Chapter 4

Personnel Requirements

Introduction

- How much **space** to allocate for **personnel** can be dictated by the corporation **philosophy** concerning employees.

- **Examples** include:

1. "Employees spend one third of their life within our facility; we must help them enjoy working here"
2. "A happy worker is a productive worker"
3. "Personnel considerations are of little importance in our facility. We pay people to work, not to have a good time".
4. Etc.

The Employee-Facility Interface

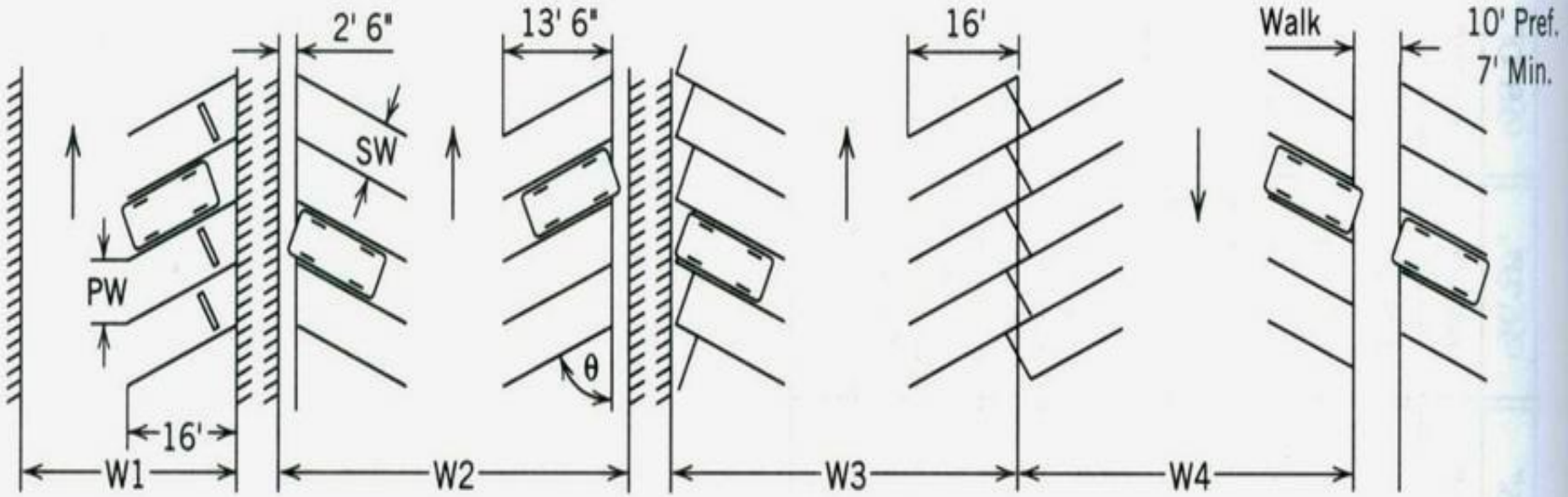
- The planning of **personnel requirements** includes planning for employee:
  - Parking
  - Locker rooms
  - Restrooms
  - Food services
  - Drinking fountains
  - Health services
  - Etc.

Employee Parking

- Procedure:
  - Determine number of cars
    - 1 space for every 1.25 employees (public transportation is not available)
    - 1 space for every 3 employees (transportation available)
  - Determine type and space requirement for each car
    - Compact cars, standard, luxury, or handicapped (see table 4.1) and Fig. 4.2
    - Equals: Stall width X Stall depth
  - Determine the available space for parking
  - Determine alternative parking layout
    - The parking angle, and the aisle width (single or double-loaded module options)
  - Select the best layout that best utilizes space and maximizes convenience

Table 4.1 *Module Width for Each Car Group as a Function of Single and Double Loaded Module Options*

			θ ANGLE OF PARK									
	SW	W	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°
Group I: small cars	8′0″	1	25′9′	26′6″	27′2″	29′4″	31′9″	34′0″	36′2″	38′2″	40′0″	41′9″
		2	40′10″	42′0″	43′1″	45′8″	48′2″	50′6″	52′7″	54′4″	55′11″	57′2″
		3	38′9″	40′2″	41′5″	44′2″	47′0″	49′6″	51′10″	53′10″	55′8″	57′2″
		4	36′8″	38′3″	39′9″	42′9″	45′9″	48′6″	51′1″	53′4″	55′5″	57′2″
Group II: standard cars	8′6″	1	32′0″	32′11″	34′2″	36′2″	38′5″	41′0″	43′6″	45′6″	46′11″	48′0″
		2	49′10″	51′9″	53′10″	56′0″	58′4″	60′2″	62′0″	63′6″	64′9″	66′0″
		3	47′8″	49′4″	51′6″	54′0″	56′6″	59′0″	61′2″	63′0″	64′6″	66′0″
		4	45′3″	46′10′	49′0″	51′8″	54′6″	57′10″	60′0″	62′6″	64′3″	66′0″
	9′0″	1	32′0″	32′9″	34′0″	35′4″	37′6″	39′8″	42′0″	44′4″	46′2″	48′0″
		2	49′4″	51′0″	53′2″	55′6″	57′10″	60′0″	61′10″	63′4″	64′9″	66′0″
		3	46′4″	48′10″	51′4″	53′10″	56′0″	58′8″	61′0″	63′0″	64′6″	66′0″
		4	44′8″	46′6″	49′0″	51′6″	54′0″	57′0″	59′8″	62′0″	64′2″	66′0″
	9′6″	1	32′0″	32′8″	34′0″	35′0″	36′10″	38′10″	41′6″	43′8″	46′0″	48′0″
		2	49′2″	50′6″	51′10″	53′6″	55′4″	58′0″	60′6″	62′8″	64′6″	65′11″
		3	47′0″	48′2″	49′10″	51′6″	53′11″	57′0″	59′8″	62′0″	64′3″	65′11″
		4	44′8″	45′10″	47′6″	49′10″	52′6″	55′9″	58′9″	61′6″	63′10″	65′11″



$$PW = \frac{SW}{\text{Sine } \theta}$$

θ is the parking angle, PW is parking width and SW is the stall width. At an angle of 90° (sine 90° = 1), PW = SW. As the parking angle decreases, PW increases accordingly.

Figure 4.2 Single- and double-loaded module options. (*Source:* Ramsey and Sleeper [9].)

Employee Parking (contd.)

- Surveys of similar facilities in the area of the new facility will provide valuable data with respect to the required number of parking spaces.
- At least 2 handicapped spaces per 100 parking spaces.
- **Parking location:** Employees should not be required to walk more than 300-400 feet from their parking place to the entrance of the facility.

Employee Parking (contd.)

- The factors to be considered:
  1. The percentage of compact cars (33% if data not available).
  2. Increasing the area provided for parking decreases the time required to park and de-park.
  3. Angular configurations allow quicker turnover. Perpendicular parking often yields greater space utilization, although it also requires wider aisles.
  4. As the angle of parking increases, so does the required space allocated to aisles.

Employee Parking (contd.)

- **Example 4.1:**
- 200 employees, 1 space for every 2 employees, 40 % compact cars, 5% for handicap, and available parking space 180X200ft
- Assuming no walls, and no walking edge.
- Use SW of 8' 6" for standard cars
- Determine the best parking layout

Employee Parking (contd.)

- **Solution:**
- Starting layout
  - Assume No walls and no walking edge (W4)
  - SW for standard (8’-6”)
  - 100 spaces needed (200 employee/2)
  - 40 compact (we use 30, because not all of compact car drivers will park in a compact space)
  - Use 90° angle for stalls angle
  - Using table 4.1 for 90° and W4 (module width 57’-2” for compact and 66’ for standard)

Employee Parking (contd.)

- Table 4.1 Module width for each car group

			ANGLE OF PARK (ϴ)			
	SW	W	45	50	…	90
Group I: Small cars	8' 0"	1	**25' 9"**	**26' 6"**		**41' 9"**
		2				
		3				
		4				**57’ 2”**
Group II: Standard cars	8' 6"	1	**32' 0"**	**32' 11"**		**48' 0"**
		2				
		3				
		4				**66’ 0”**

Employee Parking (contd.)

- **Solution (contd.)**
- We will use 2 modules for standard and one module for compact cars
  - 2*66+1*57’-2” = 189’-2”<200’ (parking depth)
  - # of spaces for compact = (180/8)*2 = 44 potential compact cars
  - For standard = (180/8.5)*2modules*2=84 potential standard cars
  - 44+84= 128>100…we have enough

Employee Parking (contd.)

- **Solution (contd.)**
- We need to calculate for handicap and turning aisles
  - We have (3 modules *2 rows)=6 rows
  - We can add handicap to row1
    - **5** spaces*12’(depth) = 60’
    - # of spaces of standard cars in row1 = (180-60)/8.5 **= 14** spaces
  - Row 2,3,4 (we will have turning aisles of 15’)
    - # of spaces for standard cars = 180-(15*2)/8.5 = **17**
  - Row 5,6 is for compact
    - # of space for row 5 = (180 -30)/8 = **18**
    - # of spaces for row 6 = 180/8 = **22**
  - Total = 5 handicapped + 40 Compact + 65 Standard
    = 110 spaces >100…we have enough

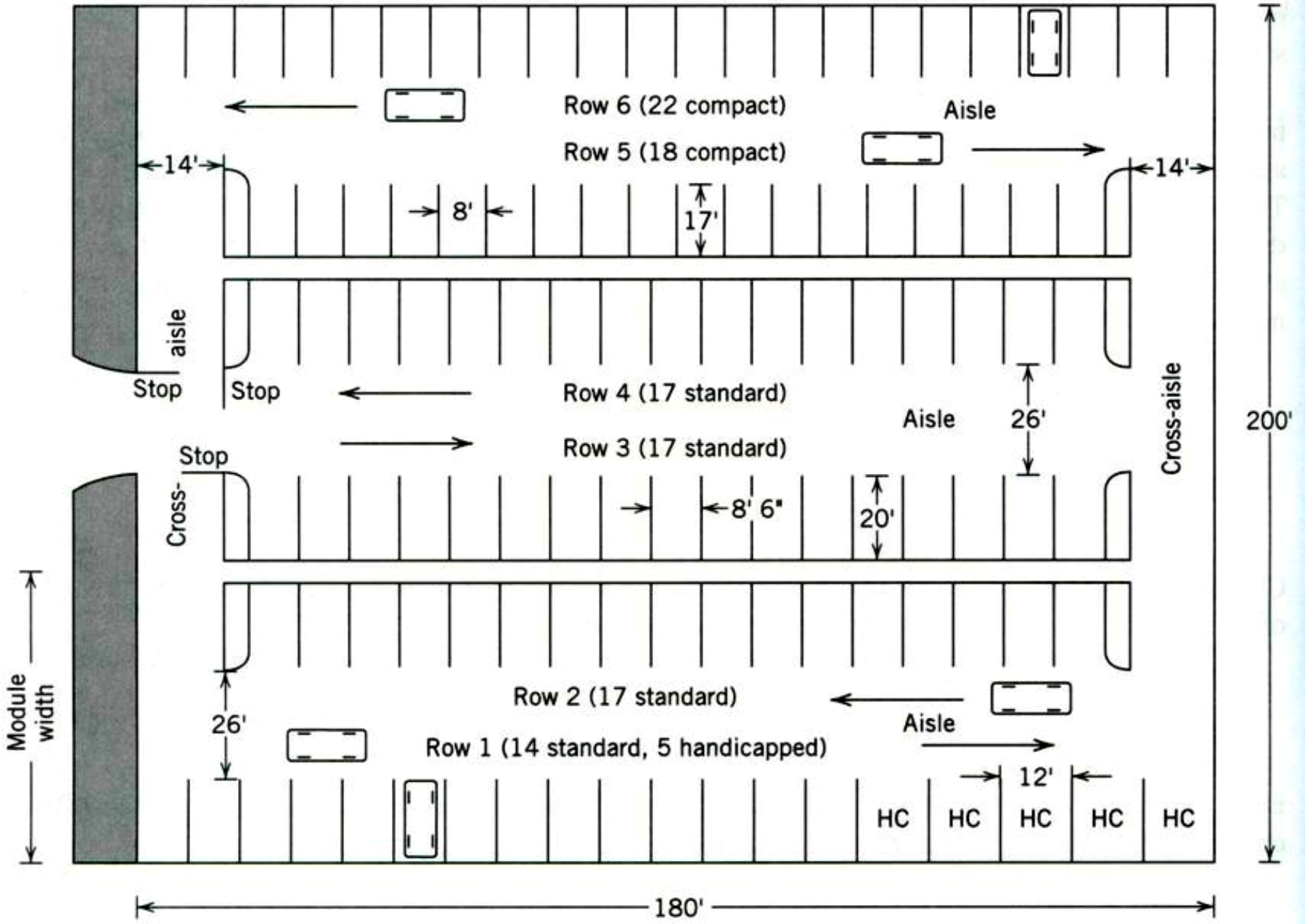


Figure 4.3 Parking lot for Example 4.1.

Storage of employees personal belongings

- Storage of Employees Personal properties
  - Coats, clothes, purses, and lunches
- Change of clothes not required
  - Lunches and personal belongings can be stored at the employees workspace (coat rack)
- Change of clothes required
  - Locker should be provided (preferable near the entrance)
  - Separate lockers for male and female with **6 ft^2** allocated for each person using the locker room
  - If showers are provided, should be separate from toilets facilities
  - Locker rooms are often located along an outside wall beside entrance. To provide ventilation, convenience and not interfere with flow of work in the facility.

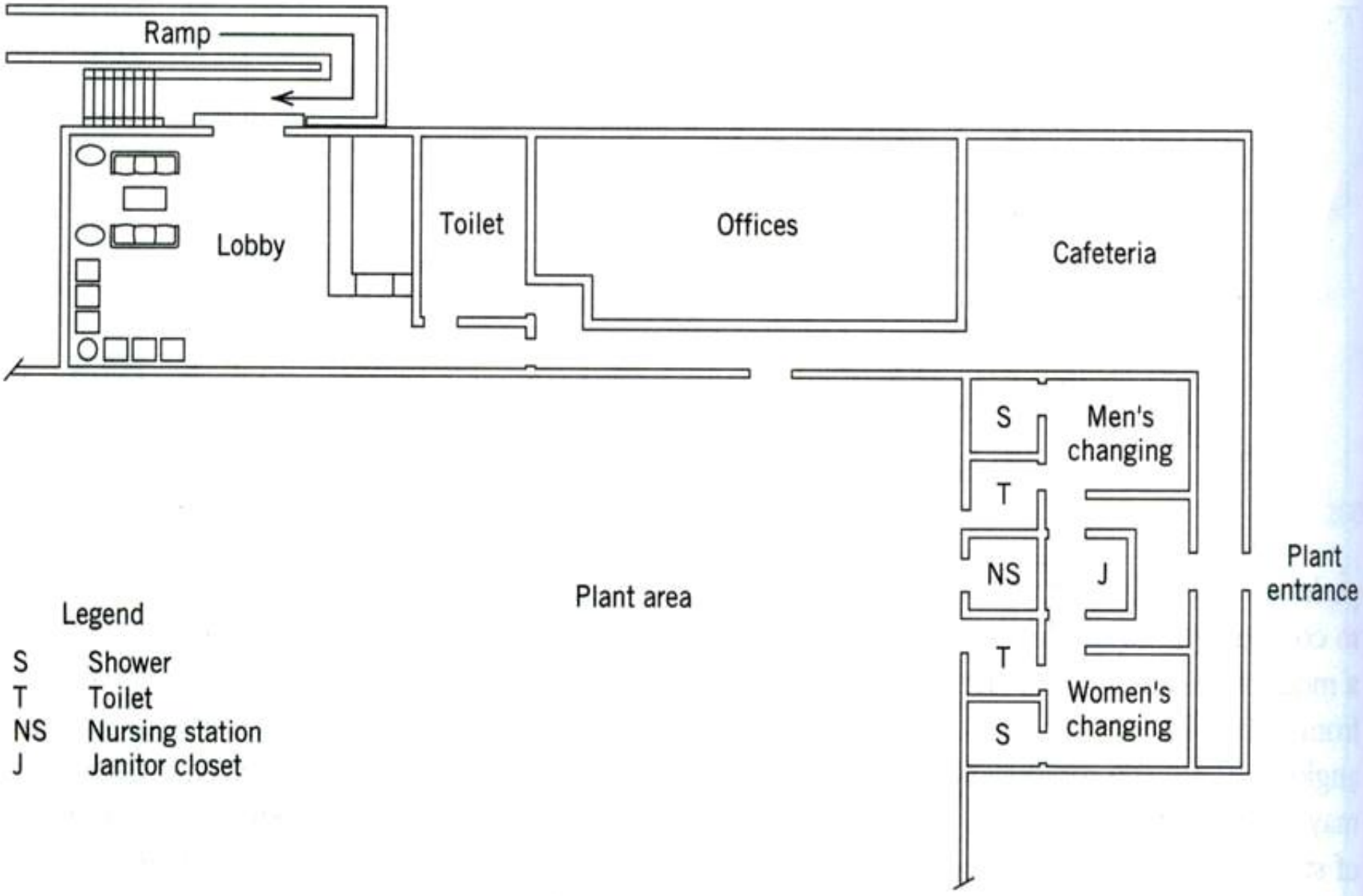


Figure 4.5 Plant entrance and changing room layout.

Restrooms

- Main point to be made, a restroom should be located within 200 ft of every permanent workstation.
- Smaller decentralized restrooms are more convenient than large centralized ones.
- Determine number of toilets, sinks, urinals, etc., to place in each restroom.
  - See table 4.2 for # of employees and plumbing fixtures requirements.
- Should not be able to see into the restroom from outside even when the door is open.
- Figure 4.6 shows an example of clearance requirements for bathrooms.

Table 4.2 *Plumbing Fixture Requirements for Number of Employees*

Business, Mercantile, Industrial Other than Foundry and Storage			
Water Closets	Employees	Lavatories	Employees
1	1–15	1	1–20
2	16–35	2	21–40
3	36–55	3	41–60
4	56–80	4	61–80
5	81–110	5	81–100
6	111–150	6	101–125
7	151–190	7	126–150
		8	151–175
One additional water closet for each 40 in excess of 190		One additional lavatory for each 30 in excess of 175	

Industrial, Foundries, and Storage			
Water Closets	Employees	Lavatories	Employees
1	1–10	1	1–8
2	11–25	2	9–16
3	26–50	3	17–30
4	51–80	4	31–45
5	81–125	5	46–65
One additional water closet for each 45 in excess of 125		One additional lavatory for each 25 in excess of 65	

Assembly, Other than Religious, and Schools					
Water Closets	Occupants	Urinal	Male Occupants	Lavatories	Occupants
1	1–100	1	1–100	1	1–100
2	101–200	2	101–200	2	101–200
3	201–400	3	201–400	3	201–400
4	401–700	4	401–700	4	401–700
5	701–1100	5	701–1100	5	701–1100
One additional water closet for each 600 in excess of 1100		One additional urinal for each 300 in excess of 1100		One additional lavatory for each 1500 in excess of 1100. Such lavatories need not be supplied with hot water.	

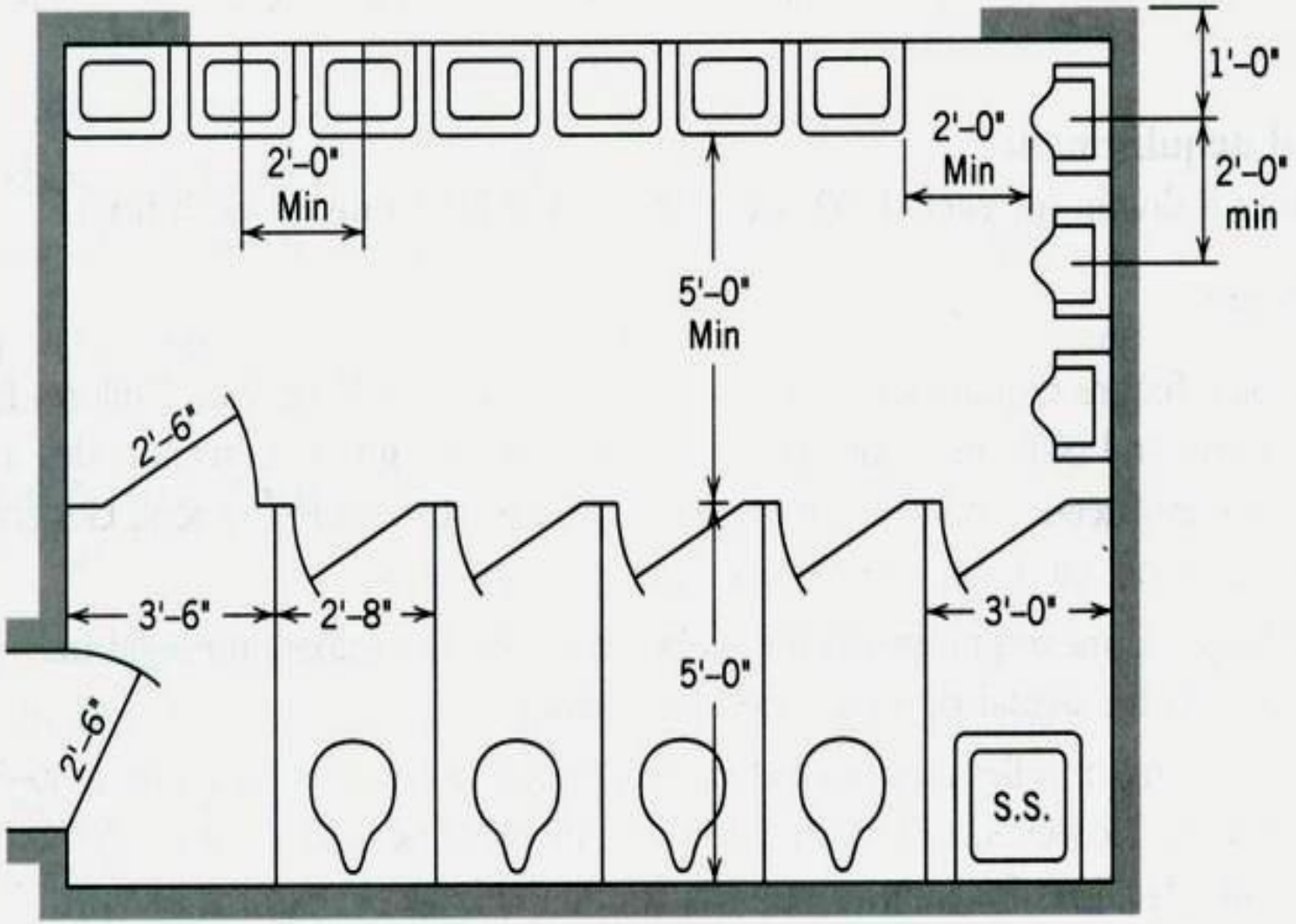


Figure 4.6 Restroom layout with typical fixture clearances. Based on New York State Labor Code. (Taken from [1] with permission of The McGraw-Hill Companies.)

Food Service

- Firms view food service as necessity, convenience or luxury
- Four main meal options:
  - Dinning away
  - vending machines and cafeteria(1ft^2/employee)
  - serving line and cafeteria(200 employee or more)
    - Caterer is needed and 300 ft^2/line (each line can serve 70 person)
  - full kitchen and cafeteria (over 400 employees).
- See table 4.4 for cafeteria space requirements and table 4.5 for full kitchen space requirements

Table 4.4 *Space Requirements for Cafeterias*

Classification	Square Footage Allowance per Person
Commercial	16–18
Industrial	12–15
Banquet	10–11

Table 4.5 *Space Required for Full Kitchens*

Number of Meals Served	Area Requirements (ft^2)
100–200	500–1000
200–400	800–1600
400–800	1400–2800
800–1300	2400–3900
1300–2000	3250–5000
2000–3000	4000–6000
3000–5000	5500–9250

Source: Kotschevar and Terrall [5].

Food Service (contd.)

- Generally try to discourage dining away:
  1. Meal breaks must be longer
  2. Lose employee supervision:
     - Return to work late
     - Return intoxicated
     - Don’t return
  3. Loss of worker interaction
  4. Less worker concentration on the tasks to be performed.

Food Service (contd.)

- General food service location guidelines:
  1. Located within 1000 feet of permanent employee workstations. If this is not the case, consider decentralized food services.
  2. Central location (though may not want this because then you cannot have windows)
  3. Consider that you need easy access for delivery of food and trash pick-up.
  4. Need good ventilation- don't want smell food in the facility since that is disruptive.
- Water fountains within 200 feet of workstations.

Food Service (contd.):
Example 4.3

- Industrial facility, 600 employees eat on 3 equal 30 minuets shifts
  - Vending and cafeteria option
    - 12 ft^2 *200 (cafeteria) +200 *1 ft^2(vending)=2600 ft^2
  - Service line and cafeteria
    - Service line could service 70 people/shift so we need 3/shift
    - 3*300 ft^2 = 900 ft^2
    - Total= 2400 (cafeteria) +900 = 3300 ft^2
  - For full kitchen and cafeteria
    - Total space = Kitchen space +service line space +cafeteria space
    - Total pace = 2100(from table) +3300 = 5400 ft^2

Health Services

- Health facility requirements depends on the type of facility and local cost
- At the very least, a small first aid room should be available (first aid kit, bed, 2 chairs)
- Minimum space 100 square feet
- If a nurse added 250 ft^2 needed for the room and 75ft^2 waiting area and 2 beds
- See figure 4.9 for the layout
- If a part time physician added, 150 ft^2 exam room needed
- Health service should be close to hazards tasks in quite area

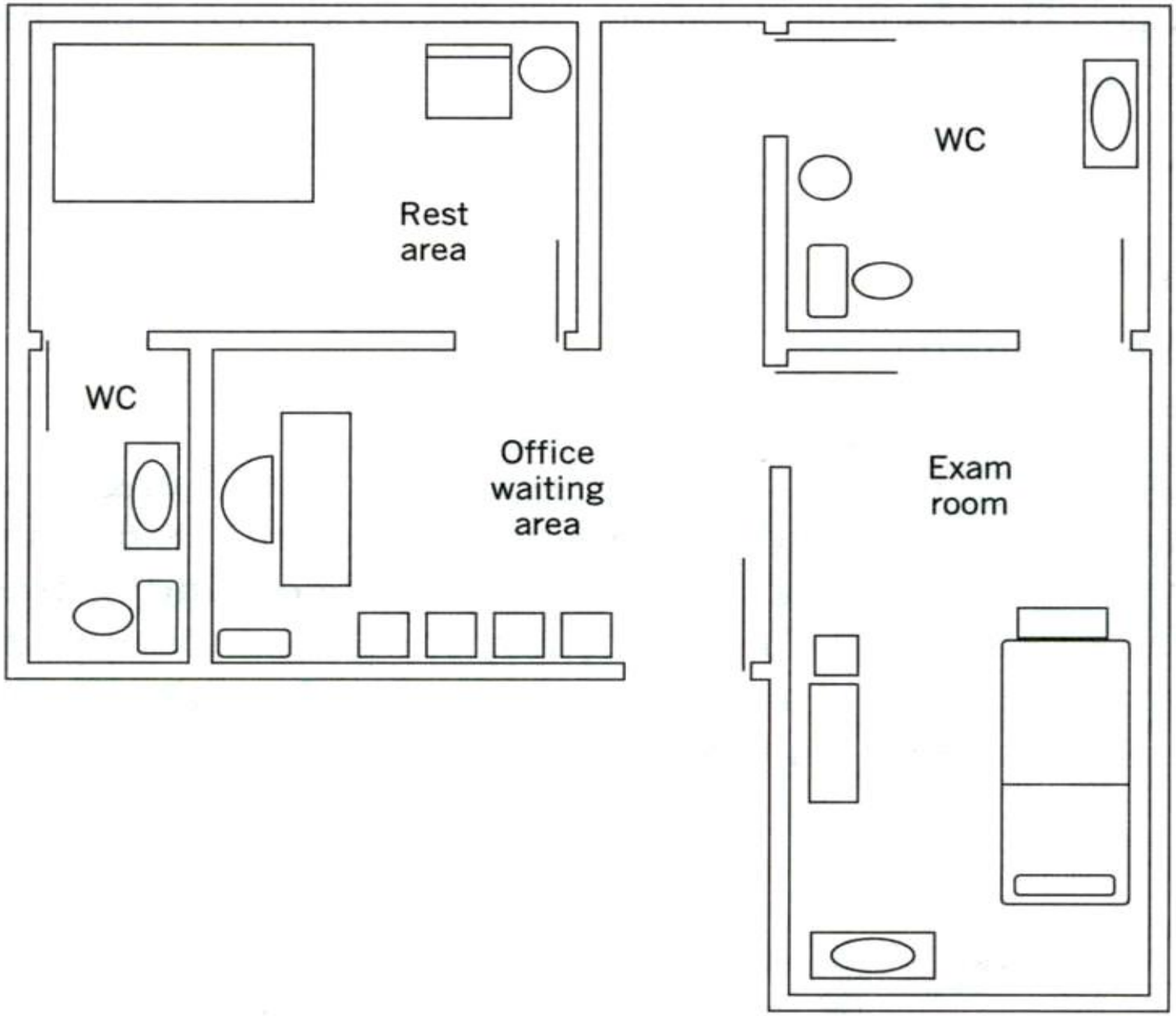
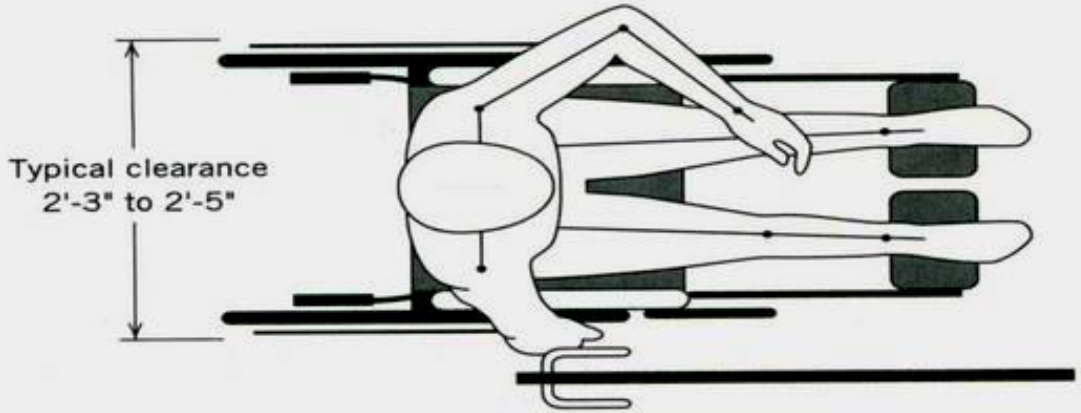


Figure 4.9 Nursing station layout.

Barrier-Free Compliance

- American Disabilities Act (ADA) must be adhered.
  - All barriers that would impede the use of the facility by the disabled person must be removed, thereby making the facility barrier free.

- Examples:
  - Doorways must accommodate wheelchairs.
  - Ramps or elevators as an alternative to stairs.
  - See figure 4.10 vs. 4-11



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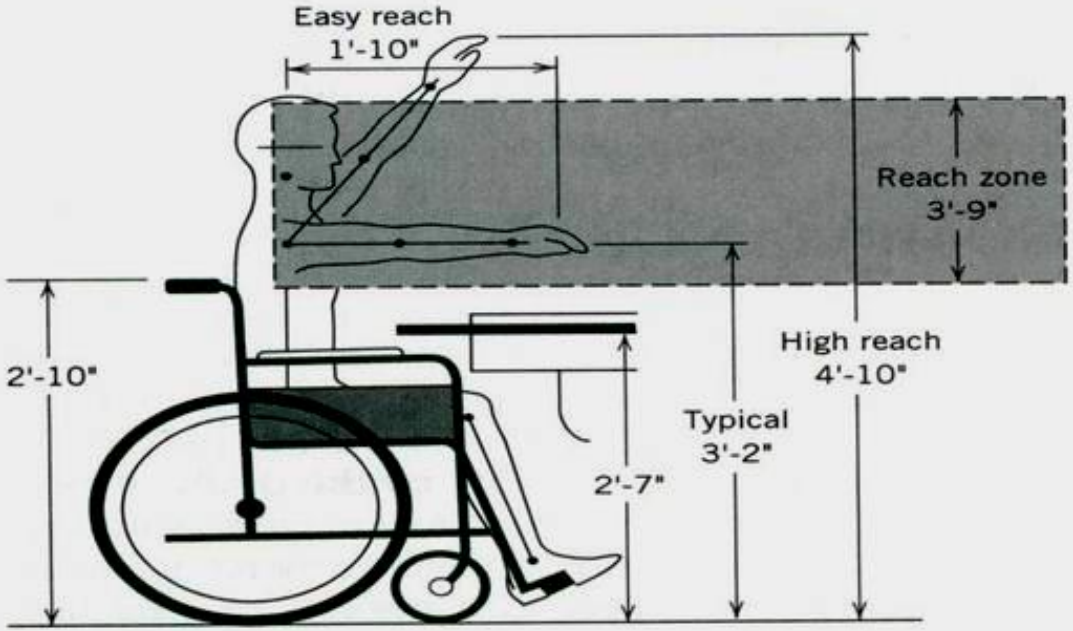

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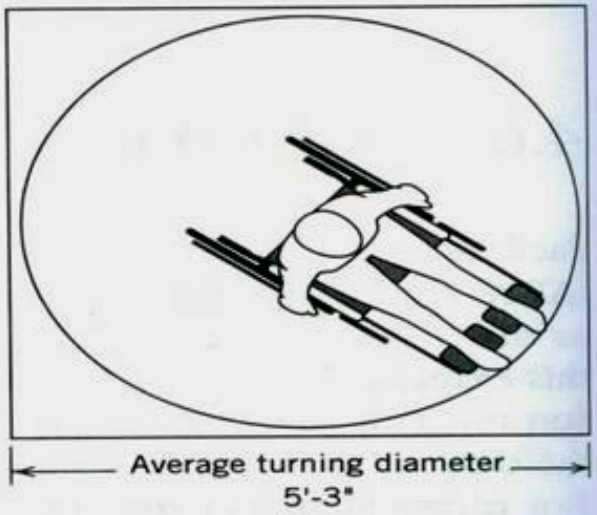


(c)

Figure 4.10 Wheelchair dimensions and turning radius.

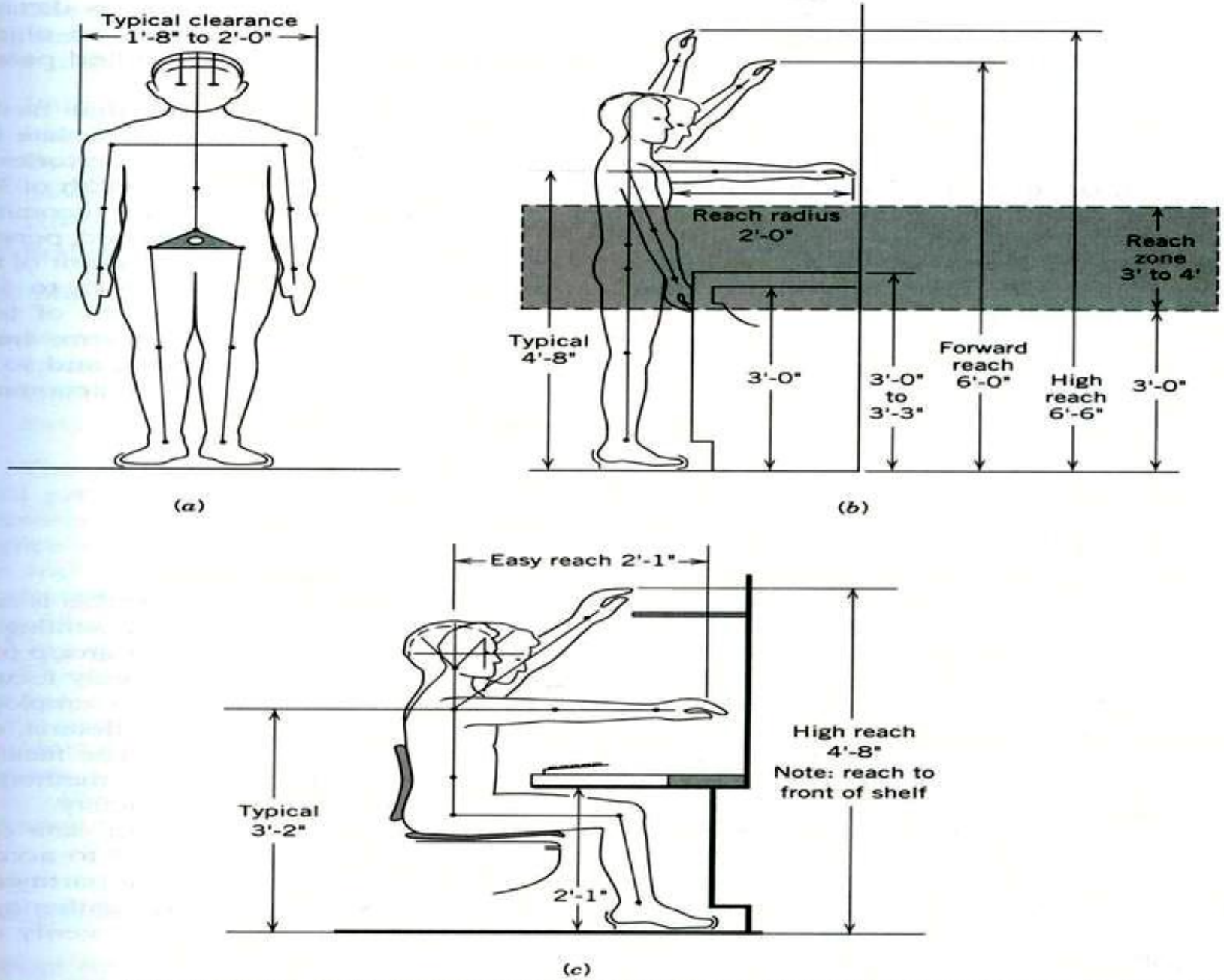
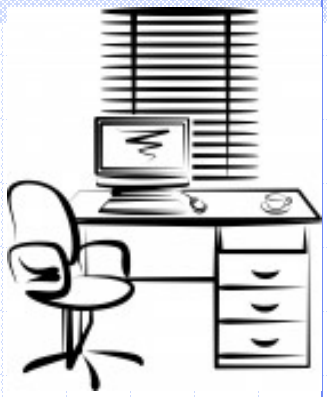


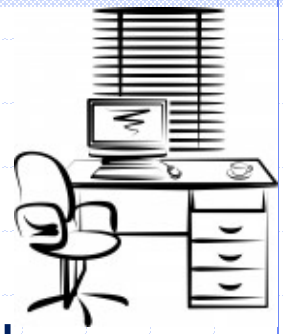
Figure 4.11 Able-bodied anthropomorphic clearance and reach requirements in standing and sitting positions.

Office Facility planning



- Office design should consider the size, proximity (coffee, cafeteria, elevator, windows, etc.), and noise.
- Office planning should start by collecting information about department relationships and department requirements

Approaches to office planning



- **Open office** design: no floor to ceiling walls exist (temporary. or permanent)
  - Advantages: good communication, better access for common files, lower maintenance cost, and improved communications and supervision.
  - Disadvantage: mainly lack of privacy
  - Figure 4-12 shows different layouts
- We use **close office** layout if privacy and tasks needed concentration
- Most offices are a combination between Open and closed.
- Space requirements: see your book page 161