

COMPREHENSIVE PLANNING PROGRAM TEMPE ARIZONA

COMPREHENSIVE PLANNING PROGRAM

TEMPE ARIZONA

Property of
Flood Control District of MC Library
Please Return to
2801 W. Durango
Phoenix, AZ 85009

REPORT NUMBER FOUR
LAND USE

PR-45



A028.902

THE
COMPREHENSIVE PLANNING PROGRAM
TEMPE, ARIZONA

Prepared Under Contract with the
Division of Economic and Business Research
University of Arizona

by

TEMPE PLANNING DEPARTMENT
and
VAN CLEVE ASSOCIATES, CONSULTING PLANNERS

REPORT NUMBER FOUR
LAND USE

The preparation of this report was financially aided through a Federal grant from the Urban Renewal Administration of the Housing and Home Finance Agency under the Urban Planning Assistance Program authorized by Section 701 of the Housing Act of 1954, as amended.

APRIL 1966

TEMPE PLANNING AND ZONING COMMISSION

Harl Chamberlain, Chairman

Dr. George Calderwood, Vice-Chairman

Mrs. B. J. Axel

John Cazan

Leonard Goodall

Mrs. John Klock

Peter Meyer

STAFF:

Harry F. Higgins, Planning Director

Mont D. Bigler, Planner I

TEMPE CITY COUNCIL

John C. Moeur, Mayor

Ray T. Ashley, Vice-Mayor

Wayne A. Forde

Hayden C. Hayden

Gil Montanez

A. P. Rowd Sanders

Robert Svob

Leland Kraft, City Manager

VAN CLEVE ASSOCIATES - CONSULTING PLANNERS

Paul W. Van Cleve, Director

John W. Stansel, Principal Planner

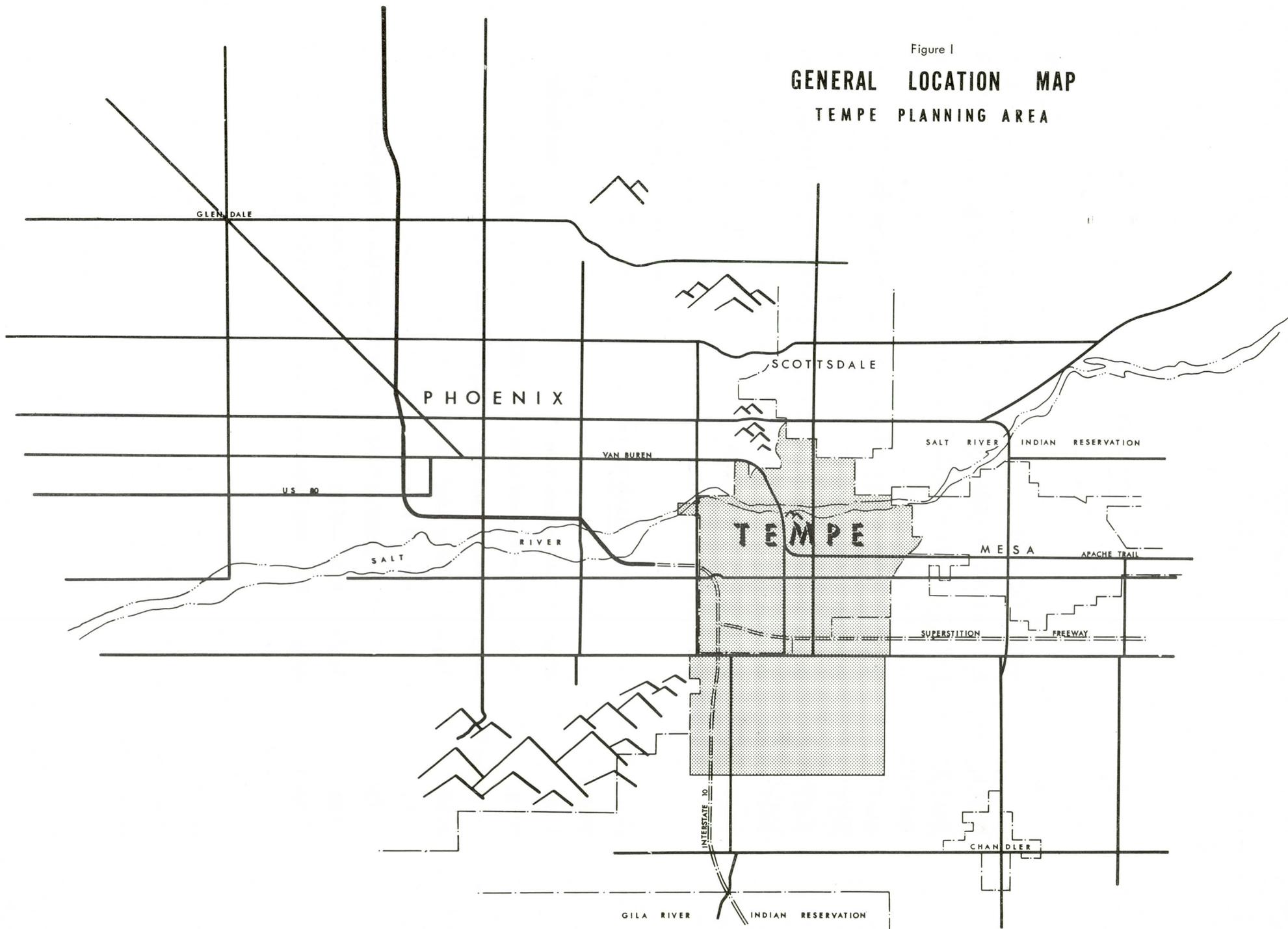
CONTENTS

		Page
	INTRODUCTION	1
PART I.	THE NATURE OF URBAN LAND DEVELOPMENT	3
PART II.	PHYSIOGRAPHY AND RESOURCES	7
PART III.	REGIONAL GROWTH	11
PART IV.	MAJOR FACTORS INFLUENCING LAND DEVELOPMENT	14
PART V.	EXISTING LAND USE	19
PART VI .	DEVELOPMENT TRENDS AND FUTURE LAND REQUIREMENTS	36
PART VII.	IMPLICATIONS FOR PLANNING	44
PART VIII.	SUMMARY OF FINDINGS	48
	SOURCES & REFERENCES	51

ILLUSTRATIONS

Figure			
1	Map	General Location	Frontispiece
2	Map	Generalized Land Use, 1963	21
3 thru 11	Maps	Existing Land Use, 1963, by Divisions	22 - 30
12	Table	Existing Land Use Data, 1963	33
13	Table	Ratio of Existing Land Use to Population, 1963	37
14	Table	Comparative Ratios of Existing Land Use to Population	38
15	Table	Projected Ratios of Land Use to Population	40
16	Map	Projected Urban Expansion, 1970 - 1985	43

Figure 1
GENERAL LOCATION MAP
TEMPE PLANNING AREA



INTRODUCTION

Although citizens and municipal officials have high aspirations for the future of their community, the planning process commences with consideration of the city as it presently exists. The physical structure of the community and its pattern of land use must be known and understood before any plan can be drawn.

Land is developed by countless individuals, corporations and institutions and by many public agencies and quasi-public organizations. The uses for which it is developed are as varied as the special purposes of its developers. Whereas the use of rural land conforms to common functional patterns and makes little demand upon public services, the physical, social and economic interrelationships of urban land uses can be amazingly complex.

These widely varying uses of urban land achieve maximum compatibility, economic productivity and functional efficiency only when guided by a comprehensive development plan based on thorough study and understanding of the community's basic structure. To develop this understanding, planners must inventory and analyze current characteristics of land use, population and economic base, and also search past history sufficiently to identify the major factors which have been instrumental in shaping the existing environment.

The productivity of land, in terms of efficient use and function, affects the entire community and each of its citizens more directly than is generally recognized. Physical characteristics of the individual site affect the efficiency of its use and the cost of its products in much the same manner that plant design and assembly line arrangement affect industrial production. Physical relationships between land uses affect employees' travel time, delivery of raw materials and finished products, and costs of streets and utility services. Conflicts between uses affect general living environment, property values and social attitudes.

Although the material products of land use may be crops, livestock, minerals, garments, electronic devices, residences or whatever, the end product most important to the community is the overall social and physical environment in which its citizens live.

The planners' concern with land use is therefore threefold. On a community basis, we need to know how much of the land will be occupied and developed for general uses. On a pattern basis we must know how it contributes to the achievement of community goals, and on a parcel basis we need to know how well it serves the purpose of its owner and occupant. Success of any long-range development plan depends upon simultaneous accomplishment of both public and private objectives.

This report is primarily concerned with the classification and distribution of land and existing land uses, including the special and economic relationships between uses and the types and extent of physical development characterized by these uses.

The report examines the general physiography and resources of the Tempe Planning Area and their past, present and future influences on its development. Physical characteristics of land are investigated to determine their future influence on land use patterns and on public policies related thereto. The report also examines in some detail the nature of land use by specific categories, including general trends and interrelationships.

PART I

THE NATURE OF URBAN LAND DEVELOPMENT

"The earth is our primary resource. Millions of years in time created the few inches of soil that supports humanity. The greed and glut of man have often and quickly destroyed what took Nature an infinite time to develop."^{1/}

Throughout the history of America, wanton exploitation of natural resources has eliminated many natural minerals, forests, and wildlife species, and has jeopardized the continued existence of many more. With the start of the 20th Century, the Federal government found it necessary to take steps to conserve, protect and restore these natural resources. Subsequently, a vast amount of legislation and federal funds have been directed to this purpose.

In urban communities, the abuse of land through speculative excesses and inadequate controls has paralleled the exploitation of the nation's natural resources. The control of land use and development through zoning and subdivision regulations was accepted as necessary only after much of the urban land had been mangled and manipulated in such a way that large areas of our cities were rendered non-productive. The City of Tempe is no exception.

Land Ownership

The ancient tradition that the land is vested primarily in the community with rights to its use being granted to individuals has persisted despite the forms which these rights have assumed from time to time. The history of land ownership in America began when the Indians grouped into tribes, appropriated the territory they occupied, and guarded it from intrusion by others. In the Colonial era a form of feudal system was established wherein the land was vested in the head of state who then granted or leased it to individuals, colonies or companies under certain stated restrictions. After the Revolution, the Federal government assumed ownership of much of the nation's land and, in order

^{1/} Arthur B. Gallion, The Urban Pattern, 1950.

to encourage national expansion and settlement of frontier lands, offered grants and sold land with certain rights and restrictions.

With the first Homestead Act, land became a speculative commodity to be bought and sold without restriction and with little regard for its natural values or condition. Land began to be valued as much, or more, for its location and trading potential as for its inherent capabilities for human use and enjoyment. Land was subdivided into gridiron patterns of extremely small lots and sold for a dollar down and a dollar a week. In this manner, Florida swamps, Mississippi River flood plains, precipitous Western mountainsides, and Southwestern deserts were subdivided and sold to individuals. Some of these areas still remain as evidence of premature subdivision and irresponsible speculation in land.

As the nation's population increased and the society began its transition from agrarian to urban living, it became necessary for cities and state to establish certain restrictions and controls upon people and their properties in order to maintain a healthful, safe and economic urban community. During recent years these regulations have, of necessity, become progressively more detailed and complex, and in many instances are being extended to include the public welfare objectives of convenience and beauty.

The nature of land ownership in our increasingly complex social structure requires that the individual property owner as well as the community leaders clearly recognize and accept the proper relationship between private ownership and the vested interest of the community. The highest courts have expressed the opinion that there is no absolute private right to land in our democratic society. It is the essence of democracy that the people shall be masters of their own destiny, but also that their behavior must be guided by the precepts of established law and order. In respect to the development and use of land in the community, it is the responsibility of the planning commission and the governing body to establish these precepts.

Expansion of Urban Areas

In 1790, when the first Federal census was taken, there were only two cities in the country having populations over 25,000, and at the beginning of the 19th Century only about 5% of the people lived in urbanized areas. The worldwide industrial revolution of the 19th Century encouraged the migration of many Europeans to the United States, and by 1850 the ratio of urban population had risen to 20%. In 1940, nearly 57% of the nation's population lived in urban communities and the population of 412 cities exceeded 25,000, with five cities exceeding one million. By 1960, 63% of the population, over 179 million people, lived in urban areas, and by 1985 this percentage is expected to rise to 75% to 80%.^{1/}

While people have congregated in cities for mutual welfare and convenience, the ease of transportation by private auto has sponsored a flight from the congested centers of large cities to outlying suburbs and small country towns. Many commercial and industrial establishments are following this same pattern of decentralization to avoid congestion and high costs associated with the central city.

In this flight to the suburbs, extensive amounts of land have been developed for urban uses, often by-passing large land areas. This leap-frogging and spreading at random throughout the hinterland is wasteful and a flagrant violation of all modern principles of urban land use and development. It places an intolerable burden upon the city for over-extension of such public services as utilities, streets, schools, police and fire protection.

The pressure of the population explosion, together with increased urbanization and the trend toward decentralization, has intensified the demand for land. This report gives considerable attention to establishing a base of principles and existing conditions upon which the City of Tempe can develop a pattern of land use which will assure a balanced and economic urban environment.

^{1/} Outdoor Recreation Resources Review Commission, Projections to the Years 1976 and 2000, Report #23, 1962.

New towns in England have been effectively designed on this basis. Yorktown, New York, with a 1960 population of 16,500 and originally developed as a community of single-family homes, undertook a detailed analysis of its economy when, despite the rising tax rate, revenues resulted in an annual deficiency of some \$100 per residence. Based upon current methods of assessment versus annual expenditures for services, that study indicated the need for the community to develop 8% of its land to industrial and laboratory facilities and 4% to business and commercial uses.

Although living conditions, methods of taxation, and policies regarding public services may be quite different in England and New York, the City of Tempe still has the same opportunity, in developing its comprehensive land use plan, to concern itself with the economics of urban land use and the interrelationship of municipal revenues, general land use ratios and population densities, so that its citizens will be provided the type of municipal facilities and services they need, desire and can afford.

PART II
PHYSIOGRAPHY AND RESOURCES

Regional Setting

The City of Tempe is one of the family of cities comprising the Phoenix Metropolitan Area. Located in the southeastern sector of the urban region, Tempe has received a major increment of metropolitan area growth since 1960. Nearly all of the Tempe Planning Area is located south of the Salt River, a physical and, to some extent, a social barrier which tended to impede southeasterly growth during the late 1950's when other parts of the metropolitan area expanded rapidly.

The City of Tempe sprang from the pioneer settlement known as Hayden's Ferry, whose principal economic base was a large flour mill and an extensive agricultural area. Agriculture is now rapidly giving way before the urban growth forces which have doubled the city's population since 1960.

Tempe is the home of Arizona State University, originally founded in 1885 as Arizona Territorial Normal School with a first year enrollment of 33 students. The University has grown in size and stature to reach an enrollment of 19,198 in 1965 and to become a major factor in the city's present and future economy.

Tempe is exceptionally well served by transportation facilities which provide convenient access to and from all parts of the metropolitan area, the state and the nation. Apache Boulevard and Mill Avenue presently carry five federal highway routes and the city will soon have direct access to the interstate highway system. The construction of planned freeways will further improve its regional access.

The city is served with rail freight service by the Southern Pacific Railroad, with direct connections to the branch line of the Santa Fe Railroad terminating in Phoenix. Rail passenger service is limited to boarding at Mesa or Phoenix. In 1964, the freight terminal station on West Third Street handled nearly 4,000 cars and existing facilities can accommodate twice that amount of shipping as industrial expansion continues.

Tempe receives transcontinental and intercontinental air passenger and freight service from Sky Harbor Airport, five miles to the west in Phoenix. Sky Harbor Airport serves seven major airlines making direct flights or connections to all parts of the state, nation and world.

Physical Features

The Tempe Planning Area is situated on the broad, flat plain flanking the Salt River. The older portion of the city and most of the remainder of the Planning Area lies south of the Salt River, separated from the hilly terrain of Papago Park on the north by the river's broad flood plain and meandering channels. The general elevation of the gently sloping valley land varies only slightly, from 1150 to 1190 feet above sea level.

The Salt River bed and adjacent lowlands have a high water table during periods of streamflow and heavy runoff, complicating construction problems and increasing the rate of deterioration for roads, buildings and other urban facilities.

South of the Salt River the generally level terrain is broken by two groups of buttes — Tempe Buttes and Bell Buttes — which rise abruptly 150 to 350 feet above the valley floor. The Planning Area is flanked on the southwest by the eastern slope of the Salt River Mountains, which rise to an elevation of 2540 feet.

North of the river the terrain is broken by a series of undulating hills and rock outcroppings, reaching 1700 feet above sea level. Much of this area comprises Papago Park, partly in Tempe and partly in the city of Phoenix.

A break in natural drainage occurs in a line running generally east and west in the vicinity of Guadalupe Road. All parts of the Planning Area to the north of this "ridge" drain to the Salt River, while that to the south drains southwest to the Gila River.

Resources

Soils: With the exception of the Salt River, the buttes and the Papago Park area, soils in the Planning Area are suitable for production of most types of vegetation and

crops, and are generally capable of supporting most types of buildings and other structures. However, some of the area contains soil having a high residual salt content which causes excessive corrosion of underground metal installations. Some soils south of Baseline Road also have a high iron sulfate content which produces excessive corrosion of metal. Soil bearing strength in unsubjected and uncultivated areas is extremely variable, and subject to considerable settling in some areas. However, areas which have been cultivated for any considerable length of time are well leached out and sufficiently settled to support normal construction.

Agriculture: Tempe is located near the center of the Salt River Project Agricultural Improvement and Power District, one of the most successful agriculture-by-irrigation-and-power-production projects in the world. Due to the warm, sunny climate, fertile soil and adequate supply of irrigation water, the local growing season extends throughout the year, facilitating the growth of a wide range of farm crops. In 1964 approximately half of the land in the Tempe Planning Area was devoted to farming. The 1964 crop report of the Salt River Project farm lands indicates an average gross value per acre of all crops of \$337.18 per acre, producing a total agricultural base of about \$4,046,000 for the Planning Area.

Mining: The extraction of sand and gravel from the Salt River bed constitutes the only mining activity in the Tempe Planning Area. Virtually all of this material is used locally in the production of ready-mixed concrete and concrete products.

Ground Water: Water is pumped from the underground water basin by nine City wells for domestic consumption and by private wells for agricultural irrigation. The Tempe Planning Area is located in the Mesa Basin, one of two ground water hydrologic units in the metropolitan area. Although ground water tables tend to stabilize as urban development replaces agriculture and irrigation pumping decreases, the projected decline of the water table by 1980 will present serious problems in the economic delivery of ground water to most parts of the Planning Area. The shallowest ground water table in the Mesa Basin occurs west of Tempe, at about 60 feet depth. The remainder of the area presently has a static water table depth varying from 100 to 200

feet.^{1/}

Ground water now being used for domestic consumption is deteriorating in chemical quality. Water from most of the Tempe wells contains soluble salts, chlorides and iron in amounts exceeding the maximum limits suggested by the U. S. Public Health Service.^{2/} It also exceeds the desirable upper limit of total hardness, a matter of economics rather than of public health. Fluoride content is well below the suggested upper limit for drinking water.

Surface Water: Surface water impounded by the Salt River Project is delivered to the Tempe Planning Area by the Arizona Crosscut, Tempe and Western Canals. This supply essentially meets requirements for Drinking Water Standards issued by the U. S. Public Health Service. Although surface water has not yet been used for domestic consumption by the City of Tempe, the new filtration plant in Papago Park will soon start drawing its supply from the Crosscut Canal. Henceforth, it is anticipated that existing wells will gradually be placed on standby or phased out operation entirely.

1/ Dr. Heinrich J. Thiele, Present and Future Water Use and Its Effect on Planning in Maricopa County, Arizona, 1965.

2/ John Carillo Engineers, Report on Water Works Facilities, 1963.

PART III
REGIONAL GROWTH

In 1940, the city of Phoenix, with a population of 65,000, and the small outlying towns of Glendale, Tempe and Mesa, comprised the urbanized parts of what is now the Phoenix Metropolitan Area. Although dominated by agriculture, the area's economic base was elaborated by Phoenix' status as state capitol and Arizona's largest city, and by its strategic location on main tourist and transportation routes across the thinly populated region between Texas and California. Maricopa County had a total population of 186,000, and long-term projections then indicated that the population was unlikely to exceed 300,000 by 1965.

Nationwide forces generated by World War II initiated a new growth cycle involving large-scale migration and economic activity. By 1960 the Phoenix SMSA*, with a population of 663,510 ranked 37th in the nation and second behind Denver in the Mountain Census Division. By 1965 its population had reached 861,000, exceeding projections made in 1940 by more than a half million. The several original towns, together with the newer city of Scottsdale, have grown laterally to form a contiguous urban region sustained by an increasingly complex and diversified economy.

The terrain of the Salt River Valley is notably flat with few significant physical growth barriers, and has shown itself receptive to large-scale and rapid urbanization. Many of the earlier costs of urban expansion were borne by the improvement of roads, utilities, water supply and other facilities built primarily for service to agriculture. These conditions made it possible and feasible for the urbanized area to expand laterally in any direction without undue restriction and, due to the vast amount of suitable land available, to favor certain directions, to by-pass idle lands, and to entirely encompass some farm lands.

During the 1950's, the dominant direction of lateral growth was northward from pre-war Phoenix toward Glendale and Scottsdale. Rapid extension of urban develop-

* Standard Metropolitan Statistical Area (U. S. Census).

ment encouraged the migration of many normal functions and activities out of the Phoenix central business district to widely dispersed locations in outlying areas. The virtually unplanned and often erratic nature of this expansion created a plague of urban problems, particularly for the central city. Perhaps the common denominator behind most of these growth problems was the basic unsuitability of the gridiron thoroughfare pattern inherited from earlier agricultural land use. As a result, an acute need for urban freeways has developed much faster than in most other metropolitan regions.

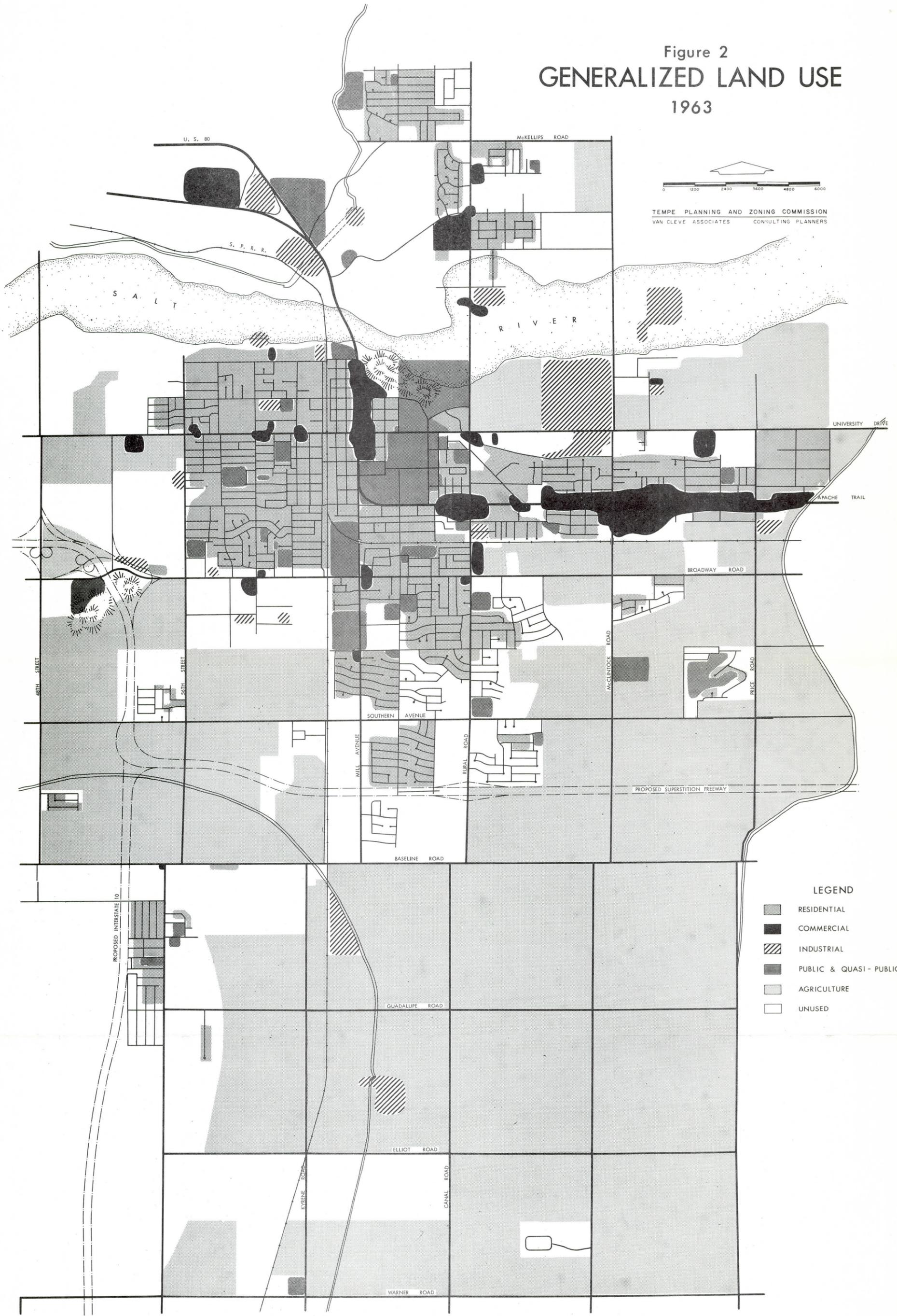
During the late 1950's, while the northern sections were absorbing the majority of population growth and economic activity, the older urban axis between downtown Phoenix and the Tempe-Mesa area remained relatively dormant. Between 1950 and 1960, Mesa achieved a moderate population gain, Tempe registered a substantial gain based largely on university growth, and the 1950 area of the City of Phoenix actually lost population.

To a considerable extent, the nature of Tempe's future role in metropolitan area development is conditioned by the character of the region's early growth. Areas which once attracted major increments of urban growth are now beset with serious problems which, at best, will require years to solve. Many of these conditions are simply not curable. Other problems, such as the revitalization of downtown Phoenix, can be overcome only with difficulty.

Similar problems have not developed in acute forms in the Tempe-Mesa area simply because it is fortunate enough to have been overlooked during the unplanned, uncontrolled growth period of Valley history.

It may be observed that the Tempe-Mesa area has proven relatively immune to scattered and isolated subdivision development and has grown outward from the urban centers through the development of contiguous tracts -- a sharp contrast with earlier experience in Phoenix. Here, the grid thoroughfare pattern is imminently suitable to serve the elongated zone bounded by the Salt River on the North and proposed Superstition Freeway on the South.

Figure 2
GENERALIZED LAND USE
 1963



TEMPE PLANNING AND ZONING COMMISSION
 VAN CLEVE ASSOCIATES CONSULTING PLANNERS

- LEGEND**
- RESIDENTIAL
 - COMMERCIAL
 - INDUSTRIAL
 - PUBLIC & QUASI - PUBLIC
 - AGRICULTURE
 - UNUSED

By the early 1960's, certain inevitable results of the over-extension of the Phoenix Urban Area in a northerly direction were perceivable: (1) the general wave of northward expansion had ceased, to be followed by a marked selectivity in further extension in that direction; (2) the basic impetus for outward expansion had been overpowered by other forces directed toward development of more central and by-passed areas of the city; and (3) the eastern and southeastern sections of the region were assuming domination of lateral expansion.

Two physiographic features have proven important in establishing the relationship of the eastern sector of the metropolitan region to the remainder of the urban area. One of these is the line of bedrock exposures extending across the Salt River Valley from the Phoenix Mountains to the Salt River Mountains, separating Scottsdale and Tempe from Phoenix. Although the wide opening between Papago Park and Camelback Mountain contributed to circumstances favoring development of the central Scottsdale area during the late 1950's, the rapid growth of the Scottsdale area largely reflects a basic change in the direction of urban growth. The development of South Scottsdale clearly helped to prepare the way for urban expansion to jump the Salt River.

By 1960 it was clearly evident that Tempe and Mesa were destined to receive a substantial share of future metropolitan area growth. Since then, their growth has consistently gathered momentum.

PART IV
MAJOR FACTORS INFLUENCING FUTURE LAND DEVELOPMENT

In the development of every community, certain natural and manmade features exert a general influence over the structure of the city, the direction of growth, and the location, types and physical relationships of urban land uses.

Topographic Features

The Salt River is a basic structural element of the city and has influenced the location of the Tempe Bridge and other river crossings which further influence the city's form and functions. In pioneer days seasonal flows hampered travel in the Valley and the settlement which is now the City of Tempe grew up around Hayden's Ferry. During recent years the river has proven a psychological as well as physical deterrent to the expansion of regional growth into the Tempe-Mesa area. The wide riverbed and occasionally heavy storm flows have created a broad wasteland through the center of the urban area which is unsafe for urban development and unsuitable for non-urban uses other than extraction of sand and gravel. Until such time as storm flows can be confined to a well-defined man-made channel, the Salt River will remain a constant threat to property and the productive use of its floodplain will remain uncertain. The river does, however, facilitate the disposal of surface water from a large part of the Planning Area.

Papago Buttes north of the river have restricted the development of the North Tempe-South Scottsdale section of the metropolitan area. However, their natural form and color contribute significantly to the beauty and character of surrounding lands and they should be preserved in their undeveloped state for recreational use and enjoyment.

Tempe Buttes, on the south bank of Salt River, have influenced the location of streets and highways, river crossings, and irrigation canals. They presently provide sites for the city's water storage facilities and for ASU's football stadium. They will continue to influence flood control measures, the expansion of downtown Tempe, and design of the proposed civic center.

Bell Butte, south of Broadway Road, has been a controlling factor in the location and design of Interstate 10 and its interchanges.

Railroads

The branch line of the Southern Pacific Railroad has strongly influenced the basic structure of the city. It has severely restricted north-south vehicular circulation and, for a time, constituted a psychological as well as physical barrier which deterred residential expansion to the south. It has attracted concentrations of commercial and industrial establishments, which in turn have influenced the development of abutting lands as much as has the railroad itself. The sidings and branches which serve the Hayden Flour Mill and the Arizona Public Service power plant exert little influence on existing or future land development. The extension of existing facilities is unlikely, although their use will tend to increase as new industries locate in the area.

Major Thoroughfares

Apache Boulevard and Mill Avenue are basic structural elements of the city and will continue to influence its development and redevelopment. Federal highways gave rise to tourist travel on these streets and other commercial development throughout their lengths. With completion of Interstate 10 and the proposed Superstition Freeway, the basic function of these thoroughfares will change significantly; however, they will continue to function as major traffic carriers and principal commercial streets in the Tempe-Mesa area.

The proposed Superstition Freeway is already becoming something of a physical barrier influencing the extension of urban growth beyond it to the south as well as affecting the design of street patterns and land uses in adjacent areas. When completed, the Freeway will accommodate much of the through traffic presently using Apache Boulevard, and some of the commercial and industrial traffic using Broadway Road.

Interstate 10, located near the western edge of the Planning Area and connecting with major east-west thoroughfares in the Tempe-Mesa area, will significantly

influence land development both directly and indirectly. It will provide a direct, high-speed traffic route facilitating the regional commuting of workers to and from Tempe industries, and will tend to focus the attention of industrial developers on adjacent lands in West Tempe and the Kyrene District.

Other major thoroughfares, chiefly section-line roads, have influenced land use patterns to some extent and will continue to do so until their future function in an overall transportation plan has been designated. It is anticipated that in the future they will function primarily as traffic carriers, and their development as commercial streets will be de-emphasized.

Arizona State University

The University has been a major factor in the attraction of new residents to Tempe. Its future physical influence on Tempe's development will stem largely from its status as a major land user and its need for expansion room. Continuing campus development will require acquisition and redevelopment of surrounding properties, with important effects on the character and form of the city's core area.

Irrigation Canals and Laterals

Irrigation facilities have influenced the development and use of agricultural lands in the Planning Area and to some extent have affected traffic circulation and the arrangement of streets and other urban land uses. Continued urban growth will demand their placement underground, after which their influence on land development will be negligible.

Airports

Airport facilities and uses adversely influence the development and use of nearby lands for residential purposes. They exert two types of influence: (1) crash hazards affect life and property, both physically and psychologically; and (2) high noise levels affect the health and convenience of nearby residents. Sky Harbor Airport, adjacent to the west city limits and three miles west of downtown Tempe, seriously endangers the health, safety, and welfare of residents of West Tempe and adversely

influences the development, livability, and economic stability of residential property in that part of the city.

In 1964, Sky Harbor Airport was the seventh busiest air facility in the nation, and the Federal Aviation Authority is presently forecasting a 93% increase in domestic passenger service and a 191% increase in international travel by 1980. Higher-power take-offs and slow rates of climb associated with long non-stop flights create the highest noise levels and seriously affect residents of approach zones. Although the industry has long voiced the intention to develop improvements which will reduce these deleterious effects, experience indicates that each new engine development increases horsepower and noise levels, and that improved aerodynamics permitting higher speeds with heavier weights are accompanied by increased noise levels. Sky Harbor Airport will exert a very serious and difficult influence upon the future development and use of land in the area west of Mill Avenue and north of Broadway Road.

Utilities

Water Supply and Distribution

Domestic water supply has not proven a limiting factor in the growth of Tempe, nor is it likely to prove so in view of the presently planned conversion from underground to surface sources. A recent report on water facilities assures the City that supplies are adequate for all foreseeable future needs.^{1/} Fortunately, the city is so situated that distribution to all parts of the planning area is readily possible and will impose no restriction on the location of urban growth.

Sanitary Sewage Disposal

Sewage disposal has not so far proven a limiting factor in local growth; however, extensive improvements to existing systems are presently required to adequately serve the existing urbanized area. The planned Salt River Interceptor, a joint project of

1/ Report on Water Works Facilities, John Carollo Engineers, 1963

Scottsdale, Tempe, Mesa and Phoenix, extends downstream along the Salt River channel to a major treatment plant located west of Phoenix. Many new trunk sewers will be required to serve the area south of Superstition Freeway, and their planning, financing and construction may well cause periodic delays in the development of certain parts of this area. It may ultimately prove desirable to develop separate disposal facilities somewhere in or beyond the southwest portion of the Planning Area to accommodate urban development occurring south of Guadalupe Road. A detailed analysis for the city's sewerage system is included in the Ferguson, Brooks and Kelly report.^{1/}

Availability of Land

The availability of suitable land in the right location, the right amount and at the right price is a critical factor in the development of future land use patterns. While both location and price are of primary importance to residential development, location is usually the principal key to successful commercial and industrial development. To date the availability of land has not impeded the development of Tempe to any considerable extent, nor will it deter future expansion. The Tempe Planning Area contains approximately 17,000 acres of undeveloped land, either idle or in agricultural use, which is physically and economically suited for urban development. In general undeveloped land in the older parts of the city does not exist in suitable locations for such specific uses as civic buildings, hospitals, parks and schools, and the development of new sites for such uses will require assembly and clearance of existing structures. The same conditions prevail in respect to land availability for major commercial and industrial development within the central city area.

1/ Sanitary Sewer Report, Ferguson, Brooks and Kelly, 1963.

PART V
EXISTING LAND USE

The primary purpose of the Tempe Planning Program is to prepare documentary guides and plans for the physical development of the city. The character of physical development, in turn, will largely influence the city's social, economic and cultural progress. Current use of land is the single factor most basic to the preparation of physical development plans, and a thorough knowledge of its classification, distribution and characteristics is critical to the success of the planning process.

A mere inventory of existing land use has little value unless followed by competent analysis of collected data. It is therefore necessary, before commencing the survey, to determine the types of data which will be required for analysis. It is also important to consider all of the ways that this data may be used in other administrative functions of the city and how it should be recorded for most efficient use.

The land use survey is concerned with collecting information which identifies, locates and measures the use of each separate parcel in the study area. Whereas, determining the location and extent of use is a purely mechanical process, the accurate identification of use and recordation of data in a concise, meaningful form is more difficult. Recordation of data pertaining to the numerous urban uses of land requires employment of an exhaustive coding system which classifies land uses in separate and distinct categories according to their functions and distinguishing characteristics.

VATTS Survey

The land use survey used as the basis of this report was conducted during the months of June, July and August of 1963 by the Valley Area Traffic and Transportation Study. The VATTS survey used an elaborate coding and classification system aimed at achieving the following objectives:

1. To collect all land use data needed for transportation and general planning purposes;

2. To provide adequate detail in respect to geographic location;
3. To facilitate use of high-speed data processing systems and equipment; and
4. To develop an economical and efficient system for maintaining currency of data.

Accordingly, land uses were coded, using a four-digit system which produced extensive and detailed data for land use analysis and readily adapts to data processing techniques.

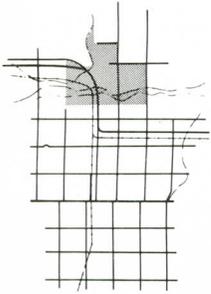
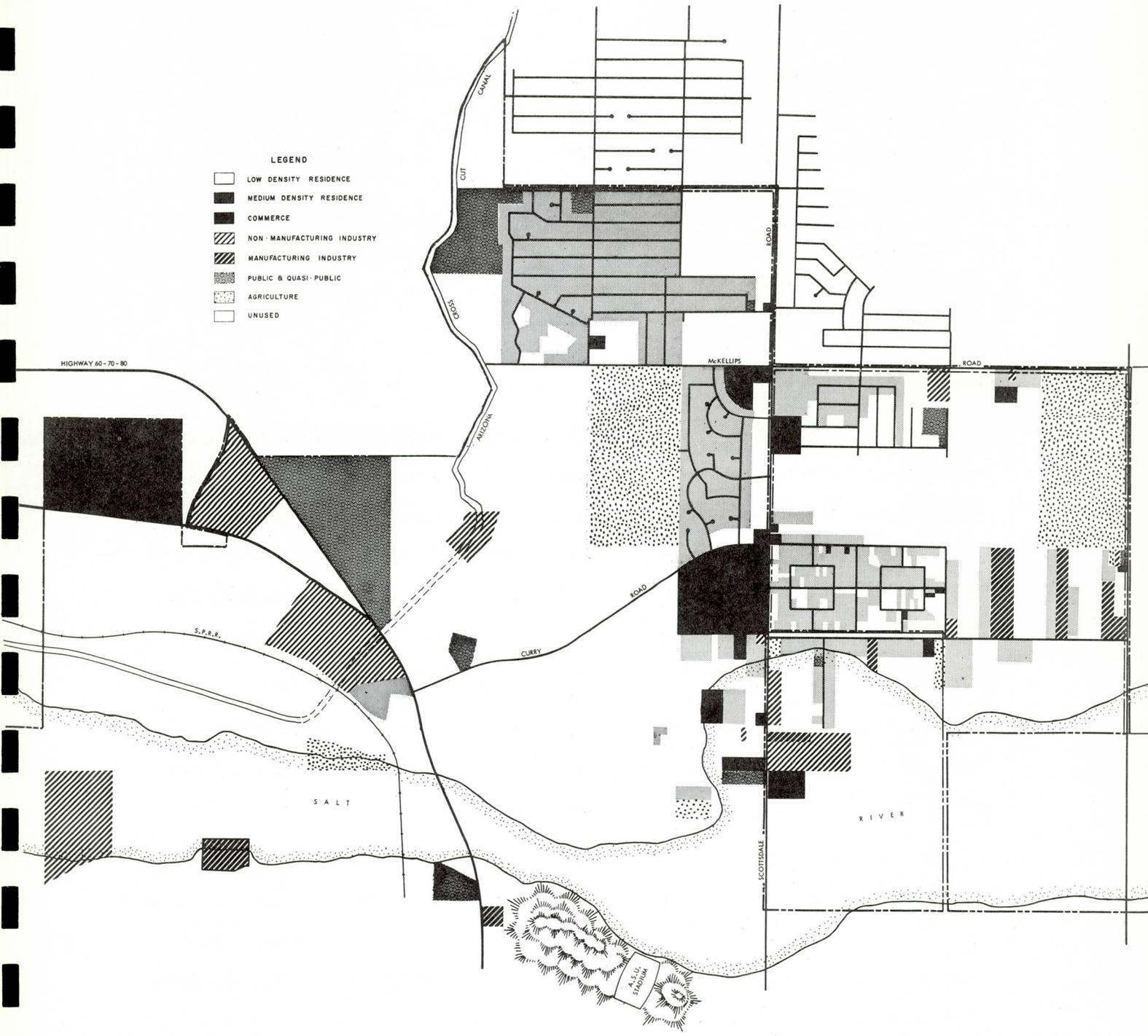
General Arrangement of Land Use

Figure 2, Generalized Land Use, 1963, presents a graphic picture of the extent and arrangement of land use in the Tempe Planning Area. This map presents a broad and simple picture of the general patterns, functions and physical relationships of land use on an area-wide basis and indicates how the use of land has been influenced by such factors as highways, railroads, utilities, flood plains, and airports. Accordingly, the map shows all uses grouped into six basic categories: Residential, Commercial, Industrial, Public and Quasi-Public, Agriculture, and Unused Land.

The size of the Planning Area and the need to present land use in greater detail than can be shown on a single map dictated the division of the Planning Area into nine parts as indicated in Figures 3 through 11.

The original townsite development included residential, commercial, industrial, public and quasi-public uses. Areas along the Southern Pacific Railroad were reserved for industrial uses, which have developed intermittently through the years. Mill Avenue was established as the main business street and Apache Boulevard, the east-west main thoroughfare south of the Salt River, developed as a highway-oriented business street in response to increasing tourist traffic to and from Phoenix. The main center of downtown business has gradually moved south as older commercial buildings deteriorated, and Apache Boulevard frontage has filled in with low-rent commercial and outdoor sales establishments. The Arizona State University campus located in the central city and its expansion over the years has gradually replaced older residences originally situated on its fringe.

- LEGEND**
-  LOW DENSITY RESIDENCE
 -  MEDIUM DENSITY RESIDENCE
 -  COMMERCE
 -  NON-MANUFACTURING INDUSTRY
 -  MANUFACTURING INDUSTRY
 -  PUBLIC & QUASI-PUBLIC
 -  AGRICULTURE
 -  UNUSED



KEY MAP

EXISTING LAND USE - 1963

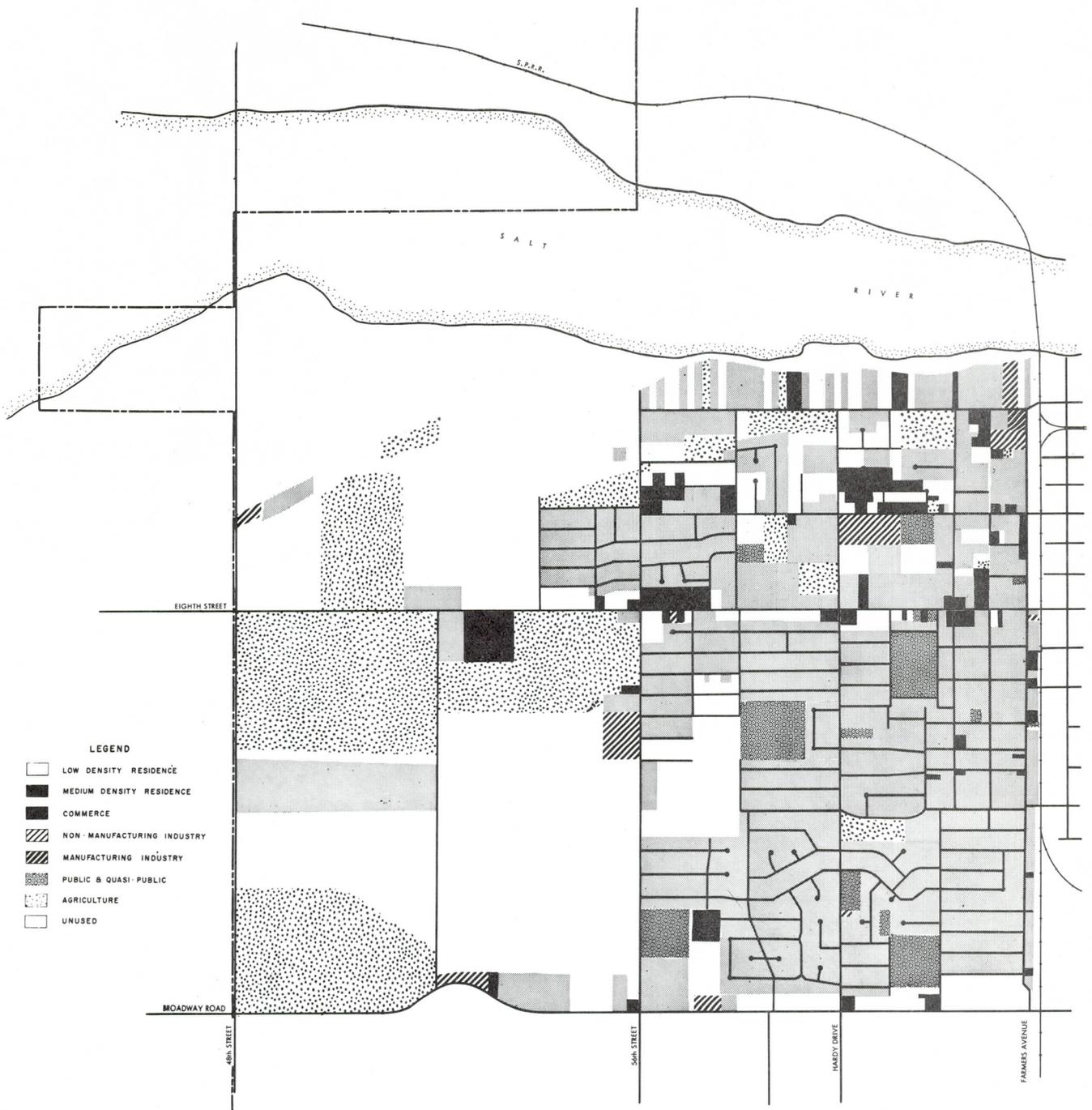
NORTH DIVISION - TEMPE PLANNING AREA



TEMPE PLANNING AND ZONING COMMISSION
 VAN CLEVE ASSOCIATES CONSULTING PLANNERS

The preparation of this map was financially aided through a Federal grant from the Urban Renewal Administration of the Department of Housing and Urban Development under the Urban Planning Assistance Program authorized by Section 701 of the Housing Act of 1954, as amended.

Figure 3



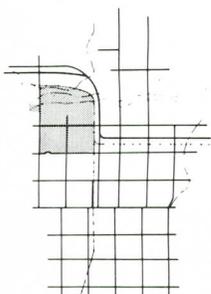
- LEGEND**
- LOW DENSITY RESIDENCE
 - MEDIUM DENSITY RESIDENCE
 - COMMERCE
 - ▨ NON-MANUFACTURING INDUSTRY
 - ▩ MANUFACTURING INDUSTRY
 - ▨ PUBLIC & QUASI-PUBLIC
 - ▨ AGRICULTURE
 - UNUSED

EXISTING LAND USE - 1963

NORTHWEST DIVISION - TEMPE PLANNING AREA



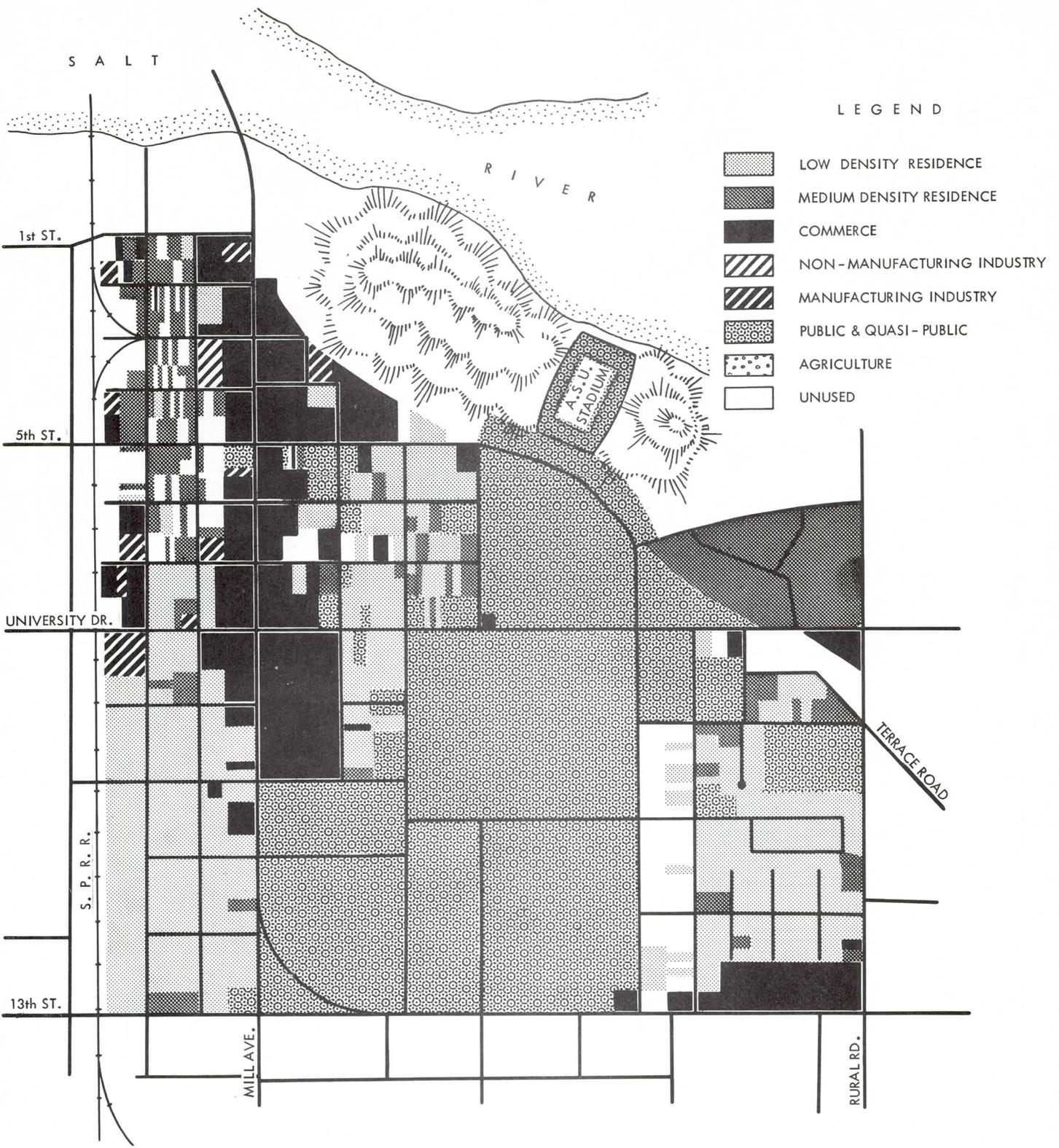
TEMPE PLANNING AND ZONING COMMISSION
VAN CLEEF ASSOCIATES CONSULTING PLANNERS



KEY MAP

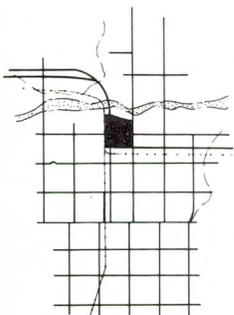
The preparation of this map was financed, in part, through a Federal grant from the Urban Renewal Administration of the Department of Housing and Urban Development under the Urban Planning Assistance Program authorized by Section 701 of the Housing Act of 1954, as amended.

Figure 4



EXISTING LAND USE - 1963

CBD - UNIVERSITY DIVISION - TEMPE PLANNING AREA

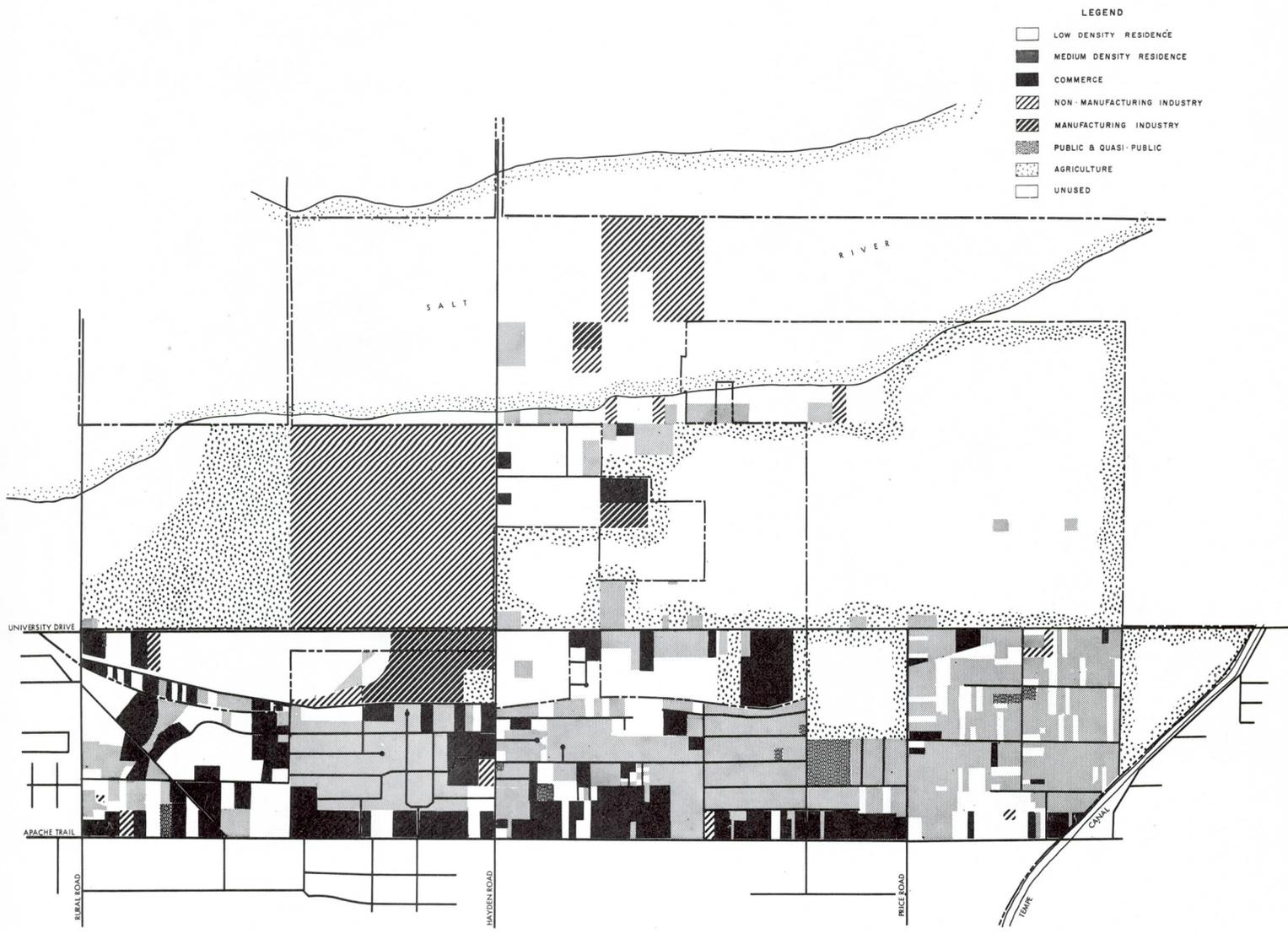


KEY MAP



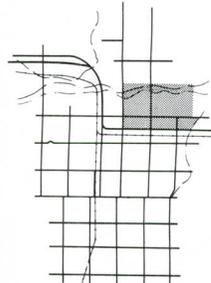
TEMPE PLANNING AND ZONING COMMISSION
VAN CLEVE ASSOCIATES CONSULTING PLANNERS

The preparation of this map was financially aided through a Federal grant from the Urban Renewal Administration of the Department of Housing and Urban Development under the Urban Planning Assistance Program authorized by Section 701 of the Housing Act of 1954, as amended.



EXISTING LAND USE - 1963

NORTHEAST DIVISION - TEMPE PLANNING AREA



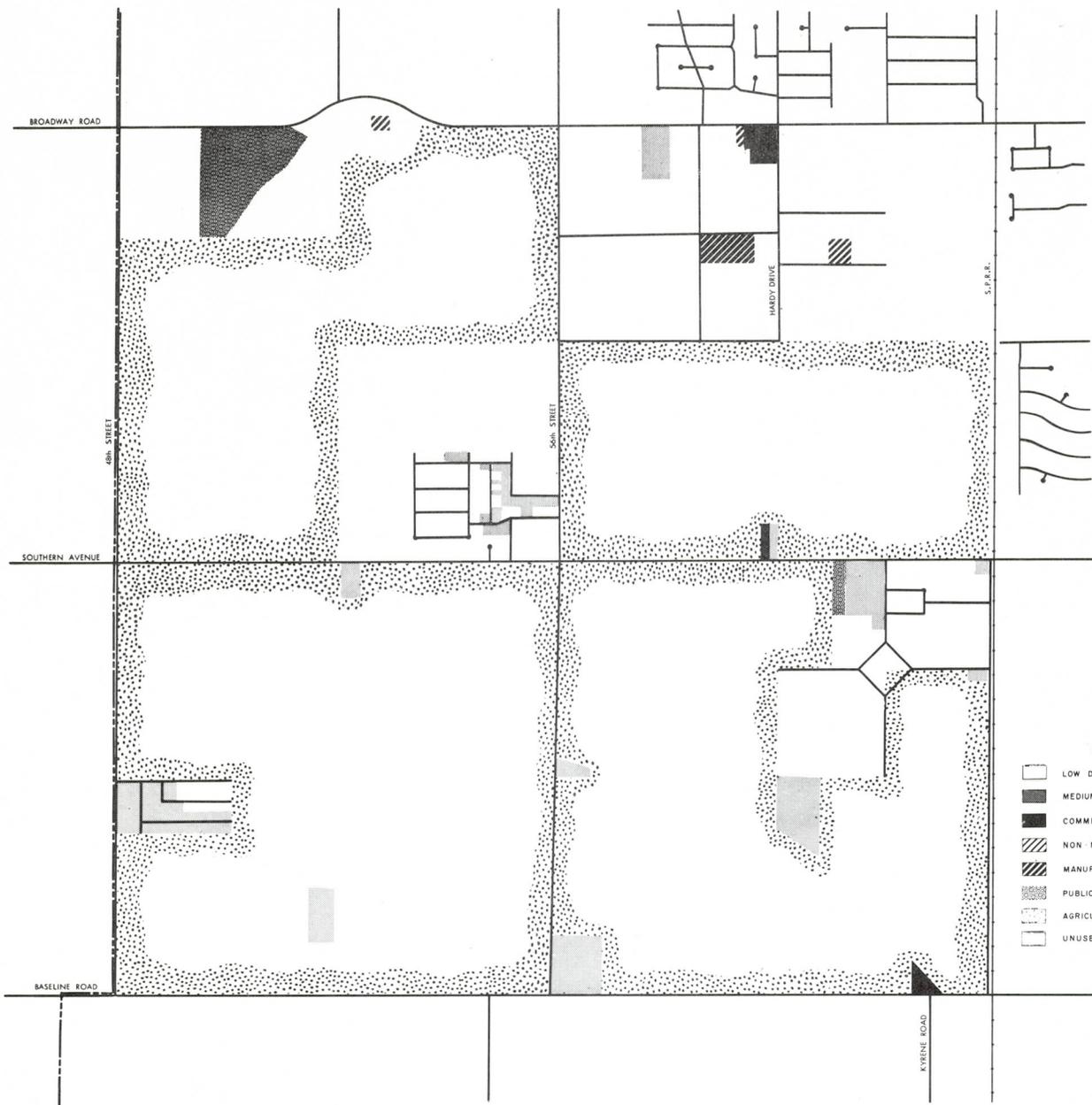
KEY MAP



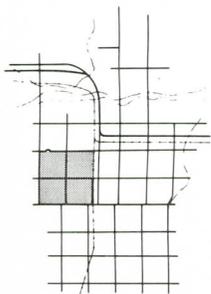
TEMPE PLANNING AND ZONING COMMISSION
VAN CLEVE ASSOCIATES CONSULTING PLANNERS

The preparation of this map was financially aided through a Federal grant from the Urban Renewal Administration of the Department of Housing and Urban Development under the Urban Planning Assistance Program authorized by Section 701 of the Housing Act of 1954, as amended.

Figure 6



- LEGEND
- LOW DENSITY RESIDENCE
 - MEDIUM DENSITY RESIDENCE
 - COMMERCE
 - NON-MANUFACTURING INDUSTRY
 - MANUFACTURING INDUSTRY
 - PUBLIC & QUASI-PUBLIC
 - AGRICULTURE
 - UNUSED



KEY MAP

EXISTING LAND USE - 1963

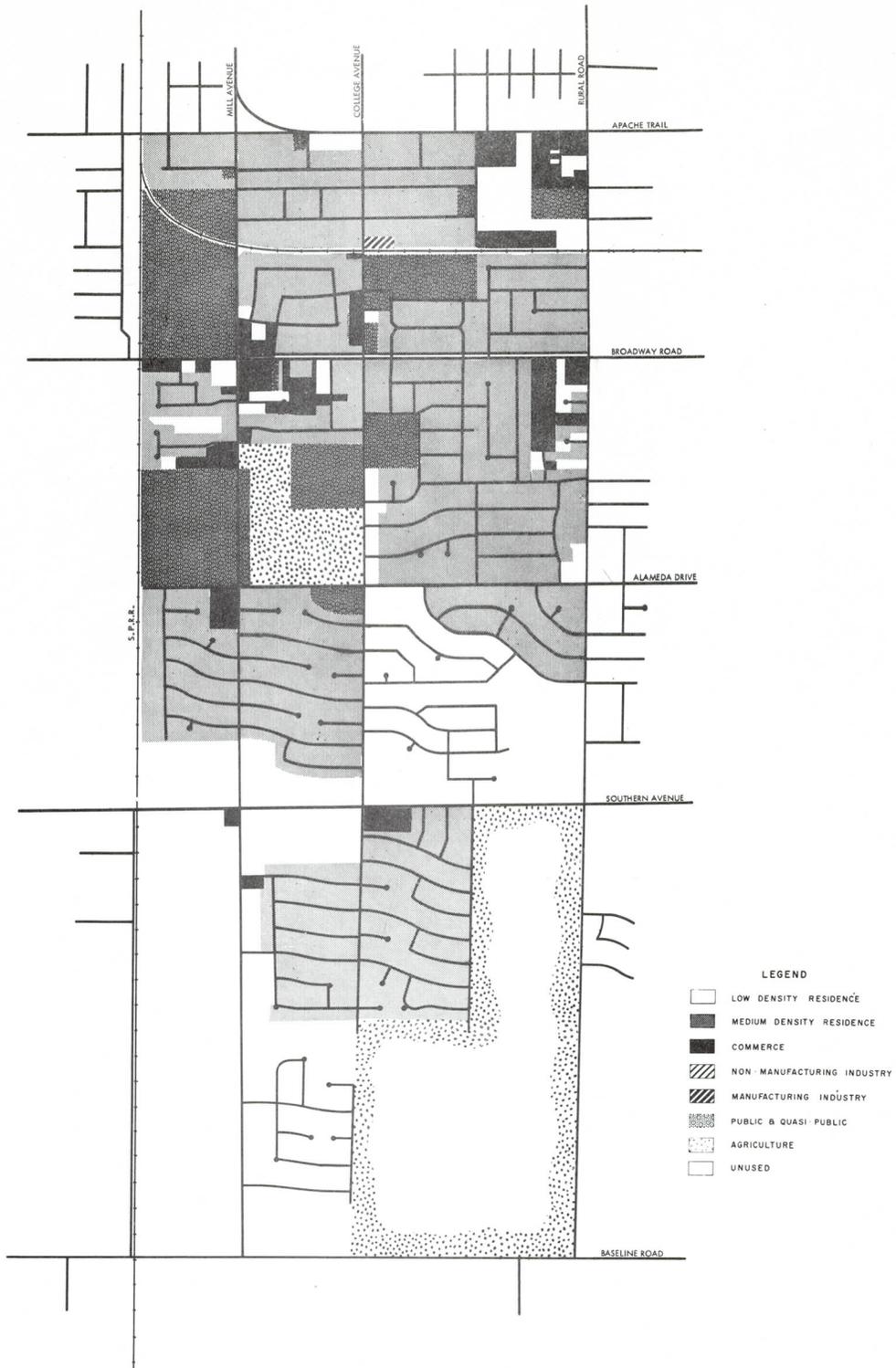
SOUTHWEST DIVISION - TEMPE PLANNING AREA



TEMPE PLANNING AND ZONING COMMISSION
VAN CLEVE ASSOCIATES CONSULTING PLANNERS

The preparation of this map was financially aided through a Federal grant from the Urban Renewal Administration of the Department of Housing and Urban Development under the Urban Planning Assistance Program authorized by Section 701 of the Housing Act of 1954, as amended.

Figure 7



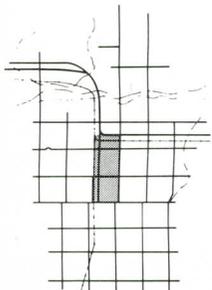
- LEGEND
- LOW DENSITY RESIDENCE
 - MEDIUM DENSITY RESIDENCE
 - COMMERCE
 - ▨ NON-MANUFACTURING INDUSTRY
 - ▩ MANUFACTURING INDUSTRY
 - ▨ PUBLIC & QUASI-PUBLIC
 - ▨ AGRICULTURE
 - UNUSED

EXISTING LAND USE - 1963

SOUTH CENTRAL DIVISION - TEMPE PLANNING AREA



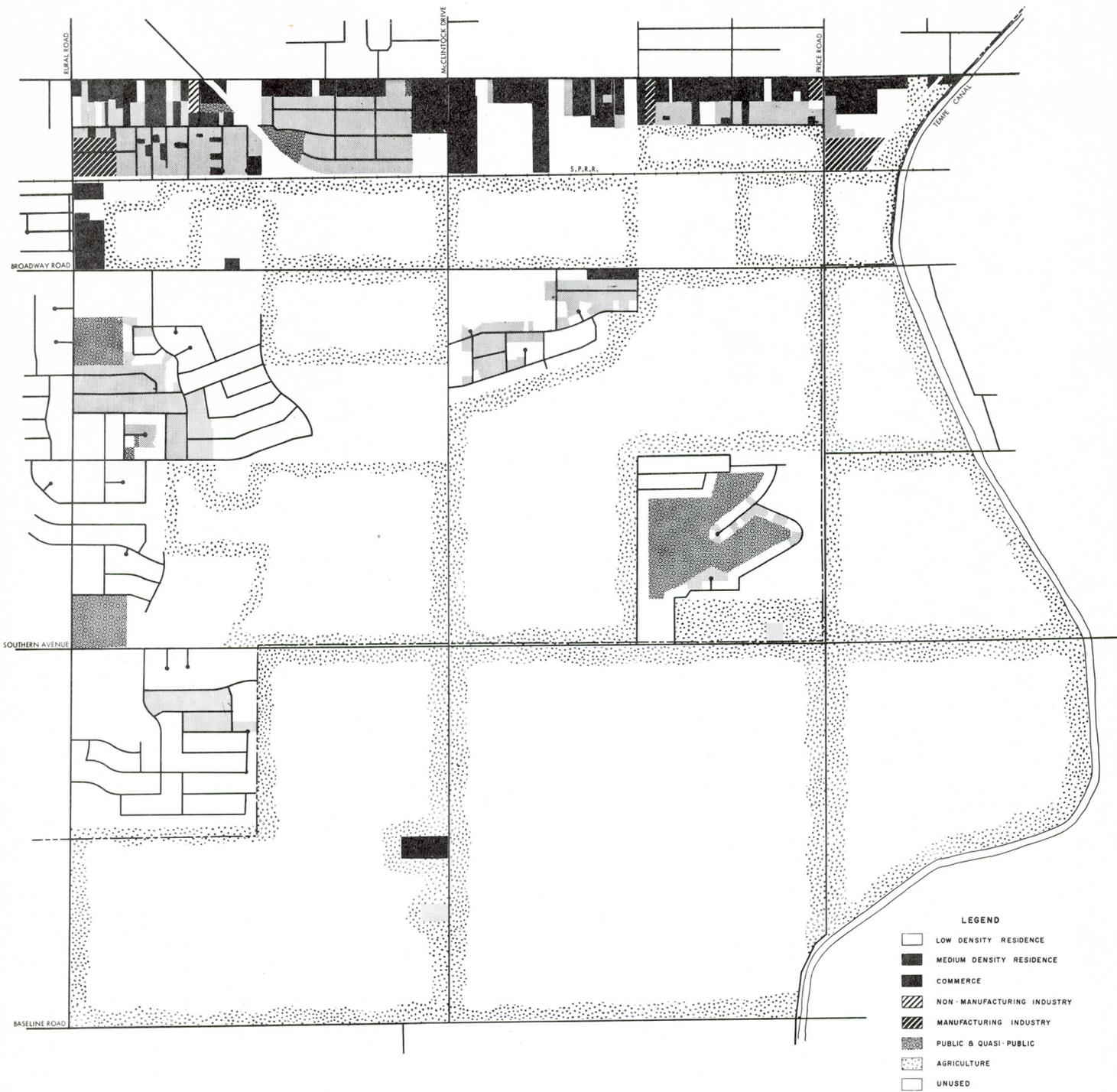
TEMPE PLANNING AND ZONING COMMISSION
VAN CLEVE ASSOCIATES CONSULTING PLANNERS



KEY MAP

The preparation of this map was financially aided through a Federal grant from the Urban Renewal Administration of the Department of Housing and Urban Development under the Urban Planning Assistance Program authorized by Section 701 of the Housing Act of 1954, as amended.

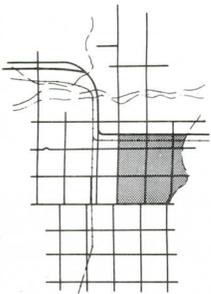
Figure 8



- LEGEND
- LOW DENSITY RESIDENCE
 - MEDIUM DENSITY RESIDENCE
 - COMMERCE
 - ▨ NON-MANUFACTURING INDUSTRY
 - ▩ MANUFACTURING INDUSTRY
 - ▨ PUBLIC & QUASI-PUBLIC
 - ▨ AGRICULTURE
 - UNUSED

EXISTING LAND USE - 1963

SOUTHEAST DIVISION - TEMPE PLANNING AREA



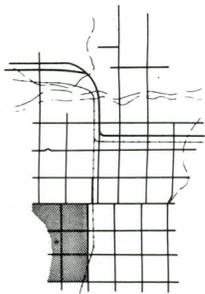
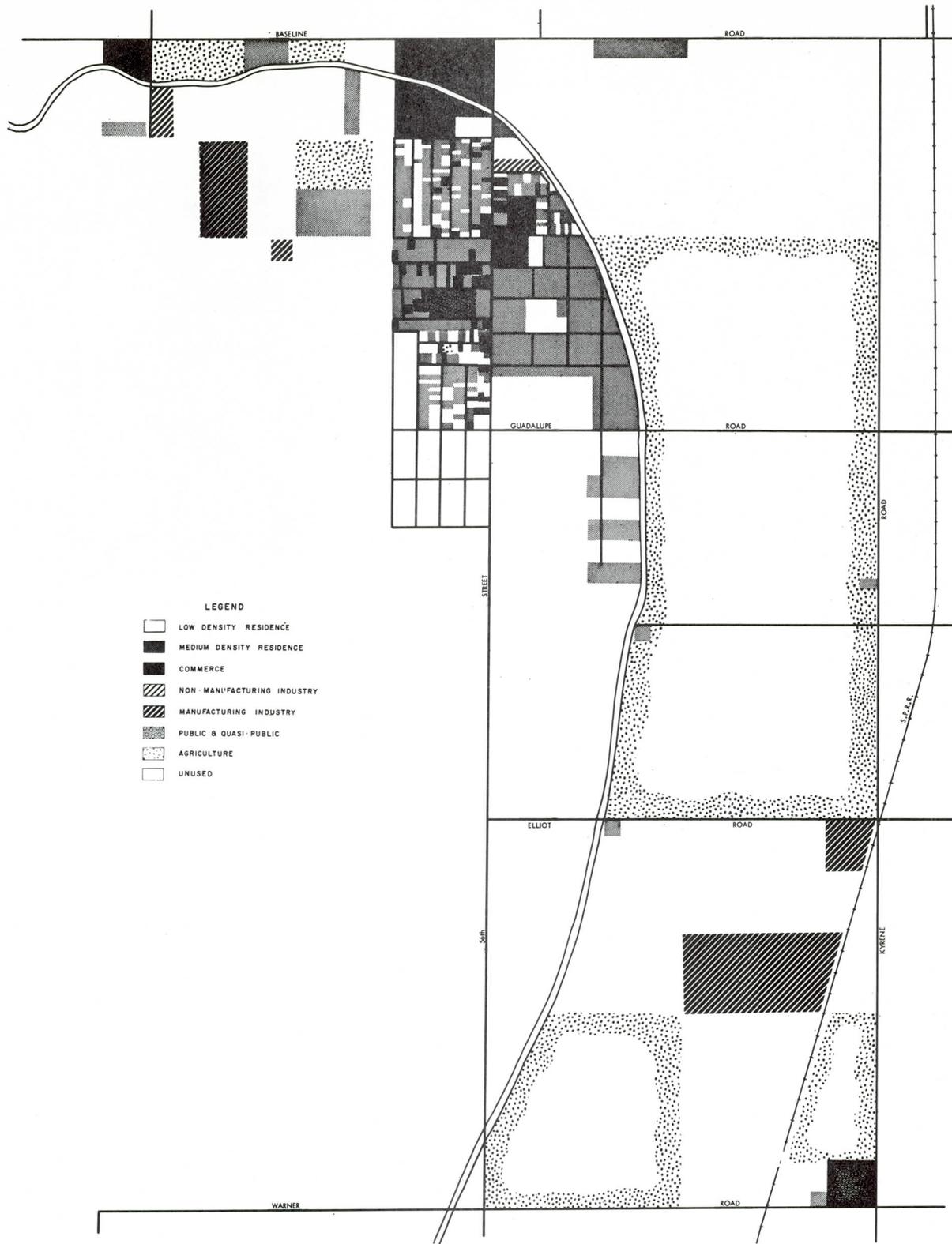
KEY MAP



TEMPE PLANNING AND ZONING COMMISSION
VAN CLEVE ASSOCIATES CONSULTING PLANNERS

The preparation of this map was financially aided through a Federal grant from the Urban Renewal Administration of the Department of Housing and Urban Development under the Urban Planning Assistance Program authorized by Section 701 of the Housing Act of 1954, as amended.

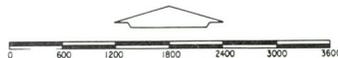
Figure 9



KEY MAP

EXISTING LAND USE - 1963

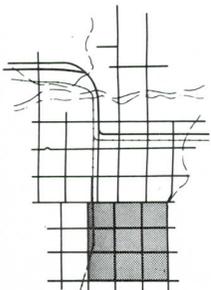
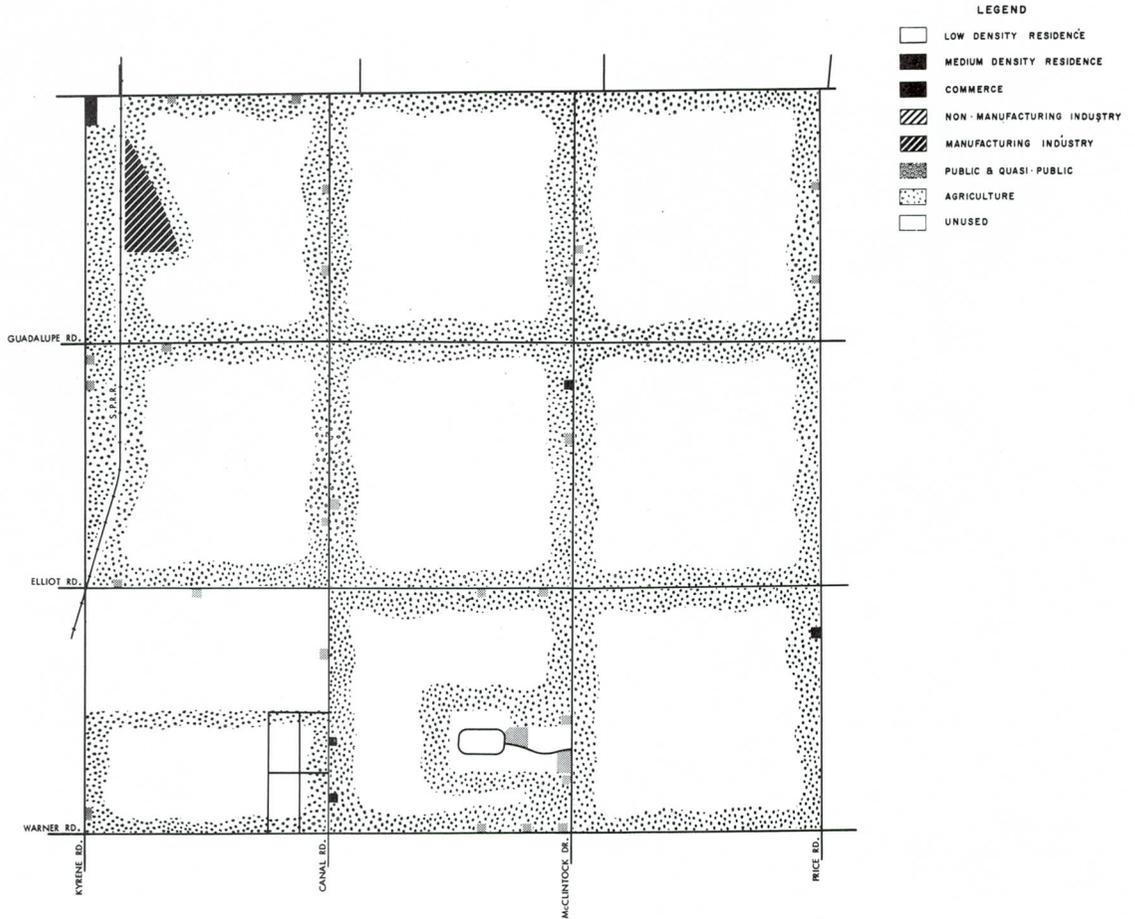
GUADALUPE DIVISION - TEMPE PLANNING AREA



TEMPE PLANNING AND ZONING COMMISSION
VAN CLEVE ASSOCIATES CONSULTING PLANNERS

The preparation of this map was financially aided through a Federal grant from the Urban Renewal Administration of the Department of Housing and Urban Development under the Urban Planning Assistance Program authorized by Section 701 of the Housing Act of 1954, as amended.

Figure 10



KEY MAP

EXISTING LAND USE - 1963

KYRENE DIVISION - TEMPE PLANNING AREA



TEMPE PLANNING AND ZONING COMMISSION
VAN CLEVE ASSOCIATES CONSULTING PLANNERS

The preparation of this map was financially aided through a Federal grant from the Urban Renewal Administration of the Department of Housing and Urban Development under the Urban Planning Assistance Program authorized by Section 701 of the Housing Act of 1954, as amended.

Figure 11

In general, Tempe's residential areas are unusually free of conflicting land uses. Even in the older residential section immediately west of the downtown area, encroachment by business and overflow parking, and conversion of single residences into multi-family or business uses, has not been significant.

All of the land surrounding Tempe south of the Salt River was once in agricultural use. As the city grew, residences took over farmlands, and intermittent small parcels were by-passed, went out of cultivation and now lie vacant and unused. The southeastern part of the Planning Area is still used exclusively for crop production, while the western edge has never been irrigated and remains as idle desert land. Most of the Salt River floodplain presently lies idle awaiting protection from periodic storm flows which have discouraged agriculture as well as urban uses. In 1963, farm land and undeveloped vacant land still comprised nearly three-fourths of the acreage in the Tempe Planning Area.

Major portions of the older city remain in single-family residential use. The area east of the university and north of Apache Boulevard is occupied with a hangover mixture of low-income single residences, new apartments, commercial and industrial uses, and vacant lots; however, it is presently undergoing redevelopment to higher-density multiple housing and other more productive and central land uses. New residential areas south of the railroad are largely single-family with concentrations of townhouses beginning to appear in areas surrounding major street intersections. A concentration of low-density multiple housing is developing in the area north of University Drive and west of the downtown district. For the most part, new residential areas are developing in a contiguous fashion without extensive skip distance between subdivisions. Most of the by-passed vacant parcels comprise land which is zoned and held for future industrial or commercial development.

The central business district contains only a small part of the city's total commercial development. Of necessity, residential growth has fanned out toward the south and west away from the downtown area, rendering the downtown district non-central and unable to compete for convenience shopping trade with more conveniently located and

newer shopping centers. Apache Boulevard's earlier character has deteriorated into a vast jumble of retail and service commercial and outdoor sales lots. Areas nearest the university are gradually being redeveloped to modern, productive service commercial and tourist-oriented uses.

The Hayden Flour Mill, Arizona Public Service power plant and Superlite concrete block plant dominate industrial land uses in the central city area. New light industries are developing in the vicinity of 56th Street and Broadway. Metal processing and fabricating industries are well established along the branch rail line south of Baseline Road where they are surrounded by farmlands.

Public streets and alleys occupy the largest proportion of land in the Public and Quasi-Public category. Otherwise, Arizona State University campus and Papago Park constitute the major public uses of land in the Planning Area. Other public and quasi-public uses, chiefly schools and churches, are generally scattered throughout the developed area.

Composition of Land Use

Figure 12 presents a tabulation of existing land use data extracted from the VATTs survey data. In 1963, only one-third of the land in the Tempe Planning Area was developed to urban uses and there was an agricultural and unused land reserve amounting to nearly 17,000 acres. However, the assessed valuation of agricultural and unused land amounted to only 8% of the total for the Planning Area.

Residential Land Use

Residential land use has been classified in four major categories: single-family, two-family, multi-family and mobile homes. Although originally coded as residential uses, motels, hotels and resorts are herein considered as commercial uses.

According to the VATTs survey, the 9,505 dwelling units enumerated in the Tempe Planning Area occupied some 2,945 acres and had an assessed valuation of \$20.8 million (68% of total assessed valuation). Of the total developed residential land, 94% was occupied by single-family dwellings, 2% by duplexes, and 4.0% by

Figure 12
EXISTING LAND USE DATA, 1963
 Tempe Planning Area

Land Use	Land		Buildings		Assessed Valuation			% of Tot. Category
	Acreage	% of Tot. Category	Floor Sp (sf)	No.	Land	Improvements	Total	
Residential	2,945	34.2	n.a.		\$1,290,980	\$19,464,912	\$20,755,892	74.1
Single-Family	2,757	93.6			1,201,425	17,051,422	18,252,847	87.9
Two-Family	54	1.8			32,280	618,085	650,365	3.1
Multi-Family	127	4.3			55,950	1,791,275	1,847,225	8.9
Mobile Home	7	0.2			1,325	4,130	4,130	0.3
Commercial	660	7.7	1,217,870	559	291,055	\$ 2,473,688	\$ 2,764,743	9.9
Retail	183	27.7	735,023	229	146,365	875,146	1,021,511	36.9
Service	357	54.1	132,555	188	62,930	709,162	772,092	27.9
Office	49	7.4	259,941	72	45,500	436,625	482,125	17.4
Motel, Hotel	71	10.7	90,351	70	36,260	452,755	489,015	17.4
Industrial	1,746	20.3	966,763	119	115,725	1,354,455	1,470,180	5.2
Wholesale	44	2.5	66,349	11	8,230	60,765	68,995	4.7
Extractive	108	6.2	8,402	—	695	—	695	0.5
Manufacturing	383	21.9	752,887	53	46,200	885,145	931,345	63.3
Non-Mfg.	150	8.6	89,873	25	15,945	59,015	74,960	5.1
Transp. Com & Ut	1,061	60.8	49,252	27	44,655	349,530	394,185	26.8
Public & Quasi-Public	3,241	37.6	—	—	78,655	2,927,054	3,005,709	10.7
Streets & Alleys	2,584	79.7	—	—	—	—	—	—
Other Public	316	9.8	—	—	45,890	2,564,924	2,610,814	86.8
Quasi-Public	341	10.5	10,712	68	32,765	362,130	394,895	13.2
Total Developed Land	8,592	33.6	—		1,776,415	26,220,109	\$27,996,524	92.0
Agricultural	12,589	74.1	n.a.		959,790	336,805	1,296,595	53.4
Unused	4,398	25.9			619,340	619,340	1,130,200	46.6
Total Undeveloped Land	16,987	66.4	—		1,470,650	956,145	2,426,795	8.0
Totals	25,598	100.0	—		7,176,254	\$27,176,254	\$30,423,319	

Note: Percentage totals may not check due to rounding.
 Source: Valley Area Traffic & Transportation Study, Preliminary Statistics

multi-family dwellings. Only seven acres were devoted to mobile home parks.

Commercial Land Use

Commercial land use is classified in four major categories: retail sales, services, business and professional offices, and hotels, motels and resorts. For purposes of this analysis, wholesale facilities were considered as non-manufacturing industrial uses due to their employment and operational characteristics. Retail sales commercial includes establishments selling such commodities as food, apparel and accessories, furniture, home furnishings and appliances, vehicles, boats and aircraft, eating and drinking establishments, gasoline service stations, general merchandise, building materials and hardware, miscellaneous retail goods, farm and garden supplies. Service commercial comprises personal services, repair and rental services, and amusement and recreation facilities. Business and Professional offices include finance, insurance, real estate, banking, medical and dental offices, clinics and laboratories, and professional offices.

At the time of the VATTS survey, commercial establishments in the Tempe Planning Area occupied approximately 660 acres, 7.7% of the total developed area. Commercial sites averaged 1.3 acres and buildings averaged 1,100 square feet. The total assessed valuation of all commercial uses was \$2,764,743 (9% of the total assessed valuation).

The 231 retail sales establishments utilized 183 acres and 735,023 square feet of floor space. They accounted for 46% of commercial establishments, 28% of total commercial land use and 37% of commercial assessed valuations.

Service establishments occupied 357 acres and 132,555 square feet of floor space. They accounted for 54% of commercial land acreage and 28% of commercial assessed valuation.

Business and professional offices occupied only 7.4% of commercial land area but accounted for 17.5% of commercial assessed valuation.

Industrial Land Use

Industrial land use is classified in five categories: wholesale, extractive, manufacturing, non-manufacturing industry and services, and transportation, communications and utilities. Wholesale establishments include storage and wholesale activities, but exclude those storage and warehousing facilities normally associated with freight transportation terminals. Manufacturing industries include those engaged in processing, fabrication or assembly of a product or parts of a product. Non-manufacturing industries include such facilities as offices, work and storage areas of general and special trade contractors, junk yards and other material storage. Transportation, communication and utilities establishments include such facilities as railroad terminals, airports, truck terminals, communication facilities and their rights-of-way, electrical power and gas generating, transfer and distribution facilities and their rights-of-way, water supply, storage, treatment and distribution facilities, sewage and refuse disposal facilities, etc.

Industrial uses in 1963 occupied 1,746 acres, or 20% of the total developed area; however, they accounted for only 5% of total assessed valuation. Transportation, communication and utilities uses accounted for 61% of the industrial land area, but only 26% of total industrial assessed valuation. Manufacturing plants, representing 22% of industrial land area, accounted for 63% of industrial assessed valuations.

Public and Quasi-Public Land Use

Public uses include buildings and land occupied by federal, state, county and city governments, publicly-owned educational and other institutions, cultural centers, parks and recreation areas. Quasi-public uses include such facilities as churches and other religious institutions, hospitals, and civic, social, fraternal and other non-profit organizations and facilities.

Public land uses accounted for 34% of all developed land in the Tempe Planning Area, 89% of which was devoted to streets and alleys. The greatest proportion of the remaining public land was occupied by Arizona State University and Papago Park. Quasi-public uses occupied less than one percent of total developed land.

PART VI

DEVELOPMENT TRENDS AND FUTURE URBAN LAND REQUIREMENTS

In a rapidly growing urban community, one of the chief purposes of planning research and study is to determine why, how and where past growth has occurred. Armed with this knowledge, existing conditions can be analyzed to determine what is good, what is bad, and what has been inevitable. It can be determined whether a good balance of land uses has been developed in an orderly fashion, and whether future development patterned after past practice is likely to preserve, or create, a sound tax base and a progressive local economy. Then, and not until then, can comprehensive land use planning commence.

With studies of Tempe's population and economy completed and existing land use information at hand, we are ready to investigate the relationship between these very basic determinants of future urban growth and development. The relationship between developed land and population, expressed in terms of developed acres per 100 persons, is basic to many decisions regarding the desired future balance of land uses. It is also basic to preliminary projections of the geographic location and general extent of future urban growth in increments corresponding to population projection years. Such physical growth projections are important in providing municipal government and policy-makers the guidance required to assure adequate public facilities and services at any given future population level.

Based on 1963 land use data collected by the VATTS survey and an assumed 1963 population level of 37,500, Figure 13 shows the relationship between developed land in each basic land use category and the total population of the Tempe Planning Area.

Relative normality or abnormality of local land use ratios can be judged only through comparison with other communities whose general development character is known. During the period 1958 - 1961, Maricopa County Planning Department and the Advance Planning Task Force surveyed and analyzed existing land use and population of the

cities of Phoenix,^{1/} Mesa,^{2/} Scottsdale^{3/} and Chandler,^{4/} and the Phoenix Urban area^{1/}.

Figure 13
RATIO OF EXISTING LAND USE TO POPULATION - 1963

Tempe Planning Area

Land Use	Developed Acres	Developed Acres per 100 Persons
Residential	2,945	7.86
Commercial	660	1.57
Industrial	1,746	4.65
Public & Quasi-Public	3,241	8.65
Totals	8,592	22.73

Although the survey techniques and land use classification systems used in these studies were markedly different from that of the more recent VATTs survey, the processes are considered sufficiently similar to produce data suitable for purposes of comparison. Figure 14 shows comparative ratios of existing land use to population for Tempe, the aforementioned urban areas, and for eight other cities under 250,000^{5/}.

Studying the comparative ratios shown in Figure 14, it is immediately seen that Tempe's land use ratio in nearly all categories is appreciably higher than that of any

1/ Phoenix-Maricopa County Advance Planning Task Force, Land Use of the Phoenix Urban Area, 1959.

2/ Maricopa County Planning Department, Part 1, Comprehensive Plan for Mesa, Arizona, 1961

3/ Maricopa County Planning Department, Chapter 1, Comprehensive Plan for Scottsdale, Arizona, 1960.

4/ Maricopa County Planning Department, Part One, A Comprehensive Plan for Chandler, Arizona, 1961

5/ The Rand Corporation, Recent Land Use Trends in 48 Large American Cities, 1963

Figure 14

COMPARATIVE RATIOS OF EXISTING LAND USE TO POPULATION

Tempe and Selected Entities

City	Residential	Commercial	Industrial	Public & Quasi-Public	Totals
Tempe (1963) ^{1/} Pop: 37,500	7.86	1.57	4.65	8.65	22.73
Mesa (1961) ^{2/} 1960 Pop: 33,772	5.19	0.66	0.46	5.14	11.45
Scottsdale (1960) ^{3/} Pop: 32,700	10.90	1.28	0.41	6.04	18.67
Chandler (1960) ^{4/} Pop: 9,531	3.97	0.77	0.48	5.75	10.97
Phoenix (1958) ^{5/} Pop: 242,260	4.74	0.55	0.51	4.09	9.89
Phoenix Urban Area (1958) ^{1/} Pop: 397,836	6.05	0.54	0.75	4.40	11.74
8 Other Cities ^{6/} Under 250,000 Population	3.19	0.39	0.68	2.84	7.10

- Sources: 1/ Valley Area Traffic & Transportation Study, Preliminary Land Use Data, 1963
2/ Maricopa County Planning Department, Part I, Comprehensive Plan for Mesa, Arizona, 1961.
3/ Maricopa County Planning Department, Chapter 1, Comprehensive Plan for Scottsdale, Arizona, 1960.
4/ Maricopa County Planning Department, Part One, A Comprehensive Plan for Chandler, Arizona, 1961.
5/ Phoenix-Maricopa County Advance Planning Task Force, Land Use of the Phoenix Urban Area, 1959.
6/ The Rand Corporation, Recent Land Use Trends in 48 Large American Cities, 1963.

other urban area listed. It is also immediately concluded that these ratios do not present an accurate picture of Tempe's land use. In exploring the reason for this inaccuracy it was discovered that some of the VATTS data for the Tempe Planning Area is badly distorted by reason of methodology and faulty judgment of survey personnel. Quantitative distortions are particularly serious in residential and commercial categories. It is our considered opinion that Tempe's present ratio of residential land use is actually in the neighborhood of 5 to 6 acres per 100 persons, and that commercial acreage presently amounts to about 1.0 acres per 100 persons.

Foregoing qualifications notwithstanding, Tempe's commercial land use is seriously scattered, particularly in areas along Apache Boulevard, where many commercial sites are only partially developed or used. Whereas the same conclusions pertain to Tempe's industrial development, it should be recognized that in the aggregate, the Arizona Public Service power plant, Salt River Project installations, Superlite concrete block plant, railroad rights-of-way and the metal products manufacturing plants occupy an abnormally large land area in relation to the Planning Area's current population.

Arizona State University landholdings and the extensive area known as Papago Park are clearly responsible for the abnormally large ratio of land in public and quasi-public use.

Future Land Use/Population Ratios

Figure 15 represents an attempt not only to project land use trends to 1985 in terms of acreage/population ratios, but also to: (1) establish a more economic balance between land uses; and (2) determine the general amounts of land needed for specific purposes by the future population.

Planning Report No. 2, Housing and Residential Environment, projected a reduced proportion of single-family housing units in the total 1985 housing supply and increased proportions of two-family and multi-family units. Changes in the overall composition of Tempe's housing will result in a gradual reduction of the residential acreage-to-population ratio. At 6.0 acres per 100 persons, residential development will occupy nearly 9,500 acres, or 44% of total developed land, by 1985.

Figure 15

PROJECTED RATIOS OF LAND USE TO POPULATION

Tempe Planning Area

Developed Acres per 100 persons								
Land Use	1963 (Pop: 37,500)		1970 (Pop: 67,880)		1980 (Pop: 126,195)		1985 (Pop: 157,485)	
	Ratio	Acreg.	Ratio	Acreg.	Ratio	Acreg.	Ratio	Acreg.
Residential	7.86	2,945	7.3	4,955	6.4	8071	6.0	9,450
Commercial	1.57	660	1.2	815	0.9	1,136	0.8	1,260
Industrial	4.65	1,746	3.0	2,036	1.9	2,398	1.7	2,677
Public & Quasi-Public	8.65	3,241	7.5	5,091	5.9	7,446	5.0	7,874
Totals	22.73	8,592	19.2	12,898	15.1	19,046	13.5	21,262
Percent of Planning Area		33.6		50.4		74.5		83.1

Source:

1963 acreage totals from preliminary data, VATTS Land Use Survey;
 1963 ratios based on an assumed population of 37,500 at time of VATTs survey;
 1970, 1980 & 1985 ratios and acreages developed on basis of selected
 population projections, Report No. 1, Population, Van Cleve Associates.

The commercial land use-to-population ratio is expected to drop only slightly by 1985, based on many factors, including the following:

1. It is unlikely that the percentage of total commercial development represented by central commercial will ever reach the "norm" for neighboring suburban and free-standing cities.
2. The average land area per commercial establishment will be reduced somewhat by gradual re-arrangement into more organized complexes making multiple and joint use of off-street parking space.
3. Rising land values will demand more efficient use of commercial land.

The ratio of industrial land use is considerably higher than that in comparable communities, reflecting the following conditions:

1. An unusual proportion of industrial land in the Planning Area is occupied by facilities and rights-of-way in the category of transportation, communications and utilities. Railroads, electric power plants and their transmission systems, and the Salt River Project's system of irrigation canals, account for over 1,000 acres and more than 60% of total industrial land. No substantial expansion of these particular facilities is anticipated in the future, with the result that their influence on the balance of land use will consistently decline as other industrial uses develop.
2. Several of the larger industrial land users have very extensive outdoor storage and shipping areas.
3. Several industrial concerns are holding vacant land for future expansion, and the VATTs methodology counted such reserve land in the same parcel as a part of the industrial site. (Hence, not all of the industrial land was actually developed or used.)

Industrial land use trends indicate that future industrial land use/population ratios will be considerably lower than in 1963 for reasons including the following:

1. Land costs will make it increasingly prohibitive to hold extensive acreages against the possibility of future expansion, or for speculation.

2. Industrial establishments involving large storage areas will tend to locate in lower-priced-land areas or will intensify their use of land.
3. The continuing trend toward organized industrial parks, multiple use and condominium-type ownership of industrial buildings will increase the efficiency of industrial land use.
4. Science-oriented industries making more intensive use of land will comprise an increasing ratio of incoming industry.

The ratio of public and quasi-public land use will decline appreciably as the population "grows up" to the existing supply of university and Papago Park land, the two uses causing Tempe's ratio to exceed that of other cities. Whereas, the ratio of developed land devoted to streets and alleys (37% of all developed land) is appreciably higher than in other cities, this abnormality merely reflects the higher ratios in other major categories of land use. As the total acreage-per-100-persons drops, the ratio of streets and alleys will drop.

Such factors as topography, land price and legal entanglements commonly cause the continued existence of undeveloped land within the urban community. Although flood control measures will eventually reduce the waste land along the Salt River, the river and other topographic features will still render some of the land in the Planning Area permanently unusable. It is also inevitable that large land areas will be by-passed and remain undeveloped for a long time, despite development controls intended to prevent this condition. Hence, it is estimated that as much as 10% of all land within the urban perimeter may always remain undeveloped.

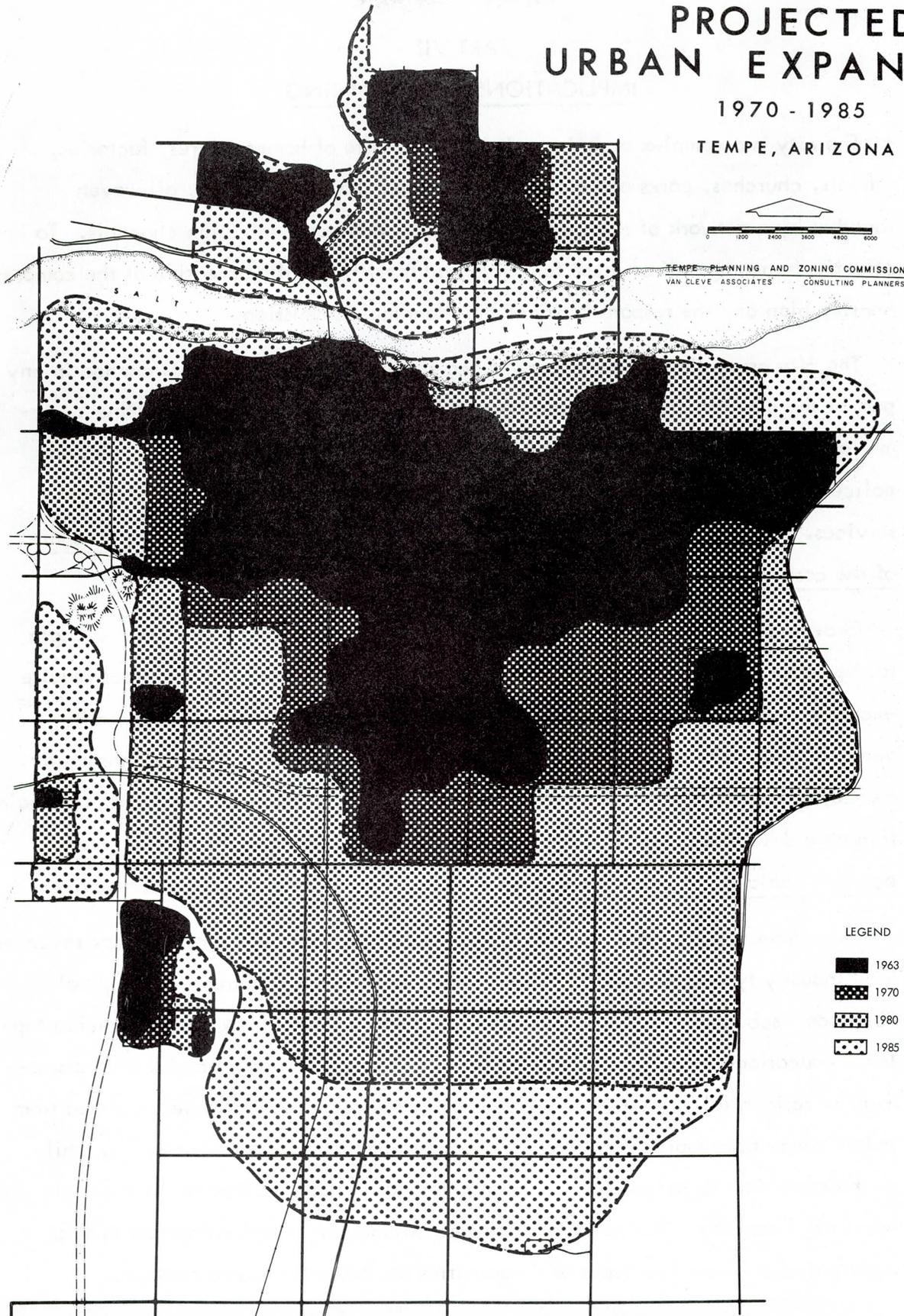
Figure 15 predicts that by 1985 as much as 83% of the Tempe Planning Area may be developed to urban uses. This means that virtually all of the Planning Area will be included within the urban perimeter. Based on the foregoing projections and assumptions, Figure 16 indicates the general limits of urban expansion as projected for the years 1970, 1980 and 1985.

Figure 16

PROJECTED URBAN EXPANSION

1970 - 1985

TEMPE, ARIZONA



The preparation of this map was financially aided through a Federal grant from the Urban Renewal Administration of the Department of Housing and Urban Development under the Urban Planning Assistance Program authorized by Section 701 of the Housing Act of 1954, as amended.

PART VII
IMPLICATIONS FOR PLANNING

The city is a complex organism. It is a composite of homes, stores, factories, schools, churches, parks and a multitude of other special facilities, all woven together by a network of transportation, utility, and communication channels. To effectively arrange all of these functions and facilities is the objective of the comprehensive plan and the responsibility of the Planning Commission.

The city grows through development and redevelopment of land. A change in any part of the city affects other parts. A new home means more traffic, another customer at the supermarket, more children in school. It requires expansion of fire and police protection and extension of water, power, sanitation and communication services. But it may not mean a sufficient increase in tax revenues to pay its share of the cost of expanded public facilities and services.

Growth does not automatically bring increased prosperity and economic strength to the community. Improper location or premature development of land uses require excessive expenditure of public funds to provide necessary services, and usually deter the orderly filling-in of partially-developed areas within the urban perimeter. Hence, growth presents a challenge to the community in terms of developing and maintaining a desirable balance of land use and resources. Achievement of an overall economic balance of urban land use is a top goal of every progressive community.

Residences require more services than their tax contributions support. Tax revenues from industry typically support more services than industry requires. The typical "bedroom" suburb, being largely residential, lacks sufficient tax base to provide top-level educational and other public facilities and services without prohibitive assessment of residential properties. The city whose tax revenues are largely derived from industry may have more funds than its public facilities and services require, while at the same time its preponderance of industry deters the development of desirable residential amenity. The need for economic balance of land development is most apparent when these two types of communities are adjacent to one another.

Unfortunately, guides to planning and developing an economic balance of land use are very general and philosophical. The specific conditions contributing to economic balance and the pattern of steps required to achieve it differ widely between communities. Hence, the achievement of this goal requires that development policy decisions be based on constant surveillance of trends and careful analysis of changing conditions. It usually involves the city in a long, continuing process of trial and error.

In many respects, the process of achieving economic balance is mindful of the "square search" technique employed in air-sea rescue operations, wherein the general location of the distress call and the direction of flight to its general vicinity are known. When the rescue plane arrives in the search area it begins to fly a pattern of expanding squares until the craft is sighted.

Three aspects of urban land development contribute to the achievement of economic balance of land use, and are otherwise critical to present and future social, cultural and economic environment:

1. The areal extent of each basic category of land use, i.e., the quantitative division of land among the several urban uses.
2. The geographic location in which the various types of land uses occur, including the physical relationships between land uses.
3. The characteristics of individual land uses — spatial, esthetic, functional and cultural.

The total amount of land devoted to the various basic categories of land use is perhaps the most commonly used guidepost to economic balance. Areal extent may be expressed in terms of the percentage of total developed land occupied by a specific type of use, or expressed as a ratio of total developed land to total population. In pursuit of economic balance, the desired ratio of land use to population is most valuable as a long-range target toward which development can be directed.

The characteristics of individual land uses is an especially important consideration in establishing practical acreage-to-population ratios, and one of the most

important of these characteristics is economic. If the proposed land use is a heavy water-user, can it be located where sufficient water is readily available or must its needs be provided through development of new supplies and construction of new distribution facilities? Does the proposed land use require rail transportation or involve heavy truck traffic, requiring easy access to major highways and thoroughfares? Would the proposed industry provide employment opportunity for the local labor force, or will many of its employees become local residents? Will the proposed development make an intensive use of land by employing a large number of workers per site acre, or is it an extensive use having a low employment density? Will the proposed complex be attractive to families with children and cause an overloading of existing school and recreation facilities? Will the development involve high capital investment in real property and improvements or will it make its major investment in personal property? Will tax assessments support or exceed the cost of the public services it will require?

Spatial and esthetic characteristics of individual land uses are especially important in selection of location and site. Will the proposed land use provide sufficient open space to insulate it from conflicts with neighboring land uses? Is its physical and esthetic character compatible with that of residential development? Is it compatible in physical and functional character with commercial development?

The answers to most of the foregoing questions will point to the proper location and physical relationship between land uses. The location must be such that each land use fits into, or at least does not suffer from, its new environment. In the final analysis, extent influences location, and location influences extent. Characteristics influence location and extent influences characteristics.

Continuing Land Use Analysis

A periodic inventory and analysis of land use should be conducted by the City just as a well-administered business periodically inventories its stock and evaluates its financial position. This report has been chiefly concerned with analysis of land use as it existed at one point in time, 1963. The data obtained from VATTS data

has not so far proven wholly adequate for general planning purposes, and rapid growth has already rendered some of it out-of-date. The Tempe Planning Department should work closely with the VATTs staff toward improvement of techniques and periodic up-dating of the land use and related information required to keep abreast of development. Comprehensive analyses of land use, if carried out on a periodic basis, will become progressively easier and produce more meaningful data than can be expected of a single analysis. Ultimately, comparison of data collected at progressive stages of urban development will reveal a growth pattern and direction which is provable and, when correlated with tax revenues and other economic data, will permit more definitive conclusions.

Land Development and Use Controls

Zoning furnishes the principal means of controlling the location and areal extent of proposed land uses and their spatial and functional relationships to adjoining uses. Zoning also provides some measure of design control. The chief value of subdivision regulations, as a land development control, is in the arrangement of proposed land uses. A building code, particularly in its requirements pertaining to water supply and sewage disposal, also effects a measure of control over the location of land uses.

The foregoing standard implements can be extremely effective when developed with full understanding of the long-term objectives of the community, up-dated as often and as extensively as needed, and enforced with firmness. Nevertheless, the municipal kit of tools is still incomplete. Additional types of standards, policies and controls are needed if the city is to accomplish its objectives in terms of efficient use of land, maximum function of facilities and services, and civic beauty. A constant search for better ways and means of achieving these objectives is underway all over the country. Devices which prove effective in one community or one state may be completely impractical and unworkable in another. It is the Planning Department's duty to keep on the alert for improved methods of development guidance and control, and the Planning Commission's responsibility to thoroughly explore all possible devices for achieving community goals.

PART VIII

SUMMARY OF FINDINGS

The major findings of this report on Tempe's land use are summarized as follows:

Major Factors Influencing Future Land Development

1. As part of the Phoenix Metropolitan Area, Tempe's physical development has been and will always be influenced by such regional factors and facilities as Arizona State University, regional transportation systems, regional development patterns, and general availability and price of suitable land.
2. Salt River, Tempe Buttes and Bell Buttes are principal topographic features which influence Tempe's land development. Area soils and the availability and quality of the water supply may prove to be limiting factors in future development.
3. Nuisance characteristics and safety hazards associated with Sky Harbor Airport and its flight patterns adversely influence the livability and stability of residential development in West Tempe.

Existing Land Use

1. Two-thirds of the land in the Tempe Planning Area was still undeveloped in 1963. 74% of this undeveloped land was farmed and the remainder lay vacant and unused. The total land reserve suitable for urban development is presently estimated at 15,000 acres.
2. In 1963, developed land was divided: Residential, 34%; Commercial, 8%; Industrial, 20%; Public and Quasi-Public, 38%.
3. In 1963, assessed valuations in the Tempe Planning Area were divided: Agricultural, 4.3%; Unused land, 3.7%; Residential, 68.2%; Commercial, 9.1%; Industrial, 4.8%; Public and Quasi-Public, 9.9%.
4. The overall ratio of developed land-to-population is considerably higher in Tempe than in nearby urban areas. In general, this reflects inefficient land use and a very low intensity of land development and implies a relatively high cost of public facilities and services

5. If Tempe continues to develop until 1985 at its present ratio of 22.7 acres per 100 persons, it will then occupy about 35,800 acres, nearly 56 square miles. The designated Tempe Planning Area comprises only about 25,600 acres, or 40 square miles.

Future Land Requirements

1. To create and maintain a high level of public facilities and services at reasonable cost, the present land use/population ratio must be reduced considerably as the city expands. If the ratio can be reduced to 13.5 acres per 100 persons by 1985, urban development will occupy some 21,260 acres, about 83% of total land in the Planning Area.
2. Unusually extensive land areas occupied by transportation, communication and utility facilities are largely responsible for high industrial land use ratios. The high ratio of public land is attributed to Arizona State University and Papago Park areas. Ratios in both categories will decline consistently as population growth reduces the relative effects of existing extensive uses.
3. Ratios of residential and commercial land use will decline somewhat as overall residential density increases and commercial land use becomes more efficient.

Planning for Improved Land Use Balance

1. The City of Tempe must establish a proposed future land use-to-population ratio which will produce a sound economic balance of land use. Economic balance means the division of total assessed valuation among the basic categories of land use in such a way that no single type of land use must bear an intolerable proportion of the tax load. Achievement of this goal will require continuing attention to the type and valuation of proposed development, as well as to the enforcement of improved development standards related to the geographic location, areal extent, and spatial, functional and esthetic characteristics of proposed land uses.
2. The direction and guidance of future land use into desirable physical and

economic patterns and balances should be a major community goal. Achievement of this goal will require involvement of all municipal officials, community leaders and citizens in a long, continuing process of planning, surveillance of trends, and constant improvement of development policies, standards, and regulatory controls.

SOURCES AND REFERENCES

- Bartholomew, Harland, Land Uses in American Cities, 1955.
- Chapin, F. Stuart, Jr., Urban Land Use Planning, 1957.
- Ferguson, Brooks and Kelly, Sanitary Sewer Report, 1963.
- Gallion, Arthur B., The Urban Pattern, 1950.
- John Carollo Engineers, Report on Water Works Facilities, 1963.
- Maricopa County Planning Department:
Part 1, Comprehensive Plan for Mesa, Arizona, 1961.
Chapter 1, Comprehensive Plan for Scottsdale, Arizona, 1960.
Part 1, A Comprehensive Plan for Chandler, Arizona, 1961.
- Outdoor Recreation Resources Review Commission, Projections to the Years 1976 and 2000, Report No. 23, 1962.
- Phoenix-Maricopa County Advance Planning Task Force, Land Use in the Phoenix Urban Area, 1959.
- Tempe Chamber of Commerce, Kyrene Industrial Area, 1964.
- The Rand Corporation, Recent Land Use Trends in 48 Large American Cities, 1963.
- Thiele, Dr. Heinrich, Jr., Present and Future Water Use and Its Effect on Planning in Maricopa County, Arizona, 1965.