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WATER SYSTEMS EVALUATION
FOR
APACHE JUNCTION, ARIZONA

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Planning Research Company

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WATER SYSTEMS EVALUATION
FOR
APACHE JUNCTION, ARIZONA

APACHE JUNCTION PROJECT NO. PL-80-1(IN PART)

MAY 1981

Prepared By:

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(This report was funded in part by grant FCRC No. 101-811-082-2 awarded to the City of Apache Junction, Arizona, by the Four Corners Regional Commission, Albuquerque, New Mexico.)

Registered Professional Engineer (Sanitary) CERTIFICATE NO. 12204 WOODROW C. SOUTTEN, JR. DATE SIGNED 5-28-81 Arizona U. S. A.

Registered Professional Engineer (Civil) CERTIFICATE NO. 12908 PAUL S. SKAGER Date Signed 5-28-81 ARIZONA, U.S.A.

WATER SYSTEMS EVALUATION
FOR
APACHE JUNCTION, ARIZONA

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WATER SYSTEMS EVALUATION

FOR

APACHE JUNCTION, ARIZONA

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WATER SYSTEMS EVALUATION
APACHE JUNCTION, ARIZONA

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CHAPTER 1
INTRODUCTION

HISTORY OF PROJECT.

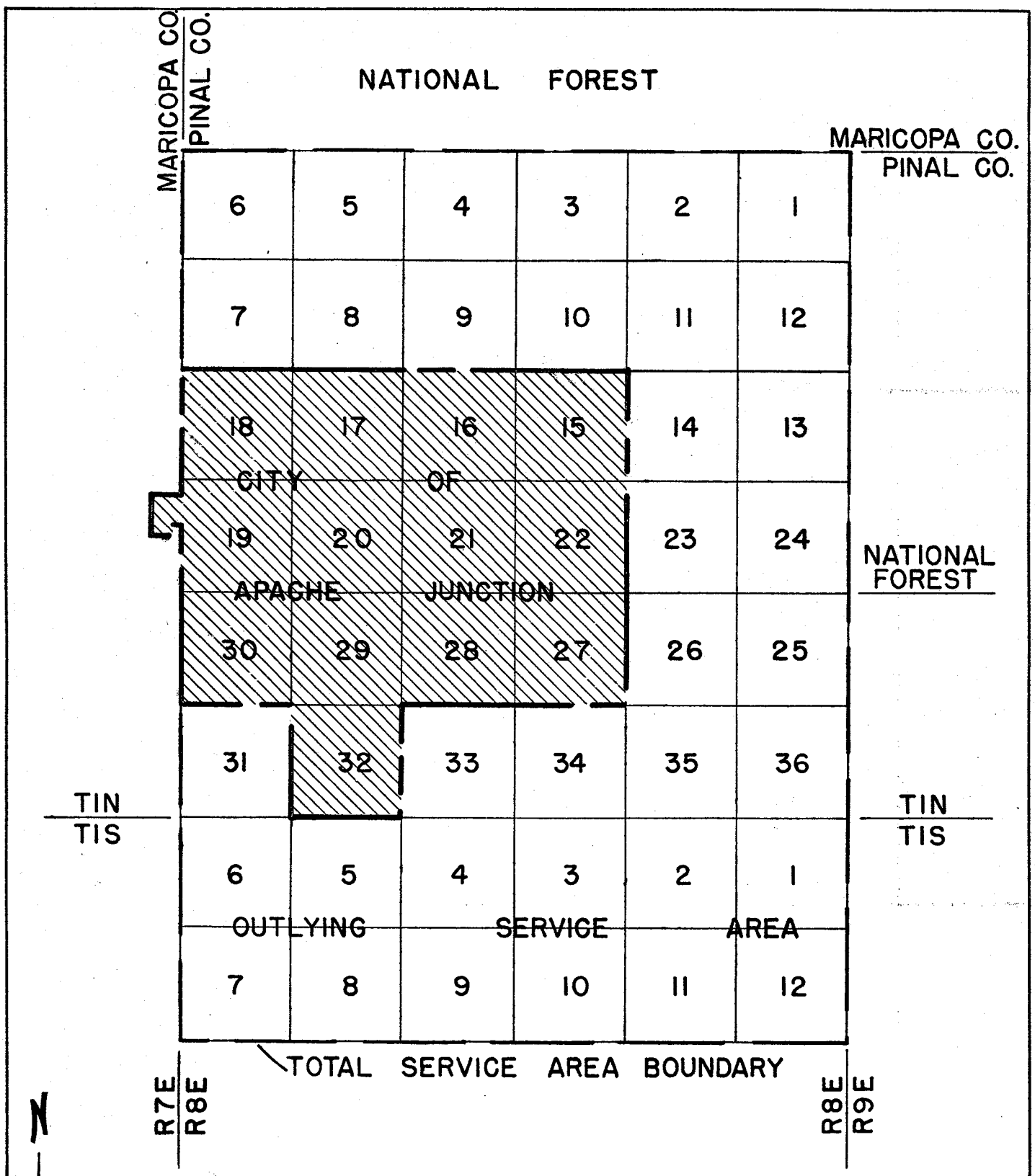
Apache Junction is a rapidly growing community located slightly over thirty miles east of downtown Phoenix, Arizona. It is situated principally in Pinal County; however, a 1980 annexation added a small area in Maricopa County. The permanent population in 1980 is approximately 10,500 persons. It is estimated that winter visitors to Apache Junction raise the population to over 30,000 persons.

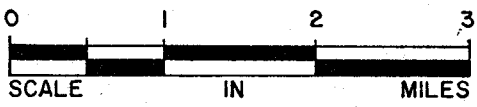
The City of Apache Junction was incorporated in November, 1978. Since that time, the need to establish staff and procedures has dominated the program agenda of the City. City officials are desirous of establishing a General Plan for the Apache Junction service area, defined in Figure 1-1. With this goal in mind, the City applied for and on June 1, 1980, received a grant from the Four Corners Regional Commission to assist in the development of a general plan. The areas specifically addresssed in the terms of the grant included the following:

1) Sewer Needs Determination
2) Water Systems Evaluation
3) Transportation Facilities Plan
4) Municipal Complex Development
5) Land Use Plan

AUTHORIZATION.

Upon receipt of the planning grant, the City was authorized by the Four Corners Regional Commission to proceed with the selection of a consultant to perform those parts of the scope of work set forth in "Bid Specifications for Apache Junction General Plan of Selected Elements, Project No. PL-80-1". Through a competitive bid process, PRC Toups was chosen to perform all of the items listed in the scope of work. The term and effective date of the contract with PRC Toups was from October 29, 1980, through September 30, 1981.





WATER SYSTEMS EVALUATION
FOR
APACHE JUNCTION, ARIZONA

PLANNING AREA MAP

PRC TOUPS
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FIGURE NO. 1-1

PURPOSE AND SCOPE OF STUDY

The purpose of this particular report is to address the second of the above listed topics, namely 2) Water Systems Evaluation. The City of Apache Junction and its surrounding service area are presently served by three private water companies. From time to time, at least certain areas of the City experience drastic water shortages. In addition, there is an insufficient number of fire hydrants in the area to provide adequate fire protection. This report describes in detail the present operating capabilities of the three water companies and what needs to be done to provide an adequate level of service through the year 2000.

When the term "Apache Junction service area" or "service area" is used herein, it is meant to describe only the physical boundaries shown in Figure 1-1. These boundaries include the current boundary of the incorporated city plus the boundary of the area in which the city or water service entities may be required to deliver water service in the future.

Topics covered in this report include the following:

- Existing Conditions
- Future Conditions
- Development and Evaluation of Alternatives
- Selection of the Best Alternative Plan

In addition, to assist the layman in understanding the contents of the report, a list of abbreviations and a glossary of terms commonly used in the civil engineering field are included in the Appendix.

This report is an independent analysis by the consulting engineering firm of PRC Toups. Conclusions and recommendations contained herein are those made only by the consultant after consideration of all the data, and do not represent individual views of the staff of the City of Apache Junction.

For purposes of this report, all costs are projected in terms of 1981 dollars.

CHAPTER 2

MAJOR ASSUMPTIONS, CONCLUSIONS AND RECOMMENDATIONS

MAJOR ASSUMPTIONS.

1. This report takes a somewhat conservative look at the potential for population growth in the Apache Junction service area. Major factors which could increase the rate of growth include completion of the Superstition Freeway, development of a municipal airport, opening of a community college, and the further development of industrial parks and shopping centers.

2. When comparing population densities in the report, it is important to keep in mind that they are gross averages based on the conservative projection described above. Individual sections of the outlying service area, for example, may develop rather quickly, while other sections may not develop at all.

3. Residential water requirements make up the majority of the total water system demand; the requirements of commercial and industrial sources are a relatively insignificant portion of the total.

4. The existing level of service is appraised on the ability of the water system to meet the maximum day domestic demand plus fire flow with one major supply source out of service plus the ability to provide storage for at least two hours worth of the maximum day plus fire flow demand with one major storage facility out of service.

5. The future level of service is also appraised on the ability of the water system to meet the maximum day domestic demand plus fire flow with one major supply source out of service. However, the future storage requirement is based on the following Insurance Services Office (ISO) recommendations which have been found to be reasonable and effective in meeting system needs:

- 20 percent of the maximum day demand for operational uses.
- 5 percent of the maximum day demand for emergency uses.
- One maximum fire occurring during the maximum day demand.

6. Groundwater supplies appear to be adequate for meeting long term future water demands when coupled with a Central Arizona Project allocation to supplement groundwater depletion.

CONCLUSIONS AND RECOMMENDATIONS.

EXISTING CONDITIONS.

1. The final 1970 census listed Aapche Junction as having 2,390 persons and 1,161 housing units. The preliminary report of the 1980 census showed that Apache Junction has a population of 9,935 and a total of 6,837 housing units. However, the preliminary 1980 report also indicated that 2,632 housing units were vacant at the time of the survey, leaving 4,205 occupied units for an average of 2.36 persons per occupied unit.

2. A report entitled "Population Analysis for the City of Apache Junction, Arizona", completed by PRC Toups in December, 1980, estimated the total 1980 population for the Apache Junction service area to be 30,348, comprised of the following:

   1) A permanent resident population of 10,500 within the city limits.
   2) A permanent resident population of 2,200 in the outlying service area.
   3) A seasonal resident population of an additional 17,648 persons in the city and outlying service area.

3. At the present time, three water companies are certificated to operate in the Apache Junction service area: Arizona Water Company, Crescent Valley Utility Company and Palm Springs Water Company. Together, the three companies can serve approximately 89 percent of the land in the service area, with the remaining 11 percent not yet allocated to any company.

4. The existing supply and storage components of the Arizona Water Company system appear satisfactory. This company is basically a sound organization with dedicated management and a good system of operations. In Apache Junction, planning is continuously carried out to insure that the water supply will be available to serve the anticipated future population. Annual capitol improvements insure adequately sized pipelines are built into the distribution system to properly handle the necessary flows and good scheduling of operation and maintenance insures that the supply sites are running smoothly and the pipes are not becoming clogged or deteriorated.

5. In order to have a completely flexible and reliable Palm Springs Water Company system, it would be necessary to install storage and booster facilities, for example, at the Well No. 5 site (16th Avenue and Delaware Drive). In addition, the Palm Springs system also suffers from a high percentage of small, deteriorating pipelines. Up until a year ago, the Palm Springs Water Company was plagued by a general lack of planning and a poor schedule of operation and maintenance. However, in December, 1979, the ownership changed and the company became affiliated with Consolidated Water Utilities, a water company which was formed in the middle 1960's and which should have the expertise necessary to correct the existing deficiencies and turn the system into a reliable working operation.

6. The Apache Junction water system was evaluated by the Insurance Services Office (ISO) of Arizona in April and May of 1977. The major recommendations noted in the report were:

   1) *That the arterial systems be strenghthened by installation of arterial mains (8-inch or larger) extending to all sections of the District, with size sufficient to provide delivery of maximum consumption demands in addition to recommended fire flows. The following quantities are desirable:*

Commercial	*1500 to 4000 gpm*
(includes business, institutions and industrial)	
Residential	*1000 gpm*

2) *That sufficient hydrants be installed to provide a maximum distribution of one hydrant for every 130,000 square feet in the high value districts and one hydrant for every 160,000 square feet in the residential districts.*

FUTURE CONDITIONS.

1. According to the previously mentioned report, "Population Analysis for the City of Apache Junction, Arizona", the population of the service area is expected to grow at a rate of 5 percent per year for the next ten years, 4 percent per year for the years 1991-1995, and 3 percent per year for the years 1996-2000. By the year 2000, there is projected to be 60,161 permanent and seasonal residents in the city and 8,268 permanent and seasonal residents in the outlying service area, for a total population of 68,429. It is also estimated that the water company service area populations will be 55,573 for the Arizona Water Company, 12,000 for the Palm Springs Water Company, and 708 for the Crescent Valley Utility Company.

2. Using the service area populations, year 2000 requirements were estimated for peak flows and storage capacities. Table 2-1 summarizes these requirements and compares them with the existing system capacities determined in Chapter 3.

DEVELOPMENT AND EVALUATION OF ALTERNATIVES.

1. Based on an analysis of major deficiencies completed in Chapters 3 and 4 and the desire of the residents of Apache Junction to receive an adequate level of service, four alternatives were developed for management of Apache Junction's water services at least through the year 2000:

TABLE 2-1

COMPARISON OF YEAR 2000 WATER SYSTEM REQUIREMENTS WITH EXISTING CAPACITIES

CATEGORY	ARIZONA WATER COMPANY	PALM SPRINGS WATER COMPANY	CRESCENT VALLEY UTILITY COMPANY
Year 2000 Maximum Day plus Fire Flow Demand	10,900 gpm	5,000 gpm	4,100 gpm
Existing Capacity	6,750 gpm	420 gpm	---
Year 2000 Storage Requirement	3.43 mg	1.32 mg	0.99 mg
Existing Capacity	3.80 mg	0.20 mg	---

Alternative 1):
Continued private ownership and operation by the Arizona Water Company, the Palm Springs Water Company and the Crescent Valley Utility Company.

Alternative 2):
Continued private ownership and operation by the Arizona Water Company; city purchase but private operation (by the Arizona Water Company) of the Palm Springs Water Company and the Crescent Valley Utility Company certificated areas which are within the Apache Junction service area.

Alternative 3):
Continued private ownership and operation by the Arizona Water Company; city purchase and operation of the Palm Springs Water Company and the Crescent Valley Utility Company certificated areas which are within the Apache Junction service area.

Alternative 4):
Complete city purchase and operation of the Arizona Water Company, the Palm Springs Water Company and the Crescent Valley Utility Company certificated areas which are within the Apache Junction service area.

It must be emphasized, that under any of these four alternatives reuse of treated wastewater should be encouraged in certain areas.

2. Table 2-2 shows the "Technical Evaluation Matrix" used to compare the four alternatives in terms of the following parameters: construction costs, ability to implement, flexibility and reliability, operational experience, and parity to users. The point totals and relative standing of the alternatives are 19 for Alternative 1 (second), 20 for Alternative 2 (first), and 16 each for Alternative 3 and Alternative 4 (tied for third).

TABLE 2-2

TECHNICAL EVALUATION MATRIX

SHOWING RELATIVE STANDING OF ALTERNATIVES

ALTERNATIVE	CONSTRUCTION COSTS	ABILITY TO IMPLEMENT	FLEXIBILITY AND RELIABILITY	OPERATIONAL EXPERIENCE	PARITY TO USERS	POINT TOTAL	RELATIVE STANDING
ALTERNATIVE 1	B	A	D	A	C		
	4	5	2	5	3	19	2
ALTERNATIVE 2	B	B	C	A	B		
	4	4	3	5	4	20	1
ALTERNATIVE 3	B	C	D	C	B		
	4	3	2	3	4	16	3
ALTERNATIVE 4	B	E	B	D	A		
	4	1	4	2	5	16	3

SELECTION OF THE BEST ALTERNATIVE PLAN.

Based on the analysis of alternatives completed, this report recommends the following plan of action for the City of Apache Junction: 1) that the Arizona Water Company be left to operate as a completely private entity; 2) that the relatively new ownership of the Palm Springs Water Company be given an adequate time (say three years) in which to improve the existing water supply and distribution systems such that an adequate level of service can be provided at a reasonable rate. At the end of that time period, if a fair degree of progress has indeed been made, it is felt that private operation should continue. On the other hand, if the city has determined that little or no progress has been made, it should initiate the procedure for purchase of the water company and investigate how arrangements might be made with the Arizona Water Company for operation and maintenance of the system; 3) that if the city eventually purchases the Palm Springs Water Company, it also consider purchasing the certificated area of the Crescent Valley Utility Company which is within the Apache Junction service area. This would allow for a natural expansion of the Apache Junction city limits to the southwest.

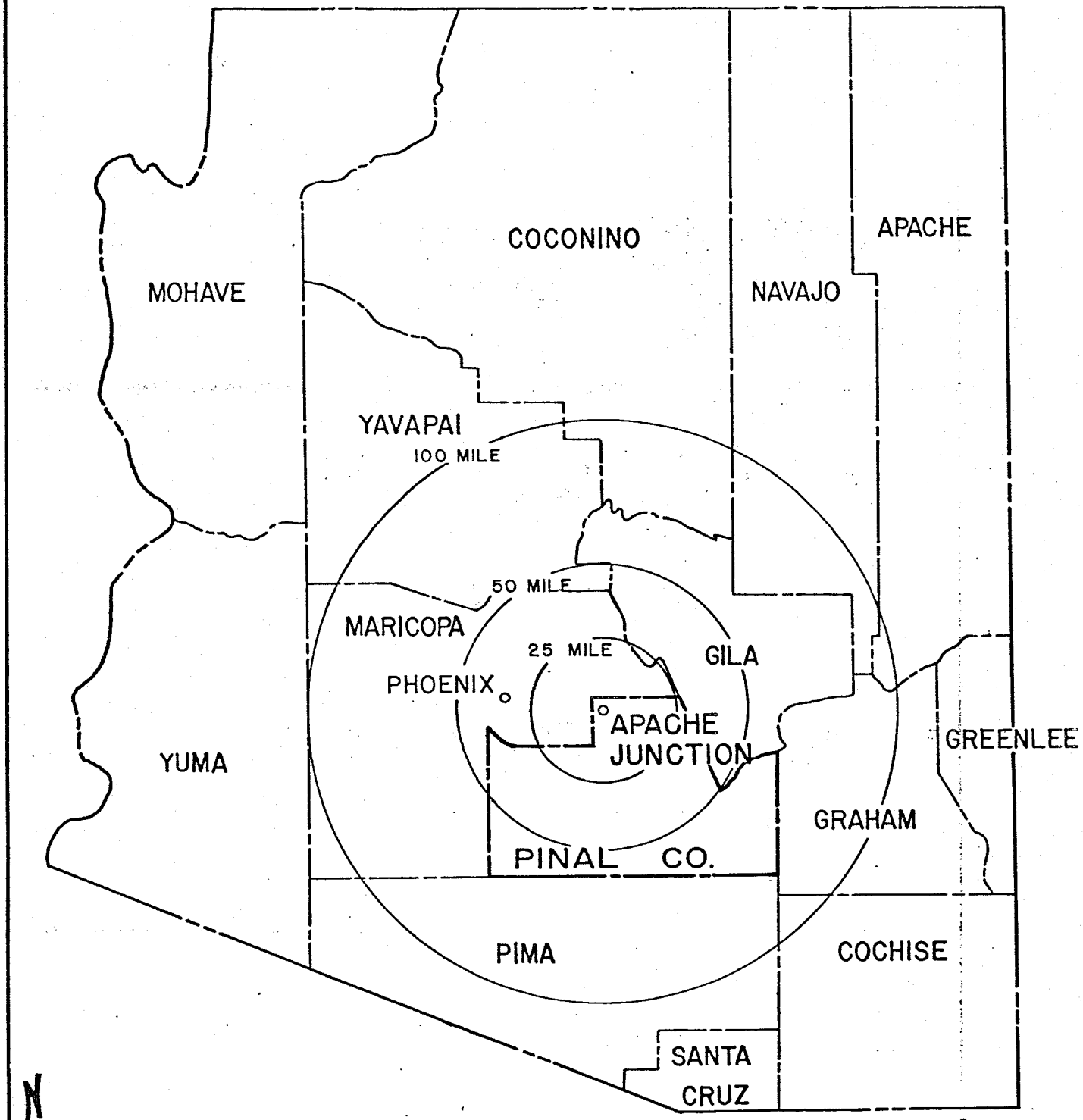
CHAPTER 3
EXISTING CONDITIONS

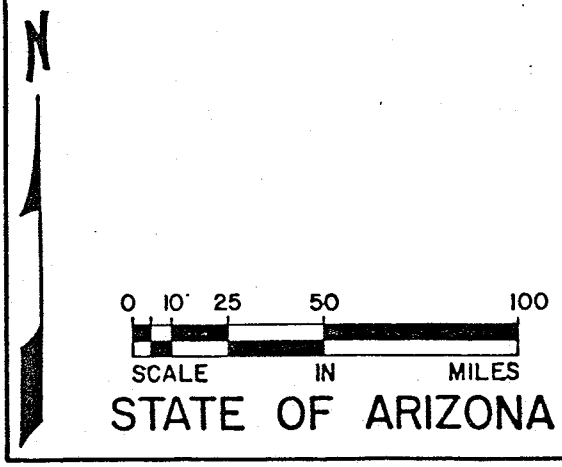
SERVICE AREA DESCRIPTION.

GENERAL. The City of Apache Junction is located in central Arizona slightly over thirty miles east of downtown Phoenix, as shown in Figure 3-1. For purposes of this report, the Apache Junction service area consists of slightly greater than 48 square miles, as shown in Figure 3-2. The service area includes: all of Township 1 North, Range 8 East and the northern one-third of Township 1 South, Range 8 East of the Gila and Salt River Baseline and Meridian in Pinal County, Arizona; and a 20-acre area in Maricopa County added by a 1980 annexation. The 20-acre parcel is a mobile home park located just west of Meridian Road between Apache Trail (U.S. Highway 60) and Superstition Boulevard. The area included in the city limits is slightly more than thirteen (13.03) square miles, also shown in Figure 3-2. Two square miles of state land and a school are located within the city limits and only about half (6.5 ± square miles) of the area is actually developed. Most of the 35-square mile area in the service area but beyond the city limits (22 ± square miles) is either land in trust to the Arizona State Land Department or land controlled by the United States Bureau of Land Management, as presented in Figure 3-3.

As used hereafter in this report, the term "city" will be used to describe the 13.03 square miles actually within the present city limits. The term "outlying service area" will designate the remaining 35 square miles which are outside of the city limits but still within the overall service area of the study. The term "total service area" will refer to the total 48.03 square miles.

CLIMATE. The weather in Apache Junction reflects the city's location in the central Arizona desert and is characterized by hot summers and mild winters. High diurnal temperature variations are common. The prevailing winds are from the east and are usually light, although severe windstorms occur at rare intervals. The mean annual precipitation is approximately 7-1/2 inches, equally divided between summer and winter seasons. Three types of storms produce precipitation in the Apache Junction area: general winter storms, general summer storms, and local summer storms. Significant climatological data for Apache Junction is summarized in Table 3-1.



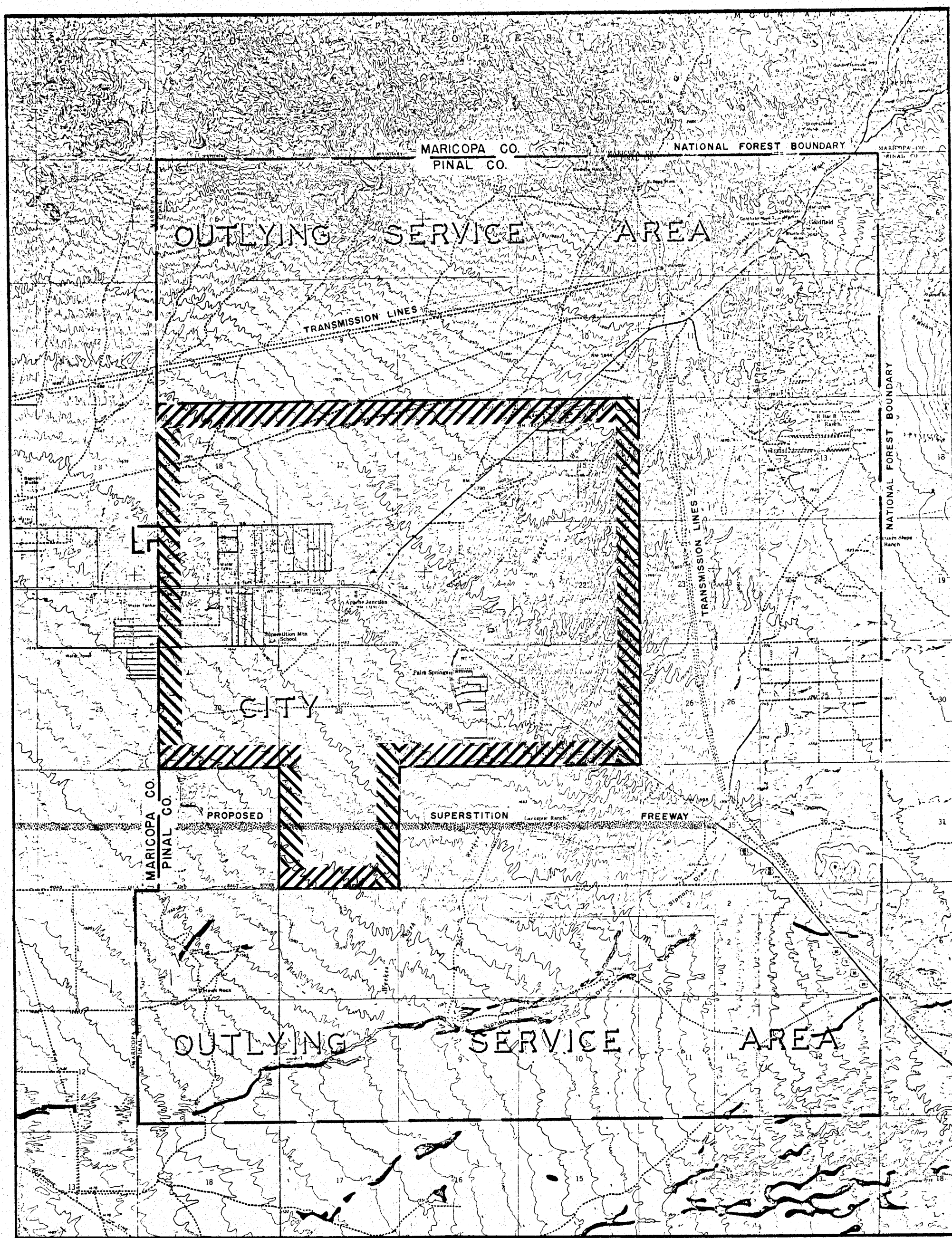


WATER SYSTEMS EVALUATION
FOR
APACHE JUNCTION, ARIZONA

GENERAL LOCATION MAP

PRC TOUPS
4131 N 24 ST. PHX., AZ.

FIGURE NO. 3-1



LEGEND

— — — TOTAL SERVICE AREA BOUNDARY

— - — AREA WITHIN CITY LIMITS

N

0 1/4 1/2 3/4 1

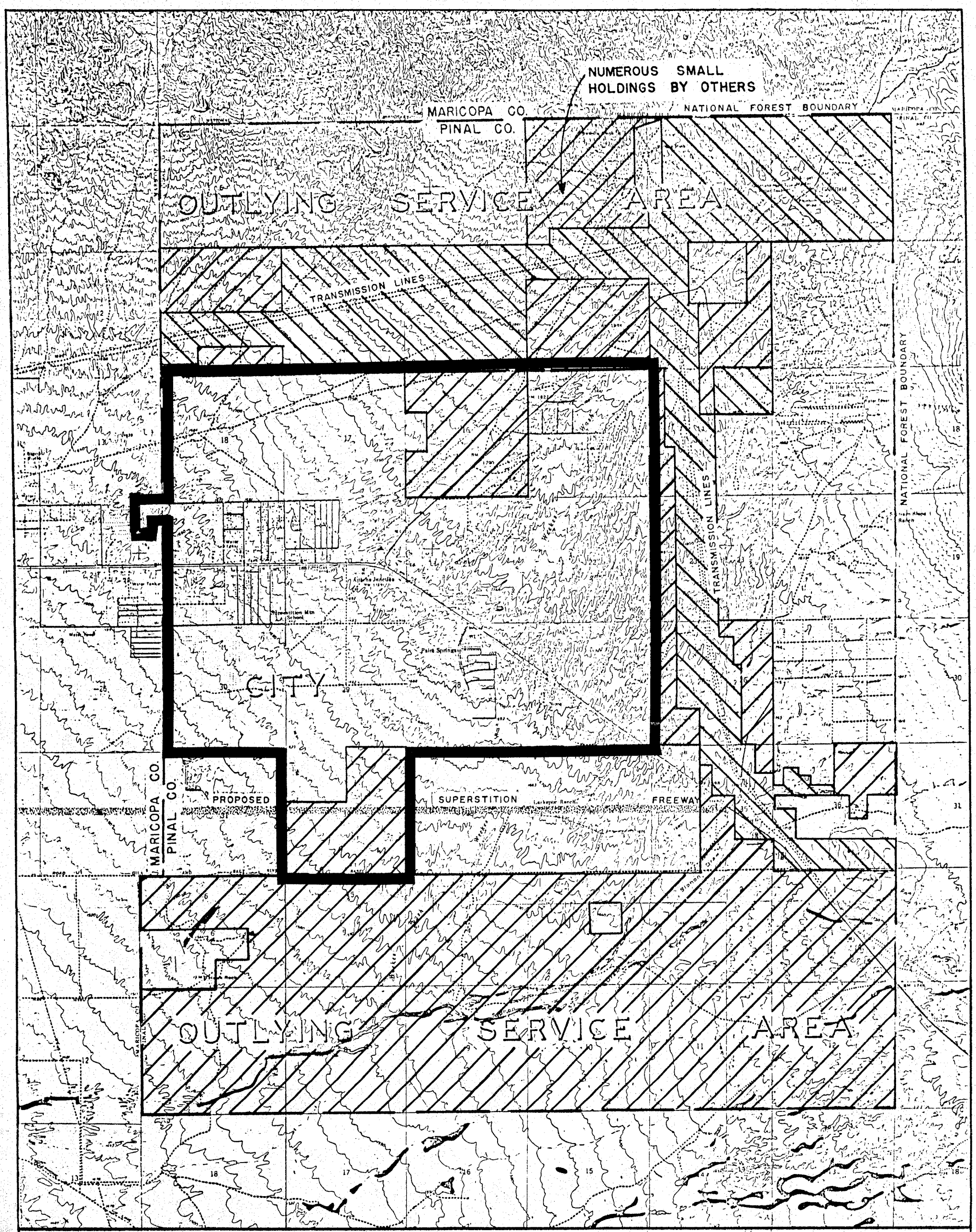
SCALE IN MILES

WATER SYSTEMS EVALUATION
FOR
APACHE JUNCTION, ARIZONA

SERVICE AREA MAP

PRC TOUPS
4131 N 24 ST. PHX., AZ.

FIGURE NO. 3-2



LEGEND

- — — — TOTAL SERVICE AREA BOUNDARY
- ▬▬▬ AREA WITHIN CITY LIMITS
- \\\\\\ BUREAU OF LAND MANAGEMENT
- //////, ARIZONA TRUST PROPERTIES

N

0 ¼ ½ ¾ 1

SCALE IN MILES

WATER SYSTEMS EVALUATION
FOR
APACHE JUNCTION, ARIZONA

FEDERAL AND STATE LAND OWNERSHIP

PRC TOUPS
4131 N 24 ST. PHX., AZ.

FIGURE NO. 3-3

TABLE 3-1

SIGNIFICANT CLIMATOLOGICAL DATA

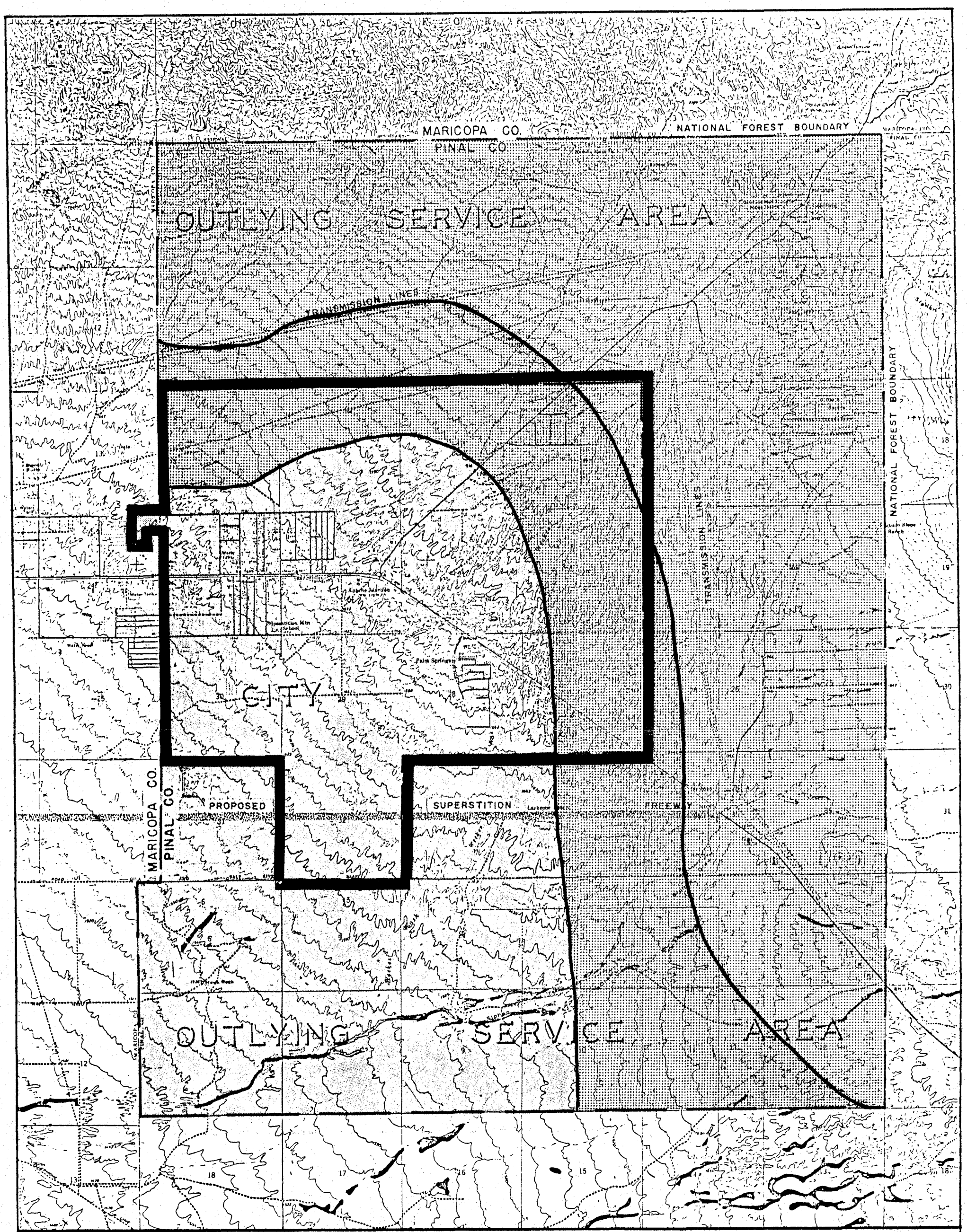
MONTH	AVERAGE TEMPERATURE (°F) DAILY MAX.	DAILY MIN.	AVERAGE HEATING DEGREE DAYS	TOTAL PRECIPITATION (INCHES)
January	66.9	35.8	400	0.92
February	71.7	38.8	267	0.76
March	76.8	42.9	168	0.69
April	86.0	49.2	42	0.34
May	94.9	56.9	4	0.10
June	103.2	65.1	0	0.09
July	106.8	75.3	0	0.74
August	104.5	73.7	0	1.24
September	101.0	66.1	0	0.74
October	90.2	53.7	13	0.44
November	77.0	42.1	160	0.57
December	68.2	36.2	391	0.93
YEARLY	87.3	53.0	1,445	7.56

GEOLOGY. The rock materials in the higher regions vary widely. The materials include fine grained, coarse grained, and metamorphosed granites including gneiss and schist, sandstones, breccias, and metamorphosed sedimentary rocks. Various lava rocks including the basalt, andesite, rhyolite, volcanic glass, and white tuff are also present. The soils are typical of desert and semi-desert regions, being mostly shallow, rocky and poorly developed. The northern and eastern portions of the study area lie in the foothill ranges of the Goldfield and Superstition Mountains. The remainder of the Apache Junction area occupies an alluvial plain built up from water deposited, soil-forming materials and rock debris. These soils consist of various forms of clays and loams.

SOILS. The soil in Apache Junction is of the hyperthermic arid variety and is characterized by either of two major types: HA-1, the torrifluvents association; and HA-3, the mohall-vecont-pinamt association. Generally speaking, the torrifluvents association is found in the southwest portion of the service area, with the mohall-vecont-pinamt association occupying the northern and eastern portions, as shown in Figure 3-4. Table 3-2 presents distinguishing characteristics of the two soil types. Conclusions which can be drawn from Table 3-2 are that the soil in the southwest portion is basically a sandy loam with moderate permeability, while the soil in the northern and eastern portions is a loam containing a relatively high percentage of gravel, cobbles and clay with a lower permeability.

VEGETATION. Natural vegetation is sparse at best. Cacti grow throughout the area along with other desert shrubs. Native trees such as Paloverde, Mesquite, and Ironwood are scattered among the shrubs. In uncultivated areas, good covers of annual grasses occur after winter rains. The vegetation tends to be somewhat thicker along and adjacent to washes in the area.

RUNOFF CHARACTERISTICS. Little flow occurs except during and immediately following heavy precipitation because climatic and drainage characteristics are not conducive to continuous runoff. Due to the



LEGEND

- — — — TOTAL SERVICE AREA BOUNDARY
- AREA WITHIN CITY LIMITS
- SOIL TYPE HA-1: TORRIFLUVENTS ASSOCIATION BETTER SOIL AREA
- SOIL TYPE HA-3: MOHALL-VECONT-PINAMT ASSOCIATION POORER SOIL AREA
- TRANSITION ZONE

N

0 1/4 1/2 3/4 1

SCALE IN MILES

WATER SYSTEMS EVALUATION
FOR
APACHE JUNCTION, ARIZONA

SOIL DISTRIBUTION MAP

PRC TOUPS
4131 N 24 ST. PHX., AZ.

FIGURE NO. 3-4

TABLE 3-2

DISTINGUISHING CHARACTERISTICS OF APACHE JUNCTION SOILS

SOIL TYPE AND CLASSIFICATION	DOMINANT SLOPE (percent)	DEPTH TO HARDPAN (feet)	REPRESENTATIVE PROFILE TEXTURES	PERMEA-BILITY	CORRO-SIVITY	LIMITATION FOR SEPTIC SYSTEMS
HA-1 Torrifluvents Association	0 to 3	>60	Mainly sandy loam with some sandy clay loam	Moderate	Low	Moderate
HA-3 Mohall-Vecont-Pinamt Association	0 to 5	>60	A mixture of gravelly, cobbly, and clay loam with some sandy clay loam	Moderately slow to slow	Moderate	Moderately severe

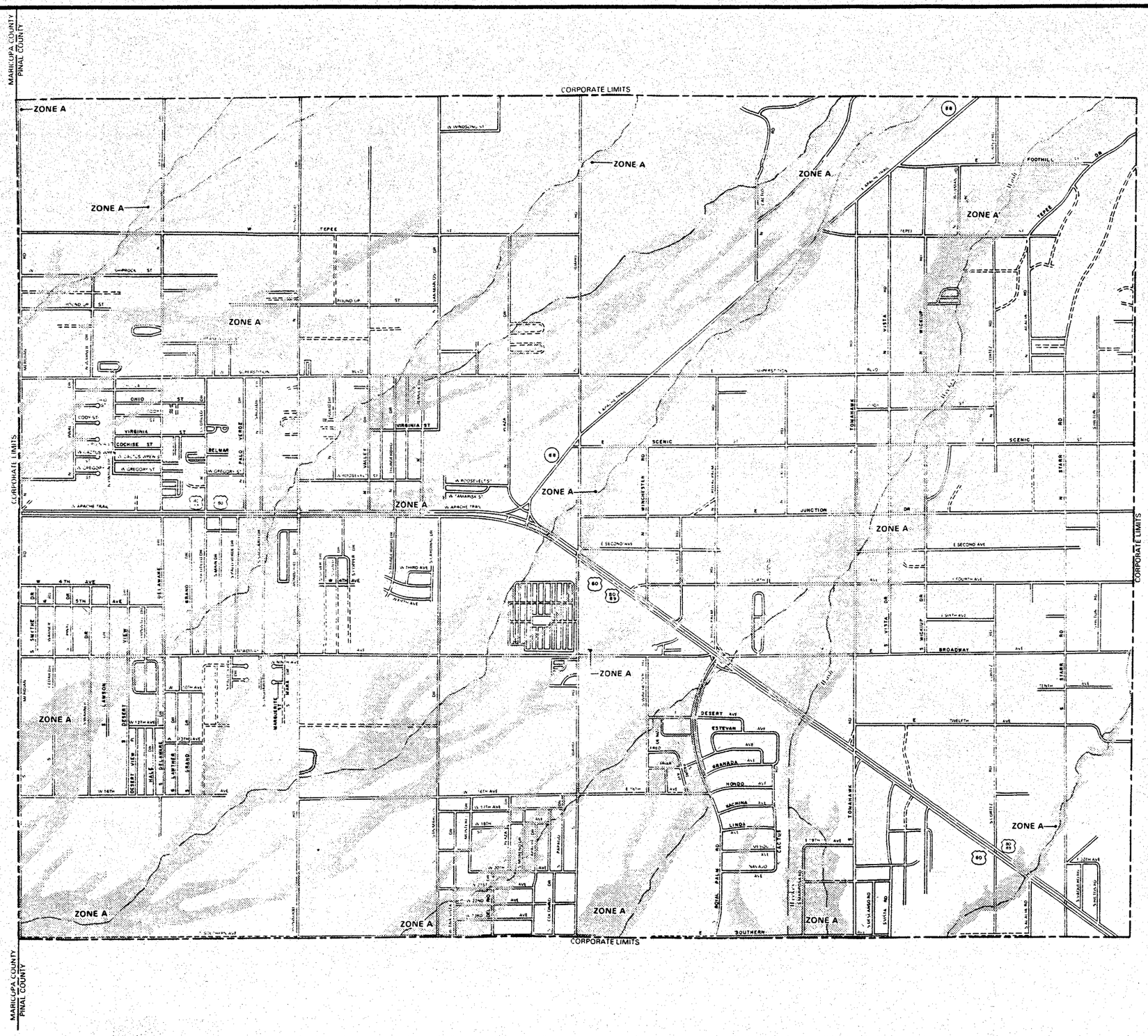
relatively flat slope, wide overflow area, and lack of defined channels, floods on the valley plain spread out overland and cause existing channels and washes to shift over time. As one moves toward the mountains, however, stream channels are more defined and generally deeper. Flow velocities and depths are relatively small compared to runoff concentrated in stream channels and washes.

FLOOD HAZARD POTENTIAL. Proposed flood control structures which will regulate the drainage area include the Weekes Wash Dam, the Apache Junction Floodway, and the Apache Junction Dam. These structures are under the jurisdiction of the Flood Control District of Maricopa County. The runoff generated by the drainage area flows in a southwest direction, where ground slopes are normally less than one percent (except in foothill areas of the mountains).

A vast network of intermingling washes is found throughout the alluvial fan. These erodable channels do not allow an accurate account of flooding limits, but lead to the conclusions that overland flow and channel flow will coexist for the 100-year storm discharges. The preliminary flood hazard boundary map for Apache Junction, dated June 10, 1980, is presented in Figure 3-5. This map identifies the special flood hazard area, Zone A, which is defined as an area inundated by the 100-year flood, determined by approximate methods. With the preliminary map, no base flood elevations are shown and no flood hazard factors are determined. The final map, which will present a much more detailed breakdown of flood hazard zones, is being prepared by the firm of Cella Barr Associates and will be available within the next few months.

POPULATION ANALYSIS.

The final 1970 census listed Apache Junction as having 2,390 persons and 1,161 housing units. The preliminary report of the 1980 census showed that Apache Junction has a population of 9,935 and a total of 6,837 housing units. Thus, according to the census figures, population in the City increased at a rate of 15 percent per year over the last decade, while the number of housing units increased even faster, at a rate of about 20 percent per year. However, the preliminary 1980 report also



KEY TO MAP

SPECIAL FLOOD HAZARD AREA — **ZONE A**

Note: These maps may not include all Special Flood Hazard Areas in the community. After a more detailed study, the Special Flood Hazard Areas shown on these maps may be modified, and other areas added.

TO DETERMINE IF FLOOD INSURANCE IS AVAILABLE IN THIS COMMUNITY, CONTACT YOUR INSURANCE AGENT, OR CALL THE NATIONAL FLOOD INSURANCE PROGRAM, AT (800) 638-6620, OR (800) 424-8872.

INITIAL IDENTIFICATION DATE

JUNE 10, 1980

FHBM COMMUNITY-PANEL NUMBER
040120-0001-A
(1 OF 1)

NOTE: MAP DOES NOT INCLUDE AREAS ANNEXED TO THE CITY OF APACHE JUNCTION AFTER JANUARY 1, 1980.

WATER SYSTEMS EVALUATION
FOR
APACHE JUNCTION, ARIZONA

PRELIMINARY FLOOD HAZARD BOUNDARY MAP

PRC TOUPS
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FIGURE NO. 3-5

indicated that 2,632 housing units were vacant at the time of the survey leaving 4.205 occupied units for an average of 2.36 persons per occupied unit. A further breakdown of the census count by enumeration district is included in Appendix F.

Seasonal residents, who have not been included in the above figures, account for a large number of Apache Junction's total popoulation. In fact, it is quite likely that the 2,632 housing units reported vacant at the time of the census are actually occupied during the tourist season. Whether these residents should be classified as permanent residents from a federal census definition is difficult to determine. For the most part, these seasonal residents live in mobile home or travel trailer parks while in Apache Junction and reside for anywhere between 1 week and 6 months from September through March. They consider some other location, where they may own property, as being their permanent place of residency.

A survey carried out by the City in November, 1980, showed that there are 80 separately owned mobile home or travel trailer parks located within the city limits, containing 1,263 mobile home spaces, 4,427 travel trailer spaces, and 473 spaces of unknown type. Seven additional parks, containing 761 mobile home spaces, 441 travel trailer spaces, and 38 spaces of unknown type, are located in the outlying service area. The survey estimated that 90 percent of all mobile home and travel trailer spaces are filled during the peak of the winter season. Consequently, it appears that the seasonal resident population in mobile home and travel trailer parks could be as high as 10,850 within the city limits, with an additional 1,450 in the outlying service area.

A report entitled "Population Analysis for the City of Apache Junction, Arizona", completed by PRC Toups in December, 1980, estimated the total 1980 population for Apache Junction to be 30,348, comprised of the following:

1) A permanent resident population of 10,500 within the city limits.

2) A permanent resident population of 2,200 in the outlying service area.

3) A seasonal resident population of 17,648.

Table 3-3 on the following page regroups these figures to yield a total 1980 population in the City of 26,697, and a total population in the outlying service area of 3,651. Population projections through year 2000 using this same method will be presented in the following chapter.

EXISTING WATER FACILITIES.

GENERAL. At the present time, three water companies are certificated to serve the Apache Junction service area: Arizona Water Company, Crescent Valley Utility Company and Palm Springs Water Company. Figure 3-6 shows the land served by each water company. Together, the three companies can serve approximately 89 percent of the land in the Apache Junction service area, as shown in Table 3-4. The remaining 11 percent (five sections along the southern edge of the service area) has not yet been allocated to any company.

CRESCENT VALLEY UTILITY COMPANY. Although the Crescent Valley Utility Company is certificated to operate in Sections 31, 6 and 7 in the Apache Junction service area, it presently has no facilities there. These three sections form the easternmost boundary of a certificated area that exists primarily in eastern Mesa, so it is assumed that water facilities could be made available when the need arises. The remainder of this section, therefore, is concerned with descriptions of the Arizona and Palm Springs Water Companies.

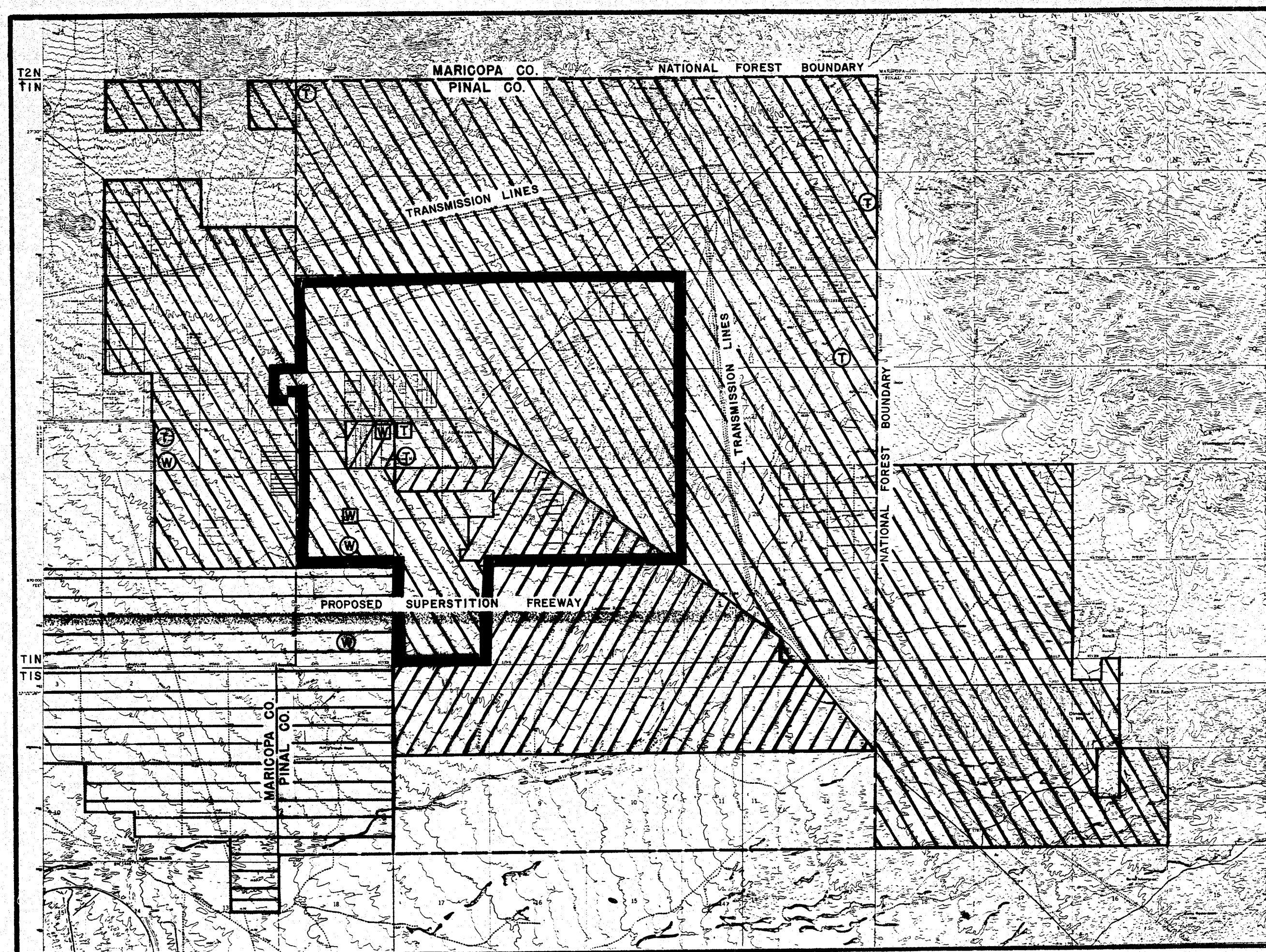
ARIZONA WATER COMPANY. The Arizona Water Company is a relatively large organization operating in several counties within the state of Arizona. In its most recent report filed with the Arizona Corporation Commission, it listed total assets of $30,589,000 with 32,531 connected services. In its Apache Junction certificated areas, the Arizona Water Company serves nearly 11,000 people through approximately 3,500 connected services, of which approximately 6,500 people and 2,050 services are located in the service area being analyzed in this report. Although its

TABLE 3-3

1980 POPULATION IN THE APACHE JUNCTION

SERVICE AREA

CATEGORY	POPULATION	
Permanent Population in City	10,500	
Seasonal Population in City	16,197	
Total Population in City	26,697	
Permanent Population in Outlying Service Area	2,200	
Seasonal Population in Outlying Service Area	1,451	
Total Population in Outlying Service Area	3,651	
Total Population in Service Area		30,348



WATER SYSTEMS EVALUATION
FOR
APACHE JUNCTION, ARIZONA

WATER COMPANY CERTIFICATED AREAS

PRC TOUPS
4131 N 24 ST. PHX., AZ.

FIGURE NO. 3-6

TABLE 3-4

WATER COMPANY SERVICE AREAS

AGENCY	SERVICE AREA (acres)	SERVICE AREA (sq. mi.)	PERCENT OF TOTAL
ARIZONA WATER COMPANY	19,481	30.44	63.4
CRESCENT VALLEY UTILITY COMPANY	1,920	3.00	6.2
PALM SPRINGS WATER COMPANY	5,887	9.20	19.2
UNOCCUPIED	3,452	5.39	11.2
TOTAL	30,740	48.03	100.0

assets are not listed separately for the Apache Junction certificated area, they are estimated at between $3 and $4 million dollars, based on ratios of the number of connected services and the total pipe in place.

Water is supplied to the Apache Junction service area by four wells which pump to a total of five storage facilities. The installed capacities and the normal pumping capacities for the four wells are shown in Table 3-5. Also shown are the installed storage capacities at the five storage sites. Total water produced for domestic use over the past year amounted to about 480 million gallons, making for an average consumption of 120 gallons per capita per day (gpcd).

Available water quality data for the Arizona Water Company system are summarized in Table 3-6. Also shown for comparison are the Arizona Department of Health Services (ADHS) drinking water regulations for the State of Arizona, published in 1978. The Arizona regulations are based on standards promulgated by the U.S. Environmental Protection Agency (EPA) at both the primary and secondary levels. The National Interim Primary Drinking Water Regulations (1976) concern constituents affecting the health of consumers and are applicable to all public water systems. The maximum contaminant levels for inorganic constituents are as follows:

CONSTITUENT	LEVEL (mg/l)
Arsenic	0.05
Barium	1.0
Cadmium	0.01
Chromium	0.05
Fluoride (Phoenix Area)	1.4
Lead	0.05
Mercury	0.002
Nitrate (as N)	10.0
Selenium	0.01
Silver	0.05

TABLE 3-5

ARIZONA WATER COMPANY

WELL PUMP CAPACITIES

LOCATION	INSTALLED WELL PUMPING CAPACITY (GPM)	NORMAL OPERATING CAPACITY (GPM)
OASIS - WELL NO. 11	400	300
SOUTHERN - WELL NO. 12	1,600	860
OASIS - WELL NO. 13	3,500	950
BASELINE - WELL NO. 14	1,250	1,100
TOTAL	6,750	3,210

STORAGE TANK CAPACITIES

LOCATION	INSTALLED STORAGE CAPACITY (GALLONS)
University Tanks (Superstition Blvd., near Barkley Road).	1,500,000
Goldfield Tanks (McDowell Road near Meridian Road)	1,000,000
Oasis Park Tanks (Lake Drive near Signal Butte Road)	850,000
Superstition Tanks (Ironwood Drive near Broadway Road)	300,000
Mining Camp Tanks (Reavis Street near Barkley Road)	150,000
TOTAL	3,800,000

TABLE 3-6

ARIZONA WATER COMPANY

WATER QUALITY DATA

CONSTITUENT (mg/l)	ADHS STANDARDS	OASIS STORAGE TANK (3/29/79)	OASIS WELL NO. 11 (3/29/79)	SOUTHERN WELL NO. 12 (3/29/79)	OASIS WELL NO. 13 (3/29/79)
Residue	500	470	380	460	1,120
Calcium	-	45	33	45	145
Magnesium	-	7.2	5.6	8.7	18
Hardness ($CaCo_3$)	-	142	106	148	437
Sodium	-	102	83	93	243
Iron	0.3	lt* 0.1	0.8	lt 0.1	1.1
Copper	1.0	lt 0.05	lt 0.05	lt 0.05	0.19
Manganese	0.05	lt 0.05	lt 0.05	lt 0.05	lt 0.05
Zinc	5	lt 0.05	0.05	lt 0.05	lt 0.05
Alkalinity P	-	0	0	0	0
Alkalinity MP	-	154	156	182	130
Chloride	250	146	92	120	550
Nitrate	10	2.7	2.4	3.0	1.6
Sulfate	250	34	32	34	70
Fluoride	1.4	0.7	0.7	0.7	0.8
Arsenic	0.05	0.025	0.033	0.011	lt 0.01
Silver	0.05	lt 0.02	lt 0.02	lt 0.02	lt 0.02
Chromium	0.05	lt 0.01	lt 0.01	lt 0.01	lt 0.01
Cadmium	0.01	lt 0.005	lt 0.005	lt 0.005	lt 0.005
Lead	0.05	lt 0.02	lt 0.02	lt 0.02	0.040
Selenium	0.01	lt 0.005	lt 0.005	lt 0.005	lt 0.005
Mercury	0.002	lt 0.001	lt 0.001	lt 0.001	lt 0.001
Barium	1	lt 0.2	lt 0.2	lt 0.2	lt 0.2
pH	6.5-8.5	8.0	7.9	8.0	7.7

* less than

The National Secondary Drinking Water Regulations (1977) concern the aesthetic qualities of drinking water. Secondary regulations are not federally enforceable, but are intended as guidelines. The constituents for which secondary maximum contaminant levels are proposed in these regulations may not have a significant direct impact on the health of the consumers, but their presence in excessive quantities may discourage the utilization of a drinking water supply by the public. The maximum contaminant levels are as follows:

CONSTITUENT	LEVEL (mg/l)
Chloride	250
Copper	1.0
Foaming Agents	0.5
Hydrogen Sulfide	0.05
Iron	0.3
Manganese	0.05
pH	6.5-8.5
Sulfate	250
Total Dissolved Solids	500
Zinc	5.0

The existing distribution system for the Arizona Water Company is presented in Figure 3-7, which can be found in the pocket at the back of the report. Table 3-7 is a tabulation of the lengths of pipe for the various diameters. As shown, only about 70 percent of the pipe in the distribution system is greater than 4 inches in diameter. As of the writing of this report, 162 fire hydrants were operated off the Arizona Water Company system by the Apache Junction Volunteer Fire District.

PALM SPRINGS WATER COMPANY. The Palm Springs Water Company, a subsidiary of Consolidated Water Utilities, is significantly smaller than the Arizona Water Company and operates entirely within the Apache Junction service area. In its most recent report filed with the Arizona Corporation Commission, it listed total assets of $758,000 with 884 connected services. The total number of persons served in Apache Junction is approximately 3,100.

TABLE 3-7

ARIZONA WATER COMPANY

EXISTING PIPE TABULATION

DIAMETER (inches)	STEEL (S) (feet)	GALVANIZED STEEL (GS) (feet)	ASBESTOS CEMENT (AC) (feet)	PLASTIC (P) (feet)	TOTAL (feet)	PERCENT OF TOTAL
1 - 1-1/2	5,640	16,860		700	23,200	4.0
2		50,850		2,800	53,650	9.3
3				3,040	3,040	0.5
4			93,410		93,410	16.2
6			281,220		281,220	48.7
8			34,080		34,080	5.9
12			89,080		89,080	15.4
TOTAL	5,640	67,710	497,790	6,540	577,680	
PERCENT	1.0	11.7	86.2	1.1		100.0

Water is supplied to the Apache Junction service area by two wells. The larger of the two (Well No. 5) is located at 16th Avenue and Delaware Drive and has a capacity of 750 gallons per minute (gpm). The other well pump (Well No. 3) has a capacity of 250 gpm and is located behind the water company office at 75 South Saguaro Drive. These two wells pump water to either of two 100,000 gallon storage tanks also located behind the water company office.* A battery of two booster pumps, one designed for 220 gpm @ 80 psi and the other for 200 gpm @ 80 psi, move the water out of the storage facilities and through a hydropneumatic tank into the system. Total water produced for domestic use over the past year amounted to about 78.5 million gallons. In addition, Palm Springs purchased approximately 12 million gallons from the Arizona Water Company. Therefore, the average consumption for the service area was about 80 gpcd.

Available water quality data for the Palm Springs Water Company system are summarized in Table 3-8. Also shown for comparison are the ADHS drinking water regulations for the State of Arizona, published in 1978. The Arizona regulations are based on standards promulgated by the EPA, as discussed previously for the Arizona Water Company.

The existing distribution system for the Palm Springs Water Company is presented in Figure 3-8, which can be found in the pocket at the back of the report. Table 3-9 is a tabulation of the lengths of pipe for the various diameters. As shown, none of the pipe in the existing system is larger than 6-inches in diameter and nearly 55 percent is 4-inches in diameter or smaller. Of major significance is that over 20 percent of the pipe in the ground is only 2-inches or 3-inches in diameter. As of the writing of this report, 19 fire hydrants were operated off the Palm Springs Water Company system by the Apache Junction Volunteer Fire District.

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* One of the tanks actually has a capacity of 150,000 gallons. However, due to the low pressure capability of the well pumps, the upper one-third of the tank is not able to be filled.

TABLE 3-8

PALM SPRINGS WATER COMPANY

WATER QUALITY DATA

CONSTITUENT (mg/l)	ADHS STANDARDS	WELL NO. 3 (2/8/80)	WELL NO. 5 (3/8/77)	WELL NO. 3 STORAGE TANK (11/20/80)
Residue	500	1,840	910	1,200
Calcium	-	177	76	109
Magnesium	-	37	11	16
Hardness ($CaCo_3$)	-	595	234	338
Sodium	-	362	248	287
Iron	0.3	2.4	0.2	0.23
Copper	1.0	0.1	-	lt 0.05
Manganese	0.05	0.04	-	lt 0.05
Zinc	5	3.1	-	lt 0.05
Alkalinity P	-	0	0	0
Alkalinity MP	-	122	170	164
Chloride	250	808	392	504
Nitrate	10	0.7	-	0.9
Sulfate	250	108	57	72
Fluoride	1.4	0.4	2	1.3
Arsenic	0.05	lt* 0.01	-	0.011
Silver	0.05	lt 0.02	-	lt 0.02
Chromium	0.05	lt 0.01	lt 0.01	lt 0.01
Cadmium	0.01	lt 0.005	-	lt 0.005
Lead	0.05	0.035	-	lt 0.02
Selenium	0.01	0.005	-	lt 0.005
Mercury	0.002	0.001	-	lt 0.001
Barium	1	0.2	-	lt 0.2
pH	6.5-8.5	7.0	7.6	7.9

* less than

TABLE 3-9

PALM SPRINGS WATER COMPANY

EXISTING PIPE TABULATION

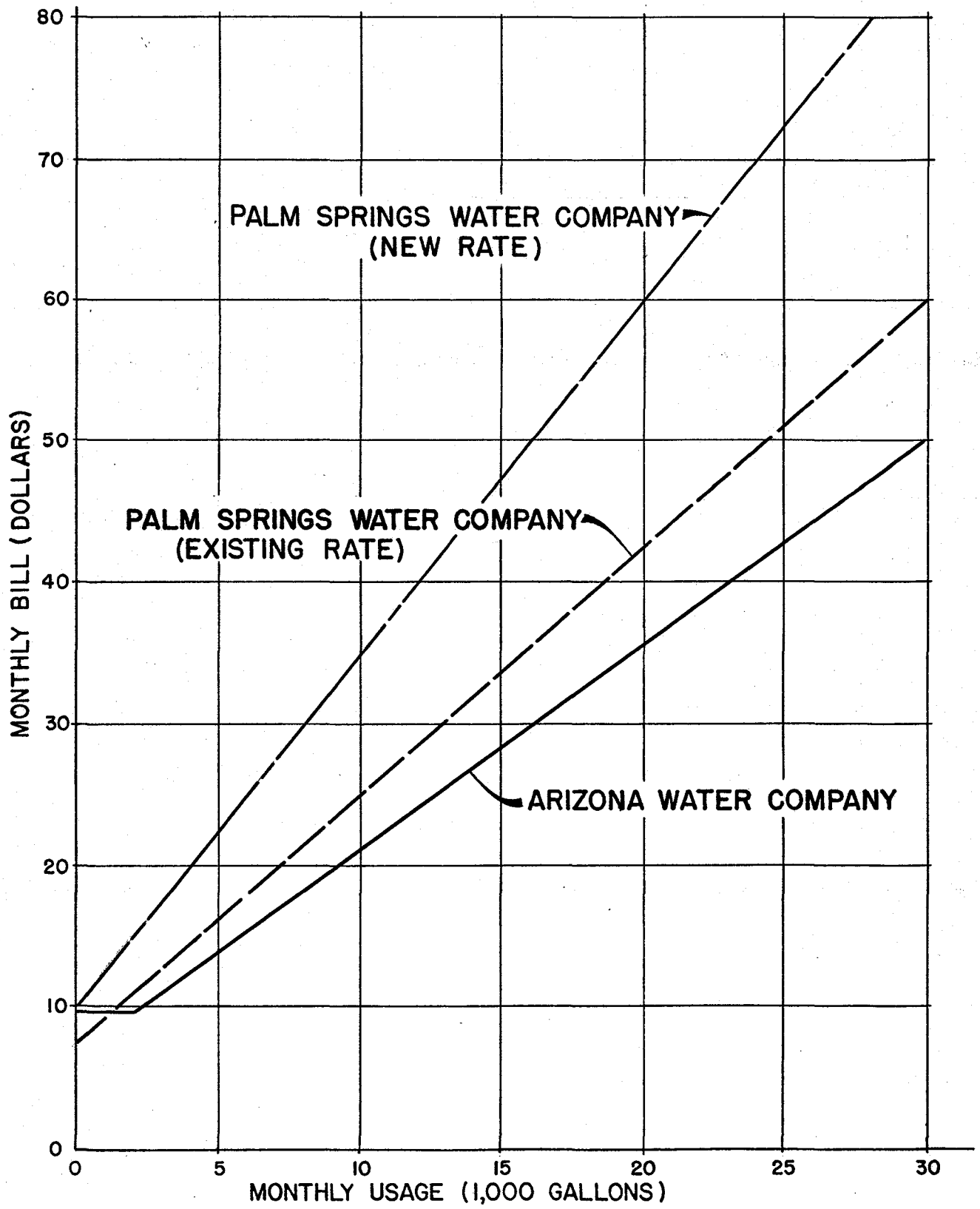
DIAMETER (inches)	GALVANIZED IRON (GI) (feet)	ASBESTOS CEMENT (AC) (feet)	POLYVINYL CHLORIDE (PVC) (feet)	TOTAL (feet)	PERCENT OF TOTAL
2	7,800			7,800	5.1
3	5,200	17,600	800	23,600	15.5
4		49,300	2,200	51,500	33.7
6		58,000	11,800	69,800	45.7
TOTAL	13,000	124,900	14,800	152,700	
PERCENT	8.5	81.8	9.7		100.0

APPRAISAL OF EXISTING LEVEL OF SERVICE.

ARIZONA WATER COMPANY. Generally speaking, a water system should be able to meet the maximum day domestic demand plus fire flow, with one major supply source out of service. Storage should also be provided for at least two hours worth of the maximum day plus fire flow demand with one major storage facility out of service. Based on the past year's operating records, the maximum day domestic demand is approximately 1,400 gpm. A desirable fire flow capability would be 2,000 gpm for a period of two hours. Therefore, the maximum day plus fire flow demand is approximately 3,400 gpm and the storage capacity needed for two hours worth of this flow is 408,000 gallons. Referring to information presented earlier, the Arizona Water Company has a total installed pumping capacity of 6,750 gpm and storage capacity of 3,800,000 gallons. With the largest unit in each category out of service, the company would still be able to supply 3,250 gpm with a storage capacity of 2,300,000 gallons, thereby nearly satisfying the maximum day plus fire flow demand and greatly exceeding the storage capacity requirement. Therefore, the supply and storage components of this system appear satisfactory.

The Arizona Water Company is basically a sound organization with dedicated management and a good system of operations. In Apache Junction, planning is continuously carried out to insure that the water supply will be available to serve the anticipated future population. Adequately sized pipelines are built into the distribution system to properly handle the necessary flows and good scheduling of operation and maintenance insures that the supply sites are running smoothly and the pipes are not becoming clogged or deteriorated. Over the years, some small pipes have become part of the distribution system through purchase of small existing water companies. However, through an annual capitol improvements program, the company is gradually replacing these lines on a year by year basis.

The minimum monthly bill for the standard 5/8" x 3/4" residential water meter is $9.50, which includes the first 2,000 gallons of use. The rate for all use over 2,000 gallons per month is $1.46 per 1,000 gallons. The Arizona Water Company rate is shown diagrammatically in Figure 3-9.



WATER SYSTEMS EVALUATION
FOR
APACHE JUNCTION, ARIZONA

EXISTING WATER RATES

PRC TOUPS
4131 N 24 ST. PHX., AZ.

FIGURE NO. 3-9

PALM SPRINGS WATER COMPANY. Based on the past year's operating records, the maximum day domestic demand is approximately 250 gpm. Once again, a desirable fire flow capability would be 2,000 gpm for a period of two hours. Therefore, the maximum day plus fire flow demand is approximately 2,250 gpm and the storage capacity needed for two hours worth of this flow is 270,000 gallons. Referring to information presented earlier, the Palm Springs Water Company has an installed booster pump capacity of 420 gpm and storage capacity of 200,000 gallons, all at the same location. It is immediately apparent that the existing system would become virtually inoperable should this location be taken out of service. It would be necessary to install storage and booster facilities at the Well No. 5 site in order to have a completely flexible and reliable system.

In addition to the above deficiency, the Palm Springs system also suffers from a high percentage of small, deteriorating pipelines. As discussed earlier, over 20 percent of the pipe in the ground is only 2 inches or 3 inches in diameter; furthermore, corrosion and scale buildup over the years has undoubtedly reduced the carrying capacity of these pipelines even further. Up until a year ago, the Palm Springs Water Company suffered from a general lack of planning and a poor schedule of operation and maintenance. However, in December, 1979, the ownership changed and the company became affiliated with Consolidated Water Utilities, a water company which was formed in the middle 1960's and which serves a forty square mile certificated area in the north central portion of the Phoenix metropolitan area. This company does have office and field personnel who are qualified to meet its present requirements. The field crews have a variety of trade skills which are valuable in support of routine operations, while the administrative personnel have recently become more sophisticated in their handling of management and administrative procedures and have retained qualified people to direct these efforts. Thus, it appears that Consolidated has the expertise necessary to correct the deficiencies in the existing Palm Springs system and turn it into a reliable working operation. The length of time needed to improve the system will be somewhat dependent on available revenues.

The present minimum monthly bill for the standard 5/8" x 3/4" residential water meter is $7.25, which does not include any water for use. The existing rate for all use of water is $1.75 per 1,000 gallons. The present Palm Springs Water Company rate is shown diagrammatically in Figure 3-9. Also shown is the new rate which will go into effect on or about June 1, 1981. The new minimum monthly bill will be $10.00 plus $2.50 per 1,000 gallons for all water consumed. The following table shows how the monthly bills would compare for the Arizona Water Company rate and for both Palm Springs Water Company rates for usages of 12,000 and 30,000 gallons, respectively.

UTILITY	MONTHLY BILL for 12,000 gallons	MONTHLY BILL for 30,000 gallons
Arizona Water Company	$24.10	$50.38
Palm Springs Water Company (existing)	28.25	59.75
Palm Springs Water Company (new)	40.00	85.00

ISO REPORT. The Apache Junction water system was evaluated by the Insurance Services Office (ISO) of Arizona in April and May of 1977. The major recommendations noted in the report were:

1) *That the arterial systems be strenghthened by installation of arterial mains (8-inch or larger) extending to all sections of the District, with size sufficient to provide delivery of maximum consumption demands in addition to recommended fire flows. The following quantities are desirable:*

Commercial (includes business, institutions and industrial)	*1500 to 4000 gpm*
Residential	*1000 gpm*

2) *That sufficient hydrants be installed to provide a maximum distribution of one hydrant for every 130,000 square feet in the high value districts and one hydrant for every 160,000 square feet in the residential districts.*

The need to increase pipe diameters and fire hydrant coverage cannot be overstated. Over 35 percent of the existing pipe in the ground is no greater than 4-inches in diameter. In addition, while the second of the above statements translates into a minimum of *176 fire hydrants per section* of developed area, the entire Apache Junction service area (48.03 square miles) contains only 181 fire hydrants, an average of only about *4 fire hydrants per section.* Even if only the developable area is included, the City of Apache Junction has only about *15 fire hydrants per section.*

OPERATING CERTIFICATES. Under the Certificates of Convenience and Necessity granted by the Arizona Corporation Commission, privately owned water companies are only mandated the responsibility for meeting domestic water demands. Industrial and fire flow requirements are not included under the terms of these certificates. The burden of providing fire protection is that of the local fire agency, be it the City of Apache Junction or the rural fire department.

CHAPTER 4

FUTURE CONDITIONS

POPULATION.

According to the previously mentioned report, "Population Analysis for the City of Apache Junction, Arizona", the population of the service area is expected to grow at a rate of 5 percent per year for the next ten years, 4 percent per year for the years 1991-1995, and 3 percent per year for the years 1996-2000. Table 4-1 shows the projected populations for the City itself, the outlying service area, and the total service area through the year 2000. As shown, there is projected to be 60,161 residents and 8,268 residents in the City and the outlying service area, respectively, for a total year 2000 population of 68,429. The report took a somewhat conservative look at the potential for population growth in the service area. Major factors which could increase the rate of growth include completion of the Superstition Freeway, development of a municipal airport, opening of a community college, and the further development of industrial parks and shopping centers.

As important for this study as the total population is the population density in the two major areas. The upper half of Table 4-2 shows the population densities through year 2000 based on land area within the city limits of 13.03 square miles and a land area of 35 square miles in the outlying service area. The land area in the total service area is approximately 48.03 square miles. An important distinction between the City and the outlying service area is apparent from Table 4-2, which shows that the population density in the outlying service area is only about 5 percent of that in the City. By year 2000, population density in the City will have reached 4,617 persons per square mile, while the population density in the outlying service area will only be 236 persons per square mile.

The lower half of Table 4-2 presents a further comparison. Within the city limits, there are two square miles which are under public ownership. It therefore seems reasonable to use an eleven square mile figure

TABLE 4-1

APACHE JUNCTION POPULATION PROJECTIONS THROUGH YEAR 2000

	CITY			OUTLYING SERVICE AREA			TOTAL SERVICE AREA
YEAR	PERMANENT POPULATION	SEASONAL POPULATION	TOTAL POPULATION	PERMANENT POPULATION	SEASONAL POPULATION	TOTAL POPULATION	TOTAL POPULATION
1980	10,500	16,197	26,697	2,200	1,451	3,651	30,348
1985	12,762	20,669	33,431	2,806	1,851	4,657	38,088
1990	16,288	26,375	42,663	3,579	2,362	5,941	48,604
1995	19,816	32,085	51,901	4,294	2,873	7,167	59,068
2000	22,972	37,189	60,161	4,938	3,330	8,268	68,429

TABLE 4-2

APACHE JUNCTION POPULATION DENSITIES THROUGH YEAR 2000

(1) GROSS POPULATION DENSITIES

YEAR	CITY		OUTLYING SERVICE AREA		TOTAL SERVICE AREA	
	TOTAL POPULATION	POPULATION DENSITY (PERSONS PER SQ. MI.) 13.03 SQ. MI.	TOTAL POPULATION	POPULATION DENSITY (PERSONS PER SQ. MI.) 35 SQ. MI.	TOTAL POPULATION	POPULATION DENSITY (PERSONS PER SQ. MI.) 48.03 SQ. MI.
1980	26,697	2,049	3,651	104	30,348	632
1985	33,431	2,565	4,657	133	38,088	793
1990	42,663	3,274	5,941	170	48,604	1,012
1995	51,901	3,983	7,167	205	59,068	1,230
2000	60,161	4,617	8,268	236	68,429	1,425

(2) NET POPULATION DENSITIES

YEAR	CITY		OUTLYING SERVICE AREA		TOTAL SERVICE AREA	
	TOTAL POPULATION	POPULATION DENSITY (PERSONS PER SQ. MI.) 11 SQ. MI.	TOTAL POPULATION	POPULATION DENSITY (PERSONS PER SQ. MI.) 13 SQ. MI.	TOTAL POPULATION	POPULATION DENSITY (PERSONS PER SQ. MI.) 24 SQ. MI.
1980	26,697	2,427	3,651	281	30,348	1,265
1985	33,431	3,039	4,657	358	38,088	1,587
1990	42,663	3,878	5,941	457	48,604	2,025
1995	51,901	4,718	7,167	551	59,068	2,461
2000	60,161	5,469	8,268	636	68,429	2,851

to represent the area within the city limits which is actually developable. Likewise, in the outlying service area, 22 of the 35 square miles are either lands in trust to the Arizona State Land Department or are lands controlled by the United States Bureau of Land Management. Once again, it seems reasonable to use a thirteen square mile figure to represent the area within the outlying service area which is actually developable. Certainly, the state lands will be proposed for development in the future; however, for base statistical purposes and for the fact that the users today are unknown, it is felt that the statistics should be presented in terms of both the gross and net areas. The lower half of Table 4-2 shows that, by year 2000, population density in the city will have reached 5,469 persons per square mile, while the population density in the outlying service area will only be 636 persons per square mile, or about 12 percent of the city figure.

The density figures within the city limits become even more significant when the existing pattern of development is considered. Conservatively speaking, only about 6.5 square miles within the city limits is actually developed at present. Over this developed area, the population density is estimated to be 1,615 persons per square mile during the summer and 4,107 persons per square mile during the peak of the winter season. When comparing these population densities, it is important to keep in mind that they are gross averages based on the conservative projections contained in the 1980 population report. Individual sections of the outlying service area, for example, may develop rather quickly, while other sections may not develop at all. The major factors identified in the above paragraphs could have a significant effect on how the population actually distributes in the future.

For comparison, population density figures for the major valley cities of Glendale, Mesa, Phoenix, Scottsdale, and Tempe are presented in Table 4-3. With the exception of Scottsdale, which had a large quantity of recently annexed and generally undeveloped or sparsely developed land area included in its total, the average population density is about

TABLE 4-3

POPULATION DENSITY COMPARISON

COMMUNITY	POPULATION FROM PRELIMINARY 1980 CENSUS	LAND AREA (SQ. MI.)	AVERAGE POPULATION DENSITY (PERSONS/SQ. MI.)	MAXIMUM POPULATION DENSITY (PERSONS/SQ. MI.)	AVERAGE POPULATION DENSITY IN DEVELOPED AREA (PERSONS/SQ. MI.)
Glendale	92,809	40	2,320	--	--
Mesa	149,662	66	2,270	9,340	3,120
Phoenix	779,592	325	2,400	--	--
Scottsdale	87,700	89	990	--	--
Tempe	106,306	38	2,800	7,300	3,980
Apache Junction (1980) - Gross	26,697	13.03			2,049
Apache Junction (1980) - Net	26,697	11	955 (summer) 2,427 (winter)		1,615 (summer) 4,107 (winter)
Apache Junction (2000) - Gross	60,161	13.03			4,617
Apache Junction (2000) - Net	60,161	11	2,088 (summer) 5,469 (winter)		3,534 (summer) 9,256 (winter)

2,400 persons per square mile. Additional data received from the east valley cities of Mesa and Tempe shows maximum population densities of 9,340 and 7,300, respectively. The average population densities in the developed residential areas are about 3,120 and 3,980 persons per square mile for Mesa and Tempe, respectively. As can be seen from Tables 4-2 and 4-3, population density in the 1990's within the city limits of Apache Junction will become comparable to these other larger valley cities, where complete municipal services have been provided for many years.

DISTRIBUTION BY WATER COMPANY. As expected, the largest percentage of the future population would fall into the service area of the Arizona Water Company. It is estimated that by year 2000, the company would serve 51,004 people within the city limits and 4,569 in the outlying service area, for a total of 55,573. The Palm Springs Water Company would serve 9,017 persons within the city limits plus 1,710 in the outlying service area. In addition, it is expected that the land not presently within any certificated area would eventually be brought into the Palm Springs system as part of a natural expansion to the south. This would add 1,273 people to the outlying service area, for a total population in the Palm Springs system of 12,000. The smallest percentage of the future population would be allocated to the Crescent Valley Utility Company. This company would not serve at all within the city limits and would serve only 708 persons in the outlying service area.

GENERAL ASSESSMENT OF WATER QUANTITY.

The economy of Apache Junction, like that of the rest of central Arizona, utilizes nearly 100 percent of the indigenous surface water and requires an overdraft on the groundwater reservoirs. However, con-

struction of the Central Arizona Project (CAP) will be a major step toward supplementing the groundwater with a dependable source. The importation of Colorado River water accompanied by a reduction in groundwater pumping will go far toward bringing into balance the available supply with the demands of irrigated agriculture.

Table 4-4 presents the municipal allocation recommendations for Central Arizona Project water made by the Arizona Department of Water Resources (DWR) in 1980. A comparison of columns (3) and (5) in the table reveals that the Arizona Water Company received its requested amount, while the Palm Springs Water Company received significantly less than the amount it requested. The reason for this appears to be the large discrepancy in population projections as submitted by the water company and the Arizona Department of Economic Security (DES). Earlier in this chapter, a service area population of 12,000 was projected for the Palm Springs Water Company for the year 2000, which is in between the two projections in the table, but closer to that of the DES. Thus, it appears that Palm Springs will be short on its allocation of CAP water, but not to the extent indicated by its own population projections.

It is beyond the scope of this study to attempt to analyze in detail the groundwater resources in the Apache Junction area; however, a general review was made of the *Geology and Groundwater Resources Report* for the Central Arizona Project published by the Bureau of Reclamation in December, 1976. For the Apache Junction area, the following general conclusions regarding groundwater resources can be made:

> During the period 1952 to 1964, groundwater levels declined by approximately 100 feet.
>
> During the period 1964 to 1972, groundwater levels tended to stabilize and in some areas even increased 10 to 20 feet.
>
> In the spring of 1972, groundwater levels were in the range of 200 to 500 feet below the surface.
>
> The aquifer usually penetrated ranges from about 600 to nearly 800 feet deep.

TABLE 4-4

CENTRAL ARIZONA PROJECT

MUNICIPAL ALLOCATION RECOMMENDATIONS

APPLICANT	YEAR	(1) APPLICANT POPULATION PROJECTION	(2) DEPT. OF ECONOMIC SECURITY POPULATION PROJECTION	(3) APPLICANT 1980 REQUEST (af/yr)	(4) PRORATED WATER REQUIREMENT (af/yr)	(5) 1980 STAFF ALLOCATION (af/yr)
ARIZONA WATER COMPANY	1985	11,520	9,645	1,500	1,945	1,500
	2005	21,000	20,565	3,500	4,146	3,500
	2034	34,800	50,790	6,000	9,137	6,000
PALM SPRINGS WATER COMPANY	1985	8,300	3,800	1,550	766	766
	2005	30,400	8,000	13,200	1,613	1,613
	2034	42,600	18,560	22,000	3,339	3,339

(1) Population projections submitted by applicant.

(2) Current population projection for applicant's service area as computed by the Arizona Department of Economic Security.

(3) Current request for water by applicant.

(4) The base water requirement of each applicant. The values represent the quantity of water necessary to provide the designated use rate for the population shown in (2).

(5) Current staff recommended CAP allocation. The amount is the lesser of (3) or (4).

It is not known with accuracy what level of adequacy is represented by Apache Junction's groundwater supplies. However, it has been found in the past that when land under cultivation is removed from production and developed into reasonably well-mixed land uses, the demands on the aquifer are usually reduced. Therefore, it is hoped that groundwater overdrafts will not significantly affect Apache Junction as it continues to grow.

INDIVIDUAL WATER COMPANY REQUIREMENTS.

PEAK FLOWS. Historical data was used to generate a "per capita" demand for each water company in the Apache Junction service area. This data yielded a figure of 120 gpcd for the Arizona Water Company, 80 gpcd for the Palm Springs Water Company, and 100 gpcd for the Crescent Valley Utility Company. It is anticipated that these figures will remain about the same through year 2000 for two offsetting reasons. First, as has been seen in other communities in Arizona, as the population grows and the community becomes more urbanized, the per capita contribution tends to increase to account for more car washing, lawn watering, and water intensive appliances. However, offsetting this trend is the fact the new residences are now being furnished with water conserving fixtures as required by local ordinances. As a result, it is felt that the above figures will remain realistic into the future.

It is interesting to note that, on the whole, the water consumption figures for Apache Junction are somewhat less than the national average of 150 gpcd. The major factors contributing to this phenomenon include the following:

1. The large percentage of desert-type landscaping in the community.

2. The high ratio of metered services to the total number of services.

3. The high percentage of water-conscious elderly people on fixed income in the community, especially during the winter season.

4. The lack of a municipal water utility to serve the entire area. (Often, a municipality is able to charge lower rates than private water companies, thereby encouraging somewhat greater consumption.)

As a check on the Apache Junction figures, the valley retirement community of Sun City was contacted regarding water consumption figures. Though not quite as low as Apache Junction, the Sun City residential gpcd consumption also fell below the national average.

To provide an adequate level of service in terms of a peak requirement, each water company should be able to meet the maximum day domestic demand plus fire flow. Earlier in the report, a fire flow of 2,000 gpm for 2 hours was utilized in examining the existing conditions. However, for the future conditions, it is felt that a higher fire fighting capacity should be used to represent the increased risk of larger fires as the city grows. For the year 2000, the fire flow selected is 4,000 gpm for 4 hours, or a total of 960,000 gallons.

The maximum day domestic demand for the Arizona Water Company is based on a service population of 55,573 and a maximum day per capita demand of 178 gpcd. This equates into a requirement of 6,900 gpm; thus, the maximum day plus fire flow demand is 10,900 gpm. The maximum day domestic demand for the Palm Springs Water Company is based on a service population of 12,000 and a maximum day per capita demand of 118 gpcd, which equates into a requirement of 1,000 gpm. Therefore, the maximum day plus fire flow demand for this company is 5,000 gpm. Finally, the maximum day domestic demand for the Crescent Valley Utility Company is based on a service population of 708 and a maxumum day per capita demand of 148 gpcd. This equates into a requirement of 100 gpm; thus, the maximum day plus fire flow demand is 4,100 gpm. All of this information is summarized in Table 4-5.

STORAGE. In order to provide a well-balanced water network, it is recommended that a certain amount of storage be provided for each supply system. The storage tank provides reserve capacity for meeting maximum

TABLE 4-5

DETERMINATION OF YEAR 2000 PEAK FLOW REQUIREMENTS

CATEGORY	ARIZONA WATER COMPANY	PALM SPRINGS WATER COMPANY	CRESCENT VALLEY UTILITY COMPANY
Service Population	55,573	12,000	708
Maximum Day Per Capita Demand, gpcd	178	118	148
Maximum Day Demand, gal.	9,870,000	1,421,000	105,000
Maximum Day Demand, gpm	6,900	1,000	100
Fire Flow Demand, gpm	4,000	4,000	4,000
TOTAL MAXIMUM DEMAND, gpm	10,900	5,000	4,100

domestic and fire-fighting demands of the system. In addition, where booster pumps are employed, the tank acts as a buffer between the well and the pumps to simplify their operation.

The Insurance Services Office (ISO) of Arizona publishes storage requirements which have been found to be reasonable and effective in meeting system needs. Their procedure for determining the total system storage consists of three components added together:

- 20 percent of the maximum day demand for operational uses.
- 5 percent of the maximum day demand for emergency uses.
- One maximum fire occurring during the maximum day demand.

In Table 4-6, the storage requirements for the three water companies are determined using the ISO procedure. As shown, the total storage requirement is approximately 3.43 million gallons, 1.32 million gallons, and 0.99 million gallons for the Arizona Water Company, the Palm Springs Water Company, and the Crescent Valley Utility Company, respectively. By the year 2000, the Arizona Water Company will be large enough such that the storage for operational and emergency uses will make up more than half of the total storage requirement. For the other two smaller companies, however, the fire fighting requirement accounts for the vast majority of the total storage requirement.

SUMMARY.

A summary of the peak flow and storage requirements for the three water companies is presented in Table 4-7. Also shown for comparison purposes are the existing system capacities as described in Chapter 3.

TABLE 4-6

DETERMINATION OF YEAR 2000 STORAGE REQUIREMENTS (PER ISO)

CATEGORY	ARIZONA WATER COMPANY	PALM SPRINGS WATER COMPANY	CRESCENT VALLEY UTILITY COMPANY
Maximum Day Demand	9,870,000 gal.	1,421,000 gal.	105,000 gal.
Storage for Operational Uses (20 percent of max. day demand)	1,974,000 gal.	284,000 gal.	21,000 gal.
Storage for Emergency Uses (5 percent of max. day demand)	494,000 gal.	71,000 gal.	5,000 gal.
Storage for Fire Fighting (4,000 gpm for 4 hours)	960,000 gal.	960,000 gal.	960,000 gal.
TOTAL STORAGE REQUIREMENT	3,428,000 gal.	1,315,000 gal.	986,000 gal.

TABLE 4-7

COMPARISON OF YEAR 2000 WATER SYSTEM
REQUIREMENTS WITH EXISTING CAPACITIES

CATEGORY	ARIZONA WATER COMPANY	PALM SPRINGS WATER COMPANY	CRESCENT VALLEY UTILITY COMPANY
Year 2000 Maximum Day plus Fire Flow Demand	10,900 gpm	5,000 gpm	4,100 gpm
Existing Capacity	6,750 gpm	420 gpm	---
Year 2000 Storage Requirement	3.43 mg	1.32 mg	0.99 mg
Existing Capacity	3.80 mg	0.20 mg	---

CHAPTER 5

DEVELOPMENT AND EVALUATION OF ALTERNATIVES

PRESENTATION OF ALTERNATIVES.

Based on the analysis of major deficiences completed in Chapters 3 and 4 and the desire of the residents of Apache Junction to receive an adequate level of service, four alternatives will be evaluated in this chapter for management of Apache Junction's water services at least through the year 2000. These alternatives are:

1) Continued private ownership and operation by the Arizona Water Company, the Palm Springs Water Company and the Crescent Valley Utility Company.
2) Continued private ownership and operation by the Arizona Water Company; city purchase but private operation (by the Arizona Water Company) of the Palm Springs Water Company and the Crescent Valley Utility Company certificated areas which are within the Apache Junction service area.
3) Continued private ownership and operation by the Arizona Water Company; city purchase and operation of the Palm Springs Water Company and the Crescent Valley Utility Company certificated areas which are within the Apache Junction service area.
4) Complete city purchase and operation of the Arizona Water Company, the Palm Springs Water Company, and the Crescent Valley Utility Company certificated areas which are within the Apache Junction service area.

It must be emphasized that under any of these four alternatives, reuse of treated wastewater should be encouraged in certain areas.

ANALYSIS OF COSTS.

ARIZONA WATER COMPANY. In Table 5-1, the estimated construction costs are presented for the supply and distribution of water over the territory of the Arizona Water Company. As shown, the cost estimate is comprised of several items, including the replacement of existing small lines (less than four inches in diameter), the provision for 8-inch and

TABLE 5-1

ARIZONA WATER COMPANY

COST ESTIMATE TO COVER APACHE JUNCTION SERVICE AREA

WATER DISTRIBUTION SYSTEM	
Replace Existing 1" to 1-1/2" Pipe	$348,000
Replace Existing 2" Pipe	805,000
Replace Existing 3" Pipe	46,000
SUBTOTAL	$1,199,000
New 8" Transimission Pipe	2,336,000
New 12" Transmission Pipe	9,030,000
SUBTOTAL	$11,366,000
WATER SUPPLY SYSTEM	
New Wells and Booster Pumps	775,000
New Storage Tank	300,000
SUBTOTAL	$1,075,000
TOTAL ESTIMATED CONSTRUCTION COST	$13,640,000

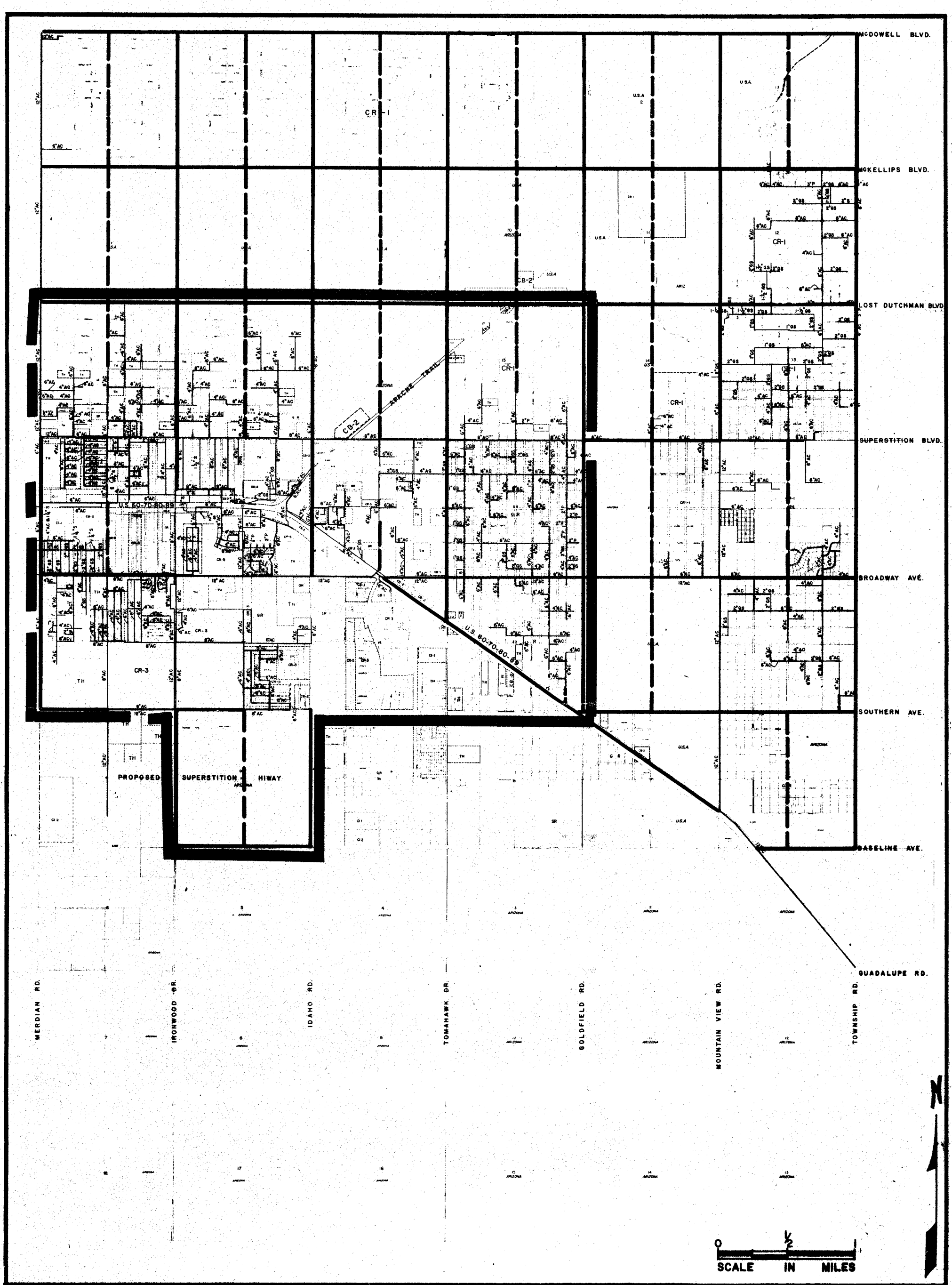
12-inch transmission lines along a grid pattern, the provision for future supply and booster pump facilities, and the provision for future storage facilities.

As shown earlier in Table 3-7, there is approximately 79,900 feet of pipe in the Arizona Water Company's system in Apache Junction which is less than four inches in diameter. In Table 5-1, a cost of $1,199,000 is shown for replacing these lines with pipe six inches in diameter. Once this replacement program is completed, the smallest pipe in the system would be four inches in diameter, and this would account for only about 16 percent of the existing total.

The largest percentage of the cost in Table 5-1 is attributed to covering the existing service area with a grid system of 8-inch and 12-inch pipe, as shown in Figure 5-1. The most heavily developed sections of Apache Junction are already served with an adequate grid system; therefore, this analysis merely extends the grid system to cover the remainder of the service area. The sizing criteria utilized is based on a system used by the City of Phoenix and its major suburbs whereby 12-inch pipe is installed in the one-mile streets and 8-inch pipe in the half mile streets, splitting each square mile into two 1/2-square mile sections. As shown, the estimated cost for this work is $11,366,000. This cost does not include the actual distribution piping (mainly six inch) which would serve the individual customers. It is likely that these line extensions to serve new areas would be financed by developers and individual homeowners through reimbursement agreements.

The remainder of the costs shown in Table 5-1 are attributed to meeting the ISO requirements discussed at the end of Chapter 4. $775,000 is the estimated cost for drilling new supply wells and providing booster pumping equipment to help pressurize the system. Additional storage facilities are estimated to cost $300,000.

The total estimated cost for expansion of the Arizona Water Company into the entire service area shown is $13,640,000.



LEGEND

FUTURE 8" WATERLINE

FUTURE 12" WATERLINE

WATER SYSTEMS EVALUATION
FOR
APACHE JUNCTION, ARIZONA

ARIZONA WATER COMPANY
FUTURE GRID SYSTEM

PRC TOUPS
4131 N 24 ST. PHX., AZ.

FIGURE NO. 5-1

PALM SPRINGS WATER COMPANY. Table 5-2 presents the estimated construction costs for the supply and distribution of water over the territory of the Palm Springs Water Company. As shown, immediate improvements recommended by the water company's consulting engineer to strengthen the existing distribution system include the addition of 8,500 feet of 6-inch pipe, 2,600 feet of 8-inch pipe, and 7,700 feet of 12-inch pipe for an estimated cost of $411,000. In addition, as shown earlier in Table 3-9, there is approximately 31,400 feet of pipe in the system which is less than 4-inches in diameter. In Table 5-2, a cost of $471,000 is shown for replacing these lines with pipe six inches in diameter. Once this replacement is completed, the smallest pipe in the Palm Springs system would be four inches in diameter, and this would account for about one-third of the total.

The largest percentage of the cost in Table 5-2 is attributed to covering the existing service area with a grid system of 8-inch and 12-inch pipe, as shown in Figure 5-2. The design criteria utilized is the same as that described for the Arizona Water Company. As shown, the estimated cost for this work is $3,936,000, and it does not include the actual distribution piping (mainly six inch) which would serve the individual customers. Here again, it is likely that these line extensions to serve new areas would be financed by developers and individual homeowners through reimbursement agreements.

The remainder of the costs shown in Table 5-2 are attributed to meeting the ISO requirements discussed at the end of Chapter 4. $455,000 is the estimated cost for drilling new supply wells and providing booster pumping equipment to help pressurize the system. Additional storage facilities are estimated to cost $200,000, of which approximately $85,000 is allocated for a 300,000 gallon storage tank at the existing Well No. 5 site at 16th Avenue and Delaware Drive.

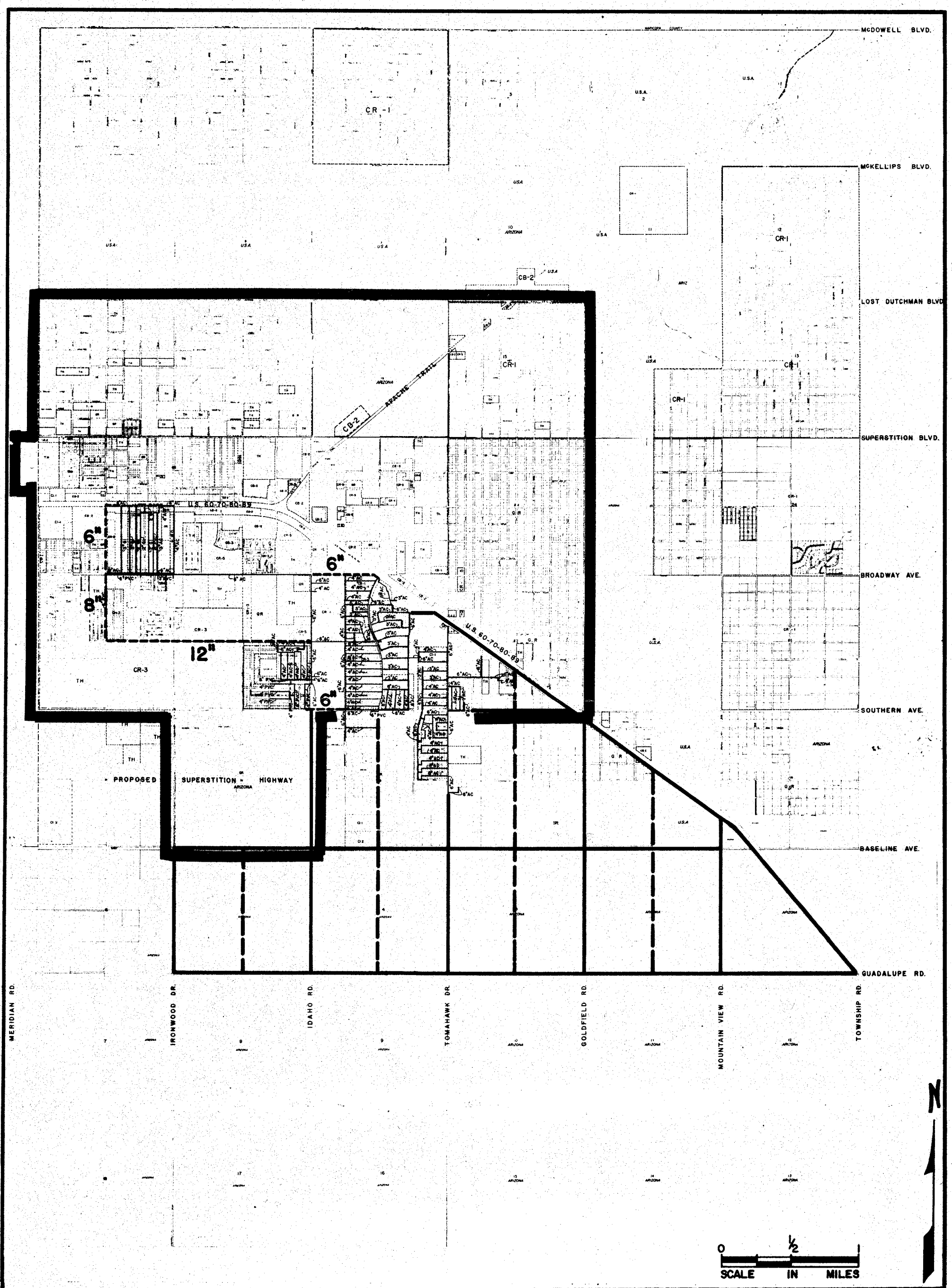
The total estimated cost for expansion of the Palm Springs Water Company into its entire service area is $5,473,000.

TABLE 5-2

PALM SPRINGS WATER COMPANY

COST ESTIMATE TO COVER APACHE JUNCTION SERVICE AREA

IMMEDIATE IMPROVEMENTS	
Proposed 6" Pipe	$128,000
Proposed 8" Pipe	52,000
Proposed 12" Pipe	231,000
SUBTOTAL	$411,000
WATER DISTRIBUTION SYSTEM	
Replace Existing 2" Pipe	117,000
Replace Existing 3" Pipe	354,000
SUBTOTAL	$471,000
New 8" Transmission Pipe	732,000
New 12" Transmission Pipe	3,204,000
SUBTOTAL	$3,936,000
WATER SUPPLY SYSTEM	
New Wells and Booster Pumps	455,000
New Storage Tanks	200,000
SUBTOTAL	$655,000
TOTAL ESTIMATED CONSTRUCTION COST	$5,473,000



LEGENI

- PROPOSED WATERLINE SIZE AS INDICATED
- FUTURE 8" WATERLINE
- FUTURE 12" WATERLINE

WATER SYSTEMS EVALUATION FOR APACHE JUNCTION, ARIZONA

PALM SPRINGS WATER CO. FUTURE GRID SYSTEM

PRC TOUPS
4131 N 24 ST. PHX., AZ.

FIGURE NO. 5-2

CRESCENT VALLEY UTILITY COMPANY. The estimated construction costs for the supply and distribution of water over the territory of the Crescent Valley Utility Company are presented in Table 5-3. The largest percentage of the cost is attributed to covering the existing service area with a grid system of 8-inch and 12-inch pipe, as shown in Figure 5-3. The design criteria utilized is the same as that described previously for the other water companies. As shown, the estimated cost for this work is $1,668,000, and it does not include the actual distribution piping (mainly six inches) which would serve the individual customers. Here again, it is likely that these line extensions to serve new areas would be financed by developers and individual homeowners through reimbursement agreements.

The remainder of the costs shown in Table 5-3 are attributed to meeting the ISO requirements discussed at the end of Chapter 4. $310,000 is the estimated cost for drilling new supply wells and providing booster pumping equipment to help pressurize the system. Storage facilities are estimated to cost $150,000. These two figures are very conservative in that they assume the facilities would be developed from scratch to serve Crescent Valley's three square mile area. Depending on the location of the existing wells and storage tanks in eastern Mesa, however, Crescent Valley may be able to serve part or all of the three square mile area from existing facilities.

The total estimated cost for developing the service area of the Crescent Valley Utility Company is $2,128,000.

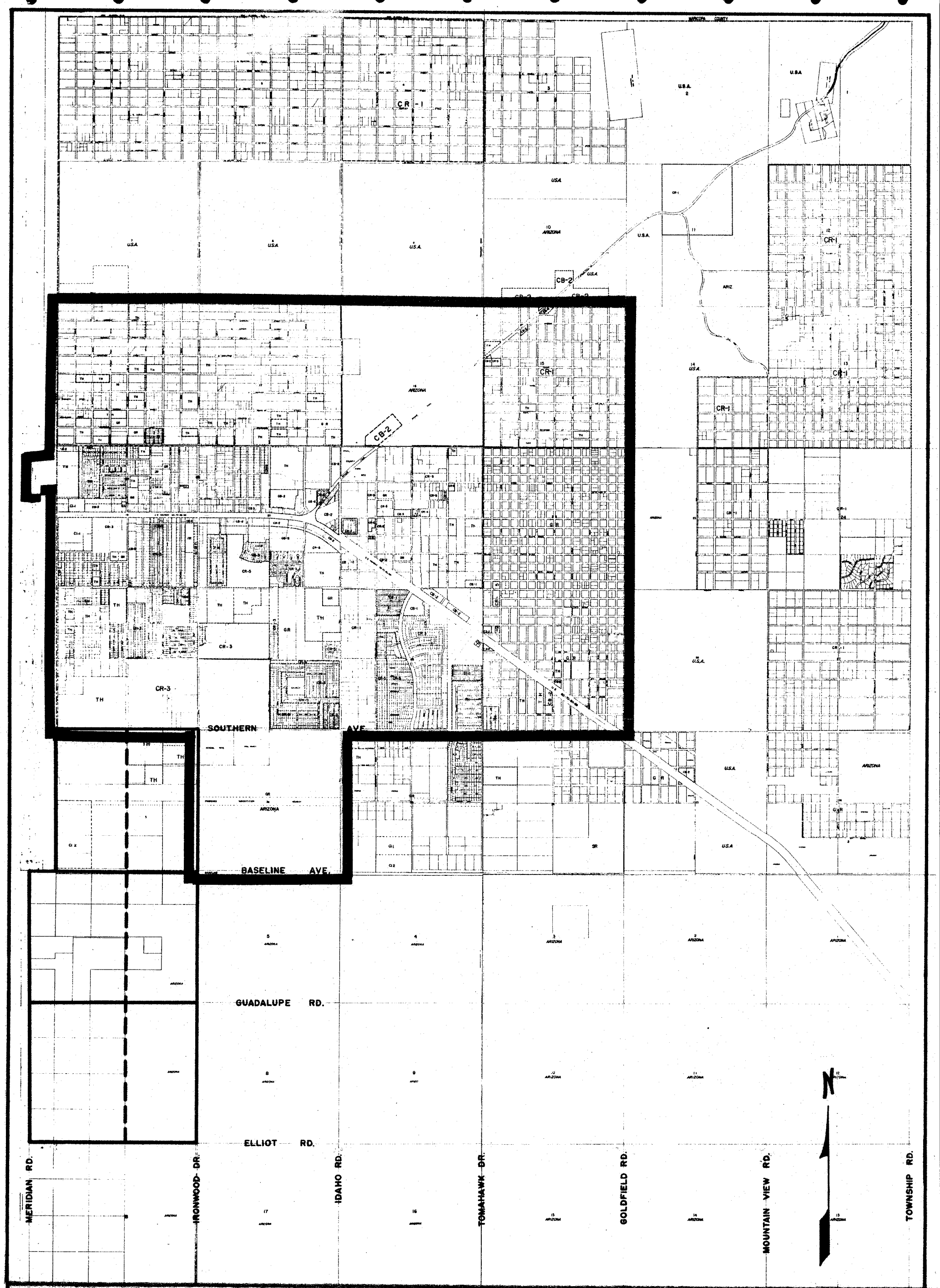
FIRE HYDRANTS. The ISO requirement for fire hydrant coverage presented in Chapter 3 translates into a minimum of 176 fire hydrants per section of developed area. If the effort for fire hydrants coverage is concentrated within the city limits (13.03 square miles), the total number of fire hydrants required by the year 2000 will be 2,294. Subtracting the 166 existing hydrants within the city limits leaves 2,128 hydrants to be installed. The total estimated construction cost for installing 2,128 fire hydrants is $3,192,000.

TABLE 5-3

CRESCENT VALLEY UTILITY COMPANY

COST ESTIMATE TO COVER APACHE JUNCTION SERVICE AREA

WATER DISTRIBUTION	
New 8" Transmission Pipe	$ 318,000
New 12" Transmission Pipe	1,350,000
SUBTOTAL	$1,668,000
WATER SUPPLY SYSTEM	
New Wells and Booster Pumps	310,000
New Storage Tanks	150,000
SUBTOTAL	$460,000
TOTAL ESTIMATED CONSTRUCTION COST	$2,128,000



LEGEND

FUTURE 8" WATERLINE

FUTURE 12" WATERLINE

0 ½ SCALE IN MILES

WATER SYSTEMS EVALUATION
FOR
APACHE JUNCTION, ARIZONA

CRESCENT VALLEY UTILITY CO
FUTURE GRID SYSTEM

PRC TOUPS
4131 N 24 ST. PHX., AZ.

FIGURE NO. 5-3

Under the Certificates of Convenience and Necessity granted by the Arizona Corporation Commission, privately owned water companies are not mandated the responsibility to meet fire flow requirements. The burden of providing fire protection is that of the local fire agency, be it the City of Apache Junction or the rural fire department. Normally, to avoid incurring a large financial burden, municipalities work with developers and individual homeowners through reimbursement agreements to finance fire hydrant installation at the same time line extensions are being constructed.

COST COMPARISON OF ALTERNATIVES. The cost analysis in this section is concerned only with the supply and distribution of water over the Apache Junction service area. (Costs for possibly acquiring water companies will be included as part of the following section, "Ability to Implement.") As such, it is felt that these costs will be substantially the same no matter which alternative is considered. Private water company ownership versus municipal ownership should have little, if any, effect on the cost of drilling new wells and providing new booster pumps, distribution pipes and fire hydrants in the service area and, therefore, all alternatives will be given the same ranking under "Cost Analysis".

ABILITY TO IMPLEMENT.

The easiest of the four alternatives to implement would undoubtedly be Alternative 1, simply because no major changes would be made from the way things are done at present. Each water company would be responsible for providing service to its own customers, for setting its own schedule of rates, for collecting payment from its own customers, and for dealing with complaints.

Any of the other three alternatives providing for varying degrees of city purchase of private water companies would be more difficult to implement, due to the fact that the purchase itself is not an easy procedure. The procedure is initiated by the setting of a goal for city purchase and operation, which is usually to give all citizens the same level of service at the same rate. The city hires a consulting engineer

to appraise the water company for a replacement value of the physical assets. Next, the city presents its desire for purchase and its appraisal to the water company involved. If the water company does not agree with the city's appraisal, it will obtain its own independent appraisal. Once an appraised value has been agreed upon, the city must show the affected citizens its intentions for purchase, the appraised value of the assets, and the advantages or disadvantages to be gained through its action. After reviewing this information, if the citizens are in fact desirous of entering the municipal system for water supply, the city can pursue a bond issue to cover the agreed upon appraisal. Normally, this would occur in a general election and a favorable vote would be required from a majority of those voting.

Of the remaining three alternatives, Alternative 2 would be the easiest to implement. The City of Apache Junction would be involved in the purchase of the Palm Springs Water Company and in obtaining the three square mile area of the Crescent Valley Utility Company; however, operation and maintenance of these systems would be turned over to the Arizona Water Company. Thus, the city would be involved only in the purchase, but not the operation, of the water systems. The current bonding capacity of Apache Junction is four percent of the net assessed valuation. The total net assessed value of the property in Pinal and Maricopa Counties is approximately $15,500,000; thus, the bonding capacity of the city is about $620,000. This figure is not that much less than the estimated total assets of $758,000 for the Palm Springs Water Company, which indicates that the city could purchase the assets of the water company without going deeply into debt with a major bond issue.

Alternative 3 would be the third easiest alternative to implement. As with Alternative 2, the city would be involved in the purchase of the Palm Springs Water Company and in obtaining the three square mile area of the Crescent Valley Utility Company. In addition, however, the city would also become involved in the actual operation and maintenance of the water systems. Thus, the city would have to hire and possibly train a small O&M staff to keep the water facilities running smoothly.

The most difficult alternative to implement would be Alternative 4. Possibly the biggest roadblock to implementing this alternative would be the purchase of the Arizona Water Company's Apache Junction system. Since the level of service for this system is adequate and the rates are not considered excessive, it might be difficult to obtain customer approval for the city purchase and operation. Furthermore, even if customer approval was obtained, a special bond issue would undoubtedly be required to enable the city to acquire the $3 to $4 million dollars worth of assets in this system. The difficulties would not end with acquisition of the water companies. Whereas only a small O&M staff would be needed to run the Palm Springs facilities, a much larger staff would be required to run all of the water company facilities in the service area, due to the relatively large size of the Arizona Water Company system.

FLEXIBILITY AND RELIABILITY.

On an overall basis, full city purchase and operation of all three water systems (Alternative 4) would provide the most flexible and reliable system. One agency (the city) would have control of the entire service area and would make all decisions regarding where and when to expand the system, rate schedules, degree of operation and maintenance required, replacement of poor existing lines, etc.

An adequate level of flexibility and reliability would still be found under Alternative 2. Although there would be two owners (the city and Arizona Water Company), only one agency would be responsible for running the entire system. Therefore, all of the operation and maintenance items could be handled equitably by just one experienced company.

Neither of the remaining alternatives (Alternatives 1 and 3) would provide for a proper degree of flexibility and reliability. Alternative 1, the "no action" plan, would continue with three different owner/operators of water systems in the service area. Each water company

would make decisions in its own best interest, but not necessarily in the best interest of the city. Alternative 3 would have the city owning and operating one system, with a private water company owning and operating the other. Once again, decisions would be made independently and not necessarily for the overall benefit of the city and the surrounding service area.

OPERATIONAL EXPERIENCE.

Implementation of either Alternative 1 or Alternative 2 would provide for a relatively high degree of operational experience. Alternative 1 would continue to make use of the existing experience levels of the three water companies, while Alternative 2 would utilize the experience of the Arizona Water Company for operating the entire system. Implementation of either Alternative 3 or Alternative 4, on the other hand, would bring an inexperienced municipal government into the business of providing adequate water service. Through proper hiring and training, the city could eventually provide an adequate degree of experience; however, there would undoubtedly be a period of transition and adjustment following purchase of the private companies. This situation would be most aggravated under Alternative 4, where none of the private ownership experience would be maintained.

PARITY TO USERS.

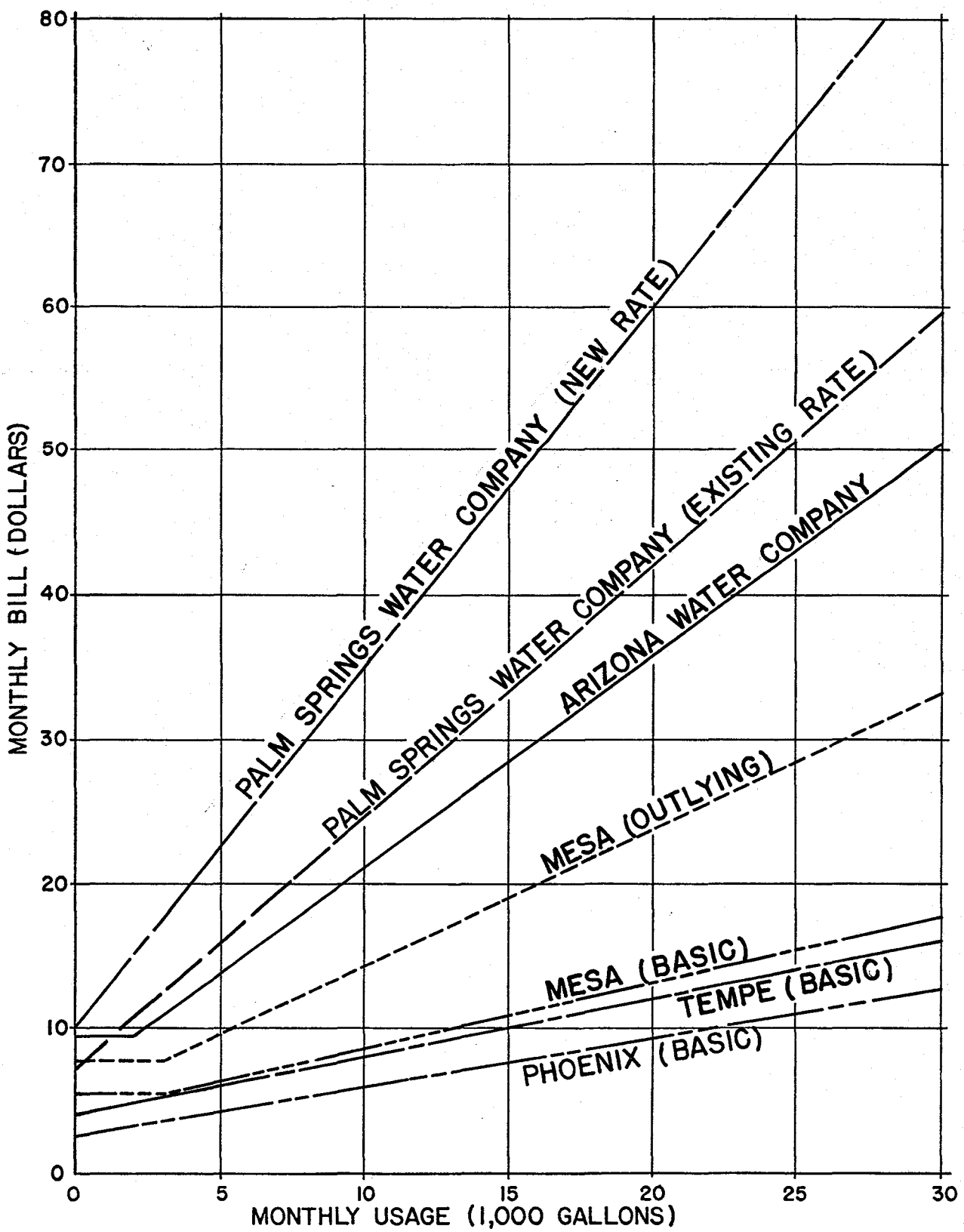
Ideally, all residents of a municipality should be able to receive approximately the same level of service at the same rate. Implementation of Alternative 4, complete city purchase and operation of all water systems within the service area, would guarantee this parity of service and rates to homeowners. On the other hand, implementation of Alternative 1 would continue the inequalities which presently exist, with each water company operating its own system in the manner in which it saw fit. Implementation of either Alternative 2 or Alternative 3 might tend to bring the existing rates and levels of service closer together; however, with part of the total system privately run and the other part municipally run, some inequalities would undoubtedly still exist.

Theoretically, a well-run municipal water system is often able to charge a lower rate for water than private water companies. Figure 5-4 shows how the rates for the Arizona and Palm Springs Water Companies (presented previously in Figure 3-9) compare with the basic rates of Mesa, Phoenix and Tempe and also the average rate charged by Mesa to customers in its outlying service area. Generally, as the water system gets larger, a municipality is able to charge less for use of water through the economies of scale.

SUMMARY.

The ranking of the four alternatives in the areas just discussed is summarized in terms of a "Technical Evaluation Matrix", presented in Table 5-4. The values for the letters A through E are defined below the matrix.

This matrix will be used in the following chapter to identify and select a recommended plan of action for future water systems management in the Apache Junction service area.



WATER SYSTEMS EVALUATION
FOR
APACHE JUNCTION, ARIZONA

WATER RATE COMPARISON

PRC TOUPS
4131 N 24 ST. PHX., AZ.

FIGURE NO. 5-4

TABLE 5-4

TECHNICAL EVALUATION MATRIX

ALTERNATIVE	CONSTRUCTION COSTS	ABILITY TO IMPLEMENT	FLEXIBILITY AND RELIABILITY	OPERATIONAL EXPERIENCE	PARITY TO USERS
ALTERNATIVE 1	B	A	D	A	C
ALTERNATIVE 2	B	B	C	A	B
ALTERNATIVE 3	B	C	D	C	B
ALTERNATIVE 4	B	E	B	D	A

A = Very Good

B = Good

C = Average

D = Below Average

E = Poor

CHAPTER 6

SELECTION OF THE BEST ALTERNATIVE PLAN

MATRIX EVALUATION.

Table 6-1 is an enhanced version of the "Technical Evaluation Matrix" appearing at the end of Chapter 5. Table 6-1 takes the letter values assigned previously for comparison purposes and assigns a number to each letter based on the following point system:

A = 5
B = 4
C = 3
D = 2
E = 1

The numbers are then added and the totals show the final relative standing of the four alternatives. The point totals are 19 for Alternative 1 (second), 20 for Alternative 2 (first), and 16 each for Alternative 3 and Alternative 4 (tied for third).

The major conclusion which can be drawn from the alternatives evaluation is that it is not necessary for the City of Apache Junction to become immediately involved in the purchase *and* operation of a water system within the service area. Alternatives 3 and 4, which provided for varying degrees of city purchase and operation of the three water companies in the service area, accumulated the fewest number of points of the four alternatives. Although the potential is there to eventually offer more parity in rates and service to users and to provide an adequate degree of flexibility and reliability, these two alternatives were hindered by the difficulty in their implementation and the lack of operational experience on the part of the city.

On the other hand, the two alternatives (1 and 2) which kept the city out of actually operating a water system placed highest in the analysis. Under the terms of Alternative 2, the city would purchase the Palm

TABLE 6-1

TECHNICAL EVALUATION MATRIX

SHOWING RELATIVE STANDING OF ALTERNATIVES

ALTERNATIVE	CONSTRUCTION COSTS	ABILITY TO IMPLEMENT	FLEXIBILITY AND RELIABILITY	OPERATIONAL EXPERIENCE	PARITY TO USERS	POINT TOTAL	RELATIVE STANDING
ALTERNATIVE 1	B	A	D	A	C		
	4	5	2	5	3	19	2
ALTERNATIVE 2	B	B	C	A	B		
	4	4	3	5	4	20	1
ALTERNATIVE 3	B	C	D	C	B		
	4	3	2	3	4	16	3
ALTERNATIVE 4	B	E	B	D	A		
	4	1	4	2	5	16	3

Springs Water Company and the Crescent Valley Utility Company certificated areas which are within the Apache Junction service area, but operation would be turned over to the Arizona Water Company. The Arizona Water Company itself would be left to operate as is. Since it is dealing with only the smaller water companies, this alternative has the advantage of not being as difficult to implement as Alternatives 3 and 4 and of providing the operational experience and reliability of an established water company.

Alternative 1, the "no action" plan, also placed high in the analysis. The main reason for this is that the largest water company in the study area, the Arizona Water Company, is basically a sound, well-run organization dedicated to adequate levels of service, operation and maintenance. Most of the problems in the Apache Junction area have been experienced with the Palm Springs Water Company. However, as mentioned earlier in the report, this company became affiliated with Consolidated Water Utilities in December, 1979, an established water company capable of meeting problems head on and providing an adequate level of service. It is hoped that, given time, the situation at Palm Springs could be turned around and good service could be provided at a reasonable rate.

RECOMMENDED PLAN OF ACTION.

Based on the analysis of alternatives just completed, this report recommends the following plan of action for the City of Apache Junction: 1) that the Arizona Water Company be left to operate as a completely private entity; 2) that the relatively new ownership of the Palm Springs Water Company be given an adequate time (say three years) in which to improve the existing water supply and distribution system such that an adequate level of service can be provided at a reasonable rate. At the end of that time period, if a fair degree of progress has indeed been made, it is felt that private operation should continue. On the other hand, if the city has determined that little or no progress has been made, it should initiate the procedure for purchase of the water company and investigate how arrangements might be made with the Arizona Water

Company for operation and maintenance of the system; 3) that if the city eventually purchases the Palm Springs Water Company, it also consider purchasing the certificated area of the Crescent Valley Utility Company which is within the Apache Junction service area. This would allow for a natural expansion of the Apache Junction city limits to the southwest.

For purposes of review, the main steps involved in purchase of a private water company by a municipality are as follows:

1) The city sets a goal for purchase and operation, which is usually to give all affected citizens the same level of service at the same rate.
2) The city hires a consulting engineer to appraise the water company for a replacement value of the physical assets.
3) The city presents its desire for purchase and its appraisal to the water company involved. If the water company does not agree with the city's appraisal, it will obtain its own independent appraisal.
4) Once an appraised value has been agreed upon, the city must show the affected citizens its intentions for purchase, the appraised value of the assets, and the advantages to be gained through its action.
5) After reviewing this information, if the citizens are in fact desirous of entering a municipal system for water supply, the city can pursue a bond issue to cover the agreed upon appraisal.

DEVELOPMENT AND OPERATION OF A MUNICIPAL SYSTEM.

Although this report does not recommend immediate municipal operation of a water system, the city may eventually wish to pursue that avenue anyway. This section of the chapter describes in general terms how a municipality can go about developing and operating its own water supply and distribution system.

GENERAL FINANCING. Funds to develop and operate a municipal water system come from a variety of sources: metered sales, connection fees, turn-on fees, revenue bonds, grants and loans from public agencies, and grants-in-aid of construction from land developers. In general, these funds can be divided into two categories: those that go toward constructing the facilities and those that are used to meet operation and maintenance expenses. In the case of revenue bonds, for example, the funds are used to build or improve the system, but the principal and interest on the bonds is paid out of the revenue generated by water sales.

In any event, the finances of a water utility should be just as well designed as the pumps and pipes that comprise the physical system in order to allow the system to produce the revenue it needs to meet its expenses while providing a high level of service to the customers. In order to properly design the financial aspect of the water system, planning must be carried out to anticipate the future expenditures and how best to finance those expenditures. In the process of implementation, water rates and bonding develop a workable mix of revenue sources that will satisfy the needed capital costs.

WATER RATES. While it is beyond the scope of this report to project what the city would charge for water service, it is meaningful to make a few observations regarding the price of water. Comparisons of the rates and annual per capita water costs between local communities is not a realistic way to approach the question of appropriate water rates. Numerous factors interplay to create differences such as cultural backgrounds; level of service; population size, age and density; water sources; terrain of the service area; age of the system; etc. Rather, each water system must be evaluated on its own merits and, more important, the market for water sales (the customers) must be considered. A recent study by the American Water Works Association made the following observations regarding water rates.

> Economic theory suggests that if water supply prices do not conform to fundamental economic pricing principles, then there will be something less than maximum efficiency in water allocation

and use. If water is overpriced, then the use of this important resource in certain economic sectors may be discouraged and general economic development may be stymied. If water is underpriced, there is a temptation for individuals and businesses to use excessive amounts, thereby encouraging a needlessly large investment in water supply equipment. Only when water is priced properly is the public welfare best served.

REVENUE BONDS. Discussions with the bond consultants of other small valley cities indicate that for an original revenue bond issue, minimum net revenues of approximately 125 percent of the debt service must be realized to secure the debt. In order for additional bonds to be sold, the requirements for net revenue security tend to increase to about 150 to 175 percent of the debt service requirements. Net revenues are defined as gross revenues from water sales and other incomes less operation and maintenance expenses before depreciation and before interest charges. The point is that a prospective investor considers existing and new debt service in light of rate increases and other expenses to evaluate the degree of risk. If the amount of security is at the minimum recognized values, then the credit rating is reduced and the bonds must have a higher rate of return to attract investors. Furthermore, a portion of the revenues should go to developing and maintaining a debt service reserve fund to help meet debt service requirements during periods of low revenues.

The financing of the debt service and operation and maintenance needs of a water utility is an intricate process that considers the selling of bonds and the establishment of adequate water rates. The entire financial picture of the water systems in Apache Junction must be considered to insure that revenues will be adequate to keep pace with rising costs and the growth of the city.

APPENDIX A

LIST OF ABBREVIATIONS

ac-ft	acre feet
ADHS	Arizona Department of Health Services
°C	degrees Celsius
CAP	Central Arizona Project
cfs	cubic feet per second
DES	Department of Economic Security
DO	dissolved oxygen
DWR	Department of Water Resources
ENR	Engineering News Record
EPA	U.S. Environmental Protection Agency
°F	degrees Fahrenheit
FCRC	Four Corners Regional Commission
fps	feet per second
gpad	gallons per acre per day
gpcd	gallons per capita per day
gpd	gallons per day
gpm	gallons per minute
hp	horsepower
ISO	Insurance Services Office
kw	kilowatt
mgd	million gallons per day
ml	milliliter
mg/l	milligrams per liter
O&M	operation and maintenance
PE	population equivalent
TDS	total dissolved solids
USGS	United States Geological Survey

APPENDIX B

GLOSSARY OF TERMS

ACRE-FOOT - The quantity of water required to cover one acre of land to a depth of one foot. Equivalent to 43,560 cubic feet or 326,000 gallons.

AESTHETICS - Of or pertaining to the beautiful; pleasing to the senses. In this report, aesthetic considerations include elements of sight and smell.

ALLUVIUM - Material deposited by running water; alluvial deposits usually result from the action of rivers, including ephemeral streams.

AQUATIC - Consisting of or pertaining to water.

BACTERIA - Small, living organisms. In wastewater treatment, bacteria consume organic constituents in sewage.

BENTHIC ORGANISMS - Organisms that live on the bottoms of water bodies.

BIOTIC COMMUNITY - An assemblage of populations (plant and animal) occupying a particular area of physical habitat.

CFS - Cubic feet per second. A unit of measure used to describe volume of streamflow, equal to 1 cubic foot in 1 second (also called "second-foot").

CO - Carbon monoxide. A very toxic, colorless, and odorless gas; one product of combustion of gasoline in automobile engines.

CONFLUENCE - The point at which a tributary converges into or joins the main stream, or where two tributaries come together.

DEMOGRAPHY - Study of population and population changes.

DENSITY - Demographic term referring to the number of people in a specified area.

DEPENDABLE SUPPLY - The estimated amount of water that can be depleted annually without lowering storage levels in either surface or ground-water reservoirs over a long period of time.

DEPLETION - The measure of the amount of water removed from the water supply system for a use; synonymous with "consumptive use".

DISCHARGE - A term for flow rate as a ratio of volume over a given time period, usually measured in cubic feet per second (cfs).

ECOLOGY - The totality or pattern of relations between organisms and their environment.

ECOSYSTEM - A system formed by the interaction of a community of organisms with their environment.

ENVIRONMENT - This all-embracing term generally includes natural (physical and biological) elements and human (socio-economic and cultural) elements.

ENVIRONMENTAL ASSESSMENT - A study to determine harmful or beneficial changes to the human and natural environmental system resulting directly or indirectly from changes imposed on that system.

ENVIRONMENTAL IMPACT - Effect upon the physical, biological, socio-economic and cultural characteristics of an area produced by an action.

EPHEMERAL STREAM - A stream that flows only during and following a period of rainfall.

EROSION - The detachment of soil and rock particles by water, wind, ice or gravity.

EVAPORATION - The process of converting a liquid to a vapor.

FAUNA - Animals or animal life of a region.

FLOOD - An overflow from the designated channel of a river or other body of water.

FLOODPLAIN - The land area adjoining a river, stream or watercourse that has been or may be covered by floodwaters.

FLOODWAY - The channel of a river or other watercourse and the adjacent land areas required to carry and discharge a flood of a given magnitude.

FLOODWAY FRINGE - The portion of a floodplain between the floodway and the normal outline of a flood of a certain magnitude.

FLORA - Plants of a given region.

GROUNDWATER - The body of water beneath the surface of the ground, found in aquifers. It is made up primarily of water that has seeped down from the surface.

HABITAT - The environment in which the life needs of a plant or animal are supplied.

IMPOUNDMENT - A basin or other area surrounded by physical structure(s) in which water is contained.

INTERMITTENT STREAM - A stream that flows only during part of the year, in contrast with perennial streams, which flow all year, and ephermal streams, which carry only stormflows.

INVERSION - An increase in air temperature with an increase in altitude. An event associated with air pollution.

MATRIX - A figure consisting of rows and columns, which portrays information where items in rows and items in columns interact.

MITIGATE - To alleviate or modify adverse or negative impacts resulting from a specific action.

MITIGATIVE MEASURE - A step taken to moderate the severity of the effects of a proposed action.

NON-CONSUMPTIVE USE - Water use that does not reduce the water supply available for other purposes. Examples of non-consumptive water use are: generation of hydroelectric power, fishing, boating and swimming.

NON-POINT SOURCE - Generalized discharge of waste into a water system which cannot be located as to a specific source. Examples are street runoff, agricultural irrigation return flow, etc.

NPDES - National Pollution Discharge Elimination System. An environmental program, administered by EPA, in accordance with the Federal Water Pollution Control Act (PL 92-500), as amended, to control discharge of wastes into waters of the United States.

OVERDRAFT - Term used to identify groundwater supplied when more groundwater is being pumped and used from an area that is returned to replenish the groundwater in the area. The difference between consumptive use and dependable supply.

PARTIAL BODY CONTACT - A level of water quality where the human body may come in direct contact with the water, but normally not to the point of complete submergence. Sensory organs will not be exposed to water of this quality.

PARTICULATE - Of or pertaining to particles or occurring as minute particles.

PERCOLATION - Movement of water through subsurface soil layers, usually continuing downward to the groundwater table.

POINT SOURCE - A stationary , readily identifiable source of pollution.

POTABLE WATER - Drinkable water.

RECHARGE - Process by which water is absorbed and added to the groundwater aquifer, either directly into a particular water-bearing formation, or indirectly by way of another formation.

RIPARIAN - Pertaining to the banks of a body of water.

RIVERINE - Living or situated on the banks of a river.

RUNOFF - That portion of precipitation not initially captured by soil or vegetation to cause flow across a land surface.

SCOUR - The powerful and concentrated clearing and digging action of flowing water, especially the downward erosion by stream water in sweeping

away sediments during time of flood.

SEDIMENT - Fragmented material that originates from weathering of rocks and is transported by, suspended in, or deposited by water and air or is accumulated in beds by other natural agencies.

SITE-SPECIFIC - Pertaining only to individual areas.

STREAM BED - Channel that contains the stream's waters; all the space ordinarily covered by water and lying between the lands on each side of the stream.

SUBSIDENCE - Settling of the surface of the ground to a new level.

TERRESTRIAL - Consisting of or pertaining to the land.

201 PLAN - A plan developed under Section 201 of the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500) for constructing and operating wastewater treatment facilities.

208 PLAN - An areawide waste treatment management plan developed under Section 208 of the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500).

VELOCITY - The speed of movement given as a ratio of length over time, usually measured in feet per second (fps).

WASTEWATER - Any water derived from one or more previous uses.

WASTEWATER TREATMENT PLANT (WWTP) - A facility consisting of a series of tanks, screens, filters and other components that process wastewater so that pollutants are removed.

WATER SUPPLY - A volume of water that is ready for use, either in its natural state or through treatment.

WATER TABLE - The upper limit of that portion of the ground wholly saturated with water.

WITHDRAWAL - The process of capturing or acquiring water either by diversion from a surface water source or by pumping from the groundwater basin.

APPENDIX C

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APPENDIX D

INSURANCE SERVICES OFFICE REPORT
APACHE JUNCTION FIRE PROTECTION DISTRICT

INSURANCE SERVICES OFFICE
OF ARIZONA

255 EAST OSBORN ROAD, SUITE 201, PHOENIX, ARIZONA 85012
TELEPHONE (602) 264-7021

ARVIE P. KORSTAD, MANAGER

June 8, 1977

Ms. Elaine Ross
Board of Fire Commissioners
Apache Junction Fire Protection District
P. O. Box 3
Apache Junction, Arizona 85220

Dear Ms. Ross:

We have completed the processing of a grading of the fire defense facilities for the Apache Junction Fire Protection District and are enclosing two copies of a recent mailing to fire insurance agents reflecting grading results.

The new grading produced a total of 3647 deficiency points. This is a reduction of 37 deficiency points from the former grading made in 1968, however, the class remains the same.

Additional information and a set of recommendations to be used as a guide when fire defense improvements are contemplated, can be obtained from our Public Protection Department upon request from the District.

Very truly yours,

INSURANCE SERVICES OFFICE

Arvie P. Korstad
Manager

apk:vcs:df

Enclosures

cc: Mr. Howard A. Jones, Fire Chief

INSURANCE SERVICES OFFICE

Arizona
STATE OFFICE

SUMMARY OF GRADING

GRADING SCHEDULE FOR MUNICIPAL FIRE PROTECTION
(1973 Edition)

Date Graded: April '77 City or District: Apache Junction F.P.D.

Total Deficiency: 3647 Points. Graded by: V. C. Shaw Engineering Representative

Protection Class _____

WATER SUPPLY

Item	Assigned Points
1. Supply Works	0
2. Reliability of Source Supply	53
3. Reliability of Pumping Capacity	29
4. Reliability of Power Supply	9
5. Condition, Arrangement, Operation, and Reliability of System Components	90
6. Adequacy of Mains	442
7. Reliability of Mains	28
8. Installation of Mains	19
9. Arrangement of Distribution System	64
10. Additional Factors and Conditions Relating to Supply and Distribution	113
11. Distribution of Hydrants	311
12. Hydrants - Size, Type and Installation	4
13. Hydrants - Inspection and Condition	45
14. Other Conditions Adversely Affecting Adequacy, Reliability, or Operation of the System	83
Total	1290

FIRE DEPARTMENT

1. Pumpers	0
2. Ladder Trucks	0
3. Distribution of Companies and Type of Apparatus	10
4. Pumper Capacity	33
5. Design, Maintenance, and Condition of Apparatus	109
6. Number of Officers	46
7. Department Manning	254
8. Engine and Ladder Company Unit Manning	80
9. Master and Special Stream Devices	8
10. Equipment for Pumpers and Ladder Trucks	45
11. Hose	8
12. Condition of Hose	49

Item	Assigned Points
13. Training	263
14. Response to Alarms	0
15. Fire Operation	285
16. Special Protection	0
17. Other Conditions Adversely Affecting Operations	127
Total	1321

FIRE SERVICE COMMUNICATIONS

1. Communication Center	29
2. Communication Center Equipment and Current Supply	94
3. Boxes	60
4. Alarm Circuits and Alarm Facilities Including Current Supply at Fire Stations	9
5. Material, Construction, Condition, and Protection of Circuits	3
6. Radio	9
7. Fire Department Telephone Service	20
8. Fire Alarm Operators	18
9. Conditions Adversely Affecting Use and Operation of Communication Facilities and the Handling of Alarms	12
10. Credit for Boxes Installed in Residential Districts	(-) 0
Total	254

FIRE SAFETY CONTROL

1. Flammable or Compressed Gases	123
2. Flammable or Combustible Liquids	104
3. Special Hazards	104
4. Miscellaneous Hazards	104
5. Supplemental Fire Prevention Activities	90
6. Building Laws	85
7. Electricity	40
8. Heating and Ventilating Installations	55
Total	605

ADDITIONAL DEFICIENCIES

1. Adverse Climatic Conditions	162
2. Other Adverse Conditions or Occurrences	15
3. Divergence Between Water Supply and Fire Department	0
Total	177

SUMMARY OF DEFICIENCY POINTS

WATER SUPPLY	1290
FIRE DEPARTMENT	1321
FIRE SERVICE COMMUNICATIONS	254
FIRE SAFETY CONTROL	605
ADDITIONAL DEFICIENCIES	177
Total Deficiency	3647

INSURANCE SERVICES OFFICE
of Arizona
Phoenix, Arizona

A P A C H E J U N C T I O N F . P . D .

May 1977

NOTE: The following recommendations are based on 1977 conditions in Apache Junction F. P. D. and are intended for use as a general guide when future inprovements are contemplated. Those marked with an asterisk (*) are deemed more important at this time and their early adoption is strongly urged.

IT IS RECOMMENDED:

WATER SUPPLY

*1. That the arterial systems be strenghthened by installation of arterial mains (8-inch or larger) extending to all sections of the District, with size sufficient to provide delivery of maximum consumption demands in addition to recommended fire flows. The following quanties are desirable:

Commercial	1500 to *4000 g.p.m.
(Includes Business, Institutions & Industrial)	
* Supersitition Inn	
Residential	1000 g.p.m.

2. That sufficient hydrants be installed to provide a maximum distribution of one hydrant for every 130,000 square feet in the high value districts and one hydrant for every 160,000 square feet in the residential districts.

APPENDIX E

WATER COMPANY RATE SCHEDULES

WATER RATES

RECEIVED MAR 04 1981 W-188

ARIZONA WATER COMPANY
Phoenix, Arizona
Filed by: R. E. Polenske
Title: Exec. Vice Pres. & General Manager
Date Original Filing: 12-16-64
District: APACHE JUNCTION

A.C.C. No. 361
Cancelling A.C.C. No. 335
Tariff or Schedule No. W-188
Filed: December 11, 1980
Effective: For all bills rendered on or after January 1, 1981

GENERAL SERVICE

AVAILABILITY

In APACHE JUNCTION and environs at all points where facilities of adequate capacity and pressure are adjacent to the premises served.

APPLICATION

To all water service required when such service is supplied at one premise through one point of delivery and measured through one meter. Not applicable to temporary, standby, supplementary or resale service.

MONTHLY BILL:

MINIMUM	$ 9.50	for 5/8" x 3/4"	meter for 2,000 gallons or less
	11.50	" 1"	" " " " " "
	14.25	" 1½"	" " " " " "
	18.00	" 2"	" " " " " "
	24.75	" 3"	" " " " " "
	37.50	" 4"	" " " " " "
	49.50	" 6" and over	" " " " " "
RATE	$0.146	per 100 gallons for all over 2,000 gallons	

ADJUSTMENT Plus the applicable proportionate part of any taxes or governmental impositions which are or may in the future be assessed on the basis of the gross revenues of the Company and/or the price or revenue from the water or service sold and/or the volume of water pumped or purchased for sale and/or sold hereunder. In the event of any increase or decrease in taxes or other governmental impositions rates shall be adjusted to reflect such increase or decrease.

SPECIAL PROVISIONS 1. A non-refundable service establishment charge of $10.00 and the appropriate tax adjustment will be assessed each time the Company is requested to establish water service to the Customer's delivery point. Billing for the service establishment charge will be rendered as a part of the Customer's first service bill.

2. If service is to be re-established at the same service location for a Customer who has there ordered a service disconnection within the preceding twelve month period, or for any member of such Customer's household, a non-refundable charge of eight (8) times the Customer's monthly minimum charge and the appropriate tax adjustment will be required as a precondition to the establishment of such service. Payment for such charge shall be made at the time of application for re-establishment of service.

TERMS AND CONDITIONS
Subject to the Company's "Terms and Conditions For the Sale of Water Service."

RECEIVED MAR 0 4 1981

WATER RATES

ARIZONA WATER COMPANY
Phoenix, Arizona
Filed by: R. E. Polenske
Title: Exec. Vice Pres. & Gen. Mgr.
Date Original Filing: 11-1-77
District: ALL SERVICE AREAS

A.C.C. No. 332
Cancelling A.C.C. No. 317
Tariff or Schedule No. W-249
Filed: October 30, 1979
Effective: For all bills rendered on or after December 1, 1979

MULTIPLE UNIT SERVICE

AVAILABILITY

In all cities, towns and unincorporated areas in which the Company does a general water utility business where there are facilities of adequate capacity and pressure.

APPLICATION

To all water service rendered to multiple unit developments (condominium, townhouse, apartment, commercial plaza, shopping center), IN LIEU of individual metering of each unit under the Company's current GENERAL SERVICE Water Rate Schedules.

MONTHLY BILL:

MINIMUM — For each Unit (occupied or vacant) served by master meter. The Monthly Bill Minimum for base meter size on GENERAL SERVICE Water Rate Schedule; includes minimum gallonage.

RATE — The rate per 100 gallons for all over the minimum gallonage, if any, as set forth in the Company's GENERAL SERVICE Water Rate Schedule for the respective system.

ADJUSTMENT — Plus the applicable proportionate part of any taxes or governmental impositions which are or may in the future be assessed on the basis of the gross revenues of the Company and/or the price or revenue from the water or service sold and/or the volume of water pumped or purchased for sale and/or sold hereunder.

SPECIAL PROVISIONS

1. Maintenance of all facilities on customer's side of master meter shall be customer's responsibility.

2. The Company will supply only such water at such pressures as may be available from time to time as a result of the normal operation of its water system. The Company does not guarantee a specific water pressure or gallons-per-minute flow rate at any of the meters installed subject to this tariff.

3. The customer shall indemnify the Company and save it harmless against any and all claims arising out of the service under this schedule and shall further agree to make no claim against the Company for any loss or damage resulting from the services provided hereunder.

TERMS AND CONDITIONS

Subject to the Company's "Terms and Conditions For the Sale of Water Service."

CONTINUITY OF SERVICE

The Company will use reasonable diligence to supply continuous service, but does not guarantee its service against fluctuations, interruptions or curtailment. The Company will not be liable to the customer for any damages occasioned by fluctuations, interruptions or curtailment, or by failure to begin supplying service due to any cause beyond the Company's reasonable control. The Company may, without incurring any liability therefor, suspend service for periods reasonably necessary to accomplish repairs to or changes in any of the Company's facilities.

RECEIVED MAR 0 5 1981

PALM SPRINGS WATER COMPANY

75 South Saguaro Drive
P. O. Box 1211
Apache Junction, Arizona 85220
Telephone 982-6030

June 20, 1980

Dear Customer:

The Arizona Corporation Commission conducted a hearing April 24, 1980, on the application of Palm Springs Water Company for an interim (emergency) rate increase. The rates granted in its Decision #51017 (Docket #U-1426-80-25), dated June 3, 1980, are lower than those requested by Palm Springs Water Company. The rates authorized to be effective with July usage and August billing are as follows:

5/8" - 3/4" Meters:

Minimum: $7.25 per month - no water
Rate: $1.75 per 1,000 gallons of water or portion thereof used per month per customer

1" Meters:

Minimum: $14.50 per month - no water
Rate: $ 1.75 per 1,000 gallons of water or portion thereof used per month per customer

1 1/2" Meters:

Minimum: $18.25 per month - no water
Rate: $ 1.75 per 1,000 gallons of water or portion thereof used per month per customer

2" Meters:

Minimum: $21.75 per month - no water
Rate: $ 1.75 per 1,000 gallons of water or portion thereof used per month per customer

The Commission further ordered that Palm Springs Water Company file for a permanent rate within 90 days of the date of the interim order. We anticipate that this filing will be made in about 30 days. All Palm Springs customers will be notified of the date of hearing for that rate application.

The rates requested by Palm Springs at the interim hearing were designed to provide sufficient cashflow to assure the bank that a loan for system improvements could be repaid. The granting of lower rates than those requested eliminates Palm Springs' ability to show that, in fact, a $500,000 capital improvements project could be repaid. Therefore, our planned improvements of replacing the deteriorated galvanized pipe and the construction of a new 500,000 gallon storage facility, booster station, and 12-inch transmission mains to the Palm Springs development have been delayed until a permanent rate is established which will warrant the lending of the necessary funds.

In the meantime, we will provide you the best service that the existing water production and distribution plant allows us to reasonably provide.

Lawrence M. Stewart, General Manager

PALM SPRINGS WATER COMPANY

75 South Saguaro Drive
P. O. Box 1211
Apache Junction, Arizona 85220
Telephone 982-6030

APRIL 27, 1981

NOTICE OF RATE CHANGE

On January 20, 1981, Palm Springs Water Company appeared before the Arizona Corporation Commission in request of a rate increase based on financial data for the test year ending May 31, 1980. On April 24, 1981, per decision No. 52092, the Arizona Corporation Commission issued the following rate schedules for Palm Springs Water Company customers to become effective with May usage. You will receive your first billing at the new rates approximately June 1, 1981.

Customer Charge	5/8" x 3/4" meter	$10.00
Customer Charge	1" meter	$25.00
Customer Charge	1 1/2" meter	$50.00
Customer Charge	2" meter	$100.00

Per 1,000 gallons for water consumed $2.50

The Commission further ordered that six (6) months from the date of this Order, the rate per 1,000 gallons shall be $3.54.

In addition to the above rates, the Commission provided for a nonrefundable service establishment charge of $10.00 for each new customer to be paid prior to establishment of service. This service charge places the cost of setting up new water service accounts directly on the new customer, rather than having such costs borne by existing customers through larger increases in water rates.

An important part of this decision by the Commission was its finding in paragraph 5 of Conclusions of Law: "The increases contained in the rates and charges authorized herein are cost precipitated and do not reflect inflationary expectations."

APPENDIX F

PRELIMINARY 1980 CENSUS COUNTY BY ENUMERATION DISTRICT (ED)

APPENDIX F

PRELIMINARY 1980 CENSUS COUNT
BY ENUMERATION DISTRICT (ED)

	ED NUMBER	POPULATION	HOUSING
City of Apache Junction	130	1201	691
	131 T	512	426
	131 U	1035	488
	132 T	639	331
	132 U	835	424
	132 V	233	246
	132 W	631	510
	132 X	145	139
	132 Y	145	318
	133 T	765	640
	133 U	570	499
	133 V	677	664
	133 W	1023	609
	133 X	1524	852
	TOTAL (City)	9935	6837

	ED NUMBER	POPULATION	HOUSING
Pinal County	15	482	
	16	279	
	119	201	
	134 (400 series)	491	
	135 (900 series)	537	
	TOTAL (County)	1990	No Data
	Maricopa County		
	Block III*	182	

*Includes persons living outside city of Apache Junction city limits.

NOTES:

Annexation Into Maricopa County

Effective Date: February 15, 1980
Population (Est.): 150
Housing (Est.): 125

Annexation of Section 32

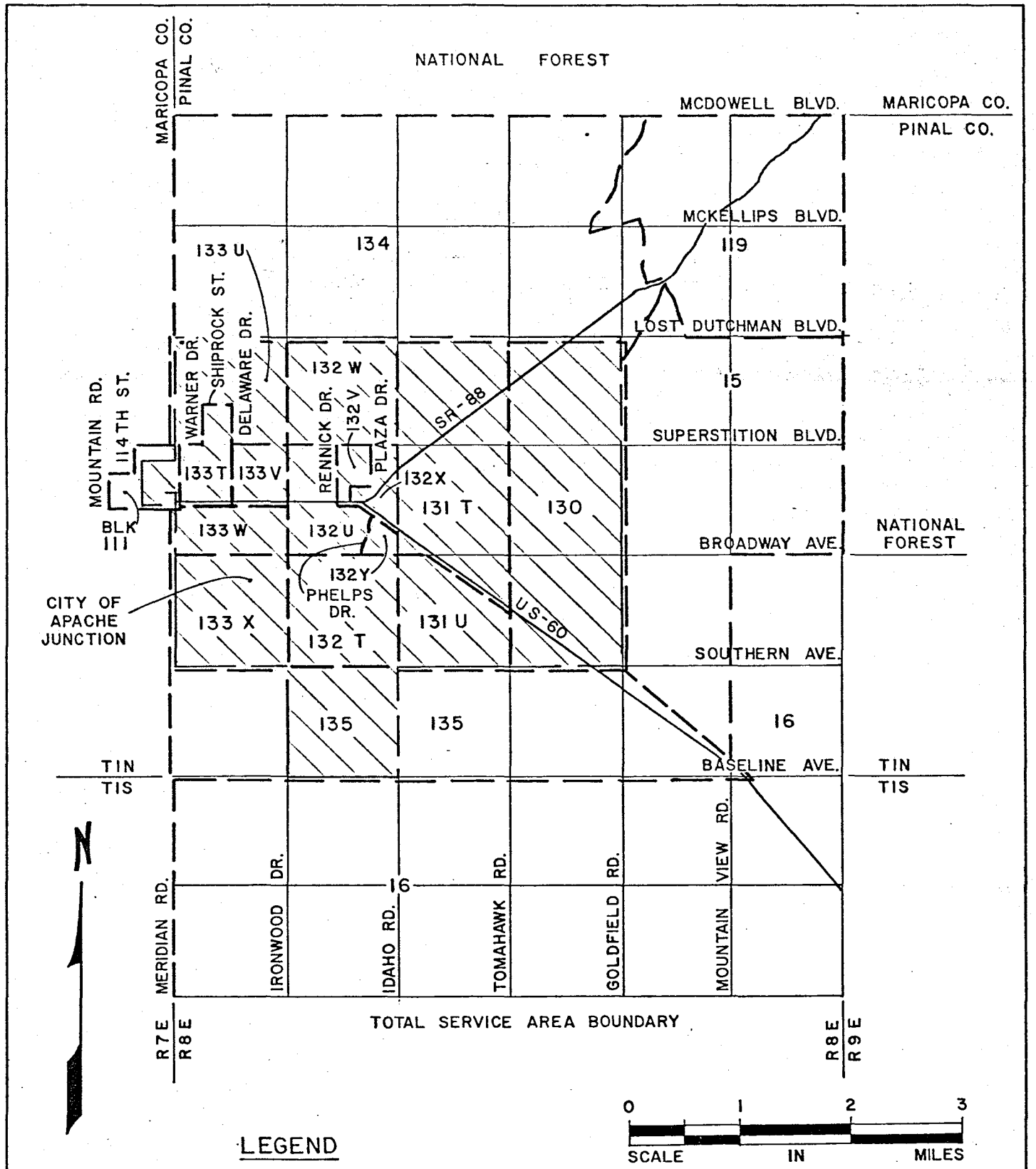
Effective Date: June 6, 1980
Population (Est.): 0
Housing: 0

Preliminary Count Indicated Vacancy Rate About 38.5%

Total Housing - Vacant (38.5%) = Total Occupies

6837 - 2632 = 4205

$$\frac{\text{Total Population}}{\text{Total Occupied Housing}} = \frac{9935}{4205} = 2.36 \text{ person/household}$$

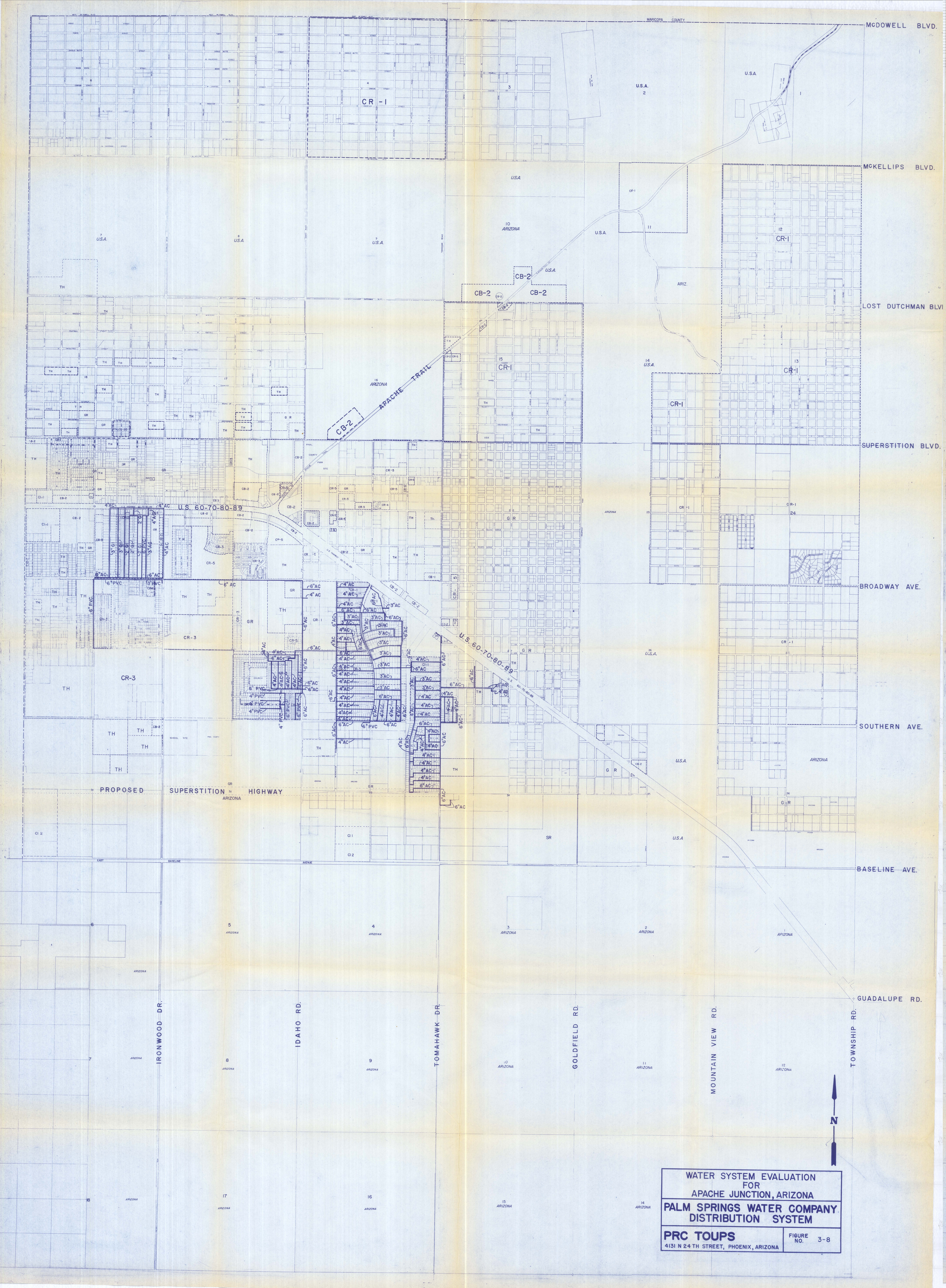


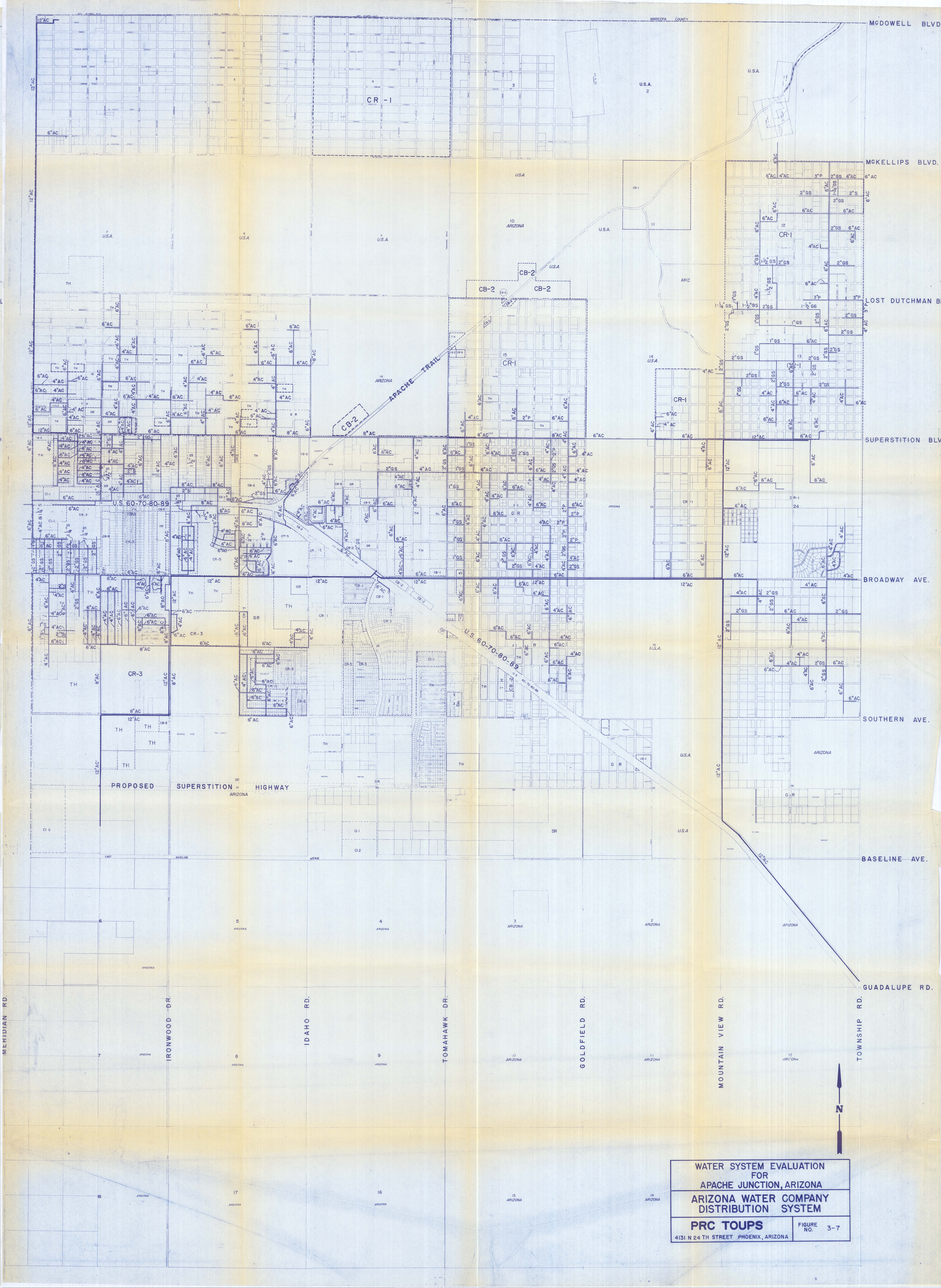
WATER SYSTEMS EVALUATION FOR APACHE JUNCTION, ARIZONA

CENSUS ENUMERATION DISTRICTS

PRC TOUPS
4131 N 24 ST., PHX., AZ.

FIGURE NO. F-1


MARICOPA COUNTY
McDOWELL BLVD.
McKELLIPS BLVD.
LOST DUTCHMAN BLVD.
SUPERSTITION BLVD.
BROADWAY AVE.
SOUTHERN AVE.
BASELINE AVE.
GUADALUPE RD.
IRONWOOD DR.
IDAHO RD.
TOMAHAWK DR.
GOLDFIELD RD.
MOUNTAIN VIEW RD.
TOWNSHIP RD.
APACHE TRAIL
U.S. 60-70-80-89
PROPOSED SUPERSTITION HIGHWAY
U.S.A.
ARIZONA
CR-1
CR-3
CR-5
CB-2
GR
TH
SR
N
WATER SYSTEM EVALUATION
FOR
APACHE JUNCTION, ARIZONA
PALM SPRINGS WATER COMPANY
DISTRIBUTION SYSTEM
PRC TOUPS
4131 N 24 TH STREET, PHOENIX, ARIZONA
FIGURE NO. 3-8


McDOWELL BLVD
McKELLIPS BLVD.
LOST DUTCHMAN BL
SUPERSTITION BLV
BROADWAY AVE.
SOUTHERN AVE.
BASELINE AVE.
GUADALUPE RD.
MERIDIAN RD.
IRONWOOD DR.
IDAHO RD.
TOMAHAWK DR.
GOLDFIELD RD.
MOUNTAIN VIEW RD.
TOWNSHIP RD.
APACHE TRAIL
U.S. 60-70-80-89
PROPOSED SUPERSTITION HIGHWAY
CR-1
CB-2
CR-3
U.S.A.
ARIZONA
N
WATER SYSTEM EVALUATION
FOR
APACHE JUNCTION, ARIZONA
ARIZONA WATER COMPANY
DISTRIBUTION SYSTEM
PRC TOUPS
4131 N 24 TH STREET PHOENIX, ARIZONA
FIGURE NO. 3-7