

## BAB II

### Persyaratan Teknis Fungsional

#### 1. Tipe Laboratorium

Secara garis besar Laboratorium dibagi kedalam tiga kategori, yaitu :

- a. Research
- b. Teaching
- c. Routine

Research : Untuk laboratorium dengan tipe research yang ditekankan adalah kebutuhan untuk menyediakan perubahan yang sangat cepat.

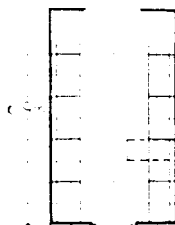
Teaching : Pada tipe laboratorium seperti ini penekanan diutamakan pada fleksibilitas ruang, hal ini dimaksudkan untuk penyesuaian terhadap beragamnya metode pendidikan dan disiplin ilmu yang ada.

Routine : Karena kegiatan yang terjadi merupakan kegiatan rutin maka perubahan ruang disini jarang sekali terjadi, tetapi kemungkinan itu ada dan harus diperhitungkan.

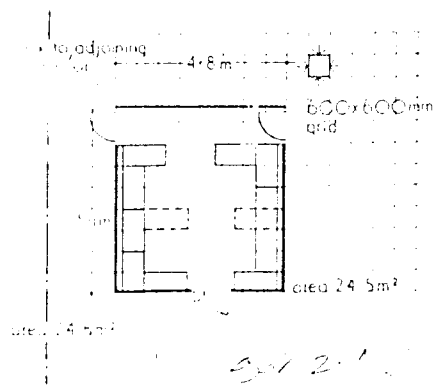
Laboratorium riset biasanya merupakan ruangan yang didalamnya terdiri dari beberapa tim kerja kecil dengan beberapa ruangan yang relatif sama. Sehingga ruangan yang terpakai dan dibutuhkan sekitar 24 m per unitnya ( table 1.01 ), ini akan dapat mengakomodasi empat orang pekerja dengan luasan masing-masing 6 m. Sementara bentuk dari ruang penelitian itu sendiri ada dua macam yaitu persegi empat dan persegi panjang.

**Tabel 1.01 Areas per Workplace for Research ( Government and Industrial )**

<b>Chemistry</b>	8 – 12 m <sup>2</sup>
<b>Physics</b>	6 – 8 m <sup>2</sup>
<b>Biology</b>	6 – 8 m <sup>2</sup>

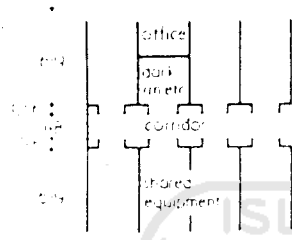


**Gbr. 2.1** Laboratorium riset dengan bentuk dasar ruang persegi panjang

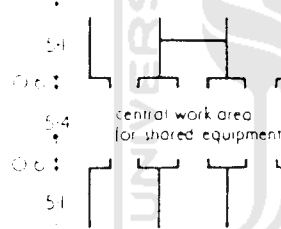


**Gbr. 2.2** Laboratorium riset dengan bentuk dasar ruang persegi empat

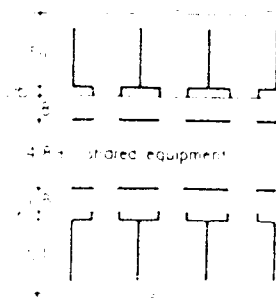
Dari segi penghematan ruang maka laboratorium yang mempunyai bentuk persegi panjang dengan lorong/koridor ditengah lebih sering digunakan. Tetapi pada perkembangannya bentuk persegi panjang dan bentuk persegi empat ini dikombinasikan untuk mendapatkan ruangan yang lebih baik.



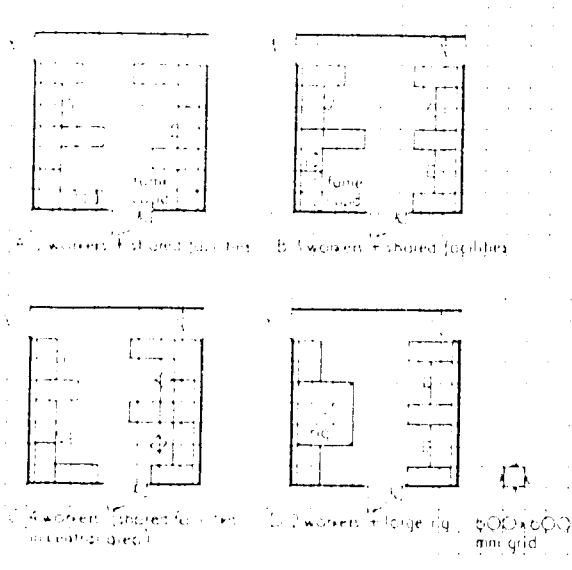
**Gbr.2.3** Ruang riset persegi panjang dengan koridor di tengahnya dan modul 3.6 m



**Gbr.2.4** Ruang riset persegi empat dengan ruang kerja di tengah dan modul 4.8 m



**Gbr.2.5** Ruang riset dengan koridor ganda dengan peletakan peralatan ditengah bermodul 4.8 m



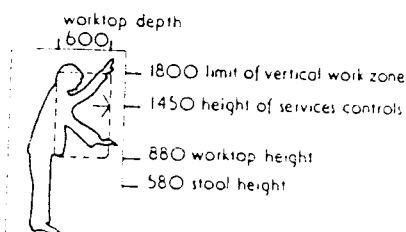
**Gbr.2.6** Ruang riset dengan penataan alternatif selain yang diatas.

### Dimensi Peralatan dan Perlengkapan

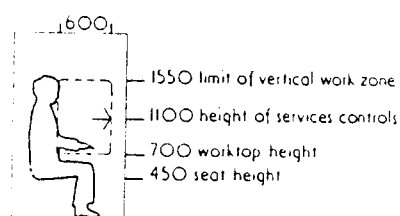
#### Tinggi Jangkauan Area Kerja

Untuk ukuran peralatan dan perlengkapan ketinggiannya harus mudah dijangkau, termasuk penggunaan meja untuk melakukan penelitian preparat dan beberapa meja tempat peletakan alat-alat elektronok seperti komputer dan alat-alat pencatat data kegempaan.

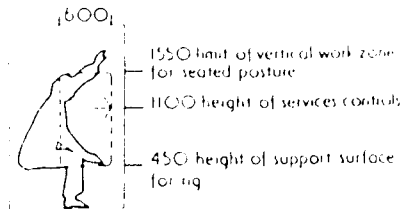
Dibawah ini gambar yang menunjukkan ketinggian jangkauan area kerja terhadap kegiatan peneliti.



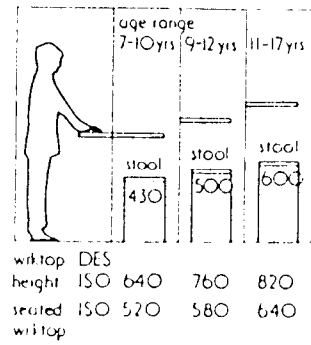
**Gbr.2.7.**Batasan jangkauan ketika melakukan kegiatan berdiri atau duduk



**Gbr.2.8.**Batasan jangkauan ketika melakukan kegiatan duduk dikursi.



**Gbr.2.9.**Batasan jangkauan area kerja dengan jarak terjauh.

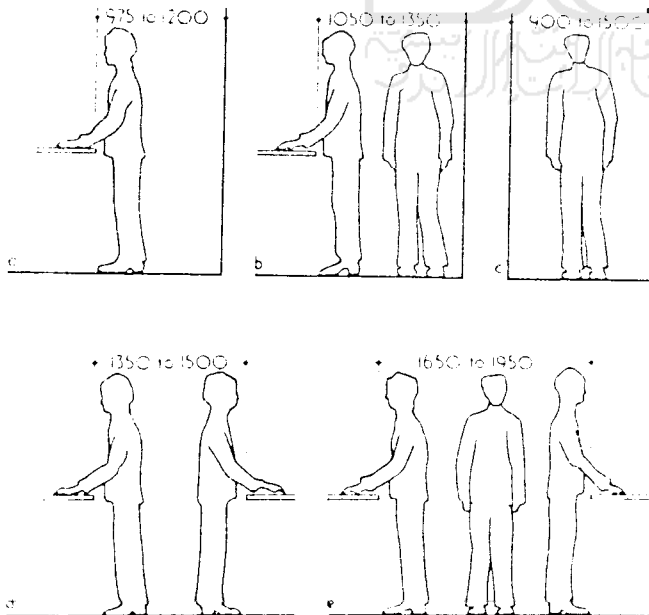


**Gbr.2.10.** Luasan area kerja pada keadaan berdiri dan duduk.

**Tabel 1.02. Kebutuhan tinggi ruang kerja untuk peralatan.**

Level of Work	Worktop length per person	Activity
Research	3600 to 4800	For overall calculation a mean length should be taken

Lebar Jangkauan Area Kerja

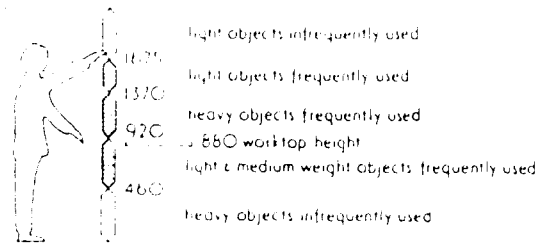


**Gbr.2.11.**Lebar ruang yang dibutuhkan beserta area peralatan.

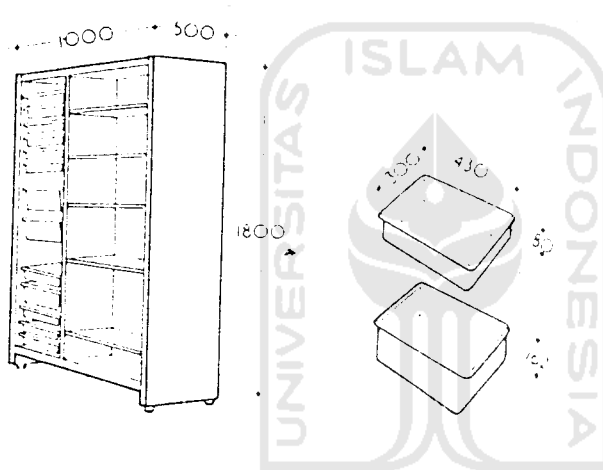
- Seorang pekerja
- Seorang pekerja dan pengguna yang melewati area kerja.
- Pengguna yang melewati area kerja
- Dua orang pekerja yg saling membelakangi.
- Dua orang pekerja yang saling membelakangi dengan seorang yang berjalan diantaranya.

Beberapa contoh untuk luasan area kerja beserta perlengkapannya :

Untuk luasan area kerja beserta peralatan dan perlengkapan pada laboratorium ini standarnya adalah  $\pm 600$  mm pada setiap area kerja, tetapi untuk menjaga kenyamanan maka tidak ada salahnya jika ukurannya  $\pm 700$  sampai  $\pm 750$  mm.



**Gbr.2.12.** Luasan jangkauan pada lemari penyimpanan.

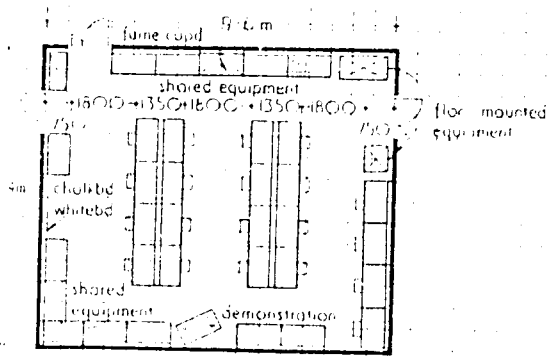


**Gbr.2.13.** Luasan lemari penyimpanan dengan rak.

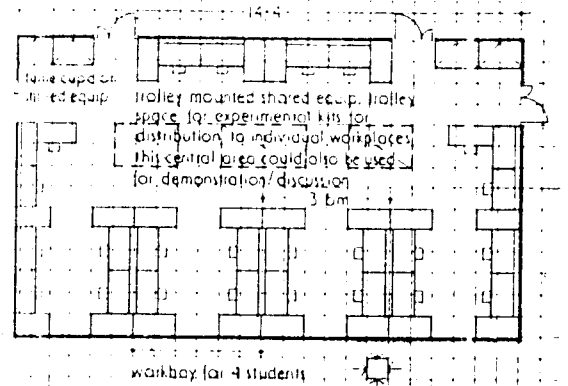
Tabel 1.03. Jumlah kebutuhan tempat penyimpanan.

<b>Research Work</b>	1 to 1 or 2 workers
Chemistry	1 to 2 or 4 workers
Biochemistry	Small demand ad hoc to individual needs
Physics	Small demand ad hoc to individual needs
Biology	

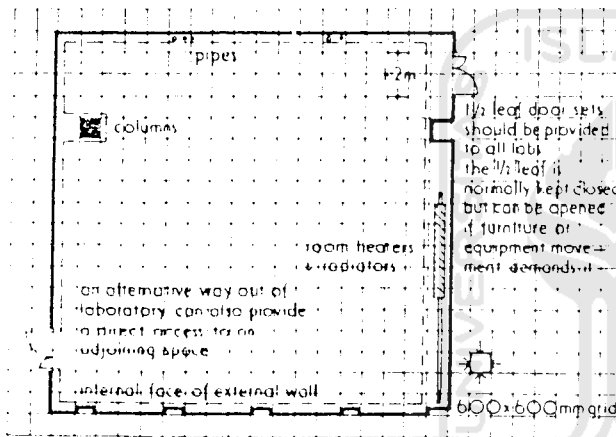
Beberapa contoh ruang laboratorium dengan efektifitas tinggi



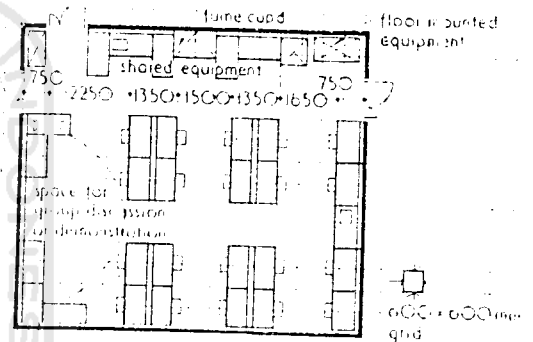
**Gbr.2.14.**  
a. Laboratorium Universitas dengan penataan untuk mengakomodasi 20 mahasiswa.



**Gbr.2.15.**  
Laboratorium dengan kapasitas untuk 24 orang dan peralatan yang diletakan di tengah ruang.



*Effective space and access*



**Gbr.2.16.**  
Ruang laboratorium dengan penataan yang dapat digunakan untuk diskusi.

## 2. Spesifikasi khusus untuk kegiatan pengamatan dan penelitian

- a. Seismik : Menerima data kegempaan mekanik yang dikirim dari pos-pos pemantauan gunungapi yang terdapat di lereng gunung Merapi secara telemetric.
- b. Magnetik : Menerima data kromotografi suhu gas, magnetic, dengan alat tiltmeter pengukur gas dan suhu.

c. Geologi :

1. Laboratorium Petrografi ( pemotong batu )
2. ROVS ( Remotely Operated Visual System )

d. Deformasi : Penerima data elektris pada ruang monitoring, seismograf digital dengan system GPS dan tilt lahar/ AFM ( Acoustic Flow Measurement ).

e. Geokimia : Laboratorium kimia yang didalamnya terdapat alat-alat khusus seperti :

- Alat Kromotografi Gas
- Tabung Gas
- Timbangan
- AAS ( Atomic Observation Spectrophotometry )
- Spektro
- Alat Pengasaman
- Lemari penyimpanan bahan kimia

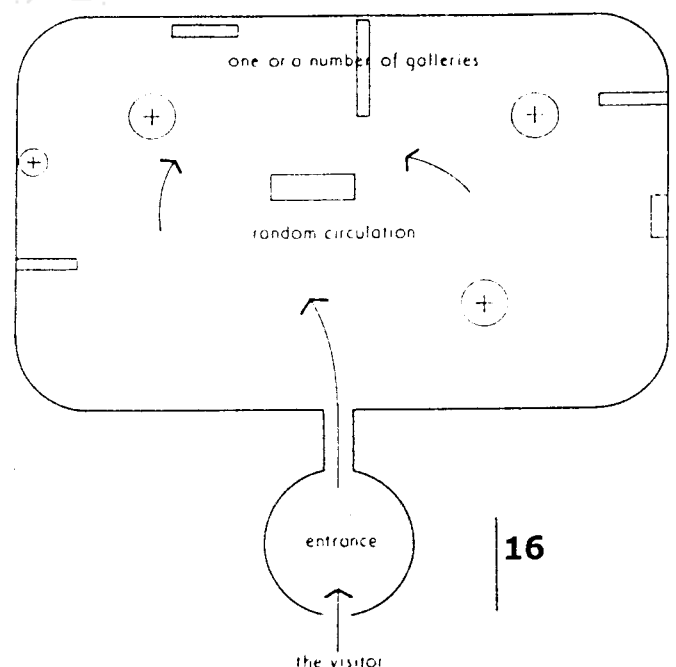
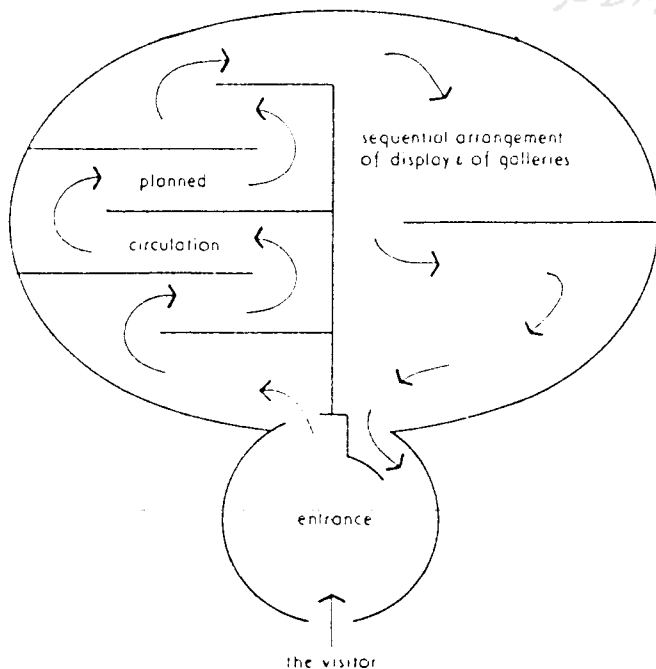
### 3. Sarana Penyediaan Informasi/Penerangan

#### a. Gallery Pamer

Untuk area gallery pamer ini yang menjadi perhatian adalah penataan sirkulasi yang tidak membingungkan bagi pengunjungnya. Ada dua cara penataan sirkulasi pada gallery yaitu :

1. Sequential Circulation

2. Random



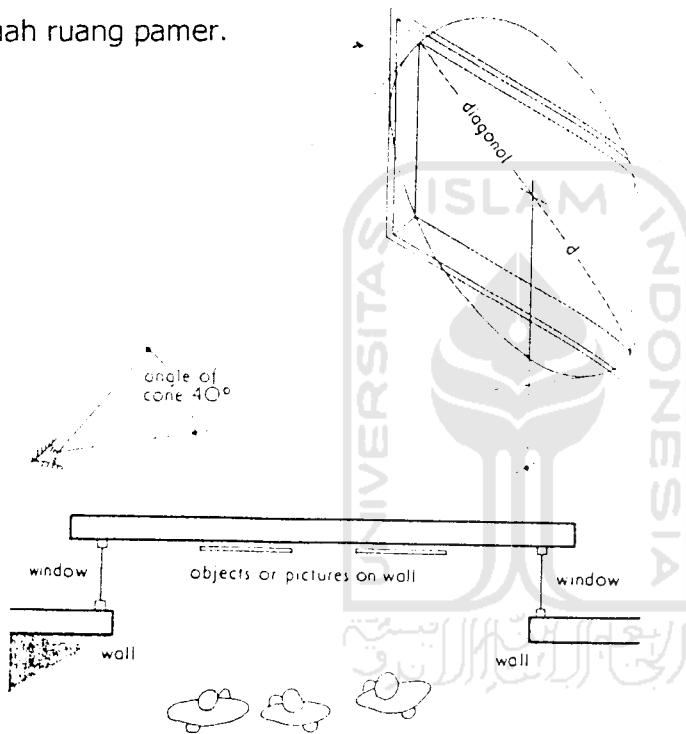
Display objek dapat diletakan pada :

- Lemari Display
- Berdiri pada lantai/ freestanding
- Pada Dinding
- Pada Panel-panel

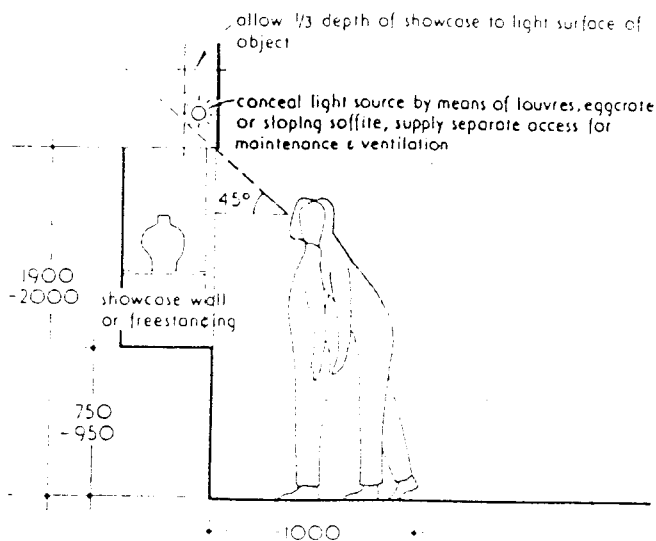
Selain itu perlu juga memperhatikan penataan dan display dari objek yang akan dipamerkan. Ada beberapa hal yang diperhatikan yaitu :

1. Pencahayaan
2. Jarak Pandang

Dibawah ini merupakan ukuran standar dalam melakukan penataan dan peletakan pada sebuah ruang pameran.

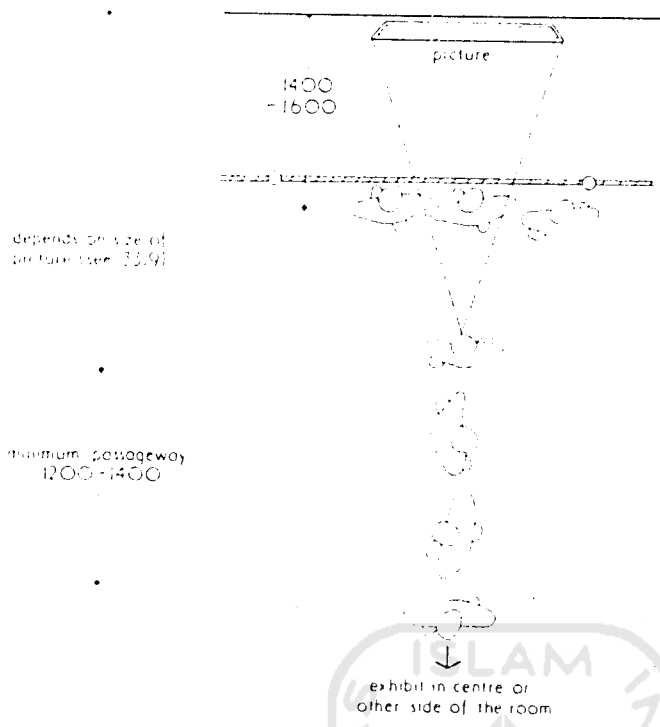


**Gbr.17.** Jarak dan sudut pandang pengunjung.

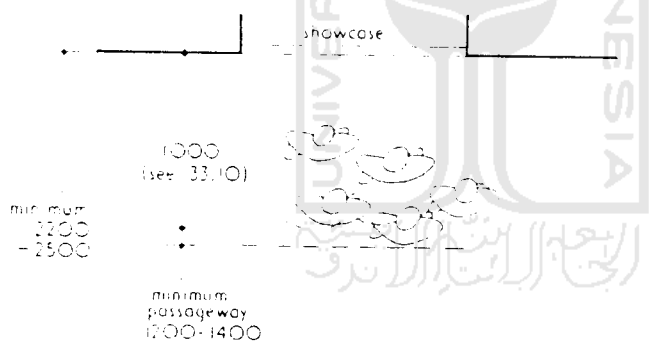


**Gbr.19.** Jarak dan sudut pandang pengunjung terhadap objek di lemari display

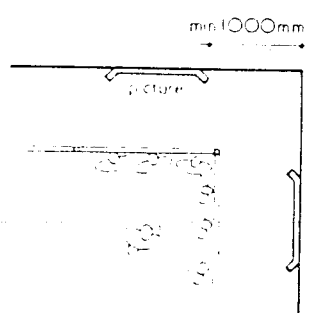




*Viewing and circulation for objects or pictures on walls*



*Viewing and circulation for showcases*

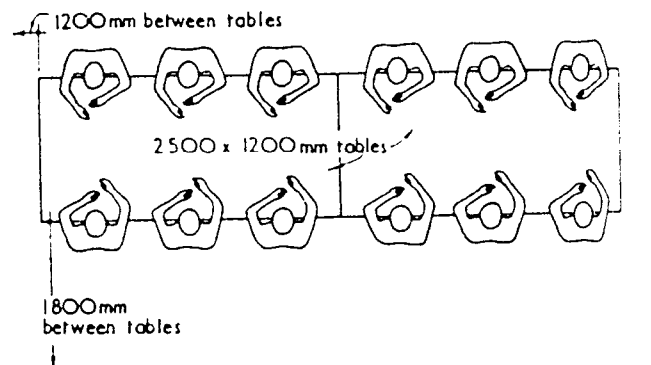
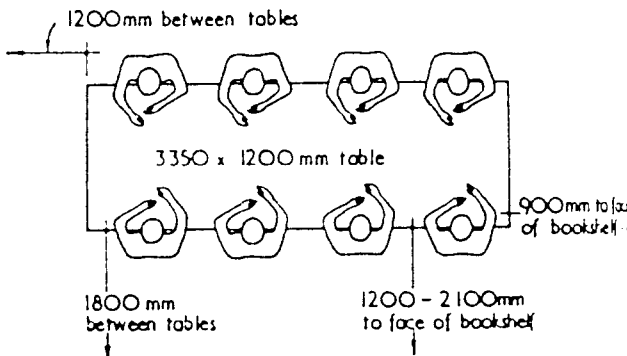
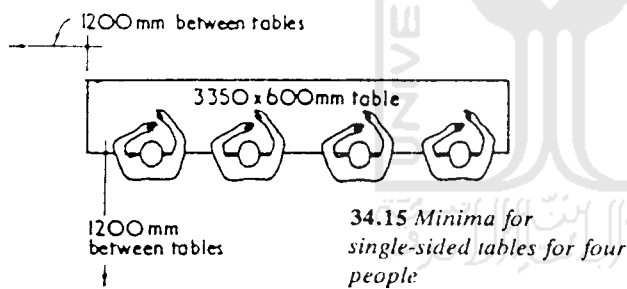
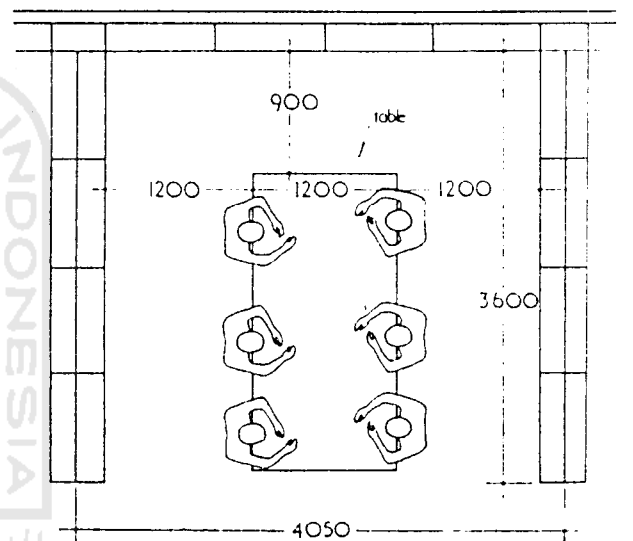
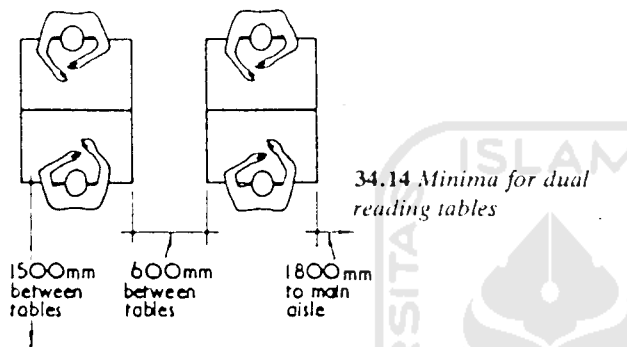
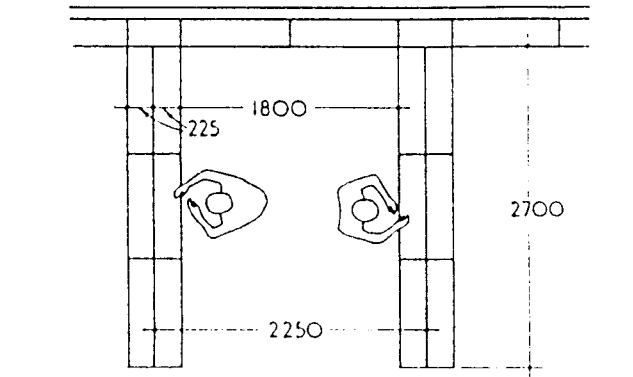
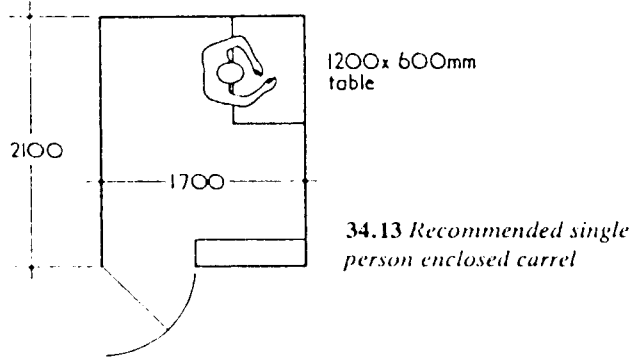


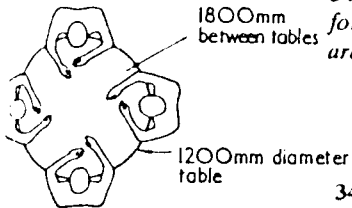
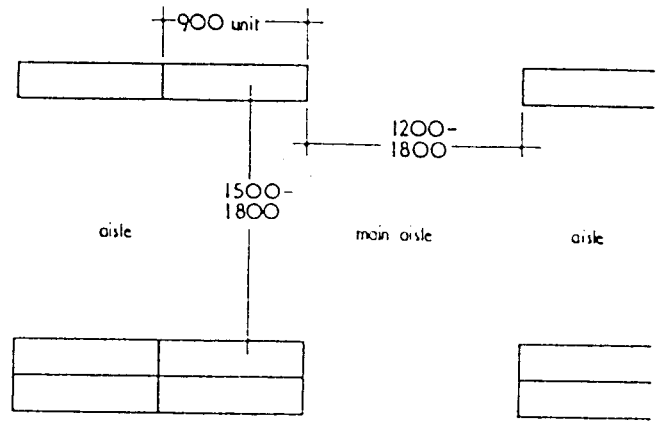
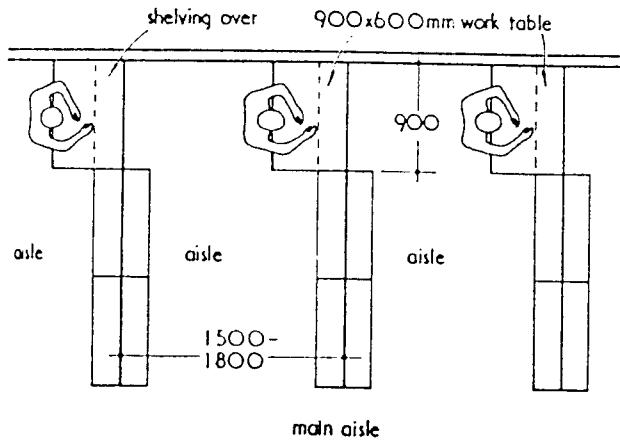
*Method of avoiding congestion in corners*

**Gbr.20.** Pandang dan sirkulasi Pengunjung ketika melihat objek

## b. Perpustakaan

Dibawah ini gambar beberapa standar tentang penataan ruang pada perpustakaan.

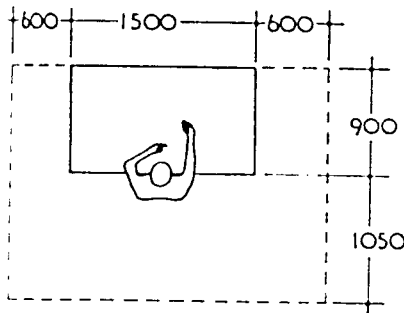




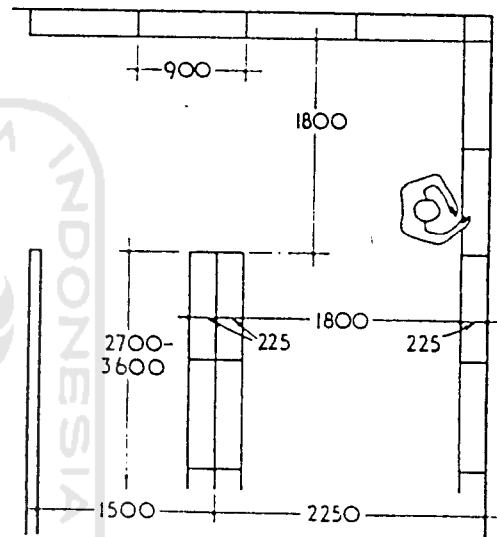
34.20 Suggested arrangement for open carrels in bookshelf area

34.24 Recommended minimum aisle widths in open access bookstacks

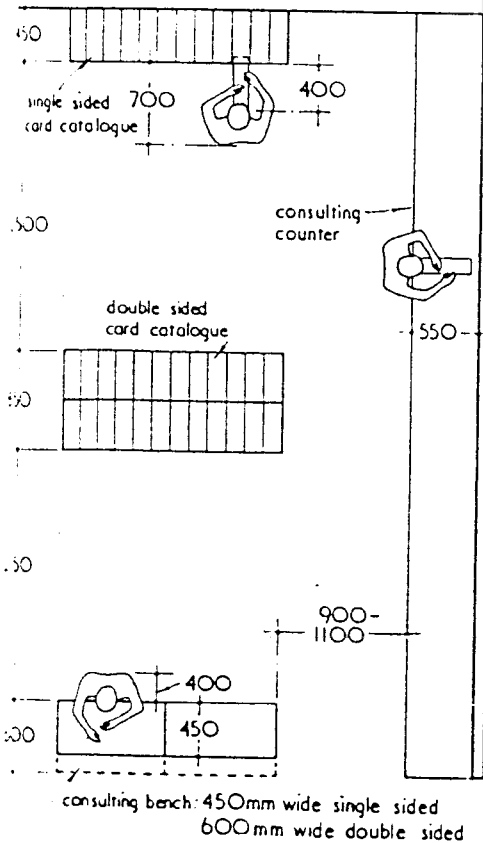
34.21 Round reading tables



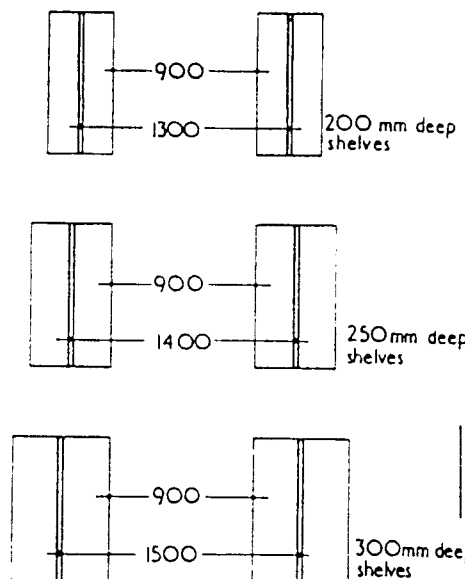
34.22 Recommended minima for library staff



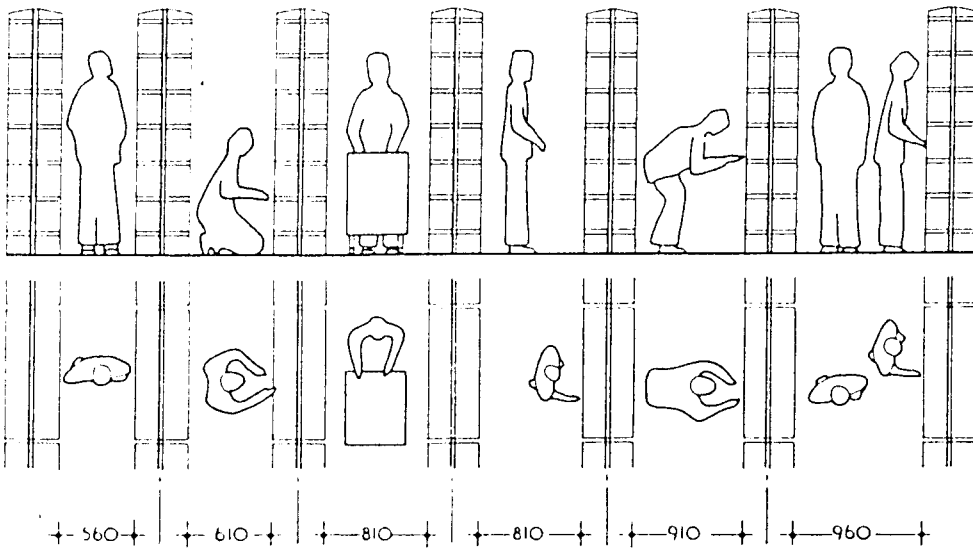
34.25 Recommended minima in open access bookshelf areas



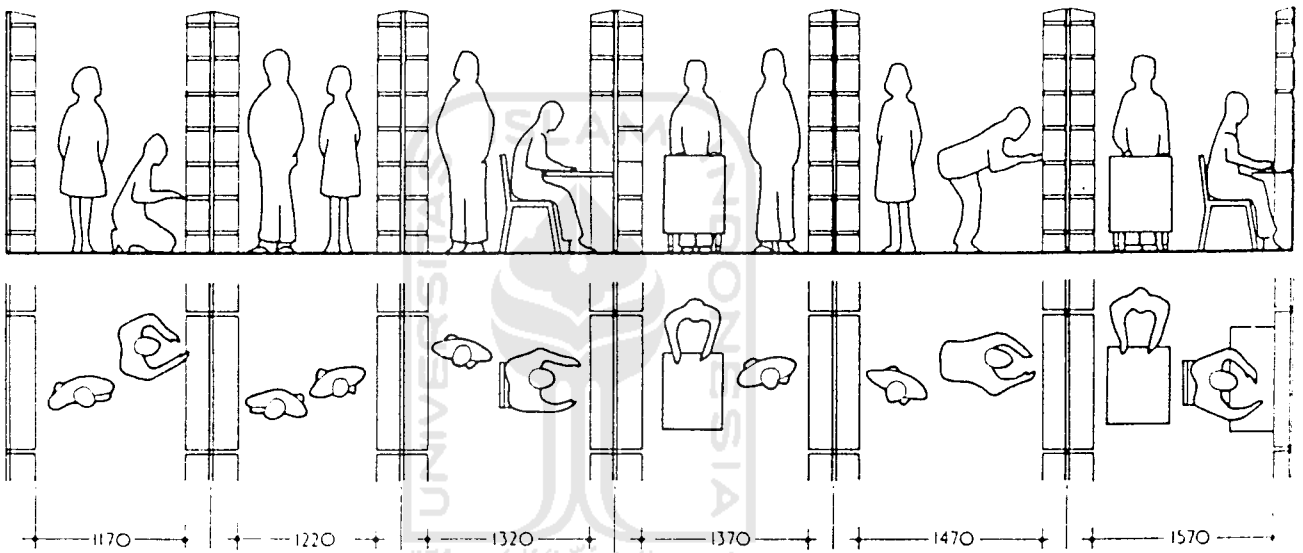
34.23 Recommended minima in card catalogue area



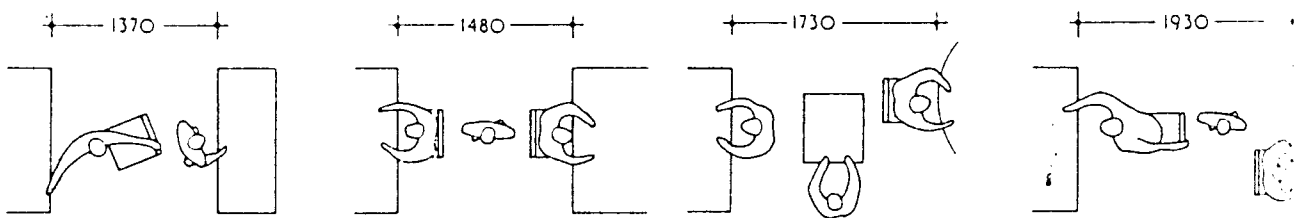
34.26 Recommended aisle widths in closed access bookstacks for various depths of shelf



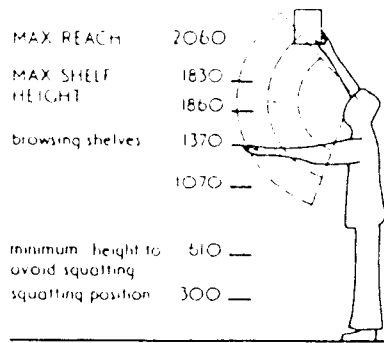
34.27 Minimum clearances in shelving areas for various attitudes: narrow aisles



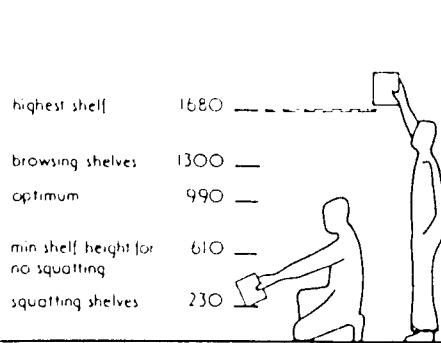
34.28 Minimum clearances in shelving areas for various attitudes: wide aisles



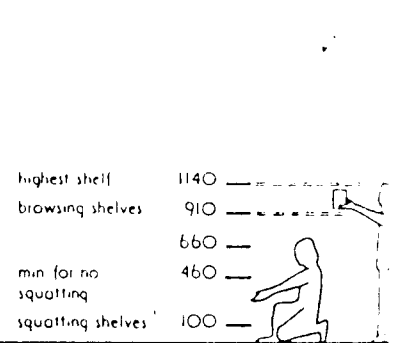
34.29 Minimum clearances in reading areas



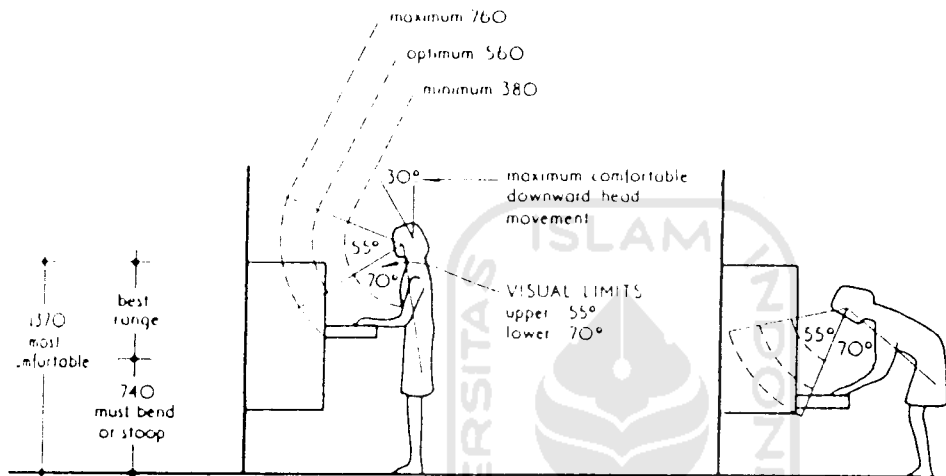
34.30 Optimum shelf heights for adults



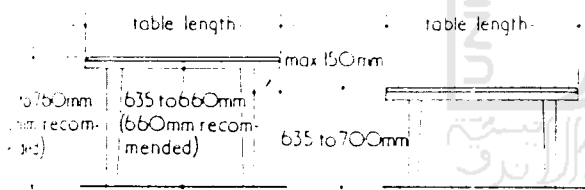
34.31 Optimum shelf heights for teenagers



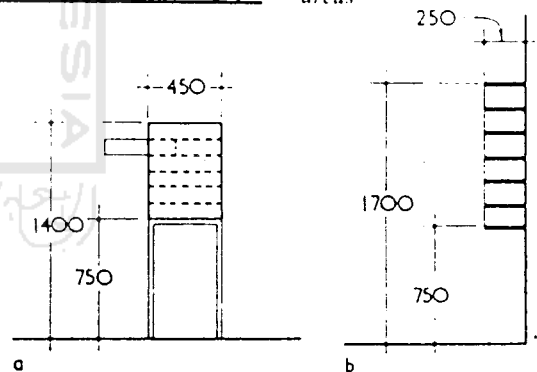
34.32 Optimum shelf heights for children



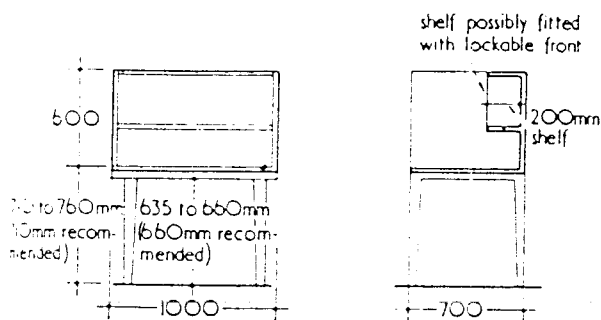
34.33 Recommended drawer heights in card catalogue areas



34.34 Reading table heights for adults and children



34.36 Recommended heights for:  
a card catalogue cabinet  
b sheaf catalogue binder shelves



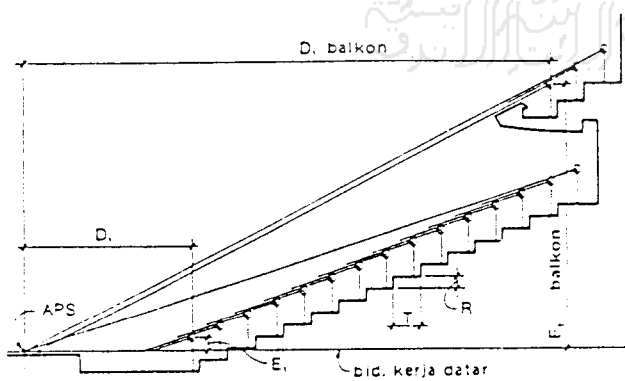
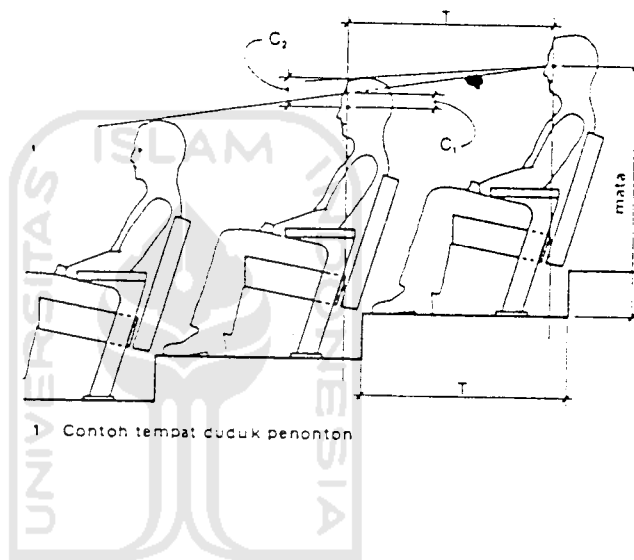
34.35 Typical open carrel

## B. Ruang multimedia

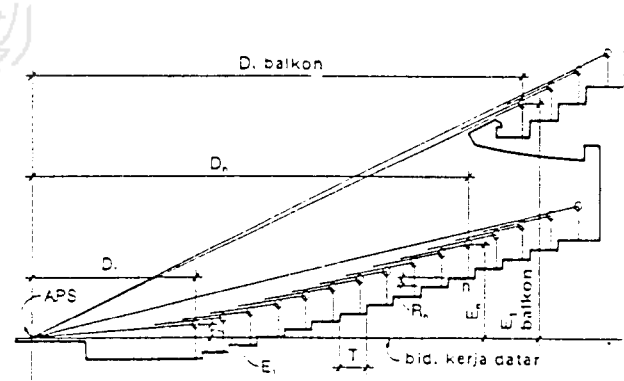
Yang perlu diperhatikan dalam perancangan auditorium adalah kemiringan lantai pada tempat duduk penonton dan garis pandang, akustik ruang, sirkulasi, sistem pencahayaan.

### 1. Kemiringan dan garis pandang

Skala pertunjukan menentukan ukuran jangkauan luas pandangan. Membatasi sudut jangkauan sampai 130 derajat disekitar pandangan penonton pada titik tertentu akan membantu secara visual.



2 Kemiringan sudut lantai tetap



3 Kemiringan lantai isidomal

### 3. Sarana Penunjang

#### a. Parkir

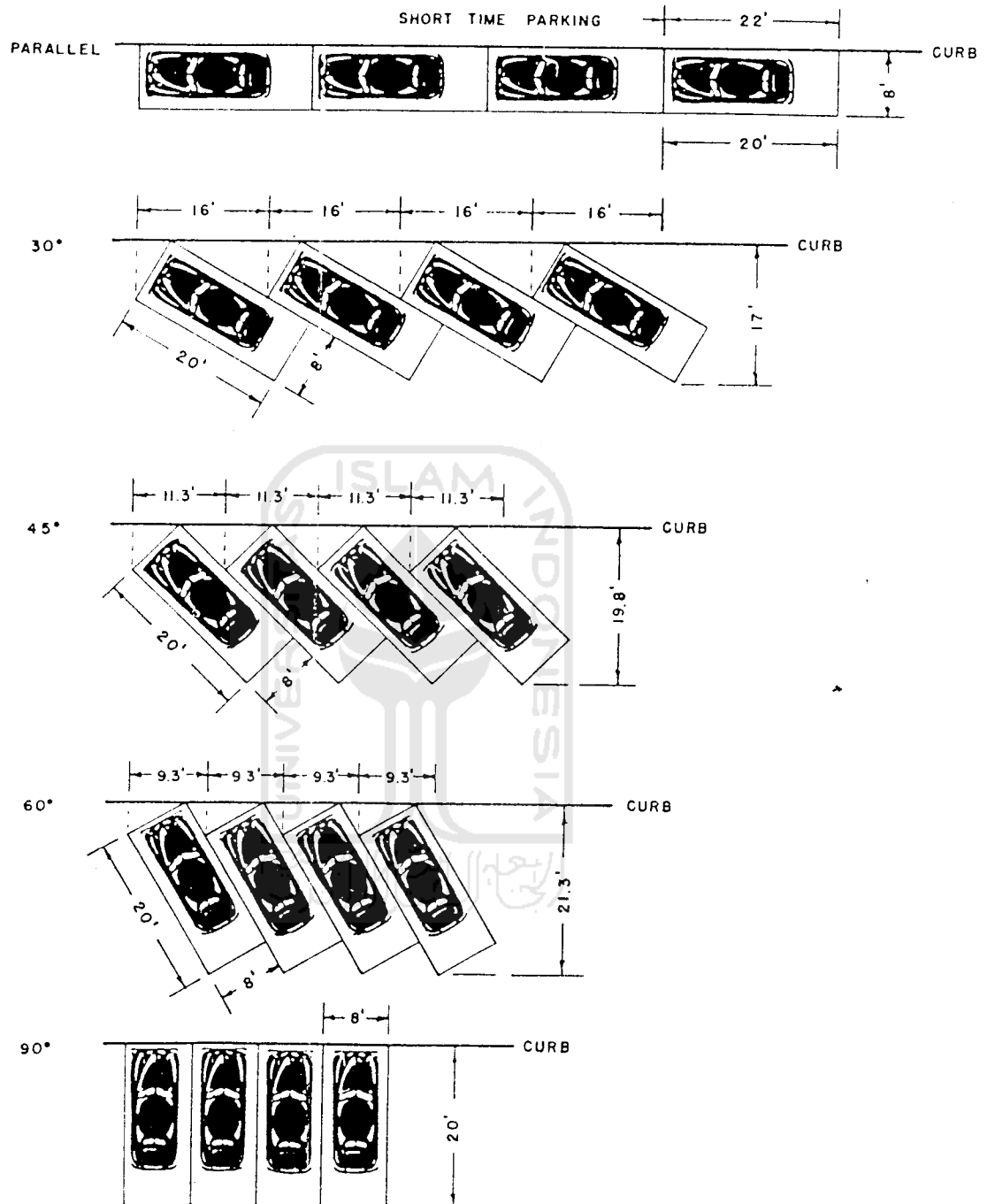
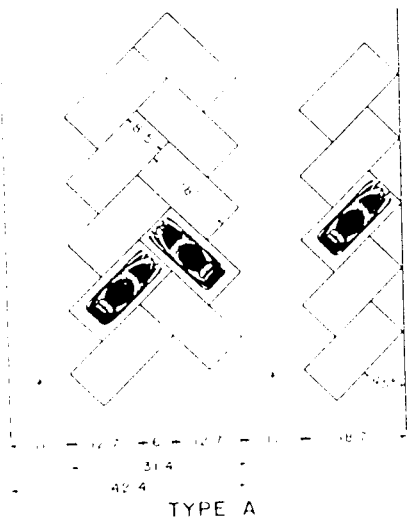
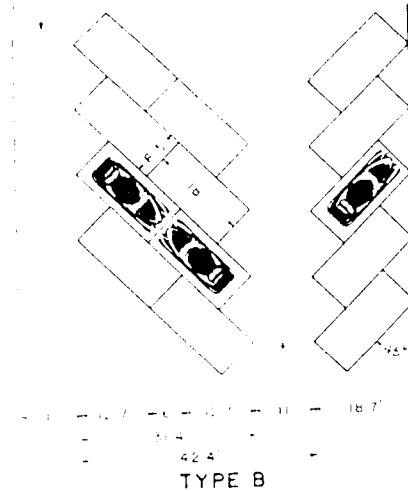


Figure 6.216 Space requirements for curb parking at various angles.



TYPE A



TYPE B

Figure 6.204 Herringbone-pattern parking layouts

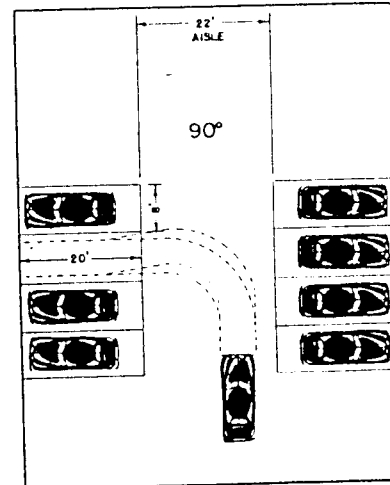
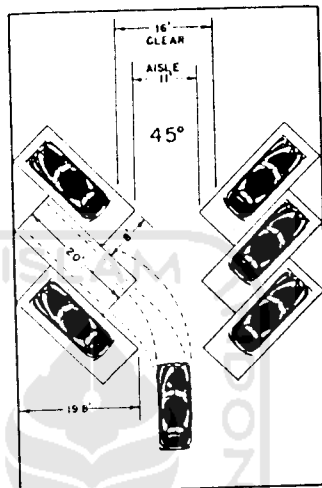
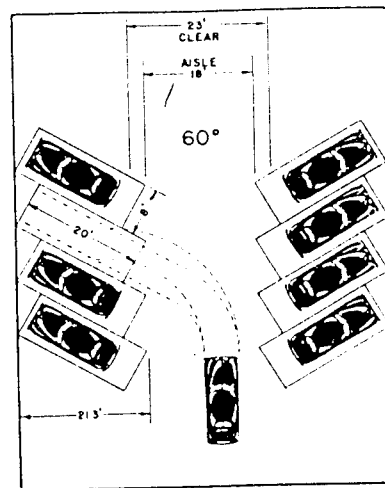
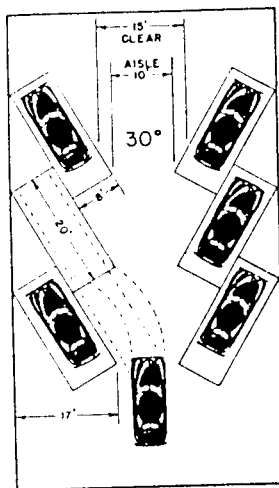
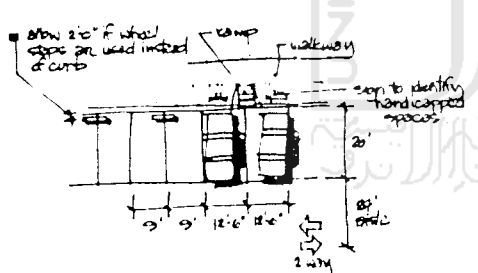
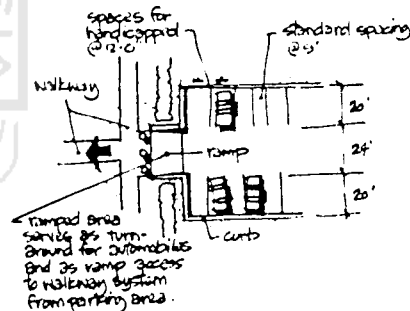


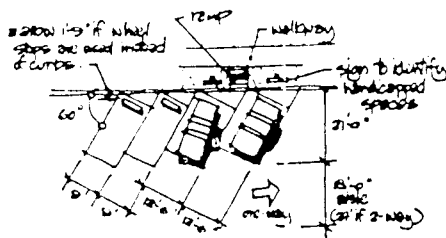
Figure 6.205 Space and aisle requirements for lot or garage parking at various angles.



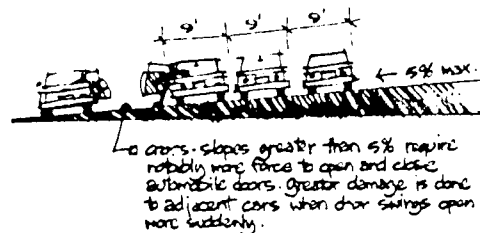
90 Parking



Parking Using End-Lot Access



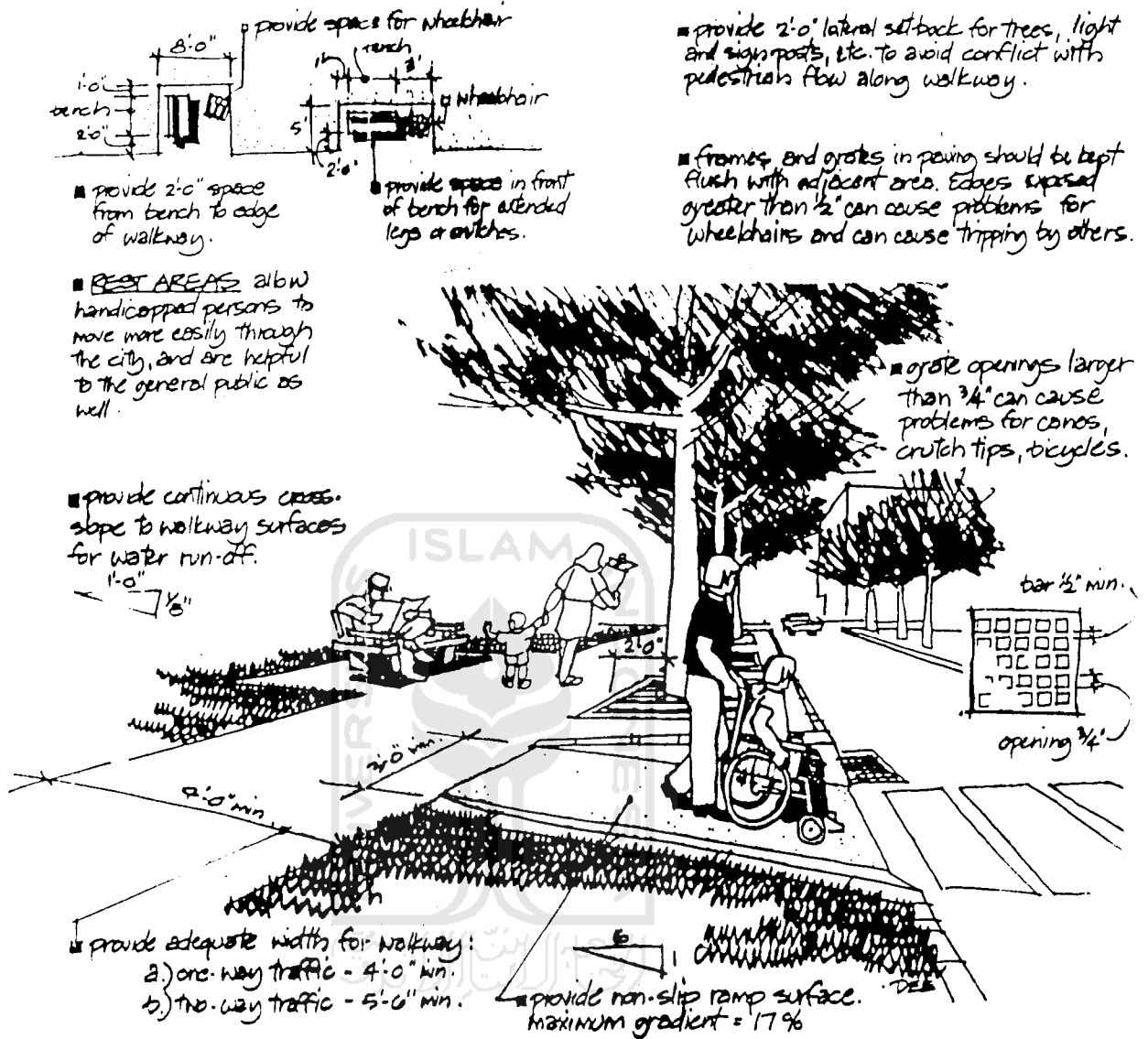
60 Parking



Cross-Slope in Parking Areas

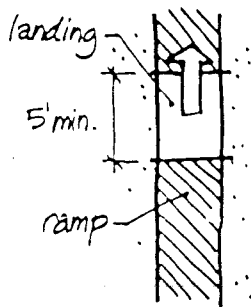


## b. Aksesibilitas Penyandang cacat

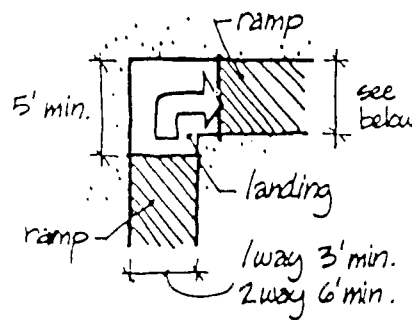


## Conditions at Tops & Bases of Ramps

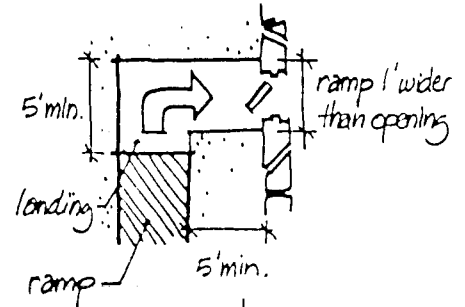
### 1. Traffic Goes Straight



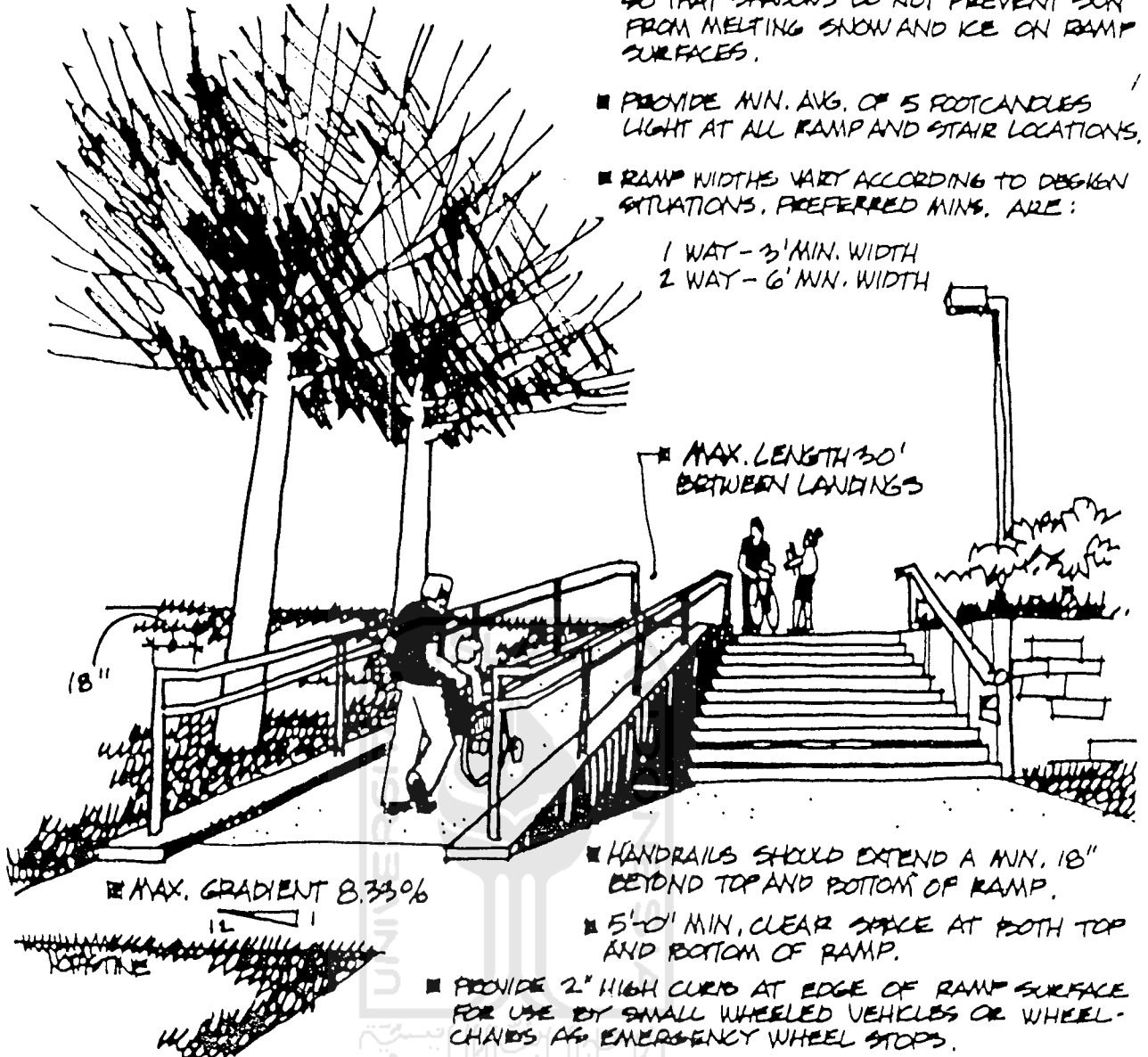
### 2. Traffic Turns



### 3. Traffic Turns to Gate/Doorway



# Outdoor Ramps



- PLANT MATERIALS SHOULD BE LOCATED SO THAT SHADOWS DO NOT PREVENT SUN FROM MELTING SNOW AND ICE ON RAMP SURFACES.
- PROVIDE MIN. AVG. OF 5 FOOTCANDLES LIGHT AT ALL RAMP AND STAIR LOCATIONS.
- RAMP WIDTHS VARY ACCORDING TO DESIGN SITUATIONS. PREFERRED MINS. ARE:
  - 1 WAY - 3' MIN. WIDTH
  - 2 WAY - 6' MIN. WIDTH

■ MAX. LENGTH 30' BETWEEN LANDINGS

■ MAX. GRADIENT 8.33%

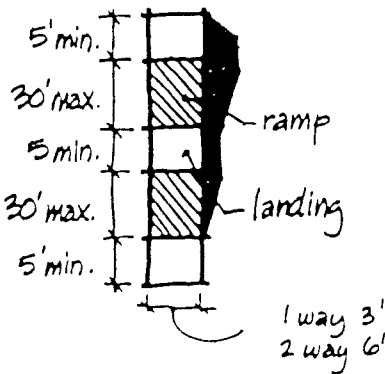
■ HANDRAILS SHOULD EXTEND A MIN. 18" BEYOND TOP AND BOTTOM OF RAMP.

■ 5'-0" MIN. CLEAR SPACE AT BOTH TOP AND BOTTOM OF RAMP.

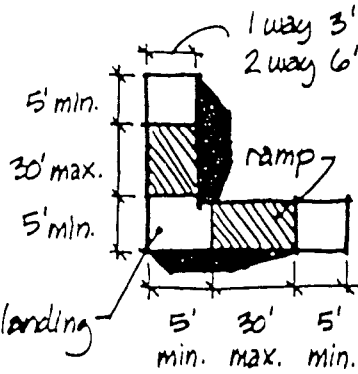
■ PROVIDE 2" HIGH CURB AT EDGE OF RAMP SURFACE FOR USE BY SMALL WHEELED VEHICLES OR WHEELCHAIRS AS EMERGENCY WHEEL STOPS.

## Ramps for Outdoor Use

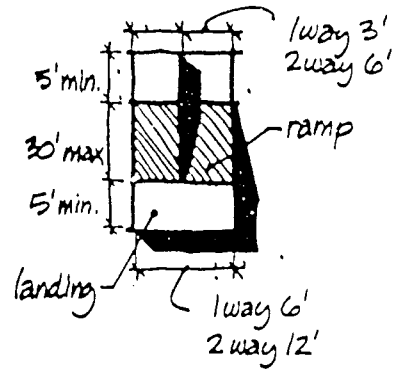
### 1. Straight-Run

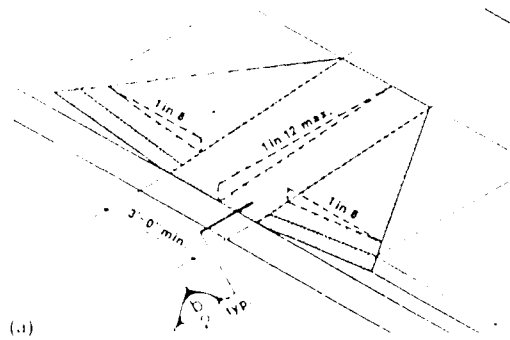


### 2. Angled Landing

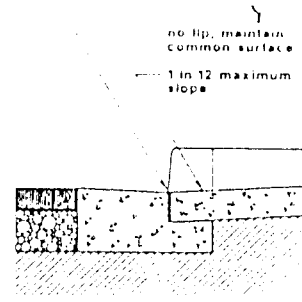


### 3. Intermediate/Switch-Back Landing

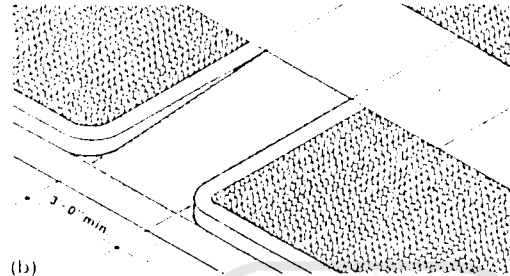




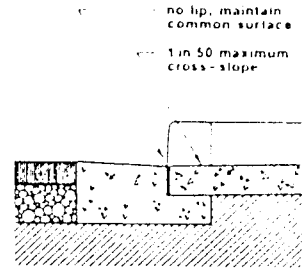
(a)  
curb ramp



section

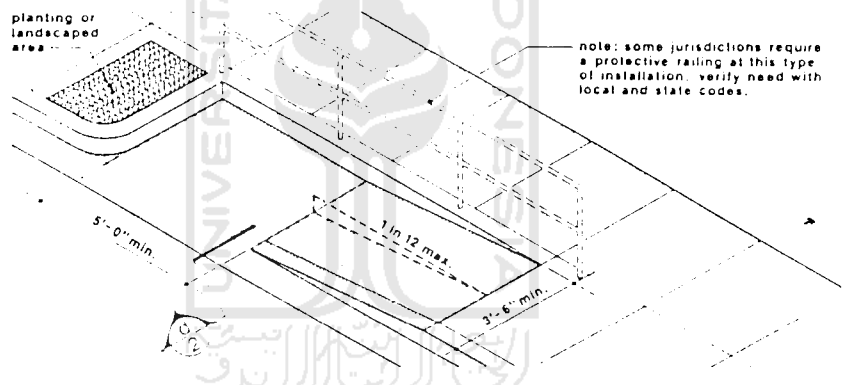


(b)  
curb ramp



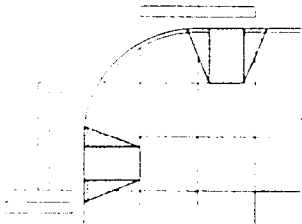
section

Figure 6.15

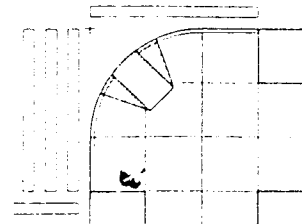


curb ramp

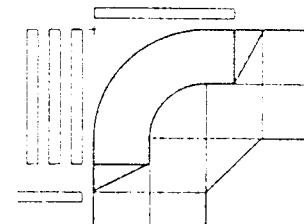
Figure 6.16



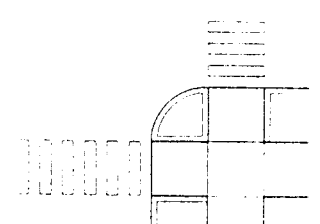
90° ramps



45° ramps

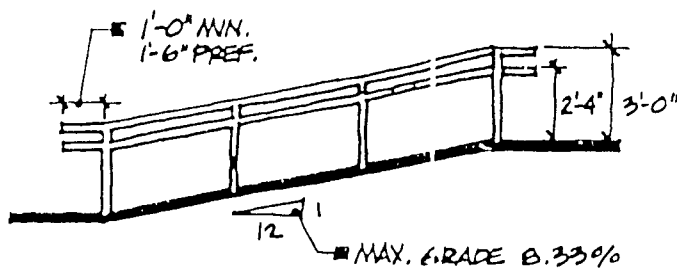


corner



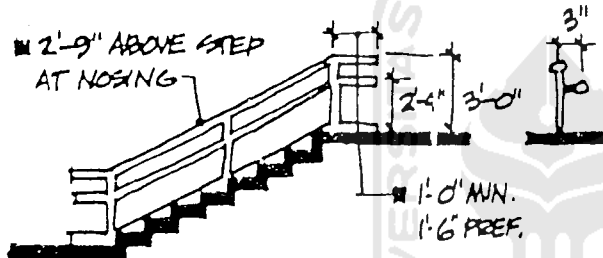
90° ramps

## Handrails for Ramps



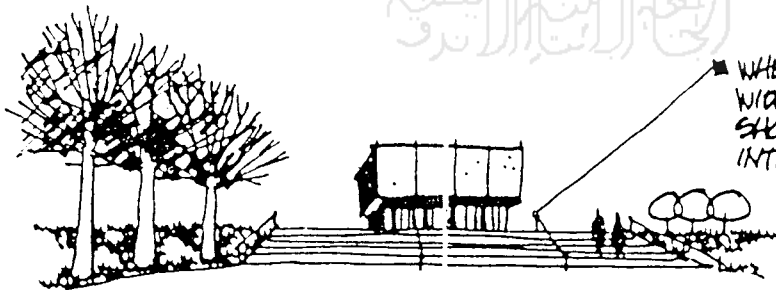
- 3'-0" IS THE MOST COMFORTABLE HT. FOR HANDRAILS ON RAMPS.
- A SECOND HANDRAIL, USEFUL TO PEOPLE IN WHEELCHAIRS AND CHILDREN SHOULD BE PLACED AT 2'-4".
- HANDRAILS SHOULD EXTEND A MIN. 1'-0" BEYOND BOTH ENDS OF A RAMP.

## Handrails for Stairways



- 3'-0" IS THE MOST COMFORTABLE HT. FOR RAILINGS AT BOTH ENDS OF STAIRWAYS. 2'-9" IS THE ACCEPTED HT. ON STAIRWAYS.
- A SECOND HANDRAIL, USEFUL TO CHILDREN SHOULD BE PLACED AT 2'-4"
- HANDRAILS SHOULD EXTEND A MIN. OF 1'-0" BEYOND STAIRWAYS.

## Handrails for Extra-Wide Stairways



- WHEN STEPS BECOME EXCEPTIONALLY WIDE, INTERMEDIATE HANDRAILS SHOULD BE PROVIDED AT 20'-30' INTERVALS.

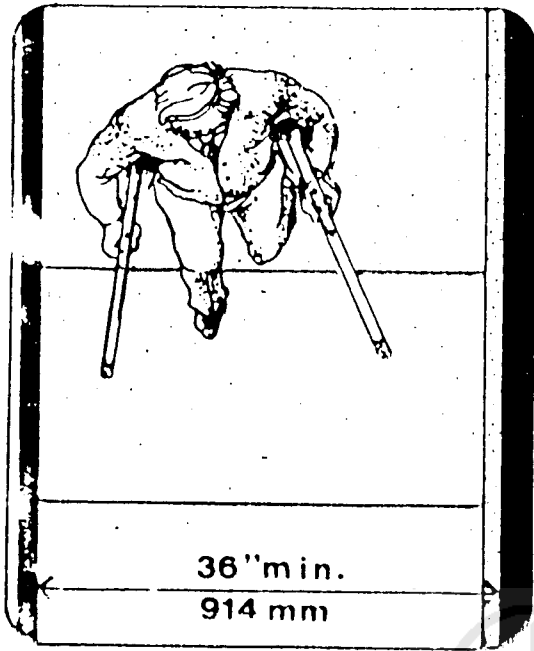


Fig. 1a One-way traffic.

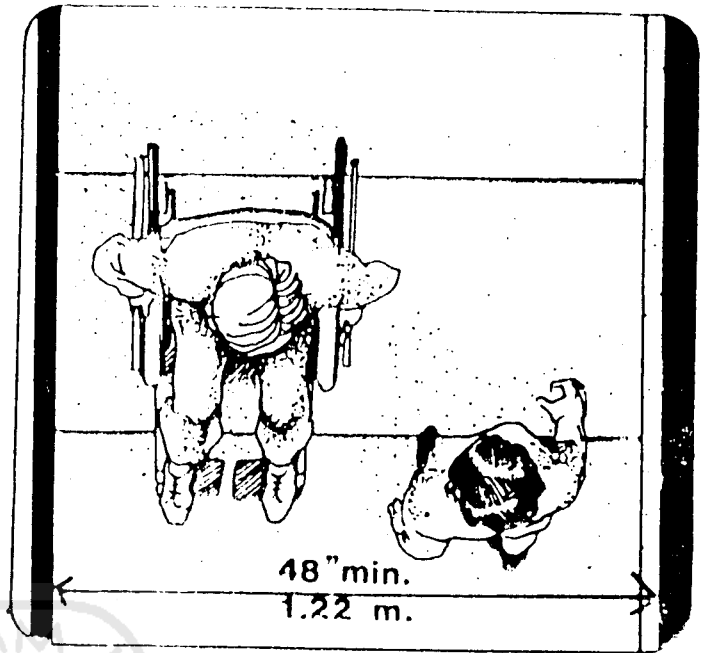


Fig. 1b Two-way traffic.

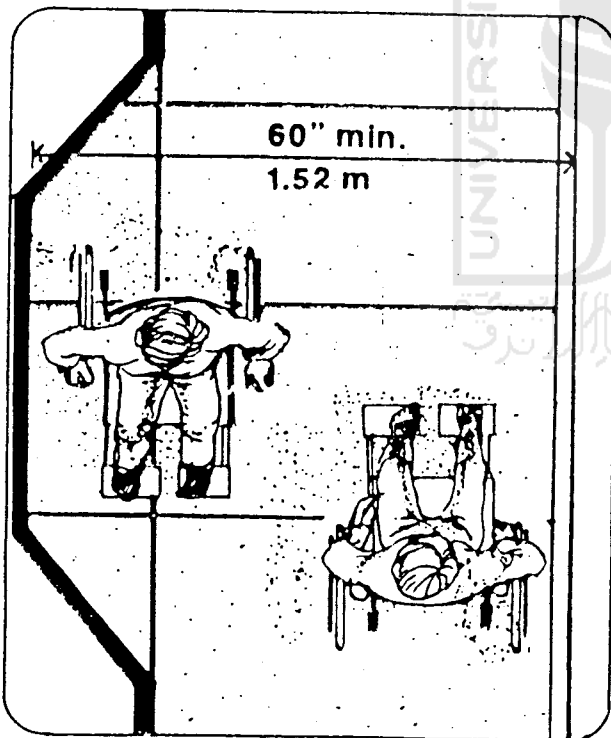


Fig. 1c Passing areas.

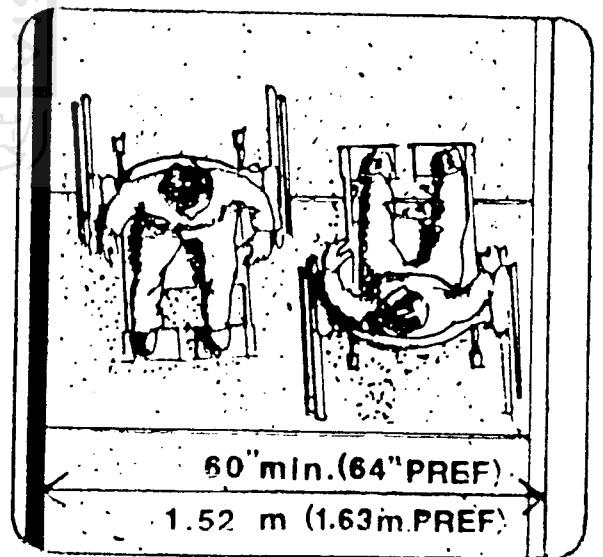
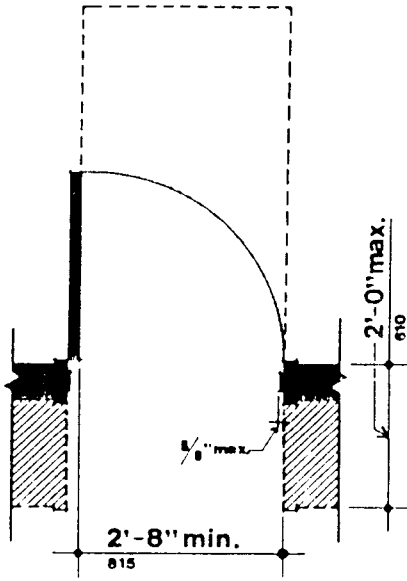
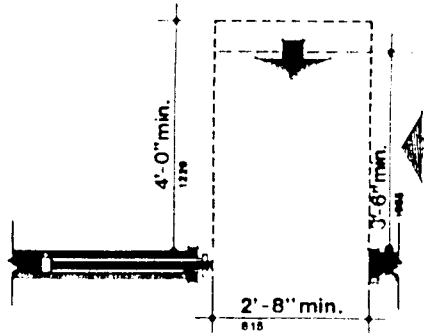


Fig. 1d Recommended minimum widths for passing.

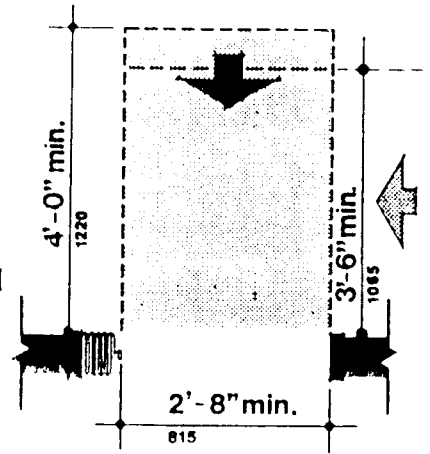
ENTRANCE APPROACHES



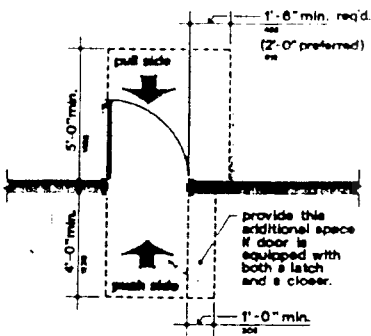
**hinged**



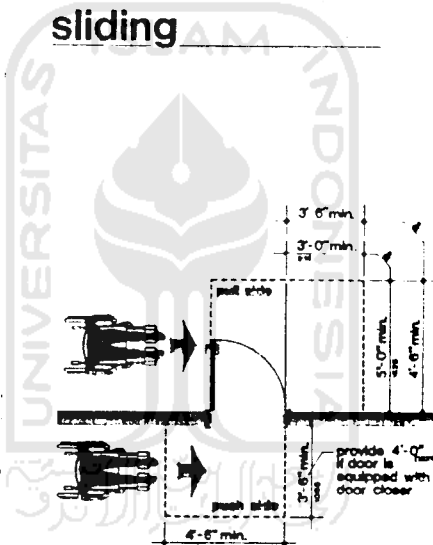
**sliding**



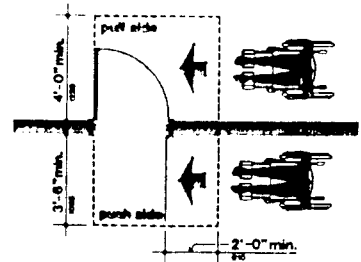
**folding**



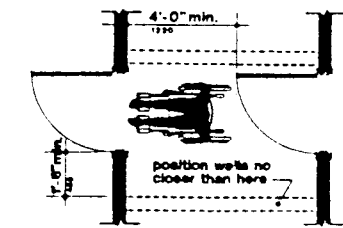
**front approach**



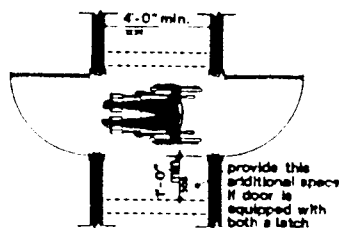
**hinge approach**



**latch approach**



**doors in series**



**doors in series**

- PROVIDE A MINIMUM AVERAGE OF 5 FOOTCANDLES LIGHT AT ALL STAIRWAY LOCATIONS.
- SURFACE OF ALL TREADS SHOULD BE NON-SLIP AND PITCHED FORWARD AT 1/8" PER FOOT TO DRAIN SURFACE WATER. PROVIDE 3/4" CHAMFER OR 1" BOUNDING TO NOSING OF ALL TREADS.
- COLOR OF STAIRS SHOULD CONTRAST WITH ADJACENT PAVING.
- CHEEKWALLS AT SAME GRADE LEVEL AS ADJACENT LAWN ELIMINATES NEED FOR HAND TRIMMING OF GRASS.
- SEE HANDRAILS FOR ADDITIONAL INFORMATION.
- STAIRWAYS WIDTHS SHOULD BE DETERMINED BY THE PROJECTED AMOUNT OF PEDESTRIAN TRAFFIC AND THE WIDTHS OF APPROACHING WALKWAYS. PREFERRED MINIMUMS ARE:
  - 1 WAY- 3' MINIMUM WIDTH
  - 2 WAY- 5' MINIMUM WIDTH
- SHADOWS FROM ADJACENT PLANTINGS SHOULD NOT PREVENT THE SUN FROM MELTING ICE AND SNOW.
- HANDRAILS SHOULD EXTEND BEYOND THE TOP AND BOTTOM STEPS A MINIMUM OF 18"
- CHEEKWALLS SHOULD EXTEND BENEATH HANDRAILS AN EQUAL DISTANCE.

