metoda berkomunikasi dengan ATC pada saat inspeksi sesuai dengan buku pedoman (manual) ?			
6.	Apakah upaya tindak lanjut dengan segera yang dilakukan untuk memperbaiki kondisi tidak aman sesuai dengan buku pedoman (manual) ?			
7.	Apakah petugas sadar akan persyaratan keselamatan berkaitan dengan inspeksi?			
8.	Apakah ada kondisi atau perkecualian yang harus dituruti?			
Chek Produk				
Apakah kondisi lapangan dari salah satu contoh fasilitas bandar udara (aerodrome) sesuai dengan hasil dari inspeksi serviceability?				
Umpan Balik				
Apakah insiden berkaitan dengan inspeksi diketahui, dilaporkan dan ditindaklanjuti?				

DAFTAR CHEK AUDIT – MANUAL AERODROME, VISUAL AID, PENERANGAN DAN SISTEM KELISTRIKAN

Aktivitas dan Tujuan	Ref. CASR - MOS	Status	Komentar
Buku Pedoman Pengoperasian Bandar Udara			
1. Apakah buku pedoman berisikan prosedur untuk memastikan bahwa sistem penerangan dan VASIS direncanakan, dipasang dan dipelihara sesuai dengan standard MOS?	CASR 139.95(1)		
2. Apakah ada rancangan untuk memastikan bahwa ada penerangan tertentu yang tidak diaktifkan keculai telah dilakukan flight cheked, diperiksa oleh petugas kelistrikan yang terlatih dan disurvei oleh petugas yang tepat?	CASR 139.97		
3. Apakah buku pedoman berisikan rincian dari rancangan untuk melakukan inspeksi penerangan serta daftar chek untuk pelaksanaan inspeksi?	CASR App1, 4.6(a)		
4. Apakah termasuk di dalamnya penerangan obstacle?			
5. Apakah termasuk di dalamnya rancangan untuk mencatat hasil inspeksi?	CASR App1, 4.6(b)		
6. Apakah ada rancangan untuk melakukan tindak lanjut untuk memperbaiki kekurangan?	CASR App1, 4.6(c)		
7. Apakah ada rancangan untuk menyalamatikan penerangan, termasuk rancangan sumber daya cadangan?			
8. Apakah ada rancangan untuk melakukan pemeliharaan rutin dan pemeliharaan gawat darurat?	CASR App1, 4.6(c)		
9. Apakah ada rancangan untuk sumberdaya cadangan jika ada?	CASR App1, 4.6(d)		
10. Apakah ada metoda lain yang tersedia untuk menghadapi kegagalan sistem baik sebagian atau seluruhnya?			
11. Dan nama serta peran dari petugas yang bertanggungjawab untuk inspeksi dan pemeliharaan penerangan, serta nomor telepon yang dapat dihubungi selama dan setelah jam kerja?	CASR App1, 4.6(e)		
Penyimpanan Catatan			
1. Daftar dokumen yang dichek			
2. Apakah operator yang menyimpan catatan sesuai dengan buku pedoman pengoperasian bandar udara (manual aerodrome) ?			
3. Apakah laporan inspeksi teknis disimpan dan apakah ada bukti bahwa rekomendasi dan temuan telah ditindaklanjuti?			
Fasilitas – Lihat lembar kerja fasilitas untuk pengechekan serviceability			
1. Apakah tersedia petugas yang cukup dan tepat?			
2. Apakah tersedia suku cadang seperti yang dirinci di buku pedoman pengoperasian bandar udara (manual aerodrome) ?			
Prosedur			
1. Apakah inspeksi lampu penerangan dilakukan sesuai dengan buku pedoman (manual) ?			
2. Apakah daftar chek yang digunakan sesuai dengan buku pedoman (manual) ?			
3. Apakah kekurangan yang terjadi ditindaklanjuti sesuai dengan buku pedoman (manual) ?			
4. Apakah pemeliharaan rutin dan darurat dilakukan seperti pada buku pedoman (manual) ?			
5. Apakah rancangan untuk menghidupmatikan lampu sesuai dengan buku pedoman (manual) ?			
6. Apakah rancangan untuk sumberdaya siap pakai sesuai dengan buku pedoman (manual) ?			
7. Apakah rancangan lain berkenaan dengan kegagalan sistem			

sebagian atau seluruhnya sesuai dengan buku pedoman?			
8. Apakah petugas sadar akan persyaratan keselamatan berkaitan dengan lampu penerangan?			
9. Apakah ada kondisi atau perkecualian yang harus dituruti?	CASR 139.47(1)		
10. Sudahkan elemen baru dalam sistem penerangan dichek seperti disyaratkan?			
Chek Produk			
1. Apakah contoh penerangan bandar udara (aerodrome) dichek pada saat audit sesuai dengan standard MOS?			
2. Apakah PAPI/VASI akan dipasang jika diperlukan?			
3. Apakah elemen penting dalam sistem penerangan dipasang?			
Umpan Balik			
Apakah insiden berkaitan dengan penerangan diketahui, dilaporkan dan ditindaklanjuti?			

DAFTAR CHEK AUDIT – MANUAL AERODROME, PERLINDUNGAN LOKASI RADAR & NAVAID

Aktivitas dan Tujuan	Ref. CASR - MOS	Status	Komentar
Buku Pedoman Pengoperasian Bandar Udara			
1. Apakah buku pedoman berisikan prosedur untuk perlindungan atas radar dan navaid yang berlokasi di bandar udara (aerodrome) untuk memastikan bahwa kinerja mereka tidak berkurang?	CASR App1, 4.17		
2. Apakah termasuk di dalamnya rancangan untuk mengontrol kegiatan di dekat instalasi radar dan navaid?	CASR App1, 4.17(a)		
3. Dan rancangan, yang dibuat sesuai konsultasi dengan pemasok instalasi navaid, untuk penyediaan dan pemasangan rambu peringatan radiasi gelombang mikro yang berbahaya?	CASR App1, 4.17(b)		
4. Dan rancangan untuk pemeliharaan ground di dekat instalasi?	CASR App1, 4.17(c)		
Penyimpanan Catatan			
1. Daftar dokumen yang dichek			
2. Apakah operator yang menyimpan catatan sesuai dengan buku pedoman pengoperasian bandar udara (manual aerodrome) ?			
Fasilitas			
Apakah tersedia petugas dan sumberdaya yang cukup dan tepat?			
Prosedur			
1. Apakah kegiatan di dekat radar dan navaid dikontrol sesuai dengan buku pedoman (manual) ?			
2. Apakah pemeliharaan ground di dekat fasilitas dilakukan sesuai dengan buku pedoman (manual) ?			
3. Apakah petugas sadar akan persyaratan keselamatan berkaitan dengan radar dan navaids?			
4. Apakah ada kondisi dan perkecualian yang harus dituruti?			
Chek Produk			
Apakah rambu peringatan bahaya radiasi gelombang mikro yang tepat telah disediakan dan dipasang sesuai dengan buku pedoman (manual) ?			
Umpan Balik			
Apakah insiden berkaitan dengan radar dan navaid diketahui, dilaporkan dan ditindaklanjuti?			

DAFTAR CHEK AUDIT – MANUAL AERODROME, PEMELIHARAAN AREA PERGERAKAN

Aktivitas dan Tujuan	Ref. CASR - MOS	Status	Komentar
Buku Pedoman Pengoperasian Bandar Udara			
1. Apakah buku pedoman berisikan prosedur untuk pemeliharaan rutin permukaan area pergerakan dan sistem drainasi untuk memastikan bahwa kinerja mereka tidak berkurang?	CASR 139.79(1)		
2. Apakah termasuk di dalamnya rancangan pemeliharaan runway yang diaspal dan/atau tidak diaspal, serta bahu dan area aman yang berhubungan?	CASR App1, 4.7		
3. Apakah termasuk di dalamnya rancangan pemeliharan taxiway yang diaspal atau tidak diaspal serta bahu jalannya?	CASR App1, 4.7		
4. Apakah termasuk di dalamnya rancangan untuk pemeliharaan runway dan taxiway strip yang berhubungan?	CASR App1, 4.5		
5. Apakah buku pedoman menyediakan hal-hal tentang uji reguler gesekan runway?			
Penyimpanan Catatan			
1. Daftar dokumen yang dichek			
2. Apakah operator yang menyimpan catatan sesuai dengan buku pedoman pengoperasian bandar udara (manual aerodrome) ?			
Fasilitas			
1. Apakah tersedia petugas dan sumberdaya yang cukup dan tepat?	CASR 139.43(1)		
2. Sudahkah operator menyediakan peralatan yang cukup dan tepat?	CASR 139.43(1)		
Prosedur			
1. Apakah kegiatan pemeliharaan di atau di dekat area pergerakan dikontrol sesuai dengan buku pedoman (manual)?			
2. Apakah pemeliharaan ground dilakukan sesuai dengan skedul atau rutinitas yang dicatat di buku pedoman (manual) ?	MOS 10.15.1.2		
3. Dapatkah hasil uji gesekan runway dikaitkan dengan serviceability dan batas-batas keselamatan?	MOS 10.15.2.1		
4. Apakah petugas sadar akan persyaratan keselamatan berkaitan dengan area pergerakan?			
5. Apakah ada kondisi atau perkecualian yang harus dituruti?			
Chek Produk			
1. Apakah prosedur dilakukan sesuai dengan rancangan keselamatan kerja?			
2. Apakah bantuan visual dan pemarkaan permukaan dalam kondisi seperti yang diharapkan dari program pemeliharaan tersebut?			
3. Apakah pengaspalan permukaan terbebas dari masalah permukaan	MOS 10.15.4		
Umpan Balik			
Apakah insiden berkaitan dengan pemeliharaan diketahui, dilaporkan dan ditindaklanjuti?			

DAFTAR CHEK AUDIT – MANUAL AERODROME, KESELAMATAN KERJA AERODROME

Aktivitas dan Tujuan	Ref. CASR - MOS	Status	Komentar
Buku Pedoman Pengoperasian Bandar Udara			
1. Apakah buku pedoman berisikan prosedur-prosedur untuk perencanaan dan pelaksanaan kerja di bandar udara (aerodrome) secara aman (termasuk pekerjaan yang harus dilaksanakan setelah pemberitahuan mendadak)?	CASR App1, 4.8		
2. Termasuk di dalamnya memastikan bahwa pekerjaan tersebut tidak menciptakan bahaya bagi pesawat terbang atau kebingungan bagi pilot?	CASR 139.111(1)		
3. Apakah termasuk di dalamnya rincian persiapan suatu rencana metoda kerja?	CASR App1, 4.8(a)		
4. Dan mengidentifikasi bidang-bidang pada bandar udara (aerodrome) yang terpengaruh pada setiap tahapan pekerjaan?			
5. Dan tahapan tindakan yang diambil untuk memastikan standar keselamatan telah dipenuhi?			
6. Dan proses untuk memastikan bahwa petugas telah dilatih sesuai dengan MOS?			
7. Apakah termasuk di dalamnya daftar pendistribusian untuk rencana metoda kerja?	CASR App1, 4.8(e)		
8. Dan rancangan untuk memberitahu operator pesawat terbang serta pengguna bandar udara (aerodrome) lainnya tentang rencana metoda kerja serta nomor telepon untuk menghubungi operator serta pengguna selama dan sesudah jam kerja?	CASR App1, 4.8(d)		
9. Dan proses agar sesuai dengan persyaratan MOS sehubungan dengan tenggang waktu pemberitahuan adanya pekerjaan?			
10. Dan rancangan untuk berkomunikasi dengan kontrol lalu lintas udara serta pesawat terbang pada saat pekerjaan tersebut dilaksanakan?	CASR App1, 4.8(e)		
11. Dan rancangan untuk menjalankan pekerjaan dengan batasan waktu?	MOS 10.10.3		
12. Dan nama, nomor telepon serta peran dari petugas dan organisasi yang bertanggungjawab untuk merencanakan dan melaksanakan pekerjaan, serta rancangan untuk menghubungi petugas dan organisasi setiap saat?	CASR App1, 4.8(c)		
Penyimpanan Catatan			
1. Daftar dokumen yang dichek			
2. Apakah operator yang menyimpan catatan sesuai dengan buku pedoman pengoperasian bandar udara (manual aerodrome) ?			
Fasilitas			
1. Apakah tersedia petugas dan sumberdaya yang tepat dan cukup?			
2. Apakah tersedia alat bantu visual yang tepat untuk pemarkaan lokasi kerja dan area unserviceable?	MOS 10.10.8		
Prosedur			
1. Apakah pekerjaan direncanakan dan didokumentasikan sesuai dengan buku pedoman (manual) ?			
2. Apakah konsultasi untuk perencanaan kerja dan pembuatan MOWP sesuai dengan buku pedoman (manual) ?			
3. Apakah pemberitahuan kerja diberikan sesuai dengan buku pedoman (manual) ?			
4. Apakah petugas sadar akan persyaratan keselamatan selama			

pekerjaan?			
5. Apakah tersedia prosedur untuk membuat bantuan penglihatan untuk kerja?			
6. Apakah ada kondisi atau perkecualian yang harus dituruti?			
Chek Produk			
1. Apakah interface dengan ATC dan/atau lalu lintas udara sesuai dengan buku pedoman (manual) ?	MOS 10.10.9		
2. Apakah isi dan format MOWP benar?	MOS 10.10.2		
3. Apakah pekerjaan dilakukan sesuai dengan MOWP?			
4. Apakah pekerjaan di dalam runway strip dilakukan sesuai dengan buku pedoman (manual) ?			
5. Apakah pekerjaan lain termasuk pekerjaan dibatasi waktu dilakukan sesuai dengan buku pedoman (manual) ?			
6. Apakah pekerjaan dibatasi waktu dilakukan dibawah pantauan seorang Works Safe Officer?	MOS 10.10.12		
Umpan Balik			
Apakah insiden berkaitan dengan pekerjaan diketahui, dilaporkan dan ditindaklanjuti?			

DAFTAR CHECK AUDIT – MANUAL AERODROME, MANAJEMEN OPERASI APRON

Aktivitas dan Tujuan	Ref. CASR - MOS	Status	Komentar
Buku Pedoman Pengoperasian Bandar Udara			
1. Apakah buku pedoman (manual) berisikan prosedur untuk pengontrolan parkir pesawat terbang, jika dibuat?			
2. Apakah termasuk di dalamnya rancangan antara kontrol lalu lintas udara dan manajemen apron?	CASR App1, 4.9(a)		
3. Dan rancangan pengalokasian posisi parkir pesawat terbang?	CASR App1, 4.9(b)		
4. Dan rancangan untuk mulai menghidupkan mesin serta memastikan kondisi bebas bagi pesawat terbang untuk push back?	CASR App1, 4.9(c)		
5. Dan inventarisasi serta penjabaran aktivasi dan deaktivasi sistem tuntunan docking visual yang digunakan di bandar udara (aerodrome) ?	CASR App1, 4.9(d)		
6. Dan rincian dari marshalling service?	CASR App1, 4.9(e)		
7. Dan layanan leader van atau follow me?	CASR App1, 4.9(f)		
8. Dan nama, nomor telepon serta peran dari petugas yang bertanggungjawab dalam perencanaan serta implementasi kontrol pemarkiran pesawat terbang?	CASR App1, 4.9(g)		
Penyimpanan Catatan			
1. Daftar dokumen yang dichek			
2. Apakah petugas yang menyimpan catatan sesuai dengan buku pedoman pengoperasian bandar udara (manual aerodrome) ?			
Fasilitas			
1. Apakah tersedia petugas yang tepat untuk mengontrol pemarkiran pesawat terbang?			
2. Apakah tersedia petugas dan fasilitas yang tepat untuk mendisain tata letak parkir dan pembuatan marka?			
3. Apakah tersedia petugas yang memberikan layanan leader van jika diperlukan?			
Prosedur			
1. Apakah petugas sadar akan persyaratan keselamatan berkaitan dengan kondisi bebas (clear) dan dorongan mesin?	CASR App1, 4.10(a)		
2. Apakah tanggungjawab organisasi serta rancangan pengontrolan sesuai dengan buku pedoman (manual) ?			
3. Apakah posisi parkir ditempatkan sesuai dengan buku pedoman?			

4. Apakah penghidupan mesin dan push back dilakukan sesuai dengan buku pedoman (manual) ?			
5. Apakah ada kondisi dan pengecualian yang harus dituruti?			
Chek Produk			
1. Apakah sistem docking visual sesuai dengan buku pedoman (manual) ?			
2. Apakah pembuat marka dan pemarkaan parkir pesawat terbang sesuai dengan buku pedoman (manual) ?			
Umpan Balik			
Apakah insiden berkaitan dengan parkir pesawat terbang diketahui, dilaporkan dan ditindaklanjuti?			

DAFTAR CHEK AUDIT - MANUAL AERODROME, MANAJEMEN KEAMANAN APRON

Aktivitas dan Tujuan	Ref. CASR - MOS	Status	Komentar
Buku Pedoman Pengoperasian Bandar Udara			
1. Apakah buku pedoman berisikan prosedur untuk manajemen operasional apron yang aman?	CASR 139.23(1)(b) dan (d)		
2. Apakah berisikan rancangan pengamanan dari dorongan jet dan baling-baling?	MOS 6.6		
3. Termasuk di dalamnya rancangan disain posisi parkir? 4. Dan penyediaan struktur pengaman dari dorongan jet?	MOS 6.6.2.1		
5. Apakah buku pedoman berisikan prosedur untuk memberdayakan tindakan pengamanan pencegahan pada saat pengisian bahan bakar ke pesawat terbang?	CASR App1, 4.10(b)		
6. Apakah buku pedoman (manual) berisikan prosedur untuk memastikan bahwa apron dibersihkan untuk menghilangkan sampah?	CASR App1, 4.10(c)		
7. Apakah buku pedoman (manual) berisikan prosedur untuk memastikan bahwa apron bersih dari kontaminasi benda berbahaya?	CASR App1, 4.10(d)		
8. Apakah buku pedoman (manual) berisikan prosedur berkaitan dengan pelaporan insiden dan kecelakaan di apron?	CASR App1, 4.10(e)		
9. Dan nama, nomor telepon dan peran dari petugas yang bertanggungjawab dalam perencanaan dan penerapan kontrol parkir pesawat terbang?			
Penyimpanan Catatan			
1. Daftar dokumen yang dichek			
2. Apakah petugas yang menyimpan catatan sesuai dengan buku pedoman pengoperasian bandar udara (manual aerodrome) ?			
Fasilitas			
1. Apakah tersedia petugas yang tepat untuk mengontrol, memantau dan/atau mensupervisi kegiatan keselamatan apron?			
2. Apakah tersedia petugas dan fasilitas untuk mendisain tata letak parkir, pemarkaan dan fasilitas pelindung dari dorongan jet?			
Prosedur			
1. Apakah petugas sadar akan persyaratan keselamatan berkaitan dengan *clearances* dan dorongan jet?	CASR App1, 4.10(a)		
2. Apakah tanggungjawab organisasi dan rancangan kontrol sesuai dengan buku pedoman (manual) ?			
3. Apakah tindakan pembersihan dan penyapuan yang dilakukan sesuai dengan buku pedoman (manual) ?			
4. Apakah kegiatan pengisian bahan bakar diawali dan dilakukan sesuai dengan buku pedoman (manual) ?			
5. Apakah ada kondisi dan perkecualian yang harus dituruti?			

Chek Produk			
1. Apakah sistem docking visual sesuai dengan buku pedoman (manual) ?			
2. Apakah pembuatan marka penuntun untuk pesawat terbang dan tug operator sesuai dengan buku pedoman (manual) ?			
3. Apakah permukaan apron dalam suatu kondisi yang sejalan dengan prosedur yang telah dirinci?			
Umpan Balik			
Apakah insiden berkaitan dengan keselamatan apron diketahui, dilaporkan dan ditindaklanjuti?			

DAFTAR CHEK AUDIT – MANUAL AERODROME, KONTROL KENDARAAN AIRSIDE

Aktivitas dan Tujuan	Ref. CASR - MOS	Status	Komentar
Buku Pedoman Pengoperasian Bandar Udara			
1. Sudahkah ditetapkan suatu prosedur di aerodrome untuk pengontrolan kendaraan yang beroperasi di atau di sekitar area pergerakan?	CASR App1, 4.11		
2. Jika telah ditetapkan, apakah manual tersebut memasukkan rincian aturan-aturan lalu lintas yang dapat diterapkan termasuk pembatasan kecepatan?	CASR App1, 4.11(a)		
3. Dan langkah-langkah pemberdayaan aturan tersebut?	CASR App1, 4.11(b)		
4. Dan metoda untuk memberikan perintah dan ujian bagi pengemudi dalam kaitan dengan aturan-aturan lalu lintas yang dapat diterapkan?	CASR App1, 4.11(c)		
5. Dan nama, nomor telepon dan peran dari petugas yang bertanggungjawab atas kontrol kendaraan airside?	CASR App1, 4.11(d)		
Penyimpanan Catatan			
1. Daftar chek dokumen			
2. Apakah operator menyimpan catatan sesuai dengan buku pedoman pengoperasian bandar udara (manual aerodrome) ?			
Fasilitas			
1. Apakah tersedia petugas dan sumberdaya yang cukup untuk menguji pengemudi, menerbitkan ijin mengemudi dan memantau para pengemudi pada saat mengemudi?			
2. Apakah copy dari aturan-aturan mengemudi tersedia dan sesuai dengan buku pedoman pengoperasian bandar udara (manual aerodrome) ?			
Prosedur			
1. Apakah penerapan sesuai dengan buku pedoman (manual) ?			
2. Apakah pengujian pengemudi sesuai dengan buku pedoman (manual) ?			
3. Apakah pemantauan dilakukan sesuai dengan buku pedoman (manual) ?			
4. Apakah hukuman diterapkan sesuai dengan buku pedoman (manua) l?			
5. Apakah petugas sadar akan persyaratan keselamatan berkaitan dengan kendaraan airside?			
6. Apakah ada kondisi dan pengecualian yang harus dituruti?			
Chek Produk			
1. Apakah ijin/lisensi diberikan sesuai dengan buku pedoman (manual) ?			
2. Apakah aturan mengemudi selalu diamati?			
3. Apakah tanda/lampu kendaraan serta persetujuan disampirkan sesuai dengan buku pedoman (manual) ?			
4. Apakah prosedur radio yang benar digunakan?			

Umpan Balik			
Apakah insiden kendaraan airside diketahui, dilaporkan dan ditindaklanjuti?			

LEMBAR AUDIT – MANUAL AERODROME, MANAJEMEN GANGGUAN BINATANG LIAR

Aktivitas dan Tujuan	Ref. CASR - MOS	Status	Komentar
Buku Pedoman Pengoperasian Bandar Udara			
1. Apakah buku pedoman (manual) berisikan prosedur-prosedur berkaitan dengan bahaya terhadap operasi pesawat terbang yang disebabkan oleh adanya burung atau binatang di atau di sekitar bandar udara (aerodrome) ?	CASR App1, 4.12		
2. Apakah berisikan rincian dari rancangan untuk pengukuran gangguan burung atau binatang?	CASR App1, 4.12(a)		
3. Dan rancangan untuk peniadaan gangguan dari burung atau binatang?	CASR App1, 4.12(b)		
4. Dan nama dan peran dari petugas yang bertanggungjawab dalam menghadapi gangguan burung atau binatang, serta nomor telepon untuk menghubungi mereka selama dan setelah jam kerja?	CASR App1, 4.12(c)		
Penyimpanan Catatan			
1. Daftar dokumen yang dichek			
2. Apakah operator menyimpan catatan sesuai dengan buku pedoman pengoperasian bandar udara (manual aerodrome) ?			
Fasilitas			
1. Apakah tersedia petugas dan sumberdaya yang cukup dan memadai?			
2. Apakah tersedia perlengkapan sesuai dengan buku pedoman (manual) ?			
3. Apakah lisensi dan ijin disediakan sesuai dengan buku pedoman (manual) ?			
Prosedur			
1. Apakah pemantauan dilakukan sesuai dengan buku pedoman (manual) ?			
2. Apakah penggangguan dilakukan sesuai dengan buku pedoman (manual) ?			
3. Apakah manajemen lingkungan yang dijalankan sesuai dengan buku pedoman (manual) ?			
4. Apakah semua serangan burung dilaporkan ke NTSC?			
5. Apakah petugas sadar akan persyaratan keselamatan berkaitan dengan gangguan burung dan binatang?			
6. Apakah ada kondisi dan perkecualian yang harus dituruti?	CASR 139.47(3)		
Chek Produk			
1. Apakah situasi lapangan dan ESIR berkaitan dengan faktor-faktor di logbook?			
2. Apakah manajemen lingkungan sesuai dengan buku pedoman (manual) ?			
Umpan Balik			
Apakah insiden berkaitan dengan gangguan burung dan binatang diketahui, dilaporkan dan ditindaklanjuti?			

DAFTAR CHEK AUDIT – MANUAL AERODROME, KONTROL OBSTACLE

Aktivitas dan Tujuan	Ref. CASR - MOS	Status	Komentar
Buku Pedoman Pengoperasian Bandar Udara			
1. Apakah buku pedoman yang berisikan prosedur-prosedur untuk	CASR 139.119		

	penetapan OLS bagi bandar udara (aerodrome) sesuai dengan MOS?			
2.	Dan untuk mengambil semua langkah yang dapat diambil untuk memantau OLS?	CASR 139.119(3)		
3.	Dan untuk mendeteksi obstacle sesegera mungkin?	CASR 139.119(3)		
4.	Termasuk objek, bangunan dan struktur?			
5.	Dan untuk memantau permukaan take off Type A chart dari obstacle?	CASR 139.119(1)		
6.	Dan prosedur untuk memantau pendirian bangunan (dalam kaitan dengan ketinggian bangunan dan struktur lainnya) dalam batas horisontal dari batas hambatan permukaan?			
7.	Dan jika bandar udara (aerodrome) memiliki prosedur pendekatan instrumen, prosedur untuk memantau pembangunan objek atau bangunan baru di area lainnya yang diusulkan oleh perancang prosedur instrumen?	CASR App1, 4.13(f)		
8.	Dan rancangan bersama DGAC, otoritas perencana lokal dan organisasi terkait lainnya dalam kaitan dengan pemberian persetujuan atas pengembangan bangunan yang dapat mempengaruhi permukaan berbatas hambatan?			
9.	Termasuk proses untuk meminta DGAC untuk mengukur gangguan-gangguan yang diajukan? (jika dapat dilakukan pada bandar udara)			
10.	Dan untuk melaporkan gangguan melalui NOTAM termasuk declared distance yang telah dirubah?	CASR 139.119		
11.	Dan nama, nomor telepon dan peran dari petugas yang bertanggungjawab dalam perencanaan dan penerapan kontrol gangguan?			
Penyimpanan Catatan				
1.	Daftar dokumen yang dichek			
2.	Apakah operator menyimpan catatan sesuai dengan buku pedoman pengoperasian bandar udara (manual aerodrome) ?			
Fasilitas				
1.	Apakah tersedia petugas dan sumberdaya yang cukup dan memadai?			
2.	Apakah survei OLS dilakukan oleh petugas yang berkualifikasi dan dilatih dengan benar?			
Prosedur CASR App 1, 4.13				
1.	Apakah OLS dimonitor sesuai dengan buku pedoman (manual)?	CASR App1, 4.13(a)		
2.	Apakah permukaan type A dimonitor sesuai dengan buku pedoman (manual) ?	CASR App1, 4.13(b)		
3.	Apakah area NPA dimonitor sesuai dengan buku pedoman (manual) ?			
4.	Apakah pemantauan dilakukan terhadap bangunan temporer dan permanen?			
5.	Dan terhadap gaseous effluxes?			
6.	Apakah prosedur untuk berkoordinasi dengan otoritas lain telah diikuti?			
7.	Apakah petugas sadar akan persyaratan keselamatan berkaitan dengan obstacle?			
8.	Apakah ada kondisi dan perkecualian yang harus dituruti?			
Chek Produk				
1.	Apakah rancangan OLS disiapkan sesuai dengan MOS?			
2.	Apakah catatan survei sejalan dengan informasi yang dipublikasikan?			
3.	Apakah kondisi lapangan mencerminkan data survei dan informasi yang dipublikasikan?			
4.	Apakah NOTAM berkaitan dengan obstacle mencerminkan kondisi lapangan?			

Umpan Balik			
Apakah insiden berkaitan dengan kontrol obstacle diketahui, dilaporkan dan ditindaklanjuti?			

DAFTAR CHEK AUDIT – MANUAL AERODROME, PEMINDAHAN PESAWAT TERBANG RUSAK

Aktivitas dan Tujuan	Ref. CASR - MOS	Status	Komentar
Buku Pedoman Pengoperasian Bandar Udara			
1. Apakah buku pedoman berisikan prosedur-prosedur untuk memindahkan pesawat terbang yang rusak di atau di sekitar area pergerakan?	CASR App1, 4.14		
2. Apakah termasuk rincian peran dari operator bandar udara (aerodrome) dan pemegang sertifikat registrasi pesawat terbang?	CASR App1, 4.14(a)		
3. Dan rancangan untuk memberitahu pemegang sertifikat registrasi?	CASR App1, 4.14(b)		
4. Dan rancangan untuk berkoordinasi dengan kontrol lalu lintas udara dan National Transportation Safety Committee?	CASR App1, 4.14(c)		
5. Dan rancangan untuk mendapatkan peralatan dan petugas untuk memindahkan pesawat terbang?	CASR App1, 4.14(d)		
6. Dan nama dan peran dari petugas yang bertanggungjawab untuk menyiapkan pemindahan pesawat terbang yang rusak, dan nomor telepon untuk menghubungi mereka selama dan di luar jam kerja?	CASR App1, 4.14(e)		
Penyimpanan Catatan			
1. Daftar dokumen yang dichek			
2. Apakah operator menyimpan catatan sesuai dengan buku pedoman pengoperasian bandar udara (manual aerodrome) ?			
Fasilitas			
Apakah tersedia petugas dan sumberdaya yang tepat dan memadai?			
Prosedur			
1. Apakah rancangan untuk menghubungi pemegang sertifikat registrasi sesuai dengan buku pedoman (manual) ?			
2. Apakah rancangan untuk berkoordinasi dengan ATC dan NTSC sesuai dengan buku pedoman (manual) ?			
3. Apakah rancangan untuk mendapatkan peralatan dan petugas untuk memindahkan pesawat terbang sesuai dengan buku pedoman (manual) ?			
4. Apakah petugas sadar akan persyaratan keselamatan pada saat pemindahan pesawat terbang?			
5. Apakah ada kondisi atau perkecualian yang harus dituruti?			
Chek Produk			
Jika diobservasi, apakah pemindahan sesuai dengan buku pedoman (manual) ?			
Umpan Balik			
Apakah insiden pemindahan pesawat rusak diketahui, dilaporkan dan ditindaklanjuti?			

DAFTAR CHEK AUDIT – MANUAL AERODROME, PENANGANAN MATERIAL BERBAHAYA

Catatan :

1. Termasuk material berbahaya adalah benda-benda eksplosif, cairan dan benda padat yang mudah terbakar, cairan korosif, gas tekanan tinggi, dan material radioaktif / yang dimagnetisasi. Material berbahaya tidak termasuk material yang diklasifikasi oleh ICAO/IATA sebagai barang-barang berbahaya, dimana freight forwarder dan maskapai penerbangan bertanggungjawab untuk prosedur pengemasan dan penanganan yang aman.
2. Rancangan untuk menghadapi kejadian tumpahnya material berbahaya harus ditetapkan dalam rancangan gawat darurat bandar udara (aerodrome).

Aktivitas dan Tujuan	Ref. CASR - MOS	Status	Komentar
Buku Pedoman Pengoperasian Bandar Udara			
1. Apakah buku pedoman (manual) berisikan prosedur-prosedur untuk penanganan yang aman material berbahaya di bandar udara (aerodrome) ?	CASR App1, 4.15		
2. Apakah tercantum nama, nomor telepon dan peran dari petugas yang akan menerima dan menangani material berbahaya?	CASR App1, 4.15(a)		
3. Dan rancangan untuk area khusus di aerodrome yang didisain untuk menyimpan cairan mudah terbakar (termasuk bahan bakar pesawat) dan material berbahaya lainnya?	CASR App1, 4.15(b)		
4. Dan metoda yang harus diikuti untuk pengiriman, penyimpanan, penuangan dan penanganan material tersebut?	CASR App1, 4.15(c)		
Penyimpanan Catatan			
1. Daftar dokumen yang dichek			
2. Apakah operator menyimpan catatan sesuai dengan buku pedoman pengoperasian bandar udara (manual aerodrome) ?			
Fasilitas			
Apakah tersedia petugas dan sumberdaya yang cukup dan memadai?			
Prosedur			
1. Apakah petugas yang menerima dan menangani material berbahaya sama seperti yang telah disebutkan di buku pedoman (manual) ?			
2. Apakah prosedur untuk mengirim, menyimpan, menuang dan menangani material tersebut sesuai dengan buku pedoman (manual) ?			
3. Apakah petugas sadar akan persyaratan keselamatan berkaitan dengan material berbahaya?			
4. Apakah ada kondisi atau perkecualian yang harus dituruti?			
Chek Produk			
Apakah rancangan area khusus untuk penyimpanan material berbahaya sesuai dengan buku pedoman (manual) ?			
Apakah material disimpan dengan benar?			
Umpan Balik			
Apakah insiden berkaitan dengan material berbahaya diketahui, dilaporkan dan ditindaklanjuti?			

DAFTAR CHEK AUDIT – MANUAL AERODROME, OPERASI PADA KONDISI PANDANGAN TERBATAS

Aktivitas dan Tujuan	Ref. CASR - MOS	Status	Komentar
Buku Pedoman Pengoperasian Bandar Udara			

1. Apakah buku pedoman berisikan prosedur bagi petugas operator bandar udara (aerodrome) yang terlibat dalam aktivitas ground untuk operasi dalam kondisi pandangan terbatas?	MOS 10.17.1.1		
2. Apakah juga berisikan rancangan untuk: 3. Prosedur pemberitahuan, pembatasan akses airside dan chek instalasi penerangan dan rambu?	MOS 10.17.1.2		
4. Jika RVR ditentukan secara manual, apakah buku pedoman (manual) berisikan informasi tentang: 5. Metoda pengukuran, prosedur pelaporan, posisi observasi dan syarat-syarat petugas termasuk pelatihan yang harus dilakukan?	MOS 10.17.1.3		
6. Dan rincian nama serta kontak dari petugas yang bertanggungjawab?	CASR App1, 4.16(d)		
Penyimpanan Catatan			
1. Daftar dokumen yang dichek			
2. Apakah operator menyimpan catatan sesuai dengan buku pedoman pengoperasian bandar udara (manual aerodrome) ?			
Fasilitas			
Apakah tersedia petugas dan peralatan yang cukup dan memadai?			
Prosedur			
1. Apakah rancangan pengukuran visibilitas di sepanjang runway sesuai dengan buku pedoman (manual) ?			
2. Apakah prosedur untuk meminimalkan lalulintas kendaraan dijalankan sesuai dengan buku pedoman (manual) ?			
3. Apakah rancangan inspeksi runway selama periode pandangan terbatas sesuai dengan buku pedoman (manual ?			
4. Apakah petugas sadar akan persyaratan keselamatan berkaitan dengan operasi pada pandangan terbatas?			
Chek Produk			
Apakah rambu, gerbang dan tanda-tanda peringatan untuk operasi pada pandangan terbatas berada di tempat sesuai dengan buku pedoman (manual) ?			
Umpan Balik			
Apakah insiden berkaitan dengan operasional pada pandangan terbatas diketahui, dilaporkan dan ditindaklanjuti?			

Catatan : Section pada manual ini ditujukan hanya untuk diterapkan pada proses yang dihubungkan dengan operasional ground pada kondisi pandangan terbatas. Ini tidak ditujukan untuk meniru rancangan prosedural untuk Air traffic Services and Meteorological Officers. Pada umumnya operasi dalam pandangan terbatas dianggap berlaku pada saat kondisi area seperti pada saat ILS Category II atau III sedang berlaku.

DAFTAR CHEK AUDIT – MANUAL AERODROME, PERLINDUNGAN LOKASI RADAR & NAVIGATIONAL AID

Aktivitas dan Tujuan	Ref. CASR - MOS	Status	Komentar
Buku Pedoman Pengoperasian Bandar Udara (Manual Aerodrome) CASR App1, 4.17			
1. Apakah buku pedoman (manual) berisikan prosedur-prosedur untuk perlindungan atas radar dan navaid yang berlokasi di bandar udara (aerodrome), untuk memastikan bahwa kinerja mereka tidak turun?	CASR App1, 4.17(a)		
2. Apakah juga berisikan rancangan untuk mengontrol kegiatan di sekitar instalasi radar dan navigational aid?	CASR App1, 4.17(b)		
3. Dan rancangan, yang dibuat berdasarkan konsultasi dengan penyedia instalasi navaid, untuk pasokan dan instalasi rambu peringatan akan adanya radiasi gelombang pendek yang berbahaya?	CASR App1, 4.17(c)		

4. Dan rancangan untuk pemeliharaan ground dekat instalasi?			
Penyimpanan Catatan			
1. Daftar dokumen yang dichek			
2. Apakah petugas yang memelihara catatan sesuai dengan buku pedoman pengoperasian bandar udara (manual aerodrome) ?			
Fasilitas			
Apakah tersedia petugas dan sumberdaya yang cukup dan memadai?			
Prosedur			
1. Apakah kegiatan di dekat radar dan navaid dikontrol sesuai dengan buku pedoman (manual) ?			
2. Apakah pemeliharaan ground di dekat fasilitas dilakukan sesuai dengan buku pedoman (manual) ?			
3. Apakah petugas sadar akan persyaratan keselamatan berkaitan dengan radar dan navaid?			
4. Apakah ada kondisi dan perkecualian yang harus dituruti?			
Chek Produk			
Apakah tanda peringatan adanya bahaya radiasi gelombang mikro yang tepat dipasok dan dipasang sesuai dengan buku pedoman (manual) ?			
Umpan Balik			
Apakah insiden berkaitan dengan radar dan navaid diketahui, dilaporkan dan ditindaklanjuti?			

DAFTAR CHEK AUDIT – MANUAL AERODROME, ADMINISTRASI AERODROME

Aktivitas dan Tujuan	Ref. CASR - MOS	Status	Komentar
Buku Pedoman Pengoperasian Bandar Udara (Manual Aerodrome)			
1. Apakah buku pedoman pengoperasian bandar udara (manual aerodrome) telah dirubah pada saat dibutuhkan agar keakuratannya tetap terpelihara?			
2. Apakah operator sesuai dengan arahan-arahan yang diberikan oleh DGAC untuk mengubah buku pedoman (manual) ?			
3. Apakah operator memberitahu DGAC secara tertulis dalam tempo 30 hari atas dirubahnya buku pedoman (manual) ?			
4. Apakah petugas yang disebut menyimpan copy buku pedoman (manual) benar-benar memegang copy?			
5. Apakah mereka terus dimutakhirkan?			
6. Struktur manajemen			
7. Apakah struktur manajemen berada pada posisi sesuai dengan buku pedoman pengoperasian bandar udara (manual aerodrome) ?			
8. Tanggungjawab Manajemen			
9. Apakah petugas yang ditunjuk sebagai pengontrol manual telah melakukan tugasnya?			
10. Apakah manajemen memiliki suatu proses untuk memastikan bahwa bandar udara (aerodrome) dioperasikan sesuai dengan buku pedoman pengoperasian bandar udara (manual aerodrome) ?			
Penyimpanan Catatan			
1. Daftar dokumen yang dichek			
2. Apakah ada catatan tentang penominasian petugas yang bertanggungjawab atas operasional dan pemeliharaan bandar udara (aerodrome) ?			
3. Apakah rincian kontak mereka benar?			
Fasilitas			
Apakah ada fasilitas yang tersedia untuk pelatihan dan/atau membuat pegawai tetap dimutakhirkan tentang standar dan			

persyaratan-persyaratan?			
Prosedur			
1. Apakah petugas yang dinominasikan memastikan bahwa kondisi yang melekat dengan perkecualian-perkecualian telah sesuai?			
2. Dan bahwa kondisi-kondisi yang melekat pada sertifikat juga sesuai?			
Chek Produk			
1. Apakah catatan pelatihan staf mengindikasikan adanya suatu komitmen manajemen yang sedang berjalan?			
2. Apakah para petugas sadar akan persyaratan dan tanggungjawab?			
Umpan Balik			
1. Apakah staf didorong untuk mengetahui dan melaporkan adanya masalah berkaitan dengan Administrasi?			
2. Dan apakah laporan tersebut ditindaklajuti?			

DAFTAR CHEK AUDIT – MANUAL AERODROME, INSPEKSI FASILITAS BANDAR UDARA

Aktivitas dan Tujuan	Ref. CASR - MOS	Status	Komentar
Buku Pedoman Pengoperasian Bandar Udara			
1. Apakah buku pedoman (manual) berisikan prosedur-prosedur untuk menjalankan inspeksi fasilitas, jasa dan peralatan?			
2. Apakah juga berisikan rincian dari produk yang membutuhkan inspeksi khusus?			
3. Dan kapan inspeksi harus dilakukan?			
4. Termasuk proses untuk memastikan bahwa inspeksi dilakukan dalam interval tidak lebih dari 12 (dua belas) bulan?			
5. Dan bahwa inspeksi teknis yang disyaratkan dilakukan setelah suatu inspeksi serviceability telah dilakukan?			
6. Dan rancangan untuk memastikan bahwa petugas yang cukup secara kualifikasi teknis dan berpengalaman yang melakukan inspeksi teknis?			
7. Dan rancangan untuk mencatat hasil dari inspeksi?			
8. Dan tetap menyimpan catatan untuk paling sedikit 3 tahun?			
9. Apakah manual memiliki proses untuk meninjau ulang data yang dipublikasikan dalam AIP dan NOTAM?			
10. Dan rancangan untuk melakukan aksi tindak lanjut dengan cepat untuk memastikan perbaikan kerusakan?			
11. Apakah buku pedoman (manual) memiliki suatu proses untuk memastikan bahwa prosedur yang ada di dalamnya tetap relevan, mutakhir dan akurat			
Penyimpanan Catatan			
1. Daftar dokumen yang dichek			
2. Apakah operator menyimpan catatan sesuai dengan buku pedoman pengoperasian bandar udara (manual aerodrome) ?			
3. Apakah catatan disimpan paling tidak selama 3 (tiga) tahun?			
4. Apakah operator memiliki catatan kualifikasi dan pengalaman dari petugas yang melakukan inspeksi teknis?			
Fasilitas			
Apakah tersedia petugas dan sumberdaya yang cukup dan memadai?			
Prosedur			
1. Apakah dalam inspeksi teknis juga termasuk semua hal-hal yang mengacu pada buku pedoman (manual) ?			
2. Apakah saat inspeksi dilakukan sesuai dengan buku pedoman (manual) ?			
3. Apakah suatu inspeksi lengkap dilakukan dalam satu periode 12 (dua belas) bulan?			

4. Apakah setiap hal yang diinspeksi tidak lebih dari 12 (dua belas) bulan setelah inspeksi sebelumnya?			
5. Apakah inspeksi dilakukan oleh petugas yang berkualifikasi dan berpengalaman serta sesuai dengan buku pedoman (manual) ?			
6. Apakah tindaklanjut yang segera dilakukan untuk memastikan perbaikan atas penyimpangan dilakukan sesuai dengan buku pedoman (manual) ?			
7. Pada saat inspeksi serviceability mengindikasikan adanya kebutuhan untuk suatu inspeksi teknis, apakah hal tersebut dilakukan sesegera mungkin?			
8. Apakah petugas memahami persyaratan keselamatan berkaitan dengan inspeksi			
9. Apakah ada kondisi dan perkecualian yang perlu dituruti?			
Chek Produk			
1. Apakah operator mengindikasikan bagaimana mereka dapat memastikan bahwa fasilitas aerodrome sesuai dengan MOS?			
2. Apakah pendokumentasian mencakup pengadaan fasilitas baru?			
3. Dan pemeliharaan/penggantian fasilitas yang ada?			
4. Apakah karakteristik fisik area pergerakan sesuai dengan Standard MOS?			
5. Apakah perambuan aerodrome sesuai dengan standard MOS?			
6. Apakah area sinyal sesuai dengan standard MOS?			
7. Apakah indikator angin sesuai dengan standard MOS?			
8. Apakah PAPI/VASI sesuai dengan standard MOS?			
9. Apakah penerangan area pergerakan sesuai dengan standard MOS?			
Umpan Balik			
Apakah kerusakan berkaitan dengan inspeksi atau isu-isu kesesuaian diketahui, dilaporkan dan ditindaklanjuti?			

Daftar Triger - Fasilitas Bandar Udara (Aerodrome)

1. RUNWAY
   a. Marka dan pemarkaan
   b. Kondisi pengaspalan
   c. Profil tekstur permukaan (misal: berlekuk)
   d. Kekasaran
   e. Kebersihan
   f. Ketinggian tumbuhan (jika berumput)
   g. Lain-lain (patahan, lubang, batu besar,dll)
   h. Stopway
   i. Bahu
   j. RESA

2. RUNWAY STRIP
   a. Obstacle RWS
   b. Kondisi permukaan (graded dan overall)
   c. Clearway
   d. Rambu
   e. Ketinggian tumbuhan

3. TAXIWAY
   a. Kondisi pengaspalan
   b. Kekasaran
   c. Kebersihan
   d. Ketinggian tumbuhan (jika berumput)

e. Bahu
f. Taxiway strip
g. Marka, pemarkaan dan MAGS
h. Kesalahan lain

4. APRON
   a. Kondisi pengaspalan
   b. Kekasaran
   c. Kebersihan
   d. Ketinggian tumbuhan (jika berumput)
   e. Marka, pemarkaan dan MAGS
   f. Area tie-down pesawat terbang
   g. Parkir pesawat terbang dan clearance
   h. Lain-lain (earthing point, akses kendaraan, dll)
   i. Kesalahan lain

5. PENERANGAN
   Catatan: Inspeksi penerangan dilakukan malam atau siang hari?
   a. Runway
   b. Runway intermediate holding point atau guard light
   c. Portabel
   d. Batas apron
   e. Genangan apron
   f. Cadangan sumberdaya listrik
   g. Indikator angin
   h. PAPI/VASIS
   i. MAGS
   j. Lampu portabel
   k. Obstacle
   l. Lain-lain (beacon, dll)

6. UMUM
   a. Indikator angin
   b. Area sinyal
   c. Pemarkaan unserviceability dan marka yang tersedia
   d. Pagar batas/kontrol akses
   e. Crash road

DIREKTUR JENDERAL PERHUBUNGAN UDARA

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CUCUK SURYO SUPROJO
NIP. 120089499

SALINAN sesuai dengan aslinya
Kepala Bagian Hukum
Ditjen Hubud

<u>E.A. SILOOY</u>
NIP.120108009

LAMPIRAN II
PERATURAN DIREKTUR JENDERAL PERHUBUNGAN UDARA
NOMOR : SKEP/76/VI/2005
TANGGAL : 20 JUNI 2005

FORMAT – B

CHECK SHEET PEMERIKSAAN PROSEDUR DAN PETUNJUK PELAKSANAAN KEGIATAN DALAM RANGKA AERODROME CERTIFICATION (SERTIFIKASI OPERASI BANDAR UDARA)

Nama bandara : ....
Nama pengelola bandara : ....
Tanggal pemeriksaan : ....

No.	URAIAN	ADA	TIDAK ADA	KETERANGAN /JUMLAH
1.	**PROSEDUR PELAYANAN JASA BANDAR UDARA**			
	Prosedur Pelayanan Penumpang			
	Prosedur Pelayanan Kargo Dan Pos			
	Prosedur Pelayanan Pesawat Udara			
	Prosedur Pelayanan Konsesioner			
2.	**PETUNJUK PENGOPERASIAN BANDARA**			
	Petunjuk Pengoperasian Fasilitas Penerbangan			
	Petunjuk Pengoperasian Peralatan Penunjang Penerbangan			
3.	**PROSEDUR PELAYANAN LALU LINTAS PENERBANGAN**			
	I. AFIS:			
	✈ Out Going Traffic Procedures			
	✈ Incoming Traffic Procedures			
	✈ Coordination Procedures			
	II. ADC:			
	✈ Departure Procedures			
	✈ Arrival Procedures			
	✈ Coordination Procedures			
	III. APP:			
	✈ Visual/Instrument and Departure Procedures			
	✈ Visual/Instrument and Approach Procedures			
	✈ Coordination Procedures (Letter of Agreement).			
	✈ MSA (Minimum Sectoring Altitude Procedures).			
	IV. ACC:			
	✈ Coordination Procedures (Letter of Agreement).			
	✈ RVSM Route Procedures			
	✈ RNP 10 Route Procedures;			
	✈ RNAV Route Procedures			
	✈ MVA (Minimum Vectoring Altitude) Procedures			
	V. FIC/FSS:			
	✈ Coordination Procedures (Letter of Agreement).			

	✈ RVSM Route Procedures			
	✈ RNP 10 Route Procedures;			
	✈ RNAV Route Procedures			
	VI. AIS			
	✈ Pre- Flight Information Service (Oral, Bulletin, Route Bulletin, Aerodrome Bulletin, FIR Bulletin)			
	✈ Flight Planning (FPL,RPL)			
	✈ Service Integrasi Otomasi AIS (Local, Nasional dan Internasional)			
	✈ Briefing Service (Oral, Telephone, Self Service)			
	✈ AIS Documentation/Refferences (AIP Indonesia, Foreign AIP, AIS Operation Manual/instruction, ICAO Annexes/Document WAC,ANC, other Small ScaleCharts)			
4.	**PETUNJUK PENAGGULANGAN KEADAAN DARURAT BANDAR UDARA**			
	Penanggulangan pesawat udara yang mengalami kecelakaan di bandara/luar bandara (sampai radius 5 NM dari pagar bandara)			
	Penanggulangan pesawat udara yang mengalami keadaan darurat penerbangan			
	Penanggulangan pesawat udara dan/atau prasarana yang mengalami sabotase atau ancaman Bom			
	Penanggulangan pesawat udara dari ancaman tindakan gangguan melawan hukum			
	Penanggulangan kejadian pada pesawat udara di darat/perairan karena bahan berbahaya			
	Penanggulangan kebakaran pada bangunan di bandara			
	Penanggulangan darurat medis			
	Penanggulangan bencana alam			
5.	**PETUNJUK PEMINDAHAN PESAWAT UDARA YANG RUSAK**			
	Tugas dan tanggung jawab pengelola bandara			
	Prosedur pemindahan			
	Daftar peralatan (form terlampir)			
6.	**PETUNJUK PERAWATAN BANDAR UDARA**			
	Petunjuk perawatan fasilitas penerbangan			
	Petunjuk perawatan peralatan penunjang penerbangan			
7.	**PROGRAM PENGAMANAN BANDAR UDARA**			
	Tujuan pengamanan bandar udara			
	Dasar hukum			
	Kewenangan, hak, kewajiban dan tanggung jawab			
	Komite pengamanan bandar udara			
	Informasi dan komunikasi			
	Uraian kegiatan bandar udara			
	Pengamanan sarana dan prasarana bandar udara			
	Skrining penumpang, bagasi, kargo dan pos			
	Perlakuan terhadap penumpang tertentu			
	Pengamanan senjata dan senjata api			
	Pengamanan pesawat udara			
	Pengamanan perlatan penunjang fasilitas penerbangan			
	Prosedur Kontijensi			
	Pendidikan dan pelatihan			
	Daftar peralatan (form terlampir)			

8.	**PETUNJUK PENGELOLAAN HIGIENE DAN SANITASI BANDARA**			
	Kesehatan bandar udara			
	Peraturan tentang penyelenggaraan kesehatan, kebersihan dan kerapihan (K-3)			
	Jasa boga pesawat udara			
	Penanganan limbah Bandar udara			
9.	**PETA DLKR**			
10.	**PETA KKOP**			
11.	**STRUKTUR ORGANISASI PENYELENGGARA BANDAR UDARA**			

DIREKTUR JENDERAL PERHUBUNGAN UDARA

CUCUK SURYO SUPROJO
NIP120089499

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Ditjen Hubud

E.A. SILOOY
NIP.120108009

LAMPIRAN II
PERATURAN DIREKTUR JENDERAL PERHUBUNGAN UDARA
NOMOR : SKEP/76/VI/2005
TANGGAL : 20 JUNI 2005

FORMAT – C

CHECK SHEET PEMERIKSAAN PERSONIL PENERBANGAN DALAM RANGKA AERODROME CERTIFICATION (SERTIFIKASI OPERASI BANDAR UDARA)

Nama bandara : ....
Nama pengelola bandara : ....
Tanggal pemeriksaan : ....

No.	PERSONIL PENERBANGAN	JUMLAH	KETERANGAN
1.	PERSONIL PELAYANAN NAVIGASI PENERBANGAN		
	✈ Jumlah Personil		
	✈ Jumlah Personil yang memiliki Licensee		
	✈ Jumlah Personil yang tidak memiliki Licensee		
2.	PERSONIL PENGAMANAN BANDAR UDARA		
	✈ Jumlah Personil		
	✈ Jumlah Personil yang memiliki Licensee		
	✈ Junior Avsec Licensee		
	✈ Senior Avsec Licensee		
	✈ Jumlah Personil yang tidak memiliki Licensee		
3.	PERSONIL PKP-PK BANDAR UDARA		
	✈ Jumlah Personil		
	✈ Jumlah Personil yang memiliki Licensee		
	✈ Basic PKP-PK		
	✈ Junior PKP-PK		
	✈ Senior PKP-PK		
	✈ D-III PKP-PK		
	✈ Jumlah Personil yang tidak memiliki Licensee		
4.	PERSONIL APRON MOVEMENT CONTROL/AVIOBRIDGE		
	✈ Jumlah Personil		
	✈ Jumlah Personil yang memiliki Sertifikat A.M.C		
	✈ Jumlah Personil yang memiliki Licensee Marshaller		
	✈ Jumlah Personil yang memiliki Licensee ADGS		
	✈ Jumlah Personil yang memiliki Licensee Aviobridge		
	✈ Jumlah Personil yang tidak memiliki Licensee		
5.	PERSONIL PERALATAN PENUNJANG PENERBANGAN (GSE)		
	✈ Jumlah Personil		
	✈ Jumlah Personil yang memiliki Licensee		
	✈ Jumlah Personil yang tidak memilki Licensee		
6.	PERSONIL FASILITAS ELEKTRONIKA DAN LISTRIK PENERBANGAN		
	✈ Jumlah Personil:		
	✈ SLTA/STM		
	✈ D-II		
	✈ D-III		
	✈ D-IV		
	✈ S-I		
	✈ S-II		

	✈ Jumlah Personil yang memiliki SKP Ahli Elektronika		
	✈ Jumlah Personil yang memiliki SKP Terampil Elektronika		
	✈ Jumlah Personil yang memiliki SKP Ahli Listrik		
	✈ Jumlah Personil yang memiliki SKP Terampil Listrik		
	✈ Jumlah Personil Elektronika yang tidak memiliki SKP Elektronika		
	✈ Jumlah Personil Listrik yang tidak memiliki SKP Ahli Listrik		
	✈ Jumlah Personil yang memiliki Rating Kelompok Peralatan Komunikasi Penerbangan:		
	✈ Voice Switching Communication System		
	✈ Controller Pilot Data Link Communication		
	✈ Automatic Message Switching Center		
	✈ Very High Frequency Digital Link		
	✈ Aeronautical Telecommunication Network System		
	✈ Automatic Message Handling System		
	✈ Integrated Remote Control and Monitoring System		
	✈ Very High Frequency Air Ground Communication		
	✈ Aerodrome Terminal Information System		
	✈ High Frequency Air Ground Communication (RADAR/MWARA)		
	✈ Very Small Apperture Terminal		
	✈ Radio Link		
	✈ High Frequency-Single Side Band		
	✈ Tele Printer		
	✈ Jumlah Personil yang memiliki Rating Kelompok Peralatan Navigasi Peralatan:		
	✈ Very High Frequency Omnidirectional Range		
	✈ Distance Measuring Equipment		
	✈ Satellite Navigation System		
	✈ Non Directional Beacon		
	✈ Jumlah Personil yang memiliki Rating Kelompok Peralatan Pengamatan Penerbangan:		
	✈ Primary Surveillance Radar		
	✈ Secondary Surveillance Radar/ Monopulse Secondary Surveillance		
	✈ ATC Automation (Automatic Dependent Surveillance, Radar Data Processing System, Flight Data Processing System, Aeronatical Information System).		
	✈ Aerodrome Surface Detection Equipment		
	✈ Jumlah Personil yang memiliki Rating Kelompok Peralatan Bantu Pendaratan:		
	✈ Instrument Landing System/Runway Visual Range		
	✈ Satellite Landing System (Differential Global Positioning System)		
	✈ Airfield Lighting Control System		
	✈ Constant Current Regulator, Sequence Flashing Light System and Runway Threshold Indicator Light		
	✈ Airfield Lighting Configuration.		
	✈ Precision Approach Path Indicator/Visual Approach Slope Indicator System		
	✈ Signal and Beacons		

	✈ Jumlah Personil yang memiliki Rating Kelompok Peralatan Penunjang Fasilitas Penerbangan:		
	✈ Security Equipment (X-Ray Inspection Machine, Explosive Metal Detector).		
	✈ Integrated Security System.		
	✈ Centralized Information System.		
	✈ Close Circuit Television, Access Control.		
	✈ Integrated Ground Communication System		
	✈ Flight Information Display System		
	✈ Check-In System		
	✈ Jumlah Personil yang memiliki Rating Kelompok Peralatan Fasilitas Listrik Penerbangan :		
	✈ Power Control System		
	✈ Aircraft Docking Guidance Suystem		
	✈ Genset and Automatic Change Over Switch		
	✈ Transmission and Distribution		
	✈ Uninterrupted Power Supply		
	✈ Air Conditioning		
	✈ Traction Equipment (Elevator, Escalator, Conveyor, etc)		
	✈ Electrical Installation (Flood Light, Building/Road Lighting) and Solar Cell		
	✈ Jumlah Personil Elektronika yang tidak memiliki Rating		
	✈ Jumlah Personil Listrik yang tidak memiliki Rating		
	✈ Jumlah Personil Elektronika yang memiliki 1 buah Rating		
	✈ Jumlah Personil Elektronika yang memiliki 2 buah Rating		
	✈ Jumlah Personil Elektronika yang memiliki 3 buah Rating		
	✈ Jumlah Personil Elektronika yang memiliki 4 buah Rating		
	✈ Jumlah Personil Elektronika yang memiliki 5 buah Rating		
	✈ Jumlah Personil Listrik yang memiliki 1 buah Rating		
	✈ Jumlah Personil Listrik yang memiliki 2 buah Rating		
	✈ Jumlah Personil Listrik yang memiliki 3 buah Rating		
	✈ Jumlah Personil Listrik yang memiliki 4 buah Rating		
	✈ Jumlah Personil Listrik yang memiliki 5 buah Rating		
7.	PERSONIL FASILITAS TEKNIK BANDAR UDARA (SKEP 019/III/2005)		
	✈ Jumlah Teknisi Ahli Fasilitas Teknik Bandar Udara :		
	✈ Sisi Udara		
	✈ Sisi Darat		
	✈ Peralatan		
	✈ Jumlah Teknisi Terampil Fasilitas Teknik Bandar Udara:		
	✈ Sisi Udara		
	✈ Sisi Darat		
	✈ Peralatan		

DIREKTUR JENDERAL PERHUBUNGAN UDARA

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CUCUK SURYO SUPROJO
NIP120089499

SALINAN sesuai dengan aslinya
Kepala Bagian Hukum
Ditjen Hubud

E.A. SILOOY
NIP.120108009

LAMPIRAN II
PERATURAN DIREKTUR JENDERAL PERHUBUNGAN UDARA
NOMOR : SKEP/76/VI/2005
TANGGAL : 20 JUNI 2005

FORMAT – D

CHECK SHEET PEMERIKSAAN FASILITAS BANDAR UDARA DALAM RANGKA AERODROME CERTIFICATION (SERTIFIKASI OPERASI BANDAR UDARA)

Nama bandara : ....
Nama pengelola bandara : ....
Tanggal pemeriksaan : ....

No.	FASILITAS PENERBANGAN	ADA	TIDAK ADA	KETERANGAN /JUMLAH
1.	FASILITAS PELAYANAN PENUMPANG			
	✈ Parkir Kendaraan			
	✈ Security Check			
	✈ Jumlah trolley			
	✈ Pelayanan Bagasi			
	✈ Check In Counter			
	✈ Jumlah Timbangan			
	✈ Jumlah Counter Desk			
	✈ Counter Penjualan Tiket			
	✈ Telepon/Telex/Facsmili			
	✈ Information Displayui			
	✈ Public Addressing System			
	✈ Bea Cukai, imigrasi dan Karantina			
	✈ Bank, Money Changer dan asuransi			
	✈ Ruang Tunggu			
	✈ Counter Kesehatan			
	✈ Toilet			
	✈ Ruang Merokok			
	✈ Ruang Perawatan Bayi			
	✈ Fasilitas Penyandang Cacat			
	✈ Restoran dan Kantin			
	✈ CIP Lounge			
	✈ Transportasi dari/ke bandar udara			
2.	FASILITAS PELAYANAN KARGO DAN POS			
	✈ Warehouse/gudang			
	✈ Kargo X-Ray			
	✈ Timbangan			
3.	FASILITAS PELAYANAN PESAWAT UDARA			
	✈ GSE			
	✈ Marshalling			
	✈ Aviobridge			
	✈ ADGS			
	✈ Allocations Parking Stand			
4.	FASILITAS PELAYANAN KONSESIONER			

	✈ Petunjuk Pelaksanaan Usaha di Bandar Udara			
	✈ Jumlah Konsesioner:			
	✈ Pada Boarding Lounge			
	✈ Pada Anjungan			
5.	FASILITAS KOMUNIKASI PENERBANGAN			
	Fasilitas Komunikasi Antar Stasiun Penerbangan:			
	✈ Automatic Message Switching Centre (AMSC)			
	✈ High Freq. Single Side Band (HF-SSB)			
	✈ Tele-Printer			
	✈ Aeronautic Telecommunication Network System			
	✈ Automatic Message Handling System			
	✈ Direct Speech			
	Fasilitas Komunikasi Lalu Lintas Penerbangan:			
	✈ Voice Switching Communication System			
	✈ Controller Pilot Data Link Communication (CPDLC)			
	✈ Very High Freq. Digital Link			
	✈ Integrated Remote Control and Monitoring System			
	✈ Very high Freq. Air Ground Communication			
	✈ Automatic Terminal Information System			
	✈ High Freq. Air Ground Communication (RDARA/MWARA)			
6.	FASILITAS NAVIGASI PENERBANGAN			
	Alat Bantu Navigasi Darat: ✈ Non Directional Beacon (NDB)			
	✈ Very High Freq. Omnidirectional Radio Range (VOR)			
	✈ Distance Measuring Equipment (DME)			
	Alat bantu Navigasi Satelit: ✈ Satellite Navigation System (GNS)			
	✈ Global Navigation Satellite System (GNSS)			
7.	*FASILITAS PENGAMATAN PENERBANGAN*			
	✈ Primary Surveillance Radar (PSR)			
	✈ Secondary Surveillance Radar (SSR)			
	ATS Automation:			
	✈ Radar data Processing System			
	✈ Flight Data Processing System			
	✈ Aeronautical Information System			
	✈ Automatic Dependent Surveillance (ADS)			
	✈ Aerodrome Surface Detection Equipment			
8.	*FASILITAS BANTU PENDARATAN*			
	✈ Instrument Landing System (ILS)			
	✈ Runway Visual Range (RVR)			
	✈ Satellite Landing System (Differential Global Positioning System)			
9.	FASILITAS BANTU PENDARATAN VISUAL			
	✈ Indicator and Signaling Device			
	✈ Markings			
	✈ Rotating Beacon			
	✈ Approach Lighting System			
	✈ Visual Approach Slope Indicator System/Precision Approach Path Indicator			
	✈ Circling Guidance Light			

	✈ Runway Lead-in Lighting System			
	✈ Runway Threshold Identification Lights			
	✈ Runway Edge Light			
	✈ Runway Threshold and Wing Bar Light			
	✈ Runway End Light			
	✈ Runway Centre Line Light			
	✈ Runway Touch Down Zone Light			
	✈ Stop Way Light			
	✈ Taxiway Centre Line Light			
	✈ Taxiway Edge Light			
	✈ Stop Bar			
	✈ Taxiway Intersection Light			
	✈ Runway Guard Light			
	✈ Apron Floodlighting			
	✈ Aircraft Stand Manouevering Guidance Light			
	✈ Road Holding Position Light			
10.	FASILITAS METEOROLOGI PENERBANGAN			
	✈ Anemometer			
	✈ Barometer			
	✈ Barograph			
	✈ Wet Ball and Dry Ball Thermometer			
	✈ Thermometer Maximum			
	✈ Thermometer Minimum			
	✈ Observation Rain Fall Meter			
	✈ Weather Radar Satellite			
11.	FASILITAS POKOK BANDAR UDARA (FORM TERLAMPIR)			
12.	PETA DLKR			
13.	PETA KKOP			
14.	FASILITAS PKP-PK			
	Kategori bandar udara untuk PKP-PK			
	Jumlah kendaraan PKP-PK:			
	✈ Rescue Car			
	✈ Foam Tender tipe I			
	✈ Foam Tender tipe II			
	✈ Foam Tender tipe III			
	✈ RIV -CA tipe IV			
	✈ RIV- CA tipe II			
	✈ RIV- CA tipe III			
	✈ Rescue Boat			
	✈ Utility Car			
	Kapasitas tangki air kendaraan PKP-PK yang tersedia di bandar udara:			
	✈ Foam Tender tipe I			
	✈ Foam Tender tipe II			
	✈ Foam Tender tipe III			
	Jenis dan jumlah pemadam api utama dan pelengkap yang tersedia di bandar udara:			
	✈ Protein Foam			
	✈ AFFF			
	✈ FFFP			
	✈ Fluoro Protein Foam			

	✈ Synthetic Foam			
	✈ Air			
	✈ CO2			
	✈ Dry Chemical Powder			
	✈ Free Halon			
	Jenis kendaraan dan peralatan pendukung PKP-PK dan Salvage (form terlampir)			
	Pakaian pelindung keselamatan kerja personil PKP-PK:			
	✈ Jumlah baju tahan api			
	✈ Jumlah baju tahan panas			
	✈ Jumlah helm			
	✈ Jumlah sepatu bot			
	✈ Jumlah sarung tangan			
	✈ Jumlah alat bantu pernapasan			
	Peralatan komunikasi:			
	✈ Jumlah Peralatan komunikasi			
	✈ Jenis Peralatan komunikasi			
	✈ Kondisi Peralatan komunikasi			
	Luas Fire station			
	Fasilitas latihan			
	Kapasitas bak persediaan air			
	Emergency Access Road:			
	✈ Lebar			
	✈ Radius Putar			
	Jumlah ambulance			
	Emergency Operation Centre			
	Staging area			
	Rendezvous point			
	Kehandalan dan kelayakan kendaraan PKP-PK (Form Terlampir)			
	Grid Map			

DIREKTUR JENDERAL PERHUBUNGAN UDARA

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CUCUK SURYO SUPROJO
NIP120089499

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Kepala Bagian Hukum
Ditjen Hubud

E.A. SILOOY
NIP.120108009

LAMPIRAN III
PERATURAN DIREKTUR JENDERAL PERHUBUNGAN UDARA
NOMOR : SKEP/76/VI/2005
TANGGAL : 20 JUNI 2005

DEPARTMENT OF COMMUNICATIONS
DIRECTORATE GENERAL OF AIR COMMUNICATIONS

CIVIL AVIATION
AIRPORT OPERATION CERTIFICATE

No. ....

AIRPORT NAME	**:**	**..**
LOCATED	**:**	**..**

This Airport Certificate is issued by the Director General of Air Communication pursuant to the Indonesian Aviation Regulation under authority of The Aviation Act Number 15 Year 1992, The Government Regulation Number 3 Year 2001 on Aviation Safety and Security, and authorizes the operator named in the approved Aerodrome Manual to operate this airport.

The Director General may suspend or cancel this Airport Certificate at any time where the airport operator fails to comply with the provisions set forth in the Act, the Regulations or for other grounds as set out in the Act.

This Certificate is subject to any conditions established by the Minister Communication pursuant to KM 47 Tahun 2002 of the Regulations and set out in the approved Aerodrome Manual.

This Airport Certificate is not transferable and shall effective for 5 (five) years unless there is suspension or cancellation during that period.

Jakarta, ...
THE DIRECTOR GENERAL OF AIR COMMUNICATION

CUCUK SURYO SUPROJO
NIP. 120089499

DEPARTMENT OF COMMUNICATIONS
DIRECTORATE GENERAL OF AIR COMMUNICATIONS

CIVIL AVIATION
AIRPORT OPERATION CERTIFICATE

No. ....

This Airport Certificate is issued by the Director General of Air Communication pursuant to the Indonesian Aviation Regulation under authority of The Aviation Act Number 15 Year 1992, The Government Regulation Number 3 Year 2001 on Aviation Safety and Security, and authorizes the operator named in the approved Aerodrome Manual to operate this airport.

The Director General may suspend or cancel this Airport Certificate at any time where the airport operator fails to comply with the provisions set forth in the Act, the Regulations or for other grounds as set out in the Act.

This Certificate is subject to any conditions established by the Director General of Air Communication pursuant to section 139.29 of the Regulations and set out in the approved Aerodrome Manual.

This Airport Certificate is not transferable and shall effective for 5 (five) years unless there is suspension or cancellation during that period.

Jakarta, ...
THE DIRECTOR GENERAL OF AIR COMMUNICATION

CUCUK SURYO SUPROJO
NIP. 120089499

TERM OF CERTIFICATION
Number :

NAMA BANDAR UDARA ______________________________

I. Data of Airport

Name of the Airport : ______________________
City and Province of the Airport : ______________________
ARP Coordinate : ______________________
Direction and distance from city : ______________________
Elevation of each threshold : ______________________
Name of the Airport Operator : ______________________
Type of Traffic permitted : ______________________
Type of Runway : ______________________
Runway Physical Characteristic : ______________________

Designation RWY	True BRG	Dimension of RWY	Strength (PCN) and Surface of RWY	THR Coordinate

Slope of RWY-SWY	SWY Dimension and Surface	CWY Dimension and Surface	Strip Dimension and Surface	OFZ

Aerodrome Category for Fire Fighting : ______________________
Capability for removal disabled Aircraft : ______________________

II. Scope of Authorization

International Airport of Soekarno-Hatta Operator which is mentioned in the Aerodrome Manual have authorization:

1. to operate airport in accordance with CASR Part 139, Manual of Standard, approved Aerodrome Manual and other legislations related to airport operation, and also shall consider any restriction and condition as set forth in this Term of Certification;

2. to maintain aerodrome in accordance with CASR Part 139, Manual of Standard, approved Aerodrome Manual and other legislations related to airport operation, and also shall consider any restriction and notice as set forth in this Term of Certification;

III. Restriction

Not applicable

IV. Condition

Directorate General of Air Communication, by issuing Airport Operation Certificate of Soekarno – Hatta, require the operator to establish arrange Standard Operating Procedure of Apron Incident Report.

The establishment of Standard Operating Procedure, as mentioned above, shall not be later than one year since the date of the Airport Operating Certificate issued.

Jakarta,

DIRECTOR GENERAL OF AIR COMMUNICATION

CUCUK SURYOSUPROJO
NIP.120089499

SALINAN sesuai dengan aslinya
Kepala Bagian Hukum
Ditjen Hubud

E.A. SILOOY
NIP.120108009

TERM OF CERTIFICATE
NOMOR : ....

....
(NAMA BANDARA)

I. SCOPE OF CERTIFICATE

This certificate empower PT. (Persero) Angkasa Pura I to operate the .... (nama bandara) Airport in accordance with the approved Aerodrome Manual, Standard Operating Procedures and other related standard and regulation for airport operation.

II. CONDITION

This Certificate issuance is subject to the followings :

……
………………………………….. .
(Catatan yan harus dipenuhi oleh penyelenggara Bandara)

Jakarta

DIRECTOR GENERAL OF AIR COMMUNICATIONS

CUCUK SURYO SUPROJO
NIP. 120089499

AERODROME DATA

Nme of the Airport	:
City and Province of the Airport	:
Name of the Airport Owner	:
Name of the Airport Operator	:
ARP Coordinate	:
Elevation	:
Type of Traffic permitted	:
Type of Runway	:
Maximum Capacity	:
Runway Physical Characteristic	:

Designation of RWY	True BRG	Dimenstion of RWY	Strength (PCN) and Surface of RWY	THR Coordinate	Runway End Safety Area

Slope of RWY - SWY	SWY Dimension and Surface	CWY Dimension and Surface	Strip Dimension	OFZ

Declare Distance

Designation of RWY	TORA	TODA	ASDA	LDA

Aerodrome Category for
Fire Flighting :

Capability for removal disabled
Aircraft :