

BUREAU OF PLANNING
GOVERNMENT OF GUAM
P.O. BOX 2950
AGANA, GUAM 96910

Community Development Standards

for use in preparations
of General Plans for
Communities in the territory
of Guam

COMMUNITY DEVELOPMENT STANDARDS FOR USE
IN THE PREPARATION OF GENERAL PLANS FOR
COMMUNITIES IN THE TERRITORY OF GUAM.

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THE DISTRICT CONCEPT

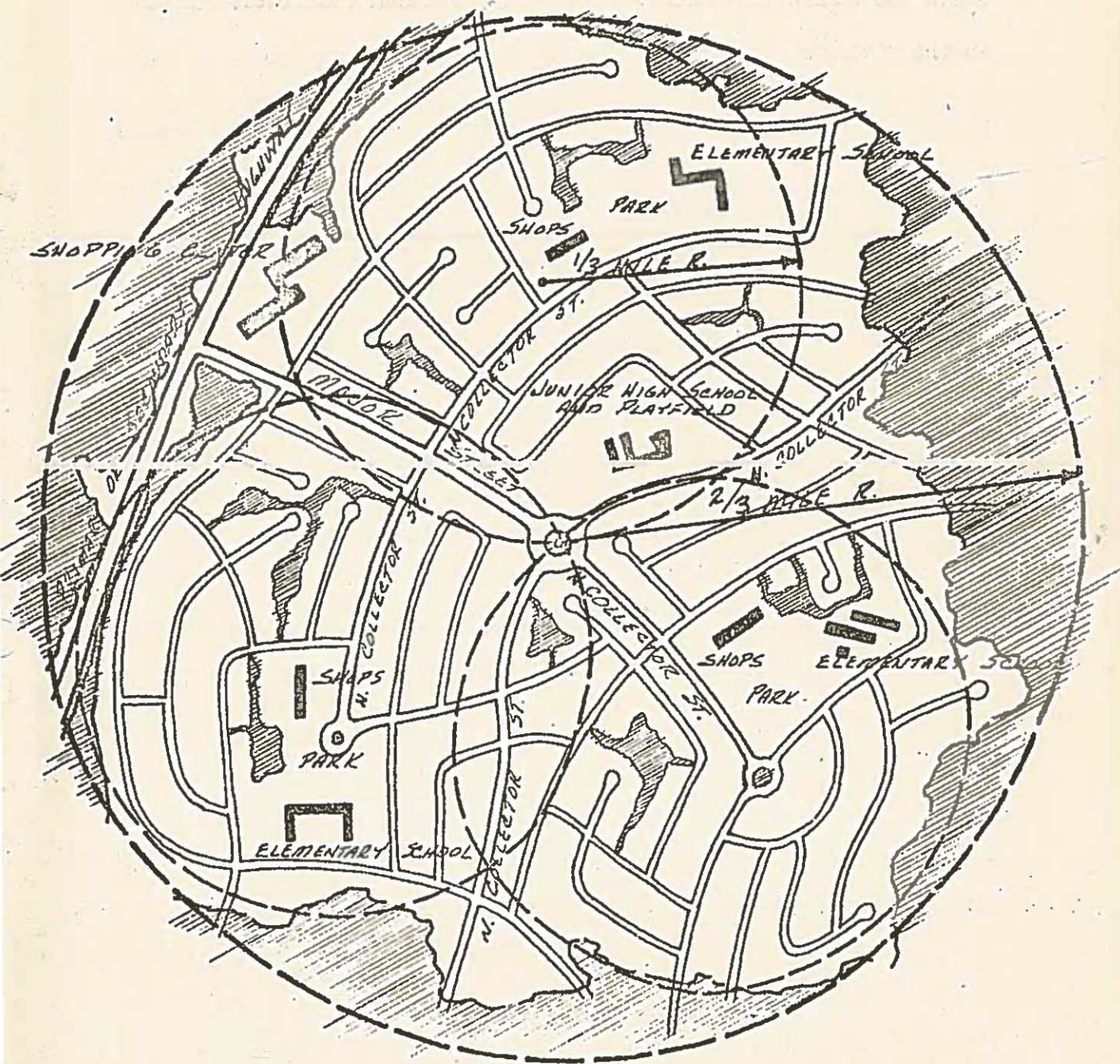
The different functional areas of a city (industrial, business, and residential) normally fall into a regular pattern. At the heart of the city is the central business district with its shops, theaters, office buildings, and related facilities. At the periphery of the central business district are located the wholesale and warehouse or light industrial facilities. Intersecting this area are the principle industrial sections of the city. Extending outward from the industrial area is an area marked by a variety of uses. Here the residential uses first appear. Beyond this transition area are the residential areas of the community interspersed with local shopping centers.

This district concept depicts the normal city complete with residential, business, and industrial development — a self-sufficient unit. In applying this concept to the territory we find that many of the existing villages do not fit this pattern because of lack of business and industrial or large employment uses. People living in these villages are employed and do most of their business away from the village. These villages then are not self-sufficient but are actually "satellite" residential districts dependent on other areas for business and employment needs. There is no reason to expect this situation to change within the foreseeable future because of the dominance of the military as it relates to the available labor force. These villages must, therefore, be designed as satellite cities.

District development standards should include those for industrial, business and residential areas, and also provide for the variables encountered in the design of "satellite" residential cities.

THE DISTRICT CONCEPT

RESIDENTIAL DISTRICT



3 NEIGHBORHOODS OF 3000 PERSONS EACH

THE NEIGHBORHOOD UNIT

Residential areas or districts may usually be subdivided into physically self-contained units containing most of the daily necessities of life. This unit is the neighborhood, an area within which residents may all share the common services, social activities and facilities required in the vicinity of the dwelling.

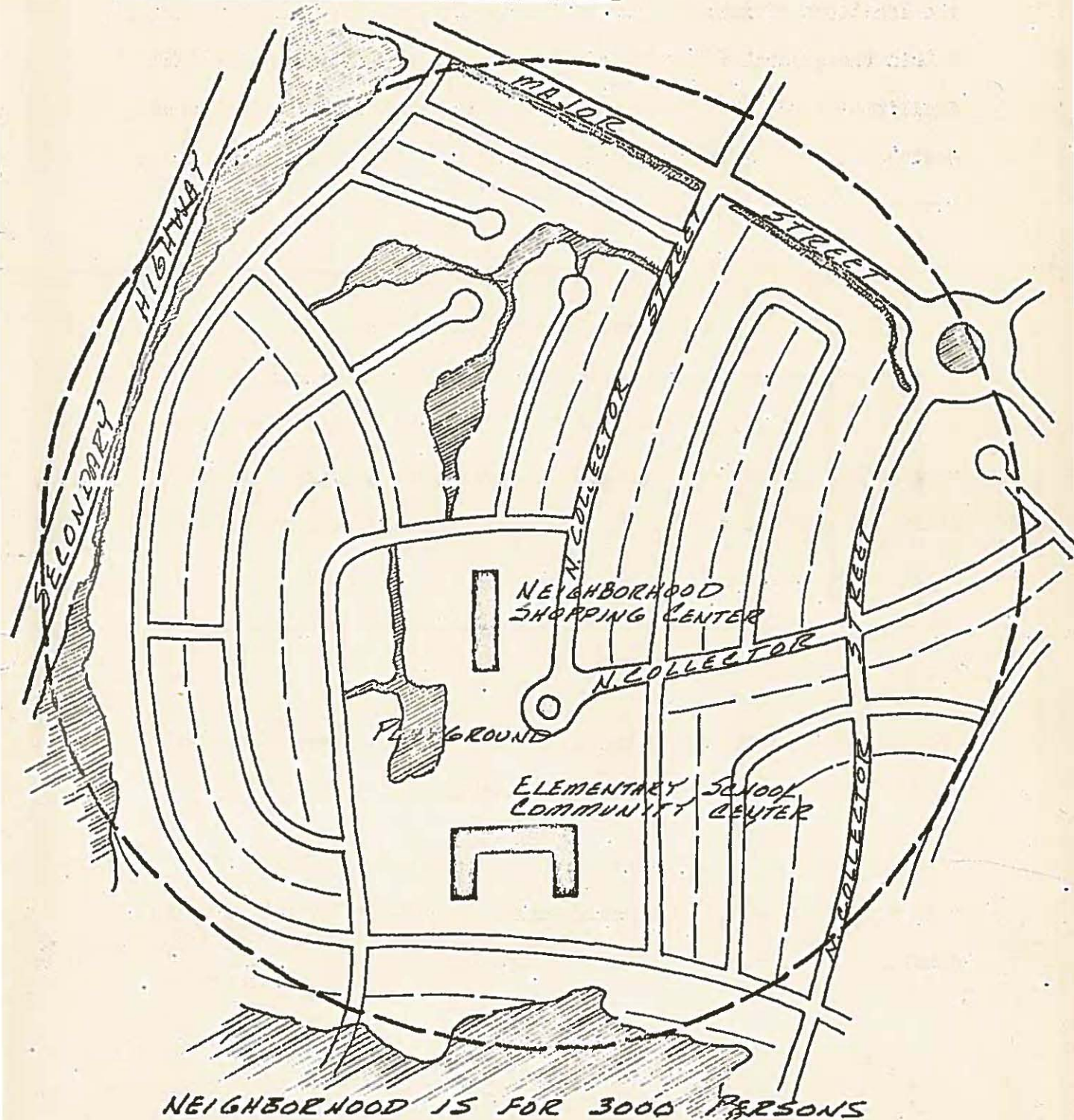
Each such neighborhood is designed to house a reasonably homogeneous population served by a single elementary school, well located neighborhood recreation spaces and a local shopping center. The size of a neighborhood is determined in two ways: The population and the geographic area. The upper and lower limits for population are set by the capacity of the elementary school. The maximum extent of the area is fixed mainly by walking distance to school and other community facilities.

Traffic arteries, rivers and streams, large open areas, political subdivisions, or major terrain changes tend to split residential areas. This makes it imperative that areas to be designed as neighborhood units use as definitive boundaries: Streets carrying through traffic, water courses, open spaces, political boundaries, and/or prominent topographic features.

The neighborhood unit must satisfy the everyday educational, recreational, social, and commercial needs of the families residing therein.

SELF-CONTAINED UNITS

"THE NEIGHBORHOOD"



RESIDENTIAL FACILITIES STANDARDS

I. CLASSIFICATION OF PRINCIPAL DWELLING TYPES

Dwelling types are the various structural forms in which dwelling units may be assembled. A structure is a building which either stands by itself with open space on all sides or has a common (party) wall or walls from ground to roof dividing it from adjoining structures. The following scheme of dwelling classification will be used in all residential planning:

A. BY NUMBER OF DWELLING UNITS IN STRUCTURE

ONE-FAMILY — a single dwelling unit occupies the structure, with independent access, services, and use of land.

TWO-FAMILY — two units comprise the structure, with individual access and services, and common use of land.

MULTI-FAMILY — three or more units occur in one structure, with common use of access, services, and land.

B. BY PHYSICAL RELATION OF STRUCTURES

The types above may be built in any of the following forms:

DETACHED — each structure has open space on all four sides.

SEMI-DETACHED — one wall of each structure is a party wall in common with an adjoining structure.

ATTACHED (group or row) — both side walls of all except end structures are party walls.

With semi-detached houses, the thing ordinarily called a building will consist of two structures; with attached houses it will contain several structures.

II. GOVERNING FACTORS IN SITE PLANNING

Good site planning practice should make adequate provision for:

- a) Light and air in the buildings
- b) Protection against noise
- c) Outdoor space for daily family needs
- d) Safety from accidents and fire

A. LIGHT AND AIR

Structures should be placed so as to admit daylight to all habitable rooms in amounts adequate for the performance of general household tasks without artificial light during the hours of full daylight. To capitalize on cooling breezes, structures should be oriented and have exposure to prevailing winds.

B. QUIET

The basic objectives in designing for quiet may be expressed as follows:

- 1) To assure that bedrooms will be sufficiently quiet to prevent interference with sleep at any hour of the day or night.
- 2) To assure that other habitable rooms and outdoor living spaces will be quiet enough so that residents may carry on all normal activities without interruption or irritation.

Quiet may be provided in residential areas by the following methods:

1) SELECTION OF DWELLING TYPE

The dwelling type determines the exposure of the dwelling unit to outside noise and to direct transmission of noise from adjacent buildings.

2) SETBACK, SPACING, AND ORIENTATION OF BUILDINGS

The distance of buildings from the source of noise determines its volume at the point of desired control.

Orientation of buildings to noise sources, whether streets, playgrounds or structures, determines the amount of surface exposed to the noise and the extent of diffusion of noise. Setback for all residential structures should be no less than 25 feet. Spacing between detached and/or semi-detached structures should be no less than 15 feet.

Spacing between structures should be increased if structures are more than 2 stories in height or if structures are attached.

3) PROVISION OF BAFFLES AND DISSIPATING SURFACES

Baffles such as walls, heavy planting, etc. and the breaking up of solid surfaces by layout, planting or choice of structural material may absorb or diffuse part of the sound and thereby reduce its nuisance value. Baffles in the form of heavy planting and/or walls should be used between residential structures and traffic arteries and between residential structures and commercial, industrial, or institutional uses.

C. USABLE OUTDOOR SPACE

Every family should have outdoor space for the following activities provided in the immediate vicinity of the dwelling as a part of the residential facilities:

- 1) Play space for small children (up to the age of 6).
- 2) Sitting out, gardening or other outdoor hobbies.

- 3) Clothes drying.
- 4) Storage of refuse.
- 5) Storage of lawn and garden tools, baby carriages, bicycles, etc.
- 6) Approach for car and pedestrians.
- 7) Storage of car and parking space for visitors' cars.

The major design factor affecting provision of usable outdoor space is choice of dwelling type. A basic distinction must be made between one- and two-family houses, where each family has individual services and access to the dwelling, and multi-family dwellings, which have shared access and common use of outdoor space and services.

Detached and semi-detached house requirements:

- 1) Clear, usable and sunny area for outdoor living and children's play with minimum standard width of 25-30 feet and a depth of at least 35-40 feet.
- 2) Space for access walks to front and rear of the house.
- 3) Space on the lot for clothes drying, refuse storage, outdoor equipment storage and service access.
- 4) Space for garage or parking of car on the lot so as not to conflict with other uses, and space for a safe and convenient automobile driveway.

These considerations plus the needs for light, air and privacy for windows facing side yards, and allowance for flexibility in design of houses and their layout on the lot govern the width and depth of the lot. The dept is also affected by need for setback from the street.

The desirability of relatively wide frontages for freestanding houses should be emphasized. Sixty-foot lot width is a minimum requirement for detached one-family houses and 70 feet is a desirable goal.

Semi-detached houses make possible some reduction of lot width per family; possibly to a minimum of 40 feet per family.

In order to provide adequate setback from the street, lots should be no shallower than 110 feet, and 125 feet is a desirable goal. Double frontage lots should be no shallower than 125 feet, and 140 feet is a desirable goal.

Attached (row) house requirements.

- 1) Clear, usable, and sunny area for outdoor living and children's play with minimum standard width of 20-25 feet and depth of at least 35-40 feet.
- 2) Space for access walks to front and rear of the house.
- 3) Space on the lot for clothes drying, refuse storage, outdoor equipment storage and service access.
- 4) Space for garage or parking of car on the lot or in group garages with access space designed for safe and convenient entry and exit. Where group parking or group garages are used, they should be within reasonable distance of the dwelling served.

On this basis a minimum standard lot width of 20-25 feet should be used for row houses. The depth will depend on the design and location of houses and space mentioned above, and also on the setback from the street.

In addition to the above requirements, multi-family dwellings need special areas for play of small children (3 through 5 years). A playlot should be provided within 300 to 400 feet of each building, accessible without crossing any street. The area of the playlot should be based on a space allowance of 100 square feet per child in the specified age group. The playlot should have a minimum area of 5000 square feet to serve up to 50 children, and the maximum should not exceed 10,000 square feet, or a capacity of 100 children.

D. SAFETY

Residential facilities should be entirely free from grave hazards to life or health, and as free as possible from minor hazards and nuisances. Major accident hazards are collision with moving vehicles, fire and explosion, falls and drowning. Chief cause of collision is street traffic, with crash landings of aircraft to be considered near airports. Sources of fire and explosion hazards include: Bulk storage of oil, gasoline, or gas; rifle ranges and other places where firearms are used under potentially dangerous conditions; dumps and rubbish piles; large expenses of brushland; and certain industries. Falls and drowning may occur with unprotected cliffs, quarries, pits, junk yards, etc.

III. DENSITY OF DEVELOPMENT

Densities show the crowding of people and structures on the land and the amount of open space available to the families. The per cent of land covered by buildings reflects in general the amount of open space available for gardens, children's play, outdoor living, the drying of laundry, etc. The intensity of residential use can be expressed by different types of density calculations, showing mathematical relationships between the area of a given piece of land and the population load or building bulk. Density standards are useful as a guide for preliminary design schemes, and for estimating population loads and required areas of land. Density standards have major value as controls in zoning and subdivision regulations. This section will deal with the following types of density measurement.

- a) Net dwelling density
- b) Building coverage
- c) Building bulk
- d) Population density

A. NET DWELLING DENSITY

Net dwelling density is the number of dwelling units per acre of net residential land (land devoted to residential buildings and accessory uses on the same lots, such as informal open space, drives and service areas, but excluding land for streets, public parking, playgrounds, and non-residential buildings). The following minimum area allowances per family for various dwelling types will be used for dwelling density calculations:

TABLE 1: NET DWELLING DENSITIES, BASIS OF CALCULATION

<u>DWELLING TYPE</u>	<u>LOT SIZE OR EQUIVALENT (FEET)</u>	<u>NET RESIDENTIAL AREA PER FAMILY (SQUARE FEET) MINIMUM</u>
One- and Two-Family		
One-Family detached	60x110	6,600
One-Family semi-detached	80x110 (For two families)	4,000
Two-Family detached	80x110 (For two families)	4,400
One-Family attached (Row)	24x110 plus 40-foot Side yard between each 10 structures	3,080
Two-Family semi-detached	96x110 (For four families)	2,640
Multi-Family		
Two-Story	30x125 plus 40-foot Side yard between each 10 structures	1,500
Three-Story	20x125 plus 40-foot Side yard between each 10 structures	1,000
Four-Story	20x125 plus 40-foot Side yard between each 10 structures	750

Good design practice can provide adequate open space for all outdoor functions of family life using the above areas and using standards for spacing of structures, orientation and other features of site layout providing neighborhood density standards are closely adhered to.

Neighborhood density standards based on residential facilities standards plus community, commercial, and circulation needs are covered in Section IX. Based on the above area requirements, the following dwelling density standards will be used:

TABLE 2: NET DWELLING DENSITIES

<u>DWELLING TYPE</u>	MINIMUM	NET DWELLING DENSITY		DESIRABLE
	AREA	(PER RESIDENTIAL ACRE)		AREA
	<u>PER FAMILY</u>	<u>MAXIMUM</u>	<u>DESIRABLE</u>	<u>PER FAMILY</u>
One- and Two-Family				
One-Family detached	6,600	6.6	5.0	8,750(70x125)
One-Family semi-detached	4,400	9.9	8.7	5,000(40x125)
or				
Two-Family detached				
One-Family attached(Row)	3,080	14.1	12.4	3,500(28x125)
Two-Family semi-detached	2,640	16.5	14.5	3,000(24x125)
Multi-Family (Common Access and Services)				
Two-Story	1,500	29.0	24.9	1,750(28x125)
Three-Story	1,000	43.6	37.4	1,165(28x125)
Four-Story	750	58.1	49.8	875(28x125)

B. BUILDING COVERAGE

Building coverage is the proportion of net or gross residential land area taken up by buildings. In use, net building coverage must be related to building height and population density to provide a usable guide for spacing of residential structures. A high percentage of land coverage is undesirable even if population density is low because there remains no outdoor space for various uses conducive to better health and circulation. Coverage, location, and height are closely interrelated, and can only be established in the process of design. Excess building coverage will not allow conformity with standards for light, air, and open spaces. Poorly designed spaces although conforming to building coverage standards may still not allow sufficient light, air, and open space. The following net building coverage standards will be used:

TABLE 3: NET BUILDING COVERAGE

<u>DWELLING TYPE</u>	<u>NET BUILDING COVERAGE</u> <u>(MAXIMUM)</u>	<u>min. area</u> <u>cl. U.</u>
One- and Two-Family		
One-Family detached	25%	1650 sq. ft.
One-Family semi-detached or Two-Family detached	25%	
One-Family attached (Row) or Two-Family semi-detached	30%	
Multifamily		
Two-Story	30%	
Three-Story	28%	
Four-Story	25%	

C. BUILDING BULK (FLOOR AREA RATIO)

Floor area ratio is the total floor area of all stories used for residential purposes divided by the area of residential land.

Normal practice is to include one-half the area of abutting streets as part of the land area, but because of the expected large number of minimum width streets with maximum usage for car storage, and the large family size, the streets will not add much in the way of open space. Only the individual lot area will, therefore, be used as the residential land area. Because floor area ratio establishes a mathematical relation between the land area, the floor area of the building, and its height, it is considered among the most accurate indices for adequacy of light and air and is most used for this purpose. If the floor area ratios given below are used as density controls, they will generally assure adequate admission of sunshine, daylight, and air to dwellings. Floor

area ratios will not reflect population densities because floor area per person varies (usually increasing as income increases).

The following are considered to be the maximum allowable floor area ratios:

TABLE 4: FLOOR AREA RATIO

<u>DWELLING TYPE</u>	<u>FLOOR AREA RATIO (MAXIMUM)</u>	
One- and Two-Family		min area des area
One-Family detached	50%	3300 4380
One-Family semi-detached	50%	max bldg A/person 500 ft ² 795 ft ²
Two-Family detached	50%	
One-Family attached (Row)	60%	
Two-Family semi-detached	60%	
Multi-Family		
Two-Story	60%	
Three-Story	84%	
Four-Story	100%	

D. POPULATION DENSITY

Dwelling densities do not accurately measure the population load on residential land, because the number of persons will vary with dwelling sizes and composition of occupancy. The number of persons per room is likely to decrease, and floor area per person is likely to increase, from low to high income families. The number of persons per acre is particularly useful as an index of the population load on various community facilities. For this reason standards for population density are most usefully applied on a neighborhood basis. Population load does, however, have a direct effect on the amount of land required for multiple dwellings.

NEIGHBORHOOD STANDARDS

I. ASSUMED FAMILY SIZE AND COMPOSITION

Dwelling types, playgrounds, schools and other community facilities serving specific age groups must be planned in relation to a known or assumed age distribution. The following age distribution is based on Chief Commissioner's population figures for January 31, 1957, a U.S. Census for the years 1930, 40 and 50. Average size of family is assumed 5.2 persons.

TABLE 5: AGE DISTRIBUTION OF CHILDREN

<u>AGE DISTRIBUTION OF CHILDREN SERVED BY NEIGHBORHOOD SCHOOLS AND PLAY AREAS</u>	<u>CHILDREN PER 1000 PERSONS</u>	<u>CHILDREN PER FAMILY</u>
Children by School Age Groups		
Nursery School 3 and 4 years	68	.35
Kindergarten 5 years	22	.17
Six-Grade Elementary School 6 through 11 years	190	.99
Three-Grade Junior High School 12 through 14 years	83	.42
Three-Grade Senior High School 15 through 17 years	72	.36
Children by Play Age Groups		
Playlot 3 through 5 years	100	.52
Playground 6 through 14 years	273	1.41
Playfield 12 through 17 years	155	.78

system, private septic tank disposal systems may be used provided that lot areas are increased to a minimum standard as approved by the Chief of Public Health and Sanitation.

I. FREEDOM FROM LOCAL HAZARDS AND NUISANCES

Sites should be free from accident hazards as covered by Section II D; from excessive noise and vibration; and from moral hazards including places of gambling, bars, taverns, night clubs, and houses of prostitution.

J. ACCESS TO COMMUNITY FACILITIES OUTSIDE THE NEIGHBORHOOD

All residents of the neighborhood development should have access to an improved highway system. Travel to community facilities should not require excessive time, cost, or fatigue.

III. NEIGHBORHOOD COMMUNITY FACILITIES

Those basic services which cannot be supplied by or to the individual family in its own dwelling should be considered for inclusion among the neighborhood community facilities. These neighborhood community facilities should normally include:

EDUCATION

Kindergarten, elementary school, adult education

OUTDOOR RECREATIONAL

Playlot, playground, neighborhood park

INDOOR SOCIAL, CULTURAL, AND RECREATIONAL

Church, library, assembly and recreation space

NEIGHBORHOOD SHOPPING

Food and drug stores, miscellaneous services

facilities for secondary education, special or infrequent shopping, organized sports and employment will usually serve more than one neighborhood and are discussed in the section on district standards.

The number of facilities and services used in common is constantly increasing: Because of the development of new techniques which can be used most effectively on a shared basis; because of the growing complexity of urban life; and because responsibilities of the community are increasingly recognized. The type of facility to be provided will depend on the degree to which needs may be met in the dwellings or by private facilities. Cultural background, age composition and economic status of families housed will condition their needs for adult education, church facilities and recreation. The providing of safe and convenient access to neighborhood

facilities is as important as providing the facilities. Avoidance of fatigue, protection from traffic and other accident hazards, and positive encouragement of use of the facilities will increase the value of the facilities.

V. OUTDOOR RECREATION

Among commonly recognized public responsibilities, that of providing adequate recreation facilities for the people of the territory is presently being almost completely neglected. Recreation — the enrichment of living through the constructive use of leisure and the expression of normal human interest in art, dance, drama, music, sports, nature, the world of the mind, and social activities — is urgently needed to provide for the physical and mental well-being of the territory's population.

Recreation is not a luxury, opportunities for which may be provided only if a civilization is wealthy and prosperous and has funds left after all other services have been met. Rather, recreation is an essential in the life of the people and opportunities for engaging in it rank substantially in the same order of importance as opportunities for schooling. It may well be that at some future date the operation of the recreation program will be put in its proper place alongside formal schooling and be operated and developed by school authorities. Until that time, there should be a fully organized recreation department responsible for directing the territory's recreation program.

To be effective, a recreation department needs a comprehensive system of recreation and park facilities which cater to the wishes of all age groups. Facilities serving these wishes should be distributed in such a manner as to be convenient to all of the people. Recreation facilities are divided into two large groups: Outdoor recreation, and indoor social, cultural, and recreational facilities. Indoor

social, cultural, and recreational facilities are covered in Section VI. Outdoor recreational activities are generally considered in two categories: Active, which include neighborhood playlots and playgrounds, district playfields and athletic fields and city-wide or regional facilities like swimming pools, beaches, boat docks, golf clubs, etc.; and passive, which include neighborhood parks, large urban parks, regional parks, and various special types of city parks.

This section will cover that part of outdoor recreation provided within the neighborhood. They are: Playlots, playgrounds, and neighborhood parks. Playlots are intended entirely for the use of children of pre-school age and their mothers. Playgrounds are intended for the active play of children from 6 to 15, and neighborhood parks for the passive recreation of all age groups, with emphasis on areas for mothers with babies, the aged, and whole families.

A. PLAYLOT

A playlot is a small area planned for the imaginative, creative, and sometimes vigorous outdoor play of pre-school children. It supplements the home by providing experiences not possible at home and is especially important in crowded residential areas. It normally is provided by apartment house owners or developers, but may be provided publicly in large-scale housing projects or in congested neighborhoods where backyard play opportunities are not available.

1) SIZE

A playlot should be from 5,000 to 10,000 square feet as

covered in Section II C. Standards in II C are for multi-family dwellings. Playlots serving other dwelling types should use the same standard except that the service area will be expanded.

2) LOCATION

Playlots should be provided in the middle of blocks containing minimum size lots with high population density, or near the center of multi-family apartment areas. In areas of relatively low population density, they may be included as part of the neighborhood playground.

In low density areas, some crossing of residential streets will be required, but in no case should pre-school children be required to cross streets carrying heavy traffic. Playlots must be within walking distance of mothers and children they serve and should be within $\frac{1}{4}$ mile of each home.

3) FEATURES

A low fence, hedge or barrier should entirely surround the playlot. Desirable range of facilities would include:

Swings, slide, sand box, an open area for free play, "Gopher Holes", climbing maze, wheeltoy freeway, play sculpture, playhouse, shrubs and trees, and a shelter with benches for mothers.

B. PLAYGROUND

This area is intended to provide an outdoor recreation area for the people of the neighborhood. Primarily it will serve children from 6 to 15 with a wide range of normal play activities. In addition it provides limited facilities for games and other

activities for young people and adults. It should also include a separate small section for pre-school children. Desirably the playground should be a part of the neighborhood recreation center as covered in Section V C.

1) SIZE

To serve the varied needs of a neighborhood, a playground should be no less than 7 acres. Seven acres plus 1 additional acre for each 1,000 neighborhood population is recommended.

For neighborhood population sizes established in Section IV A, the recommended playground size would be:

TABLE 8: NEIGHBORHOOD PLAYGROUND SIZE

<u>NEIGHBORHOOD POPULATION</u>	<u>SIZE NEEDED (ACRES)</u>
1,000	8
2,000	9
3,000	10
4,000	11

2) LOCATION

There should be a playground within a quarter to a half mile of every home. In densely built-up neighborhoods a playground is needed within a quarter mile; under the most favorable neighborhood conditions no person should be required to walk more than half a mile from home to reach a playground. Since the playground is used to a large extent by children of elementary school age, the best location for the playground is at or adjoining the elementary school site. The playground should be located as near as possible to the center of the neighborhood it is intended to serve. Location

of playgrounds along streets with heavy traffic, industrial sites or other barriers, or non-residential areas should be avoided.

3) FEATURES

The well-developed playground should include the following facilities:

PLAYLOT AND MOTHERS' AREA — Facilities should be as suggested in Section V A.

APPARATUS AND PLAY AREA — A safe apparatus area with swings, traveling rings, horizontal ladder; large-scale play sculpture; vacant lot area for digging caves and trenches, build huts, etc.

NATURE AND SCIENCE HOBBY AREA — For serious pursuit of scientific and mechanical interests with space for garden plots and a bath house; and area for group science activities and outdoor display of hobbies and collections.

PAVED AREA FOR COURT GAMES — The area includes any desired combination of tennis, volleyball, badminton, and basketball courts and a paved slab for all-purpose use. Night lighting may be used.

FIELD FOR SPORTS — Large open space required for softball, field hockey, speedball, soccer, and touch football.

PARKLIKE AREA FOR FREE PLAY. — A free play turfed area bordered by shrubs and trees.

NEIGHBORHOOD PARK SHELTER — A building to provide toilet facilities, an indoor game area, and storage facilities. The school serves this function in a neighborhood school and recreation center.

QUIET AREA — For quiet relaxation.

OLDER PEOPLE — A turfed area required for bowling, croquet, and horseshoe. A paved area for games and social activities, and some storage for game equipment.

OFF-STREET PARKING — Sufficient off-street parking space should be provided so as to avoid congestion in streets around the park. About 350 square feet should be allowed for each space to be provided, this will include necessary circulation area and landscaping.

LANDSCAPING — All public areas should be well landscaped so that they are an aesthetic asset to the neighborhood. The use of hedges as barriers and shrubs and trees as baffles should be used wherever possible.

Topography will have a considerable effect on the location of the playground, as it requires a level and well drained area. Finished grades should not exceed 2 per cent for those portions where organized sports are carried on. The minimum slope for drainage should not fall below 0.5 per cent. The playground should be fully surrounded by fencing or other effective barriers. Proper surfacing for playgrounds is important for protection of the children. Surfaces of general play areas should be resilient, dust free, and quick drying. Sod surfaces are preferable, with concrete and coral definitely hazardous.

C. NEIGHBORHOOD PARK

Shade, walks, benches and a pleasant outlook are the chief requirements for passive recreation areas. These areas need not be all in one location, but may include land surrounding the

neighborhood recreation center buildings, other municipal buildings, and land along streams or rivers, highways, beaches, or cliffs. Where the park area is broken up into separate small units, these should be interconnected by pedestrian paths and landscaped strips. The park area will depend not only on the population load, but on the design of the park. A minimum of 2 acres is recommended for any neighborhood park, regardless of population load.

D. NEIGHBORHOOD SCHOOL AND RECREATION CENTER

A neighborhood school and recreation center is a combination school, playground, and park all acting as the nucleus of the neighborhood. This could provide the basis for a comprehensive school and recreation unification, with one school-recreation program.

A neighborhood school and recreation center, therefore, should have a playlot, playground, and neighborhood park as outlined above plus an elementary school as outlined in Section IV A. This center then will provide education facilities for grade school children and adults; it will provide a wide range of normal play activities for all age groups; and will in addition become an important part of the neighborhood's center of community activities.

The size of the neighborhood school and recreation center should be a minimum of 10 acres plus three additional acres for each thousand neighborhood population. This provides a space saving over separate facilities since play area is not duplicated and because the school building can take over the functions of the park shelter. Space allocation will generally follow the table below, with alterations for special requirements.

TABLE 9: ELEMENTARY SCHOOL, PLAYGROUND, AND NEIGHBORHOOD SCHOOL AND RECREATION CENTER

F A C I L I T I E S	ELEMENTARY SCHOOL (PUPILS)				NEIGHBORHOOD PLAYGROUND (PERSONS)				NEIGHBORHOOD SCHOOL AND RECREATION CENTER (PERSONS)			
	210	450	660	870	1,000	2,000	3,000	4,000	1,000	2,000	3,000	4,000
School Building	.40	.70	1.10	1.50					.40	.70	1.10	1.50
School Lawn, Service & Parking	.90	1.10	1.20	1.30					.90	1.10	1.20	1.30
Margin for School Expansion (20%)	.25	.35	.45	.55					.25	.35	.45	.55
Apparatus and Play Area	.25	.30	.40	.50	.40	.50	.75	.85	.40	.50	.75	1.00
Nature & Science Hobby Area	.40	.45	.50	.60					.40	.45	.60	.70
Paved Area for Court Games	.50	.60	.75	.75	.50	.75	1.00	1.00	.70	.85	1.15	1.15
Field for Sports	2.00	3.00	3.50	4.00	3.50	4.00	4.50	5.00	4.50	5.00	5.50	6.00
Playlot and Mother's Area					.35	.40	.45	.50	.35	.40	.45	.50
Parklike Area for Free Play	.75	.80	1.00	1.35	.75	1.00	1.25	1.50	1.00	1.50	1.75	2.00
Neighborhood Park Shelter					.30	.35	.40	.50				
Quiet Area					.25	.35	.40	.60	.25	.35	.40	.60
Older People					.25	.35	.40	.60	.25	.35	.40	.60
Off-Street Parking					.60	.75	.85	1.00	.60	.75	.85	1.00
	5.45	7.30	8.90	10.55	6.90	8.45	10.00	11.55	10.00	12.30	14.60	16.90
Landscaping at 30 per cent	1.65	2.20	2.70	3.15	2.10	2.55	3.00	3.45	3.00	3.70	4.40	5.10
TOTAL AREA	7.1	9.5	11.6	13.7	9.0	11.0	13.0	15.0	13.0	16.0	19.0	22.0
	5 + 1/Hundred				7 + 2/Thousand				10 + 3/Thousand			

F. DESIGN OF STREETS

Streets should permit easy and safe circulation by avoidance of steep grades, sharp curves and needless intersections; and by adequate width in relation to volume of traffic. Major design factors include intersections, width, grades, surfacing and drainage.

1) DESIGN AND SPACING OF INTERSECTIONS

The spacing of intersections at too close intervals should be avoided. Intersections of main traffic streets bordering residential development should be at least $\frac{1}{4}$ mile apart. The number of intersecting streets at any one point should be held to a minimum. Desirably, an intersection should include only two streets. Where more than two streets are involved, a traffic circle is recommended.

Street intersections should be at 90° wherever possible and should never be less than 75°. There should be unobstructed view across the angle of an intersection. Where this is not possible, traffic on the less important street should be forced to stop before entering the intersection.

Turning radii should permit right turns by vehicles without having to cross the center line of the roadway. Curb radii should be computed in relation to the widths of intersecting streets. Barriers and traffic islands should be used to segregate potentially conflicting lanes of traffic. Signs, pedestrian safety zones and traffic lights should be used where necessary for proper control.

2) PAVEMENT WIDTH

The basic consideration governing pavement width is that there be one free and clear traffic lane at all times (even with occasional curb parking on streets not permitting parking) for passage of emergency vehicles. Street width is determined by the number of required driving lanes and the additional parking lanes. Ten feet is considered the minimum width for a lane of moving traffic, with 12 or 14 feet widths for faster traffic. Eight feet is the standard width for a lane of parallel parking.

Parking should be eliminated from streets other than residential service streets wherever possible. The following pavement widths and design elements are recommended as absolute except where extremely extraordinary circumstances dictate otherwise.

RESIDENTIAL SERVICE STREET — 50 foot Right-of-way

36 ft. pavement Parking both sides Two-way

2 — 10 ft. Travel lanes 2 — 8 ft. Parking lanes

RESIDENTIAL SERVICE STREET — 40 foot Right-of-way (permissible for dead-end streets — 300 feet or less)

26 ft. pavement No parking Two-way

1 — 10 ft. Travel lane 2 — 8 ft. stop lanes

NEIGHBORHOOD COLLECTOR STREET — 60 foot Right-of-way

40 ft. pavement No parking Two-way

2 — 10 ft. Travel lanes 2 — 10 ft. stop and/or turn lanes

MINOR TRAFFIC STREET (MAJOR COLLECTOR) — 80 foot Right-of-way

44 ft. pavement No parking Two-way

2 — 12 ft. Travel lanes 2 — 10 ft. stop and/or turn lanes

4 — 11 ft. Travel lanes where necessary

MAJOR TRAFFIC STREETS

SECONDARY HIGHWAY — 100 foot Right-of-way

28 ft. pavement No stopping Two-way

2 — 14 ft. Travel lanes 2 — 12 ft. shoulders

2 — 24 ft. Grading and Drainage

PRIMARY HIGHWAY — 140 feet and over Right-of-way

2 — 28 ft. pavement No stopping Divided Two-way

2 — 28 ft. pavement 2 — 12 ft. shoulders

2 — 24 ft. Grading and Drainage 1 — 12 ft. Median

Where dead-end streets (cul-de-sac) are used, they should not be longer than 800 feet and should be provided with an unobstructed turn-a-round 80 feet in diameter. Short cul-de-sac streets with 26 feet pavement should also have an 80 foot turn-a-round.

3) STREET GRADES AND CURVES

Residential streets should have a maximum grade of 6 to 8 per cent if possible. This may be increased to 10 per cent where necessary and in some instances 12 per cent is permissible for very short streets. Grade should be a maximum of 3 per cent at intersections. Curves in residential service and neighborhood collector streets should have a minimum center radius of 125 feet for safe design.

4) SURFACING, CURBS, AND DRAINAGE

Streets should be designed for maximum utility with minimum maintenance and minimum annoyance to adjacent property owners. To meet these requirements, all neighborhood streets must have:

Paved (bituminous or concrete) surface for all-weather, dust-free

use; concrete curbs for preservation of pavement and ease of street and lawn maintenance; proper drainage to keep street water from running onto lawns and to keep streets free of water for easy traffic movement.

G. DESIGN OF WALKS

It is desirable that walks be separated from street pavements by a planting strip at least 4 feet wide. Curbwalks (combined curb and walk) should not be used except in unusual situations. Curb heights should be not more than 6 inches to permit easy street crossings by pedestrians. Long blocks should have marked crosswalks in addition to those at intersections. Curbs at intersections should have a slot for easy passage of bicycles.

Where a large volume of pedestrian traffic from the development will cross major arteries bounding the area, special safety measures should be taken. Traffic lights or stop signs will be sufficient in most cases. In rare instances an under-or overpass may be necessary.

The width of walks should be based on the volume of pedestrian traffic. Entrance walks to group dwellings should have a minimum width of 4 feet. Service walks and sidewalks along residential service streets should be 3 feet wide. Major walks and walks along collector streets should be 4 feet wide. Approaches to schools, shopping centers and other community facilities should be correspondingly wider.

H. DESIGN OF PARKING SPACES AND DRIVENAYS

Wherever possible, parking should not be allowed directly adjacent to

lanes which carry through or fast moving traffic. Parking should not be allowed where it may interfere with safe sight distances, either at intersections or on curves. Parking then should be prohibited within 25 feet of intersections, from inside of curves of less than 150-foot radius, and all other potential danger points.

Entrances and exits of parking spaces and driveways at critical accident points should be eliminated. For maximum safety, driveway design would include: Adequate radii of curb returns, adequate curb cuts, adequate distance of driveways from street intersections (25 feet), adequate width between adjacent driveways.

I. CIRCULATION LIGHTING

Streets, parking spaces, and walks should be lighted to provide safe travel for all vehicles, to prevent pedestrian accidents, and to prevent crime. This requires lighting throughout the night along all intersections and at a spacing of 120-160 feet apart. Walks not adjoining streets should be separately lighted as should steps or other hazardous points.

A. DETERMINATION OF NEIGHBORHOOD DENSITY LIMITS

The following tables derive a range of what may reasonably be considered as maximum permissible neighborhood densities. Table 12 is an illustrative calculation of land required per family for all neighborhood uses in a development of 4,000 persons. Table 13 gives a total land requirement per family for each size of neighborhood and each type of dwelling considered in this report. Tables 14 and 15 convert these data into neighborhood density allowances: families per acre and persons per acre, respectively. Average family size is as previously indicated, 5.2 persons. Street allowance is based on 60 feet rather than the 50 feet recommended, to allow for intersections, cross streets, and larger minor traffic streets bordering the development. Street allowance for community facilities is approximately 20% of required area.

1) ASSUMPTIONS MADE: LIMITATIONS OF THE DATA

Areas allowed for each type of land use conform to the recommendations made in previous sections of this report. In all calculations, the most favorable conditions in regard to topography and usability of land have been assumed. Unusable land or land devoted to non-neighborhood uses has been excluded from the computations. If such land occurs within the neighborhood, its area must be deducted before these densities can be applied. Deductions must also be made for any unusual setbacks necessary at boundaries or other similar unspecified land allowances. For irregular or steep land, densities must be lowered.

TABLE 12:

LAND AREA PER FAMILY FOR A NEIGHBORHOOD OF 4,000 PERSONS (750 FAMILIES)

(LAND AREA IN SQUARE FEET PER FAMILY AND PERCENT OF TOTAL)

<u>Dwelling Type</u>	<u>Net Residential</u>		<u>Streets Serving Dwellings</u>		<u>Community Facilities</u>		<u>Streets Serving Community Facilities</u>		<u>Total</u>	
One- or Two-family										
1 - Family detached	6,600	64%	1,800	18%	1,600	15%	320	3%	10,320	100%
1 - Family semi-detached	4,400	59%	1,200	16%	1,600	21%	320	4%	7,420	100%
or										
2 - Family detached										
1 - Family attached (Row)	3,080	54%	840	14%	1,600	27%	320	5%	5,840	100%
2 - Family semi-detached	2,640	50%	720	14%	1,600	30%	320	6%	5,280	100%
Multi-Family										
2 - Story	1,500	37%	660	16%	1,600	39%	320	8%	4,080	100%
3 - Story	1,000	29%	520	15%	1,600	46%	320	10%	3,440	100%
4 - Story	750	25%	450	14%	1,600	51%	320	10%	3,120	100%

TABLE 13:

LAND AREA PER FAMILY FOR NEIGHBORHOODS OF VARIOUS SIZES

	NEIGHBORHOOD POPULATION			
<u>Dwelling Type</u>	<u>1,000 Persons</u> <u>200 Families</u>	<u>2,000 Persons</u> <u>400 Families</u>	<u>3,000 Persons</u> <u>575 Families</u>	<u>4,000 Persons</u> <u>750 Families</u>
	SQUARE FEET PER FAMILY			
One- or Two-family				
1 - Family detached	12,360	11,040	10,560	10,320
1 - Family semi-detached) or 2 - Family detached)	9,560	8,240	7,760	7,520
1 - Family attached (Row)	7,880	6,560	6,080	5,840
2 - Family semi-detached	7,320	6,000	5,520	5,280
Multi-Family				
2 - Story	6,120	4,800	4,300	4,080
3 - Story	5,480	4,160	3,680	3,440
4 - Story	5,160	3,840	3,360	3,120

TABLE 14:

NEIGHBORHOOD DENSITY — FAMILIES PER ACRE

NEIGHBORHOOD POPULATION

<u>Dwelling Type</u>	1,000 Persons <u>200 Families</u>	2,000 Persons <u>400 Families</u>	3,000 Persons <u>575 Families</u>	4,000 Persons <u>750 Families</u>
	FAMILIES PER ACRE			
One- or Two-Family				
1 - Family detached	3.5	3.9	4.1	4.2
1 - Family semi-detached) or 2 - Family detached)	4.6	5.3	5.6	5.8
1 - Family attached (Row)	5.5	6.6	7.2	7.5
2 - Family semi-detached	6.0	7.3	7.9	8.3
Multi-Family				
2 - Story	7.1	9.1	10.1	10.7
3 - Story	7.9	10.5	11.8	12.7
4 - Story	8.4	11.3	13.0	14.0

TABLE 15:

NEIGHBORHOOD DENSITY — PERSONS PER ACRE

<u>Dwelling Type</u>	NEIGHBORHOOD POPULATION			
	<u>1,000 Persons</u> <u>200 Families</u>	<u>2,000 Persons</u> <u>400 Families</u>	<u>3,000 Persons</u> <u>575 Families</u>	<u>4,000 Persons</u> <u>750 Families</u>
	PERSONS PER ACRE			
One- or Two-Family				
1 - Family detached	18	20	21	22
1 - Family semi-detached or 2 - Family detached	24	28	29	30
1 - Family attached (Row)	29	34	37	39
2 - Family semi-detached	31	38	41	43
Multi-Family				
2 - Story	37	47	53	56
3 - Story	41	55	61	66
4 - Story	44	59	68	73

**TABLE 16: LAND AREA AND DENSITY FOR A NEIGHBORHOOD OF 4,000 PERSONS
(750 FAMILIES) WITH DIVERSIFIED DWELLING TYPES**

PROPOSED DWELLING TYPE	DWELLING UNITS (FAMILIES)		REQUIRED NEIGHBORHOOD LAND AREA	
	PER CENT-NUMBER		SQUARE FEET PER FAMILY	TOTAL ACRES
One-Family detached	65	488	10,320	115.6
One-Family semi-detached	15	112	7,520	19.3
One-Family (Row)	15	112	5,840	15.0
Two-Story Apartments	5	38	4,080	3.6
Total Land Area - - - -				153.5

Resultant neighborhood density: 4.9 families per acre

TABLE 17: LAND AREA AND DENSITY FOR A NEIGHBORHOOD OF 2,000 PERSONS

PROPOSED DWELLING TYPE	DWELLING UNITS (FAMILIES)		REQUIRED NEIGHBORHOOD LAND AREA	
	PER CENT-NUMBER		SQUARE FEET PER FAMILY	TOTAL ACRES
One-Family detached	74	296	10,320	70.1
One-Family semi-detached	10	40	7,520	6.9
One-Family (Row)	12	48	5,840	6.4
Two-Story Apartments	4	16	4,080	1.6
Total Land Area - - - -				85.0

Resultant neighborhood density: 4.7 families per acre

D. RANGE OF NEIGHBORHOOD SIZES

The neighborhood size at which all the requirements for neighborhood facilities can be met is based on the following factors:

- Population which will support an elementary school and other neighborhood community facilities.
- Area which meet accessibility standards (walking distance to community facilities);
- Area which will accommodate the necessary dwellings and

facilities, in accordance with space requirements;

- d) City planning and administrative considerations which may modify theoretical size within the maximum limits. The most important of these are conformity to appropriate physical boundaries and choice of neighborhood density to avoid excessive multiplication of facilities within a small area.

Within the geographic limits of accessibility the area of the neighborhood will depend on densities and dwelling types in relation to the population housed, (Table 17). The area equivalent to $\frac{1}{4}$ -mile radius of accessibility is 126 acres. For $\frac{1}{2}$ -mile radius the area is about 500 acres.

TABLE 18: NEIGHBORHOOD AREA DERIVED FROM NEIGHBORHOOD DENSITY ALLOWANCES:

	NEIGHBORHOOD POPULATION			
	1,000 PERSONS	2,000 PERSONS	3,000 PERSONS	4,000 PERSONS
	<u>200 FAMILIES</u>	<u>400 FAMILIES</u>	<u>575 FAMILIES</u>	<u>750 FAMILIES</u>
ACRES IN ALL NEIGHBORHOOD USES				
One- or Two-Family Dwellings				
One-Family detached	57	103	140	179
One-Family semi-detached)	43	75	103	129
Two-Family detached				
One-Family attached (Row)	36	61	80	100
Two-Family semi-detached	33	55	73	90
Multi-Family				
Two-Story	28	44	57	70
Three-Story	25	38	49	59
Four-Story	24	35	44	54

II. BUSINESS DISTRICT

In a complete city there will be a central business district with financial and administrative institutions, retail stores, service groups of theaters and hotels, and wholesale house. Presently, Agana is the Island's only city which could come close to fitting this description. As the Island's population expands, increased competition should force expansion of such business facilities. Through proper planning and education these new facilities can be guided to more logical locations, so that each of the Island's cities will more nearly provide the services and functions normal to a city.

A. TYPES OF SERVICES AND FACILITIES

The completely developed business district for the territory can be expected to occur in those cities of large population. The cities whose future growth will probably put them in this category are:

Agana, Agat-Santa Rita, and Tamuning. The remainder of the territory's cities will provide something less than this as covered in the section on satellite residential cities.

Those facilities which may be provided — Again depending on the need — are the following:

Retail shops (of all kinds)

Hotels (these may occur, but it is more probable that if such facilities are developed they will be disconnected from all cities where they may adjoin a beach or golf course, or command a view)

Other services (beauty and barber shops, doctors' and dentists' offices, etc.)

Finance, insurance, and real estate

General offices -- private

Public administration

Parking lots or garages

Wholesaling (ideally placed with similar activities in a service or light industry area rather than the central business district)

Trucking and warehousing (in a service industry area)

Communications and utilities (operating facilities only)

Entertainment (theaters, private clubs, etc.)

B. AREA REQUIREMENTS

There is no certain and ready method for determining the required size of the general business area. Many rule of thumb methods have been used, but none appear to be very satisfactory. The key to the appropriate amount of space is the purchasing power of the consumer, the anticipated volume of sales, the density of population, income levels of the people, and the proximity and the type of services in adjoining business districts.

The tendency is always to allow too much room for business uses because each landowner would like to have his property zoned for business, hoping to improve its value. A great spreading out and consequent undersirable development, however, breeds physical blight to the aesthetic and economic detriment of the whole area.

The only satisfactory guide appears to be one which can be used on a city-wide basis. This would be to allow two to five per cent of the total city area for commercial use. This percentage will vary with

the type and character of the city and must be individually determined.

C. LOCATION AND SITE REQUIREMENTS

As the size and diversity of a shopping area increases, location and site requirements become more critical. The increase in size and diversity increases its nuisance value to residential uses, compounds traffic circulation and parking problems, and increases the chances for individual business failure which may be the start of the deterioration process.

The business area, therefore, must be carefully located so it is readily accessible and attractive to potential customers.

The area should be adjacent to a major collector, secondary or primary highway.

The facilities must be compactly grouped in a relatively flat area so that pedestrian traffic is encouraged.

Auto traffic and pedestrian traffic must be well separated.

Adequate parking areas must be provided which will not interfere with circulation to and around the area.

Parking should be provided at a minimum of three square feet of parking for each square foot of store area.

Streets must be wide enough to allow for stopping and turning without blocking traffic.

Blocks, if necessary, should be as large as possible to keep auto traffic out of the shopping area.

And finally, the area must be an attractive, functional amenity for the city.