BAB VI
KESIMPULAN

6.1. Kesimpulan

Berdasarkan kepada hasil penelitian, analisa dan pembahasan yang dilakukan oleh penulis didapat kesimpulan sebagai berikut:

Runway pada Bandara Tanah Merah sampa didarati pesawat terbang F-27 dan sejenisnya setelah dikembangkan (Gambar 6.1). Adapun data teknis adalah sebagai berikut:

1. Tipa non-instrument runway 3 C

<table>
<thead>
<tr>
<th>Kondisi Awal</th>
<th>Hasil Rancangan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensi runway</td>
<td>1050 m x 20 m</td>
</tr>
<tr>
<td>Dimensi taxiway</td>
<td>70 m x 15 m</td>
</tr>
<tr>
<td>Dimensi apron</td>
<td>50 m x 40 m</td>
</tr>
</tbody>
</table>

- Overrun 07: 50 m
- Overrun 25: 50 m
- Lebar shoulder: 20 m (kiri) + 20 m (kanan)
- Lebar strip: 150 m

<table>
<thead>
<tr>
<th>Kemiringan: Runway</th>
<th>Melintang</th>
</tr>
</thead>
<tbody>
<tr>
<td>0,10 %</td>
<td>1,5 %</td>
</tr>
<tr>
<td>Shoulder</td>
<td>0,10 %</td>
</tr>
<tr>
<td>Taxiway</td>
<td>0,10 %</td>
</tr>
<tr>
<td>Apron</td>
<td>0,5 %</td>
</tr>
</tbody>
</table>

- 96 -
2. Konstruksi perkerasan runway, taxiway dan apron yang telah ada masih cairu memenuhi persyaratan untuk melayani operasional penerbangan pesawat sejenis F-27.

6.2. Saran

1. Perlunya pemahaman istilah-istilah asing yang berkaitan dengan perencanaan suatu Bandar Udara sehingga akan dihasilkan suatu perencanaan yang mudah dipahami oleh pelaksana pembangunan.

2. Kelengkapan data-data yang diperlukan dalam perhitungan perencanaan suatu Bandar Udara perlu diperhatikan.
Gambar 6.1. Ruang Lingkup Area Tanah Morän
DAFTAR PUSTAKA


Departemen Pekerjae Umum, 2005, Spesifikasi Umum Bidang Jalan dan Jembatan (Divisi 6 Pekerjaan aspal), Jakarta.

ICAO, 1988, Pelabuhan Udara Annex-14, Keputusan Directorat Jendral Perhubungan Udara, Kantor Wilayah V-Papua, Jayapura.


Horonjeff, Robert, X.Mckelvey, Francis., 1997, Perencanaan dan Penyelenggara Bandar Udara (jilid 1 & jilid 2)


## I. INFORMASI UMUM BANDAR UDARA

<table>
<thead>
<tr>
<th>NAMA KOTA</th>
<th>TANAH MERAH</th>
</tr>
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<tbody>
<tr>
<td>BANDAR UDARA</td>
<td>TANAH MERAH</td>
</tr>
<tr>
<td>KELAS BANDARA</td>
<td>IV</td>
</tr>
<tr>
<td>PENGENOLA</td>
<td>BANDAR UDARA TANAH MERAH</td>
</tr>
<tr>
<td>JAM OPERASI</td>
<td>07.00 - 17.00 WIT</td>
</tr>
<tr>
<td>KLASIFIKASI OPERASI</td>
<td>UN ATTENDED</td>
</tr>
<tr>
<td>KEMAMPUAN OPERASI</td>
<td>DHC-6 / HS-748</td>
</tr>
<tr>
<td>PELAYANAN KILU</td>
<td>TIDAK ADA</td>
</tr>
<tr>
<td>KATEGORI PKP - PK</td>
<td>(satu)</td>
</tr>
</tbody>
</table>

| KOORDINAT LOKASI | 36°07′07″ S - 140°16′ E |
| ELEVASI | 18 M / 60 FT |
| 2. DPPU | TIDAK ADA |
| 3. METEO | ADA |
| 4. JARAK BANDARA KE KOTA TERDEKAT | DALAM KOTA |
| 5. TERMASUK | PAPUA |
| - PROVINSI | BOVENDIGOEIL |
| - KABUPATEN | TANAH MERAH |
| - KECAMATAN | |

| ALAMAT | JL. AIRPORT TANAH MERAH |
| 7. KODE | |
| ICAO | WAKT |
| IATA | TMH |

## II. DATA PERSONALIA DAN PERUMAHAN

### PERSONALIA

1. KEPALA BANDAR UDARA
   - NIP: SUTRISNO SUWARDJO
   - PANGKAT/GOLONGAN: PENATA MUDA TKI III/b
   - INSTANSI: BANDAR UDARA TANAH MERAH
   - DIREKTORAT JENDERAL PERHUBUNGAN UDARA
   - TELFON: 120002729

<table>
<thead>
<tr>
<th>JUMLAH PERSONALIA BANDARA</th>
<th>TENAGA ADMINISTRASI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. GOLONGAN IIV</td>
<td>- orang</td>
</tr>
<tr>
<td>2. GOLONGAN III</td>
<td>- orang</td>
</tr>
<tr>
<td>3. GOLONGAN II</td>
<td>- orang</td>
</tr>
<tr>
<td>4. GOLONGAN I</td>
<td>- orang</td>
</tr>
</tbody>
</table>
b. TENAGA TEKNIKI  
1. GOLONGAN IV : - orang
2. GOLONGAN III : 1 orang
3. GOLONGAN II : 1 orang
4. GOLONGAN I : - orang

c. TENAGA OPERASIONAL  
1. GOLONGAN IV : - orang
2. GOLONGAN III : - orang
3. GOLONGAN II : 4 orang
4. GOLONGAN I : 1 orang

3. PENDIDIKAN  
a. SARJANA : - orang
b. SARJANA MUDA : - orang
c. SLTA : 3 orang
d. SLTP : 1 orang
e. SD : 4 orang

B. PERUMAHAN  
- TYPE 70 : 2 UNIT  
- TYPE 50 : 2 UNIT

III. FASILITAS BANDAR UDARA

A. FASILITAS LANDASAN  
1. LANDASAN  
   A. Ukuran : 1050 m X 20 m
   B. Kenetralisasi : Aspal Kolakan
   C. Arah : 07 / 25
2. SHOULDER SISI I : 1.100 m X 21 m
3. SHOULDER SISI II : 1.100 m X 21 m
4. TAXIWAY : 70 m X 15 m
5. APRON : 60 m X 40 m
6. OVER RUN : 50 m X 50 m
7. KEMAMPUAN : DHC - 6 TWIN OTTER/ HS - 748

B. FASILITAS BANGUNAN  
1. BANGUNAN TERMINAL : 12 X 10 = 120 m²
2. GEDUNG OPERASIONAL GEDUNG KANTOR : 20 X 6 = 120 m²
3. GEDUNG NDB : 6 X 4 = 24 m²
4. GEDUNG GENSET : 8 X 6 = 48 m²
5. GEDUNG PKP - PK : Tidak ada
EVALUASI DATA & INFORMASI AERONAUTIKA
BANDAR UDARA

I. UMUM
1. Nama Derah / Kota / Provinsi : Tanah Merah, Boen Digoe, Papua
2. Nama Bandar Udara : Tanah Merah
3. Kelas Bandar Udara : IV
4. Pengelola : Direktorat Jenderal Perhubungan Udara
5. Jam Operasi : 07.00 - 17.00 WIT
6. Klasifikasi Operasi : UN ATTENDED
7. Kemampuan Operasi : DHC-6 / HS-748
8. Koordinat ARP : 06.07.07.5 - 40.16 E
9. Temperatur Rata-Rata / Tahun :
10. Elevasi Aerodrome : 18 M. / 33 FT
11. Jarak dari Kota : DALAM KOTA
12. Alamat Bandar Udara : JLN AIRPORT TANAH MERAH
13. Nomor Telepon & Facsimili : (0975) 31097

II. FASILITAS AREA PERGERAKAN PESAWAT
1. Runway (RWY)
   a. RWY Designation/Azimuth : 07 dan 25
   b. Dimension (Length x Width) : 1050 M. X 20 M.
   c. Strength :
   d. Longitudinal slope dari RWY :
      0 s/d 100 m :
      100 s/d 200 m :
      200 s/d 300 m :
      300 s/d 1400 m :
      1400 s/d 1460 m :
      1600 s/d 1870 m :
      1870 s/d 2220 m :
   e. Surface :
      Aspal Kolakan

2. Taxiway (SVY)
   a. Dimension (length x Width) :
   b. Longitudinal Slope :
   c. Strength :
   d. Surface :

3. Taxiway (TWY)
   a. Dimension (length x Width) : 70 M. X 15 M.
   b. Strength :
   c. Surface :
   d. Rapid Exit TWY :
   e. TWY on Bridges :
4. Apron
   a. Dimension (Length x Width) : 60 M x 40 M
   b. Distance between Edge of RWY and Edge Of Apron : 70 M
   c. Surface : Aspal Perkotaan
   d. Strength : DHC-6 / HS - 748

5. RWY Strip
   a. Dimension (Length x Width) : 1.100 M x 62 M
   b. Surface : Rumput
   c. Slope

6. RWY Shoulder
   a. Dimension (Length x Width) : 2 x (1.100 M x 21 M)
   b. Surface : Rumput

7. Turning Area
   a. Surface
   b. Strength

III. MARKINGS :
1. RWY Marking
   a. RWY Designation Marking
   b. Threshold Marking
   c. RWY Center Line Marking
   d. RWY Edge Marking
   e. Fixed Distance Marking
   f. Touch Down Zone Marking
   g. RWY Side Strip Marking

2. TWY Marking
   a. TWY Center Line Marking /
      Nosewheel Line Marking
   b. Taxi Holding Position Marking
   c. Taxiway Intersection Marking
   d. Holding Beys and Taxi Holding Position

3. Apron :
   a. Apron Edge Line Marking
   b. Traffic Line Marking
   c. Clearance Distance on Aircraft Stand

IV. OBSTRUCTIONS :
1. Obstructions within Take Off/Approach Area :
   a. RWY : Distance : Height & Slope
   b. RWY : Distance : Height & Slope
1. **TELEKOMUNIKASI**

<table>
<thead>
<tr>
<th>NO</th>
<th>NAMA</th>
<th>MERK/TYPE</th>
<th>FREQ.</th>
<th>MULAI OPERASI</th>
<th>JML</th>
<th>KONDISI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Single Side Band</td>
<td>SBX-100 EKV/KARNA</td>
<td>4811.2 KHZ</td>
<td>07.00-17.00</td>
<td>1</td>
<td>60% (BAIK)</td>
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<td>2</td>
<td>VHF TRANSCIEVER</td>
<td>UITTEL/ FS671MPC</td>
<td>122.1 MHZ</td>
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<td>RUSAK BERAT</td>
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2. **NAVIGASI**

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<th>JML</th>
<th>KONDISI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NON DIRECTION BEACON (NDB)</td>
<td>NAUTEL/ ND 2005</td>
<td>295 KHZ</td>
<td>07.00 -17.00</td>
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<td>75% (BAIK)</td>
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<tr>
<td>2</td>
<td>BEACON MONITOR RECEIVER</td>
<td>NAUTEL</td>
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<td>75% (BAIK)</td>
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3. **PERALATAN LISTRIK**

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<tr>
<th>NO</th>
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<th>KAPASITAS</th>
<th>VOLT.</th>
<th>MULAI OPERASI</th>
<th>JUMLAH</th>
<th>KONDISI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GENERATOR</td>
<td>YANMAR TP 105</td>
<td>5 KVA</td>
<td>220</td>
<td>1994</td>
<td>1 UNIT</td>
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<tr>
<td>2</td>
<td>SOLAR CELL</td>
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<td>1995,1994, 1998</td>
<td>3 UNIT</td>
<td>RUSAK, 2 UNIT BAIK</td>
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4. **PERALATAN LAIN-LAIN**

4.1. **PERALATAN VISUAL AIDS**

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<th>NAMA PERALATAN</th>
<th>MERK/TYPE</th>
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<tr>
<td>1</td>
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### 3. PERALATAN PKP - PK

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<td>ALPINDO</td>
<td>MULTYPURPOSE</td>
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### 4. PERALATAN PEMELIHARAAN BANDAR UDARA

<table>
<thead>
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<th>NAMA</th>
<th>MERK/TYPE</th>
<th>MULAI OPERASI</th>
<th>JUMLAH</th>
<th>KONDISI</th>
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<tbody>
<tr>
<td>1</td>
<td>MOWER TRACTOR</td>
<td>YAMAAR</td>
<td>1999</td>
<td>5 UNIT</td>
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<td>2</td>
<td>MESIN POTONG RUAPUT</td>
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<td>1999 - 1999</td>
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### 5. JALAN DAN TEMPAT PARKIR KENDARAAN

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<tr>
<th>NO</th>
<th>JALAN DAN TEMPAT PARKIR</th>
<th>KONSTRUKSI</th>
<th>TAHUN PEMBANGUNAN</th>
<th>LUAS (M2)</th>
<th>KONDISI</th>
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### IV. ANGGARAN PEMBANGUNAN DAN RUTIN

#### A. PEMBANGUNAN

##### 1. FASILITAS BANDAR UDARA

<table>
<thead>
<tr>
<th>TAHUN</th>
<th>KEGIATAN</th>
<th>BIAYA (000)</th>
<th>REALISASI (%)</th>
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</tr>
<tr>
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# Pasilitas Kebersihan

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<th>REALISASI (%)</th>
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<tbody>
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## Armada Udara Perintis

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## Rutin

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<tbody>
<tr>
<td>1</td>
<td>BELANJA PEGAWAI</td>
<td>128.676</td>
<td>200.126</td>
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## V. Data Statistik dan Kapasitas Pelayanan

### A. Data Statistik

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<tr>
<th>TAHUN</th>
<th>PESAWAT</th>
<th>PENUMPANG</th>
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<th>POS (Kg)</th>
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### B. FREKUENSI PERGERAKAN PESAWAT

#### INTERNASIONAL

<table>
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<tr>
<th>PESAWAT</th>
<th>TUJUAN</th>
<th>OPERATOR</th>
<th>FREKUENSI/ MINGU</th>
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</tr>
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#### DOMESTIK

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<tr>
<td>2001</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2002</td>
<td>WAKT – WAKK, (TAMAN MERAH – MERU FC)</td>
<td>MNA</td>
<td>3 X SEMINGGU</td>
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<tr>
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<td>WAKT – WAKK, (TAMAN MERAH – SENTANI PARK)</td>
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<td>3 X SEMINGGU</td>
</tr>
<tr>
<td></td>
<td>WAKT – WAJU</td>
<td>MNA</td>
<td>2 X SEMINGGU</td>
</tr>
</tbody>
</table>
V. Peralatan Navigasi

a. Non Direction Beacon (NDB)
   a. Location: TANAH MERAH
   b. Coordinate: -
   c. Function: -
   d. Emission: -
   e. Frequency: 295 KHZ
   f. Dual / Single Set: Single
   g. Power Out Put: -
   h. Coverage: -
   i. Main Power Source: Solar Cell
   j. Standby Gen Set: -
   k. Tgl. Commissioning Flight Check berikutnya: -
   l. Tgl. Periodical Flight Check terakhir: -
   m. Operating Hours: 07.00 - 17.00 WIT
   n. Instrument Approach Procedure: -

b. VOR
   a. Location: -
   b. Coordinate: -
   c. Call Sign / Identification: -
   d. Frequency: -
   e. Coverage: -
   f. Dual / Single Set: -
   g. Main Power Source: -
   h. Power Out Put: -
   i. Standby Gen Set: -
   j. Tgl. Commissioning Flight Check berikutnya: -
   k. Tgl. Periodical Flight Check terakhir: -
   l. Classification Status: -
   m. Operating Hours: -
   n. Procedure Approach / Take Off: -

c. DME
   a. Location: -
   b. Coordinate: -
   c. Call Sign / Identification: -
   d. Frequency: -
   e. Coverage: -
   f. Dual / Single Set: -
   g. Main Power Source: -
   h. Power Out Put: -
   i. Standby Gen Set: -
   j. Tgl. Commissioning Flight Check berikutnya: -
   k. Tgl. Periodical Flight Check terakhir: -
   l. Classification Status: -
   m. Operating Hours: -
   n. Procedure Approach / Take Off: -
4. ILS (Instrument Landing System)
   a. Location (SEL/LOC 3000 German) Freq.
   b. Glide Slope (SEL/6S 3000 German) Freq.
   c. Middle Marker (SEL/M 3000 German) Freq.
   d. Out Marker (SEL/M 3000 German) Freq.

5. Wind Direction Indicator: WIND SOCK

6. Type of Flight Procedure

VI. LIGHTINGS
1. Signaling Lamp
2. Aerodrome Beacon
3. Approach Lighting System
4. VASI System
5. Circling Guidance Light
6. RWY Lead-in Lighting System
7. RWY Threshold Identification Light
8. RWY Edge Light
9. RWY Threshold and Wing Bar Light
10. RWY Center Line Light
11. RWY Touchdown Zone Light
12. SWY Light
13. TWY Center Line Light
14. TWY Edge Light
15. Taxi Holding Position Light
16. Visual Guidance System

VII. FASILITAS KOMUNIKASI
1. Aeronautical Mobile Service (AMS)
   a. Call Sign
      - Frequency
         - Emergency Frequency
   b. Frequency
   c. Operating Hours
   d. Coordinate Link
   e. Direct Link
   f. Intercom

2. Aeronautical Fixed Service (AFS)
   a. Operating Hours
   b. Main Power Source
   c. Standby Power Source
   d. Automatic / Manual
   e. Network Station

1.1. MWRA (Major World Air Route Area)
1.2. RDARA (Regional Domestic Air Route Area)/FSS (Flight Service Station)
2.2. Fixed Voice Radiotelephony (PTP):
   a. Operating Hours
   b. Main Power Source
   c. Standby Power Source
   d. Frequency
   e. Network Station

3. Aerodrome Control Tower
   a. Operating Hours
   b. VHF A/G COMM

4. Area Control Center (ACC)
   a. Operating Hours
   b. VHF A/G COMM
   c. Standby VHF A/G COMM

5. Approach Control Office (APP)
   d. Operating Hours
   e. VHF A/G COMM
   f. Standby VHF A/G COMM

6. APP / ACC RADAR
   a. Operating Hours
   b. VHF A/G COMM
   c. Standby VHF A/G COMM
   d. SSR
   e. PSR

VIII. FASILITAS METEOROLOGI
1. Jenis Pelayanan Penerbangan: Pelayanan Penerbangan
2. Lokasi Kantor Meteorologi: Tanah Merah

IX. FASILITAS PELAYANAN INFORMASI AERONAUTIKA
1. Briefing Office Equipment:
   a. Flight Plan Sheet
   b. Telex
   c. Pieseimile
   d. Telephone

2. Pre-Flight Information Service:
   a. Physical Layout of Briefing Room
   b. Pre-Flight Information Bulletin (PIB) Type:
   c. Charts:
      1. Aerodrome Chart
      2. En Route Chart
      3. Navigation Warning Chart
      4. ONC/TPC/JOS/other Base Map
3. Coordination (with name of unit)
   a. ATS Unit: Koramil
   b. Military: Agen MA
   c. Operator / Airlines: Meteorologi & Geofisika
   d. Meteorology: Polsek
   e. Others

4. Basic Reference Material
   a. AIP Indonesia
   b. Others State AIP
   c. AIS operating Instruction
   d. ANNEX 15 dan UU No.15
   e. ICAO Doc
   f. Dokumen lain

X. FASILITAS OPERASI PK-PK
   1. Kategori: 1
   2. Jenis Fasilitas: Portable

XI. FASILITAS REFUELING
   1. Jenis Fuel: Aftur
   2. Kapasitas yang tersedia: 144 Drum (Pengadaan Proyek Perintis)

XII. SUMBER DAYA MANUSIA
   1. Jumlah personil yang berdiras/merangkap briefing office:
   2. Klasifikasi personil:
      a. AIS
      b. Non AIS

Lokasi: TANAH MERAH, BOVEN DIGOEL, PAPUA
Tgl/Bln/Thn: 21 AGUSTUS 2003
Data Evaluator: 
Penanggung Jawab Narasumber: Ka.Bandara Tanah Merah (Sutrieno Sumardjo)
NIP. 120092729.
Netherlands

Possibility of an advanced technology radome for transport in the 1980's was for marketing in 1975.

P-76-304 was employed in the Fokker 50's for flight testing carried out in 1981.

Fokker Skyline, Fokker 104 and 105 are in an advanced stage.

The production flight test differed from the F-170 test version.

Outlook: The F-170 flight test version is expected to be in service by 1980.

Fokker 50: The Fokker 50 is a modern, large, versatile transport aircraft that is being developed in the Netherlands.

The Fokker 50 combines excellent performance with modern design and ergonomics. It is the result of many years of experience with other Fokker aircraft and the latest technology. The Fokker 50 has a number of unique features, such as a wide cabin, a high-speed cruise, and a low-noise environment.

The Fokker 50 is designed for a variety of roles, including regional transport, charter, and cargo. It is capable of flying long distances with a comfortable layout.

The Fokker 50 is powered by two engines, which provide high performance and fuel efficiency. The aircraft has a maximum takeoff weight of 120,000 kg and a maximum cruise speed of 900 km/h.

Fokker 50: The Fokker 50 is the latest in a series of transport aircraft developed by Fokker, the Dutch aerospace company. It is a twin-engine, high-speed, long-range transport aircraft that is used for both passenger and cargo transportation.

The Fokker 50 is designed to be a versatile aircraft that can be used for a variety of roles, including regional transport, cargo, and charter services. It is capable of flying long distances with a comfortable layout and a high-speed cruise.

The Fokker 50 is powered by two engines, which provide high performance and fuel efficiency. The aircraft has a maximum takeoff weight of 120,000 kg and a maximum cruise speed of 900 km/h.

The Fokker 50 is equipped with modern avionics and communication systems, which provide a high level of safety and reliability. It is also designed to be easy to maintain and operate, making it a popular choice for airlines around the world.

The Fokker 50 is the result of many years of experience with other Fokker aircraft and the latest technology. It is expected to be in service in the 1980s.

Fokker 50: The Fokker 50 is a large, twin-engine transport aircraft that is designed to be a versatile and reliable vehicle for regional and international transport.

The Fokker 50 has a number of unique features, such as a large cabin, a high-speed cruise, and a low-noise environment. It is designed to be capable of flying long distances with a comfortable layout and a high level of safety.

The Fokker 50 is powered by two engines, which provide high performance and fuel efficiency. The aircraft has a maximum takeoff weight of 120,000 kg and a maximum cruise speed of 900 km/h.

The Fokker 50 is equipped with modern avionics and communication systems, which provide a high level of safety and reliability. It is also designed to be easy to maintain and operate, making it a popular choice for airlines around the world.

The Fokker 50 is the result of many years of experience with other Fokker aircraft and the latest technology. It is expected to be in service in the 1980s.
Fokker 50 maritime transport/short-range transport (Alstom Pres)

Available of expeditious transport and single-crew operation allowed Fokker 50s to be used for various missions, including transport, observation, and reconnaissance.

Landing gear on Fokker 50s consists of two main undercarriages, each with a hydraulic system for automatic deployment and retraction. The main gear is used for takeoff, landing, and taxiing, while the nose gear is used for takeoff and landing. The Fokker 50 can carry up to 60 passengers in a single configuration.

Primary flight and navigation instruments included the Fokker Digital Flight Control System (DFCS), which provides automatic pitch, roll, and yaw control, and a digital autoland system for precision approach and landing.

The Fokker 50 can fly at an altitude of up to 40,000 feet (12,000 meters) and has a range of up to 6,000 miles (9,656 kilometers).

The Fokker 50 is powered by two Rolls-Royce RB.211-524 turbofan engines, each with a thrust of 25,000 pounds (113 kilonewtons) at takeoff and 14,500 pounds (65.3 kilonewtons) at cruise.

The Fokker 50 has a maximum takeoff weight of 148,900 pounds (67,517 kilograms) and a maximum landing weight of 134,400 pounds (60,949 kilograms).

The Fokker 50 can carry up to 120 passengers or 15 tons of cargo.

The Fokker 50 is a versatile aircraft that is well-suited for a variety of missions, including passenger transport, freight transport, and military operations.

Lampiran 4

Hal 115
<table>
<thead>
<tr>
<th>No.</th>
<th>Deskripsi</th>
<th>Nilai</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Operating Weight Empty</td>
<td>12,344 kgs</td>
</tr>
<tr>
<td>2</td>
<td>Pay Load</td>
<td>4,500 kgs</td>
</tr>
<tr>
<td>3</td>
<td>Maximum Structural Take Off Weight</td>
<td>20,410 kgs</td>
</tr>
<tr>
<td>4</td>
<td>Maximum Structural Landing Weight</td>
<td>19,732 kgs</td>
</tr>
<tr>
<td>5</td>
<td>Kapasitas Angkut Penumpang Maksimum</td>
<td>52 PAX</td>
</tr>
<tr>
<td>6</td>
<td>Jumlah Crew Pesawat</td>
<td>2 Pilot, 2 Pramugari</td>
</tr>
<tr>
<td>7</td>
<td>Kapasitas Angkut Bagasi Kab</td>
<td>620 kgs</td>
</tr>
<tr>
<td>8</td>
<td>Kapasitas Angkut Bagasi/Cargo</td>
<td>1,400 kgs</td>
</tr>
<tr>
<td>9</td>
<td>Jarak Jelajah Maximum</td>
<td>5 hours</td>
</tr>
<tr>
<td>10</td>
<td>Ketinggian Terbang Pesawat</td>
<td>2,5000 feet</td>
</tr>
<tr>
<td>11</td>
<td>Kecepatan Pesawat</td>
<td>230 knots</td>
</tr>
<tr>
<td>12</td>
<td>Kebutuhan BIM per miil</td>
<td>1520 lbs</td>
</tr>
<tr>
<td>13</td>
<td>Kapasitas Tengki BIM</td>
<td>4,061 kgs</td>
</tr>
<tr>
<td>14</td>
<td>Panjang Badan Pesawat</td>
<td>25.06 meter</td>
</tr>
<tr>
<td>15</td>
<td>Lebar Rentang Sayap Pesawat</td>
<td>29 meter</td>
</tr>
<tr>
<td>16</td>
<td>Jarak Pendaratan awal Fluri Kuning-Mak. Alor</td>
<td>138 NM</td>
</tr>
<tr>
<td>17</td>
<td>Wheel Tread (jarak antara main gear)</td>
<td>23.75&quot;</td>
</tr>
<tr>
<td>18</td>
<td>Wheel Base (jarak antara main gear dengan main gear)</td>
<td>31&quot; + 13&quot;</td>
</tr>
<tr>
<td>19</td>
<td>Maksimum Height (onggi maksimum badan pesawat)</td>
<td>29&quot; = 8.84 meter</td>
</tr>
</tbody>
</table>

Keterangan: 30 September 2002
Yang memeriksa dan menandatangani: [S dipisahkan dan dibaca]

SOVRI AMALO
CHAPTER 1. GENERAL

Introduction Note—This Annex contains standards and recommended practices (specifications) that prescribe the physical characteristics and overall design limitations subject to be provided for at aerodromes, and certain facilities and technical services normally provided at an aerodrome. It is not intended that these specifications itself or regulate the operation of an aircraft.

The great extent, the specifications for individual facilities detailed in Annex 14, Volume 1 have been interrelated by a reference code system, described in this chapter, and by the disposition of the type of runway for which they are to be provided, as specified in the definitions. This not only simplifies the reading of Volume 1 of this Annex, but in most cases, provides for efficiently proportioned aerodromes when the specifications are followed.

This document sets forth the minimum aerodrome specifications for aircraft which have the characteristics of those which are currently operating as, for similar aircraft, that are planned for introduction. Accordingly, any additional safeguards that might be considered appropriate to provide for more demanding aircraft are not taken into account. Such measures are left to appropriate authorities to evaluate and who may account as necessary for each particular aerodrome, evidence on some possible effects of future aircraft on these specifications is given in the Aerodrome Design Manual, Part 2.

It is to be noted that the specifications for precision approach runway categories II and III are only applicable to aircraft intended to be used by airports in the numbers 3 and 4.

Annex 14, Volume 1 does not include specifications relating to the overflight planning of aerodromes such as operation between adjacent aerodromes or capacity of individual aerodromes or to economic and other non-technical factors that need to be considered in the development of an aerodrome. Information on these subjects is included in the Airport Planning Manual, Part 1.

ANNEX 14 — VOLUME 1

security are given in Annex 17 and detailed guidance on the subject is contained in the ICAO Security Manual.

1.1. Definitions

When the following terms are used in the Annex, they have the following meanings:

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.

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

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

Aerodrome identification sign. A sign placed on an aerodrome to aid in identifying the aerodrome from the air.

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

Aerodrome beacon. An aerodrome beacon is visible at all times, either continuously or intermittently, to designate a particular point on the surface of the earth.

Aerodrome ground light. Any light specifically provided as an aid to air navigation, other than a light displayed on any aircraft.

Aerodrome reference field length. The minimum field length required for take-off at maximum certificated take-off mass, sea level, standard temperature condition, still air and zero runway slopes, as shown in the appropriate airplane flight manual prescribed by the certifying authority or equivalent data from the aircraft manufacturer. Field length means balanced field length for airplanes, if applicable, or take-off distance in other cases.

Note.—Attachment A, Section 2 provides information on the concept of balanced field length and the Airworthiness.
c) Precision approach runway, category III. An instrument runway served by 1.5 km and visual aids intended for operations down to 30 m (100 ft) to decision height and down to an RVR of the order of 400 m.

d) Precision approach runway, category III. An instrument runway served by 1.5 km and visual aids intended for operations down to 30 m (100 ft) to decision height and down to an RVR of the order of 400 m.

A = intended for operations down to an RVR of the order of 300 to 400 m, in which decision height being applicable along visual aids during the final phase of landing
B = intended for operations down to an RVR of the order of 50 to 100 m, in which decision height being applicable along visual aids for landing
C = intended for operations without reliance on visual references for landing or taking-off.

Note 1: See Annex 10, Volume 1, Part 1, Chapter 3, for raised 2.5 specifications.

Note 2: Visual aids must not necessarily be matched to the scale of runways unless prescribed. The criterion for the section of visual aids is the consideration to which operations or visual aids are intended to be conducted.

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

Landing direction indicator: A device to indicate visually the direction of the runway for landing and for take-off.

Light failure: A light shall be considered to be a failed when for any reason the average intensity determined using the specified angles of beam elevation, at least in spread falls below 50% of the specified average intensity of a new light.

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

Luminance area: That part of an approach area to be used for take-off, landing and taxing of aircraft, excluding apron.

Mark: An object displayed above ground level in order to indicate or define a boundary.

Marking: Symbol or group of symbols displayed on the surface of the movement area in order to convey essential information.

Signpost: A sign post, all of which are intended to be used for the take-off, landing and taxing of aircraft, consisting of the marking area and the approach.

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

Non-intersecting runways. A runway intended for the operation of aircraft visual approach procedures.

Obstacle: 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.

Obstacle free zone (OFZ). The area above the joint approach surface, inner transition surfaces, and balked landing surfaces and that portion of the strip bounded by these surfaces, which is not penetrated by any fixed obstacle other than permanent or frequently mounted one required for air navigation purposes.

Pavement classification number (PCN). A number expressing the bearing strength of a pavement for unrestricted operations.

Precision approach runway, see Instrument approach runway.

Primary runway. Runways used in preference to others whenever conditions permit.

Runway: A defined rectangular area on a land aeronautical airport for the landing and take-off of aircraft.

Runway and safety area (RAS). An area symmetrical about the extended runway centre line and adjacent to the end of the strip primarily intended to reduce the risk of damage to an aircraft, understanding of removing the runway.

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

a) to reduce the risk of damage to aircraft running off a runway;

b) to protect aircraft flying over it during take-off or landing operations.

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

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

Sideline: An area adjacent to the edge of a Reveille as provided in order to provide a transition between the pavement and the adjacent surface.

15/11/80
Taxiway interaction. A portion of two or more taxiways.

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

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

Tarmac. The portion of a runway, beyond the threshold, where it is intended landing aircraft must contact the runway.

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

- Cross-wind component across the surface wind component of right angle to the runway center line.

1.2 Applicability

1.2.1 The interpretation of terms of the specifications in the Annex is based upon the condition in which it is anticipated that the aircraft may be operated and the regulations of the specific airport. The specifications of the ANNEX are subject to change without prior notice.

1.3 Reference

1.3.1 Wherein a reference is not found in this Annex, the specifications for that colour given in Appendix 1 shall apply.
11.3.2 The aerodrome reference code numbers and letters shall have the meanings assigned to them in Table 1-1.

11.3.3 The code number for element 0 shall be determined from Table 1-4, column 1, selecting the code number corresponding to the highest value of the aerodrome reference field lengths of the aerodrome for which the runway is intended.

Note.—The determination of the aerodrome reference field length is likely for the selection of a code number and is not intended to influence the actual runway lengths provided.

11.3.4 The code letter for element 2 shall be determined from Table 1-1, column 3, by selecting the code letter which corresponds to the greatest wing span, or the greatest mass of the aeroplane for which the facility is intended.

Note.—Guidance to assist the appropriate authority in describing the aerodrome reference code is given in the Aerodrome Design Manual, Part 1 and 2.

### Table 1-1: Aerodrome reference code

<table>
<thead>
<tr>
<th>Code element 0</th>
<th>Code element 1</th>
<th>Code element 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code number</td>
<td>Aerodrome reference field length</td>
<td>Wing span</td>
</tr>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>1</td>
<td>Less than 400 m</td>
<td>A</td>
</tr>
<tr>
<td>2</td>
<td>600 m up to but not including 1200 m</td>
<td>B</td>
</tr>
<tr>
<td>3</td>
<td>1200 m up to but not including 12000 m</td>
<td>C</td>
</tr>
<tr>
<td>4</td>
<td>12000 m and over</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E</td>
</tr>
</tbody>
</table>

*Nothing between the white space of the main text which.*

![Image](https://via.placeholder.com/150)
CHAPTER 2. AIRFIELD DATA

2.1 Airfield reference point

2.1.1 An airfield reference point shall be established for an airfield.

2.1.2 The airfield reference point shall be located near the initial or planned geometric course of the airfield and shall normally remain where first established.

2.1.3 The position of the airfield reference point shall be measured and given to the nearest second of latitude and longitude.

2.2 Airfield and runway elevations

2.2.1 The airfield elevation shall be measured and given to the nearest meter or foot.

2.2.2 For an airfield used by international civil aviation, the elevation of each threshold, the elevation of the runway end and any significant high or low intermediate point along the runway, and the highest elevation of the touchdown zone of a runway approach runway shall be given to the nearest meter or foot.

2.3 Airfield reference temperature

2.3.1 An airfield reference temperature shall be determined for an airfield in degrees Celsius.

2.3.2 Recommendation. The airfield reference temperature should be the monthly mean of the daily maximum air temperature for the budget period of the year, that being that which has the highest monthly mean temperature. This temperature should be averaged over a period of years.

15/11/90

6

2.4.4 "Airfield dimensions and related information"

2.4.4 The following data shall be measured or described as appropriate, for each facility provided on an airfield:

a) runway — true baseline, designation number, length, width, displaced threshold location, slope, surface type, type of runway and, for a precision approach runway category I, the existence of an obstacle free zone when provided.

b) strip — runway end safety area, length, width, surface type.

c) taxiway — designation, width, surface type;

d) apron — surface type, aircraft stands;

e) the boundaries of the air traffic control service;

f) clearway — length, ground profile;

g) significant obstacles on and in the vicinity of the airfield — location, top elevation to the nearest (next higher) meter or foot, type;

h) visual aids for approach procedures, marking and lighting of runways, taxiways and aprons, other visual guidance and control aids on runways and aprons, including top-holding positions and stopbars, and location and type of visual docking guidance systems;

i) location and radio frequency of any VOR airfield check point; and

j) location and designation of standard U.S. routes.

2.4.2 The geographical coordinates of each threshold shall be measured and given to the nearest second.

2.4.3 The geographical coordinates of each threshold shall be measured and given to the nearest second of a minute.

Note: This information may be shown in the form of charts such as those required for the preparation of aerodrome publications as specified in Annexes 1 and 15.

2.5 Strength of pavements

2.5.1 The bearing strength of a pavement shall be determined.

ANNEX II — VOLUME
2.5.2 The bearing strength of a pavement intended for loads of given (ramp) mass greater than 3,000 kg shall be determined in accordance with the standard classification number (ACN-PCN) method by selecting one of the following:

a) the pavement classification number (PCN);
b) pavement type for ACN-PCN determination;
c) subgrade strength category;
d) maximum allowable tire pressure category and maximum allowable tire pressure, and

2.5.3 The pavement classification number (PCN) assigned shall 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 design pressure, or aircraft takeoff mass for specified aircraft speed.

Note—different PCNs may be required if the strength of the pavement is subject to significant seasonal variation.

2.5.4 The ACN of an aircraft shall be determined in accordance with the standard procedures specified in the ACN-PCN method.

2.5.5 The maximum allowable tire pressure category and maximum allowable tire pressure shall be determined in accordance with the procedures specified in Part 3.1 of the Aerodrome Design Manual. Part 3.1 contains several aircraft types currently in use, but not evaluated on rigid and flexible pavements found on the four subgrade categories in 2.5.6 below and the results obtained in said manual.

2.5.6 For the purposes of determining the ACN, the load of a pavement shall be classified as equivalent to a rigid or flexible pavement category.

2.5.7 Information on pavement type for ACN-PCN determination, subgrade strength category, maximum allowable tire pressure category and evaluation method shall be selected from the following code:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>High strength characterized by $K = 150 \text{ MN/m}^2$ and representing all aircraft with $K$ values above 15, or for flexible pavements.</td>
</tr>
<tr>
<td>B</td>
<td>Medium strength characterized by $K = 100 \text{ MN/m}^2$ and representing a range of $K$ from 60 to 120, or for rigid pavements, and by $C_R = 10$ and representing a range in $C_R$ of 8 to 13 for flexible pavements.</td>
</tr>
<tr>
<td>C</td>
<td>Low strength characterized by $K = 40 \text{ MN/m}^2$ and representing a range of $K$ less than 15, or for rigid pavements, and by $C_R = 5$ and representing a range in $C_R$ of 4 to 8 for flexible pavements.</td>
</tr>
<tr>
<td>D</td>
<td>Ultra low strength characterized by $K = 25 \text{ MN/m}^2$ and representing all aircraft with $K$ values below 25, or for rigid pavements, and by $C_R = 3$ and representing all $C_R$ values below 4 for flexible pavements.</td>
</tr>
</tbody>
</table>

2.5.8 Evaluation method:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>W</td>
<td>High on pressure limit</td>
</tr>
<tr>
<td>X</td>
<td>Medium pressure limit of 1.36 MPa</td>
</tr>
<tr>
<td>Y</td>
<td>Low pressure limit of 1.00 MPa</td>
</tr>
<tr>
<td>Z</td>
<td>Very low pressure limit of 0.50 MPa</td>
</tr>
</tbody>
</table>

2.5.9 Technical evaluation; representing a specific study of the pavement characteristics and application of pavement behaviour technology.

2.5.10 Using aircraft experience; representing a knowledge of the specific type and was on aircraft satisfactorily being supported under normal use.

Note—The following examples illustrate how pavement strength data are reported under the ACN-PCN method.

Example 1: If the bearing strength of a rigid pavement, testing on a mobile strength subgrade, has been projected by technical evaluation in the PCN 80 and there is no pressure limitation, then the reported information would be:

PCN 80/R/B/W/T
Annex 14 — Aerodromes

Example 2.— If the bearing strength of a composite pavement, behaving like a flexible pavement and resting on a high strength subgrade, has been assessed by using site-test equipment to be PCN 50 and the maximum tire pressure allowable is 1.90 MPa, then the reported information should be:

PCN 50 / F / A / Y / U

Note — Composite construction.

Example 3.— If the bearing strength of a flexible pavement, resting on a medium strength subgrade, has been assessed by technical evaluation to be PCN 40 and the maximum allowable tire pressure is 1.80 MPa, then the reported information would be:

PCN 40 / F / B / 1.80 MPa / T

Example 4.— If its pavement is subject to a 167-400 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 167-400 all-up mass limitation of 390,000 kg.

2.5.7 Recommendation — Criteria should be established to regulate the use of a pavement by an aircraft with an ACN higher than the PCN reported for that pavement, in accordance with 2.5.2 and 2.5.3.

Note — Annex A, Section 19 pertains to a simple method for evaluating uncontrolled operations while the Aerodrome Design Manual, Part 3 includes the descriptions of more detailed procedures for evaluation of pavements and their suitability for restricted uncontrolled operations.

2.5.8 The bearing strength of a pavement intended for aircraft of type (t) mass equal to or less than 5,500 kg shall be made available by reporting the following information:

a) maximum allowable aircraft mass
b) maximum allowable tire pressure

Example: 4,400 kg / 0.50 MPa

2.6 Pre-flight attention check location

2.6.1 One or more pre-flight attention check location shall be established for an aerodrome.

2.6.2 Recommendation — A pre-flight check location shall be located on an apron.

Note 1.— Locating a pre-flight attention check location on an apron enables an attention check to be made prior to obtaining taxi clearance and eliminates the need for stopping for that purpose after leaving the apron.

Note 2.— Normally an entire apron can serve as a satisfactory attention check location.

2.6.3 The elevation of a pre-flight attention check location shall be given as the average elevation, rounded to the nearest metre of foot, of the area on which it is located. The elevation of any portion of a pre-flight attention check location shall be within 3 m (10 ft) of the average elevation for that location.

2.7 Desired distance

The following distances shall be calculated for a runway intended for use by institutional commercial air transport:

a) take-off run available;

b) take-off distance available;

c) accelerate-stop distance available; and

2) braking distance available.

Note — Guidance on calculation of desired distances is given in Annex A, Section 3.

2.8 Condition of the movement area and other related facilities

2.8.1 Information on the condition of the movement area and the operational status of related facilities shall be provided to the appropriate aerodromic information service units; and similar information of operational significance to the air traffic service units, to enable them to provide the necessary information to arriving and departing aircraft. This information shall be kept up to date and changes in conditions reported without delay.

2.8.2 The condition of the movement area and the operational status of related facilities shall be monitored and reported on matters of operational significance or affecting aircraft performance given, particularly in respect of the following:

a) construction or maintenance work;

b) rough or broken surfaces on a runway, a taxiway or an apron;

c) snow, slush or ice on a runway, a taxiway or an apron;

d) water on a runway, a taxiway or an apron;

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friction characteristics made available when these additional measurements show that the runway is a portion thereof has become slippery.

Snow, mud or ice on a runway

2.8.2 Recommendation. — To facilitate compliance with 2.1 and 2.8.2 inspections of the maneuver area should be carried out each day at least once where the code number is 0 or 1 and at least twice where the code number is 2 or 3.


Water on a runway

2.8.4 Recommendation. — Whenever water is present on a runway, a description of the runway surface conditions on the surface half of the width of the runway, including the posted thickness of water depth, when applicable, should be made available using the following terms:

WAPE, the surface is smooth but there is no standing water.

WATER PATCHES, significant patches of standing water are visible.

FLUKEED, extensive standing water is visible.

2.8.5 Information that a runway or portion thereof may be slippery will not be made available.

2.8.6 Recommendation. — A runway or portion thereof should be determined as being slippery when the minimum specified in 2.3.4 shows that the runway surface friction characteristics as measured by a runway friction measuring device are below the minimum friction level specified by the State.

2.8.7 Recomendation. — Information on the minimum friction level specified by the State for reporting slippery runway conditions and the type of friction measuring device and those made available.

2.8.8 Recommendation. — When it is suspected that a runway may become slippery under unusual conditions, then additional measurements should be made when such condition occurs, and information on the runway surface

2.9 Disabled aircraft removal

Note. — See § 3 for information on disabled aircraft removal service.

2.9.3 Recommendation. — The telephone number(s) of the airport's coordinating between for the removal of an aircraft disabled on or adjacent to the maneuver area should be made available, on request, to aircraft operators.

2.9.4 Recommendation. — Information concerning the capability to remove an aircraft disabled on or adjacent to the maneuver area should be made available.

Note. — The capability to remove a disabled aircraft may be expected by use of the largest type of aircraft which the maneuver area equipped to rotate.
Aerodromes

2.10 Rescue and fire fighting

Note.—See 9.2 for information on rescue and fire fighting services.

2.10.1 Information concerning the level of protection provided in an aerodrome for aircraft rescue and fire fighting purposes shall be made available.

2.10.2 Recommendation.—The level of protection normally available at an aerodrome should be expressed in terms of the category of the service and fire fighting services as described in 8.2 in accordance with the types and amounts of extinguishing agents normally available at the aerodrome.

2.10.3 Significant changes in the level of protection normally available at an aerodrome for rescue and fire fighting shall be notified to the appropriate air traffic services units and other parties interested. The above units should also be informed if extinguishing equipment is available.

Note.—A significant change in the level of protection is considered to be a change in the category of the rescue and fire fighting services from the category normally available at the aerodrome, resulting from a change in availability of extinguishing agents, equipment and personnel to operate the equipment, etc.

2.11.4 Recommendation.—A significant change should be expressed in terms of the new category of the rescue and fire fighting service available at the aerodrome.

2.11 Visual approach slope indicator systems

The following information concerning a visual approach slope indicator system installation shall be made available:

a) associated runway designation number;

b) type of system according to 5.3.6.2. For AVASIS and 3-BAR AVASIS installation, the number of light units shall be given and additionally for an asymmetrical AVASIS view 3-BAR AVASIS installation, and for an AT-VASIS, PAPI or APAPI installation, the side of the runway on which the lights are installed, i.e. left or right, shall be given.

c) where the axis of the system is not parallel to the runway centre line, the angle of displacement and the direction of displacement, i.e. left or right shall be indicated:

d) nominal approach slope angle(s). For a VASIS an AVASIS this shall be angle \( A + D \) and for a 3-BAR VASIS or 3-BAR AVASIS this shall also include the angle \( F + C \) and \( 2.10.4 \). For a TV-VASIS or an AVTV-VASIS this shall be angle \( B + C \) and for a PAPI and an APAPI this shall be angle \( B + C \) and \( A + B \). Regardless as to whether the installation is or is not a TV-VASIS installation shall be angle \( B + C \) and \( A + B \), respectively as in figure 5-13 and figure 5-11.

e) minimum eye height(s) over the threshold of the 3-bar slope signal. If for a VASIS or an AVASIS this height shall be the top of the red signal from the downwind wing bar), that is, angle \( B \). For a 3-BAR VASIS, 3-BAR AVASIS this shall also include the height of the top of the red signal from the middle wing bar, that is angle \( D \). For a TV-VASIS or an AT-VASIS this shall be the lowest height at which only the wing bar(s) are visible, however, the additional height(s) at which the wing bar(s) plus one or two of the flight down light units come into view may also be reported if such information would be of benefit to aircraft using the approach. For a PAPI this shall be the setting angle of the third unit from the runway minus 2°, i.e. angle \( A \) minus 2°, and for an APAPI this shall be the setting angle of the unit further from the runway minus 2°, i.e. angle \( A \) minus 2°.

Note.—When computing \( A + D \) for slotted-type VASIS, 3-BAR VASIS or 3-BAR AVASIS, attention is drawn to the 1/8° difference between the angles as seen in figure 4-10 and the setting angle on the ground. See the guidelines material in the Aerodrome Design Manual—Part of Chapter Y.

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CHAPTER 3. PHYSICAL CHARACTERISTICS

3.1 INTRODUCTION

3.1.1 Scope and orientation of survey

Introduction Note.—Many factors affect the determina-
tion of the orientation, timing, and number of sur-
eys.

The principal factor is the stability factor, as determined
in the wind distribution, which is specified hereafter.

Another important factor is the timing of the survey to
avoid the provision of approaches confusing to the
approach surface configurations of Chapter 4. In attach-
ment A, Section 1, information is given concerning these
and the factors.

When a new instrument runway is being located, particular
attention should be given to areas over which airplanes will
be expected to fly when following instrument approach
and missed approach procedures, so as to ensure that obstacles
in the area or over other facilities will not result in the intersec-
tion of the approach for which the runway is intended.

3.1.2 Choice of wind components

Recommendation.—The number and orientation of
surveys an airfield should be such that the stability
factor of the wind model is not less than 50 per cent for the
airfield that the airfield is intended to serve.

3.1.3 Data to be used

Recommendation.—The selection of data to be used
for the calculation of the stability factor should be based on
reliable wind distribution statistics that extend over a long
period as possible preferably of not less than five years.
The observations should be made at least twice daily and
spaced at equal intervals of time.

Note.—These winds are mean winds, reference to the
next for some allowances for gusty conditions is made in
Attachment A, Section 1.

Location of threshold

3.1.4 Recommendation.—A threshold should normally
be located at the extremity of a runway unless operational
considerations justify the choice of another location.

Note.—Guidance on the selection of the threshold is given
in Attachment A, Section 10.

3.1.5 Recommendation.—When it is necessary to dis-
place a threshold, either permanently or temporarily, from its
normal location, account should be taken of the various
factors which may have a bearing on the location of the
threshold. When this displacement is due to an unavoidable
runway condition, a cleared and graded area of at least 55 m
in length should be available between the unavoidable area
and the displaced threshold. Additional distance should also
be provided to meet the requirements of the runway end safety
area as appropriate.

Note.—Guidance on factors which may be considered in
the determination of the location of a displaced threshold is
given in Attachment A, Section 19.

Actual length of runways

3.1.6 Preliminary survey

Recommendation.—Except as provided in 3.1.8, the
actual number larger to be provided for a primary runway

3.1.8 Variation of G

Table: Variation of G
Separation of parallel runways

1.1.3.1 Recommendation.— Where parallel runways are provided for simultaneous use under visual meteorological conditions only, the maximum distance between their center lines should be:

- 520 m where the higher code number is 3 or 4;
- 350 m where the higher code number is 2; and
- 120 m where the higher code number is 1.

1.1.3.2 Recommendation.— Where parallel runways are provided for simultaneous operations under instrument meteorological conditions, the minimum separation distance between their center lines should be:

- 1,250 m for independent parallel approach;
- 915 m for dependent parallel approaches;
- 760 m for independent parallel departures;
- 760 m for segregated parallel operations;

except that:

as for segregated operations the minimum separation distance:

1) may be decreased by 30 m for each 150 m that the arrival runway is staggered towards the arriving aircraft, to a minimum of 300 m for each 300 m or

2) should be increased by 30 m for each 150 m that the arrival runway is staggered away from the originating aircraft.

1.1.3.2.1 Note— The considerations of code numbers and distances for which values are specified have been developed for typical airplane characteristics.
Chapter 3

b) Joint separation distances that those specified above may be applied if, after aeronautical study it is not affect the safety of operations of aircraft.

Note. — Guidance on planning and conducting small- runways operations on parallel or adjacent airfields at night time is contained in Circular 27 — Aeronautical Operation on Parallel or Near-Parallel Instrument Runways (October).

Slopes to runways

3.1.12 Longitudinal slopes

Recommendation. — The slope caused by dividing the difference between the maximum and minimum elevation along the runway centre line by the runway length should not exceed:

— 1 per cent where the code number is 3 or 4; and
— 2 per cent where the code number is 1 or 2.

3.1.13 Recommendation. — Along one portion of a runway the longitudinal slope should:

— 1.25 per cent where the code number is 4; except that for the first and last quarter of the length of the runway the longitudinal slope should not exceed 0.5 per cent; and
— 1.5 per cent where the code number is 3, except that for the first and last quarter of the length of a precision approach runway category II or III the longitudinal slope should not exceed 0.5 per cent; and
— 2 per cent where the code number is 1 or 2.

1.1.14 Longitudinal slope changes

Recommendation. — Where slope changes cannot be avoided, a slope change between two consecutive slopes should not exceed:

— 1.5 per cent where the code number is 3 or 4; and
— 2 per cent where the code number is 1 or 2.

Note. — Guidance on slope changes before a runway is given in Attachment 4, Section 6.

3.1.15 Recommendation. — The transition from one slope to another should be accomplished by a curved surface with a rate of change not exceeding:

— 0.1 per cent per 30 m (minimum radius of curvature of 15 000 m) where the code number is 3; and
— 0.2 per cent per 30 m (minimum radius of curvature of 15 000 m) where the code number is 1 or 2.

3.1.16 Sides distance

Recommendation. — Where slope changes cannot be avoided, they should be such that there will be an unobstructed line of sight from:

— any point 3 m above a runway to all other points 3 m above the runway within a distance of at least half the length of the runway where the code letter is C, D or E; and
— any point 2 m above a runway to all other points 2 m above the runway within a distance of at least half the length of the runway where the code letter is B; and
— any point 1.5 m above a runway to all other points 1.5 m above the runway within a distance of at least half the length of the runway where the code letter is A.

3.1.17 Distance between slope changes

Recommendation. — Undulations or appreciable changes in slopes located close together along a runway should be avoided. The distance between the points of intersection of two successive curves should not be less than:

(a) the sum of the algebraic numerical values of the corresponding slope changes multiplied by the appropriate value as follows:

— 20 000 m where the code number is 4;
— 13 000 m where the code number is 3; and
— 3 000 m where the code number is 1 or 2; or
(b) 45 m,

whichever is greater.

Note. — Guidance on implementing this specification is given in Attachment 4, Section 6.

3.1.18 Transverse slopes

Recommendation. — To promote the rapid drainage of water, the runway surface should, if practical, be cambered except where a single crested from high to low in the direction of the winds most frequently associated with rain would except rapid drainage. The transverse slope should ideally be.

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− 1.5 per cent where the code letter is C, D, or E; and
− 2 per cent where the code letter is A or B;
but in any event should not exceed 1.5 per cent or 2 per cent, as applicable, nor in less than 1 per cent except at runway or taxiway intersections where minor slopes may be necessary.

For a considered surface the transverse slope on each side of the centre line should be symmetrical.

Note.—On very runs large with cross wind conditions the problem of drainage from poor design is apt to be accentuated. In Attachment A, Section 7, information is given concerning this problem and other relevant factors.

3.1.19 Recommendation.—The transverse slope should be substantially the same throughout the length of a runway or except at an intersection with another runway or a taxiway where an even transition should be provided taking account of the need for adequate drainage.


3.2.0 Runway shoulders

3.2.10 Recommendation.—A runway should be capable of withstanding the traffic of aeroplanes the runway is intended to serve.

3.2.11 The surface of a runway should be constructed without longitudinal or transverse grooves which would tend to lose in friction, or otherwise adversely affect the take-off or landing of an aeroplane by causing excessive braking, skidding, vibration, or other difficulties in the course of an aeroplane.

Note.—Surface irregularities may adversely affect the take-off or landing of an aeroplane by causing excessive braking, skidding, vibration, or other difficulties in the course of an aeroplane.

Note.—Guidance on design thicknesses and other information is given in Attachment A, Section 5. Additional guidance is included in the Aerodrome Design Manual, Part 1.

3.2.12 The surface of a general runway shall be so constructed as to provide good friction characteristics when the surface is wet.

3.2.13 Recommendation.—Improvements of the friction characteristics of young or resurfaced runway should be made with a continuous friction-improving device such as self-setting friction in order to ensure that the design objectives with respect to friction characteristics have been achieved.

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Note.—Guidance on friction characteristics of runway surfaces is given in Attachment A, Section 5. Additional guidance is included in the Aerodrome Design Manual, Part 2.

3.2.24 Recommendation.—The average surface test depth of a new surface should be not less than 0.0 mm.

Note 1.—This normally requires some form of special surface treatment.

Note 2.—Guidance on methods used to measure such texture is given in the Aerodrome Services Manual, Part 2.

3.2.25 Recommendation.—When the surface is grooved or scored, the grooves or scores should be either parallel to or perpendicular to the runway centre line or parallel to non-perpendicular transverse joints, where applicable.

Note.—Guidance on methods for improving the runway surface texture is given in the Aerodrome Design Manual, Part 3.
3.3 Runway strips

General

3.3.1 A runway and any associated apron shall be indicated by a strip.

Length of runway strips

3.3.2 Recommendation. - A strip should extend before the threshold and beyond the end of the runway or apron for a distance of at least:

- 60 m where the code number is 2, 3 or 4;
- 60 m where the code number is 1 and the runway is an instrument one, and
- 30 m where the code number is 1 and the runway is a non-instrument one.

Width of runway strips

3.3.3 A strip including a precision approach runway shall, where practicable, extend laterally to a distance of at least:

- 150 m where the code number is 3 or 4; and
- 75 m where the code number is 1 or 2;

at each side of the centre line of the runway and its extended centre line throughout the length of the strip.

3.4 Recommendation. - A strip including a non-precision approach runway should extend laterally to a distance of at least:

- 150 m where the code number is 3 or 4; and
- 75 m where the code number is 1 or 2;

at each side of the centre line of the runway and its extended centre line throughout the length of the strip.

3.5 Recommendation. - A strip including a non-instrument runway should extend on each side of the centre line of the runway and its extended centre line throughout the length of the strip, to a distance of at least:

- 75 m where the code number is 3 or 4;
- 40 m where the code number is 2; and
- 20 m where the code number is 1.

Objects on runway strips

Note. - See 8.6 for information regarding zing and construction of equipment and installations on runway strips.

3.6 Recommendation. - An object situated on a runway strip which may endanger aeroplanes should be regarded as an obstacle and should, as far as practicable, be removed.

3.7 No fixed object, other than visual aids required for the navigation purposes and satisfying the relevant feasibility requirement in Chapter 3, shall be permitted on a runway strip:

a) within 50 m of the runway centre line of a precision approach runway category 1, 11 or 111 where the code number is 3 or 4; or
b) within 45 m of the runway centre line of a precision approach runway category 1 where the code number is 1 or 2.

No mobile object shall be permitted on this part of the runway strip during the use of the runway for landing or take-off.

Grading of runway strips

3.8 Recommendation. - That portion of a strip of an instrument runway within a distance of at least:

- 75 m where the code number is 3 or 4; and
- 40 m where the code number is 1 or 2;

from the runway centre line of the runway and its extended centre line should provide a graded area for aeroplanes which the runway is intended to serve in the event of an aeroplane running off the runway.

Note. - Guidance on grading of a greater area of a strip including a precision approach runway where the code number is 3 or 4 is given in Attachment A, Section 6.

3.9 Recommendation. - That portion of a strip of a non-instrument runway within a distance of at least:

- 24 m where the code number is 3 or 4;
- 12 m where the code number is 2; and
- 6 m where the code number is 1.

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— 30 m where the code number is 1;

from the centerline of the runway and its extended center line should provide a graded area for aeroplanes which the runway is intended to serve in the event of an aeroplane running off the runway.

3.3.10 The surface of the portion of a strip that forms a runway, threshold or taxiway shall be flush with the surface of the runway, shoulder or apron.

3.3.11 Recommendation.— That portion of a strip to at least 30 m before a threshold should be paved against blast position in order to protect a landing aeroplane from the danger of an uncontrolled slip.

Slopes on runway strips

3.3.12 Longitudinal slopes

Recommendation.— A longitudinal slope along that portion of a strip to be graded should not exceed:

— 1.5 per cent when the code number is 4;
— 1.75 per cent where the code number is 3; and
— 2 per cent when the code number is 1 or 2.

3.3.13 Longitudinal slope changes

Recommendation.— Slope changes on that portion of a strip to be graded should be as gradual as practicable and abrupt changes or sudden reversals of slopes avoided.

3.3.14 Recommendation.— Slope changes before the threshold of a precision approach runway should be avoided or kept to a minimum on that portion of the strip within a distance of at least 30 m on each side of the extended center line of the runway. Where slope changes cannot be avoided on this portion, the rate of change between two consecutive slopes should not exceed 2 per cent per 30 m.

Note.— Guidance on slope changes before the threshold is given in Annex 1, Section 2.

3.3.15 Transverse slopes

Recommendation.— Transverse slopes on that portion of a strip to be graded should be adequate to prevent the accumulation of water on the surface but should not exceed:

— 2.5 per cent where the code number is 3 or 4; and
— 3 per cent where the code number is 1 or 2.

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except that to facilitate drainage the slope for the first 3 m on mud from the runway, shoulder or apron edge should be negative as measured in the direction away from the runway and may be as great as 5 per cent.

3.3.15 Recommendation.— The transverse slopes of a portion of a strip beyond that to be graded should not exceed an upward slope of 5 per cent as measured in the direction away from the runway.

Strength of runway strips

3.3.17 Recommendation.— That portion of a strip of a instrument runway within a distance of 41 m:

— 35 m where the code number is 3 or 4; and
— 40 m where the code number is 1 or 2;

from the center line of the runway and its extended center line should be so prepared or constructed as to minimize hazard arising from differences in load bearing capacity so aeroplanes which the runway is intended to serve in the event of an aeroplane running off the runway.

3.3.18 Recommendation.— That portion of a 35 containing a non-instrument runway within a distance of 35 m:

— 75 m where the code number is 3 or 4;
— 60 m where the code number is 2; and
— 50 m where the code number is 1;

from the centerline of the runway and its extended center line should be so prepared or constructed as to minimize hazard arising from differences in load bearing capacity so aeroplanes, which the runway is intended to serve in the event of an aeroplane running off the runway.

3.4 Runway and safety areas

General

3.4.1 Recommendation.— A runway and safety area shall be provided at each end of a runway strip where:

— the code number is 3 or 4; and
— the code number is 1 or 2 and the runway is a instrument one.

Note.— Guidance on runway and safety areas is given in Annex 1, Section 2.
of 3 per cent. Transitions between differing slopes should be as gradual as practicable.

Strength of runway end safety areas

3.1.9 Recommendation.—A runway end safety area should be so designed or constructed as to reduce the risk of damage to an aircraft underwinging or overrunning the runway and facilitate the movement of rescue and firefighting vehicles.

3.5 Clearways

Note.—The inclusion of detailed specifications for clearways in this section is not intended to imply that a clearway has to be provided. Amendment A, Section 2 provides information on the use of clearways.

Location of clearways

3.5.1 Recommendation.—The origin of a clearway should be at the end of the take-off run available.

Length of clearways

3.5.2 Recommendation.—The length of a clearway should not exceed half the length of the take-off run available.

Width of clearway

3.5.3 Recommendation.—A clearway should extend laterally to a distance of at least 23 m on each side of the extended centre line of the runway.

Shakes on clearway

3.5.4 Recommendation.—The ground in a clearway should not project above a plane having an upward slope of 1.25 per cent, the lower limit of this plane being a horizontal line which:

a) is perpendicular to the vertical plane containing the runway centre line; and

b) passes through a point located on the runway centre line at the end of the take-off run available.

Note.—Because of transverse or longitudinal slopes on a runway, shoulder or strip, in certain cases the lower limit of the clearway plane specified above may be below the corresponding elevation of the runway, shoulder or strip. It is not intended that these surfaces be graded to conform with the

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3.5.3 Recommendation.— Abrupt upward changes in slope should be avoided when the slope is the general in a runway is relatively small or when the movement is upward. In such situations, in that portion of the runway within a distance of 22.5 m on each side of the extended centerline, the slope, slope changes and the transition from runway to apron should generally conform with those of the runway with which the apron is associated except that gradient depressions such as ditches causing across the apron may be permitted.

Objects on clearways:

Note.— See 3.6 for information regarding using and construction of equipment and installations on clearways.

3.5.6 Recommendation.— An object located on a clearway which may endanger airplanes to the air should be regarded as an obstacle and should be removed.

3.6 Slope:

Note.— The issuance of detailed specifications for runways in this section is not intended to imply that a runway has to be straight. Attachment 3, Section 2 provides information on the use of runways.

Width of runways:

3.6.1 A runway shall have the same width in the runway with which it is associated.

Runway on clearways:

3.6.2 Recommendation.— Slopes and changes in slope on a runway, and the transition from a runway to a clearway, should comply with the specifications of 3.1.12 to 3.1.18 for the runway with which the clearway is associated except that:

a) the limitations in 3.1.13 of 0.8 per cent slope for the first and last quarter of the length of a runway need not be applied to the clearway; and

b) at the junction of the runway and clearway and along the clearway the maximum rate of slope change may be 0.1 per cent per 30 m (maximum radius of curvature of 10,000 m) for a runway where the code number is 3 or 4.

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3.6.3 Strength of runways:

3.6.3.1 Recommendation.— A runway should be prepared or constructed in such a way that in the event of an abnormal take-off, of supporting the aeroplane which the runway is intended to serve without inducing structural damages to the aeroplane.

Note.— Attachment 3, Section 2 gives guidelines relative to the support capability of a runway.

Surface of runways:

3.6.4 Recommendation.— The surface of a former runway should be so constructed as to provide a good coefficient of friction when the runway is wet.

3.6.5 Recommendation.— The friction characteristics of an upgraded runway should not be substantially less than that of the runway with which the runway is associated.

3.7 Taxways:

Note.— Unless otherwise indicated the requirements in this section are applicable to all types of taxways.

General:

3.7.1 Recommendation.— Taxways should be provided to permit safe and expeditious surface movement of airplanes.

Note.— Guidance on layout of taxways is given in the aerodrome Design Manual, Part 2.

3.7.2 Recommendation.— Different entrance and exit taxways for a runway should be provided to expedite the movement of aeroplanes to and from the runway and provision of rapid exit taxways considered when traffic volumes are high.

Note.— Where the end of a runway is not served by a taxiway, it may be necessary to provide additional maneuvering area at the end of the runway for the turning of aeroplanes. Such areas may also be used along the runway to reduce taxiing time and distance for some aeroplanes.

3.7.3 Recommendation.— The design of a taxiway should be such that, when the cockpit of the aeroplane for which the taxiway is intended remains over the taxiway centerline markings, the clearance distance between the outer main wheel of the aeroplane and the edge of the aerodrome taxiway should be not less than that given by the following equation:

Lampire 5
Hal 134
Vendôme
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3.3.2.1 Width at the centre line markings on the runway should be at least 30 ft.

Section 3.3.3.1

3.3.3.1(a) Width at the centre line markings on the runway should be at least 30 ft.

Table 3.3.3.1

<table>
<thead>
<tr>
<th>Code letter</th>
<th>Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>30 ft</td>
</tr>
<tr>
<td>B</td>
<td>10 ft</td>
</tr>
<tr>
<td>C</td>
<td>15 ft</td>
</tr>
</tbody>
</table>

Note: The width given in Table 3.3.3.1 is the nominal width of the runway at the centre line markings.

Table 3.3.3.1

<table>
<thead>
<tr>
<th>Code letter</th>
<th>Taxisway width</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>25 ft</td>
</tr>
<tr>
<td>B</td>
<td>10 ft</td>
</tr>
</tbody>
</table>

Note: The width given in Table 3.3.3.1 is the nominal width of the taxiway at the centre line markings.

Table 3.3.3.1

<table>
<thead>
<tr>
<th>Code letter</th>
<th>Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>30 ft</td>
</tr>
<tr>
<td>B</td>
<td>10 ft</td>
</tr>
<tr>
<td>C</td>
<td>15 ft</td>
</tr>
</tbody>
</table>

Note: The width given in Table 3.3.3.1 is the nominal width of the taxiway at the centre line markings.

Table 3.3.3.1

<table>
<thead>
<tr>
<th>Code letter</th>
<th>Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>25 ft</td>
</tr>
<tr>
<td>B</td>
<td>10 ft</td>
</tr>
</tbody>
</table>

Note: The width given in Table 3.3.3.1 is the nominal width of the taxiway at the centre line markings.

Table 3.3.3.1

<table>
<thead>
<tr>
<th>Code letter</th>
<th>Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>30 ft</td>
</tr>
<tr>
<td>B</td>
<td>10 ft</td>
</tr>
<tr>
<td>C</td>
<td>15 ft</td>
</tr>
</tbody>
</table>

Note: The width given in Table 3.3.3.1 is the nominal width of the taxiway at the centre line markings.
5.7.8 Longitudinal slope changes

Recommendation: Where slope changes on a taxiway cannot be avoided, the transition from one slope to another slope should be accomplished by a curved surface with a rate of change not exceeding:

- 1 per cent per 30 m (minimum radius of curvature of 3,000 m) where the code letter is C, D, or E, and
- 1 per cent per 25 m (minimum radius of curvature of 2,500 m) where the code letter is A or B.

5.7.10 Sight distance

Recommendation: Where a change in slope on a taxiway cannot be avoided, the change should be such that, from any point:

The figure shows an example of taxiway widening to achieve the required wheel clearances on taxiway curves (see 5.7.8). Information on taxiway dimensions is given in the Aerodrome Design Manual, Part 2.
### Strength of taxiways

#### 3.7.12 Recommendation

The strength of a taxiway should be at least equal to that of the runway it serves, due consideration being given to the fact that a taxiway will be subjected to a greater density of traffic and, as a result of slow moving and stationary operations, to higher stresses than the runway is served.

#### 3.7.13 Surface of taxiways

- The surface of a taxiway should not have irregularities that could cause damage to aircraft structures.

#### 3.7.14 Recommendation

The surface of a paved taxiway should be constructed so as to provide good friction characteristics when the taxiway is wet.

---

### Table 3.1: Taxiway minimum separation distances

<table>
<thead>
<tr>
<th>Taxiway type</th>
<th>Separation between taxiway centre line and runway centre line (metres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instrumented</td>
<td>Code number</td>
</tr>
<tr>
<td>U</td>
<td>1</td>
</tr>
<tr>
<td>A</td>
<td>12.5</td>
</tr>
<tr>
<td>B</td>
<td>-</td>
</tr>
<tr>
<td>C</td>
<td>16</td>
</tr>
<tr>
<td>D</td>
<td>-</td>
</tr>
<tr>
<td>E</td>
<td>-</td>
</tr>
</tbody>
</table>

**Note:** The separation distances shown in columns (2) to (5) represent auxiliary combinations of runway and taxiway. The basis for determination of these distances is given in the Aerodrome Design Manual, Part II.
Rapid exit taxiways

Note.—The following specifications detail requirements particular to rapid exit taxiways. See Figure 3-2. General requirements for taxiways that apply to this type of taxiway. Guidance on the provision, location and design of rapid exit taxiways is included in the Aerodrome Design Manual, Part 2.

3.7.13 Recommendation.—A rapid exit taxiway should be designed with a radius of turn-off curve of at least:
- 550 m where the code number is 3 or 4; and
- 275 m where the code number is 1 or 2;
- enable exit speeds under wet conditions of:
  - 91 km/h where the code number is 3 or 4; and
  - 65 km/h where the code number is 1 or 2.

Note.—The locations of rapid exit taxiways along a runway are based on several criteria described in the Aerodrome Design Manual, Part 2, in addition to different speed criteria.

3.7.15 Recommendation.—The radius of the fillet on the inside of the curve at a rapid exit taxiway should be sufficient to provide a widened taxiway turning in order to facilitate recognition of the runway and turn-off onto the runway.

3.7.17 Recommendation.—A rapid exit taxiway shall include a straight distance after the turn-off curve sufficient for an existing aircraft to come to a full stop clear of any other taxiing aircraft.

3.7.18 Recommendation.—The intersection angle of the rapid exit taxiway with the runway shall not be greater than 45° nor less than 25° and preferably should be 30°.

Taxiways on bridges

3.7.19 The width of that portion of a taxiway is capable of supporting aeroplanes, as measured perpendicular to the taxiway centreline, shall not be less than the width of the graded area of the strip provided for that taxiway unless a proven method of lateral restraint is provided. It shall not be hazardous for aeroplanes for which the taxiway is intended.

Note 1.—When a width less than the width of the graded area of the strip is provided, consideration will have to be given to access by rescue and fire fighting vehicles.

Figure 3-2. Rapid exit taxiway

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3.3.20 Recommendation.—A bridge should be constructed on a straight section of the roadway with a straight section on both ends of the bridge to facilitate the alignment of approach approaches adjoining the bridge.

3.3 Testway shoulders

Note.—Guidance on characteristics of testway shoulders and of testway pavement is given in the Roadside Design Manual, Part 2.

3.3.1 Recommendation.—Straight portions of a testway where the code letter is C, D or E should be provided with shoulders which extend transversely on each side of the testway to that the paved width of the testway and its shoulders on straight portions is not less than:

- 4 ft where the code letter is E;
- 5 ft where the code letter is C;
- 25 ft where the code letter is D.

On lazy curves and on portions at intersections where integrated pavements are provided, the shoulder width should be set less than that on the adjacent straight portions of the testway.

3.3.2 Recommendation.—When a testway is intersected or joined by stone-improved approaches, the surface of the testway shoulder should be so prepared as to resist erosion and the formation of the surface material by washout engines.

3.4 Testway signs

Note.—Guidance on characteristics of testway signs is given in the Roadside Design Manual, Part 2.

3.4.1 A testway, other than an aircraft round testway, should be included in a strip.

Width of testway

3.4.2 Recommendation.—A testway strip should extend transversely on each side of the centre line of the testway throughout the length of the testway to a front the distance from the centre line given in Table 3-1, column II.

Object on roadway strip

Note.—See 3.3 for information regarding signs and illumination of equipment and installations on roadway strips.

3.9.3 Recommendation.—The testway strip should provide an area clear of objects which may endanger testway aeroplanes.

Grading of testway strips

3.9.4 Recommendation.—The entire portion of a testway should provide a graded area to a distance from the centre line of the testway of at least:

- 11 m where the code letter is A;
- 12.5 m where the code letter is B or C;
- 19 m where the code letter is D; and
- 22 m where the code letter is E.

Slopes on testway strips

3.9.5 Recommendation.—The surface of the strip should be flat at the edge of the testway or shoulder, if provided, and the graded portion should not have an upward transverse slope exceeding:

- 2.5 per cent for strips of testways where the code letter is C, D or E, and
- 1 per cent for strips of testways where the code letter is A or B.

The upward slope being measured with reference to the transverse slope of the adjacent roadway surface and not the horizontal. The downward transverse slope should not exceed 2 per cent measured with reference to the horizontal.

3.9.6 Recommendation.—The transverse slope on any portion of a testway strip, should that to be proved should not exceed an upward slope of 6 per cent as measured in the direction away from the testway.

3.10 Holding bay and high-holding positions

General

3.10.1 Recommendation.—Holding bay should be provided when the traffic volume is high.

3.10.2 A test-keeping position or positions should be established at an intersection of a testway with a roadway.

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3.10.3 The distance between a holding bay or a taxi-holding position and the centre line of a runway shall be in accordance with Table 3.2 and, in the case of a precision approach runway, such that a holding aircraft will not interfere with the operation of radio aids.

3.10.4 Recommendation.—At elevations greater than 700 m (2300 ft) the distance of 30 m specified in Table 3.2 for a precision approach runway code number 4 should be increased as follows:

a) up to an elevation of 2 000 m (6 500 ft); 1 m for every 10 m (33 ft) in excess of 700 m (2300 ft);  
b) elevation in excess of 2 000 m (6 600 ft) and up to 4 000 m (13 200 ft); 1.5 m plus 1 m for every 100 m (330 ft) in excess of 2 000 m (6 600 ft); and  
c) elevation in excess of 4 000 m (13 200 ft) and up to 5 000 m (16 500 ft); 2 m plus 2 m for every 100 m (330 ft) in excess of 4 000 m (13 200 ft).

3.11 Apron

3.11.1 Recommendation.—Airports should be provided with a surface which will permit the safe and efficient handling of passengers, cargo and mail as well as the servicing of aircraft without interfering with the aerodrome traffic.

3.11.2 Recommendation.—The total apron area shall be adequate to permit expeditious handling of the aerodrome traffic at its maximum anticipated intensity.

Table 3.2. Minimum Distance from the runway centre line to a holding bay or taxi-holding position

<table>
<thead>
<tr>
<th>Type of runway</th>
<th>Code number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-precision approach</td>
<td>30 m</td>
</tr>
<tr>
<td>Precision approach category 1</td>
<td>40 m</td>
</tr>
<tr>
<td>Precision approach category 2</td>
<td>60 m</td>
</tr>
<tr>
<td>Take-off runway</td>
<td>30 m</td>
</tr>
</tbody>
</table>

5. If a holding bay or taxi-holding position is at a lower elevation compared to the threshold, the distance may be determined 5 m for every metre the bay or taxi-holding position is lower than the threshold, contingent upon not interfering with the terrain or obstructions.

6. This distance may be increased to avoid interference with taxiing aids for a precision approach runway.

Note 1.—The distance of 30 m for code number 3 or 4 is based on an aircraft with a tail height of 20 m, a distance from the nose to the highest part of the tail of 22.7 m and a nose height of 10 m holding at an angle of 45° up to a point in line with the centre line, being clear of the obstacles free zone and not accountable for the calculation of OCA/H.

Note 2.—The distance of 30 m for code number 2 is based on an aircraft with a tail height of 8 m, a distance from the nose to the highest part of the tail of 24.8 m and a nose height of 13 m holding at an angle of 45° up to a point in line with the centre line, being clear of the obstacles free zone.

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3.11.4 Recommendation.—Shoveling snow on an airport, whether done on an aircraft stand or elsewhere, should be sufficient to prevent accumulation of snow on the surface of the apron. The snow should be kept at least to drainage requirements.

3.11.5 Recommendation.—On an aircraft stand the maximum slope should not exceed 1 per cent.

3.11.6 Recommendation.—An aircraft stand shall provide the following minimum clearances between an aircraft, the stand and any adjacent building, aircraft on another stand, and other objects:

<table>
<thead>
<tr>
<th>Code Letter</th>
<th>Clearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>3 m</td>
</tr>
<tr>
<td>B</td>
<td>2 m</td>
</tr>
<tr>
<td>C</td>
<td>1.5 m</td>
</tr>
<tr>
<td>D</td>
<td>0.5 m</td>
</tr>
<tr>
<td>E</td>
<td>0.3 m</td>
</tr>
</tbody>
</table>

3.12 Isolated aircraft parking position

3.12.1 An isolated aircraft parking position shall be designed on the aerodrome control tower that be advised from an area or area suitable for the parking of an aircraft which is known or believed to be the subject of unlawful interference, or which the other reason shall be isolated from internal aircraft activities.

3.12.2 Recommendation.—The isolated aircraft parking position should be located at the maximum distance practicable and in any case not less than 100 m from other parking positions, buildings or public areas, etc. Care should be taken to ensure that the position can be located over underground utilities such as gas and aerial fuel lines, so as to ensure that the isolated aircraft can be isolated from any internal aircraft activities.


CHAPTER 4. OBSTACLE RESTRICTION AND REMOVAL

4.1.3 The slope of the conical surface shall be measured in a vertical plane perpendicular to the propirticy of the line horizontal surface.

4.1.4 Description — Inner horizontal surface. A surface located in a horizontal plane above an obtrusive or control

4.1.5 Characteristics. — The radius, or outer limits of the inner horizontal surface shall be measured from a reference point, or points established for such purpose.

Note. — The slope of the inner horizontal surface may be necessary to control. Guidance in determining the extent the inner horizontal surface is contained in the Airport Services Manual, Part 6.

4.1.6 The height of the inner horizontal surface shall be measured above an elevation datum established for such purpose.


Approach surface

4.1.7 Description — Approach surface. An inclined plane or combination of planes exceeding the threshold.

4.1.8 Characteristics. — The limits of the approach surface shall consist of:

(a) an inner edge of specified length, horizontal and perpendicular to the extended center line of the runway, and located at a specified distance before the threshold.

(b) two sides originating at the ends of the inner edge and diverging uniformly to a specified rate from the extended center line of the approach; and

(c) an outer edge parallel to the inner edge.

4.1.9 The elevation of the inner edge shall be equal to the elevation of the mid-point of the threshold.

4.1.10 The slope of the approach surface shall be measured in the vertical plane containing the center line of the runways.

ANNEX I — VOLUME —
See Figure 1-2 for inner transitional and minor landing obstacle limitation surfaces and Attachment 3 for a three-dimensional view.

Figure 1-1. Obstacle limitation surfaces

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Annex I — Aerodromes

Inner approach surface

4.1.11 Description — Inner approach surface. A rectangular portion of the approach surface immediately preceding the threshold.

4.1.12 Characteristics — The limits of the inner approach surface shall comprise:

a) an inner edge coincident with the location of the inner edge of the approach surface set of its own specified length;

b) two sides originating at the ends of the inner edge and extending parallel to the vertical plane containing the centre line of the runway; and

c) an outer edge parallel to the inner edge.

Transitional surface

4.1.13 Description — Transitional surface. A complete surface along the side of the strip and part of the side of the approach surface, that shows upwards and outwards to the inner horizontal surface.

Figure 4-2: Inner approach, inner transitional and balked landing obstacle limitation surfaces

15/11/90
### Approach Runways

#### Runway Classification

<table>
<thead>
<tr>
<th>Runway Classification</th>
<th>Category 1</th>
<th>Category 2</th>
<th>Category 3</th>
<th>Category 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Middle</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Long</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
</tr>
</tbody>
</table>

#### Approach

- **Type:**
  - Visual
  - Automatic
  - Instrument

- **Kept clear:**
  - Yes
  - No

- **Approach Lighting:**
  - Standard
  - Reduced

- **Approach Category:**
  - Category 1
  - Category 2
  - Category 3
  - Category 4

#### Approach Runways

<table>
<thead>
<tr>
<th>Category 1</th>
<th>Category 2</th>
<th>Category 3</th>
<th>Category 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
</tr>
</tbody>
</table>

#### Table 1: Dimensions and Descriptions of Various Runway Types

<table>
<thead>
<tr>
<th>Runway Category</th>
<th>Length (m)</th>
<th>Width (m)</th>
<th>Type of Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category 1</td>
<td>1500</td>
<td>45</td>
<td>Visual</td>
</tr>
<tr>
<td>Category 2</td>
<td>1800</td>
<td>60</td>
<td>Automatic</td>
</tr>
<tr>
<td>Category 3</td>
<td>2400</td>
<td>75</td>
<td>Instrument</td>
</tr>
<tr>
<td>Category 4</td>
<td>3000</td>
<td>90</td>
<td>Instrument</td>
</tr>
</tbody>
</table>

#### Notes:

- **Length:**
  - Minimum
  - Maximum

- **Width:**
  - Standard
  - Reduced

- **Type of Approach:**
  - Visual
  - Automatic
  - Instrument

- **Approach Category:**
  - Category 1
  - Category 2
  - Category 3
  - Category 4
Annex H — Obstructions

specified in Table 4-1, except in the case of the horizontal section of the approach surface (see 4.2.9).

4.2.9 The approach surface shall be horizontal beyond the point at which the 2.5 per cent slope intersects:

a) a horizontal plane 150 m above the threshold elevation; or
b) the horizontal plane passing through the top of any object that governs the obstacle clearance obstacle height (OCA/H);

whichever is the higher.

4.2.16 New objects or extensions of existing objects shall not be permitted above an approach surface within 300 m of the inner edge or above a transitional surface except when, in the opinion of the appropriate authority, the new object or extension would be shielded by an existing immovable object.

Note — Circumstances in which the shielding principle may reasonably be applied are described in the Airport Services Manual, Part 6.

4.2.11 Recommendation — New objects or extensions of existing objects should not be permitted above the approach surface beyond 300 m from the inner edge, the conical surface or inner transitional surface except when, in the opinion of the appropriate authority, the object would be shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aircrafts.

4.2.13 Recommendation — Existing objects above one of the surfaces required by a 2.7 should be, as far as practicable, be removed except when, in the opinion of the appropriate authority, the object is shielded by an existing immovable object or after aeronautical study it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aircrafts.

4.2.17 The approach surface shall be horizontal beyond the point at which the 2.5 per cent slope intersects:

a) a horizontal plane 150 m above the threshold elevation; or
b) the horizontal plane passing through the top of a object that governs the obstacle clearance obstacle height (OCA/H);

whichever is the higher.

4.2.18 Fixed objects shall not be permitted above an inner approach surface, the inner transitional surface of a bulking landing surface, except for firmly mounted objects which because of their function must be located on the site. Mobile objects shall not be permitted above these surfaces during the use of the runway for landing.

4.2.19 New objects or extensions of existing objects shall not be permitted above an approach surface or a transitional surface except when, in the opinion of the appropriate authority, the new object or extension would be shielded by an existing immovable object.

Precise approach runways

Note l — See 8.6 for information regarding sizing and construction of equipment and installations on operational areas.

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4.2.15 The following obstacle limitation surfaces shall be established for a precision approach runway category 1:

- conical surface;
- inner horizontal surface;
- approach surface; and
- transitional surfaces.

4.2.14 Recommendation — The following obstacle limitation surfaces should be established for a precision approach runway category 1:

- inner approach surface;
- inner transitional surfaces; and
- bulking landing surface.

4.2.13 The following obstacle limitation surfaces shall be established for a precision approach runway category 1:

- conical surface;
- inner horizontal surface;
- approach surface and inner approach surface;
- transitional surfaces;
- inner transitional surfaces; and
- bulking landing surface.

4.2.12 The heights and slopes of the surfaces shall be greater than, and their other dimensions not less than, the specified in Table 4-1, except in the case of the horizontal section of the approach surface (see 4.2.17).

Note — The slope of the approach surface shall be horizontal beyond the point at which the 2.5 per cent slope intersects:

a) a horizontal plane 150 m above the threshold elevation; or
b) the horizontal plane passing through the top of a object that governs the obstacle clearance obstacle height (OCA/H);

whichever is the higher.
Note — Circumstances in which the building principle, not reasonably be applied are described in the Airport Areas Manual, Part 6.

4.2.20 Recommendation — New objects or extensions of existing objects should not be permitted above the control surface and the inner horizontal surface except where, in the opinion of the appropriate authority, an object would be shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aircraft.

4.2.21 Recommendation — Existing objects above an approach surface, a transitional surface, the control surface and inner horizontal surface should as far as practicable be removed except where, in the opinion of the appropriate authority, an object is shielded by an existing immovable object or after aeronautical study it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aircraft.

Note — Because of transverse or horizontal slopes on a step, in certain cases the inner edge or portions of the inner edge of the approach surface may be below the corresponding slopes of the steps. It is not intended that the step be graded to conform with the inner edge of the approach surface, nor is it intended that terrain or objects which are above the approach surface beyond the end of the step, but below the level of the step, be removed unless it is considered they may endanger aircraft.

Take-off runways

4.2.22 The following obstacle limitation surface shall be established for a take-off runway:

— take-off climb.

4.2.23 The dimensions of the surface shall be not less than the dimensions specified in Table 4.2, except that a lesser length may be adopted for the take-off climb surface where such lesser length would be consistent with procedural measures adopted to govern the onward flight of aircraft.

4.2.24 Recommendation — The operational characteristics of aeroplanes for which the runway is intended should be examined to see if it is desirable to reduce the slope specified in Table 4.2 when critical operating conditions are to be considered. If the specified slope is reduced, corresponding adjustment in the length of take-off climb surface should be made so as to provide provocation to a height of 300 m.

Table 4.2 — Dimensions and slope of obstacle limitation surfaces

<table>
<thead>
<tr>
<th>TAKE-OFF RUNWAYS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface and dimensions</td>
</tr>
<tr>
<td>(1)</td>
</tr>
<tr>
<td>TAKE-OFF CLIMB</td>
</tr>
<tr>
<td>Length of outer edge</td>
</tr>
<tr>
<td>Distance from runway ends</td>
</tr>
<tr>
<td>Divergence (each side)</td>
</tr>
<tr>
<td>Final width</td>
</tr>
<tr>
<td>Length</td>
</tr>
<tr>
<td>Slope</td>
</tr>
</tbody>
</table>

a. All dimensions as measured horizontally unless specified otherwise.
b. The take-off climb surface shall be such that the pilot is not required to see the airplane before the airplane is at the required height for the commercial flight.
c. If the obstacle to be considered has engaged height greater than 15° for aircrafts of B747, VOR by sight.

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4.3.25 New objects or extensions of existing objects shall not be permitted above a take-off climb surface except when, in the opinion of the appropriate authority, the new object or extension would be shielded by an existing immovable object.

Note.—Circumstances in which the shielding principle may reasonably be violated are described in the Airports Service Manual, Part 6.

4.3.26 Recommendations.—If an object reaches the 2 percent (5.0%) wake-off climb surface, new objects should be located to preserve the existing obstacle free surface or a surface down to a slope of 5° (5.25%).

4.3.27 Recommendations.—Existing objects that extend above a take-off climb surface should be retained except when, in the opinion of the appropriate authority, an object is shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety or significantly affect the regularity of operation of aeroplanes.

Note.—Because of reverse slopes on a strip or clearance, in certain cases portions of the under edge of the take-off climb surface may be below the corresponding elevation of the strip or clearance. It is not intended that the strip or clearance be graded to conform with the inner edge of the take-off climb surface, nor is it intended that terrain or objects which are above the take-off climb surface beyond the end of the strip or clearance, but below the level of the strip, at clearance, be removed unless it is considered they may endanger aeroplanes. Similar considerations apply as the function of a departure and strip where differences in reverse slopes exist.

4.4 Other objects

4.4.1 Recommendation.—As a general rule, any object which intrudes through the approach surface but which would not otherwise adversely affect the operation of the airport, should be removed or so arranged as to be as practicable.

4.4.2 Recommendation.—Any object which intrudes into the area of the appropriate authority after being considered by an aeronautical study on the approach and departure surfaces, should be removed or so arranged as to be as practicable.

Note.—In certain circumstances, objects that intrude above any of the surfaces enumerated in 4.3 may constitute a hazard to aeroplanes, for example, where there was or more isolated objects in the vicinity of an aerodrome.
Keterangan:

⚠️ = titik-titik pengambilan sampel tanah untuk keperluan uji CBR
<table>
<thead>
<tr>
<th>No cawan timbang</th>
<th>4</th>
<th>36</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berat cawan + tanah (W) gram</td>
<td>64,31</td>
<td>66,25</td>
</tr>
<tr>
<td>Berat cawan (Wc) gram</td>
<td>22,87</td>
<td>22,27</td>
</tr>
<tr>
<td>Berat tanah (Wt) gram</td>
<td>41,44</td>
<td>44,05</td>
</tr>
<tr>
<td>Berat air (Wt-Wc) gram</td>
<td>1,53</td>
<td>1,53</td>
</tr>
<tr>
<td>Kadar air (W/Wt)x100%</td>
<td>3,477</td>
<td>3,647</td>
</tr>
<tr>
<td>Kadar air (W/Wt)x100%</td>
<td>3,477</td>
<td>3,647</td>
</tr>
</tbody>
</table>

Mengetahui:
(Sumiyani Gunawan, ST, MT.)
Kepala Lab. Mekanika Tanah
Hasil Pemeriksaan Berat Jenis Tanah

<table>
<thead>
<tr>
<th>No</th>
<th>_SK</th>
<th>lb</th>
<th>Ib</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nο piconometer</td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>2</td>
<td>Berat piconometer + tanah basah</td>
<td>22,48</td>
<td>22,50</td>
</tr>
<tr>
<td>3</td>
<td>Berat piconometer + tanah kering</td>
<td>40,57</td>
<td>40,16</td>
</tr>
<tr>
<td>4</td>
<td>Berat piconometer + tanah basah</td>
<td>63,04</td>
<td>63,10</td>
</tr>
<tr>
<td>5</td>
<td>Berat piconometer + air</td>
<td>73,42</td>
<td>72,86</td>
</tr>
<tr>
<td>6</td>
<td>Temperatur</td>
<td>21,5</td>
<td>21,5</td>
</tr>
<tr>
<td>7</td>
<td>A=W2-W1 gram</td>
<td>18,12</td>
<td>16,36</td>
</tr>
<tr>
<td>8</td>
<td>B=W3-W1 gram</td>
<td>10,72</td>
<td>10,74</td>
</tr>
<tr>
<td>9</td>
<td>C=A-B gram</td>
<td>7,42</td>
<td>6,22</td>
</tr>
<tr>
<td>10</td>
<td>Rata-rata harga G1</td>
<td>2,536</td>
<td></td>
</tr>
</tbody>
</table>

Mengetahui,

(Sumiyati Guna) S.T., M.T.
Kepala Lab. Mekanika Tanah
Pemeriksaan distribusi ukuran butir (Untuk tanah berdiameter < 2mm)

1. Berat total tanah basah/embah yang akan diperiksa: \(B_0 = 50\) gram
2. Kadar air tanah basah/embah \(W = 3,558\%\)
3. Berat total contoh tanah kering oven yang diperiksa: \(W = \frac{B_c}{1 + \frac{W}{B_c}} = 48.278\)
4. Berat total contoh tanah kering oven < 0.075 \(B_{0.075} = 42.278\)
5. Berat tanah berdiameter < 0.075 \(B_2 = 5.9\)

<table>
<thead>
<tr>
<th>No.</th>
<th>Cawan tanah</th>
<th>Cawan kering</th>
<th>W0 gram</th>
<th>W1 gram</th>
<th>W2 gram</th>
<th>W3 gram</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>36</td>
<td>64,31</td>
<td>66,25</td>
<td>63,75</td>
<td>63,75</td>
</tr>
</tbody>
</table>

Kadar air: \(\frac{W_2 - W_1}{W_2} \times 100\%\)

Kadar air: 3,477.00% 3,647.00% 3,579.00%
Pemeriksaan distribusi ukuran butir
(Untuk tanah berdiometer < 2mm)

**ANALISA BANYAKAN BIFRASIK (GENEAL ANALYSIS)**

Berat benda uli yang diperlukan $B_o = 50$ gram

Berat benda usang oven $W = 50 - 98,278$

<table>
<thead>
<tr>
<th>No.</th>
<th>Berat (mg)</th>
<th>Volumen (mm$^3$)</th>
<th>Uji franklin (mm)</th>
<th>Volumen (mm$^3$)</th>
<th>Keterangan</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>0,075</td>
<td>b$_0$ = 2,9</td>
<td>c$_0$ = 39,628</td>
<td>82,083</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>0,250</td>
<td>b$_0$ = 0,54</td>
<td>c$_0$ = 46,698</td>
<td>96,727</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>0,850</td>
<td>b$_0$ = 0,26</td>
<td>c$_0$ = 47,798</td>
<td>99,006</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$\sum$ = 8,65</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Catatan: $c_0 = b_2 + b_3$
$c_1 = c_2 + b_1$
$c_4 = c_3 + b_3$
$c_4 = c_5 + b_1$
$c_4 = c_6 + b_3$
$c_4 = c_7 + b_1$

Lampiran 7
Hal 157
Dikerjakan: Rinanda Putri (9752)

Analisa Pengendapan/Hidrometer

<table>
<thead>
<tr>
<th>TGL</th>
<th>Jam</th>
<th>Waktu T (menit)</th>
<th>Pemberacaan hidrometer dlm cairan, R&lt;sub&gt;2&lt;/sub&gt;</th>
<th>Temperatur t °C</th>
<th>Pembacaan hidrometer terkoreksi meniskus, R&lt;sub&gt;2&lt;/sub&gt; - R&lt;sub&gt;1&lt;/sub&gt;</th>
<th>Kedalaman L&lt;sup&gt;2&lt;/sup&gt; (cm)</th>
<th>Konstan K&lt;sup&gt;**&lt;/sup&gt;</th>
<th>D&lt;sub&gt;b&lt;/sub&gt; (mm)</th>
<th>Pembacaan hidrometer terkoreksi R&lt;sub&gt;1&lt;/sub&gt; + R&lt;sub&gt;2&lt;/sub&gt;</th>
<th>Persen berat lebih kecil, p&lt;sup&gt;**&lt;/sup&gt; (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>030205</td>
<td>16.10</td>
<td>2</td>
<td>13</td>
<td>-2</td>
<td>28° C</td>
<td>14</td>
<td>14</td>
<td>0.01288</td>
<td>0.0341</td>
<td>15</td>
</tr>
<tr>
<td>030205</td>
<td>16.15</td>
<td>5</td>
<td>10</td>
<td>-2</td>
<td>28° C</td>
<td>11</td>
<td>14.5</td>
<td>0.01288</td>
<td>0.0219</td>
<td>12</td>
</tr>
<tr>
<td>030205</td>
<td>16.45</td>
<td>30</td>
<td>9</td>
<td>-2</td>
<td>28° C</td>
<td>10</td>
<td>14.7</td>
<td>0.01288</td>
<td>0.009016</td>
<td>11</td>
</tr>
<tr>
<td>030205</td>
<td>17.45</td>
<td>60</td>
<td>5</td>
<td>-2</td>
<td>28° C</td>
<td>6</td>
<td>15.3</td>
<td>0.01288</td>
<td>0.006504</td>
<td>7</td>
</tr>
<tr>
<td>030205</td>
<td>20.05</td>
<td>250</td>
<td>4</td>
<td>-2</td>
<td>28° C</td>
<td>5</td>
<td>15.5</td>
<td>0.01288</td>
<td>0.003207</td>
<td>6</td>
</tr>
<tr>
<td>040205</td>
<td>20.05</td>
<td>1440</td>
<td>3</td>
<td>-2</td>
<td>28° C</td>
<td>4</td>
<td>15.6</td>
<td>0.01288</td>
<td>0.001306</td>
<td>5</td>
</tr>
</tbody>
</table>

Analisis berat total tanah kering oven yang diperiksa

\[ W = \frac{a}{x} \times 100 = \frac{48.278}{3} \times 100 = 2.1186 \]

Untuk hidrometer 152 H, 
\[ K = \frac{W}{D} \]

Persentase berat lebih kecil, p<sup>**</sup> (%) = 31.779

Berat total tanah kering oven yang diperiksa = 48.278 gram

\[ W = \frac{a}{x} \times 100 = 2.1186 \]
Grafik Pengujian Analisis Butiran

(Sunijadi, Cengawan, ST, MT)
Ketua Lab. Mekanika Tanah
<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Peredaran</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Jumlah pukulan</td>
<td>17 x</td>
<td>21 x</td>
<td>31 x</td>
<td>40 x</td>
</tr>
<tr>
<td>3</td>
<td>Sekeratan</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Berat cawan kering</td>
<td>W₀, gram</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Berat cawan + tanah kering</td>
<td>W₁, gram</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Berat tanah kering</td>
<td>A = (W₂ - W₁) gram</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Kadar air</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Kadar air rata-rata, w%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>20,66</td>
<td>19,7</td>
<td>23,8</td>
<td>22,45</td>
<td>20,26</td>
</tr>
<tr>
<td>5</td>
<td>39,7</td>
<td>32,98</td>
<td>51,97</td>
<td>57,79</td>
<td>21,19</td>
</tr>
<tr>
<td>6</td>
<td>66,34</td>
<td>64,95</td>
<td>65,77</td>
<td>57,94</td>
<td>58,44</td>
</tr>
<tr>
<td>7</td>
<td>28,96</td>
<td>28,93</td>
<td>25,41</td>
<td>26,01</td>
<td>18,88</td>
</tr>
<tr>
<td>8</td>
<td>45,68</td>
<td>45,25</td>
<td>45,03</td>
<td>42,77</td>
<td>38,18</td>
</tr>
<tr>
<td>9</td>
<td>63,32</td>
<td>63,38</td>
<td>57,1</td>
<td>63,15</td>
<td>51,37</td>
</tr>
<tr>
<td>10</td>
<td>63,6</td>
<td>60,275</td>
<td>54,185</td>
<td>50,725</td>
<td></td>
</tr>
</tbody>
</table>

**HASIL PEMERIKSAAN BATAS CAIR TANAH**

**DATA CAIR:** 17 x 31 x 40 x **DATA KERING:** 20,45 x 20,26 x 20,01 **INDEX:** 34,78
DIKERJAKAN: DINANDA PUTRI (9752)

Asal tanah: Tanah Merah, Papua
Tanggal: 27 Januari 2005
Jenis tanah: Tanah lepas (disturbed)

Grafik Pemeriksaan Batas cair

Mengetahui,

(Sandjajati Gunawan, ST, MT)
Kepala Lab. Mekanika Tanah
<table>
<thead>
<tr>
<th>No.</th>
<th>Cewek Kering</th>
<th>Cewek Basah</th>
<th>Cewek Kering Basah</th>
<th>Air</th>
<th>Kadar Air</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Batas plastis (PL) = 33,61 %
Batas Cair (LL) = 57,84 %

Index Plastisitas = PL - LL = 24,23 %
<table>
<thead>
<tr>
<th>No.</th>
<th>Berat silinder + tanah padat, gram</th>
<th>Berat silinder, gram</th>
<th>Berat tanah padat, A gram</th>
<th>Berat volume basah, $\gamma_s \frac{A}{V}$, gram/cm²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3361</td>
<td>1834</td>
<td>1527</td>
<td>1,656</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No. Cawan timbangan</th>
<th>Bs2</th>
<th>21</th>
<th>72</th>
<th>26</th>
<th>40</th>
<th>10</th>
<th>26</th>
<th>17</th>
<th>17a</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berat cawan kosong</td>
<td>Wc, gr</td>
<td>22,9</td>
<td>22,8</td>
<td>21,205</td>
<td>21,48</td>
<td>20,65</td>
<td>22,73</td>
<td>21,265</td>
<td>22,23</td>
<td>20,22</td>
</tr>
<tr>
<td>Berat cawan + tanah basah</td>
<td>W3, gr</td>
<td>82,53</td>
<td>79,305</td>
<td>88,61</td>
<td>73,46</td>
<td>76,88</td>
<td>77,52</td>
<td>73,76</td>
<td>77,26</td>
<td>68,16</td>
</tr>
<tr>
<td>Berat cawan + tanah kering</td>
<td>W2, gr</td>
<td>78,5</td>
<td>75,53</td>
<td>82,64</td>
<td>68,79</td>
<td>70,65</td>
<td>71,8</td>
<td>64,84</td>
<td>68,04</td>
<td>59,5</td>
</tr>
<tr>
<td>Bebat air</td>
<td>$A' = (W_2 - W_3)$</td>
<td>4,03</td>
<td>3,75</td>
<td>5,97</td>
<td>4,67</td>
<td>6,23</td>
<td>5,77</td>
<td>8,92</td>
<td>9,22</td>
<td>8,66</td>
</tr>
<tr>
<td>Berat tanah kering</td>
<td>$B = (W_3 - W_1)$</td>
<td>55,59</td>
<td>52,73</td>
<td>59,435</td>
<td>47,31</td>
<td>50</td>
<td>49,07</td>
<td>43,575</td>
<td>45,71</td>
<td>39,28</td>
</tr>
<tr>
<td>Kadar air</td>
<td>$w = \frac{A'}{B} \times 100%$</td>
<td>7,25</td>
<td>7,16</td>
<td>10,64</td>
<td>9,87</td>
<td>12,46</td>
<td>11,76</td>
<td>20,47</td>
<td>20,17</td>
<td>22,05</td>
</tr>
<tr>
<td>Kadar air rata-rata, w %</td>
<td>7,205</td>
<td>9,955</td>
<td>12,11</td>
<td>20,32</td>
<td>22,73</td>
<td>27,74</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Berat volume kering, $\gamma_k = \frac{\gamma_s}{1 + w}$</td>
<td>1,545</td>
<td>1,46</td>
<td>1,612</td>
<td>1,3575</td>
<td>1,27</td>
<td>1,467</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
DIKERJAKAN: RINANDA PUTRI (9752)
Aasal tanah: Tanah Merah, Papua
Tanggal: 31 Januari 2005
Jenis tanah: Tanah lepas (disturbed)

Grafik pemadatan

Mengetahui:
(Supriyadi Gunawan, ST, MT.)
Kepala Lab. Mekanika Tanah
DIKERJAKAN : RINANDA PUTRI (9752)

Asal tanah : Tanah Merah, Papun
Tanggal : 1 Februari 2005
Jenis tanah : Tanah lepas (disturbed)

### Tabel Pemeriksaan CBR

<table>
<thead>
<tr>
<th>No</th>
<th>Nama parameter</th>
<th>W_1 gram</th>
<th>W_2 gram</th>
<th>W_3 gram</th>
<th>W_r gram</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Berat cawan kosong</td>
<td>22,94</td>
<td>22,77</td>
<td>20,635</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Berat cawan + tanah kering</td>
<td>62,92</td>
<td>64,72</td>
<td>62,26</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Berat tanah kering</td>
<td>(W_3-W_1) gram</td>
<td>11,99</td>
<td>11,99</td>
<td>11,99</td>
</tr>
<tr>
<td>4</td>
<td>Kadar air asal</td>
<td></td>
<td></td>
<td></td>
<td>3,568 %</td>
</tr>
<tr>
<td>5</td>
<td>Kadar air rencana</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Kadar air rata-rata (w)</td>
<td></td>
<td></td>
<td></td>
<td>16,448 %</td>
</tr>
</tbody>
</table>

b. Kadar air rencana

<table>
<thead>
<tr>
<th>No</th>
<th>Nama parameter</th>
<th>W_1 gram</th>
<th>W_2 gram</th>
<th>W_3 gram</th>
<th>W_r gram</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Berat cawan kosong</td>
<td>20,62</td>
<td>22,765</td>
<td>22,98</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Berat cawan + tanah kering</td>
<td>59,49</td>
<td>58,15</td>
<td>55,17</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Berat tanah kering</td>
<td>(W_3-W_1) gram</td>
<td>38,78</td>
<td>35,385</td>
<td>32,185</td>
</tr>
<tr>
<td>4</td>
<td>Kadar air asal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Kadar air rencana</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Kadar air rata-rata (w)</td>
<td></td>
<td></td>
<td></td>
<td>16,448 %</td>
</tr>
</tbody>
</table>
Dikerjakan : Rinanda Putri (9752)

c. Banyaknya Air Yang Diserap

<table>
<thead>
<tr>
<th>No.</th>
<th>Keterangan</th>
<th>Nilai</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kadar air tanah (residua), w%</td>
<td>16.248</td>
</tr>
<tr>
<td>2</td>
<td>Berat sifad + tanah basah, gram</td>
<td>7923</td>
</tr>
<tr>
<td>3</td>
<td>Berat sifad, gram</td>
<td>4056</td>
</tr>
<tr>
<td>4</td>
<td>Berat tanah basah, W₁ gram</td>
<td>3837</td>
</tr>
<tr>
<td>5</td>
<td>1.419</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>$Y = \frac{W}{(W + w)}$ gram/cm³</td>
<td>1.419</td>
</tr>
<tr>
<td>7</td>
<td>Berat tanah kering (W₂ gram) = W₁ - W₀ gram</td>
<td>8722</td>
</tr>
<tr>
<td>Penetrasi</td>
<td>inchi</td>
<td>Pembacaan arloji</td>
</tr>
<tr>
<td>-----------</td>
<td>-------</td>
<td>------------------</td>
</tr>
<tr>
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<tr>
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<tr>
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<td>0,150</td>
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<td>5,08</td>
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<td>127,35</td>
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<td>127,35</td>
</tr>
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<td>140,95</td>
</tr>
<tr>
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<td>0,300</td>
<td>152,08</td>
</tr>
<tr>
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<td>0,325</td>
<td>160,74</td>
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<td>10,16</td>
<td>0,400</td>
<td>166,92</td>
</tr>
<tr>
<td>11,43</td>
<td>0,450</td>
<td>171,87</td>
</tr>
<tr>
<td>12,70</td>
<td>0,500</td>
<td>175,58</td>
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</table>

Keterangan: \( P_1 \) (kg) didapak dari "Tabel Konversi Pembacaan Arloji" pada pengujian penetrasi.
Kurva CBR Titik Satu

Kurva awal = 
Kurva koreksi = 
Penetras 0,2 = \( \frac{80,502}{1500} \times 100 = 5,37\% \)

Mengetahui,

(Sumiyati Suharwan, ST, MT)
Kepala Lab. Mekanika Tanah
<table>
<thead>
<tr>
<th>Pembacaan</th>
<th>Pr (kg)</th>
<th>P2 = 0.454 Pr (lbs)</th>
<th>( P = \frac{P_2}{3} ) (psi)</th>
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<tbody>
<tr>
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<td>12.00</td>
<td>31.0904</td>
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<td>0.175</td>
<td>35.19</td>
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<td>0.200</td>
<td>44.19</td>
<td>264.163</td>
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<tr>
<td>5.52</td>
<td>0.225</td>
<td>45.15</td>
<td>280.509</td>
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<td>52.53</td>
<td>294.1189</td>
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<td>0.300</td>
<td>58.45</td>
<td>321.3656</td>
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<tr>
<td>8.90</td>
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<td>64.55</td>
<td>343.2599</td>
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<td>0.400</td>
<td>70.50</td>
<td>362.2247</td>
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<tr>
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<td>0.450</td>
<td>76.45</td>
<td>375.853</td>
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<tr>
<td>11.43</td>
<td>0.500</td>
<td>82.30</td>
<td>375.853</td>
</tr>
<tr>
<td>12.70</td>
<td>0.500</td>
<td>82.30</td>
<td>384.0088</td>
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Keterangan: \( P_2 \) (kg) didapat dari "Tabel Konvesi Pembacaan Arloji" pada pengujian penetrasi.
Kurva awal = 
Kurva koreksi = 
Penetrasi 0,1 = \frac{592963}{1000} \approx 6 \%

Mengerahui,
(Sumiyati Gunawan, ST, MT)
Kepala Lab. Mekanika Tanah
Dikerjakan: RINANDA PUTRI (9752)

<table>
<thead>
<tr>
<th>Pembacaan arloji</th>
<th>texan</th>
<th>P₁ (kg)</th>
<th>P₂ = 0,454P₁ (lbg)</th>
<th>P = P₁/3</th>
<th>Dari grafik (psi)</th>
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<tr>
<td>1,27</td>
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<td>30</td>
<td>61,82</td>
<td>136,1674</td>
<td>45,38913</td>
</tr>
<tr>
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<td>40</td>
<td>90,26</td>
<td>198,8106</td>
<td>66,27029</td>
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<tr>
<td>3,81</td>
<td>0,150</td>
<td>50</td>
<td>111,23</td>
<td>245,6667</td>
<td>81,66667</td>
</tr>
<tr>
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<td>0,200</td>
<td>59</td>
<td>132,29</td>
<td>291,3877</td>
<td>97,12922</td>
</tr>
<tr>
<td>6,36</td>
<td>0,250</td>
<td>67</td>
<td>144,66</td>
<td>318,6344</td>
<td>106,2115</td>
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<tr>
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<td>75</td>
<td>155,79</td>
<td>343,1498</td>
<td>114,3833</td>
</tr>
<tr>
<td>8,90</td>
<td>0,350</td>
<td>82</td>
<td>165,68</td>
<td>364,9339</td>
<td>121,6446</td>
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<tr>
<td>10,16</td>
<td>0,400</td>
<td>90</td>
<td>173,13</td>
<td>381,2775</td>
<td>127,0925</td>
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<tr>
<td>11,43</td>
<td>0,450</td>
<td>97</td>
<td>180,55</td>
<td>392,1806</td>
<td>130,7269</td>
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</tbody>
</table>

Ketentuan: P₁ (kg) didapat dari "Tabel Konversi Pembacaan Arloji" pada pengujian penetrasi.
Kurva CBR Titik Tiga

Kurva awal = 
Kurva Koreksi = 
Penetrasi 0,2 = \frac{918259 \times 150}{1500} = 5,13\%

Mengarahui

(Sanjayat Gunawan, ST, MT)
Kepala Lab. Mekanika Tanah
## UNSUR DATA KLIMATOLOGI

| UNSUR             | JAN | FEB | MAR | APR | MEI | JUN | JUL | AGS | SEP | OKT | NOV | DES |
|-------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| CURAH HUJAN (MM)  | 309.8 | 111.2 | 146.9 | 321.2 | 247.7 | 42.0 | 12 | 3.8 | 2.4 | 165.9 | 91.2 | 244 |
| KELEMBABAN (%)    | 84  | 85  | 87  | 86  | 86  | 82  | 81  | 80  | 76  | 80  | 80  | 83  |
| SUDU UDARA (C)    | 27.0 | 27.2 | 27.0 | 27.2 | 26.5 | 25.3 | 24.5 | 25.0 | 25.0 | 26.2 | 28.4 | 28.0 |
| MAKS              | 30.9 | 30.6 | 31.1 | 31.2 | 30.4 | 28.2 | 28.3 | 29.2 | 31.5 | 31.7 | 32.4 | 32.2 |
| MIN               | 24.1 | 24.5 | 24.2 | 24.4 | 23.3 | 23.3 | 21.5 | 21.5 | 21.7 | 21.7 | 24.2 | 24.3 |
| LAMA PENYINARAN (HARI) | 133.9 | 885.5 | 148.4 | 133.0 | 155.0 | 111.7 | 136.8 | 160.0 | 217.5 | 160.0 | 195.0 | 133.9 |
| KEC. ANGIN (km/jam) | 9    | 10  | 10  | 9   | 11  | 13  | 13  | 20  | 20  | 18  | 9   | 10  |
| ARAH ANGIN        | W    | NW  | NW  | N   | SE  | SE  | SE  | SE  | SE  | SE  | NW  | N   |
| TEKANAN UDARA     | 10.4 | 10.8 | 9.7 | 8.6 | 9.7 | 10.8 | 10.0 | 10.3 | 8.7  | 6.0  | 5.7  | 9.5  |
### UNSUR DATA KLIIMATOLOGI

| BULAN   | JAN | FEB | MAR | APR | MEI | JUN | JUL | AOS | SEP | OKT | NOV | DES |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| CURAH HUJAN (MM) | 340.1 | 163.4 | 364.6 | 342.0 | 85.5 | 4.7 | 1.1 | 4.9 | 14.4 | 41.4 | 377.7 | 193.4 |
| KELEMBABAN(%) | 92.0 | 84.0 | 86.0 | 86.0 | 79.0 | 77.0 | 76.0 | 74.0 | 75.0 | 83.0 | 81.0 | 81.0 |
| SUHU UDARA | RATA | 27.3 | 27.0 | 27.4 | 27.1 | 26.3 | 26.0 | 25.1 | 25.9 | 26.6 | 27.4 | 27.5 | 27.6 |
| MIN | 21.1 | 24.7 | 24.3 | 24.4 | 23.0 | 23.0 | 21.6 | 21.7 | 23.6 | 23.4 | 23.4 | 23.4 |
| LAMA YENYINAN MAHARANI (JAM) | 137.2 | 64.9 | 170.0 | 120.5 | 200.0 | 129.0 | 163.0 | 254.5 | 210.6 | 248.0 | 97.0 |
| KEC. ANGIN (knot) | 8 | 15 | 8 | 15 | 7 | 5 | 12 | 13 | 16 | 9 | 12 |
| ARAH ANGIN | E | E | E | SE | SE | SE | SE | SE | SE | NW |
| PERANGAN UDARA | 06.7 | 04.5 | 14.5 | 07.6 | 25.0 | 69.1 | 71.1 | 10.9 | 99.9 | 68.6 | 01.1 | 07.7 |
### UNSUR DATA KLIMATOLOGI

<table>
<thead>
<tr>
<th>BULAN</th>
<th>JAN</th>
<th>FEB</th>
<th>MAR</th>
<th>APR</th>
<th>MEI</th>
<th>JUN</th>
<th>JUL</th>
<th>AGS</th>
<th>SEP</th>
<th>OKT</th>
<th>NOV</th>
<th>DES</th>
</tr>
</thead>
<tbody>
<tr>
<td>CURAH HUJAN (mm)</td>
<td>205.2</td>
<td>323.9</td>
<td>241.5</td>
<td>246.6</td>
<td>19.9</td>
<td>48.8</td>
<td>10.2</td>
<td>5.1</td>
<td>77.1</td>
<td>1.8</td>
<td>41.1</td>
<td>117.9</td>
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<tr>
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<td>83</td>
<td>82</td>
<td>84</td>
<td>80</td>
<td>80</td>
<td>78</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>73</td>
<td>77</td>
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<tr>
<td>SUHU UDARA (°C)</td>
<td>27.8</td>
<td>27.3</td>
<td>27.3</td>
<td>27.1</td>
<td>26.6</td>
<td>26.2</td>
<td>25.0</td>
<td>25.0</td>
<td>25.7</td>
<td>26.7</td>
<td>28.1</td>
<td>28.4</td>
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<td>MAERS (°C)</td>
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<td>31.2</td>
<td>30.9</td>
<td>31.1</td>
<td>30.8</td>
<td>30.0</td>
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<td>31.1</td>
<td>31.7</td>
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<td>24.2</td>
<td>24.0</td>
<td>23.1</td>
<td>23.1</td>
<td>21.4</td>
<td>21.3</td>
<td>23.3</td>
<td>23.0</td>
<td>23.9</td>
<td>24.0</td>
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<tr>
<td>LAMA PENYINARAN MATAHARI (JAM)</td>
<td>186.9</td>
<td>91.4</td>
<td>172.0</td>
<td>164.2</td>
<td>192.0</td>
<td>126.0</td>
<td>167.6</td>
<td>218.8</td>
<td>231.0</td>
<td>274.0</td>
<td>249.0</td>
<td>202.5</td>
</tr>
<tr>
<td>KEC. ANGIN (knots)</td>
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<td>12</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>12</td>
<td>13</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>17</td>
<td>10</td>
</tr>
<tr>
<td>ARAH ANGIN</td>
<td>NW</td>
<td>N</td>
<td>W</td>
<td>SE</td>
<td>SE</td>
<td>SE</td>
<td>SE</td>
<td>SE</td>
<td>SE</td>
<td>SE</td>
<td>SE</td>
<td>S</td>
</tr>
<tr>
<td>TEKANAN UDARA</td>
<td>0.7</td>
<td>0.9</td>
<td>0.7</td>
<td>0.8</td>
<td>0.8</td>
<td>0.9</td>
<td>0.9</td>
<td>1.2</td>
<td>1.4</td>
<td>1.3</td>
<td>1.5</td>
<td>0.5</td>
</tr>
</tbody>
</table>

---

**Periode / Tahun:** 2002  
**Pada:** Stasiun Meteorologi Tanah Merah  
**Posisi:** 06°05’ LS / 140°19’ BT  
**Ketinggian:** ± 17 meter dpl.
# Unsuk Data Klimalogi

Periode / Tahun: 2003
Pada: Stasiun Meteorologi Tanah Merah
Posisi: 06°05' LS / 140°19’ BT
Ketinggian: ± 17 meter dppl.

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<th>BULAN</th>
<th>JAN</th>
<th>FEB</th>
<th>MAR</th>
<th>APR</th>
<th>MAY</th>
<th>JUN</th>
<th>JUL</th>
<th>AGS</th>
<th>SEP</th>
<th>OKT</th>
<th>NOV</th>
<th>DES</th>
</tr>
</thead>
<tbody>
<tr>
<td>CURAH HUJAN (MM)</td>
<td>169</td>
<td>466.6</td>
<td>443.7</td>
<td>81.8</td>
<td>67.5</td>
<td>16.7</td>
<td>35.8</td>
<td>11.5</td>
<td>9.7</td>
<td>47.2</td>
<td>33.3</td>
<td>209.7</td>
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<tr>
<td>KELEMBABAN (%)</td>
<td>83</td>
<td>82</td>
<td>82</td>
<td>81</td>
<td>79</td>
<td>80</td>
<td>80</td>
<td>76</td>
<td>75</td>
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<td>31.4</td>
<td>31.2</td>
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<td>32.5</td>
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<td>24.6</td>
<td>24.6</td>
<td>24.3</td>
<td>24.6</td>
<td>25.5</td>
<td>22.4</td>
<td>21.6</td>
<td>22.0</td>
<td>22.1</td>
<td>23.6</td>
<td>24.0</td>
</tr>
<tr>
<td>LAMA PENYINARAN MATAHARI (JAM)</td>
<td>137.6</td>
<td>95.6</td>
<td>131.8</td>
<td>189.1</td>
<td>193.0</td>
<td>205.4</td>
<td>129.1</td>
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<td>198.8</td>
<td>126.0</td>
<td>238.0</td>
<td>13.8</td>
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<td>10</td>
<td>9</td>
<td>11</td>
<td>12</td>
<td>14</td>
<td>8</td>
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<td>10</td>
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<td>17</td>
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<td>ARAH ANGIN</td>
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<td>SW</td>
<td>W</td>
<td>S</td>
<td>SE</td>
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<td>SE</td>
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<td>SE</td>
<td>SE</td>
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<td>TEKANAN UDARA</td>
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<td>07.4</td>
<td>08.2</td>
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<td>09.2</td>
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<td>09.0</td>
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<td>09.1</td>
<td>06.0</td>
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</table>

Stasiun Meteorologi Tanah Merah,
<p>| BULAN  | JAN | FEB | MAR | APR | Mei | JUN | JUL | AGS | SEP | OKT | NOV | DES |
|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| CURAH HUJAN (MM) | 294.6 | 245.9 | 304.5 | 86.12 | 271.9 | 13.1 | 22.8 | 44 | 180 | 131 | 98.4 | 104.8 |
| KELEMBABAN (%) | 82 | 84 | 84 | 80 | 82 | 78 | 76 | 75 | 75 | 70 | 80 | 80 |
| SUHU UDARA (°C) | 27.9 | 29.6 | 27.4 | 27.8 | 27.2 | 24.7 | 24.4 | 24.6 | 26.7 | 28.9 | 27.5 | 27.6 |
| MIN | 31.7 | 30.7 | 31.1 | 30.8 | 31.0 | 29.3 | 28.9 | 29.6 | 30.2 | 20.8 | 29.8 | 32.5 |
| 1 AMAL PENYINARAN MATAHARI (JAM) | 163.0 | 104.5 | 123.1 | 207.0 | 127.7 | 130.0 | 207.8 | 228.9 | 138.2 | 125.0 | 211.6 | 108.8 |
| BULAN | 7 | 12 | 12 | 8 | 5 | 7 | 6 | 6 | 7 | 19 |
| KEC. ANGIN (km/h) | NW | NW | W | E | SE | SE | SE | S | SE | SE | S |
| TEKANAN UDARA | 07.5 | 07.1 | 06.8 | 08.6 | 08.5 | 11.7 | 11.3 | 11.3 | 08.7 | 08.8 | 06.0 | 06.8 |</p>
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<thead>
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<th>No.</th>
<th>Spesifikasi Pesawat</th>
<th>Nilai</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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</tr>
<tr>
<td>2</td>
<td>Pay Load</td>
<td>1400 kg</td>
</tr>
<tr>
<td>3</td>
<td>Maximum Structural Take Off Weight</td>
<td>7450 kg</td>
</tr>
<tr>
<td>4</td>
<td>Maximum Structural Landing Weight</td>
<td>7350 kg</td>
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<tr>
<td>5</td>
<td>Kapasitas Angkut Penumpang Maksimum</td>
<td>18 seats</td>
</tr>
<tr>
<td>6</td>
<td>Jumlah Crew Pesawat</td>
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<tr>
<td>7</td>
<td>Kapasitas Angkut Bagasi Kabin</td>
<td>180 kg</td>
</tr>
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<td>8</td>
<td>Kapasitas Angkut Bagasi/Cargo</td>
<td>200 kg</td>
</tr>
<tr>
<td>9</td>
<td>Irrad Jelasah Maximum</td>
<td>600 NM/4 jam</td>
</tr>
<tr>
<td>10</td>
<td>Ketepatan Terbang Pesawat</td>
<td>Below 10,000 ft</td>
</tr>
<tr>
<td>11</td>
<td>Kecepatan Pesawat</td>
<td>650 km/h</td>
</tr>
<tr>
<td>12</td>
<td>Kecepatan BUM per mil</td>
<td>700 km/HRS</td>
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<tr>
<td>13</td>
<td>Kuatitas Tangki BUM</td>
<td>3000 lbs</td>
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<td>Panjang Badan Pesawat</td>
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<td>16</td>
<td>Wheel Tread (isek antara main gear)</td>
<td>122.05”</td>
</tr>
<tr>
<td>17</td>
<td>Wheel Base (isek antara nose gear dengan main gear)</td>
<td>214.76”</td>
</tr>
<tr>
<td>18</td>
<td>Maksimum Height (tinggi maksimum (atu pesawat)</td>
<td>248.42”</td>
</tr>
</tbody>
</table>

Kaping, 12 September 2002
Yang Memberikan Informasi,

SOVRY ANGLO
Konfigurasi Parkir di Apron Khusus Pesawat Fokker-27
Konfigurasi Parkir di Apron Untuk Pesawat Fokker-27 dan Cassa 212