

# LAND USE of the Phoenix Urban Area

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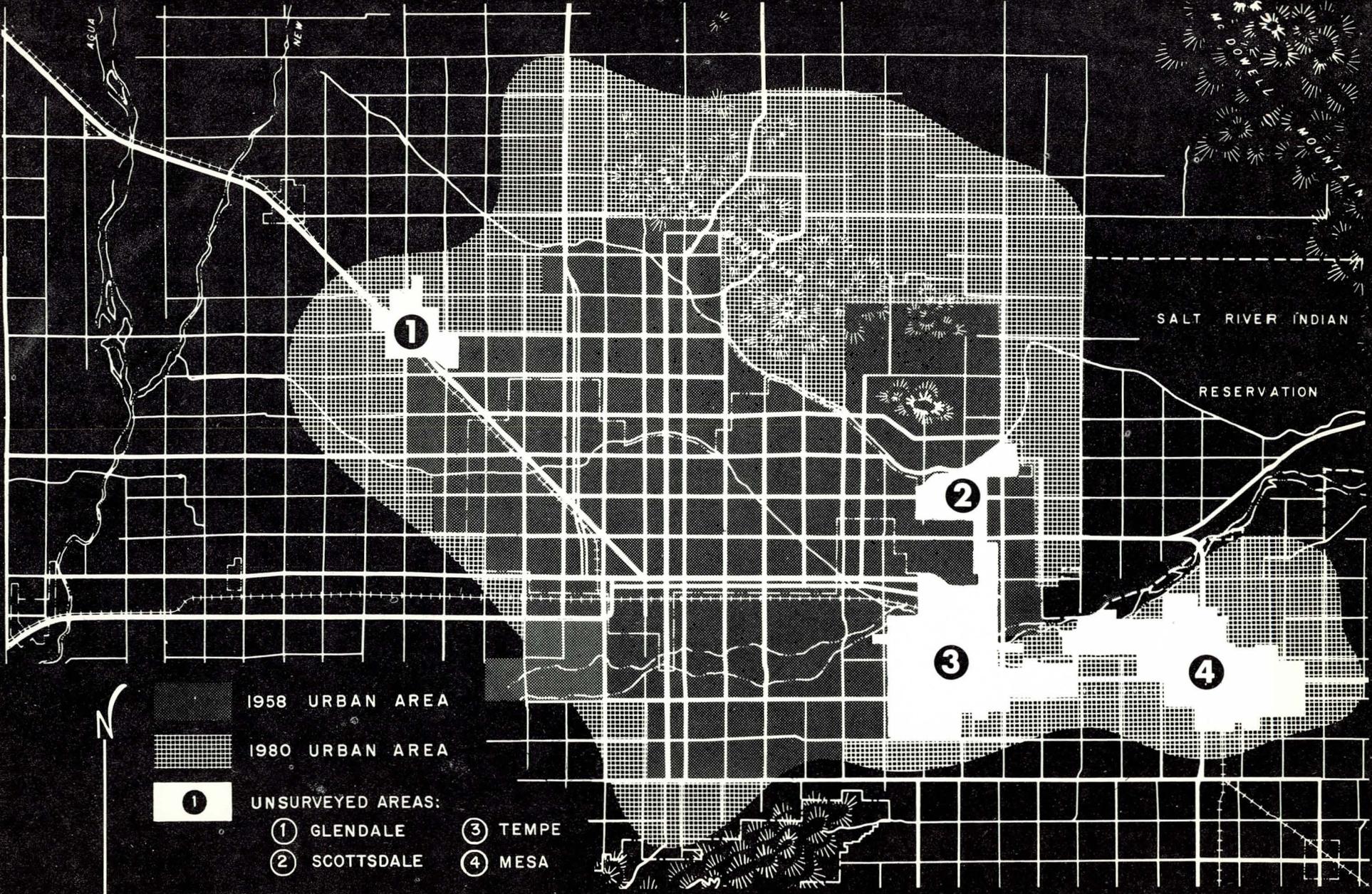
A Study Basic to Long Range Planning

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- 1958 URBAN AREA
- 1980 URBAN AREA
- UNSURVEYED AREAS:
  - ① GLENDALE
  - ② SCOTTSDALE
  - ③ TEMPE
  - ④ MESA



**ADVANCE PLANNING TASK FORCE**  
 CITY OF PHOENIX AND MARICOPA COUNTY  
 PLANNING DEPARTMENTS

**PHOENIX URBAN AREAS • 1958 and 1980**

**LAND USE**  
**of the**  
**PHOENIX URBAN AREA**

A Study Basic to Long Range Planning

Prepared By  
ADVANCE PLANNING TASK FORCE  
City of Phoenix and Maricopa County, Arizona

May 1959

Price: One Dollar and Fifty Cents

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## SUMMARY

### Findings

1. Topographic features and irrigation facilities have exerted a marked influence upon the general shape of the Phoenix Urban Area.
2. The pronounced degree of mixed land use existent in the Urban Area is a major deviation from the norm. Mixed land use gives rise to physical, economic and social conflicts which adversely affect the long-term stability of a neighborhood.
3. The Phoenix Urban Area contains an unusual amount of undeveloped land, about 43,385 acres. Intermittent vacant parcels exert adverse economic effects on developed property and have disrupted the continuity of streets and utilities making public service more expensive and less efficient.
4. All urban uses of land were found to occupy 11.74 acres per 100 persons in 1958, as compared with 14.84 acres average for 11 other similar urban areas.
5. In Phoenix the residential use of land averaged 4.74 acres per 100 persons. In the Urban Fringe Area the ratio was 8.09 acres per 100.

### Conclusions

1. Topography and irrigation will continue to influence the use of land, particularly in relation to provision of public utilities and in areas subject to flood damage.
2. Mixed land use evidences a lack of firm land use policies and their enforcement through sound zoning and subdivision controls. In partially built-up areas, land use conflicts can be alleviated through positive planning action. In completely built-up areas, their correction requires vigorous urban renewal action.
3. Forty percent of the new growth predicted by 1980 should be absorbed within the present limits of the Urban Area. Adoption and enforcement of positive land development policies are necessary to prevent continued scatteration of urban development throughout the Valley.
4. By 1980, the urban use of land is expected to total 14.33 acres per 100 persons. One million people will require 143,300 acres, or 224 square miles, of developed land.
5. By 1980, the residential use of land is expected to require about 7.4 acres per 100 persons, 95% of which will be in single-family use.

## Findings

6. Phoenix has a relatively high percentage of commercial land use -- a ratio of 0.54 acres per 100. The large amount of strip or ribbon business constitutes a major deficiency of existing commercial development.

7. Industry uses 2,600 acres of land in the Urban Area. Recent development demonstrates a trend toward decentralized, sprawling factories located on large land areas providing space for employee parking and plant expansion.

8. A grave deficiency exists in park and playground land. Exclusive of Papago Park and South Mountain Park, only 584.5 acres are in this use, less than one-fourth the ratio typical of 11 comparable urban areas.

9. Vast areas of federal and state land around the perimeter of the Valley offer excellent opportunity for development of a superior system of regional parks.

## Conclusions

6. Encouragement of the trend toward consolidation of commerce in organized centers, together with required provision of adequate off-street parking will increase the ratio of commercial land use to 0.70 acres per 100 persons by 1980.

7. Decentralization of industry must be controlled to prevent scatteration and lessen ill effects on adjacent property. By 1980, industrial land use will occupy about 8,800 acres in the urbanized area.

8. A total of 10,000 acres of park and playground space as well as 3,750 acres of elementary and high school sites will be required to serve the 1980 population. A long-range program of land acquisition and development is a vital community need.

9. Both enabling legislation and concerted public support are necessary to insure the retention of public-owned lands until they can be developed for recreation use.

## Findings

10. Public sewerage systems have not kept pace with growing needs and a relatively small proportion of existing urban development has public service. An immense and precarious reliance has been placed on private disposal systems.

11. Political boundaries affect physical growth to some extent in terms of location and sequence of development.

## Conclusions

10. As urban population grows sanitation becomes a matter of vital concern. Less and less new development must be permitted to use private disposal systems. Extension of public service to new development offers an important tool in achievement of desirable land use patterns.

11. Changes in political boundaries are not expected to exert any quantitative influence on future population growth.

## INTRODUCTION

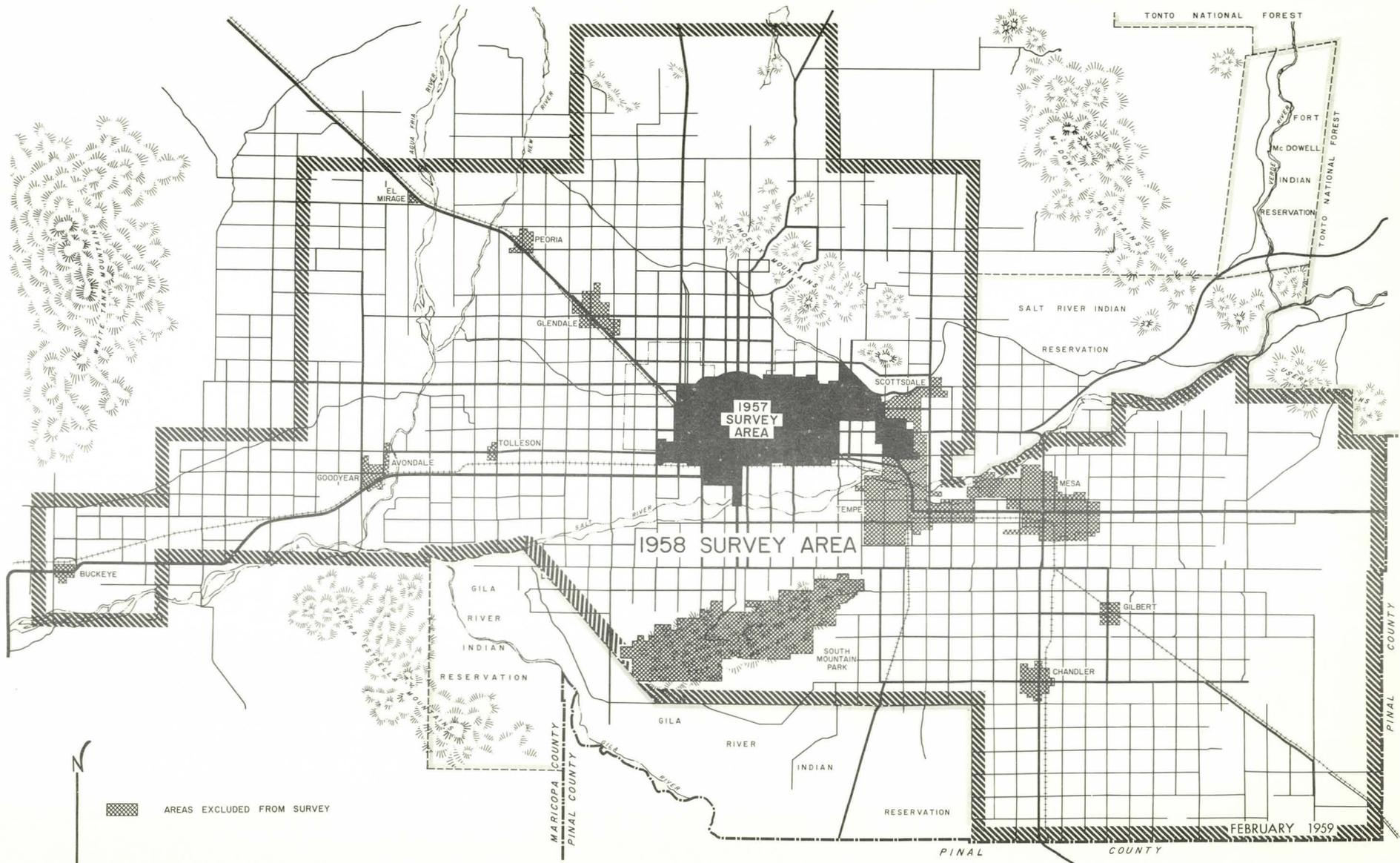
Patterns of land use are in a continuous process of change. This process becomes particularly dynamic during such periods of population explosion as that being experienced in the Phoenix area. It is crucial to the welfare of the future community that we familiarize ourselves with these land use patterns as they exist today, and that we understand how they have evolved. It is essential that we keep abreast of progressive changes in these patterns and that we periodically evaluate these changes in order to recognize and better understand the significance of trends being demonstrated. How else can we hope to be certain that these trends are leading the community in the direction its citizens want it to go?

Survey and analysis of existing land use provide the planning agency with knowledge of the basic nature of the community -- knowledge necessary to estimate the amount of space which will be required to accommodate the future population. Studies which allocate this required space among the several urban land use categories, and the land use plan which arranges these uses, establish the only solid base upon which to develop comprehensive and long-range plans for the guidance of future community growth.

This report, therefore, deals with the arrangement, location and amount of existing land use as revealed by detailed surveys of the Phoenix Urban Area\* carried out in 1957 and 1958. Analysis of these data strives toward better understanding of the social, economic and physical factors which have been responsible for today's land use patterns and the factors which will influence future change. The report further provides and explains estimates of the space required for each urban land use to serve the 1980 population, and tentatively plans the arrangement of these uses in desirable relationships designed to best satisfy the needs of this future population.

The land use data and analysis contained in this report will have extensive and continuing value to planning agencies in Maricopa County in the writing and enforcement of effective zoning and subdivision regulations. Land use-to-population ratios will help determine the amount of space required and the most desirable balance of uses within any future geographical area. Of equal importance is the hope that this report will also prove useful to other public agencies in guidance of their own specialized planning and to private enterprise in its analyses of potential development proposals.

\*The phrase, Phoenix Urban Area, as used throughout this report, designates a geographical area which includes the City of Phoenix and the urbanized unincorporated areas of Maricopa County which adjoin the City. The 1958 Phoenix Urban Area is that area judged to be primarily urban in character in 1958. The 1980 Phoenix Urban Area is that area estimated to be urbanized in the year 1980. These areas are shown on the map which serves as the frontispiece.



AREAS EXCLUDED FROM SURVEY

MILES 0 1 2 3 4 5 6

ADVANCE PLANNING TASK FORCE  
CITY OF PHOENIX AND MARICOPA COUNTY  
PLANNING DEPARTMENTS

# LAND USE SURVEY AREAS

# SURVEY OF EXISTING LAND USE

## Land Use Survey Areas

In 1957 a detailed land use survey was made of the area included within the corporate limits of the City of Phoenix as they existed in September of that year. A report and analysis of this survey was subsequently published in June, 1958\*. Even as this initial survey was in progress, two factors indicated the desirability of extending the land use survey outside the city limits:

- (1) Anticipation of an immediate and continuing program of annexation of unincorporated areas of Maricopa County by the City of Phoenix; and,
- (2) Appreciation of the need for comprehensive planning of all areas likely to become urbanized in the future, regardless of the location of corporate limits.

In 1958, the Advance Planning Task Force was established jointly by the Phoenix City Council and the Maricopa County Board of Supervisors for the purposes of collecting and studying basic data and preparing certain elements of a long-range plan for future development of the Phoenix Urban Area. One of the first assignments was the continuation and extension of the 1957 land use survey into the urbanized unincorporated fringe areas surrounding the City.

The areas covered by these two land use surveys are shown on Plate 2. It should be noted that these surveys did not include land within the 1958 limits of any incorporated place other than the City of Phoenix, a decision based on the desire to preserve local prerogatives and initiative. The Maricopa County Planning and Zoning Commission is presently offering technical assistance to all incorporated cities and towns in the County in the accomplishment of similar land use surveys and analyses as deemed necessary and desirable by the individual communities.

\* Phoenix City Planning Commission, Land Use in Phoenix, 1957

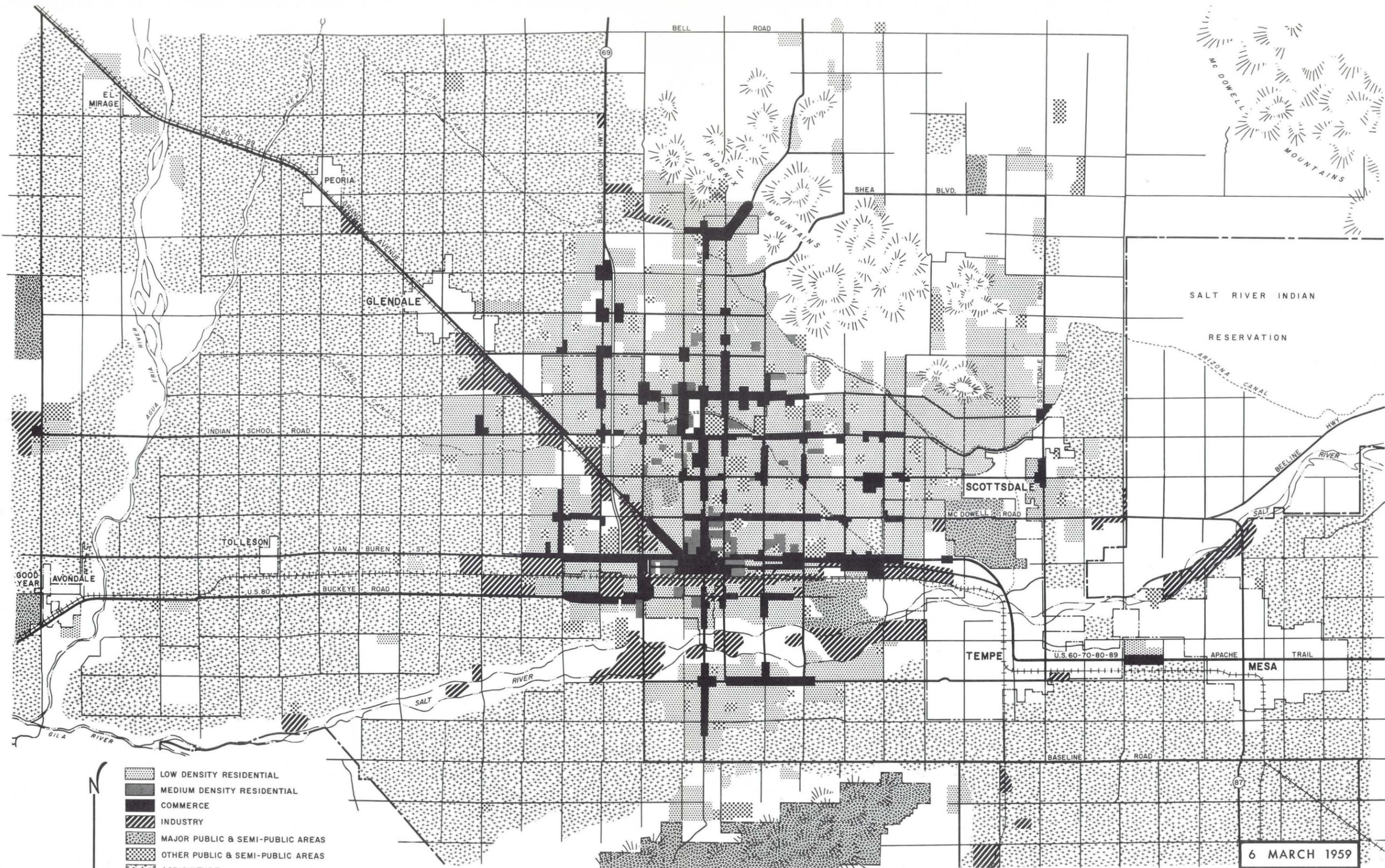
## Methodology

In both the 1957 and 1958 surveys a field check was made of every lot and parcel of land, and each property classified in one of 23 different land use categories. The 1957 survey used the methods of classification and mapping recommended by the Public Administration Service manual, "Mapping for Planning". Field notes were transferred in color to 100 scale base maps of the City. Each land use was then measured and tabulated in terms of acreage and number of dwelling units. Analysis of these tabulations dealt with ratios of land use-to-population, land use-to-zoning, and land use-to-total land area. These ratios were, insofar as practicable, compared with similar data for other cities and metropolitan areas judged to be generally comparable to Phoenix and its urbanized environs.

In order to expedite the 1958 survey and to facilitate correlation of its results with those of the previous work, the same general methods and land use classification system were used. Field notes were recorded in color at 600 scale on 67 separate half-township maps. The 1958 survey recorded the existing use of some 772,000 acres in Maricopa County and brought the total land so surveyed to about 1,242 square miles.

In tabulating the 1958 survey data it was necessary to make a number of basic assumptions in the detailed classification of uses and the count of dwelling units. These basic assumptions are set forth in Appendix A of this report. It was also necessary to determine and use the most logical geographical unit of measure for these land uses. It was decided that all data and analysis should be related to the census tracts proposed for use in the 1960 U. S. Census\*. One word of caution is appropriate in relation to these proposed census tracts: As of the date of preparation of this report, detailed demarcation of all tracts has not received full approval from the Census Bureau and minor modifications may be expected before final acceptance. The finalized census tract map will be publicized as soon as approval is received.

\* See Plate 18, Appendix C.



# GENERALIZED EXISTING LAND USE · 1958

# MAJOR CHARACTERISTICS OF EXISTING LAND USE

## General Arrangement

Zoning was first adopted by Phoenix in 1931 and the City Planning Department formed in 1947. The Maricopa County Planning and Zoning Commission was established in 1949 and the County Zoning Ordinance adopted in 1951. Population of the City increased from 48,000 in 1930 to about 242,000 in 1958. The 1958 population of the unincorporated parts of the Phoenix Urban Area numbered about 138,000. Hence, the Urban Area has been under the influence of planning and zoning through its period of heaviest growth and this influence is evident in the existing arrangement of land uses.

Past trends in land development, as reflected by the existing pattern of land use, are fairly typical of most smaller urban areas and central cities. The central business district is surrounded by areas predominantly devoted to multi-family residential use, which, in turn, gives way to single and two-family uses extending outward to the limits of urbanization. Shopping and service commerce has extended itself in strips along major traffic arteries, particularly those leading to the central core. Roadside types of commerce, e.g., motels and souvenir shops, have located along interstate routes. Industry has tended to group itself along transportation routes with a preference for rail locations.

Plate 3 presents a graphic picture of the arrangement of existing land uses. This map represents a composite of 42 separate half-township maps upon which the detailed land use is recorded from field survey.

The Urban Area contains certain topographical features which to a marked extent have dictated that large acreages of land remain undeveloped. The Salt River, once a flowing stream and now the site of extensive gravel extraction, is a primary example. The Phoenix Mountains along the northeasterly fringe of the City and the irrigation canals, necessary and vital facilities, have also been interruptive to physical growth and continuity of development.

Throughout the Urban Area there exists a pronounced intermingling of land uses not readily apparent on Plate 3. This mixture of uses has been a primary cause of deterioration and blight and is more prevalent in older sections of the Urban Area which developed prior to the advent of planning and zoning. In other areas land use conflicts have resulted from failure to base zoning on a comprehensive study of land use and land use needs, and to relate subsequent zoning amendments and subdivision proposals to a land use plan.

Another major characteristic of local land use is the existence of an unusual amount and distribution of undeveloped land within urbanized areas. Leap-frogging of development has disrupted the continuity of urban growth and has resulted in unstable property values. In 1957, one-fifth of Phoenix' total area was unused for urban purposes, while 46% of the area annexed to the City in 1958 was undeveloped. Quite expectedly, a much larger proportion, 60%, of the Urban Fringe\* was found to be undeveloped.

While the present pattern of land use in the Urban Area appears to be fairly typical of that in most established cities, more effective land use policies based upon comprehensive research and planning are needed to correct present deficiencies and prevent their recurrence.

#### Areas Occupied by Existing Land Uses

Table 1 shows the area occupied by each existing land use in the several component parts of the 1958 Phoenix Urban Area. Also shown are percentages of total areas represented by each land use.

Plate 4 shows graphically the quantitative relationship of existing types of land uses one to another and to the totals for the City of Phoenix, 1958, and the Urban Fringe, 1958.

#### Distribution of Land Use by Census Tract

Appendix B shows the distribution of land uses by the census tracts proposed for use in the 1960 U. S. Census. The location and arrangement of these census tracts are shown on Plate 18 in Appendix C.

#### Ratio of Existing Land Use to Population

Table 2 shows the ratio of existing land use-to-population for the two principal components of the Phoenix Urban Area as compared with the average ratios of eleven other urban areas and those of five other central cities having over 250,000 population.

Compilation and analysis of land use data from many cities and urban areas throughout the United States has shown that a definite and predictable relationship exists between land use and population\*\*.

Table 2, therefore, presents comparative data which is of considerable value in the estimation of the land needed for urban uses by the future population. A later section of this report gives more detailed consideration to future land needs expressed as a ratio of land use-to-population.

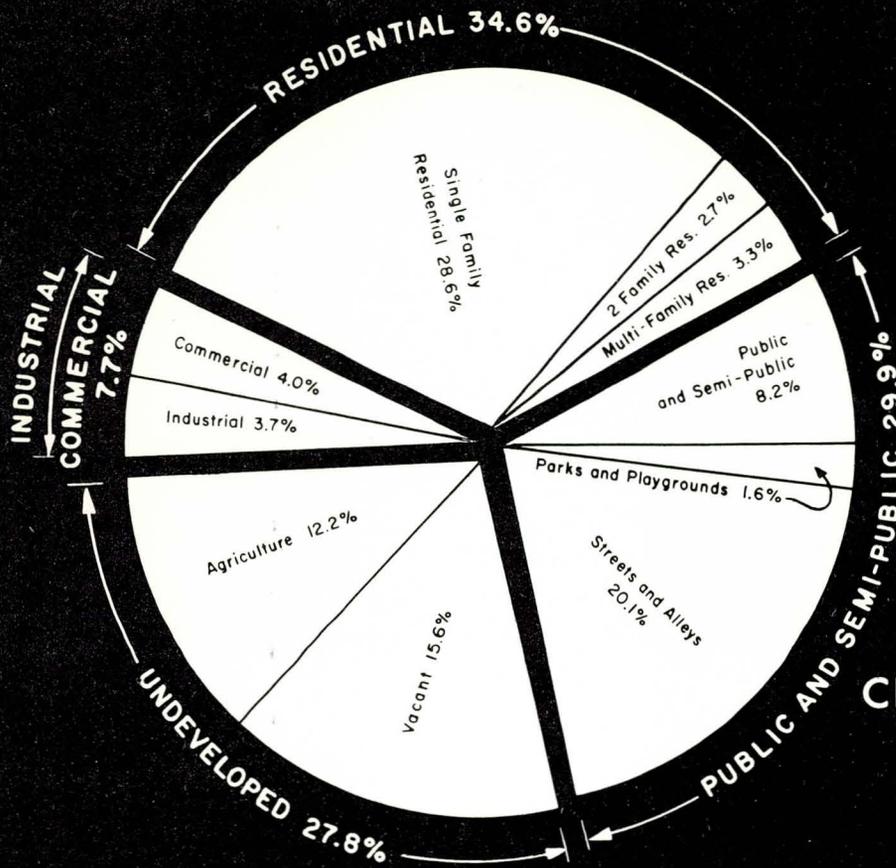
\* A designation used to describe the urbanized unincorporated (in 1958) component of the 1958 Phoenix Urban Area.

\*\*P. 120, Harland Bartholomew, "Land Uses in American Cities", 1955.

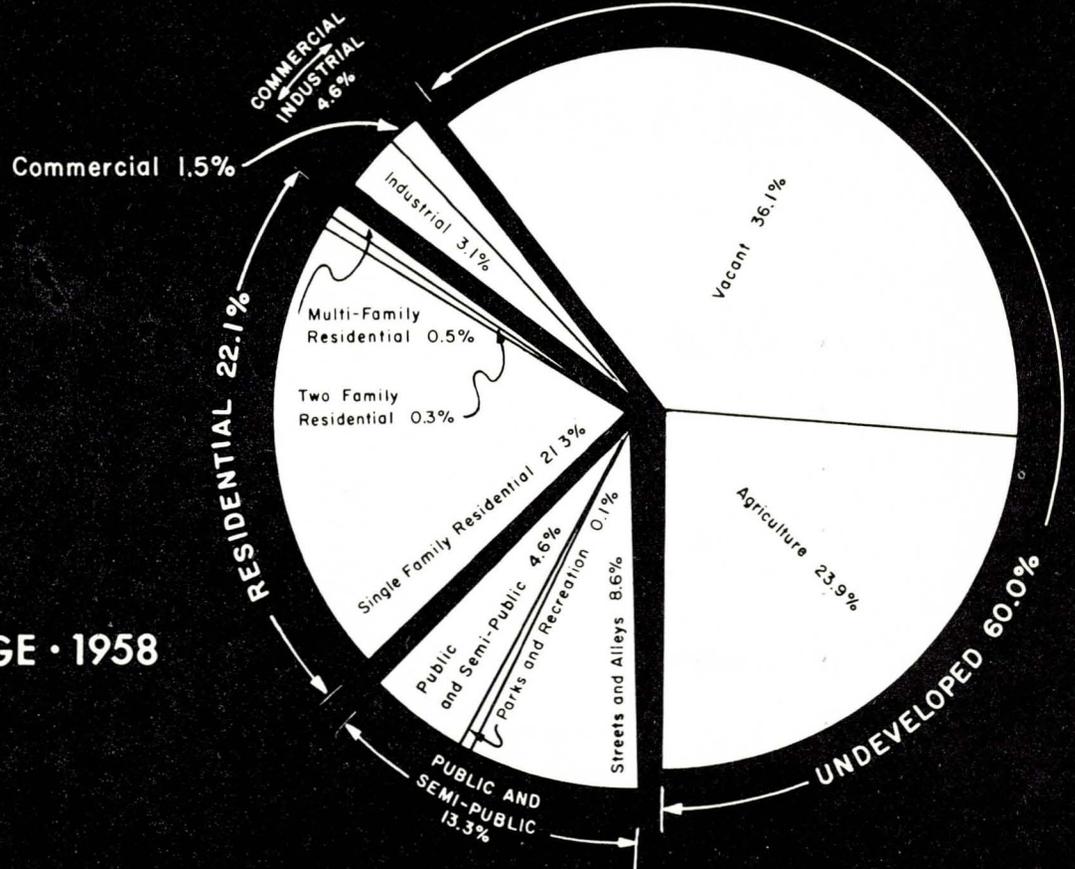
TABLE 1

EXISTING LAND USE - 1958  
PHOENIX URBAN AREA

LAND USE	A		B		C (A+B)		D		E (C+D)	
	CITY OF PHOENIX		AREA ANNEXED		CITY OF PHOENIX		URBAN FRINGE		PHOENIX URBAN	
	1957		1958		1958		1958		AREA - 1958	
	Acreage	% of Total	Acreage	% of Total	Acreage	% of Total	Acreage	% of Total	Acreage	% of Total
Single-Family	6,820.5	29.5	2,680.2	26.6	9,500.7	28.6	12,139.7	21.3	21,640.4	24.0
Two-Family	851.8	3.7	30.8	0.3	882.6	2.7	161.8	0.3	1,044.4	1.2
Multi-Family	1,036.6	4.5	64.2	0.6	1,100.8	3.3	295.5	0.5	1,396.3	1.6
TOTAL RESIDENTIAL	8,708.9	37.6	2,775.2	27.5	11,484.1	34.6	12,597.0	22.1	24,081.1	26.7
TOTAL COMMERCIAL	1,092.6	4.7	230.6	2.3	1,323.2	4.0	836.5	1.5	2,159.7	2.4
Light Industry	647.1	2.8	139.6	1.4	786.7	2.4	1,055.2	1.9	1,841.9	2.0
Heavy Industry	195.4	0.8	40.3	0.4	235.7	0.7	527.9	0.9	763.6	0.8
RR & Utilities	158.9	0.7	60.1	0.6	219.0	0.7	166.9	0.3	385.9	0.4
TOTAL INDUSTRIAL	1,001.4	4.3	240.0	2.4	1,241.4	3.7	1,750.0	3.1	2,991.4	3.3
Streets & Alleys	4,900.8	21.2	1,772.4	17.6	6,673.2	20.1	4,906.6	8.6	11,579.8	12.8
Parks & Play-grounds	528.4	2.3	-	-	528.4	1.6	56.1	0.1	584.5	0.6
Public & Semi-Public	2,281.0	9.9	441.3	4.4	2,722.3	8.2	2,612.3	4.6	5,334.6	5.9
TOTAL PUBLIC & SEMI-PUBLIC	7,710.2	33.4	2,213.7	21.9	9,923.9	29.9	7,575.0	13.3	17,498.9	19.4
TOTAL DEVELOPED LAND	18,513.1	80.0	5,459.5	54.1	23,972.6	72.2	22,758.5	40.0	46,731.1	51.9
Agricultural	1,043.3	4.5	3,026.7	30.0	4,070.0	12.2	13,583.8	23.9	17,653.8	19.6
Vacant	3,585.7	15.5	1,605.4	15.9	5,191.1	15.6	20,540.9	36.1	25,732.0	28.6
TOTAL UNDEVELOPED LAND	4,629.0	20.0	4,632.1	45.9	9,261.1	27.8	34,124.7	60.0	43,385.8	48.1
TOTAL ALL LAND	23,142.1	100.0	10,091.6	100.0	33,233.7	100.0	56,883.2	100.0	90,116.9	100.0



CITY OF PHOENIX · 1958



URBAN FRINGE · 1958

**EXISTING LAND USE · 1958**  
**PHOENIX URBAN AREA**

TABLE 2

RATIO OF EXISTING LAND USE TO POPULATION  
Compared to 11 Other Urban Areas and 5 Central Cities<sup>1</sup>

Land Use	DEVELOPED ACRES PER 100 PERSONS				
	Phoenix 1958	Urban Fringe 1958	Phoenix Urban Area <sup>2</sup>	11 Other Urban Areas <sup>3</sup>	5 Central Cities Over 250,000 Pop.
POPULATION	242,260 <sup>4</sup>	155,576 <sup>5</sup>	397,836		
Single Family	3.92	7.80	5.44	3.72	1.43
Two-Family	0.37	0.10	0.26	0.24	0.34
3 & 4 Family	0.19	0.04	0.13	} 0.20	} 0.25
5+Family	} 0.26	} 0.15	} 0.22		
Trailer Courts					
TOTAL RESIDENTIAL	4.74	8.09	6.05	4.16	2.02
TOTAL COMMERCIAL	0.55	0.54	0.54	0.39	0.21
Light Industry	0.32	0.68	0.46	0.28	0.19
Heavy Industry	0.10	0.34	0.19	0.56	0.24
RR & Public Utilities	0.09	0.10	0.10	0.92	0.22
TOTAL INDUSTRIAL	0.51	1.12	0.75	1.76	0.65
Streets & Alleys	2.75	3.15	2.91	4.10	1.25
Parks & Playgrounds	0.22	0.03	0.15	0.68	0.43
Public & Semi- Public	1.12	1.67	1.34	3.75	0.48
TOTAL PUBLIC & SEMI- PUBLIC	4.09	4.85	4.40	8.53	2.16
TOTAL ALL USES	9.89	15.40	11.74	14.84	5.04

<sup>1</sup>Harland Bartholomew, "Land Uses in American Cities", 1955.

<sup>2</sup>See page v

<sup>3</sup>Average for the following Urban Areas: Battle Creek, Michigan; Brookhaven, Mississippi; Corpus Christi, Texas; Frankfort, Kentucky; Freeport, Illinois; Jacksonville, Illinois; Jefferson City, Missouri; Lincoln, Nebraska; Sioux Falls, South Dakota; Streeter, Illinois; and Williamsburg, Virginia.

<sup>4</sup>(1957 DU's + Added DU's 1957-58 - 7 1/2% vacancy) x 3.3 persons per DU+(5% not in households)+(1958 DU's - 9% vacancy) x 3.3 persons per DU+(3 1/2% not in households) = 242,260 people.

<sup>5</sup>(1958 DU's - 9% vacancy) x 3.3 persons per DU+3 1/2% not in households=155,576 people.

Percentage of Developed Land Occupied by Types of Uses

As a further aid in comparing local use of land with that in other urban areas and central cities, Table 3 has been prepared to show the percentages of total developed land occupied by types of uses in the principal components of the Phoenix Urban Area as compared to the averages of eleven other Urban Areas and in seven other Central Cities with populations between 100,000 and 250,000.<sup>1</sup>

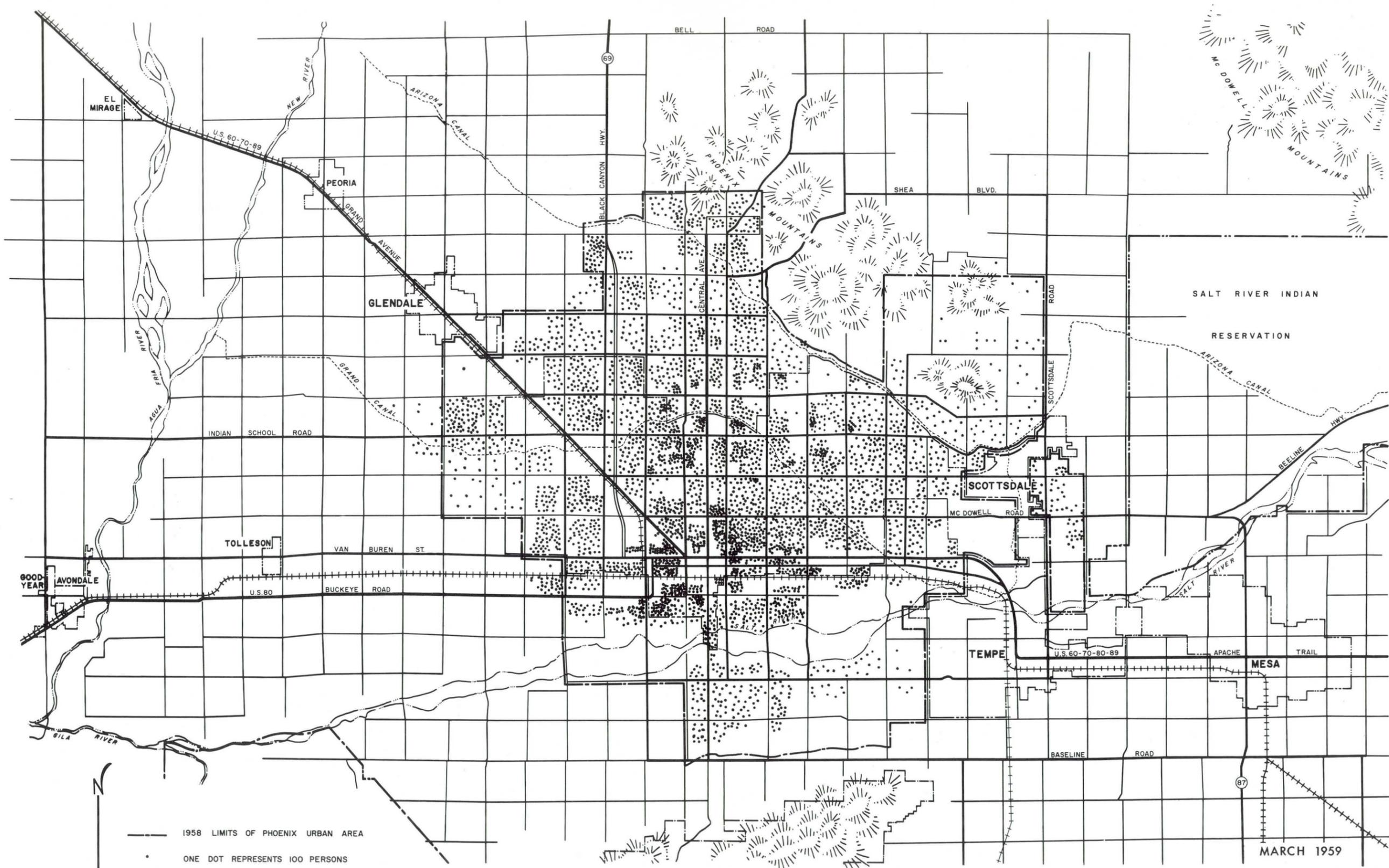
TABLE 3

PERCENTAGE OF DEVELOPED LAND OCCUPIED BY SPECIFIC USES

Land Use	PERCENTAGE OF DEVELOPED LAND				
	Phoenix 1958	Urban Fringe 1958	Phoenix Urban Area	11 Other <sup>1</sup> Urban Areas	7 Central <sup>2</sup> Cities
Single-Family	39.6	53.3	46.3	25.1	35.6
Two-Family	3.7	0.7	2.2	1.6	3.6
Multi-Family	4.6	1.3	3.0	1.3	2.2
Total Residential	47.9	55.3	51.5	28.0	41.4
Total Commercial	5.5	3.7	4.6	2.6	2.9
Light Industry	3.3	4.6	3.9	1.9	2.4
Heavy Industry	1.0	2.3	1.6	3.8	3.5
RR & Public Utilities	0.9	0.7	0.8	6.2	5.4
Total Industrial	5.2	7.7	6.4	11.9	11.3
Streets & Alleys	27.8	21.6	24.8	27.6	27.6
Parks and Play- grounds	2.2	0.2	1.3	4.6	5.7
Public and Semi- Public	11.4	11.5	11.4	25.3	11.2
Total Public and Semi- Public	41.4	33.3	37.5	57.5	44.5

<sup>1</sup> From Harland Bartholomew, "Land Uses in American Cities", 1955.

<sup>2</sup> Op. Cit. (Water areas are deducted to improve comparison).



- - - 1958 LIMITS OF PHOENIX URBAN AREA  
 • ONE DOT REPRESENTS 100 PERSONS

MILES 0 1 2 3 4

**ADVANCE PLANNING TASK FORCE**  
 CITY OF PHOENIX AND MARICOPA COUNTY  
 PLANNING DEPARTMENTS

# POPULATION DISTRIBUTION • 1958

MARCH 1959

# ANALYSIS OF EXISTING LAND USE AND SIGNIFICANT TRENDS

## RESIDENTIAL LAND USE

The predominant use of developed land in the Phoenix Urban Area is single-family residence. Tables 2 and 3 show that all residential uses occupy a somewhat higher proportion of developed land than is normal for comparable urban areas. This greater-than-normal residential use of land is explained by two characteristics of local growth:

(1) Fewer residents are dependent upon local jobs for support, due to the area's attractiveness for retirement living and winter vacations; and, (2) The abundance of suitable land has led to a larger average lot size and a resultant lower residential density than normal.

Over 93,000 single-family dwellings house some 308,000 people and occupy 21,640 acres of land in the Phoenix Urban Area. Plate 5 shows the distribution of this population in 1958. The Urban Fringe is more strongly single-family in character than is the City. There is very little two-family residential use outside the City and, percentagewise, multi-family use occupies one-third less land in outlying areas than in the City. In general, these latter are considered normal characteristics of a developing urban complex.

## History of Residential Growth

To understand present and future local trends in residential development and to recognize existing problems and prevent their recurrence, one should first look back several decades.

Phoenix' first building code was adopted in 1935, revised in 1949, and finally replaced in 1958 by a high-standard code based on the National Building Code. A rudimentary zoning ordinance was adopted by the City in 1931, and underwent comprehensive amendment in 1947 and 1955. Maricopa County zoning was adopted in 1951. To date, concerted effort to gain state enabling legislation permitting adoption of building codes for unincorporated areas has been unsuccessful.

From a half-mile square area containing 1,700 people in 1881, Phoenix grew to 6 1/2 square miles and 48,000 people by 1930 (See Plate 6). All of this growth took place without benefit of any type of public control. As recently as 1950, over half of the City's residents were living in dwellings which pre-dated adoption of a building code. That many of these structures were constructed to low standards is evidenced by the deterioration and blight prevalent in older sections of the area.

The advent of Federal mortgage insurance programs in the 1930's, primarily intended to ease purchase of homes and to shore up the construction industry, brought as important by-products higher standards in land platting and improvement as well as in home construction and financing.

Increasing home ownership, enforcement of zoning, initiation of platting controls, public education and other factors have induced a growing cognizance of the importance of livability and stable value as standards of residential construction. Residences influenced by adjacent business, industry and heavy traffic are no longer marketable at par with those which are unaffected by such non-residential uses. The homeowner is growing more sensitive to land use conflicts, and looks with increasing dependence to the public agency for better guidance, protection and services.

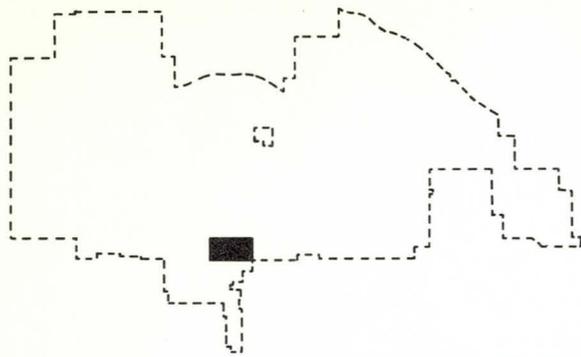
### Characteristics of Single-Family Residence

#### Lot Area per Family

Appendix D shows the average lot area per family for single-family and multi-family residence in the Phoenix Urban Area. The average net lot areas tabulated from the 1957 and 1958 land use surveys are shown by census tract (see Plate 18, Appendix C).

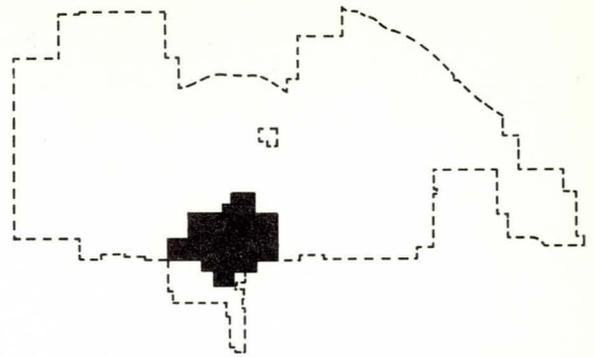
Average net lot area per family for single-family dwellings ranges from 3,844 sq. ft. in Census Tract 7-82 to 82,905 sq. ft. in Tract 7-23 (Biltmore Estates). The overall average is 10,650 sq. ft. The average land area per dwelling unit for multi-family residence is 3,005 sq. ft.

Plate 7 shows how these average lot sizes for single-family dwellings are distributed by census tract throughout the Urban Area. In general, the map shows a normal progression from small lots at the City's core to large lots in the area that once ringed the City at an earlier stage in its growth. Beyond these larger lots residential development again becomes more dense as urban growth requires more land for modest priced housing for the bulk of the expanding population. In considering the accompanying map it should be remembered that many of the census tracts are only partially developed at the present time and that a change in lot size of ensuing development would change the average from one level to another and perhaps change the apparent relationship of one tract to the adjoining tracts.



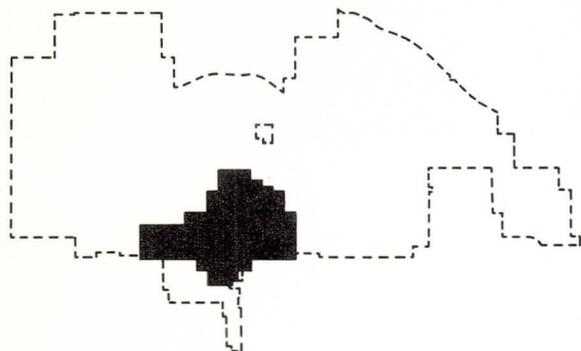
AREA: 0.5 SQ MI POP: 1,708

1881



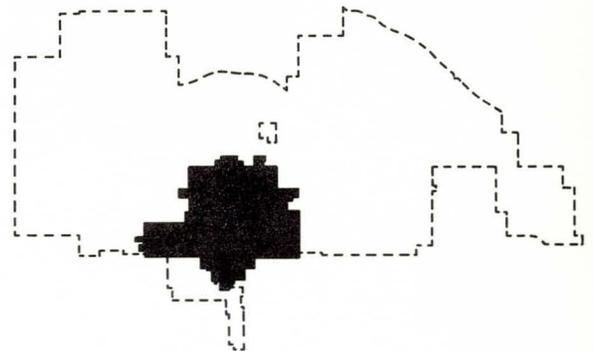
AREA: 3.2 SQ MI POP: 11,134

1910



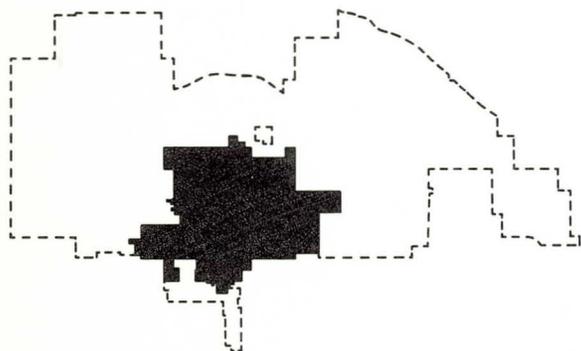
AREA: 5.1 SQ MI POP: 29,053

1920



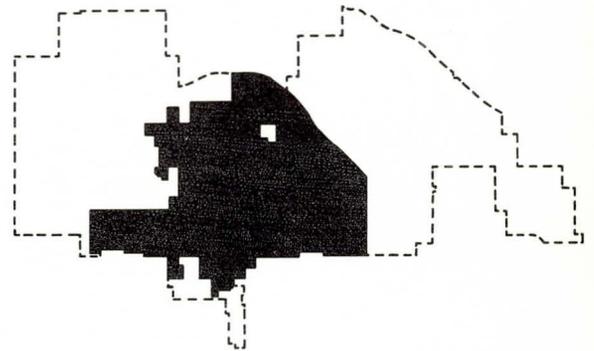
AREA: 6.4 SQ MI POP: 48,118

1930



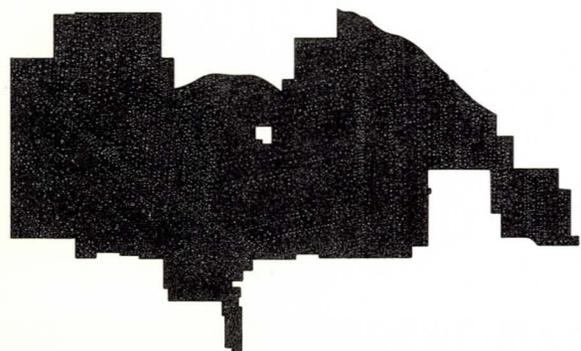
AREA: 9.6 SQ MI POP: 65,414

1940



AREA: 17.1 SQ MI POP: 106,818

1950

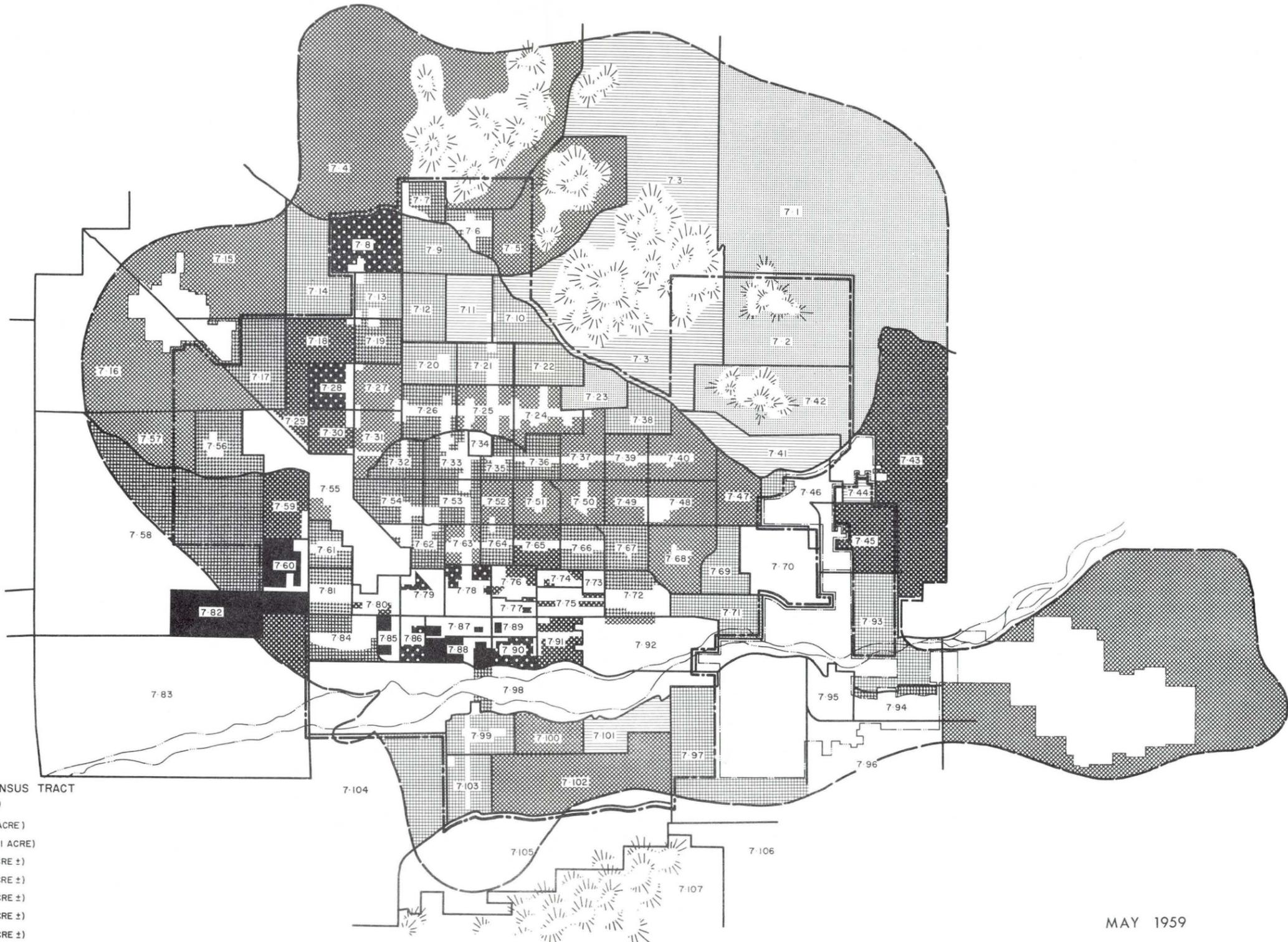


AREA: 52.6 SQ MI POP: 241,899

1958

## GROWTH OF THE CITY OF PHOENIX

ADVANCE PLANNING TASK FORCE  
CITY OF PHOENIX AND MARICOPA COUNTY  
PLANNING DEPARTMENTS



NET LOT AREA PER FAMILY BY CENSUS TRACT  
(SINGLE-FAMILY RESIDENCE)

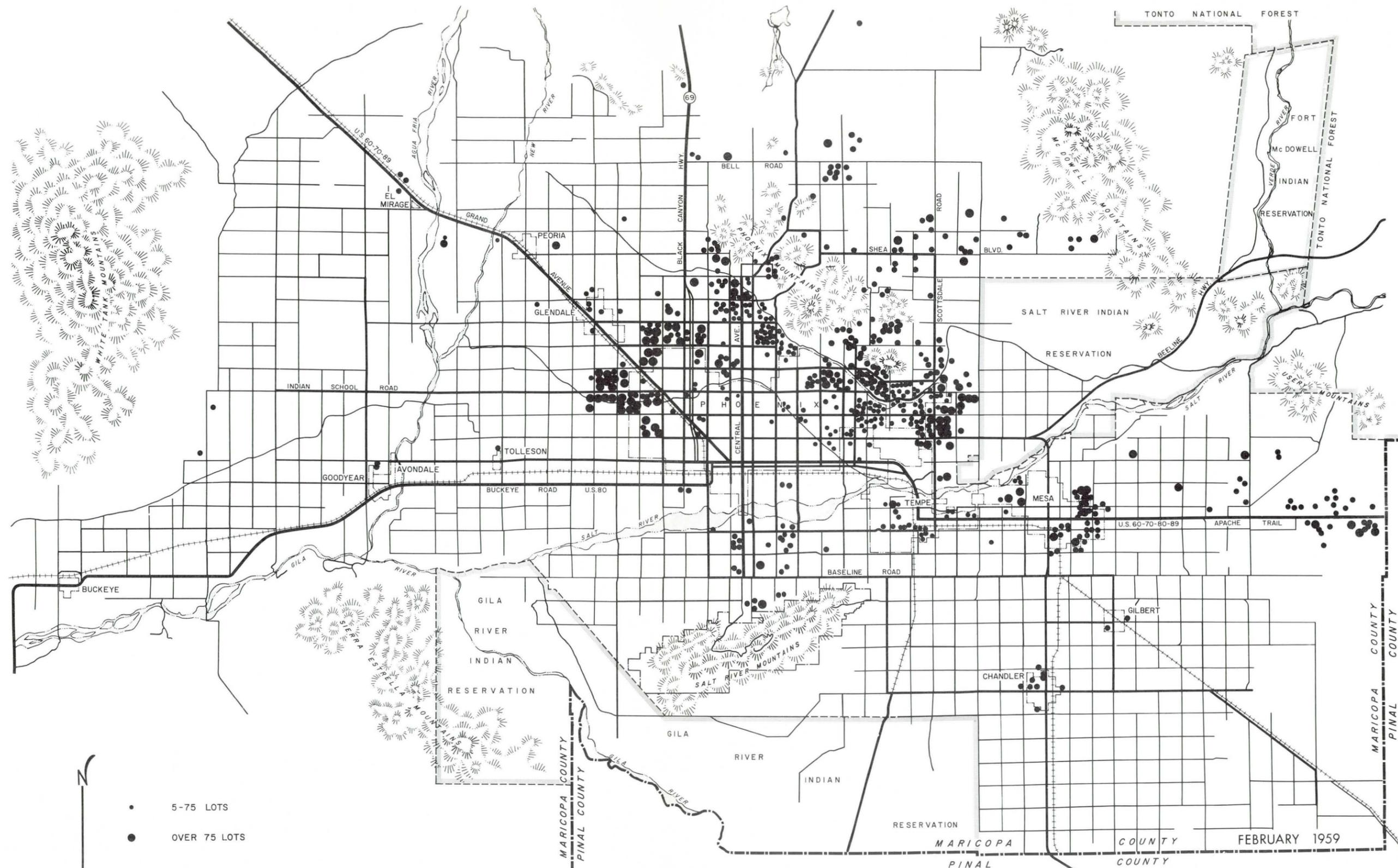
- OVER 43,000sq.ft. (OVER 1 ACRE)
- 21,500 - 43,000sq.ft. (1/2 to 1 ACRE)
- 12,000 - 21,500sq.ft. (1/3 ACRE ±)
- 9,000 - 12,000sq.ft. (1/4 ACRE ±)
- 7,500 - 9,000sq.ft. (1/5 ACRE ±)
- 6,500 - 7,500sq.ft. (1/6 ACRE ±)
- 5,500 - 6,500sq.ft. (1/7 ACRE ±)
- LESS THAN 5,500sq.ft. (LESS THAN 1/8 ACRE)

MILES 0 1 2 3 4

ADVANCE PLANNING TASK FORCE  
CITY OF PHOENIX AND MARICOPA COUNTY  
PLANNING DEPARTMENTS

MAY 1959

# LOT AREA PER FAMILY • 1958



- 5-75 LOTS
- OVER 75 LOTS

MILES 0 1 2 3 4 5 6

ADVANCE PLANNING TASK FORCE  
CITY OF PHOENIX AND MARICOPA COUNTY  
PLANNING DEPARTMENTS

# RECORDED SUBDIVISIONS · 1956 - 1958

FEBRUARY 1959

## Single-Family Location Trends

Plate 8 shows the location of residential subdivisions platted during the period 1956-58, depicting rather dramatically the areas of recent subdivision activity.

The northerly fringe area is shown to be developing strongly without marked emphasis in any particular direction. Little activity is evident south of Van Buren Street or directly west of the central business district. Two location trends related to scale of development are perceivable:

1. The larger subdivision, representing large-scale development by mass-production home builders, are located in two general areas: northwest on either side of Grand Avenue, and east in the vicinity of Scottsdale Road and East McDowell.
2. Major concentrations of smaller subdivisions have occurred throughout the northeast quadrant, including the town of Scottsdale.

Minor concentrations are evident in the City of Mesa and along Apache Trail near the east County line.

The principal trend-establishing factor in areas attractive to large-scale development has undoubtedly been the availability of large vacant land areas under single or unified ownership at a lower price. In smaller-scale development areas, influencing factors are much different and to some extent directly opposite: small-scale construction operations find smaller land areas more attractive because less outlay of capital is involved in the acquisition and improvement of land, and custom building profits from prior establishment of residential character in partially built-up neighborhoods.

## Discontinuous Residential Development

Residential development in the Phoenix Urban Area suffers from a marked lack of continuity. This deficiency stems in part from a general failure to coordinate the street patterns of adjoining subdivisions at the time of platting.

Too frequently the developer has concentrated strictly on his own subdivision without concern for the existing or future development of adjacent land. The result: street patterns of adjoining subdivisions bear little resemblance and frequently even fail to connect. Dead-ends,

long culs-de-sac and closed loop streets prevent normal or convenient vehicular and pedestrian circulation within the ultimate neighborhood.

Uncoordinated street patterns have frequently led to abrupt changes in the character of housing from one subdivision to another. Groups of expensive homes on large lots exist next to apartments or to modest homes on small lots, all without any attempt at gradation.

Aside from unnecessary inconvenience, added expense and failure to achieve the most valuable use of the land, this general indifference to continuity results in a failure to progress toward development of real neighborhoods.

The long-term value of a home as well as its livability is influenced to a marked degree by characteristics of the neighborhood in which it is located. A resident identifies himself with his neighborhood as a result of sharing its environment, facilities, advantages and problems with his neighbors. This neighborliness is of extreme social importance and the true basis of civic pride and well-being.

To weld together the many diverse and unjoined parts into functional neighborhood units will require close continuing attention by public agencies to zoning and subdivision control. Neighborhood plans which will insure desirable land use relationships, safe and convenient traffic circulation, adequate school and recreation sites and local shopping are an essential planning objective.

### Two-Family Residence

Only 1.2% of all developed land in the Urban Area is occupied by two-family dwellings and most of this is scattered throughout older sections of the Urban Area. It is probable that many existing two-family structures are conversions from single dwellings.

Some intermingling of duplexes with single-family dwellings does not generally depreciate the single-family residential values, especially in older neighborhoods. Duplexes are not generally considered an economically advantageous investment for the owner except when he occupies one of the units. Although this has proven a popular small-scale investment among older people, the proportion of two-family land use is not expected to increase or to comprise an important segment of residential land use.

### Multi-Family Residence

There seems to be a general confusion as to the types of housing included in this land use category and to some extent this confusion can be traced back to the City and County Zoning Ordinances. The key to clarification is the word residence. An important segment of local economy is based upon non-resident tourists and winter visitors. For the purposes of this report, the various types of accommodations which house these non-residents (motels, hotels, guest ranches, etc.) have been considered commercial rather than residential.

All structures comprising three or more dwelling units suitable for permanent occupancy have been considered multi-family residential. Single trailers on lots were treated as single-family dwellings while permanent trailer courts were considered multi-family developments.

Multi-family residence occupies only 1.6% of developed land in the Phoenix Urban Area, most of which is located within the City limits of Phoenix. While apartment construction is currently undergoing rapid expansion, it is anticipated that the total percentage of multi-family land use will not increase significantly in the future.

### Trends in Multi-Family Location

Plate 3 reveals a strong past inclination to locate multi-family residence along section and mid-section line roads. While the location of apartments along major streets avoids conflict with single-family purposes it subjects itself to the depressive effects of high volume traffic and intermixed commercial uses.

Livability and economic stability would be greatly benefitted by increased setback from the major street. Both hazard and nuisance would be reduced by construction of marginal access streets abutting major streets. The other alternative, in terms of location, is to develop greater concentrations of multi-family residence in more self-contained buffer areas between commercial and single-family residential uses.

### COMMERCIAL LAND USE

The land use survey classified commercial uses as local business, general business, intensive business, or offices. However, for the purposes of this analysis all commercial uses are considered in the aggregate.

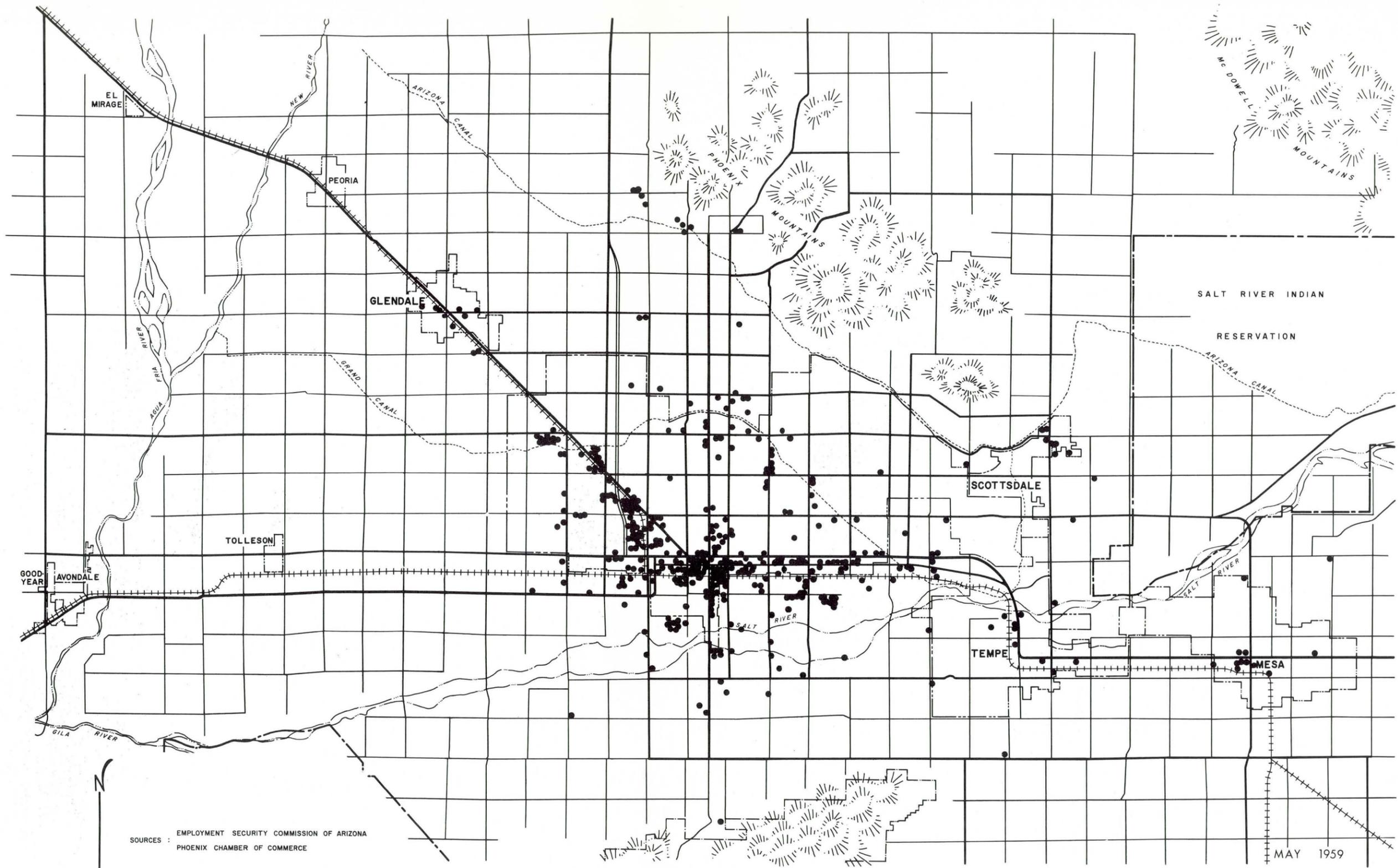
Commerce occupies 2.4% of the developed land in the Urban Area. The higher percentage in Phoenix (4.7%) is offset by the low percentage in the Urban Fringe (1.5%). Table 3 shows that the proportion of land devoted to commerce in the Urban Area is closely similar to the average for comparable urban areas. The City of Phoenix has a relatively high proportion.

Three principal factors explain Phoenix' high ratio:

1. Phoenix is the primary trade and distribution center of Arizona and extensive commercial development is required to serve its large retail and wholesale trade area.
2. Phoenix is a resort and vacation center and supplies goods and services to large numbers of non-residents.
3. Commerce in Phoenix has strongly tended toward linear expansion along major thoroughfares. This type of development makes less efficient use of land than does more concentrated grouping.

The last factor deserves further consideration. Motels and such related facilities as restaurants, souvenir shops and gas stations, all essentially roadside types of business, have located along all major state and interstate highway routes leading to the heart of the City. In 1957, 16% of the total commercial land area was devoted to motels alone. This commerce serves an important function in Phoenix' prominence as a winter resort area and its location is considered practical and proper in most respects.

The extension of other types of business in strips along all major traffic arteries throughout the Urban Area is less practical and proper. This linear expansion, considered normal to most cities until after World War II, has since fallen into ill repute on the basis of land economics. Single use of parking space is more expensive and less efficient in use of space. General failure to provide adequate parking intensifies the ratio of floor area to land area. While all business exerts a depressive effect upon abutting non-commercial real estate, ribbon business amplifies this effect by reason of its greater perimeter. Traffic hazard for both pedestrians and vehicles is increased, police and fire protection costs rise along with insurance rates.



# LOCATION OF MANUFACTURING PLANTS

During recent years the concept of the organized shopping center has caught fire in Phoenix and its customer drawing power forecasts a marked slowing in the extension of ribbon business. In the years between 1950 and 1957, over 6,000,000 square feet of organized shopping was built on 144 acres of land. About 4,000,000 square feet are under construction and another ten million in the planning stage.\*

Although the trend toward organized shopping centers has tended to consolidate commercial land use and slow linear expansion, some demand for ribbon commercial still continues. The location and type of commercial development has such far-reaching effects upon the investors, the abutting property owners and the general public that future expansion must be given much more comprehensive study than it has in the past.

#### INDUSTRIAL LAND USE

Light industry includes those warehouse and industrial uses which produce noise, traffic congestion or danger, but which are of such character as to present no serious hazard to neighboring property. Heavy industry, as a land use category, includes all industrial uses which are of a dangerous or nuisance-producing character. Railroads and public utilities are differentiated from other industries because their ability to serve public needs is frequently dependent upon their location.

Industrial use occupies 6.4% of the developed land in the Phoenix Urban Area. Light industry accounts for over half of this total, the balance representing heavy industry, railroads and public utilities. Table 3 shows this to be a considerably smaller ratio of industry than is typical of comparable cities.

Plate 9 shows the location of manufacturing plants in Phoenix and environs as compiled by the Employment Security Commission of Arizona and the Phoenix Chamber of Commerce. Although concentrations of industry are apparent in some areas, there are individual plants scattered generally throughout the Urban Area, illustrating the point that considerable intermingling of land uses exists.

Until very recent years, local industry has generally grouped itself along or near railroads, the principal exception being the extractive industries working the gravel deposits of the Salt River bottom. Development of the so-called "garden" type of industrial plant erected on a large landscaped site providing ample space for setbacks, parking, outdoor storage and loading facilities, has given rise to the planning of new specially-controlled districts. New plants have more

\* Advance Planning Task Force, "Organized Shopping Centers in the Phoenix Urban Area, 1958."

and more frequently found themselves as much out of character with the typical older plant as they are with non-industrial land uses. This, together with the decreasing dependency upon rail transportation for materials and goods, has brought about a new concept in industrial location. Among the factors influencing this location trend are: (1) lower land costs and lower taxes; (2) ease of purchase from unified ownership; and, (3) the desire for more strategic location in relation to employees' places of residence. General Electric, Sperry-Rand and Motorola are demonstrating this trend on the local scene.

### PUBLIC AND SEMI-PUBLIC

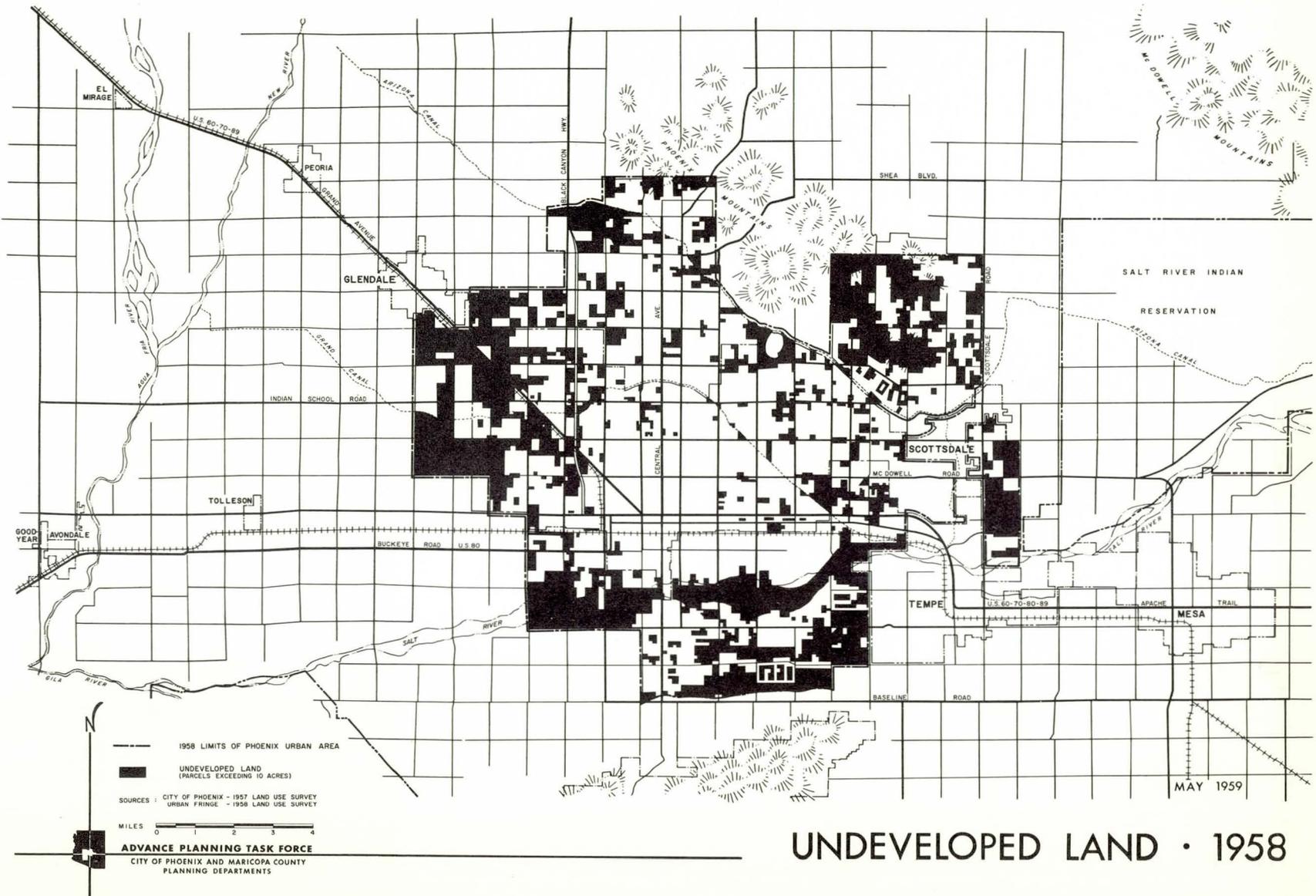
Public land uses include streets and alleys, parks and playgrounds, governmental functions, schools and other public institutions. Semi-Public (or Quasi-Public) includes charitable organizations, churches, private schools, golf clubs, hospitals, cemeteries, etc.

Streets and Alleys occupy about 1/4 of the developed land in the Phoenix Urban Area, a ratio fairly typical of other cities and urban areas.

Parks and Playgrounds occupy only 1.3% of all developed land in the Urban Area. Table 3 shows this to be less than one-third of the amount of land generally provided for this purpose. Of 22,759 acres of developed land in the Urban Fringe area, only 56 acres are in park and playground use, meaning that 156,000 residents of the fringe area (over one-third of the total Urban Area population) have virtually no neighborhood or community recreational facilities! It will take concentrated effort at all levels of public and private endeavor to make even a dent in this overwhelming deficiency.

Because its location and facilities are primarily of a character typical of regional recreation development, South Mountain Park, containing some 14,000 acres, has not been considered a part of this Park and Playground category of land use. The Papago Park area, 1,100 acres in size, is presently occupied by a variety of public uses more general than recreational in nature.

Other Public and Semi-Public uses occupy about 11 1/2% of the total developed land, a percentage consistent throughout the components of the Urban Area. This percentage is normal for comparable central cities (see Table 3) but only half the average for eleven other urban areas. Of the 2,281 acres of public and semi-public uses in Phoenix, 267 acres were used by schools and 1,100 occupied by the variety of public functions located in Papago Park.



# UNDEVELOPED LAND • 1958

## UNDEVELOPED LAND

Agricultural and vacant land accounted for one-fifth of Phoenix' total land area in 1957. Sixty per cent of the Urban Fringe area was similarly undeveloped to urban uses in 1958. The general magnitude and distribution of this undeveloped land may be seen on the accompanying map.

While this is not a startling condition in a rapidly growing urban area, it is important to examine its causes and effects in order to be guided in determining future land development policies. Normally, topographic limitations and land economics are the two basic reasons for the existence of undeveloped land within an urbanized area. Very little land in Phoenix could be considered unsuitable for urban development by reason of topography or other natural features, whereas about 10% of the Urban Area total could be so classified. Consequently the forces of land economics resulting from a vast supply are the primary causes for the by-passing of many parcels in the normal progression of Phoenix' urban development. Growing scarcity of land for some specific uses together with increased over-all land values will undoubtedly lead to the gradual development of most of the vacant parcels within the City.

In the Urban Fringe this characteristic is more pronounced and more disturbing. Abundant supply, inflationary prices caused by unbridled speculation; and inadequate public control measures have all contributed to the general scatteration and lack of continuity of residential land use. Hundreds of parcels of well-located and suitable land have been by-passed.

Undeveloped parcels scattered throughout the Urban Area disrupt the continuity of streets and public utilities and make the provision of urban services more expensive and less efficient. Access to developed property is restricted and the convenience of residents adversely affected. Uncertainty as to the nature of ultimate development influences the long term stability of neighboring homes. The unsightliness and poor housekeeping typical of vacant parcels affect the livability as well as the dollar values of these developed properties.

In the future every available device should be used by the planning agencies to encourage the development of this by-passed land and its integration with existing land uses. A considerable proportion of the anticipated future growth must be located within the present limits of the Urban Area. Firm land development policies related to continuity of street patterns and installation of public utilities are needed to avoid future extension of the skip-and-jump characteristics of recent urban development.

## FEDERAL, STATE AND INDIAN LANDS

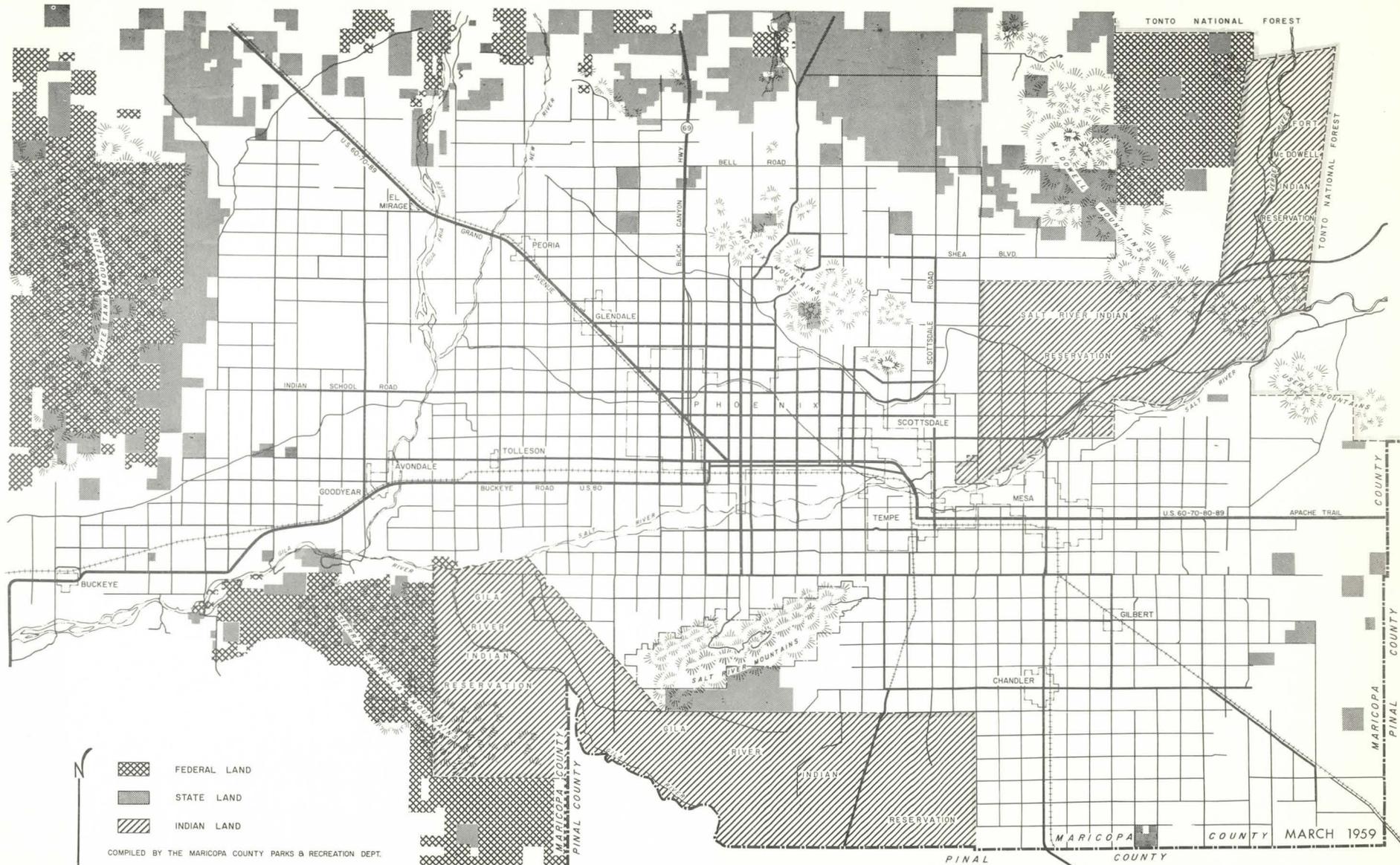
Surrounding the Phoenix Urban Area are vast acreages of Federal and State land holdings and three sizeable Indian reservations. The accompanying map shows the location of these lands in relation to the Urban Area, as compiled by the Maricopa County Parks and Recreation Department.

Very little State or Federal land is located in the irrigated sections of the Salt River Valley. Although all of this land is under lease to private interests for purposes varying from grazing to commercial use, thousands of acres are actually unused because of steep terrain, lack of water supply or scarcity of vegetation. State lands are periodically being made available for purchase by private investors at public auction.

The location of the Salt River Indian Reservation, which abuts the Urban Area on the east along Pima Road, presently restricts further urban growth in that direction. The portion of this reservation located below the Arizona Canal is under irrigation and leased out for agricultural uses.

The Tonto National Forest, located east of the Salt River and Fort McDowell Indian Reservations, encompasses many square miles of wilderness area, much of which is inaccessible by road. The Forest boundary includes the six reservoir lakes which supply water to the Salt River Valley. The recreation potential of this Forest, virtually untapped at present, can, if developed in the future, offer a very great measure of benefit to residents of the Urban Area.

Other State and Federal lands surrounding the Valley also offer unparalleled opportunity for development of an outstanding system of regional parks. This land, already under public ownership, should be made available for public park use without price competition, thereby avoiding one of the biggest obstacles to development of substantial recreational facilities.



-  FEDERAL LAND
-  STATE LAND
-  INDIAN LAND

COMPILED BY THE MARICOPA COUNTY PARKS & RECREATION DEPT.

MILES 0 1 2 3 4 5 6

ADVANCE PLANNING TASK FORCE  
CITY OF PHOENIX AND MARICOPA COUNTY  
PLANNING DEPARTMENTS

# FEDERAL, STATE AND INDIAN LANDS

MARICOPA COUNTY MARCH 1959

# FUTURE LAND USE • PHOENIX URBAN AREA

## POPULATION GROWTH AND ITS DEMANDS

The 1958 population of the Phoenix Urban Area, estimated at about 400,000, is expected to increase to 1,000,000 by 1980.\* About half of the predicted population growth will result from in-migration.

Except for the demands resulting from large-scale in-migration, all aspects of planning for future land use would be greatly simplified. Quantitative and qualitative needs for land to accommodate growth through natural increase could be predicted with a fairly high degree of accuracy by projecting forward today's known needs properly adjusted for social trends now in the making. Unfortunately, planning the physical shape of the community is not that simple.

We cannot tell whether in-migration will be steady or spasmodic. We don't know where these people will come from nor how their past experience will affect their needs and desires once they arrive. We don't know what their economic backgrounds or status will be, what kind of employment they will require, or even how many may not require employment. Nevertheless, it is necessary to make certain basic assumptions about these people for the purpose of land use planning.

It seems reasonable to assume that a great many incoming residents will move here from older areas where they have been accustomed to public sewerage and water supply, sidewalks, street lights, public recreation areas and many other urban facilities and services which are still, of necessity, in beginning stages of development in the Phoenix Urban Area. They will need jobs, and will purchase goods and services.

Although it will be difficult to satisfy all of these demands, the success of any urban area and its reputation as a desirable place in which to live is measured by the degree to which the basic needs of the people can be satisfied.

## Estimated Future Land Requirements in General

As previously stated, compilation and analysis of land use data from many cities and urban areas throughout the country have established the fact that a close relationship exists between land use and population. Ratios of land-to-people in comparable cities are remarkably similar. Departures from a general norm can usually be explained through

\* Advance Planning Task Force, "Population Growth", April 1959

close examination of a particular city's land use characteristics and the background of its growth.

Land-use-to-population ratios for the Phoenix Urban Area were compared to those for other urban areas and central cities in Table 2. These existing ratios furnish a starting point from which to estimate probable land needs of the future population.

Because the character of the Phoenix Urban Area is undergoing substantial change as a result of rapid growth, some adjustment of existing land-use-to-population ratios is essential if they are to provide a valid basis for estimating future urban land needs.

Table 4 shows that the urban use of land by 1980 is expected to total over 14 acres per 100 persons. Comparison of Tables 2 and 4 shows how existing land-to-population ratios have been adjusted for estimating future land needs.

The total land use-to-population ratio for the City of Phoenix in 1958 was 9.89 acres per 100 persons, while in the Urban Fringe the ratio was 15.4 acres per 100 persons, over 50% greater (see Table 2). The latter ratio, representing more recent development, is considered more typical of future ratios than that represented by the present City ratio. All national trends indicate that urban dwellers are using more and more land per capita than at any time in the past and these trends are presently reflected on the local scene by the Urban Fringe ratios.

Yesterday's urban patterns used about 7 acres of land for every 100 people. National statistics prove that a significantly larger amount of land has been used for urban purposes in cities under 250,000 population than in larger central cities. This undoubtedly reflects the lower land values resulting from lesser competition in small cities. To a large extent, high densities (low land use ratios) appear to be the direct result of economic pressures, higher land values being offset by a more intensive use of land (erection of higher buildings). Hence, it follows that the relatively low density of Phoenix' past urban growth is the result of a large supply of land at the lower cost typical of a small city.

How then will the continued growth of Phoenix influence the density of its land use as compared with that of its urban fringe? There is being demonstrated a trend toward construction of high-rise office buildings and apartments in the central city and this is seen as a direct reflection of increased land values and vigorous competition for well-located parcels. In addition to this trend toward more intensive use of land, an increasing tendency toward the grouping of

TABLE 4  
ESTIMATED LAND USE NEEDS, 1980  
 Phoenix Urban Area

<u>Land Use</u>	<u>Acres per 100 Persons</u>	<u>Total Dev. Acrg.</u>	<u>% of Total Dev. Acrg.</u>
<u>POPULATION = 1,000,000</u>			
Single Family	6.90	69,000	48.2
Two-Family	.16	1,600	1.1
3 & 4 Family	.13	1,300	0.9
5+ Family	} .21	2,100	1.4
Trailer Courts			
Total Residential	7.40	74,000	51.6
Total Commercial	0.70	7,000	4.9
Light Industry	.60	6,000	4.2
Heavy Industry	.19	1,900	1.3
RR & Public Utilities	.09	900	0.6
Total Industrial	0.88	8,800	6.1
Streets & Alleys	3.00	30,000	20.9
Parks & Playgrounds	1.00	10,000	7.0
Other Public & Semi-Public	1.35	13,500	9.4
Total Public & Semi-Public	5.35	53,500	37.3
Total All Uses	14.33	143,300	100.0

multi-family uses closer to the core of the central city may be expected. Much of this more intense land use will result from urban redevelopment projects carried out by both private enterprise and the public.

Conversely, modern shopping facilities tend toward sprawling buildings grouped about pedestrian plazas and the use of large areas for customer parking. Multi-story factories are a thing of the past, and the trend toward sprawling industrial plants with ample employee parking is expected to continue into the foreseeable future.

At this point another factor enters the general consideration of future land needs. While in 1958, Phoenix existed as a relatively small central city with a large urban fringe, present annexation laws and policies indicate that the physical size of the City will greatly increase in relation to the extent of the total Urban Area.

Weighing these several growth trends and factors, it is judged that future fringe growth will have much the same character evident in the present Urban Fringe and that at the same time, through redevelopment of present uses and development of land presently vacant, a more intensive use of land will occur within the present city limits. Thus, the estimated total land-use-to-population ratio of 14.33 acres per 100 persons represents an average of 1958 ratios heavily weighted toward fringe characteristics.

#### Future Land Requirements for Specific Uses

Table 4 shows the total ratio of 14.33 acres per 100 persons broken down by specific land use and the total number of acres of each use required to serve the 1980 estimated population.

##### Residential Uses

Single-family development is expected to continue at a land-use-to-population ratio similar to that demonstrated in the 1958 Urban Fringe area, with the result that it will occupy 6.9 acres per 100 persons and approximately 69,000 acres by 1980. This ratio is based on estimates of future growth in low, middle, high and extremely high income price classes at commensurate lot sizes and area.

Two-family use is expected to continue to develop at the low ratio typical of the 1958 Urban Fringe, with a resulting 1980 average ratio of 0.16 acres per 100 persons.

Multi-family residential, including the sub-categories of 3-and-4 family, 5-or-more family and Trailer Courts, is expected to continue at present Urban Area levels, with a resultant 1980 land need of 3,400 acres.

#### Commercial Uses

Based largely on the assumption that existing as well as future commerce must provide itself with sufficient off-street parking space to accommodate both customers and employees, commercial land use will require about 7,000 acres by 1980.

#### Industrial Uses

The growth of light industry is expected to accelerate in the years to 1980, bringing the Urban Area ratio for this use up to about 0.60 acres per 100 population. Heavy industry, railroads and public utilities are expected to expand at about the same rate as the population and use 0.28 acres of land per 100 persons by 1980.

#### Public and Semi-Public Uses

##### Streets and Alleys

The size of individual sites in the fields of housing, commerce and industry is increasing as urban growth extends outward from the core. Sites of schools and other public buildings, golf courses, parks and playgrounds will also occupy larger individual land areas. Street systems to serve larger parcels require less acreage. Modern subdivision street patterns are considerably more efficient than the older gridiron system typical of the Phoenix Urban Area today.

Partially offsetting the effects of this decreased need and increased efficiency is the fact that streets will be wider to accommodate increased traffic; residential streets may be as much as 20% wider. The over-all result of these several trends is expected to be a slightly increased land-to-population ratio of 3.0 acres per 100 persons for streets and

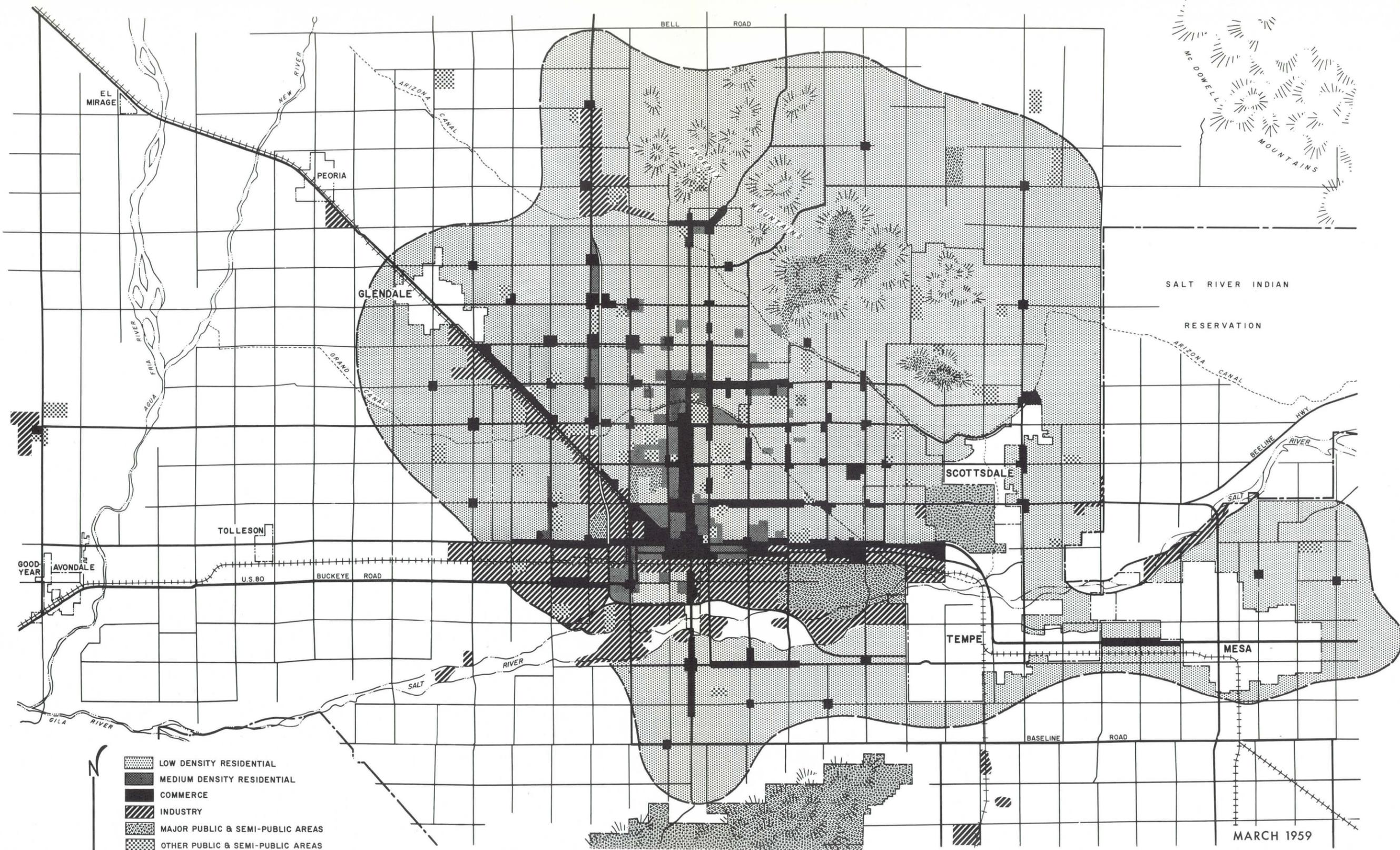
alleys. However, the use of land for this purpose, expressed as a ratio of the total developed acreage in the Phoenix Urban Area, will have tended to decrease by 1980.

### Parks and Playgrounds

The provision of land for parks and playgrounds should be increased very considerably during the period 1958-1980 and include provision of added space in settled sections of the City as well as space in newly developing residential areas. A widely accepted standard for the provision of parks and playgrounds for urban populations is one acre per 100 persons. Parks and active recreation space at a neighborhood and community level is one of the marked deficiencies of the existing land use pattern -- Table 2 shows that almost no space for this purpose has been developed outside the City of Phoenix. The one acre per 100 standard does not include provision of recreational facilities of a regional nature and for this reason South Mountain Park has been excluded from these calculations. Since about 2/3 of the area of each school site could be considered as having some recreational value, 8,000 acres of land will be needed for parks and playgrounds by the 1980 population of the Phoenix Urban Area.

### School Sites

A generally accepted minimum standard for an elementary school site is 5 acres plus one additional acre per 100 pupils of ultimate enrollment. Based on estimated future population, a total of 250 public elementary schools and 2,750 acres of elementary school sites will be required by 1980. Enough secondary schools will ultimately be required to accommodate about 50,000 pupils in 1980. At an average of 2,000 senior high school students per school, (the present typical loading), 25 high schools will be required within the 1980 Urban Area. Standard acreage of high school sites varies from 30 to 50 acres depending upon the facilities provided. Thus, there will be a total need for about 1,000 acres for high school sites by 1980.



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# DIAGRAMMATIC LAND USE PLAN • 1980

### Other Public and Semi-Public Uses

The need for other public and semi-public land use is expected to continue at about its present land-to-population ratio. Summarizing the above discussion, all public and semi-public land use will increase to a ratio of 5.35 acres per 100 persons in 1980.

### DIAGRAMMATIC LAND USE PLAN - 1980

A land use plan is essentially an analytical graphic study of the future arrangement of land uses in an urban area, and it is based upon existing conditions and perceivable significant trends. Once a preliminary estimate of future population has been made and the amount of land needed to serve this population has been determined, a decision can be reached as to the general location and arrangement of future land uses. The Land Use Plan for 1980, which follows, shows in a very diagrammatic and generalized fashion the pattern of future land use anticipated in the Phoenix Urban Area.

The 1980 population of the Phoenix Urban Area has been estimated as 1,000,000 persons.\* The general amounts of land needed by this population for various urban purposes has been determined as tabulated in Table 4. The graphic Plan which culminates this study should therefore be regarded primarily as a quantitative plan and only secondarily as a qualitative one.

### General Changes in Existing Land Use Reflected in the Plan

In the older established sections, the Plan proposes a general retention of present land use patterns and existing physical structures. However, there are certain specific areas where existing conditions dictate that a drastic change in land use should and will take place. In general, these are areas where deterioration and blight point toward redevelopment to other uses, areas whose land uses will be strongly influenced by the location of future traffic arteries and other public facilities, and areas which are being affected by growth and extension of the City's commercial districts.

One area where significant change is needed and proposed is that lying in the crash hazard area to the west of Sky Harbor Airport. As will be later shown, the adverse effects of jet aircraft operation will render further residential use of this land increasingly intolerable from both economic and social viewpoints. Height-controlled light industrial use is judged to be the future land use least likely to suffer severe effects from overhead aircraft operations.

\* Advance Planning Task Force, "POPULATION GROWTH", 1959.

Another area where change from existing land use character is anticipated lies to the southwest of the Central Business District. Here, the Plan reflects the City's decision to redevelop about 323 acres of land for residential purposes with restriction or elimination of conflicting non-residential land uses considered detrimental to a sound and stable neighborhood.

#### Residential Land Use

Land areas shown as residential embrace a wide variance in future density, ranging from less than 5 persons an acre in the Paradise Valley area to over 40 persons an acre in apartments adjoining the central business district. Proposed density and distribution of population for 1980 are shown on maps included in the previous report, "Population Growth". It will be noted that the Plan proposes the redevelopment of areas abutting the central business district and the North Central Avenue district to apartments having a medium to high density. Areas shown as residential are presumed to include those complementary facilities which are normal to residential needs, e. g., parks and playgrounds, schools and neighborhood shopping.

#### Commercial Land Use

A reasonable expansion of the Central Business District is planned as well as the extension of commercial uses along North Central Avenue, for which a strong trend is now evident. In areas not presently urbanized and where ribbon business has not firmly established itself along all major thoroughfares, the Plan shows the desirable consolidation of business at intervals at major street intersections. These intervals are diagrammatic and more exact location will be planned as the need arises. In general, a trend toward consolidation of business and a reduction of ribbon business is anticipated throughout the entire Urban Area.

#### Industrial Land Use

The location of new industry poses special problems in the development of a land use plan for an area where industrial growth is likely to exceed that of other uses. In general, the location of industry in the Plan is based upon the following considerations:

1. Where industry is presently established, the general effects of new industry on surrounding properties is lessened through extension of the established district.
2. Some areas of existing urban blight cannot be redeveloped economically into sound residential

districts. Redevelopment to industrial use is likely to produce better long-term stability than any other use. The Plan anticipates a continuing program of slum clearance and urban redevelopment.

3. Modern trends toward dispersal of new major industrial plants toward outlying areas has certain advantages to both industry and the community. However, the characteristics of these industries and the amount of land to be planned for them should come as a result of comprehensive zoning study and amendment.

In any event, it is not logical to presume that locations attractive to such large or extensive plants as General Electric, Sperry-Phoenix and Motorola are equally advantageous to smaller industries. New heavy industry must be located where its nuisances and hazards will not seriously affect either existing or future residential uses. Those new light industries which require relatively small land areas should continue to locate in close relationship to established districts. Service industries, of which a considerable increase is expected, will undoubtedly continue to locate near the areas of product demand.

In relation to industry, as indicated on the Land Use Plan, it bears repeating that this is a quantitative plan -- that industry shown on the Plan indicates the general amount anticipated to exist in 1980. Some of this industry may locate outside the area of predicted urbanization. Outlying spots of existing industry such as Avondale-Litchfield-Goodyear, Kyrene, and Sperry-Phoenix may very well serve as nuclei of future concentrations of a magnitude presently unpredictable.

#### Public and Semi-Public Uses

Public and Semi-Public land needs for schools, recreation and such major facilities as airports are less difficult to anticipate than those for government buildings, hospitals and other institutions. The Plan shows the generalized location of those existing as well as those which are considered fairly predictable, e. g., major recreation areas, high school sites, airports.

### Intermingling of Land Uses

As previously discussed, a great deal of intermingling of land uses exists in the present Urban Area, particularly in older sections of the City. It would be a mistake to predict that any significant reduction of mixed land use can be brought about in the future, except where a specific area has deteriorated to the point where public action in the form of an urban renewal program is warranted. However, the Plan assumes that the adoption and enforcement of sound land use policies for new development will avoid the extension of this unfortunate condition.

### Undeveloped Land

Of the area included within the limits of the 1980 Urbanized Area, as shown on the Plan, about 10% is expected to remain permanently vacant or undeveloped. A certain amount of land is always by-passed or involved in legal complications which prevent its development. Other land is unsuitable and undeveloped for urban purposes because of such topographic features as mountains, canals and flood channels. It should be clearly recognized that a failure to adopt and enforce public controls which will lead to eventual development of parcels now vacant will result in a higher percentage of by-passed land within the urban area and have the effect of extending the outer limits of urbanization.

## MAJOR FACTORS INFLUENCING LOCATION OF FUTURE LAND USES

There are a number of basic factors influencing the physical shape of any growing urban area. Some of these are sociological, some are economic; all must be anticipated and considered within the framework of physical patterns already laid down and the limitations exerted by the very nature of the land itself and its suitability for human habitation. The following discussion is primarily concerned with major physical factors as they influence the Land Use Plan for 1980.

### AVAILABILITY OF LAND FOR URBAN USES

The availability of suitable land in the right location, the right amount and at the right price is a most important factor in development of future land use patterns. Location and price are of primary importance to residential development, while location is frequently the principal key to successful commerce. In the development of such extensive land uses as large industrial plants, institutions, parks, and the like, the availability of large acreages under single or unified ownership frequently proves the deciding factor in location. Assembly of a large number of small parcels into unified ownership is usually too expensive and time-consuming except when carried out far in advance of intended development.

Availability of land has proven an important factor in recent land development in all categories. The importance of price has been responsible for a great deal of the residential scatteration prevalent throughout the Valley. Land prices may be expected to stabilize as land use controls become more effective, buyers become more discriminating and speculation wanes.

The Phoenix Urban Area contains a vast supply of vacant or undeveloped acreage in a wide variety of sizes and locations suitable for every urban purpose. There is no evidence that supply or availability of land will ever prove a limiting factor in the expansion of urban land uses. Availability in locations suitable for specific purposes, however, will continue to influence land use patterns. In older sections of the City precise locational needs may require assembly and clearance of existing structures in order to provide the proper amount and kind of land for such purposes as civic buildings, hospitals, parks, etc.

## SUITABILITY OF AVAILABLE LAND FOR URBAN USES

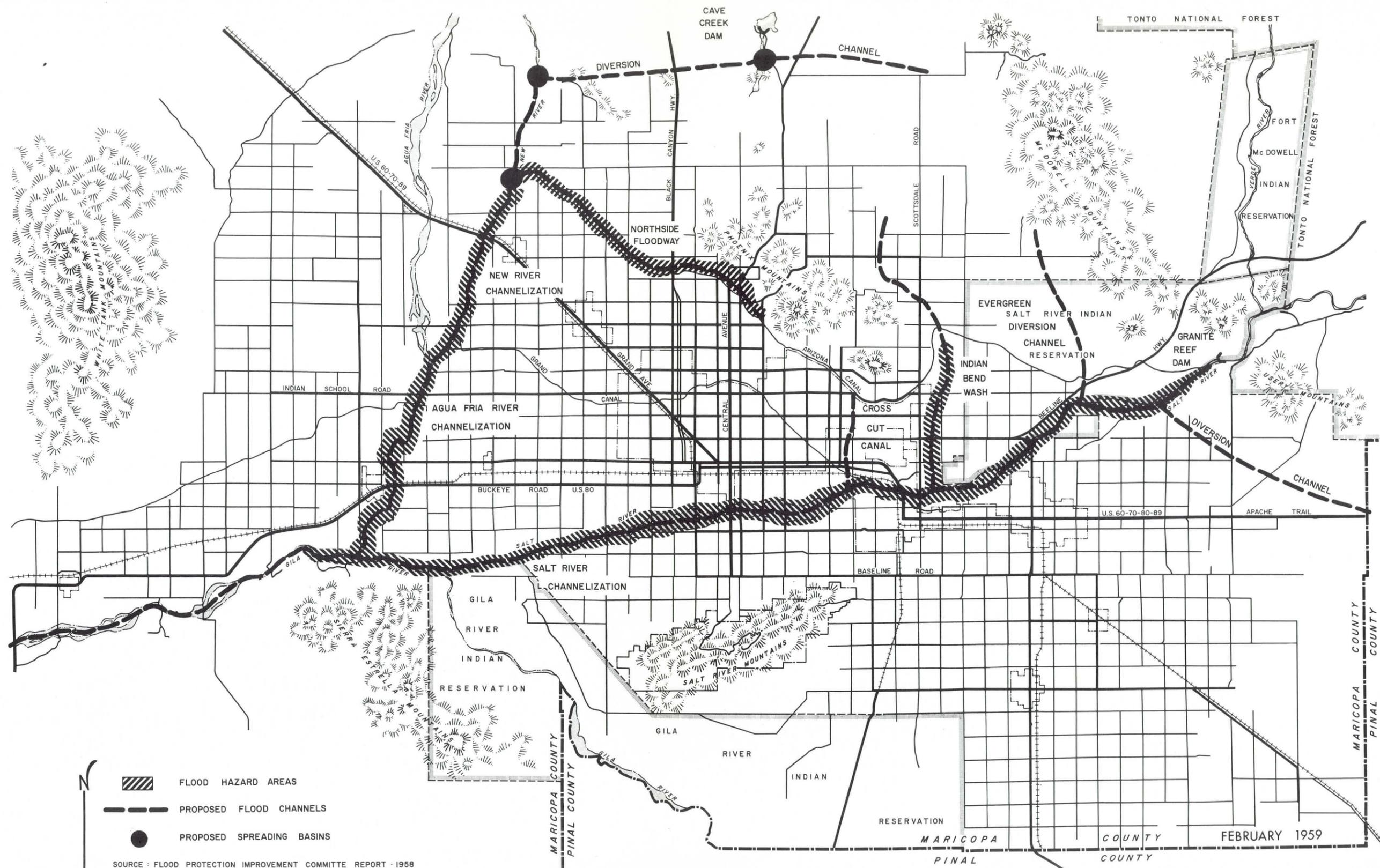
There are a number of factors influencing the suitability of land for any given urban use. Among these are topography and other natural features, existence of drainage and flood control problem areas, noise and hazards related to air traffic and the availability of public utilities.

Topographic features which render a particular piece of land unsuitable for development to low or medium priced homesites may constitute a valuable asset to expensive residences. Until recent years, most residential uses have been located on land under irrigation, land which therefore offered no topographic obstacles to intensive use. Since that time the mountain and hillside land which was avoided has become extremely attractive for expensive homesites and commands premium raw land prices. Nevertheless, the Urban Area contains a certain amount of land so steep as to be unsuitable for any type of intensive urban use; at the same time, such land may have great potential value to surrounding residents and to the community at large when it is included in a public preserve which may or may not include intensive recreational use. Such land in the Urban Area is located in and around the McDowell and Phoenix Mountain ranges, including Camelback Mountain.

Flood hazard areas exist in the Urban Area as a result of the flash floods typical of mountain desert terrain and climate. Short periods of heavy, localized rainfall combined with relatively impervious soils and steep slopes cause "dry washes" to run full and overflow with serious hazards to life and property. Even minor washes must be given more attention as drainageways and structures must be so located as to avoid property damage or interruption of drainage flow.

A great deal of growth has taken place in the Urban Area since the last period of heavy rainfall occurred and fading memories appear to have given rise to general laxity in the preservation of drainageways. As long as the bulk of urban development was located within the periphery of irrigation canals, these canals tended to intercept and divert flood waters. By 1957, with urban growth rapidly extending into areas subject to periodic inundation, flooding became recognized as a serious problem worthy of concerted public action. The Flood Protection Improvement Committee was appointed by the City of Phoenix, Maricopa County and the Salt River Power Project to lay the groundwork necessary to formulation of a comprehensive flood control plan and the execution of a construction program.

Plate 13, "Drainage and Flood Problem Areas", is based on the preliminary findings of this Committee, published in 1958. The



-  FLOOD HAZARD AREAS
-  PROPOSED FLOOD CHANNELS
-  PROPOSED SPREADING BASINS

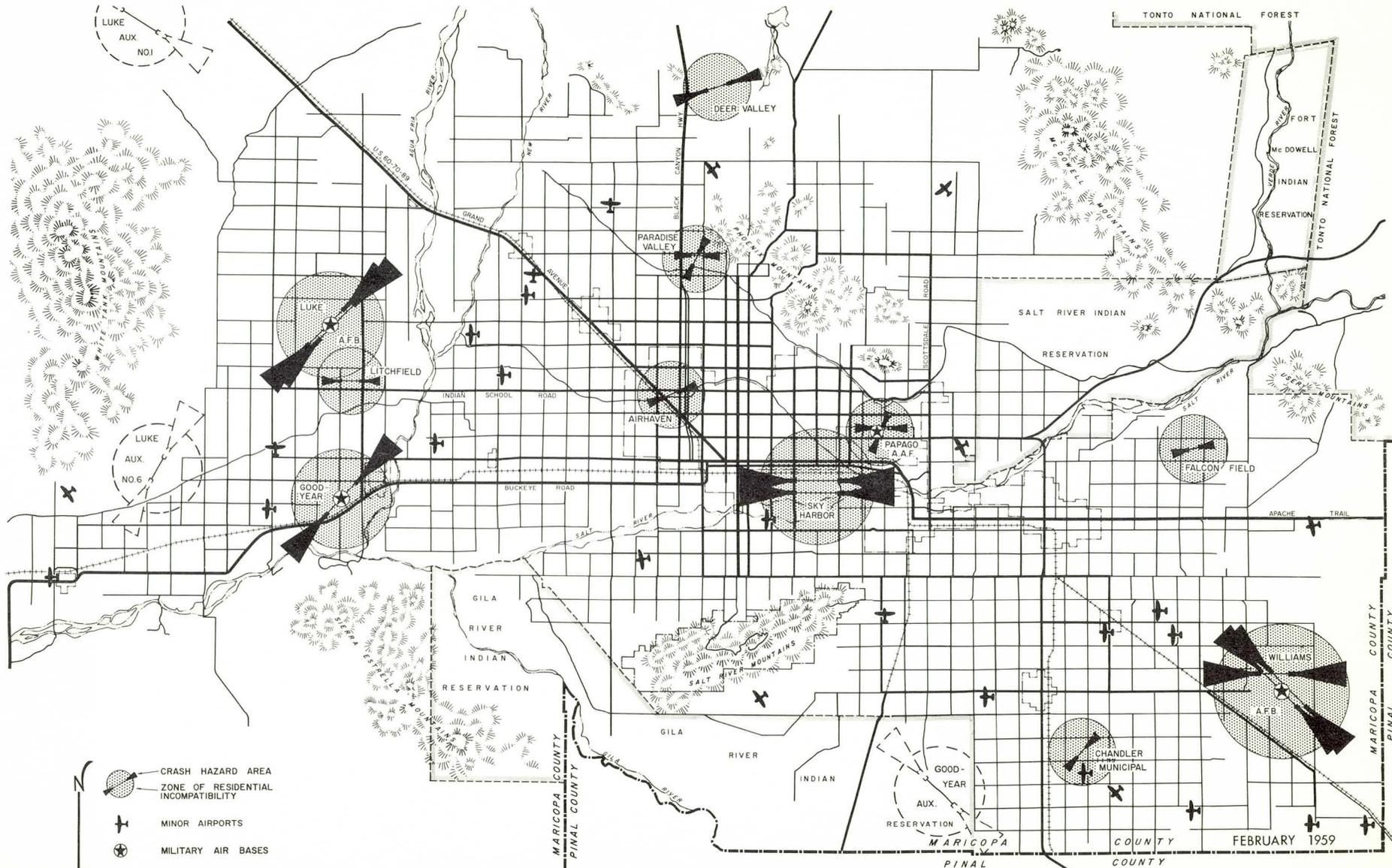
SOURCE: FLOOD PROTECTION IMPROVEMENT COMMITTEE REPORT - 1958



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# DRAINAGE AND FLOOD PROBLEM AREAS

FEBRUARY 1959



- CRASH HAZARD AREA
- ZONE OF RESIDENTIAL INCOMPATIBILITY
- MINOR AIRPORTS
- MILITARY AIR BASES

MILES 0 1 2 3 4 5 6

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# EXISTING AIRPORTS · 1958

FEBRUARY 1959

map indicates areas subject to serious flood damage and the location of diversion floodways and channelization projects which were the preliminary recommendation of the Committee. Land subject to even periodic inundation should be considered unsuitable for intensive development and only open land uses permitted until such time as flood control measures have been undertaken and completed. There is no question that close attention to avoidance of creating further potential hazard and the measures necessary to eliminate present hazard will have pronounced influence on the shape and location of future land uses in the Urban Area.

#### Land Influenced by Airports

Publication in 1952 of the "The Doolittle Report"\* developed a sudden and general realization that the jet age is destined to exert an extremely personal and adverse influence on the lives of people residing near airports. Property appraisals are reflecting this influence with increasing regularity and we can no longer hide our heads to the fact that unstable property values and subsequent urban blight are the inevitable consequence of permitting residential occupancy of space subjected to the noise and hazards emanating from jet transport operations. Nor can we refute the necessity to keep open and unobstructed the flight path of this essential transportation facility.

Plate 14, "Existing Airports, 1958", shows the location of all airports, commercial, military and private, in the Salt River Valley. Runway directions, crash hazard areas and zones of residential incompatibility are indicated for all major facilities.

Within 25 miles of Phoenix are located four major air facilities, one municipal and three military. All four are designed and will accommodate jet transport. Within the same radius there are also 32 facilities of lesser importance, ranging from private light-plane ports to military auxiliary fields.

For people on the ground, air traffic brings the hazard of crashes and the nuisance of noise. Both effects are intensified in areas close to jet airports. In areas immediately adjacent the noise level becomes physically unbearable and the crash hazard intolerable.

Crash hazard areas are directional with runways and comprise two zones:\*\* (1) an over-run area at least 1/2 mile long and 1,000 feet wide at each end of the runway; and, (2) a fan-shaped zone extending 2 miles beyond the over-run area and 6,000 feet wide at the outer

\* Doolittle Committee Report to the President, "The Airport and Its Neighbors", 1952.

\*\* Planning Advisory Service, Information Report No. 64, 1954.

extremity. The former area must be kept clear of any structures or obstructions; the latter should contain no schools, hospitals, churches or other places of public assembly and no buildings tall enough to obstruct the flight path.

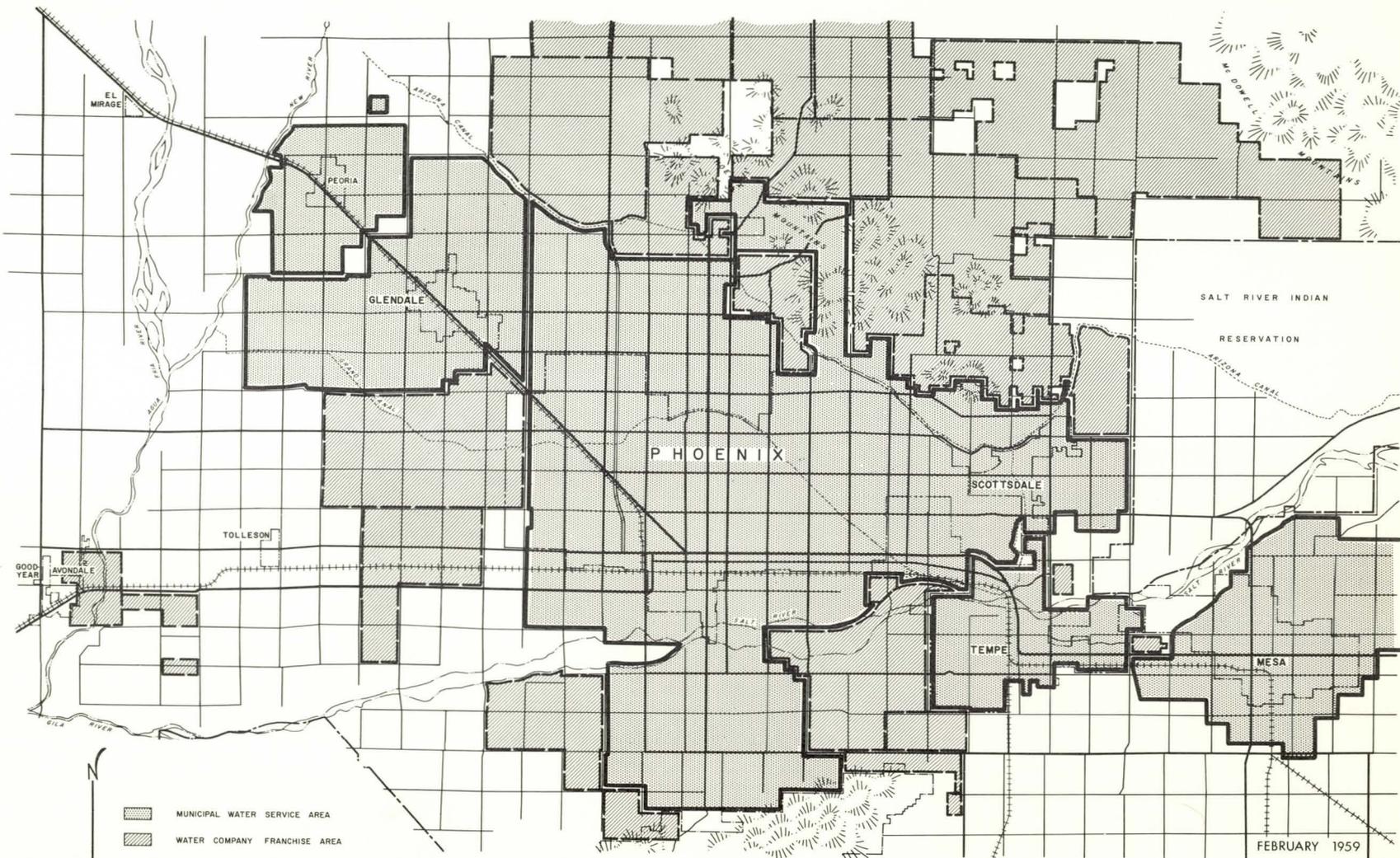
Noises and other nuisances extend the zone of residential incompatibility outward from the center of the airport a distance of 1 1/2 to 3 miles depending upon amount and type of air traffic. Irritation from noise extends far beyond these limits: a 6-jet transport produces an area of irritation 4 miles wide by 24 miles long, and a 4-engine turbo-prop aircraft an area 4 by 32 miles. Technological advances may possibly affect some reduction of these effects in the future.

The influence of airports on the lives of people living and working nearby dictates the immediate necessity for formulating and enforcing a firm land use policy which will separate people and airports. Location of individual facilities and characteristics of their environs will determine the best policy in each case.

For the purposes of this analysis, all four major air facilities in the Valley are considered permanent and their location unalterable.

Of the four major air facilities in the Valley, Sky Harbor Airport is of greatest and most immediate concern. Within the western crash hazard area of Sky Harbor are located 5 schools, more than 2 dozen churches and about 11,000 residents. Partial and temporary relief of this condition would result from limitation of jet operations to the southerly east-west runway and from bringing in aircraft on a straight-in, straight-out basis. Permanent relief can be brought about only through a long-range program of redevelopment of this crash hazard area to non-residential land uses. The zone of incompatibility for Sky Harbor obviously involves many more thousand people and presents problems which may prove unsolvable.

For the most part, the crash hazard areas and zones of incompatibility of the other major air facilities are presently unpeopled. None of the 32 lesser airports in the Valley are designed or expected to accommodate jet aircraft. Only four, Papago AAF, Airhaven, Paradise Valley and South Phoenix, present any known or special problems at present. Due to the extent of residential development in their crash hazard areas, every effort should be made to encourage relocation of Papago AAF Base and Airhaven Airport. Operations at Paradise Valley Airport are presently planned for removal to Deer Valley at an early date and the field should then be permanently closed to airport use.



 MUNICIPAL WATER SERVICE AREA  
 WATER COMPANY FRANCHISE AREA

MILES 0 1 2 3 4  
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FEBRUARY 1959

# PUBLIC WATER SUPPLY • 1958

The remaining 28 facilities are typically small private or commercial fields with relatively light air traffic and commensurately lower nuisance or hazard effects. As urban development approaches the environs of such airports, increasing land values have a way of encouraging relocation to more remote spots.

### Public Water Supply

Considering its desert location and hot summer climate, the Phoenix Urban Area is especially fortunate to have an available water supply judged by authorities\* to be sufficient for any foreseeable amount of future population growth.

Water supply for the Urban Area comes from two sources: (1) surface water collected and stored in reservoirs, and, (2) ground water tapped by wells. Flows of the Salt and Verde Rivers are stored behind six large dams owned by the Salt River Valley Water Users Association from which supplies for domestic use are delivered by transmission mains to the Verde River and Squaw Peak Filtration Plants. Public and private wells pump directly from the upper ground water strata 100 to 700 feet below surface. During recent years a lower water stratum producing water of exceptional quality has been discovered at a depth extending to 1,800 feet near Glendale.

Water service to the Urban Area is provided by four municipal systems (Phoenix, Glendale, Tempe and Mesa), and 31 private franchise companies. The municipal systems serve the areas of urban concentration while private companies serve scattered outlying developments.

The City of Phoenix system has been under constant expansion and improvement during recent years through construction of new facilities and purchase of private companies. The system presently has a peak production of about 160 million gallons of water per day. Because the surface water supply is of poorer quality and requires more treatment than well water it has been the practice to use reservoir water only to augment well supply during periods of peak consumption. Several factors are dictating that an increasing volume of reservoir water will be used in the future. These factors are: (1) increasing population, (2) increasing per capita consumption, (3) increasing consumption by commerce and industry, (4) lowering of upper strata ground water levels by pumping, and, (5) decreasing requirements for irrigation water as urban development replaces agriculture.

\* Headman, Ferguson & Carollo, "Report of the Water Works Survey", 1956.

Many of the private water companies presently serve relatively few customers. Some franchise areas are very small while others are probably larger than can be adequately served when the land is fully developed.

While the urban area is judged to have a total supply adequate for future needs, water distribution problems may for several years cause temporary shortages in certain localized areas depending upon the location of wells. In the meantime it will behoove responsible agencies to maintain close scrutiny of supply and distribution conditions in these areas, making certain that at no time will water consumption resulting from new development exceed the ability of the supplier to deliver.

Any developing need for transmission of supply from one section of the Valley to another to overcome localized shortages will point to the importance of planning toward a comprehensive single or combined system making use of all available and potential facilities.

A detailed analysis\* of water supply and service is under preparation and due for publication at an early date.

#### Irrigated Lands

Irrigation and water for crop production has played an extremely important part in the history of past development of the Valley. Agriculture, based on irrigation, is still an important segment of the community's economy.

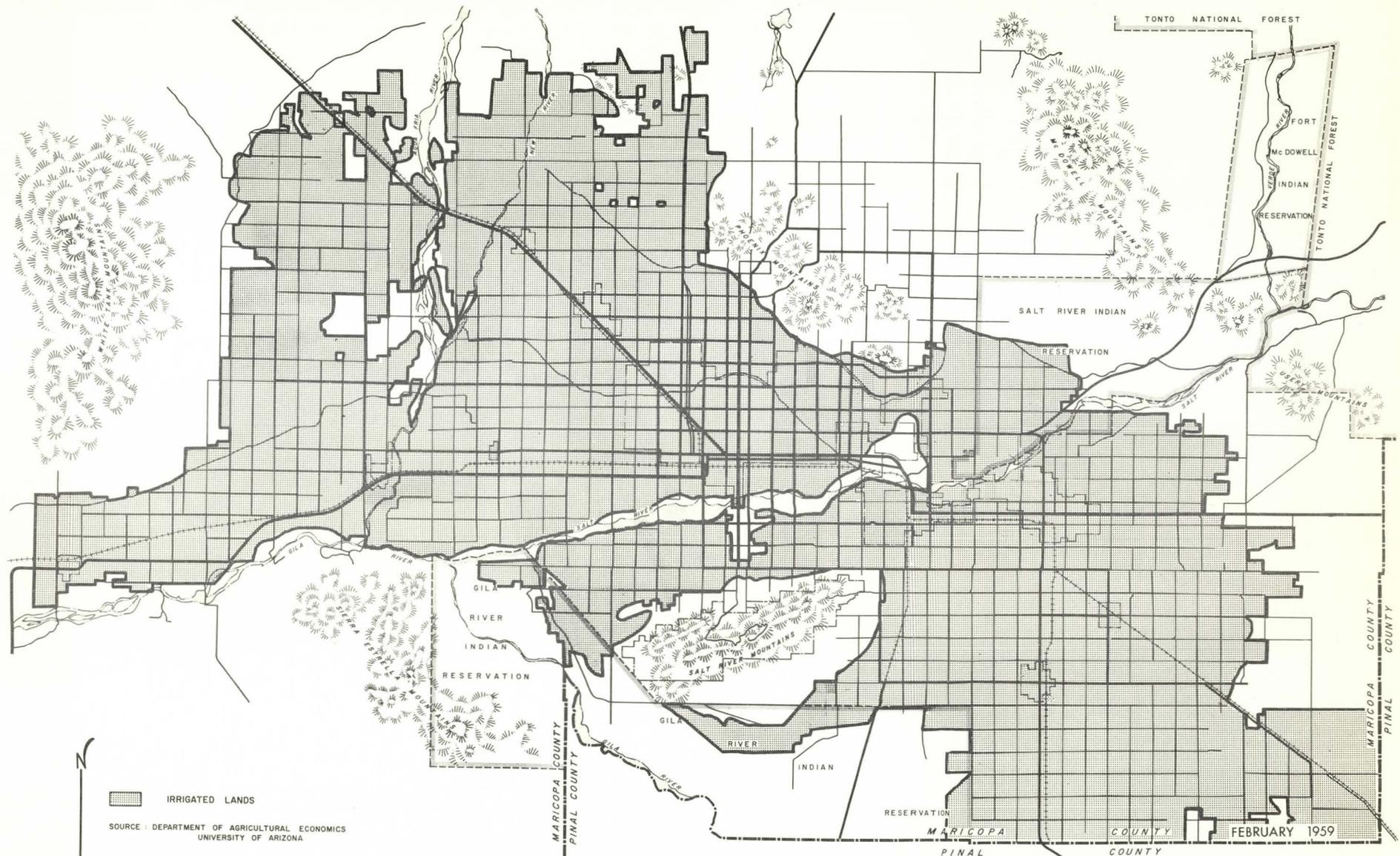
In the urban development of the Phoenix area it has been most natural to first convert to residential use those agricultural lands under irrigation. Only fairly recently has there been any marked departure from this trend, and this mostly in the high income class of residence. While the present attractiveness of desert sites for high income residences may be expected to continue, areas under irrigation will undoubtedly continue to be most attractive to development of low and middle income homesites. The map which follows shows the extent of irrigation in 1954.\*\* There have been only very minor changes in extent of irrigation coverage since that date.

#### Public Sanitary Sewer

The Phoenix Urban Area is served by five municipal sewerage systems, each of which has a planned expansion program underway: Phoenix, Glendale, Scottsdale, Tempe and Mesa. A sixth, Peoria, plans to initiate a new system in the near future.

\* By Western Business Consultants

\*\* Dept. Agricultural Economics, University of Arizona.



IRRIGATED LANDS

SOURCE: DEPARTMENT OF AGRICULTURAL ECONOMICS  
UNIVERSITY OF ARIZONA

MILES 0 1 2 3 4 5 6

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# IRRIGATED LANDS

Since its first comprehensive study of sewerage problems in 1953\* Phoenix has been intensively engaged in the planning, development and financing of its public sewerage system. During the past five years 310 miles of sewers have been constructed and about 26,000 house connections made. Many of these service connections have been conversions from private septic systems. Thirty-eight miles of trunk sewers were installed in 1958 alone. The expanded system under construction will ultimately serve an area of about 122 square miles and is so designed that additional trunk line construction can provide facilities for another 22 square miles. In addition, the South Phoenix area can be completely seweraged whenever another treatment plant and independent system can be financed.

With a comprehensive sewerage system underway, the Urban Area must have a comprehensive land development policy which supports this system. Such a policy should prohibit any mass installation of private septic systems in areas planned for public service. It is especially important that multi-family residential, commercial and industrial developments be provided public sewers. Such a policy would avoid double sewerage costs for the home buyer as well as reduce the amount of urban scatteration presently occurring. This scatteration, especially prevalent in the Phoenix area makes provision of all municipal services less economical, efficient or feasible.

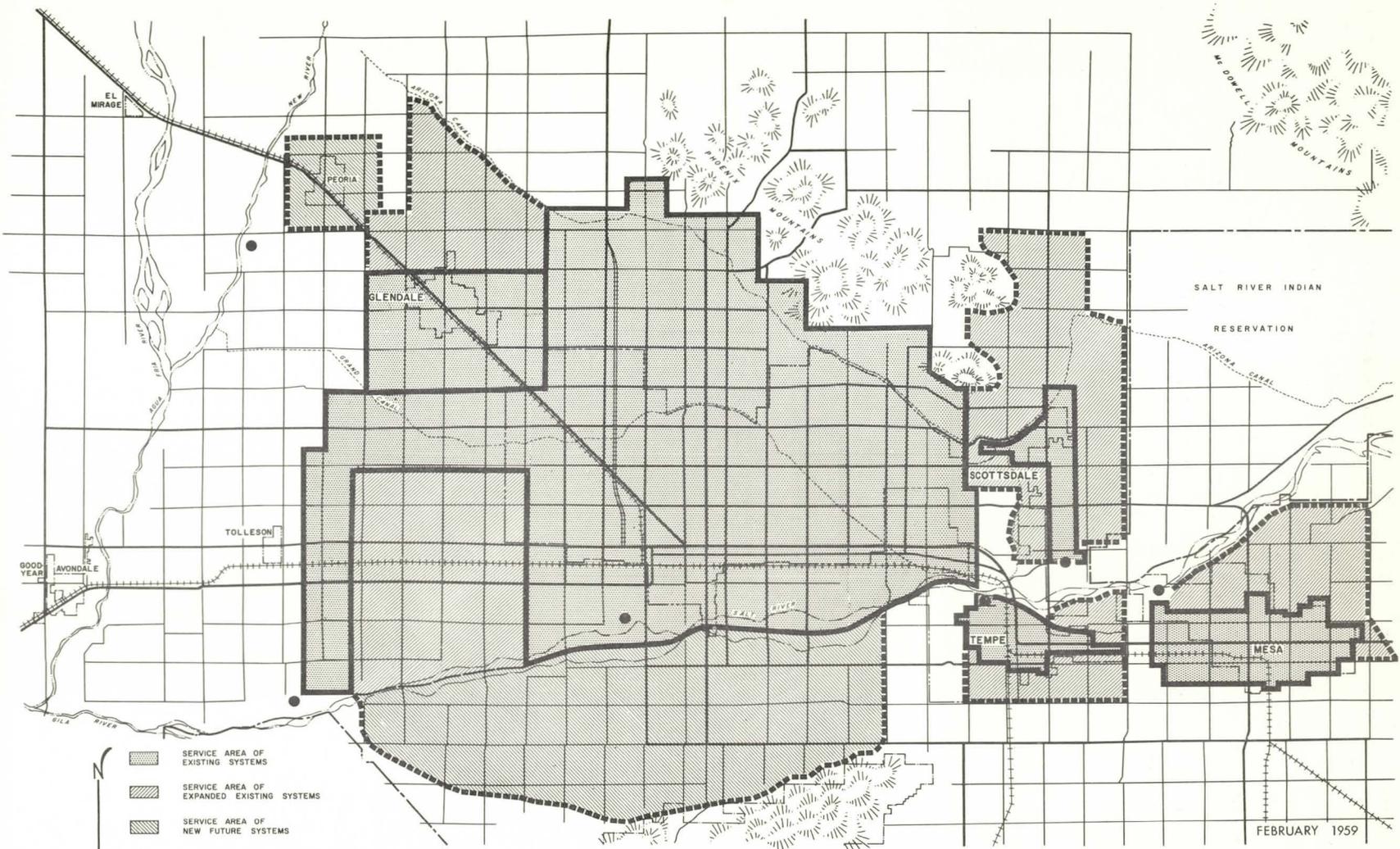
#### POLITICAL BOUNDARIES

With the exception of a semi-urban settlement growing up near Apache Junction, all of the Phoenix Urban Area is located within the boundaries of Maricopa County. The Salt River Valley includes twelve incorporated municipalities in addition to the City of Phoenix. Each of these municipalities looks forward to population increase and physical growth as a result of the predicted migration to Arizona from other parts of the United States. Some of these incorporated places are actively seeking to enlarge their boundaries to include adjacent urbanized areas or undeveloped land expected to become urbanized in the near future.

There is no apparent evidence that the location of political boundaries will exert any quantitative influence on the future population of the Valley. They may, however, exert a considerable influence upon the physical growth in terms of location and sequence of development.

Plate 6 shows graphically the growth of the City of Phoenix from the time of its incorporation in 1881 to the summer of 1958. In April of

\*Headman, Ferguson & Carollo, "Sewerage Problems of Phoenix and Its Suburbs", 1953.



-  SERVICE AREA OF EXISTING SYSTEMS
-  SERVICE AREA OF EXPANDED EXISTING SYSTEMS
-  SERVICE AREA OF NEW FUTURE SYSTEMS
-  EXISTING SEWAGE TREATMENT PLANTS

MILES 0 1 2 3 4

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FEBRUARY 1959

# PUBLIC SANITARY SEWER • 1958

1959, further annexation added about 50 square miles and 158,000 population. The 1959 annexations will extend the City limits beyond the present line of urbanization in some locations and will bring under City control thousands of acres of undeveloped land.

Considering the more effective growth control measures available for use by incorporated municipalities and the efficiencies which can be effected in the provision of urban services, the continued annexation of unincorporated areas can prove extremely beneficial to the overall future of the entire metropolitan area.

## IMPLEMENTING THE LAND USE PLAN

Through survey and analysis of existing land use in the Phoenix Urban Area we have attempted to point out the deficiencies it demonstrates as well as those respects in which it is considered normal and desirable. The land use plan is a preliminary study of desirable future land use arrangements based upon the best information available at this initial stage of area planning. It should be regarded as an introduction to comprehensive long-range plans for area development and must be constantly reappraised and revised in the light of continuing growth, better information and further study.

The master plan toward which the land use plan points will come only as the result of intensive and time-consuming study of its several elements which may take several years to complete. The elements of a comprehensive plan (master plan) include the following:

Housing	Transportation (incl. Airports)
Schools	Public Buildings & Facilities
Parks and Recreation	Public Utilities
Major Streets	Capital Improvements

Because it will take a considerable time to accomplish completion of the comprehensive plan, it is important to begin correction of land use deficiencies and their causes as soon as possible rather than to wait for master plan completion. If correction is not undertaken and no use is made of planning data and study until the comprehensive plan is complete, it is obvious that in such a rapid growing area much of the effectiveness of the Plan as a growth guide will have been negated.

The first step in implementing the land use plan is to give close attention and study to the two primary growth control tools, zoning and subdivision regulations. They are equally important. At the same time continuing study should keep building codes and other ordinances up-to-date.

### Zoning

There is need for a new zoning ordinance designed for uniform application in Phoenix and the unincorporated areas of Maricopa County. Such an ordinance must be based on consideration of existing land use, existing zoning and a comprehensive plan for future land use.

Zoning is primarily concerned with the use of land and buildings, height of structures and the open space which surrounds them. Regu-

lations must be uniform within each zoning district but may differ in the various districts.

Under a new uniform zoning ordinance it would be possible to gain greater stability of zoning in areas subject to potential annexation. A change in political jurisdiction would not in itself necessitate a change of zoning regulations unless, of course, zoning district boundaries were changed

### Subdivision Regulations

The platting of land permanently sets the pattern of urban development upon which and around which land use takes place. It is therefore of utmost importance to the welfare of the future community that this land platting take place in the most orderly and well considered manner possible. Complete and comprehensive subdivision regulations should include:

1. Clear and equitable procedures for application, review and approval of both preliminary and final subdivision plats.
2. Modern subdivision design principles and minimum acceptable standards.
3. Requirements for the preparation of plat submittals in such a manner as to furnish the planning agency with all pertinent and necessary information to review and act upon proposals.
4. Basic requirements for the improvement of public streets and utilities and definition of responsibility for design, construction and financing of such improvements.

Insofar as possible these subdivision regulations should be so prepared as to be acceptable for adoption by both the City and County planning agencies for uniform application to their areas of jurisdiction.

### Building Codes and Related Ordinances

Building Codes and their strict enforcement help prevent premature deterioration and blight resulting from land use conflicts which cannot be corrected otherwise. Research into the background of urban

blight has established that one of the principal causes is not lack of building codes but lack of enforcement of building codes. A building code is badly needed for application in unincorporated areas of the County. Permissive state enabling legislation has been sought for the past several years without success. Planning agencies and citizens' groups should continue to seek enabling legislation permitting adoption of a building code for application in unincorporated areas.

Control of signs, fences and other details of urban land use must be reassessed and enforced to insure proper use relationships and avoid conflicts which affect the community as a whole as much as the particular property owners.

#### Neighborhood Studies

Extremely important in residential areas nearing a built-up condition are detailed neighborhood studies which coordinate street patterns, provide for the integrated development of vacant parcels and the location of school, park and playground sites. These detailed studies should result in the correlation of zoning requirements and subdivision design and improvement for the development of functional neighborhoods as basic units of the physical community plan.

## APPENDIX A

### BASIC ASSUMPTIONS IN LAND USE CLASSIFICATION

Basic assumptions related to detailed classification of land uses and counting of dwelling units were made as follows:

1. The first five acres of the area of a lot or parcel occupied by a single-family dwelling are classified as single-family residential, the balance of the area up to a second five acres as appropriate.
2. Lots or parcels exceeding ten acres in area and occupied by a single-family dwelling are classified as agriculture or such other land use considered most appropriate.
3. Farm dwellings have been counted and tabulated as single-family dwelling units.
4. Where construction had been commenced and buildings were uncompleted or unoccupied, the lot or parcel was placed in the appropriate classification and the structure noted as vacant.

For the purposes of this report some related uses were tabulated under single categories: (1) Trailer Residences with 5-or-more Family Residence; (2) Motels and Hotels with General Commercial; (3) Quasi-Public with Other Public; and, (4) Irrigation Canals with Vacant.

APPENDIX B  
EXISTING LAND USE AREAS BY CENSUS TRACTS

Census Divisions Seven and Eight

Census Tract	Residence			Commer-	Indus-	Public & Semi-Public		Total Developed Land	Undeveloped		Total Undeveloped Land	
	Single Family	Two Family	Multi Family			Streets & Alleys	Other Public & Semi-Public		Agricul- ture	Canals & Vacant		
A	B	C	D	E	F	G	H	I	J	K	L	
7-	1	481.5	16.3	-	43.1	0.5	611.7	411.6	1,564.7	1,868.7	18,148.3	20,017.0
	2	672.8	1.8	0.9	115.2	4.8	221.4	246.2	1,263.1	61.1	2,359.8	2,420.9
	3	763.7	4.3	34.9	38.3	9.4	762.0	114.7	1,727.3	18.1	15,524.0	15,542.1
	4	358.5	2.8	13.0	119.4	61.4	597.9	452.1	1,605.1	10,387.9	11,697.6	22,085.5
	5	321.7	7.5	6.4	7.5	7.4	215.7	44.4	610.6	8.9	3,069.4	3,078.3
	6	170.8	2.4	3.8	11.7	3.3	73.5	49.4	314.9	1.9	71.6	73.5
	7	161.8	3.1	5.5	4.3	14.9	80.7	11.0	281.3	1.4	257.7	259.1
	8	203.6	-	13.4	23.6	-	181.6	21.5	443.7	544.3	240.7	785.0
	9	276.8	1.4	3.9	1.3	0.8	120.9	20.9	426.0	469.3	290.1	759.4
	10	411.8	4.8	6.1	8.2	3.6	91.8	13.5	539.8	210.3	51.2	261.5
	11	558.0	0.2	6.2	1.2	0.5	74.2	14.5	654.8	251.8	50.9	302.7
	12	314.3	4.3	7.3	1.0	5.3	79.3	13.4	424.9	306.2	210.7	516.9
	13	379.3	5.6	3.5	2.4	1.4	65.1	8.0	465.3	61.3	124.3	185.6
	14	168.2	2.3	1.1	2.4	6.5	82.1	13.7	276.3	1,377.1	170.0	1,547.1
	15	107.8	4.3	2.8	44.0	53.8	352.6	37.6	602.9	8,130.0	143.4	8,273.4
	16	51.8	2.0	0.9	2.0	255.4	167.2	-	479.3	5,490.5	383.9	5,874.4
	17	91.6	0.9	9.9	13.6	15.1	94.7	0.9	226.7	902.3	353.0	1,255.3
	18	216.6	-	0.7	19.3	4.9	130.1	11.9	383.5	347.3	221.9	569.2
	19	118.6	0.3	2.1	3.0	8.2	96.0	65.3	293.5	134.1	206.9	341.0
	20	353.1	2.4	7.0	7.7	0.8	82.9	18.0	471.9	124.1	189.4	313.5
	21	391.8	10.4	21.7	22.1	3.4	92.1	26.5	568.0	151.0	72.8	223.8
	22	375.2	0.5	5.6	4.4	0.1	114.7	17.2	517.7	180.9	181.2	362.1
	23	118.4	-	-	8.8	2.2	102.5	122.1	354.0	170.5	164.6	335.1
	24	235.7	12.0	16.0	78.4	15.8	106.5	67.8	532.2	139.4	171.5	310.9
	25	341.4	9.3	32.8	62.8	14.3	115.6	35.5	611.7	33.6	116.8	150.4
	26	334.5	7.0	37.2	20.9	15.2	147.7	27.4	589.9	36.2	199.8	236.0
	27	294.6	4.6	3.4	9.4	6.5	154.7	24.0	497.2	47.8	94.1	141.9
	28	201.9	2.5	5.4	9.0	5.6	143.6	38.5	406.5	181.1	56.7	237.8
	29	129.8	0.7	5.3	23.4	5.6	127.2	12.9	304.9	257.7	109.9	367.6
	30	320.4	1.3	1.4	10.7	0.5	179.9	22.7	536.9	91.8	14.3	106.1
	31	142.1	4.4	12.4	23.0	6.3	150.9	13.6	352.7	118.2	247.5	365.7
	32	251.6	3.8	12.4	9.7	1.4	131.1	29.8	439.8	42.4	34.6	77.0
	33	253.4	35.5	43.6	53.3	15.9	175.7	44.1	621.5	0.9	135.8	136.7
	34	-	-	-	-	-	6.7	165.6	172.3	-	2.4	2.4
	35	156.6	31.6	53.0	18.5	3.9	91.8	5.9	361.3	2.9	30.6	33.5
	36	226.9	35.9	33.9	18.8	5.0	130.7	58.8	510.0	37.1	59.5	96.6
	37	349.2	21.1	24.2	19.7	7.5	174.5	60.2	656.5	44.3	101.0	145.3
	38	349.9	1.1	8.5	8.8	2.7	133.8	21.9	526.7	102.4	86.4	188.8
	39	265.5	7.6	13.8	10.5	0.2	105.9	2.5	406.0	157.6	86.6	244.2
	40	446.2	9.0	12.3	17.7	1.5	216.1	23.1	725.9	158.0	150.3	308.3
	41	707.9	-	-	4.5	5.6	219.8	9.5	947.3	451.3	182.4	633.7
	42	775.8	-	1.2	172.5	0.6	204.7	137.4	1,292.2	184.6	1,644.2	1,828.8
	43	122.7	2.1	3.9	3.2	76.2	183.5	0.2	391.8	3,511.3	544.4	4,055.7
	44	99.5	2.3	5.0	8.6	8.0	23.7	29.1	176.2	90.3	38.9	129.2

(continued)

EXISTING LAND USE AREAS BY CENSUS TRACTS (continued)

A	B	C	D	E	F	G	H	I	J	K	L
45	198.0	1.7	1.5	4.5	8.1	112.3	22.7	349.8	474.4	441.0	915.4
46	73.9	0.9	4.2	2.4	0.3	57.0	127.3	266.0	29.8	132.8	162.6
47	273.8	12.3	7.6	4.3	14.2	159.8	61.2	533.2	183.4	148.6	332.0
48	413.6	8.8	20.3	25.2	6.7	186.7	62.9	724.2	172.3	78.1	250.4
49	301.1	19.1	23.6	11.9	6.1	151.5	33.2	546.5	28.3	74.9	103.2
50	293.6	20.5	13.7	18.9	4.3	147.7	17.6	516.3	47.8	97.5	145.3
51	268.7	39.5	30.2	15.3	4.0	124.2	7.2	489.1	16.5	104.7	121.2
52	172.4	17.1	22.3	11.1	2.4	96.8	172.5	494.6	-	23.6	23.6
53	256.9	24.0	30.6	84.6	1.2	178.7	189.8	765.8	0.8	61.2	62.0
54	332.0	16.0	12.7	15.3	7.1	205.6	162.2	750.9	2.2	111.6	113.8
55	87.3	8.1	24.9	55.3	522.2	289.3	175.9	1,163.0	1,094.3	599.2	1,693.5
56	429.5	-	-	51.9	15.7	179.5	59.0	735.6	140.6	239.6	380.2
57	331.9	-	-	1.4	0.9	155.4	-	489.6	845.3	74.6	919.9
58	232.6	1.0	7.6	3.2	59.7	389.4	15.2	708.7	11,023.2	185.8	11,209.0
59	218.7	0.4	0.2	1.6	6.5	151.1	15.8	394.3	323.2	163.5	486.7
60	184.1	5.4	3.3	36.1	6.3	184.8	10.8	430.8	210.0	162.5	372.5
61	261.1	5.1	2.1	8.0	15.1	111.3	63.2	465.9	77.0	34.3	111.3
62	290.0	41.5	27.7	25.1	10.8	188.8	129.6	713.5	-	17.3	17.3
63	114.3	30.1	37.7	28.1	3.9	97.4	28.8	340.3	-	18.1	18.1
64	173.7	48.8	42.6	23.0	0.5	115.1	20.8	424.5	-	10.3	10.3
65	273.3	40.5	17.7	31.2	2.1	184.3	27.7	576.8	-	46.2	46.2
66	269.9	44.5	35.2	20.9	3.8	159.3	12.1	545.7	-	77.3	77.3
67	263.7	26.9	26.8	17.0	9.0	147.8	27.2	518.4	8.3	137.9	146.2
68	315.1	4.9	36.2	10.8	9.6	135.3	30.4	542.3	422.1	316.3	738.4
69	174.5	0.4	11.7	3.2	22.7	77.6	30.4	320.5	84.6	325.5	410.1
70	-	-	-	-	-	9.6	900.4	910.0	-	810.0	810.0
71	37.0	-	9.9	14.5	112.5	48.6	11.5	234.0	120.9	581.3	702.2
72	172.2	14.1	44.7	159.9	63.8	147.7	11.2	613.6	7.9	227.3	235.2
73	-	-	-	-	-	5.9	154.1	160.0	-	-	-
74	46.5	14.2	71.3	5.9	2.2	54.4	23.4	217.9	0.1	36.2	36.3
75	76.8	33.8	32.3	96.4	61.3	149.2	11.5	461.3	0.3	82.8	83.1
76	117.5	64.8	58.8	36.1	11.0	133.7	44.5	466.4	-	17.8	17.8
77	30.7	21.8	32.5	17.2	74.0	82.7	29.6	288.5	-	16.4	16.4
78	20.8	20.4	47.4	135.0	55.5	197.3	29.6	506.0	-	3.1	3.1
79	124.1	61.7	51.4	67.8	67.8	225.5	70.6	668.9	-	22.4	22.4
80	107.2	22.5	35.3	26.9	39.9	140.8	11.7	384.3	-	37.9	37.9
81	207.7	22.5	21.2	21.5	49.9	136.2	58.7	517.7	16.8	100.9	117.7
82	3.0	-	-	0.3	559.1	40.6	-	603.0	925.4	65.3	990.7
83	76.8	14.3	1.1	6.1	218.5	327.6	51.4	695.8	8,997.4	2,667.5	11,664.9
84	236.0	6.2	9.1	28.9	54.7	112.3	4.2	451.4	122.1	395.6	517.7
85	60.4	39.9	0.4	13.6	54.8	79.5	7.9	256.5	2.1	66.0	68.1
86	169.7	8.8	11.8	26.6	66.6	131.8	20.6	435.9	-	67.2	67.2
87	59.7	18.0	42.7	11.2	95.2	113.8	17.3	357.9	-	37.0	37.0
88	98.0	4.0	28.3	16.0	52.9	119.8	42.7	361.7	2.1	55.1	57.2
89	40.2	1.9	1.7	8.6	173.0	22.6	1.8	249.8	-	88.2	88.2
90	172.0	1.5	1.5	8.4	1.1	91.1	23.3	298.9	0.7	105.8	106.5
91	263.5	2.5	5.2	11.8	21.8	99.9	29.1	433.8	15.1	231.6	246.7
92	162.4	0.9	1.1	7.5	76.7	81.7	1,016.9	1,347.2	136.5	799.4	935.9
93	64.5	1.7	1.3	1.5	60.6	53.4	-	183.0	691.5	1,135.6	1,827.1
94	0.8	-	-	-	-	5.8	-	6.6	74.6	37.7	112.3

(continued)

EXISTING LAND USE AREAS BY CENSUS TRACTS (continued)

	A	B	C	D	E	F	G	H	I	J	K	L
	96	0.4	-	-	-	3.7	90.2	7.7	102.0	3,838.9	56.1	3,895.0
	97	70.9	0.9	-	2.6	62.7	124.4	18.3	279.8	2,801.9	299.9	3,101.8
	98	275.2	6.8	4.7	45.8	628.2	189.9	277.4	1,428.0	671.1	4,423.7	5,094.8
	99	322.1	5.1	10.8	19.9	18.3	113.4	20.7	510.3	83.7	173.8	257.5
	100	210.7	3.0	3.8	5.7	6.0	97.9	13.2	340.3	101.4	418.6	520.0
	101	398.2	7.3	0.9	5.8	3.0	81.2	15.7	512.1	84.3	240.1	324.4
	102	278.9	2.1	0.7	8.2	9.8	153.2	54.9	507.8	3,154.2	453.5	3,607.7
	103	382.7	2.8	2.0	20.3	7.5	123.1	44.9	583.3	179.9	148.0	327.9
	104(1)	307.0	3.2	-	42.2	94.7	494.2	12.4	953.7	13,173.7	3,601.1	16,774.8
	105	142.6	3.5	6.0	33.1	5.3	297.8	157.8	646.1	1,623.7	2,993.3	4,617.0
	106	83.0	0.6	-	3.5	176.0	272.5	19.0	554.6	6,383.4	3,048.1	9,431.5
	107(2)	-	-	-	-	-	23.0	7,169.8	7,192.8	1,070.3	2,274.4	3,344.7
8-	1(3)	319.3	9.1	107.4	59.7	1,669.9	914.5	174.1	3,326.6	6,453.5	44,017.2	50,470.7
	2	64.1	0.5	30.3	13.6	100.6	547.6	47.2	803.9	8,350.6	2,782.6	11,132.2
	3	3.4	-	-	-	19.5	19.3	-	42.2	717.9	19.4	737.3
	4	1.2	-	-	-	5.7	12.9	-	19.8	369.0	27.0	396.0
	5	138.3	2.9	6.8	22.1	119.5	117.3	239.3	649.6	1,221.1	1,330.0	2,551.1
	6	38.5	0.2	7.6	0.8	58.6	220.3	2.4	328.4	6,302.6	111.0	6,413.6
	7	75.6	-	3.1	3.8	34.5	160.0	4.8	281.8	4,063.5	64.3	4,127.8
	8	5.4	-	-	3.7	88.8	316.6	6.4	420.9	10,231.4	30.5	10,261.9
	9	1.8	-	-	0.3	39.9	393.6	-	435.6	15,538.0	555.9	16,093.9

(1) Does not include N 1/2 of T1S, R1E and S 1/2 of T1S, R2E.

(2) Does not include S 1/2 of T1S, R2E and S 1/2 of T1S, R3E.

(3) Does not include N 1/2 of T2N, R7E.



APPENDIX D  
AVERAGE LOT AREA PER FAMILY BY CENSUS TRACT

Census Divisions Seven and Eight

Census Div. & Tract No.	Single-Family			Two-Family			Multi-Family			Trailer Residence		
	Dwelling Units (No.)	Total Lot Area (Acres)	Average Lot Area (Sq. Ft.)	Dwelling Units (No.)	Total Lot Area (Acres)	Average Lot Area (Sq. Ft.)	Dwelling Units (No.)	Total Lot Area (Acres)	Average Lot Area (Sq. Ft.)	Dwelling Units (No.)	Total Site Area (Acres)	Average Lot Area (Sq. Ft.)
A	B	C	D	E	F	G	H	I	J	K	L	M
7- 1	394	481.5	53,289	14	16.3	50,716	-	-	-	-	-	-
2	479	672.8	61,202	6	1.8	13,068	3	0.9	13,068	-	-	-
3	967	763.7	34,416	10	4.3	18,731	18	1.8	4,356	156	33.1	9,243
4	1,473	358.5	10,616	48	2.8	2,541	79	8.8	4,852	84	4.2	2,178
5	1,548	321.7	9,061	90	7.5	3,630	142	5.4	1,657	13	1.0	3,351
6	897	170.8	8,304	46	2.4	2,273	103	3.3	1,396	23	0.5	947
7	807	161.8	8,744	38	3.1	3,554	29	1.8	2,704	51	3.7	3,160
8	1,376	203.6	6,458	-	-	-	-	-	-	147	13.4	3,971
9	940	276.8	12,836	16	1.4	3,812	13	1.2	4,021	48	2.7	2,450
10	1,426	411.8	12,585	34	4.8	6,150	63	6.1	4,218	-	-	-
11	967	558.0	25,136	2	0.2	4,356	104	6.2	2,597	-	-	-
12	970	314.3	14,101	20	4.3	9,365	13	1.7	5,696	30	5.6	8,131
13	1,113	379.3	14,833	60	5.6	4,066	30	2.6	3,775	23	0.9	1,705
14	408	168.2	17,936	16	2.3	6,262	10	1.1	4,792	-	-	-
15	417	107.8	11,282	32	4.3	5,853	3	1.0	14,520	7	1.8	11,201
16	200	51.8	11,326	20	2.0	4,356	9	0.9	4,356	-	-	-
17	475	91.6	8,437	6	0.9	6,534	11	1.3	5,148	133	8.6	2,817
18	1,401	216.6	6,747	-	-	-	8	0.7	3,812	-	-	-
19	638	118.6	8,125	2	0.3	6,534	4	0.4	4,356	28	1.7	2,645
20	1,206	353.1	12,750	16	2.4	6,534	35	2.2	2,738	49	4.8	4,267
21	1,010	391.8	16,906	74	10.4	6,122	239	18.2	3,317	56	3.5	2,723
22	1,188	375.2	13,750	4	0.5	5,445	84	4.2	2,178	18	1.4	3,388
23	62	118.4	82,905	-	-	-	-	-	-	-	-	-
24	1,020	235.7	10,079	92	12.0	5,682	146	10.0	2,984	114	6.0	2,293
25	1,510	341.4	9,837	110	9.3	3,863	288	15.2	2,299	295	17.6	2,599
26	1,657	334.5	8,807	72	7.0	4,235	729	35.8	2,139	9	1.4	6,776
27	1,384	294.6	9,285	50	4.6	4,008	18	1.1	2,662	62	2.3	1,616
28	1,358	201.9	6,479	28	2.5	3,889	46	5.0	4,735	9	0.4	1,936
29	794	129.8	7,132	14	0.7	2,178	7	0.3	1,867	64	5.0	3,403
30	2,059	320.4	6,770	14	1.3	4,045	17	1.4	3,587	-	-	-
31	651	142.1	9,502	40	4.4	4,792	38	2.5	2,866	61	9.9	7,070
32	1,289	251.6	8,516	30	3.8	5,518	187	12.4	2,888	-	-	-
33	1,380	253.4	7,986	300	35.5	5,155	680	43.6	2,793	-	-	-
34	-	-	-	-	-	-	-	-	-	-	-	-
35	805	156.6	8,496	310	31.6	4,440	700	53.0	3,298	-	-	-
36	1,211	226.9	8,165	280	35.9	5,585	307	33.9	4,810	-	-	-
37	1,613	349.2	9,425	108	21.1	8,510	228	24.2	4,623	-	-	-
38	962	349.9	15,848	8	1.1	5,990	52	8.5	7,120	-	-	-
39	1,065	265.5	10,880	30	7.6	11,035	90	13.8	6,679	-	-	-
40	2,002	446.2	9,704	32	9.0	12,251	91	12.3	5,888	-	-	-
41	1,030	707.9	29,942	-	-	-	-	-	-	-	-	-
42	461	775.8	73,324	-	-	-	4	1.2	13,068	-	-	-
43	804	122.7	6,664	10	2.1	9,148	18	3.9	9,438	-	-	-
44	149	99.5	29,235	14	2.3	7,156	28	2.5	3,889	60	2.5	1,815
45	1,275	198.0	6,765	18	1.7	4,114	11	1.5	5,940	-	-	-

(continued)

AVERAGE LOT AREA PER FAMILY BY CENSUS TRACT (continued)

A	B	C	D	E	F	G	H	I	J	K	L	M
46	266	73.9	12,118	24	0.9	1,634	46	2.8	2,651	22	1.4	2,772
47	1,121	273.8	10,647	59	12.3	9,081	50	7.6	6,621	-	-	-
48	1,605	413.6	11,236	40	8.8	9,583	137	20.3	6,455	-	-	-
49	1,411	301.1	9,292	125	19.1	6,656	92	23.6	11,174	-	-	-
50	1,353	293.6	9,465	188	20.5	4,750	179	13.7	3,334	-	-	-
51	1,238	268.7	9,465	274	39.5	6,280	307	30.2	4,285	-	-	-
52	764	172.4	9,807	212	17.1	3,514	313	22.3	3,103	-	-	-
53	1,351	256.9	8,286	216	24.0	4,840	726	30.6	1,836	-	-	-
54	1,734	332.0	8,340	129	16.0	5,403	227	12.7	2,437	-	-	-
55	363	87.3	10,440	94	8.1	3,754	173	13.1	3,298	268	11.7	1,902
56	2,313	429.5	8,098	-	-	-	-	-	-	-	-	-
57	1,541	331.9	9,385	-	-	-	-	-	-	-	-	-
58	1,196	232.6	8,486	10	1.0	4,356	3	0.1	1,452	38	7.5	8,597
59	1,336	218.7	7,140	2	0.4	8,712	3	0.2	2,904	-	-	-
60	1,541	184.1	5,201	84	5.4	2,800	81	2.0	1,076	37	1.3	1,530
61	1,426	261.1	7,973	42	5.1	5,289	37	2.1	2,472	-	-	-
62	1,512	290.0	8,355	458	41.5	3,947	536	27.7	2,251	-	-	-
63	443	114.3	11,210	264	30.1	4,967	637	37.7	2,578	-	-	-
64	863	173.7	8,783	506	48.8	4,201	696	42.6	2,666	-	-	-
65	1,667	273.3	7,134	528	40.5	3,341	298	17.7	2,587	-	-	-
66	1,464	269.9	8,034	406	44.5	4,774	283	35.2	5,418	-	-	-
67	1,413	263.7	8,139	172	26.9	6,813	190	26.8	6,144	-	-	-
68	1,350	315.1	10,164	32	4.9	6,670	70	7.7	4,793	245	28.5	5,067
69	561	174.5	13,588	4	0.4	4,356	7	0.5	3,110	178	11.2	2,741
70	-	-	-	-	-	-	4	-	-	-	-	-
71	106	37.0	15,205	6	0.6	4,356	4	0.5	5,445	234	9.9	1,843
72	963	172.2	7,780	136	14.1	4,516	181	44.7	10,759	-	-	-
73	-	-	-	-	-	-	-	-	-	-	-	-
74	288	46.5	7,109	162	14.2	3,818	835	71.3	3,720	-	-	-
75	506	76.8	6,629	376	33.8	3,916	650	32.3	2,165	-	-	-
76	768	117.5	6,693	848	64.8	3,329	1,168	58.8	2,193	-	-	-
77	227	30.7	5,949	287	21.8	3,309	771	32.5	1,836	-	-	-
78	146	20.8	6,265	254	20.4	3,499	1,053	47.4	1,961	-	-	-
79	936	124.1	5,771	863	61.7	3,114	1,239	51.4	1,807	-	-	-
80	660	107.2	7,062	262	22.5	3,741	197	35.3	7,805	-	-	-
81	1,191	207.7	7,607	196	22.5	5,000	109	21.2	8,472	-	-	-
82	34	3.0	3,844	-	-	-	-	-	-	-	-	-
83	574	76.8	6,904	186	14.3	3,349	10	0.5	2,178	16	0.6	1,634
84	1,281	236.0	8,025	72	6.2	3,751	55	1.7	1,346	99	7.4	3,256
85	480	60.4	5,445	344	39.9	5,052	18	0.4	968	-	-	-
86	1,331	169.7	5,564	160	8.8	2,396	174	11.8	2,954	-	-	-
87	525	59.7	4,978	258	18.0	3,039	745	42.7	2,497	-	-	-
88	849	98.0	5,028	72	4.0	2,420	611	28.3	2,018	-	-	-
89	422	40.2	4,129	40	1.9	2,069	61	1.5	1,071	10	0.2	871
90	1,259	172.0	5,951	28	1.5	2,334	21	0.6	1,245	38	0.9	1,032
91	1,718	263.5	6,694	52	2.5	2,094	25	1.1	1,917	64	4.1	2,791
92	670	162.4	10,532	12	0.9	3,267	15	1.1	3,194	-	-	-
93	222	64.5	12,754	12	1.7	6,171	24	1.0	1,815	-	-	-
94	5	0.8	6,970	-	-	-	-	-	-	-	-	-

(continued)

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AVERAGE LOT AREA PER FAMILY BY CENSUS TRACT (continued)

	A	B	C	D	E	F	G	H	I	J	K	L	M
	96	2	0.4	8,712	-	-	-	-	-	-	-	-	-
	97	216	70.9	14,318	4	0.9	9,801	-	-	-	-	-	-
	98	1,405	275.2	8,526	72	6.8	4,114	19	1.2	2,751	72	3.5	2,118
	99	1,148	322.1	12,218	54	5.1	4,114	84	4.4	2,282	70	6.4	3,983
	100	881	210.7	10,433	36	3.0	3,630	34	2.1	2,690	6	1.7	12,342
	101	754	398.2	22,993	52	7.3	6,115	9	0.9	4,356	-	-	-
	102	1,198	278.9	10,145	16	2.1	5,717	6	0.7	5,082	-	-	-
	103	1,209	382.7	13,799	30	2.8	4,065	18	1.5	3,630	8	0.5	2,723
	104	896	307.0	14,925	24	3.2	5,808	-	-	-	-	-	-
	105	760	142.6	8,196	4	3.5	38,115	8	1.5	8,168	4	4.5	49,005
	106	530	83.0	6,822	6	0.6	4,356	12	0.3	1,163	-	-	-
	107	-	-	-	-	-	-	-	-	-	-	-	-
8-	1	1,081	319.3	12,867	42	9.1	9,438	74	10.0	5,886	630	97.4	6,745
	2	261	64.1	10,698	8	0.5	2,723	19	3.9	8,941	223	26.4	5,157
	3	6	3.4	24,684	-	-	-	-	-	-	-	-	-
	4	4	1.2	13,068	-	-	-	-	-	-	-	-	-
	5	625	138.3	9,639	36	2.9	3,509	17	1.1	2,819	87	5.7	2,854
	6	56	38.5	29,948	2	0.2	4,356	-	-	-	42	7.6	7,882
	7	90	75.6	36,590	-	-	-	49	3.1	2,756	-	-	-
	8	13	5.4	18,094	-	-	-	-	-	-	-	-	-
	9	5	1.8	15,682	-	-	-	-	-	-	-	-	-