

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

BUREAU OF PLANNING
GOVERNMENT OF GUAM
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THE REGION

The term "Region" connotes a geographic area which has socio-civic-economic ties which set it apart from adjacent areas. A region may range from neighborhood size to the size of a small state or parts of several states.

In planning for a region it is often difficult to establish the exact boundaries of the planning area. The present and future planning of the territory is greatly simplified in this one respect. The island may properly be considered a region with a definite boundary encompassing an area of 209 square miles.

Within this region are found several villages, all but one of which (Yigo) meet the following location criteria and should be developed as urban areas with the full range of community facilities.

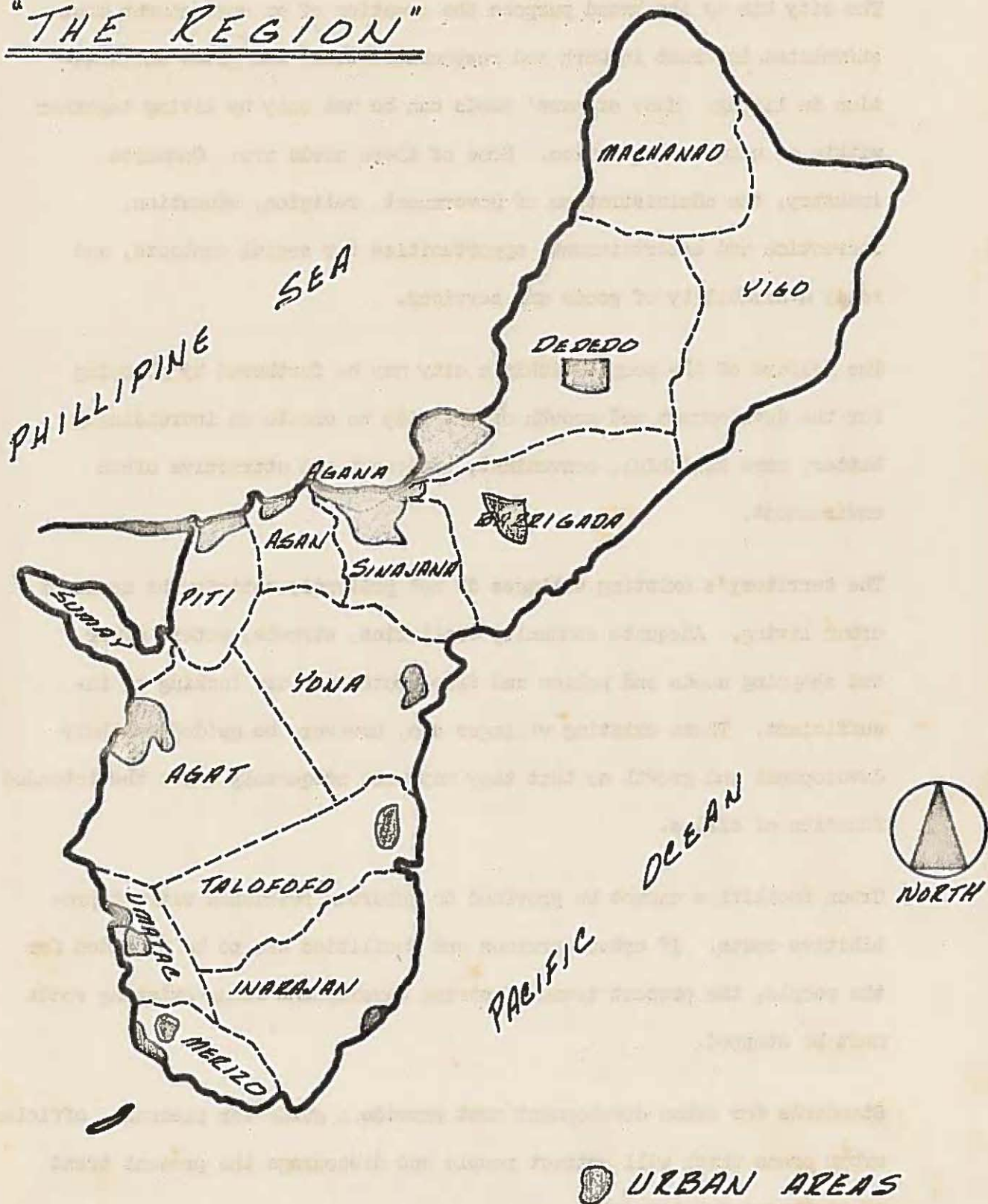
Outside population and economic effects on the territory are extremely difficult, if not impossible, to predict, so any plan for development must be extremely flexible. Satisfactory flexibility in plans can only be achieved if decisions are guided by a comprehensive set of standards.

The following sections establish desirable standards upon which design for development and growth will be based. The standards are based in large part on recommendations from affected agencies with generally accepted United States professional standards used as guides. They are, therefore, presumed to represent the best expert judgement and experience available. They may not be described as either "Maximum" or "Minimum." Rather, they are characterized as "Reasonable" and "Necessary."

The standards are not absolute, and will not be applied without adjustment in special cases. The standards enumerated are those of use to planning and details are not included. We are rather concerned with such things as "Best Location," "People Served," "Number and Size of Facilities," and "Acres Needed."

GUAM ... MARIANAS ISLANDS

"THE REGION"



THE CITY

The city has as its broad purpose the creation of an environment that stimulates interest in work and responsibilities, and gives satisfaction in living. Many of mans' needs can be met only by living together within an urban organization. Some of these needs are: Commerce industry, the administration of Government, religion, education, recreation and entertainment, opportunities for social contacts, and ready availability of goods and services.

The welfare of the people within a city may be furthured by planning for the development and growth of the city to create an increasingly better, more healthful, convenient, efficient and attractive urban environment.

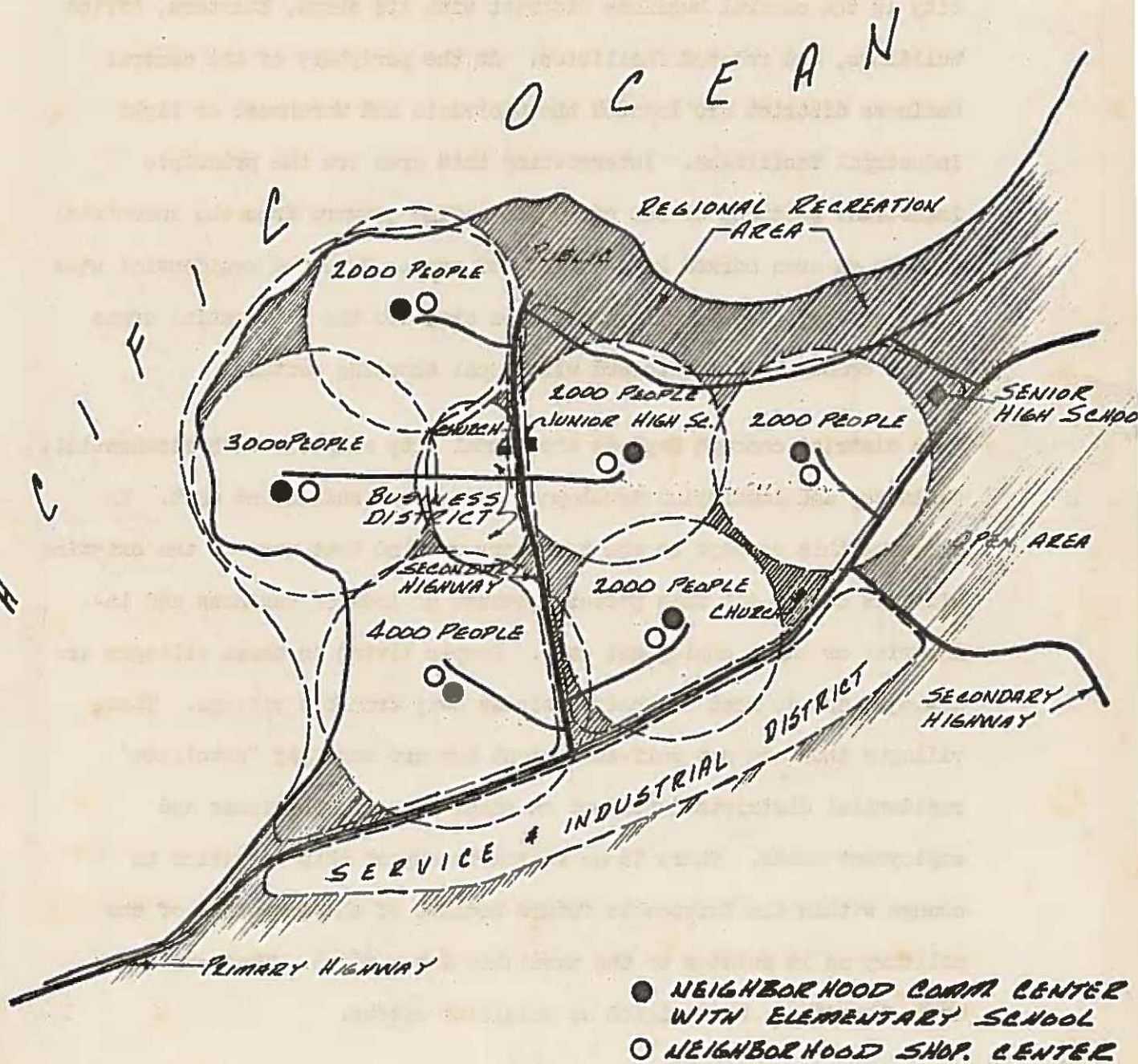
The territory's existing villages do not presently satisfy the needs of urban living. Adequate community facilities, streets, water, sewer, and shopping needs and police and fire protection are lacking or insufficient. These existing villages can, however, be guided in their development and growth so that they may more adequately serve the intended function of cities.

Urban facilities cannot be provided to suburban residents without prohibitive costs. If urban services and facilities are to be provided for the people, the present trend of string development along existing roads must be stopped.

Standards for urban development must provide a guide for pleasant, efficient urban areas which will attract people and discourage the present trend of scattered development.

URBAN AREAS

"THE CITY"



THE DISTRICT CONCEPT

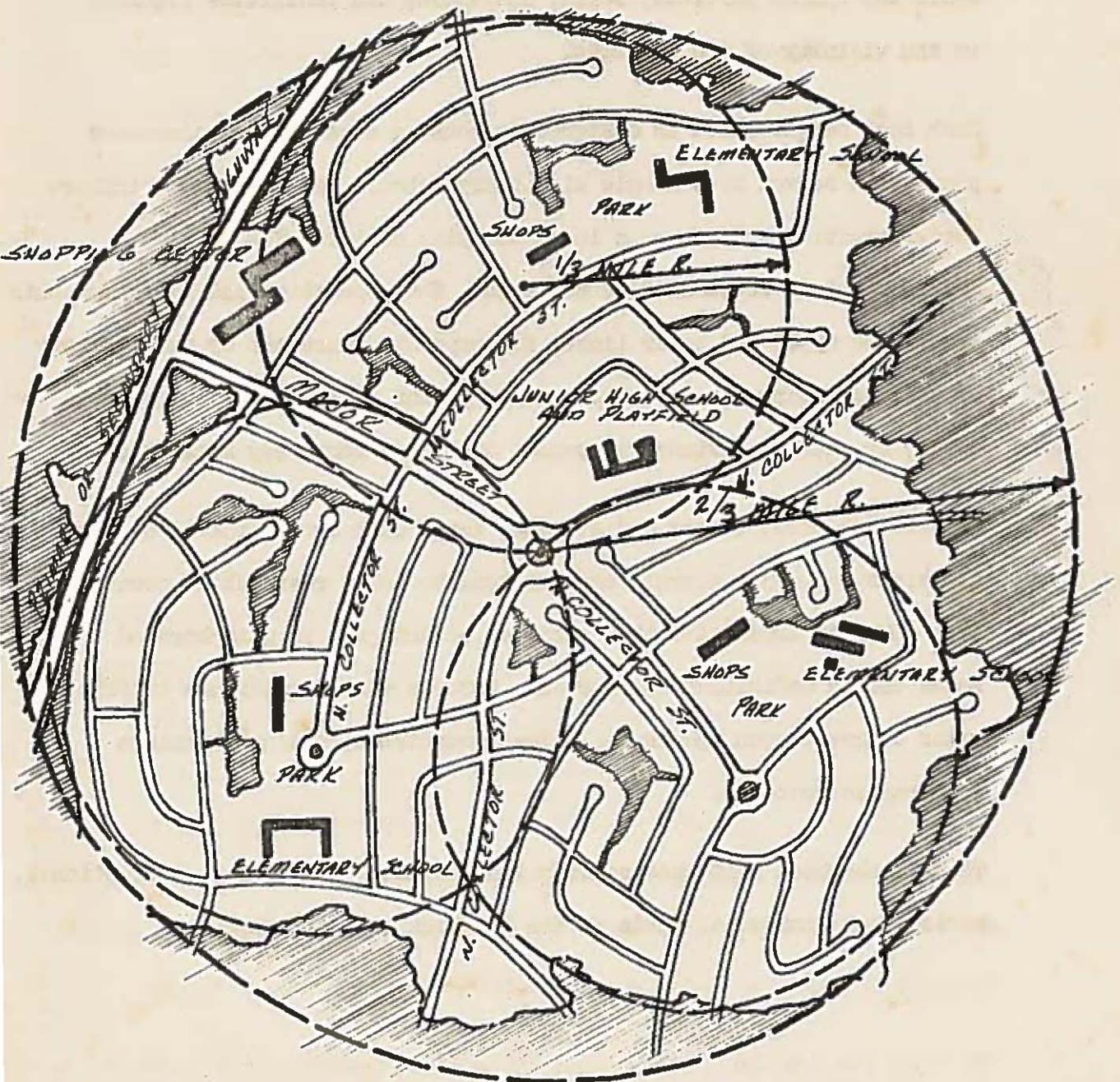
The different functional areas of a city (industrial, business, and residential) normally fall into a regular pattern. At the heart of the city is the central business district with its shops, theaters, office buildings, and related facilities. At the periphery of the central business district are located 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.

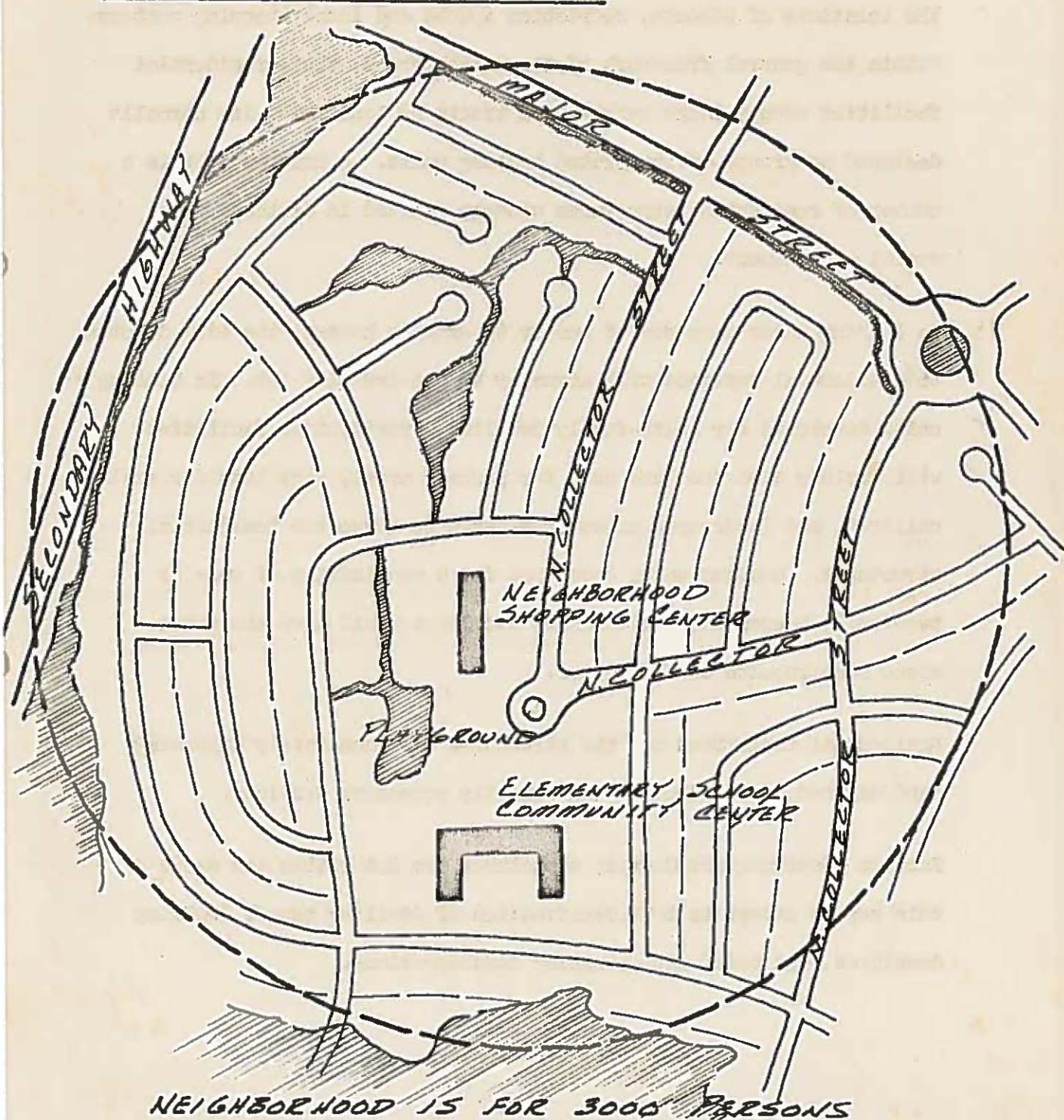
Each such neighborhood is designed to house a reasonably homogeneous population served by a single elementary school, well located neighborhood recreation spaces and a local shopping center. The size of a neighborhood is determined in two ways: The population and the geographic area. The upper and lower 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

The planning of residential facilities is closely related to all the other elements of the neighborhood plan, such as street layout, and the locations of schools, recreation spaces and local shopping centers. Within the general framework of the neighborhood, these residential facilities occupy large homogeneous tracts of land which are normally designed as groups of integrated housing units. A housing unit is a number of residential structures closely related in distance and social environment.

In housing units composed of one or two-family houses, the land devoted to residential services will normally be the dwelling lot. In housing units developed for multi-family dwellings, residential facilities will include also the land used for parking areas, play lots for small children, and landscaped areas considered to serve the residential structures. Housing units developed for a combination of one- or two-family houses and multi-family dwellings would have the extra space requirements of the latter.

Residential facilities are the structures and immediately adjoining land devoted to residential and directly accessory services.

Factors governing residential structures are not within the scope of this report except as to classification of dwelling types, dwelling densities, and brief site planning considerations.

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	20x125 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 or	4,400	9.9	8.7	5,000(40x125)
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 (MAXIMUM)</u>
One- and Two-Family	
One-Family detached	25%
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	
One-Family detached	50%
One-Family semi-detached	50%
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	32	.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

II. SITE SELECTION

The purpose of selecting a site for residential development may be summarized as follows: To procure a site which is suitable for physical development, including installation of utilities; for provision of dwellings, circulation system and neighborhood community facilities in well planned relation (all within the economic means of a definitely visualized group of families); and which is free from any grossly unfavorable environmental factors. The following conditions for healthful development and reasonable maintenance must be considered in selecting a site:

A. SOIL AND SUBSOIL CONDITIONS

Soil and Subsoil conditions must be suitable for excavation and site preparation, location of utility connections and for grading and planting. Subsoil should afford suitable bearing capacity and be free of unusual rock conditions which would make foundation costs excessively high.

B. GROUND WATER AND DRAINAGE

A water table low enough to protect against flooding and dampness in crawl spaces, and interference with sewerage, the absence of swamps or marshes, and sufficient slope to permit surface drainage of normal rainfall are extremely important.

C. FREEDOM FROM SURFACE FLOODS

Significant floods are those which inundate buildings, make them unusable by drowning utilities, or impede circulation to and within the development area. Land should be excluded from development if it shows a history of flooding at intervals of less than 50 years unless the source of flood has subsequently been controlled.

D. SUITABILITY FOR SITING OF PROJECTED BUILDINGS

Land should not be too steep for satisfactory grading in relation to dwelling construction. Orientation of slopes should not hinder cooling breezes or desirable views.

E. SUITABILITY FOR ACCESS AND CIRCULATION

Topography should permit adequate vehicular and pedestrian access to, and circulation within, the development area. Grades should conform to standards given to Section VIII.

F. SUITABILITY FOR DEVELOPMENT OF OPEN AREAS

Land to be used for private yards or gardens, playlots, playgrounds and neighborhood parks should permit grading and development for practical use. Excessively steep land can not be used to fill area requirements.

G. FREEDOM FROM TOPOGRAPHIC ACCIDENT HAZARDS

The development area should be free from — or the plan should assure correction of — topographic conditions which might be a serious cause of bodily accidents. This would include bluffs or precipices, open pits, and hazardous shore lines.

H. ADEQUATE WATER SUPPLY AND SANITARY SEWAGE DISPOSAL

Water of safe quality must be available in each dwelling under pressure, and the general supply must be adequate in amount to provide for fire fighting and other special needs. Preference should be given to sites having this need fulfilled by a public supply. Removal of bodily wastes from the dwelling by a public sewerage system is desirable. In the absence of a public sewerage

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.

IV. EDUCATION

Public education facilities to be supplied within the normal neighborhood are: Kindergarten, elementary school, and some types of adult education facilities. Junior and Senior High Schools should be provided on a district rather than neighborhood basis, because of the larger population required for their support and the less stringent access requirements. The kindergarten should be included in the public facilities because it gives the child broad contacts and guidance in group activity prior to entering the regular school program. Schools and related facilities may be combined for multiple use to save duplication of facilities and space. Desirable combinations include:

a) COMBINATION OF ELEMENTARY SCHOOL AND KINDERGARTEN:

Eliminates need for private kindergarten facilities, offers no complications where school authorities will provide facilities.

b) COMBINATION OF ELEMENTARY SCHOOL AND PLAYGROUND:

Requires coordination between recreation and school authorities with recreation department normally operating the playground after school hours.

c) USE OF ELEMENTARY SCHOOL FOR ADULT EDUCATION AND INDOOR SOCIAL AND CULTURAL ACTIVITIES:

Most economical way of providing activity space, may require some special office and storage space.

A. ELEMENTARY SCHOOL AND KINDERGARTEN FACILITIES

A satisfactory elementary school is one of permanent construction, located within the neighborhood it is intended to serve, and

having at least one classroom per grade plus supplementary facilities such as auditorium, playroom, library, workshop, etc. Each school should be designed to accommodate grades 1 through 6, with provision for expansion to include kindergarten in the near future. The kindergarten program should be instituted in new schools as they are put into operation. From the above assumptions on family size and composition, it will be further assumed that there are 32 elementary and kindergarten pupils per grade level per 1000 total population. This will vary by community.

1) NUMBER OF PUPILS PER CLASSROOM

Educators differ on the maximum allowable number of children per classroom. Thirty pupils per classroom is frequently recommended and is used here for planning calculations.

2) TOTAL NUMBER OF CHILDREN PER SCHOOL

The minimum elementary school of 6 grades (one "round") at 30 pupils per classroom will have a capacity of about 180 or 210 if a kindergarten is included. Schools over one round should follow as closely as possible the "round" system of providing elementary classrooms in groups of 7 (including kindergarten). Schools over one round should have one special classroom in addition to their usual facilities. The maximum size of an elementary school should be 4 rounds or 29 classrooms (including 4 kindergartens) accommodating 870 pupils. Two or three rounds provide a highly desirable educational facility for 450 to 660 pupils.

Population densities should not be so high that the outdoor residential space requirements cannot be met.

The size of the neighborhood is directly related to the size of the school. To operate efficiently the elementary school should have an enrollment equal to that of its designed capacity. This enrollment should be entirely composed of pupils living within walking distance of the school. The maximum school service area should be $\frac{1}{4}$ to $\frac{1}{2}$ mile.

TABLE 6: ELEMENTARY SCHOOL CAPACITY RELATED TO NEIGHBORHOOD POPULATION

	<u>MINIMUM SCHOOL</u>	<u>AVERAGE SCHOOL</u>	<u>MAXIMUM SCHOOL</u>
Classrooms	7	15 or 22	29
Pupils	210	450 or 660	870
Families	200	400 or 575	750
Persons	1,000	2,000 or 3,000	4,000

3) LAND AREA REQUIREMENTS

The elementary school site size will be determined by building area; setback from streets; the area needed for lawns, service drives, and parking; total school enrollment; and the area needed for outdoor recreation. The outdoor recreation space is best provided by combining the elementary school and neighborhood playground. The combining of the two will make possible the dual use of playground space, and in addition will provide a focal spot for neighborhood community activity. To provide adequate space for the required facilities will necessitate a minimum site of 5 acres plus one acre for each 100 pupils. The following site requirements are in addition to playground facilities.

TABLE 7: ELEMENTARY SCHOOL SITE SIZE

	<u>MINIMUM SCHOOL</u>	<u>AVERAGE SCHOOL</u>	<u>MAXIMUM SCHOOL</u>
Classrooms	7	15 or 22	29
Pupils	210	450 or 600	870
Site Area (Acres)	7.1	9.5 or 11.6	13.7

4) SITE LOCATION REQUIREMENTS

Because the maximum extreme of neighborhood area is fixed mainly by walking distance to school and other community facilities, it is important that the school location be as near the center of the population served as conditions will permit. If the school is located near a natural (ocean, cliff, etc.) or physical (military boundary, highway, etc.) boundary, its service area is limited. It should be repeated that, unless extreme conditions dictate otherwise, walking distance to elementary schools should be limited to a maximum of $\frac{1}{2}$ mile and that this distance not require crossing dangerous streets or highways. Adherence to this requirement will allow for elimination of school bus service for elementary schools and a significant monetary gain.

B. ADULT EDUCATION

Adult education is intended to serve all those beyond compulsory school age limits who seek formal instruction or guidance in some field of knowledge. The field of adult education has been classified as follows:

- 1) Socio-Civic-Economic problems, which bring people together for discussion of common interests.

- 2) Home life and personal problems, which include parent education, health education, consumer activities, clothing and food problems, home building and interior decoration.
- 3) Recreational and avocational activities, such as cultural studies, arts and crafts, shop work, dramatics, games, sports, and club activities.
- 4) Special training for groups who lack some fundamental tool needed for social participation. This includes literary training, Americanization, and instruction for the blind, deaf and physically handicapped. There should be facilities accessible to every neighborhood for such of the above activities as are needed and can be effectively organized. These facilities may be in the school or in a community building.

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 lath 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.

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			

VI. INDOOR SOCIAL, CULTURAL, AND RECREATIONAL FACILITIES

Indoor social, cultural, and recreational facilities supplement dwelling facilities and provide opportunities for normal group activity. Services and organizations for which space may be required in a neighborhood include:

SOCIAL SERVICE: Vocational and employment guidance, child guidance, family and marriage problems, girl scouts, boy scouts, consumer groups, parent-teacher association, community chest organization.

RELIGION: Adult worship and religious training of youth, with provision for the major faiths or denominations represented in the neighborhood population.

LITERATURE AND THE ARTS: Library, art exhibits, lectures, non-commercial movies, musical programs, groups or classes for participation in the arts.

RECREATION: Dances and parties given by neighborhood organizations; indoor sports and games.

A. TYPES OF FACILITIES

In order to meet the space requirements for the social cultural, and recreational activities listed above, most of the following types of general facilities should be provided:

- a) Small rooms for meetings and classes.
- b) Assembly room with stage for large meetings, movies, theatrical and musical performances and indoor recreation such as dances.
- c) Small game room, including equipment for games such as ping-pong, chess, checkers, card games, pool, etc.
- d) Reading and exhibit room

- e) Kitchen for preparation of refreshments and for cooking classes.
- f) Workshop for classes in arts and crafts, particularly in connection with household furnishings.
- g) Office and storage space for organizations participating in activities.

B. METHOD OF PROVIDING FACILITIES

Requirements listed above may be met by a separate community building for each neighborhood, in new or existing buildings such as churches, or by the elementary school if permitted by its design and operation.

Use of the school building assures the economy of multiple use and is the only practical solution for the territory. The school facilities may be supplemented by church or other facilities.

The well-designed elementary school provides adequate spaces for the above activities with the possible exception of a workshop. This could easily be added to the school facility and would prove a valuable addition for maintenance and educational needs as well as for recreational needs.

An additional advantage in a school serving as a community building is the resultant land saving. With the combined facility there is no extra space requirement.

C. CHURCHES

Neighborhood churches may play an important role not only in the religious, but also in the social and cultural life of a community, serving in part as recreational and educational centers. Although specific plans for churches in development

areas usually cannot be made before the community is occupied, it is important that space be set aside for the later building of churches.

The larger neighborhoods will almost certainly require space for at least one church. Several smaller neighborhoods may share a church at the district level, and other churches may only be provided on a regional basis. Size and number of churches to be provided at the neighborhood level will depend on neighborhood population and religious composition.

Site size should be a minimum of one to two acres, with parking provided at the rate of one space (350 square feet) for each ten church seats. Location may be near the school community center or the neighborhood shopping center. Planting buffer strips should be provided between all churches and residential structures.

VII. NEIGHBORHOOD SHOPPING

Neighborhood shopping facilities are considered to include only those stores and service establishments which are used frequently by all families and which should be easily accessible to the home. It is imperative that the proper types of facilities be provided and that rigid controls preserve the architectural and other amenities of the neighborhood.

A. TYPES OF SERVICES AND FACILITIES

The types of goods required in the neighborhood are determined by their importance to daily family life. The minimum requirement, that a grocery store and drug store be available within the neighborhood, is based on the fact that lack of food shopping facilities, especially for perishables, may affect nutrition; and that lack of medicine and first-aid supplies may be serious in an accident or acute illness.

The provision of shopping facilities is primarily an economic problem. However, it has a bearing on amenity of the neighborhood, in that a sound economic approach in the choice of stores and services will avoid an oversupply of small marginal stores which tend toward frequent change of ownership and instability. On this basis, the stores and services to be included will be those for which the total sales volume required for efficient store operation will be equalled by the estimated purchasing power and demand within the neighborhood.

The general basis for judgement as to including a given type of

commercial facility should be: Is it useful to the majority of the residents? Can it be economically supported? Is there any nuisance attached which would make it undesirable in a residential area?

The following list of basic facilities which may be included in the shopping center of a neighborhood is given as an illustration rather than a recommendation. It has been used as the basis for space allowances.

Food market (including specialty foods such as bakery and delicatessen goods)

Drugstore (including reading matter, stationery, tobacco and vanity goods)

Barber shop, beauty parlor

Laundry and dry cleaning pick-up service

Lunchroom and counter

Variety store (General merchandise)

Shoe repair

Auto service station (including filling station, minor repairs and accessories)

B. AREA REQUIREMENTS

The following table gives assumed sizes for neighborhood shopping centers for a range of neighborhood population. These sizes are based on normal merchandising practice for the types of stores indicated. Changes in store types would require adjustment in area. The total space includes building coverage, service and customer parking, circulation space, and landscaping.

TABLE 10: NEIGHBORHOOD SHOPPING CENTER SIZE

NEIGHBORHOOD - POPULATION

<u>SHOPPING CENTER COMPONENT USES</u>	<u>1,000 PERSONS 200 FAMILIES</u>	<u>2,000 PERSONS 400 FAMILIES</u>	<u>3,000 PERSONS 575 FAMILIES</u>	<u>4,000 PERSONS 750 FAMILIES</u>
Ground Area of Bldgs. (S.F.)	10,000	14,000	20,000	26,000
Customer Parking (S.F.)	30,000	42,000	60,000	78,000
Service Station (S.F.)		24,000	24,000	24,000
Circulation, Service- 15% (S.F.)	6,000	12,000	15,600	19,200
Landscaping- 20% (S.F.)	8,000	16,000	20,000	25,000
TOTAL AREA				
Square Feet	54,000	108,000	140,000	172,800
Acres	1.24	2.48	3.22	3.97
Acres Per 1,000 Persons	1.24	1.24	1.07	.99

C, LOCATION AND SITE REQUIREMENTS

All parts of a neighborhood require ready access to a local shopping center. By locating the shops near the center of the neighborhood, the focal point of the neighborhood is further emphasized and convenience is greatly improved. By combining school, playground, park, and shops, the community center will become prominent in the aesthetics of the neighborhood.

Design of the shopping center should be such that it does not interfere with the quiet necessary for school operation and home life. Design should also be such as to prevent conflict between

the different types of circulation: Pedestrian shoppers, shoppers in automobiles, and service vehicles. Planting around the shopping center should protect nearby residences from noise, traffic hazards, and glare.

VIII. GROUPING OF NEIGHBORHOOD COMMUNITY FACILITIES

The facilities should if possible be grouped together in the direction of the major traffic flow from the development area to the outside, accessible by direct pedestrian and automobile routes.

The existence of a physical center of the neighborhood stimulates the growth of community relationships and the acceptance of community responsibilities by the residents. Within the group, the various community facilities should be physically separated from each other to prevent conflict of circulation. It is especially important that pedestrian access to the school be separated from all vehicular access to other facilities.

The following table is a summation of the requirements given in preceding sections. It should be noted that this table combines recommended and assumed areas; the values given are therefore not mandatory standards. Should all facilities not be grouped, area requirements will be increased.

TABLE 11: LAND AREA OF ALL COMMUNITY FACILITIES

AREA IN COMPONENT USES (ACRES)	1,000 PERSONS 200 FAMILIES	2,000 PERSONS 400 FAMILIES	3,000 PERSONS 575 FAMILIES	4,000 PERSONS 750 FAMILIES
School and Recreation Center	13.0	16.0	19.0	22.0
Church	1.0	1.5	2.0	2.0
Shopping Center	1.2	2.5	3.2	4.0
TOTAL	15.2	20.0	24.2	28.0
Acres per 1,000 Persons	15.2	10.0	8.1	7.0
Sq. Ft./family	3,300	2,200	1,800	1,600

IX. NEIGHBORHOOD CIRCULATION

A. THE FUNCTIONS OF CIRCULATION

A properly designed circulation system must serve the positive functions of circulation and must take into account the effect of streets and walks on other land uses. Functionally, circulation provides access for the residents and all those who serve the development area. Physically, the circulation pattern, linking residential structures to each other, residences to neighborhood community facilities, and the neighborhood to centers of business and employment, results in the definition of land use areas of limited shapes and sizes because streets act as boundaries and barriers.

The design of the circulation system must begin with the following considerations: Who are the users? What are the methods of circulation? Where is access required? What is the effect of the location of streets and walks on the desired land use pattern and arrangement of structures?

The elements of the circulation system may be classified as follows:

TYPES OF USES:

- 1) For residents: In all daily activities
- 2) For deliveries and collections: Including mail and garbage
- 3) For protective services: Fire, police, ambulance
- 4) For maintenance and repair: Utilities, grounds, structures

CIRCULATION ROUTES

- 1) Access from outside to the neighborhood
- 2) Access to dwellings

- 3) Access to neighborhood community facilities

MEANS OF CIRCULATION

- 1) Pedestrian
- 2) Automobile, truck, motorcycle and scooter
- 3) Public Transit
- 4) Other (bicycle, roller skates, baby carriage, etc.)

CIRCULATION WAYS

- 1) Streets
- 2) Walks
- 3) Driveways
- 4) Parking areas

Specific standards for circulation correctly emphasize safe and convenient access and maximum land utilization. Yet the psychological effect of a street layout which provides a variety of outlook and pleasant vistas should not be overlooked. Well designed streets and walks are perhaps the most economical and effective method of increasing the amenity of the neighborhood.

The traffic scheme for the development area should be designed so that:

- 1) Future traffic loads will not require locating new traffic arteries within the neighborhood;
- 2) Future traffic loads will not cause the use of the neighborhood streets for through traffic;
- 3) Adequate rights-of-way are provided along neighborhood boundaries for any anticipated widening of the streets;
- 4) Street layouts of contiguous areas can readily be coordinated with the proposed layout;

- 5) Existing structures and land uses can be incorporated into the proposed development.

B. CLASSIFICATION AND ARTICULATION OF STREET TYPES

Directness of access, increased speed of through travel, reduction of accident hazards and elimination of unnecessary traffic from the neighborhood should be fostered by a clearly articulated street pattern. This should be composed of various types of streets, each designed for the character and volume of its traffic. The various types are:

RESIDENTIAL SERVICE STREET: Providing direct access to residential structures, serving only a comparatively small number of dwellings;

NEIGHBORHOOD COLLECTOR STREET: Connecting service streets to each other, to community facilities and to minor traffic arteries; serving only neighborhood traffic;

MINOR TRAFFIC STREET (MAJOR COLLECTOR): Connecting neighborhood collector streets to major traffic streets and to district centers. Preferably outside or bounding the neighborhood; serving district traffic.

MAJOR TRAFFIC STREET: Connecting cities and major districts of a single city; serving large volumes of comparatively long-distance fast moving traffic; includes secondary and primary highways.

There should be no through traffic within the neighborhood. To discourage through traffic, streets should be so laid out that no streets within the neighborhood can be used as a short cut between two points outside it. Each class of street should normally lead

into a street carrying the next greater volume of traffic. The frequency of intersections on a street should decrease as the traffic volume increases.

Residences should be served by streets whose layout does not invite traffic other than that bound to adjacent dwellings. This may be accomplished by loop or dead-end streets. Access to residences should be exclusively from residential service and neighborhood collector streets. Where minor traffic streets within the development are unavoidable, dwellings should not face them and should have access from service streets.

C. PARKING REQUIREMENTS

Provision of suitably located parking spaces is an important factor in planning the circulation system. Indiscriminate parking along streets slows down traffic and is a serious accident hazard at intersections and along curves.

It is essential to provide adequate parking space for residents, visitors, and service vehicles in connection with both community facilities and dwellings. Parking in connection with community facilities should be provided off the street, in separate parking lots. Parking for dwelling residents should be provided off the street as covered in Section II C. This parking space must be continually available and not made unusable by building expansion or landscaping. Parking for visitors' cars may be provided on-street where roadway width is sufficient. Parking bays or off-street lots may be used for multi-family residential facilities. The minimum

requirement is one parking space for each dwelling. This parking space should be no farther from the dwelling entrance than 200 feet.

D. PEDESTRIAN CIRCULATION

Walks from all dwellings should provide convenient and safe access to elementary schools, shops, playgrounds, and other chief pedestrian objectives. In addition, paved walks are used by children for roller skating, riding bicycles, tricycles, etc. There should be a system of continuous main walks connected to dwellings by service walks. Walks may be classified into three general types:

ENTRANCE WALKS: To individual dwellings or to entrance of multiple dwellings.

SERVICE WALKS: Serving a group of residential structures, connecting entrance walks to major walks;

MAJOR WALKS: Direct pedestrian connection between main parts of the neighborhood to neighborhood community facilities, to main pedestrian throughfares outside the neighborhood.

Substantial separation of vehicular and pedestrian traffic is necessary to minimize accidents to pedestrians. Walks should be provided on both sides of streets except where the street parallels a boundary or if there is a low pedestrian load on one side of the street.

E. LOCATION OF STREETS SERVING DWELLINGS

Street spacing and direction should permit adequate setback and orientation of building rows to minimize the effect of traffic noise on dwellings, as well as to permit a favorable orientation of dwellings for sunshine, breezes, and view.

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 unto 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 DRIVEWAYS

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.

X. NEIGHBORHOOD DENSITY

Dwellings, community facilities and the circulation scheme for a development must all be integrally related. By adding together the area allowances for these, limits for neighborhood densities may be set. Neighborhood density then is the ratio of population to the total neighborhood purposes as previously outlined, but excluding non-neighborhood land uses. It is usually expressed as families or persons per acre of total neighborhood land.

Since neighborhood densities express the relationship of population to land area, they provide an accurate measure of the required capacity and area of various facilities. They are also a rough indication of the design potential of the neighborhood, because standards for admission of light and air, for provision of safe and convenient access, for provision of sufficient school and play areas, etc. are reflected in components of the density standards.

Neighborhood density figures are used for: Setting broad limits of total population in relation to the size of the site; providing a method of expressing total land and population ratios for the purpose of preliminary cost estimates; and calculating the various possible combination of dwelling types desired to make up a neighborhood.

From neighborhood density figures a density pattern may be established for the most efficient population distribution at the city and region level.

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) } 2 - Family detached }	9,560	8,240	7,760	7,520
1 - Family attached (Row)	7,830	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

<u>Dwelling Type</u>	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>
	FAMILIES PER ACRE			
One- or Two-Family				
1 - Family detached	3.5	3.9	4.1	4.2
1 - Family semi-detached)	4.6	5.3	5.6	5.8
2 - Family detached)				
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

In determining land requirements for some of the community facilities, certain assumptions had to be made for shopping center, school size, church, etc. Variables in these and similar factors must be individually determined. For this reason the proposed densities cannot be considered as mandatory standards but can serve only as a guide.

2) EFFECT OF DESIGN ON DENSITY

Whether the basic standards for a healthful environment can be met at a given density depends on the design of the project. Densities may have to be considerably lower to take care of special conditions. This might be the case where the recommended multiple use of facilities is impractical, where land is hilly, where streets are unusually wide, etc. Although the recommended densities are valid in normal cases, they are not intended to restrict the designer who can meet the essential standards at higher densities.

B. IMPLICATIONS OF NEIGHBORHOOD DENSITY STANDARDS

Densities greatly in excess of those recommended have been achieved in the existing villages by skimping on one or more of the essentials: spacing of buildings for sunlight, setback for quiet, adequate areas for recreation, integral provision of schools, and similar factors. Such areas can be expected to decline in attractiveness as properly designed developments take place.

The tables indicate that some space saving occurs with an increase in total neighborhood population up to a 4,000 - person neighborhood. This is due to the fact that maximum permissible population loads

on parks and playgrounds are not reached with less than 4,000 persons. Therefore, highest densities may be reached in neighborhoods of 3,000 to 4,000 persons. Neighborhood densities beyond this point may decrease, because of necessary duplication of parks and playgrounds.

C. DENSITIES FOR NEIGHBORHOOD OF DIVERSIFIED DWELLING TYPES

The need for various kinds and sizes of dwellings to meet the needs of different families within a neighborhood cannot be too emphatically stressed. Neighborhood densities should always be visualized in terms of diversified dwelling types.

Because of lack of background experience in anything but one-family detached housing, the first attempt at diversified dwelling types will involve considerable trial and error with few background facts.

According to recommendations made in previous sections, it would seem desirable to provide some form of one- or two-family dwellings for families with children, while multi-family housing would be suitable for households consisting of adults. The following examples of a neighborhood for 2,000 persons and one for 4,000 persons show possible dwelling compositions. They are not a recommend standard, but in each case merely show a possible solution.

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

<u>PROPOSED DWELLING TYPE</u>	<u>DWELLING UNITS (FAMILIES) PER CENT-NUMBER</u>		<u>REQUIRED NEIGHBORHOOD LAND AREA</u>	
			<u>SQUARE FEET PER FAMILY</u>	<u>TOTAL ACRES</u>
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

<u>PROPOSED DWELLING TYPE</u>	<u>DWELLING UNITS (FAMILIES) PER CENT-NUMBER</u>		<u>REQUIRED NEIGHBORHOOD LAND AREA</u>	
			<u>SQUARE FEET PER FAMILY</u>	<u>TOTAL ACRES</u>
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 <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>
	ACRES IN ALL NEIGHBORHOOD USES			
One- or Two-Family Dwellings				
One-Family detached	57	103	140	179
One-Family semi-detached) or	} 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

E. PROBLEMS OF OBTAINING DESIRABLE NEIGHBORHOOD DENSITIES

Application of standards to a neighborhood is relatively simple when it is built as a whole. The main problems will be those involving responsibility for provision, operation, and maintenance of community facilities. The question of legal barriers against diversification of dwelling types will also appear.

The neighborhood unit where land is in multiple ownership presents many more serious problems. It is nevertheless imperative that the general design and program must in all cases be laid out for the neighborhood as a whole. The Government will in these cases take a greater part in providing the community facilities. The barrier to diversification of dwelling types becomes more rigid where there are several owners. With a large site the developer can conform to the desired over-all net residential density by mixing dwelling types within this limitation. Where land is in several ownerships, there is a problem of which landowner shall build dwellings of which type.

The effective use of neighborhood density standards and the economical provision of adequate community facilities can be achieved only if widespread development of planned neighborhoods becomes feasible.

DISTRICT STANDARDS

I. RESIDENTIAL DISTRICT

A residential district is a housing area composed of one or more neighborhood units as covered in the previous section. Although neighborhood units are basically self-sufficient, it is often necessary to group them for secondary school service, and for business and employment needs.

The residential district may be only part of an urban area containing business and industrial districts also, or it may comprise an urban area in itself. The latter situation is covered in Part IV of this section.

A. RESIDENTIAL DISTRICT COMMUNITY FACILITIES

Those services which cannot be provided at the neighborhood level should be considered for inclusion among the residential district community facilities. These community facilities should normally include:

EDUCATION

Secondary (Junior and Senior High) Schools

OUTDOOR RECREATION

Playfield, park, and athletic field

INDOOR SOCIAL, CULTURAL, AND RECREATIONAL

Church, library, assembly and recreation space

RESIDENTIAL DISTRICT SHOPPING

Food and drug stores, variety and clothing stores, building materials and hardware, miscellaneous services, doctors' and dentists'

Additional facilities should be provided on a citywide or regional basis as covered in the sections on city and regional standards.

B. EDUCATION

The residential district will usually be served by a Junior High School which should if possible be within one mile of all children using the school. Some of the smaller residential districts, however, will not have sufficient population to warrant a Junior High School. These instances should be kept to a minimum and the schools serving these areas should be carefully located to keep transportation time as short as possible. Senior High Schools will normally serve a city, but in some cases may serve several cities.

The secondary school may or may not be combined with the community shopping center, depending on space available. Individual space needs will not be lessened by such a combination, so the principle advantage would be common access and a larger community center.

In most cases, there will be only one residential district in each city. This district will, if population size warrants, be served by a Junior High School and possibly a Senior High School. Junior and Senior High Schools may be combined as a temporary measure, but a desirable goal is separate facilities for each except in the case of minimum size schools.

Design standards for secondary schools are in an extreme state of flux as educators and an aroused public strive for an educational system more suited to today's changing concepts of education. These changing concepts are affecting Senior High School design now and will affect Junior High and Elementary schools soon.

Basically the new concept puts more emphasis on the individual and consequently study area needs will be greatly changed. Instead of dividing expected enrollment by 30 to obtain the number of equal size classrooms, educators will have to determine a correct proportion between individual study-conference rooms, seminar rooms, laboratory classrooms and rooms for large group instruction.

These factors have not yet crystallized into anything resembling definite standards. It is, therefore, beyond the scope of this report to establish or consider standards applicable to secondary school design, except as to minimum school size, land area requirements, and site location requirements.

1) MINIMUM SCHOOL SIZE

Just as type and method of instruction are undergoing serious reevaluation, so also is the size of schools being given a critical look. The maximum secondary school size appears to be limited only by the capabilities of those planning, designing, and operating the facilities. As the practice of subdividing large schools into smaller units which provide an instructional program that more nearly fits the needs of the individual and personalizes his relationship to the school catches on, school size can be expected to rise considerably.

Although it is not presently possible to set a maximum on secondary school size, economics more or less set a minimum practicable size. It is not feasible to provide small schools with the full complement

of facilities necessary for a comprehensive secondary education program. This minimum feasible will, however, depend also on appropriate planning and design. Present thinking puts the minimum size for Junior High Schools at 400 to 500 pupils, and for Senior High Schools at 700 to 800 pupils.

Practical operating size for secondary schools under the present program is probably:

400 to 1,000 for Junior High Schools

700 and up for Senior High Schools

2) LAND AREA REQUIREMENTS

Secondary school site size is determined as is the elementary school site size by building area; setback from streets; the area needed for lawns, service drives, and parking; total school enrollment, and the area needed for outdoor recreation. The only practical way of providing the required outdoor recreation space is by combining the Junior High School and the playfield, and the Senior High School with the athletic field. Playfield and athletic field facilities are covered in the following section.

To provide adequate space for the required school and play facilities will necessitate a minimum site size of 20 acres plus one acre for each 100 pupils for Junior High School and playfield, and 30 acres plus one acre for each 100 pupils for Senior High School and athletic field.

TABLE 19: SECONDARY SCHOOL SITE SIZE

	JUNIOR HIGH (20 + 1)		SENIOR HIGH (30 + 1)	
	MINIMUM SCHOOL	PROBABLE MAXIMUM SCHOOL	MINIMUM SCHOOL	PROBABLE MAXIMUM SCHOOL
Pupils	400	1,000	700	1,600
Families	1,300	3,200	2,300	5,200
Persons	6,700	16,800	11,700	26,800
Site-Area(Acres)	24	30	37	46

3) SITE LOCATION REQUIREMENTS

The location of secondary schools should be given as serious consideration as the location of elementary schools. Because of the large area required, some concessions will, however, often be necessary. Availability of undeveloped land or large flat areas will quite often be the deciding factor in site location.

A location as near as possible to the center of the population is nevertheless most desirable and should be achieved if at all

possible. This is especially important for Junior High Schools so that they may be within walking distance of those they serve.

The location of Senior High Schools is somewhat less critical

since they cannot possibly be within walking distance of all those they serve. The maximum walking distance to secondary

schools is about one mile. Areas beyond this distance should

be given prior consideration regarding bus services so that

school bus needs may be kept to a minimum. All site consideration

applying to residential facilities and elementary schools should

also apply to secondary schools.

C. OUTDOOR RECREATION

As indicated above, the only practical way of providing adequate

recreation space in the residential district is through the combining of the school and recreation facilities. Separate area requirements will, therefore, not be attempted. Outdoor recreation facilities to be found within the residential district are: The playfield in conjunction with the Junior High School; and the athletic field in conjunction with the Senior High School. Each of these should have a parklike area in addition to its active play facilities.

1) PLAYFIELD

The playfield provides facilities that make possible diversified recreation activities for young people (12 through 17) and adults. It may also provide a playground if those facilities are not provided as covered in neighborhood standards for playgrounds. The playfield makes possible valuable and popular forms of recreation that require more space than is available on the neighborhood playground. It is almost always linked with the Junior High School since its facilities are of the type necessary for a complete school program.

No residential district should be without playfield facilities. If the size of a residential district does not warrant a secondary school, the neighborhood playground should be increased a minimum of five acres to provide for required active play facilities in addition to those of the usual playground.

a) SIZE

A playfield and the accompanying area required for the Junior High School should be from 24 to 30 acres as covered in part

B 2 of this section. A school larger than the suggested probable maximum will necessitate an area greater than 30 acres.

b) LOCATION

In addition to meeting the requirements covered in previous sections, the playfield-Junior High School combination must have good access routes to areas which it serves. Normally this will put it on a neighborhood collector or possibly a minor traffic street (major collector). The school and playfield when so located will require protection from street traffic in the form of barriers, heavy planting or deep setback. If located adjacent to neighborhood or district shopping facilities the site should be well separated by heavy planting.

c) FEATURES

Planned primarily for young people and adults, the playfield-Junior High School provides outdoor and indoor facilities to meet a much wider range of recreation interests than the neighborhood recreation center. The well-developed playfield should include the following facilities:

PLAYLOT AND MOTHERS' AREA — Facilities should be as suggested in the section on neighborhood standards.

APPARATUS AND PLAY AREA — Also as covered in the section on neighborhood standards.

FIELD FOR SPORTS — Room for a minimum of one baseball diamond, two softball diamonds, a touch football field, and necessary bleachers for each.

PAVED AREA FOR COURT GAMES -- Similar to that of the neighborhood playground, for supplemental use.

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

AREA FOR SPECIAL EVENTS -- Area accommodates agricultural exhibits, science fairs, art displays, etc.

OLDER PEOPLE'S CENTER -- Area accommodates lawn bowling, shuffleboard, croquet, and horseshoe courts.

OFF-STREET PARKING -- To avoid congestion in surrounding area.

LANDSCAPING -- To make area an aesthetic asset.

PLAYFIELD BUILDING -- This requirement will be met by the Junior High School which should provide rooms for arts and crafts, science study, and multi-purpose, plus lounge and toilet facilities.

2) ATHLETIC FIELD

Inter-city athletic activities play an important part in providing for the active team play of the island's young people and adults. These activities are now taking place with very few facilities. and only 1 or 2 really satisfactory courts or playing fields. Since the island's spectators have no form of professional sports (except occasional boxing matches) entertainment available to them, heavy emphasis is placed on local team competition in basketball, baseball and softball. Somewhat less emphasis is placed on football, while volleyball appears to be coming back into popularity.

These active team sports should be encouraged and the most

encouragement would come from more and better facilities. These fields and courts should not be randomly placed at the whim of an individual or the encouragement of a pressure group, but should be placed according to a pre-conceived plan.

The facilities required for an athletic field are the same as those found in a Senior High School which offers a complete educational, social, and recreational program. From this, it follows that the athletic field and the Senior High School should be combined as are the playfield and the Junior High School.

a) SIZE

An athletic field and the accompanying area required for the Senior High School should be from 37 to 46 acres as covered in part B 2 of this section. Again, a school larger than the suggested probable maximum will require an area greater than 46 acres.

b) LOCATION

The Senior High School athletic field should if possible be located on a major collector near the center of the area it serves. Since some of the athletic contests will draw large crowds, the area must have good circulation to avoid congestion. In most cases the Senior High School - athletic field will occupy the only large usable site available. Though all Senior High School students cannot live close enough to school to walk, this number should be kept as high as possible to keep bus

transportation to a minimum. The school should always be located in or adjacent to large urban areas.

c) FEATURES

The athletic field provides primarily fields and courts for highly organized games and sports with these also being used for school physical education classes and intramural contests.

The fields, courts, etc. should be complete, high quality facilities. Those facilities which should be included are:

RUNNING TRACK AND FOOTBALL FIELD — This combination, with the football field using the space inside the track, is satisfactory as the sports are engaged in most intensively during different times of year. In addition, the same seating facilities will serve each sport. The football field should be lighted if possible.

THE BASEBALL DIAMOND — A good facility with permanent backstop and fences, bleachers, skinned infield or partially skinned infield, turfed outfield, and night lighting.

THE SOFTBALL DIAMOND — A field comparable to the baseball diamond. Additional minimum facility fields should be available for P.E. classes.

THE SWIMMING POOL — A regulation size pool for instruction and competition.

BASKETBALL COURT — With seating and lighting.

PAVED COURT AREA — For volleyball, badminton, handball, etc.

TENNIS COURTS — Fenced and lighted.

ROOFED STADIUM — For basketball, volleyball, tennis, badminton etc. for all weather use, complete with showers and toilets.

OFF-STREET PARKING — Parking space must be available for large numbers of cars for athletic events. Some of this should be permanent, with turfed areas used as temporary parking for large crowds.

LANDSCAPING — To make the area an aesthetic asset will require heavy planting as baffles and barriers.

D. INDOOR SOCIAL, CULTURAL, AND RECREATIONAL FACILITIES

In addition to those facilities provided within the neighborhood, the residential district should provide for the following:

SOCIAL SERVICES: Vocational and employment guidances, parent-teacher association, holiday celebration group committees.

RELIGION: Adult worship and religious training of youth, with provision for those faiths not represented in individual neighborhoods.

LITERATURE AND THE ARTS: Library, art exhibits, lectures, non-commercial movies, musical programs, groups or classes for participation in the arts, drama groups and presentations.

RECREATION: Large dances and parties, teen-age canteen, lounge, game rooms, meeting rooms.

Residential district facilities should not replace those facilities provided in the neighborhood, but should supplement them by providing larger, more complete facilities and by providing for those facilities for which the demand on the neighborhood level is low.

1) TYPES OF FACILITIES

In order to meet the space requirements for those activities listed, the following types of facilities should be provided:

a) Small rooms for meetings and classes.

- b) Assembly auditorium with stage for large meetings, movies, theatrical and musical performances and indoor recreation such as dances.
- c) Small game room, including equipment for games such as ping-pong, chess, checkers, card games, pool, etc.
- d) Lounge and snack bar or dispensing machines to serve as teen-age canteen in conjunction with assembly and game rooms.
- e) Reading and exhibit room.
- f) Workshop for classes in arts and crafts, particularly in connection with wood, metal working, and electricity.
- g) Office and storage space.

2) METHOD OF PROVIDING FACILITIES

Requirements listed above may be met by a separate community building, in new or existing buildings such as churches, or by the secondary school if permitted by its design and operation.

Use of the school building assures the economy of multiple use and as in the neighborhood is the only practical solution for the territory. The school facilities may be supplemented by church or other facilities. The well-designed secondary school provides adequate spaces for the above activities except for a lounge suitable for teen-age canteen use. The addition of a lounge and snack bar to the secondary school would make the school a social asset.

The Senior High School must include a large auditorium (not a multi-purpose area) of 300 to 500 seating capacity or larger,

to provide appropriate space for musical and theatrical productions, and public speaking occasions,

3) CHURCHES

Those denominations which do not require a church at the neighborhood level may require a church within the residential district. As the size of the area served becomes larger, the influence of the church as a social center will normally lessen. The church influence will, however, still be apparent in recreational and educational activities.

Required site size will be a minimum of one to two acres, with parking to be provided at the rate of one space for each six church seats. Location may be near the secondary school or the district shopping center planting. Buffer strips and setback are required to protect the privacy of adjacent residences.

E. RESIDENTIAL DISTRICT SHOPPING

The neighborhood unit is, in theory, the unit served by an elementary school. Two or more such units are grouped and served by a Junior High School. Four or more neighborhood units are served by a Senior High School. This geographical division then becomes the neighborhood unit as a part of the residential district, and the residential district as a part of a city.

Commercial areas logically follow the same geographical division:

THE NEIGHBORHOOD SHOPPING CENTER, where almost daily purchases are made, consisting chiefly of food products, and for which a trip of only a few blocks is justified.

THE LOCAL OR DISTRICT SHOPPING CENTER, where less frequent trips are

made, but a larger variety of supplies is bought, and for which the family is willing to travel a little further.

GENERAL OR SELF-CONTAINED BUSINESS CENTER, where still larger sums are spent, and where a still wider variety of choice is available.

This graduation is logical because certain trades require a larger trading area than the neighborhood can provide. The proper balance between supply and demand must be found in each instance, so as to retain all the self-sustaining trade possible.

1) TYPES OF SERVICES AND FACILITIES

The provision of district shopping facilities is purely an economic problem. The stores and services to be included will be those for which the total sales volume required for efficient store operation will be equaled by the estimated purchasing power and demand within the residential district.

The following list of basic facilities which may be included in the shopping center of a residential district is used as an illustration, not as a recommendation.

Super-market (including grocery, delicatessen, and meats) or individual stores for each

General merchandise (variety store)

Apparel group (family clothing store)

Automotive group (filling and service station, and auto repair garage)

Drug store (with fountain)

Restaurant-Bar-Grill (separate or combination)

Barbershop, beauty parlor

Package liquor store

Laundry and dry cleaning pick-up service

Shoe repair

Building materials and hardware

Theater

Doctors' and dentists' offices

Branch bank and post office

2) AREA REQUIREMENTS

Factors affecting the choice of services and facilities to be included in the district shopping center are too numerous and uncertain to be covered in this report. Since the area required for the facilities is determined from the type and number of facilities, it is extremely difficult to provide suitable standards for area requirements. From several possible solutions for district population of various sizes, it appears that approximately $3/4$ to one acre per 1,000 persons should be allowed. This will provide building area, parking area (at the ratio of three square feet to one square foot of building area), circulation space, and landscape area. The lower figure ($3/4$ acre per 1,000 persons) will normally apply to large residential districts, while the higher figure (one acre per 1,000 persons) will normally apply to small residential districts.

3) LOCATION AND SITE REQUIREMENTS

The residential district shopping center must be carefully located. It is a large traffic generator and could be a nuisance if poorly placed. It should be well separated from residential

uses by large setbacks and heavy buffer planting. Because of the expected large traffic volume, the center should be located on a major collector or possibly a secondary highway. To preserve safety and simplify traffic control, the center should not occupy all four corners of an intersection, but should be confined to one side of the street or one corner of an intersection. All shops must be grouped in one location to make the district shopping center effective.

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 undesirable 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.

III. INDUSTRIAL DISTRICT

The average city is a place where people live and also make a living. Such a city needs land set aside for factories that will give people jobs and also pay taxes for community improvement. Industry provides the life blood of wages and salaries — which supports residence and business. As mentioned before, the district concept is not entirely applicable to the territory. There are several reasons why the territories industrial districts will not fit this standard pattern. The most important of these factors is the dominance of the military as it relates to the available labor force and the present economy. Because of the confinement of these military "industries" behind definite boundaries, the normal, desirable integration of people and their jobs is not possible. Another factor is that large industries subordinate to military activity require abnormally large areas closely related to military areas which they serve. These are insurmountable obstacles to the customary integration of residential and industrial districts. Industrial areas may, therefore, logically be placed near population centers but be more dependent on other factors in determining desirable locations.

With the above in mind, the following standards are considered applicable to industrial districts for the territory.

- 1) Industry should be located in cognizance of its performance characteristics and their effect on adjacent land uses.
 - 2) Industry must not be indiscriminately mixed with other land uses.
- Each such land use has its own distinct characteristics and requirements of location and facilities, and each requires protection from encroachment.

- 3) Industrial districts must be planned and organized for maximum efficiency.
- 4) Sites should be assembled in logical sizes and shapes with adequate size for expansion, accommodation of off-street employee parking and truck loading, and landscaping.
- 5) Sites should be level with good subsoil and bearing qualities and have good drainage.
- 6) Good transportation facilities must be available with good trucking routes for all sites and close proximity to port areas for those industries using heavy, bulky goods or materials.
- 7) Availability of necessary public utilities which may include large amounts of water, special waste disposal facilities, or large power requirements.
- 8) For those industries concerned with local production materials such as coral or sand, locations where these materials are available or in close proximity.
- 9) Availability of oil or gas for fuel.
- 10) Good access routes for employees.

One of the most important standards for industrial development is unfortunately one that cannot be given accurately. It would be desirable to have some basis upon which to set aside or reserve a certain number of acres of land for industrial development, but here again the many variables introduced by the military make this impractical.

- 11) Adequate land held in reserve to provide for unforeseen industrial needs.

CITY STANDARDS

I. CITY COMMUNITY FACILITIES

The city, as has been covered, exists to provide for the needs and wants of the individual. It is composed, of neighborhoods grouped into residential districts, of business districts, and of industrial districts. Each of these has been covered, showing desirable characteristics and necessary community facilities. Some of the facilities indigenous to the city do not fit into this general pattern.

This section will cover those facilities and also give a resume of community facilities standards previously covered. The city community facilities will normally include:

EDUCATION

Nursery school, kindergarten, elementary school, secondary school
(Junior and Senior High)

OUTDOOR RECREATIONAL

Playlot, playground, neighborhood park, playfield, athletic field,
special recreation areas, landscape park

INDOOR SOCIAL, CULTURAL, AND RECREATIONAL

Church, library, assembly and recreation space

ADMINISTRATIVE, HEALTH AND SAFETY

City administration, public health center, police and fire departments

CITY SHOPPING FACILITIES

Neighborhood shopping center, district shopping center, general
business center

Additional facilities for fine arts, education, recreation and government required on a regional (island-wide) basis are covered in the following section.

II. EDUCATION

Covered individually, are standards for the nursery school, the elementary school with kindergarten, the secondary schools, and for basic adult education facilities. Each of these must be provided in all cities with the possible exception of the secondary schools. Because of the small student load from some cities, consolidation of two or more cities for purposes of Junior and Senior High School education may be necessary.

The island's parochial school system presents a real challenge for cooperative school planning. Total school needs are based on total population and its composition by age groups. This total student load is a constant for each year regardless of whether education is to be public or parochial. For each student in the parochial school the public school system must provide facilities for one less student, providing, however, that this reduced enrollment does not put the total enrollment for the school below the minimum level. For a comprehensive school program with service distances for the schools as previously covered the individual school cannot economically go below this minimum level.

Therefore, the public and parochial schools can only operate effectively and economically if each operates above the minimum level and at its planned capacity. As an example, assume a neighborhood of 1,000 persons which is approximately 200 families. These 200 families will have an elementary school population of 210 pupils. These 210 pupils will require seven classrooms. If half or 105 of these pupils attend a parochial school either inside or outside of the neighborhood, there still exists a need for a public school of seven classrooms. Each

classroom will operate only at half capacity unless students are brought in by bus from outside the neighborhood. This not only is uneconomical but also undesirable because it takes the child outside the neighborhood which exists to serve his needs.

II. OUTDOOR RECREATIONAL

The playlot, playground and neighborhood park are provided for each neighborhood within the city. The playfield and athletic field will be required in those cities where there is sufficient population load to justify a complete facility. In a residential district too small to support a secondary school, the neighborhood playground should be increased in size a minimum of 5 acres to provide facilities normally found as part of the playfield.

The island's cities will be too small to require any special recreation areas individually, but rather, these special areas such as golf courses, bathing beaches, stadium, large park or reservation will be provided on a regional basis.

A major deficiency in the island's present recreation facilities, is the complete lack of public swimming pools. Because of year-round use, recreation hours provided by this facility would be far greater than any other single facility and probably greater than all others combined. In addition, it would be a valid educational asset. The swimming pool should be provided as a part of each senior high school - athletic field if possible. At any rate, there should be provided in each city as a part of the athletic field, the playfield, the playground, or as a separate facility, a regulation size swimming pool. Because of distances too great to be walked and inadequate swimming beaches, the ocean cannot fulfill this function.

In addition to the above recreational facilities, each city should have as much open area as possible with these areas well landscaped to add to the cities aesthetic amenities.

IV. INDOOR SOCIAL, CULTURAL, AND RECREATIONAL

By using school facilities, most of the requirements for indoor social, cultural, and recreational facilities can be met most economically. The schools — elementary and secondary — will provide space for social service activities, literature and the arts, and recreation. The one required additional facility in all cases will be a branch library. This library should have a full complement of facilities: Large selection of rotating, semi-permanent or permanent books; reading room; educational and exhibit space.

As in previous geographical divisions, churches must be provided, when necessary, for those denominations not having facilities on the neighborhood or district level. Site requirements are as previously covered.

More specialized use areas will be provided on a regional basis as covered in the following section.

V. ADMINISTRATIVE, HEALTH AND SAFETY

These have not previously been covered, but each must be provided to a varying degree for each city depending on the population served and the area of the city.

A. ADMINISTRATIVE FUNCTIONS

The territory's cities will differ most from the usual city in that they will not have individual city governments. Because of the small size of the territory this is not at all practical or necessary. Separate city governments would require a revenue source for each such city. Such a revenue could come from present tax sources which would then be inadequate, or would require a new individual city tax. Either method would be unworkable for the foreseeable future.

The administrative functions required in the individual cities will, therefore, be handled by a division of a central force. Through this method, individual city requirements will be kept to a minimum. The present system of village government is totally ineffective and could be abandoned, but as the villages grow into complete cities some administration will be required. This will be so small, however, that it will require very little space. The required space should be in the business area of each city in a location easily found and readily accessible to all of the people. The necessary space may be provided as a part of a small city hall type structure also containing public health, police and fire protection facilities.

B. PUBLIC HEALTH

As a minimum standard, residents should have convenient access at the city level to public health services, to practicing physicians

and dentists, and to general hospital facilities. Services which might be provided in a city health center would be: Maternal and child health clinics; school inspection services; visiting nurse service; examination and laboratory facilities for diagnosis of tuberculosis, venereal disease and other common communicable diseases; general health education programs; and inspection and laboratory services related to food, milk, and water sanitation. Each of the island's cities must have such a health center.

Private practicing physicians and dentists should be located in the business areas of those cities large enough to support such a practice. There should be a public health center located in the business area of each of the territory's cities.

C. FIRE PROTECTION FACILITIES

The objectives of fire protection in order of importance are:

- 1) To prevent fires from starting
- 2) To prevent loss of life and property in case a fire does start
- 3) To confine a fire to the place or origin
- 4) To extinguish the fire

To accomplish these objectives, a fire department requires adequate men and equipment and well-located fire stations.

Initial capital outlay or construction costs for a fire station are relatively insignificant when compared to yearly operational costs. Strategic location of fire stations and a smoothly operating pattern of response to alarms will keep the required number of stations to a minimum with resultant savings over a period of time.

In locating fire stations, the following factors must be considered:

- 1) Number of companies required
- 2) Future fire defense needs — growth of the city
- 3) High-value areas
- 4) Fire frequency map
- 5) Street widths, traffic conditions

In general, the location of fire stations should be such as to enable adequate equipment to reach fires in two to three minutes after the alarm is received. This will require a maximum distance of travel as shown in table 20.

TABLE 20: MAXIMUM FIRE EQUIPMENT TRAVEL DISTANCE

<u>TYPE OF DISTRICT</u>	<u>ENGINE OR PUMPER COMPANY</u>	<u>LADDER COMPANY</u>
Mercantile or manufacturing	3/4 Mile	1 Mile
Closely built residential	1½ Miles	2 Miles
Scattered residential	3 Miles	3 Miles

In addition to fire stations as required by these distances of effective coverage, a fire department should have a central administrative and control center, drill areas, and training grounds. Drill areas should be provided at each station and a large training ground should be provided at a location where fire fighting operations can be conducted without offense to neighbors by reason of noise or smoke. The central administrative and control center should be provided on a regional basis.

D. POLICE PROTECTION FACILITIES

A police department deals with the actions and behavior of human beings. The department is more than a law-enforcing agency. Police

activities involve: Prevention of criminality, repression of crime, apprehension of offenders, recovery of property, and regulation of noncriminal conduct. As with the fire department, their effectiveness lies with being in the proper place at the right time or soon after. This implies that the police department functions cannot, therefore, all take place in one location but that there must be well-located police sub-stations.

Most police functions are best centralized due to use of the radio and motor vehicles and the need for a tight chain of command. District stations are necessary, however, because they provide a convenience to citizens who may wish to call at a police station for some service. In addition to this, they save police time by reducing the distance between the location of their duties and their station.

To satisfy these requirements, it is necessary that in addition to a centrally located "Headquarters" station there must be a police sub-station within $2\frac{1}{2}$ miles of each urban residence.

VI. CITY SHOPPING FACILITIES

City shopping facilities will consist of the following, each serving a necessary function:

THE NEIGHBORHOOD SHOPPING CENTER, where almost daily purchases are made, consisting chiefly of food products.

THE LOCAL OR DISTRICT SHOPPING CENTER, where less frequent trips are made, but a larger variety of supplies is bought.

GENERAL OR SELF-CONTAINED BUSINESS CENTER, where still larger sums are spent, and where a still wider variety of choice is available.

A still more general commercial area is required to serve all of the needs. This should be provided on a regional basis, and is covered in the following section.

VII. CITY CIRCULATION

A. THE FUNCTIONS OF CIRCULATION

The amazing attachment which man has for the wheel of his car results in the automobile being used for trips often as short as two blocks. This compelling need for constant companionship between man and his car has confused city circulation patterns beyond all comprehension. The most economical, convenient, and maneuverable means of locomotion — travel by foot — is decreasing because the automobile is handy. Cities are not planned to handle this concentration of vehicles which in turn make the cities unattractive as a place in which to walk. Yet the pedestrian way is still an essential element in the circulation system of our cities and its use should be encouraged. With an improvement in planning for proper grouping of commercial facilities, industrial areas, and residential areas, vehicular circulation may be simplified and the pedestrian way returned as an effective and attractive element of circulation.

The street system forms the major framework of the city and is perhaps its most important single element. This system largely determines the ease, convenience, and safety with which people travel about the city; it establishes the size of blocks; it is a channel for light and air and for overhead and underground utilities. No other element in the physical make-up of the city is so permanent as its streets. Once a street has been opened, utilities installed, and abutting properties improved with buildings, the closing, relocating, or widening of the street involves the greatest difficulties and expense. The planning of new streets or the improvement of existing ones merits the most painstaking consideration to produce results

that will meet present and future requirements. Of a street system's major functions of providing access, light, and air, the access and traffic circulation function is normally the most critical.

B. CLASSIFICATION AND ARTICULATION OF STREET TYPES

Classification and articulation of those streets within the residential areas of a city are covered in Section IX of neighborhood standards.

Beyond this, the city street system must enable vehicular traffic to move swiftly and safely with a minimum of regulation to all parts of the city. To accomplish this, a well planned street system is necessary with each street designed to serve its specialized function. Such functional street design will reduce the percentage of the total area of the city that has to be devoted to street purposes, will lower the cost of constructing and maintaining streets, will increase the speed and safety of through traffic movement and will add to the amenity of the city. The various types of streets to be found within the city are:

RESIDENTIAL SERVICE STREET:

NEIGHBORHOOD COLLECTOR STREET:

MAJOR COLLECTOR: Connecting neighborhood collector streets to major traffic streets and to district centers. Preferably outside of or bounding the neighborhood; serving district traffic;

MAJOR TRAFFIC STREET: Connecting cities and major districts of a single city; serving large volumes of comparatively long-distance, fast moving traffic; includes secondary and primary highways.

Secondary or primary designation dependent on volume and speed of traffic and on resultant right-of-way width.

Highways carrying primarily through traffic should go around the city if possible. If this is not possible, the highway should not go through the center of the business area, but should follow the perimeter so that conflict between through and local traffic is kept as low as possible.

C. PARKING REQUIREMENTS

Streets can successfully serve their primary function, that of traffic circulation, only if there are adequate facilities for the parking of automobiles at the terminal points of a journey. The streets, themselves, provide a significant portion of the required parking space but, particularly in central business districts and in other areas that attract large volumes of automobile traffic, street space alone is not adequate. Furthermore, too great reliance upon streets for parking space may seriously interfere with the street's main function of traffic movement.

Commercial and industrial uses should not depend on on-street parking, but should provide off-street parking lots. Parking spaces should be provided in the central business district at the minimum rate of three square feet of parking space for each square foot of store area. This requirement should be strictly adhered to since there is no mass transit system to ease circulation problems. In industrial areas parking should be provided at the rate of one space for each one to four employees as individually determined.

D. PEDESTRIAN CIRCULATION

Pedestrian circulation within a city is confined mostly to two large groups: That within the residential area, and that within

the business district. The former is covered in section IX D.

The business district should be designed so that pedestrian traffic is encouraged. This can be done by removing vehicular traffic from those areas which are the province of the pedestrian and by enhancing the beauty of the shopping area. The pedestrian way appears to be the best way of accomplishing this since it does remove vehicular traffic, adds to the beauty of the area, and therefore encourages people to lounge and stroll in an area previously treated as a necessary ordeal.

E. DESIGN OF STREETS

Streets are primarily for the purpose of moving traffic. Cities have lost sight of this purpose as it pertains to the central business district. Instead, the business district street has been made to serve a dual role as traffic-way and parking strip.

City streets must all be designed to best serve their intended function. Standards for design and spacing of intersections; for pavement width; street grades and curves; and surfacing, curbs, and drainage as covered in the section on neighborhood standards are applicable to all city streets.

The width of pavement must in all cases be carefully determined, allowing 10 or 12 feet for each lane of travel and 8 or 10 feet for parking where necessary. An effort should be made to eliminate street parking where possible and instead to encourage the use of parking bays. Where highways go through or along the perimeter of a city, the highway should have a center dividing barrier if at all

possible. Business district streets should ordinarily have a right-of-way width of 80 feet. This may, however, be less where business center design is such as to provide all necessary off-street parking.

F. DESIGN OF WALKS

Walks should be provided within the city wherever the demand warrants their cost. Walks in the residential areas will be necessary as previously covered, and walks of some kind are necessary within the business district. The industrial district, however, will normally not require walks.

The walks to be provided within the business area are variable depending on the design of the area. Walks are necessary, but must be determined individually.

VIII. SATELLITE RESIDENTIAL CITY

Careful steps must be taken to make sure that the satellite residential city does not betray its very reason for existence. As cities grow and congestion increases, people move to the suburbs or smaller cities for escape. And as more people move the new suburb or city begins to be more like the congested city from which they recently escaped. This congestion then prompts another move and the cycle is repeated.

To combat this continual move, small cities or small residential suburbs must be carefully planned. The maximum size of the city should be predetermined and limits established so that the city may keep the identity which its inhabitants are seeking. Open space so that spreading growth may be checked.

The territory is beginning to experience this type of spreading growth as scattered development takes place along highways and other improved roads adjacent to the existing villages. This type of growth is poor because it causes the village or city to lose its identity, it causes loss of valuable open space, and it causes problems in providing urban services such as are presently being experienced.

The city standards given above apply also to satellite residential districts, except for those covering the separate commercial and industrial districts. These will normally not be found as separate districts in the territory's satellite cities although minor commercial and industrial type facilities may be found in small number.

The one important standard for these satellite cities is that they remain as identifiable units providing required urban facilities to a group of people having common interests in an area surrounded by open space.

REGIONAL STANDARDS

I. REGIONAL COMMUNITY FACILITIES

In addition to those community facilities provided on the neighborhood, district, and city levels, there are additional facilities which should be provided for the needs and wants of the people on an island wide or regional basis. These facilities should include:

EDUCATION

College, trade school, vocational rehabilitation

OUTDOOR RECREATION

The large park and/or reservation, the fair and exposition area, zoological garden and aquarium, botanical garden, arboretum, bird sanctuary, outlooks, nature trails, and special recreation areas

INDOOR SOCIAL, CULTURAL, AND RECREATIONAL

Church, library, museums, bandshell, observatory, planetarium, field house and auditorium

GOVERNMENTAL ADMINISTRATION AND SERVICE

Territorial and federal government, post office, office of trust territories

HEALTH, SAFETY, AND WELFARE

Hospital and sanitarium, central police and fire, penitentiary, juvenile detention

REGIONAL COMMERCIAL CENTER

II. EDUCATION

Facilities for an advanced or specialized education must be provided on the regional level. Such facilities will best enable the island's indigenous population to become properly trained and thereby qualify themselves for positions now held by "Statesiders" and aliens.

A. COLLEGE

A territorial college is now established which will adequately provide for the island's needs. The college site is quite well chosen in the vicinity of the island's urban center. Sufficient government land is available for expansion as its enrollment and curriculum increases. The size of the college may be expected to increase rapidly as its curriculum is increased to four years and as it becomes a center of advanced education for the trust territory islands. Land must be reserved for this expansion according to a comprehensive plan which provides for this growth before it occurs.

The character of the area surrounding the college site must be carefully considered to preserve the present un-cluttered, semi-secluded atmosphere, zoning controls for the immediate vicinity must be established and rigidly adhered to. Because of the characteristics of the expected student body, there should be no -- or at the most a very few -- required privately provided facilities. It is expected that trust territories will provide for the needs of of its transients at the college site and that all other students will live off campus. Consequently, there should be no need for private commercial enterprises.

Some publicly provided housing for college administrative and instructive personnel may be provided similar to that now provided at the hospital and space should be reserved for this.

B. TRADE SCHOOL

Because of the large number of skilled and semi-skilled positions now filled by U.S. Mainland and alien personnel, there exists a great opportunity for a trade school which would train local young people for these jobs. Such a school could best be organized as a trade high school similar to that found in large cities of the U. S. In addition to a regular trade high school program, it could provide a similar night-class program for those above normal high school age.

Such a school should have a central location so that it can best serve the entire island. The size will depend on the type and number of trade facilities offered, both of which are beyond the scope of this report.

C. VOCATIONAL REHABILITATION

The recent beginning of a vocational rehabilitation program for the territory's physically handicapped adds a great deal to the island's educational training facilities. Present workshop facilities, however, are at best a very poor temporary substitute for the needed permanent facilities. The location of the temporary facility -- in a semi-crowded residential area -- is equally poor.

Space should be provided for a future permanent workshop in the central urban area. Site size will be determined by number of trainees and the type of training to be provided.

D. EXCEPTIONAL CHILDREN

In any plan for the educational needs of Guam, one segment of the population, namely the "exceptional child" must be carefully considered. This segment would include the blind, deaf, hard-of-hearing, spastic, scoliotic, orthopedic, mentally retarded and any others suffering from disabling conditions which would tend to interfere with normal school participation.

No accurate census of this segment of the population has been established by any agency of the Government of Guam. The accepted estimates of the United States of 7 to 10 per thousand of the total population would not appear to be excessive for Guam. Statutory requirements of the Code of Guam provide for the education of all children of school age without exceptions. To provide equal educational opportunity for these children would require the addition of specially designed and equipped rooms in carefully selected schools, both elementary and secondary, and the provision of specially trained and qualified teachers.

An early study, enlisting the cooperation of the Village Commissioners, should be undertaken by the Department of Education to establish facts as to the numbers and types of disability of the exceptional children of school age currently to be found in Guam. Planning for the provision of necessary facilities and staff should follow such study. Continued failure to provide for the education of such children will bring unfavorable reflection upon the Government of Guam and the Department of Education.

III. OUTDOOR RECREATION

The following recreation facilities should be provided not "as funds are made available," but all should instead be provided on a pre-planned basis within the period of time covered by the comprehensive territorial plan. This time period is approximately twenty years.

A. THE LARGE PARK

This area is designed to give the city dweller an opportunity to get away from the noise and rush of the city and enjoy contact with nature. It also affords a pleasant environment in which to engage in recreation activities. Most and possibly all of the island's large recreation parks will be ocean-side parks with the presence of the ocean for swimming, fishing, and boating contributing greatly to its value. The size of the park will vary according to land available as limited by topography, military boundaries, extensively improved private property, etc. The location of the parks will vary because of the same factors, but they should be distributed about the island so they are readily accessible. Under normal conditions the large park will be 40 acres or more in size and not more than a 30 or 40 minute drive from those who use the park regularly. The facilities to be provided will vary a great deal, but should include: Good access roads and parking; comfort stations where number of people congregating is large; picnic areas; boating facilities if possible; shelter and/or refreshment stand; active play facilities; and natural areas.

B. THE RESERVATION

The reservation is a large tract of land with scenic features which is kept primarily in its natural state. Sections are made available

for such recreational uses as hiking, camping, picnicking, horse riding, and nature study. The reservation often presents an opportunity to control and protect stream valleys; to reforest for conservation, commercial, or aesthetic reasons; and to check wind and water erosion on rough terrain.

The island's existing conservation reserve areas fit this definition to a degree. These conservation reserve areas were established to observe the forces of nature on an area left in its natural state. Unfortunately the island does not have enough land area so that it can remove completely from all use areas which may be improved or serve multi-purposes. Rather, these areas will better serve the island's future if they are treated as the normal conservation area and replanted and reforested with some parts being used to supplement the territory's recreation system.

These reservation areas should not be intensively developed, but should be kept as far as possible in their natural state. At strategic points overnight camps, picnic centers, and water sports facilities may be located. Automobile roads afford access to the centers, and nearby parking spaces are required. Large sections of the reservation are reached only by hiking or bridle trails. Buildings are needed at the use centers, and shelters may be erected along trails or at lookout points.

The number, size, and location of such conservation areas cannot be standardized, but all possible sites must be individually considered.

C. THE FAIR AND EXPOSITION AREA

Somewhere in the central urban area there should be a large open area reserved for such events as the liberation day program. This activity presently takes place at the Paseo de Susana, where it conflicts with all other activities and developments planned for that area. Even using the whole Paseo there is not enough room to provide sufficient parking and avoid congestion.

For this activity and similar activities, the territory needs an area reserved for these purposes only. Such an area could provide facilities similar to that of a county fair ground with such facilities as: Grandstand, stage, 1/5 and/ or 1/2 mile race track, permanent offices and rest rooms, permanent or semi-permanent concession stands, permanent exhibition display buildings, and large parking areas.

This fair ground should be from 30 to 40 acres minimum size, and have a central location with good access.

D. ZOOLOGICAL GARDEN AND AQUARIUM, BOTANICAL GARDEN, ARBORETUM, BIRD SANCTUARY

Zoological gardens and aquariums, botanical gardens and/ or arboretums, and a bird sanctuary would add significantly to the island's educational and recreational system. Such of these facilities as are to be provided will normally be placed as a part of the large park or reservation and will require no additional space. These facilities will require expert technical planning and without this should not be attempted. An aquarium with sea life common to this area would seem to be an extremely desirable beginning for such a facility.

E. OUTLOOKS AND NATURE TRAILS

These also will normally occur in the park or reservation areas which have been discussed. Vantage points throughout the territory should be acquired if not now government land, so that their future use by the general public is assured.

F. SPECIAL RECREATION AREAS

Areas which provide facilities for a special form of recreation include the golf course, camp, bathing beach, swimming pool, boat dock, athletic field or stadium. Often these facilities are to be found in the types of areas previously described, but there is a growing tendency to acquire special sites for these facilities.

1) THE GOLF COURSE

Eighty acres are needed for a nine-hole course, and 160 acres for an eighteen-hole course. Land with uneven topography and some woodland is most suitable. Because the game of golf requires considerable time, ease of access to the golf course is less important than with many types of recreation areas. A clubhouse is needed and sometimes game courts are also provided. One 18-hole course should be provided for each 20,000 population.

2) THE BATHING BEACH

This may be part of a large recreation park, but may be a small tract along the ocean, a swimming hole in a stream or river, or in an artificial lake such as Fena Lake. Its location is obviously determined by the availability of satisfactory water area. A bathhouse is required, and playground apparatus, game courts, and picnic and refreshment facilities are normally provided.

3) THE SWIMMING POOL

Although commonly included in a recreation area, a separate site is sometimes acquired for a swimming pool. This site should be large enough to provide adequate parking and buffer planting areas. There should be a minimum of one pool for each city, with an additional pool if the city has over 10,000 population.

4) PLEASURE BOAT DOCK

Recreation boating in the island's protected bays and lagoons is rapidly increasing in popularity despite the fact that there are no public facilities and in most cases very limited access. Access must be acquired at each place suitable for pleasure boating and facilities provided where the number of users warrants.

5) ATHLETIC FIELD OR STADIUM

A highly specialized area intended primarily for highly organized games and sports. This type facility could be provided at a senior high school.

6) CAMP

Camps are often established in large parks or reservations. Such a site should be in a comparatively secluded area, partially wooded and preferably with access to a body of water suitable for swimming. A day camp may be organized and run by the recreation commission or interested civic service groups.

IV. INDOOR SOCIAL, CULTURAL, AND RECREATIONAL

At the present time, there is no organized clamoring for cultural facilities for the territory, and very few individual comments. Social and recreational facilities are provided for, at least in a small way, by the home and the church. As an awareness of the amenities to be derived from an association with those things commonly referred to as culture develops, this complete lack of proper facilities will be loudly voiced. Those facilities for indoor social, cultural, and recreational activities which must be provided will include churches, library, museums, bandshell, observatory and planetarium, and a field house.

A. CHURCHES

At the regional level, those denominations large enough to group together but too small for individual city churches will provide their facilities. In addition to these churches, the major faiths can be expected to provide a central headquarters for their scattered churches — such as the existing catholic cathedral. Neither of these lend themselves to standards within the scope of this report, except that their location be carefully considered with regard to traffic, parking, and nuisance value.

B. LIBRARY

Although the Nieves M. Flores Public Library has moved to new quarters, this facility can not be considered adequate beyond the immediate future. As an interest in reading grows, library facilities will again need to be increased with emphasis on a building designed for a library, with complete branch library facilities in each city.

The main library must be located in the central urban area so that it is readily accessible to the majority of the people. Access routes should be good with sufficient parking provided to avoid congestion in the area. To provide the necessary room will require a minimum area of 300 by 300 feet — approximately two acres.

C. MUSEUMS

Museums is an extremely broad term covering the building appropriated as a repository of interesting objects connected with literature, art, or science. It is impossible to foresee the future needs of the territory as regards museums, but it may be expected that at some time in the future there will be a need for museum facilities far in excess of the present meager facility. Because of the smallness of the island, its few items of historical interest, minor interest in literature and the arts, and expected limited funds, it would appear that all types of museum would best be provided for in a single facility. Individual functions could be housed in part of a group of buildings or in a wing of a single building. Space requirements would be similar to the library — two acres — with a central location mandatory.

D. BANDSHELL

A bandshell or amphitheater could logically be the first step in providing the territory with complete indoor social, cultural, and recreational facilities. The best facility can be constructed by taking advantage of natural terrain features — as a natural hollow among hills. The amphitheater may be included as a part of the large park, as a special park, or may be included in the fair

and exposition area. The territory should have a minimum of one such facility and it should be located in the central urban area. Additional smaller such facilities should be provided in those cities expressing a need. The central main amphitheater should seat several hundred and parking should be provided at the minimum rate of one space for each four seats.

E. OBSERVATORY AND PLANETARIUM

An observatory and planetarium seems as fitting for an island as does an aquarium, and yet there is no apparent interest. Still, it can be expected that such an interest will be voiced at some time during the present planning period. Land should be acquired and set aside in the near future, so that it will be available when it comes time to build. The site should take into account those things mentioned for other similar areas: A plan by qualified personnel, adequate site in central urban area, off -street parking, landscaping, and avoidance of congestion.

F. FIELD HOUSE AND AUDITORIUM

The field house and the auditorium have been covered and should be included as part of the complete senior high school. The field house should be simply a covered recreation area with seating, locker, and shower facilities, suitable for all-weather use. It will be used for basketball, volleyball, badminton, tennis, dancing, and miscellaneous other activities. The auditorium should be designed as a single purpose structure with seating for 300 to 500 persons. It will be used for musical and dramatical performances, and for public speaking occasions.

By including these two major facilities as part of the senior high school, their use will be increased considerably. The location of the senior high schools will be such that the facilities will be well distributed throughout the island.

V. GOVERNMENTAL ADMINISTRATION AND SERVICE

The conduct of government and the furnishing of essential public services require in the region numerous public buildings of many different types. These buildings may be constructed and operated by the territorial, federal, trust territory of the pacific islands, governments or by a semi-public agency. They may include administrative buildings, legislative and court facilities, federal offices, buildings of a college, post offices, museums and art gallery, hospitals, and clinics, schools, libraries, police and fire stations, water plants, sewage disposal plants, power plants, farmers market, garage and equipment repair shops, etc.

From the standpoint of location, public buildings fall into two categories: Those that serve the entire region and are therefore located near the center, and those that serve sections of the region and are therefore distributed throughout the region.

In selecting locations for public buildings of the central type, the first question to be answered is whether these buildings are to be placed on sites that are appropriate for each individual structure but that are, in general, unrelated one to the other, or whether they should be combined into a group of buildings of harmonious composition, commonly called a civic center. With some exceptions, the latter appears to be the better solution for the territory for several reasons: A grouping will improve convenience to the public in transaction of business requiring visits to more than one public agency; efficiency and economy in the conduct of public affairs may be promoted when buildings are grouped so as to facilitate easy contacts between public officials

and to make possible the joint use of some facilities; a smaller aggregate acreage may be required for a group of buildings than for scattered structures; and, probably the most important, is the increased importance, dominance and aesthetic significance they gain when each building becomes an integral part of a harmonious composition. A civic center may thus become a symbol of the civic interest and cultural attainments of the citizens of the territory.

The territory has made a good beginning on such a civic center. Included in the central Agana area at the present are: Administration building housing the Departments of Labor and Personnel, Law, and Land Management, and offices of the Chief Commissioner, Budget and Management, Passport, and the Governor; Legislative building housing court and legislative facilities; Department of Public Safety building serving as central headquarters for fire and police activities; and the post office. Under construction is additional government of Guam administration space for the Departments of Finance and Commerce and the ABC office. Planned for early construction is a second floor addition to the post office building to house federal court and temporary island court facilities.

These buildings occupy all of the public land available except for the Plaza de Espana, the Mall, and the Paseo de Susana. To provide for needed additional facilities, land must be purchased or reserved soon, before value is increased with private construction. Land to be purchased or reserved will depend on size and number of facilities to be included in the central area. Governmental administration and service facilities might include: Administrative personnel of

Departments of Education, Public Works, Agriculture, and Public Utilities; island court, legislative offices and assembly rooms; and administrative offices for trust territory of the pacific islands. Additional facilities for indoor social, cultural, and recreational activities may also be included as part of the civic center.

To provide the land required for concentrating administrative personnel of all territorial government agencies and departments will require approximately five acres of public land acquisition. This would not include space for trust territory offices or for indoor social, cultural, and recreational facilities, but would permit the preservation of open space in the mall and plaza areas.

Space allowance for some government functions such as Public Works garages and service shops must be individually determined. Public Works, for example, may have a central garage and repair shop in a service industry area with supplemental equipment motor pools at either end of the island.

VI. HEALTH, SAFETY, WELFARE

A. HEALTH

Regional health facilities are well provided for with two large, complete, centrally-located hospitals. These plus the city health centers satisfy all reasonable standards.

B. SAFETY

In addition to police and fire facilities in each city, there must be provided additional facilities serving the entire region.

1) FIRE PROTECTION FACILITIES

Regional fire protection facilities include a central administrative and control center, and a training ground in addition to individual stations. The central administrative and control center should be housed in a centrally located headquarters station which would also house specialized or seldom-used equipment. The site must have excellent travel routes in all directions. Land requirement would be one to two acres.

The location of the training ground is less critical, but should be as close to the center of the island as possible to shorten required traveling time. The training ground must be in a suburban area where noise and smoke from training operations will be inoffensive

2) POLICE PROTECTION FACILITIES

Regional control of a network of police stations is made possible by a central headquarters station. Radio control facilities, motor pool, and special equipment will be housed

at the central station in addition to administrative functions (including driver testing and licensing). The central headquarters station must have good circulation routes so that aid is quickly available for individual city district stations.

Police protection facilities will also include a penitentiary and prison farm, and a juvenile detention home. The latter facility may eventually be part of a department of social welfare as covered in the following section. The penitentiary should have a large enough site so that a prison farm (truck) may be operated by the prisoners. The site should be 50 to 75 acres of good agricultural land. Location is relatively unimportant.

C. SOCIAL WELFARE

A department of social welfare could more properly handle welfare functions than the present divided organization. Its functions would include:

AID TO POOR

AID TO HANDICAPPED

JUVENILE DETENTION

CORRECTIONAL INSTITUTION

PAROLE AND PROBATION ADMINISTRATION

VII. REGIONAL COMMERCIAL CENTER

The regional commercial center should serve as the financial, administrative, and business center for the territory. It will supplement these facilities contained within individual city business districts, providing facilities specific in nature. Reasons for the grouping of these facilities are similar to the reasoning behind the grouping of governmental facilities into a civic center.

Standards, likewise, are similar to those which apply to all other activities within the city: Circulation about the commercial center must be safe and convenient; and pedestrian, vehicular, and service traffic should be separate from each other, with ample parking facilities distributed within reasonable walking distance from all facilities. Parking should be at a three to one ratio, and multi-level parking must be used to keep parking lots from occupying all land not directly built upon. Land requirements will depend on the number and type of financial, administrative, and business needs.

VIII. REGIONAL INDUSTRIAL FACILITIES

Within the region, industrial district location will depend upon site location factors such as: Availability of land; availability of water, sewer, and power; transportation facilities; and distribution or using agencies (military). Location of production material will decide site location for some industry. Usual "Stateside" problems of industrial location concerned with laws and regulations, tax structure, climate, labor and living conditions will be of no concern since these are uniform throughout the region.

An expansion of the territory's industrial facilities must take place to provide employment for a rapidly expanding (between $3\frac{1}{2}\%$ and 4% per year) population. It is imperative that land be reserved for this future industrial development. Additional considerations are covered in Part III of the section on DISTRICT STANDARDS.

IX. REGIONAL TRAVEL, TRANSPORTATION, AND CIRCULATION FACILITIES

Regional travel, transportation, and circulation facilities necessary for adequate service to the region include: Port facilities, airport, bus service, highway net, second-class (rural) road system, and urban traffic-ways as previously covered. In addition, trucking facilities may be grouped into a trucking terminal adjacent to the commercial port.

A. PORT FACILITIES

Present commercial port facilities are located on navy land and operation is permitted by revocable permit. This imposes many problems, especially with security control. Commercial port facilities are an extremely vital part of the territory's transportation system, because of the great dependence on the importation of goods, and future improvement of port facilities will be necessary.

The ultimate goal should be a commercial port outside of navy security, on public land with adjacent trucking and industrial facilities. The achievement of this goal apparently rests with the navy and its future plans for Apra Harbor.

B. AIRPORT

As with harbor facilities, the civilian population of Guam is dependent upon the military for its airfield facilities. This is not expected to change, and indeed, there appears to be no reason for change, since the number of non-military flights to and from the territory is insignificant as compared to military operations, and since commercial traffic is in no way hindered. It would,

however, be desirable to have commercial terminal facilities free from military regulations as much as possible. Such a change is now in the discussion and preliminary planning stage.

C. BUS SERVICE

At the present time, the island has no public transportation service. In the foreseeable future, it appears as though bus transportation alone will prove feasible. In the far-distant future, however, the military may use some new form of transportation similar to helicopters to replace the present jumble of military trucks. Bus service should be of two types for the island: The first, an island-wide transportation system serving all points of the island; and the second, a metropolitan service serving the central urban area. Both types of service will be necessary and there should be a centrally-located terminal facility to serve the passengers. This terminal should be in the area of heaviest use with good access to island-wide circulation routes.

D. HIGHWAY NET

In addition to traffic-ways within the individual cities, the territory must have a good highway system joining together all parts of the island. The archaic practice of separating fast-moving traffic bound for opposite directions by a painted white line or by no line at all is a serious hazard which should be remedied soon. The island's primary highway system should all be designed for physically dividing traffic moving in opposite directions. This will require a right-of-way width of 140 feet minimum. The primary highways should skirt urban areas wherever possible, should have

as few entering roads as practicable, should have no homes fronting directly upon them, and should have all intersections carefully designed for maximum safety and minimum traffic impedance. The primary highway net will consist of those highways connecting cities with other cities or with major military facilities.

The design of the territory's secondary highways will of necessity have less stringent requirements, even though for maximum safety they should meet the same rigid design requirements of the primary highway net. It may be built with a 100 foot right-of-way, may go through the urban area it serves, will have more entering roads, and less elaborate intersection design. Individual homes may still not front on the highway, but must be served by an access road.

The secondary highway will connect parts of a city or will connect cities with recreation areas, public facilities, minor military facilities, etc.

E. SECOND-CLASS ROAD SYSTEM

To serve those areas of minimum development will require a system of all-weather roads traversing the interior areas of the island where agricultural development is possible. These roads should have an 80-foot right-of-way with a good coral surfaced road having wide shoulders and good drainage.

X. REGIONAL UTILITY CONSIDERATIONS

Present waste disposal, water, power, and telephone facilities are wholly inadequate and incapable of satisfactorily meeting today's needs. These utilities must be expanded and improved to meet current needs, and then further expanded to meet the needs of a rapidly growing population. This need — or demand — is then, of three types. First, a "lost ground" demand, representing the accumulated backlog of construction. Second, a "replacement" demand exists for facilities which are wearing out or which need to be modernized. Finally, there is an "expansion" demand, construction necessary to accommodate the expected growth in population and to bring the standards of service to an acceptable minimum. Compounding the problems of the last step is the improvement of standards as to higher qualitative and quantitative facilities. Only the most general considerations are within the scope of this report.

A. WASTE DISPOSAL

The various wastes that are produced are sewage, garbage, rubbish, street sweepings, and refuse from manufacturing, trade and building operations. Other than sewage, which must be handled separately, these forms of waste should be disposed of by using the sanitary land-fill method, whereby all forms of waste are buried under carefully controlled conditions. Such disposal areas should not be too close to built-up residential areas, and should be located throughout the island so as to keep hauling time as low as possible. All hauling should be by completely enclosed trucks.

The collection, treatment, and disposal of sewage must be carefully

controlled to protect public health. In areas of very sparse development, the disposal of sewage may be accomplished satisfactorily by the use of septic tanks. As the density of development increases, public facilities will, however, become essential. The use of "privies" in urban areas should not be allowed. Collection of waste should be by a complete, separate sewage collection system. The degree of sewage treatment required will depend upon the method of disposal of the effluent. Dumping of raw sewage directly into the sea may be permissible in some instances, whereas other instances may require full treatment including the use of a disinfectant to eliminate dangerous bacteria. The degree of treatment should be determined only after careful analysis of the characteristics of the expected dump area.

The installation of septic tanks and treatment and disposal systems should be made only after approval by the division of public health. The storm-water sewerage system serves to dispose of surface-water runoff, so as to prevent erosion and permit continual use of all streets and highways. The frequency of location, the size of pipe, and extent of location must all be based on competent engineering surveys. These surveys must allow for future expansion or extension.

B. WATER

It is accepted good policy to supply everyone in the region with all the water needed, at low cost, so that water may be used freely but without wastage. This establishes a good standard which objective can be effectively met through a sound water-supply system and good collection and distribution systems working in

conjunction with metering of the system to avoid wastage. The total amount of water required for the territory will be difficult to determine, but planning estimates may be based on population and land-use studies.

Water for domestic use should be free from bacteriological contamination, clear, colorless, odorless, and pleasant to the taste. To meet this last requirement, will require the abandonment of the present water supply system for the north part of the island as far as domestic use is concerned. As few sources of supply as possible will make a better system. A new source of supply has been studied and discussed which would meet supply needs for a considerable length of time. Any storage facility which would provide a body of water large enough for recreational purposes should be so used. Picnicking and camping, boating, fishing, and bathing may be permitted under suitable regulations, if sanitary facilities are provided and if the water is properly treated.

The distribution system should include provisions to assure continuity of service. Size of distribution system will depend on urban areas to be served. Size of distribution pipes will normally be fixed by fire protection requirements. All treatment, collection, storage, and distribution facilities should be attractively landscaped to enhance their appearance.

C. POWER AND TELEPHONE

Planning considerations for power and telephone utilities are the location of wires and buildings for housing facilities. Should wires be overhead or underground, within street rights-of-way or

in easements at the rear of lots? May electric generating plants, substations, transformer stations, storage yards, or telephone exchange buildings be located in any district or should they meet certain restrictions?

1) LOCATION OF POWER AND TELEPHONE LINES

Utility wires may be located either within the right-of-way of streets or within alleys or easements along rear lot lines. The existence of easements or the ability to obtain them, the topography, the depth of lots and the placement of structures upon them will determine whether it is more economical to locate utility lines in a street or in a rear-lot-line easement or alley.

The ideal method of locating utility wires is to place them underground. This solution is expensive but it leaves the landscape unmarred by wires and protects the wires against damage by wind and fire. A practical compromise — and a desirable standard — between the location of wires in street rights-of-way or underground, is to locate all utility wires in rear-lot-line easements or alleys except where this is impossible or undesirable because of view or topography.

2) LOCATION OF POWER AND TELEPHONE BUILDINGS

The service area of some power and telephone installations requires a location within the district served. This would apply to electric substations or transformer stations without machinery or storage yards, and telephone exchange buildings.

Electric generating plants, yards for storage of materials and truck or repair facilities should, however, be confined to industrial districts. All facilities should have sufficient land area to permit landscaping.

CONCLUSION

Planning implies a goal to be reached. This in turn suggests some unity of purpose. Guam was devastated by war over 16 years ago, and rebuilding was tragically needed. Plans were drawn to make the island a better place than it had been. Yet reconstruction lags. Why?

The answer lies with the dissatisfaction over details shown by influential individuals. Sorely needed progress is frustrated by disunity and unimaginative leadership. Unity of purpose - a conviction about the form and character we desire for our cities - has been absent. Consequently, planning has wandered aimlessly, frequently promising much but delivering little.

Cities are not presently adequate. As they are rebuilt and extended they must conform to standards which ensure a better living environment. This will require major decisions, and we must be prepared to make them. Unless these decisions are made wisely and according to plan there shall be no progress.

As stated previously, these standards are not intended to be absolute. In some areas they are so sketchy as to be of little or no use. In these areas, or in areas not covered, additional research should be done to make the standards more complete. Those areas which are covered extensively should be constantly checked and revised to keep pace with progressive thinking.