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WASTEWATER MASTER PLAN

CITY OF PEORIA, ARIZONA

OCTOBER, 1984



Prepared By

MORRIS, CLESTER, ABEGGLEN & ASSOCIATES, INC.

engineers • hydrologists • planners

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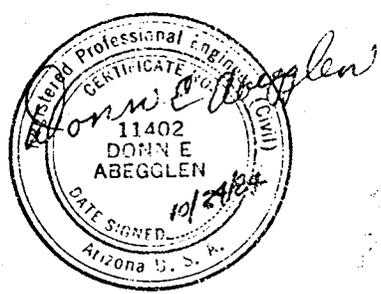
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TABLE OF CONTENTS

<u>DESCRIPTION</u>	<u>PAGE</u>
1. INTRODUCTION	
1.1 General	1-1
1.2 General Planning Area Description	1-1
2. EXISTING FACILITIES AND AGREEMENTS	
2.1 Existing Facilities	2-1
2.2 Major Existing Agreements	2-1
3. DRAINAGE AREAS, POPULATION, FLOWS, METHODOLOGY AND DESIGN CRITERIA	
3.1 Drainage Areas	3-1
3.2 Population	3-2
3.3 Flows	3-3
3.4 Sewer Master Plan Methodology	3-6
3.5 Design Criteria	3-9
4. WASTEWATER MASTER PLAN	
4.1 Existing System Deficiencies	4-1
4.2 Recommended Sewer Projects to Correct Existing System Deficiencies and to Serve Immediately Developing Areas	4-2
4.3 Recommended Sewers For Future Areas	4-6
4.4 Required Treatment Plant Facilities	4-8
5. PROJECT PRIORITIES, COST ESTIMATES, AND STAGING	
5.1 Project Priorities	5-1
5.2 Cost Estimates	5-2
5.3 Future Sewer and Treatment Plant Projects	5-7
5.4 Project Staging	5-10
6. SUMMARY AND RECOMMENDATIONS	
6.1 Summary	6-1
6.2 Recommendations	6-2

LIST OF FIGURES

Figure 1 - PLANNING AREA	Following Page 1-1
Figure 2 - EXISTING INTERCEPTOR SEWER SYSTEM	Following Page 2-1
Figure 3 - SEWER DRAINAGE AREAS	Following Page 3-1
Figure 4 - PROPOSED PROJECT 1	Following Page 4-2
Figure 5 - PROPOSED PROJECT 2	Following Page 4-3
Figure 6 - PROPOSED PROJECT 3	Following Page 4-4
Figure 7 - PROPOSED PROJECT 4	Following Page 4-5
Figure 8 - PROPOSED PROJECT 5	Following Page 4-6
Figure 9 - WASTEWATER MASTER PLAN	Following Page 4-7

CHAPTER 1

INTRODUCTION

CHAPTER 1
INTRODUCTION

1.1 General

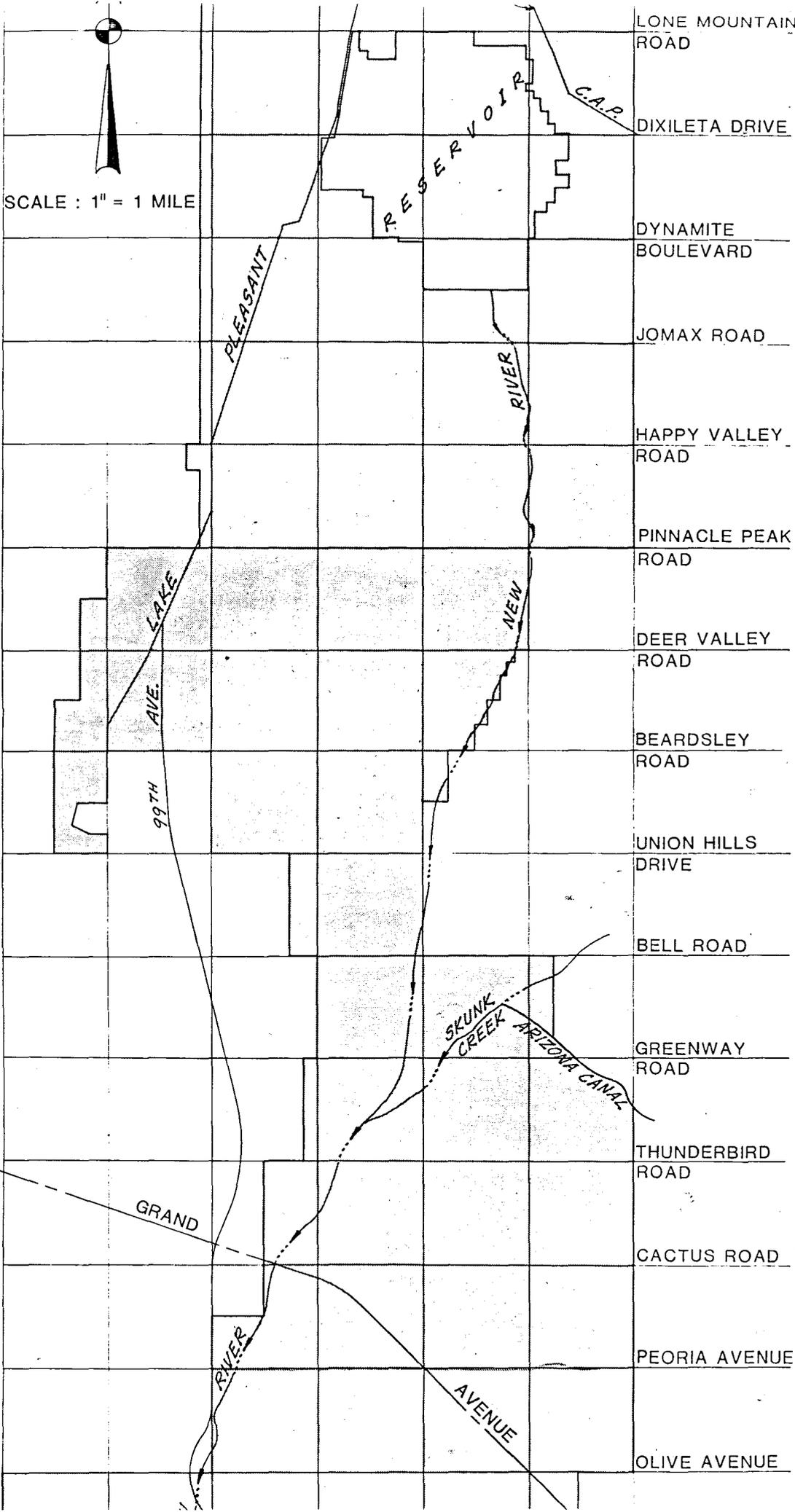
The City of Peoria is a rapidly developing community in the northwest portion of the Phoenix metropolitan area. The community is generally bounded on the west by Sun City, on the south and east by Glendale and Phoenix and on the north by the Carefree Highway.

During the past decade, the City of Peoria has experienced rapid growth especially on the eastside of the community. Rapid growth is expected to continue in the future throughout the community and the population is projected to increase to over six times the current population in the next 30 years. Faced with this dramatic projected increase in population, the City is in need of a comprehensive wastewater management plan to identify when and what facilities will be required to accommodate wastewater in the community. To this end, the City of Peoria retained Morris, Clester, Abegglen and Associates, Incorporated, to develop a comprehensive wastewater master plan and computer model of the existing and proposed future sewer system.

1.2 General Planning Area Description

The City of Peoria planning area which encompasses approximately 59.5 square miles is shown on Figure 1 in this Chapter. The City has developed a General Land Use Plan for all of the planning area south of Pinnacle Peak Road.

SCALE : 1" = 1 MILE



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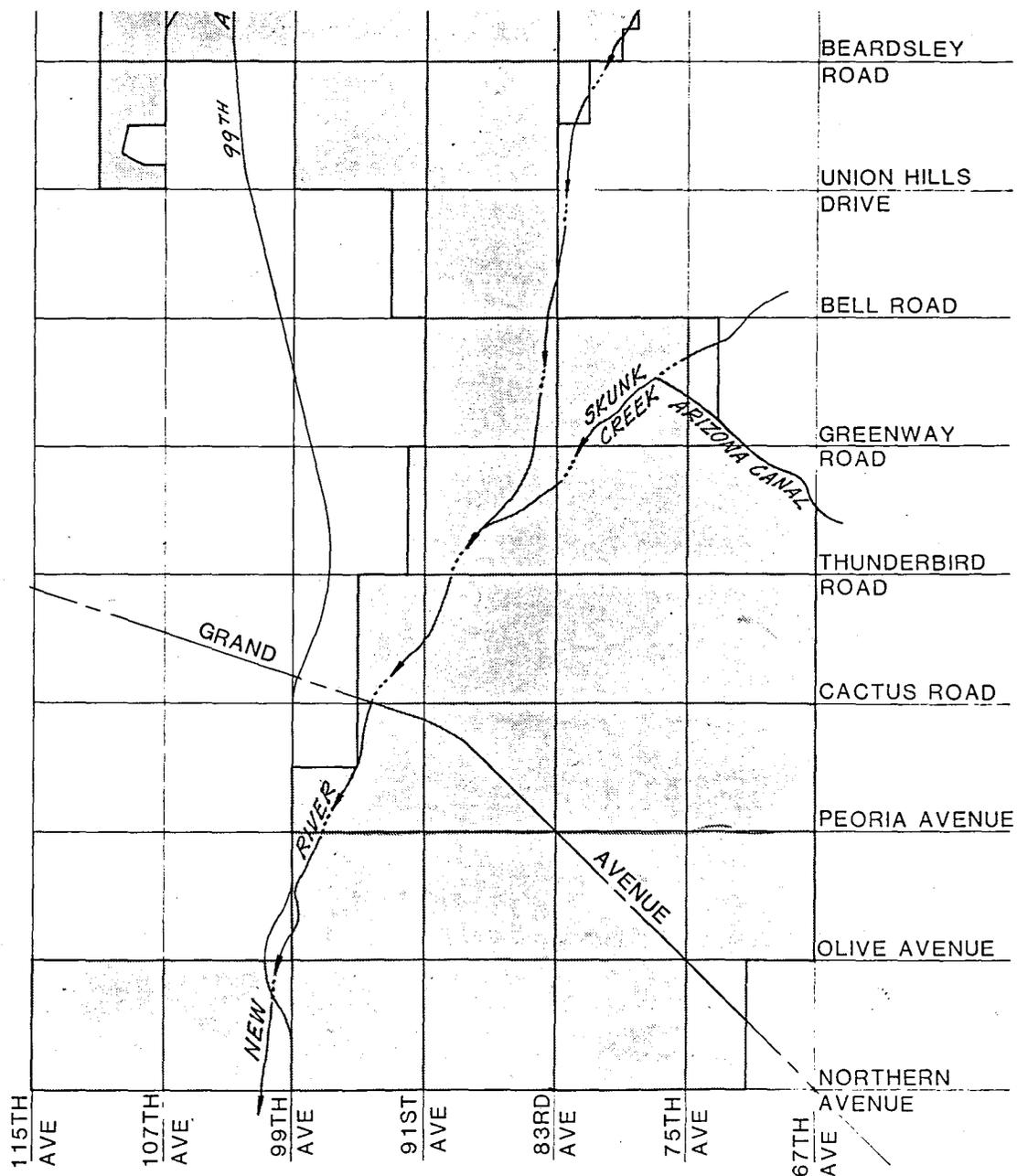


FIGURE 1
 PLANNING AREA
 CITY OF PEORIA ARIZONA

This general land use plan calls for a mixture of residential, commercial, industrial, recreation/open space, office and state park uses. North of Pinnacle Peak Road, almost no development has occurred and the area has not had a comprehensive plan developed.

The planning area for Peoria is characterized by very diverse topography from the southern to the northern boundaries of the area. The southern area includes most of the present development and in general has fairly uniform ground slopes toward and along Skunk Creek and the New River. Much of the area is agricultural, but development is occurring at a rapid pace in some sections of this zone. North of Pinnacle Peak Road, the topography becomes much more diverse. Some natural and man-made features of this north area include the New River Dam and Reservoir, the Central Arizona Project Aqueduct, Lake Pleasant Road, the Agua Fria River, The East and West Wing Mountains and numerous major stormwater water gullies and ravines. Approximately 25 percent of this north area drains towards and along the Agua Fria River to the South and West. The remainder of this area drains towards and along the New River.

CHAPTER 2

EXISTING FACILITIES
AND AGREEMENTS

CHAPTER 2

EXISTING FACILITIES AND AGREEMENTS

2.1 EXISTING FACILITIES

The existing sewage collection and treatment system for the City of Peoria consists of collector sewers, interceptor sewers, the 99th Avenue Interceptor Sewer from Olive Avenue to the Tolleson Wastewater Treatment Plant, and 2.3 mgd capacity in the Tolleson Wastewater Treatment Plant. There are several major interceptor sewers within the Peoria planning area including the new North Reach Interceptor, the Northern Avenue Interceptor from 99th Avenue to 83rd Avenue, the Cactus Road Interceptor from 75th Avenue to the North Reach Interceptor and the skeleton interceptor system on 75th Avenue, 83rd Avenue, 91st Avenue, Olive Avenue and Peoria Avenue. The existing interceptor sewer system is shown by schematic on Figure 2 in this Chapter.

2.2 MAJOR EXISTING AGREEMENTS

In the past, the City of Peoria has negotiated agreements with Youngtown, Sun City, and Glendale. Basically, these agreements granted Sun City and Youngtown the right to convey sewage through the Peoria system to the 83rd Avenue Interceptor at Northern Avenue. In addition, the old agreement with Glendale allowed Peoria to rent capacity in Glendale's interceptor sewer system and the 91st Avenue treatment plant.

At present, there are five major existing agreements between the City of Peoria and other communities concerning sewage collection and treatment.

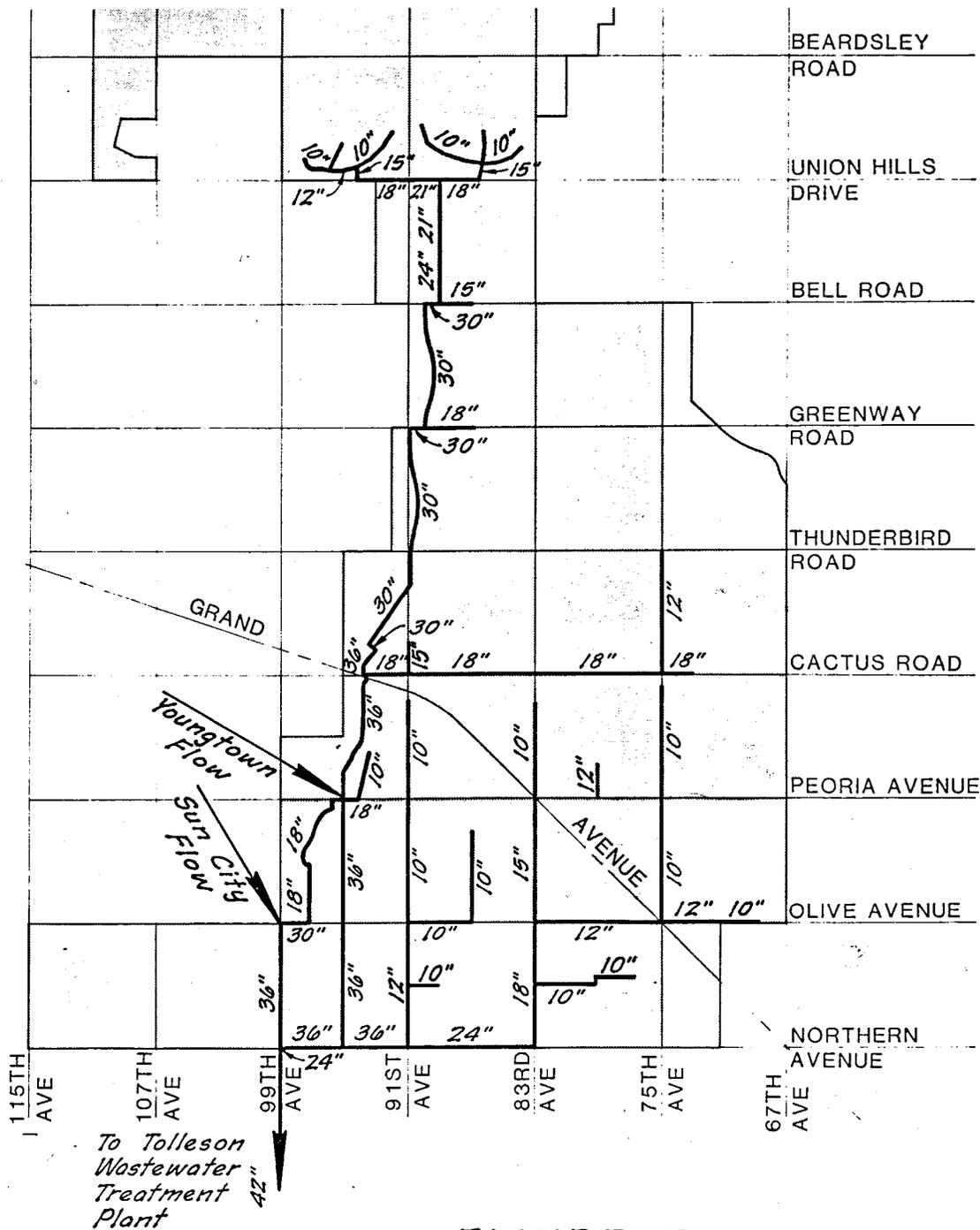


FIGURE 2

EXISTING INTERCEPTOR SEWER SYSTEM
CITY OF PEORIA ARIZONA

CAREFREE
HIGHWAY

DOVE VALLEY
ROAD

LONE MOUNTAIN
ROAD

DIXILETA DRIVE

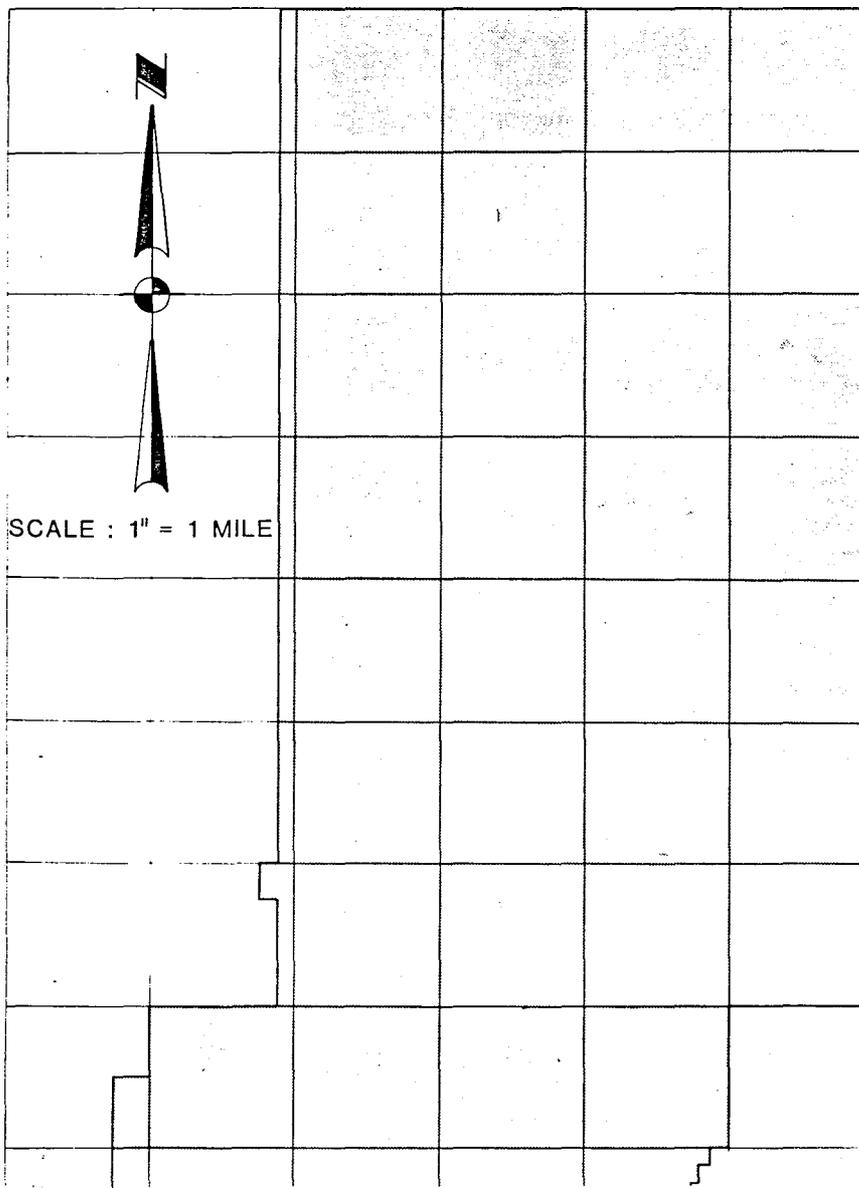
DYNAMITE
BOULEVARD

JOMAX ROAD

HAPPY VALLEY
ROAD

PINNACLE PEAK
ROAD

DEER VALLEY
ROAD



SCALE : 1" = 1 MILE

The first agreement is a multi-community agreement between the City of Phoenix, City of Tolleson, City of Glendale, and City of Peoria. This agreement provides for the joint use of the 99th Avenue sewer by the four communities and their sub-contractors. This agreement defined the ownership and capacity allocation for the 99th Avenue Interceptor based on as-built conditions and states that Peoria has capacities ranging from 8.86 mgd (peak flow) between Olive and Northern Avenue to 14.58 mgd (peak flow in limiting reach) downstream of Northern Avenue. These capacities equate to an average daily flow of 5.62 mgd and 7.29 mgd respectively.

The second agreement is between the City of Tolleson and the City of Peoria. Under this agreement, the City of Peoria obtained the right to use 1.2 mgd (average daily flow) capacity in the Tolleson Wastewater Treatment Plant. Conditions of this agreement included the requirement that Peoria align and oversize the 99th Avenue Sewer from the Tolleson City limits to the wastewater treatment plant to meet Tolleson requirements. Also, this agreement was amended on November 18, 1980, and now states that Peoria has a right to utilize a total average dry-weather peak flow capacity of 8.1 mgd and a maximum wet-weather peak flow capacity of 10.8 mgd. Finally, the 1980 amendment gave Peoria the right to share utilization of the treatment plant capacity with other communities through contractual agreements between the City of Peoria and the other communities.

The third agreement is between the City of Glendale and the City of Peoria. This agreement has several key aspects summarized as follows:

1. Glendale provided the necessary funding to increase the Tolleson wastewater treatment plant from 4.1 mgd capacity to 8.3 mgd capacity.
2. Peoria has the right to purchase all of the 4.2 mgd capacity which was constructed with Glendale funding. Capacity may be purchased by Peoria in increments as follows:

<u>AVERAGE DAILY FLOW CAPACITY</u>	<u>OPTION DATE</u>
1.1 mgd	Upon 180 days written notice
1.0 mgd	January 1, 1992
1.0 mgd	January 1, 1996
1.1 mgd	January 1, 2000

Purchases of capacity must be made by the City of Peoria within 1 year of the option dates shown above. The first option for additional capacity was exercised by Peoria effective December 1, 1983.

3. With the 1.2 mgd capacity which the City of Peoria had obtained previously, the total capacity available to the City at the Tolleson Wastewater Treatment Plant is 5.4 mgd.

The fourth agreement is between the City of Peoria and the City of Tolleson. This agreement provides for expansion of the Tolleson Wastewater Treatment Plant by 2.0 mgd above the existing 8.3 mgd plant to a total design flow capacity of 10.3 mgd. This expansion

which is currently under design will be funded by Peoria and the additional 2.0 mgd capacity will serve the City of Peoria. Upon completion of this expansion, the total available capacity at the Tolleson Wastewater Treatment Plant for the City will be 7.4 mgd.

In addition to the above agreement, City of Peoria officials have indicated that there was an offer by the City of Tolleson to lease an additional 2.0 mgd of unused existing capacity at the Tolleson treatment plant to the City of Peoria on a short term basis (2 years). This offer subsequently was changed by Peoria to a preliminary lease agreement for 200,000 gallons per day based on Peoria's estimated needs at the time. The preliminary lease agreement was never executed because Peoria determined that the extra capacity was not needed. However, due to increases in flow to the Tolleson plant from Peoria, it was later determined that Peoria would require additional capacity in the fall of 1984. Based on this need, an agreement was developed between Peoria and Tolleson to allow Peoria to lease 300,000 gallons per day capacity at the treatment plant beginning October 1, 1984. The terms of this short-term agreement include the right for Peoria to lease this extra capacity for a period from October through May with an option to renew the lease. Finally, both City of Peoria and City of Tolleson officials have indicated that all or a large portion of the 2.0 million gallons per day reserve capacity at the Tolleson treatment plant could probably be available for lease on a short-term basis if Peoria capacity needs warranted executing an additional agreement.

The fifth agreement is between the Town of Youngtown and the City of Peoria. This agreement was adopted originally in 1969 and gave Youngtown the right to pump an average daily flow of 0.35 mgd into Peoria's interceptor system at 83rd Avenue and Washington Street. The agreement called for delivery of no more than 1.0 mgd in 1 day and no pumping rate in excess of 1000 gpm. Construction of the North Reach Sewer Improvement District included a tie-in for the Youngtown force main at 95th and Peoria Avenues. Youngtown has redesigned the pumps (lower head) to pump into the North Reach Sewer and the physical connection between the Youngtown force main and the North Reach Sewer has been made by Peoria.

CHAPTER 3

DRAINAGE AREAS, POPULATION,
FLOWS, METHODOLOGY
AND DESIGN CRITERIA

CHAPTER 3

DRAINAGE AREAS, POPULATION, FLOWS, METHODOLOGY AND DESIGN CRITERIA

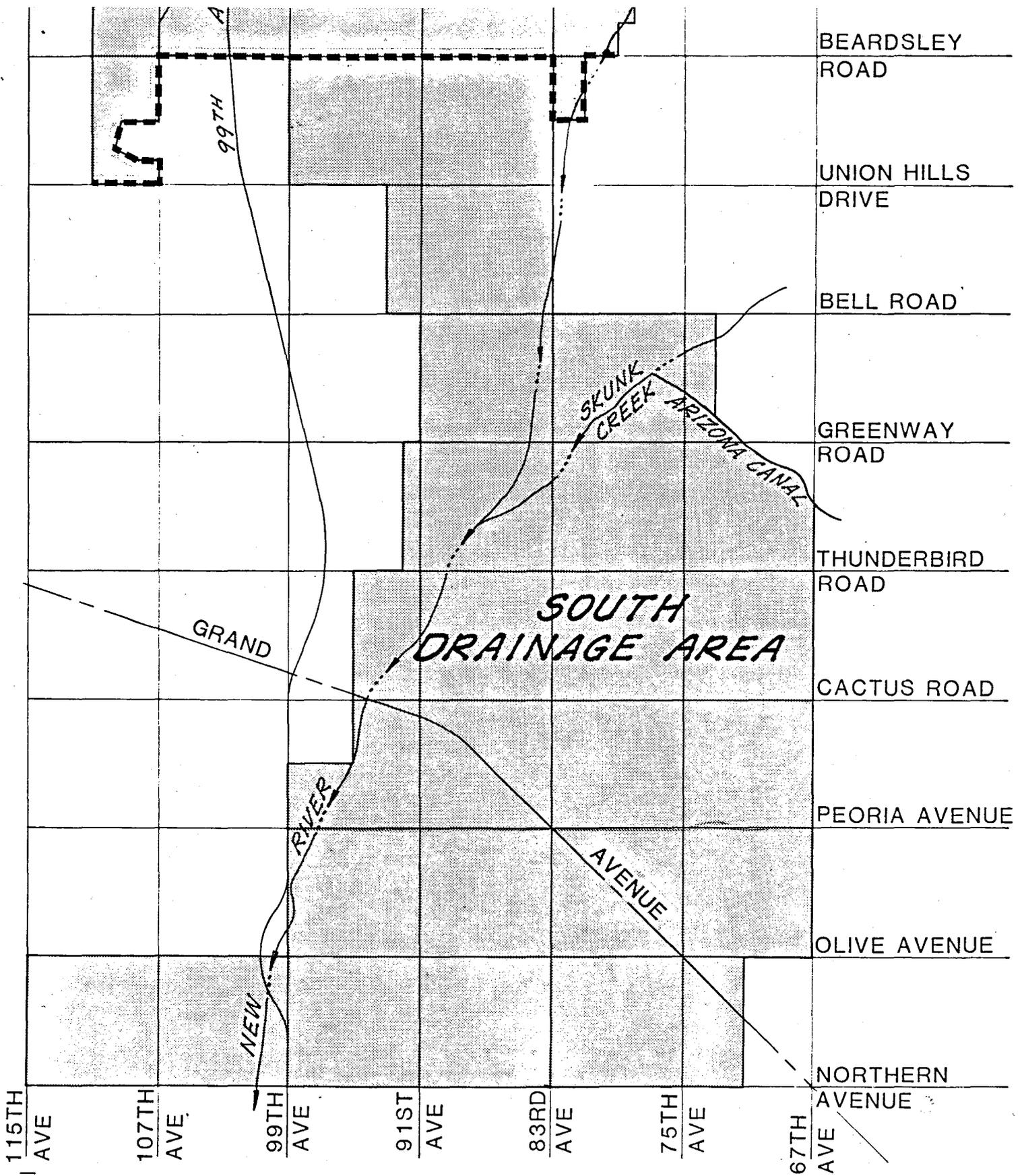
3.1 DRAINAGE AREAS

The Peoria Planning area, due to its very diverse topography, logically can be broken into three sewer planning or drainage zones. The south zone which extends from Beardsley Road to Northern Avenue drains almost exclusively towards and along the New River. This zone can be served with a system of gravity sewers to an outfall sewer on 99th Avenue at Northern Avenue. The only area in this south zone which can not be served by gravity is west of 109th Avenue between Olive and Northern Avenues.

A second sewer planning or drainage zone exists in the north central portion of the planning area between Beardsley Road and Dynamite Boulevard. This area can also be served by a system of gravity sewers and one small pump station just east of 83rd Avenue.

The third sewer planning or drainage zone north of Dynamite Boulevard to the Carefree Highway includes several natural and manmade constraints which preclude using only gravity sewers to serve the area. In this north zone, the planning constraints include the CAP Aqueduct, the New River Reservoir, the Aqua Fria River, several mountainous areas, and numerous deep ravines and gullies.

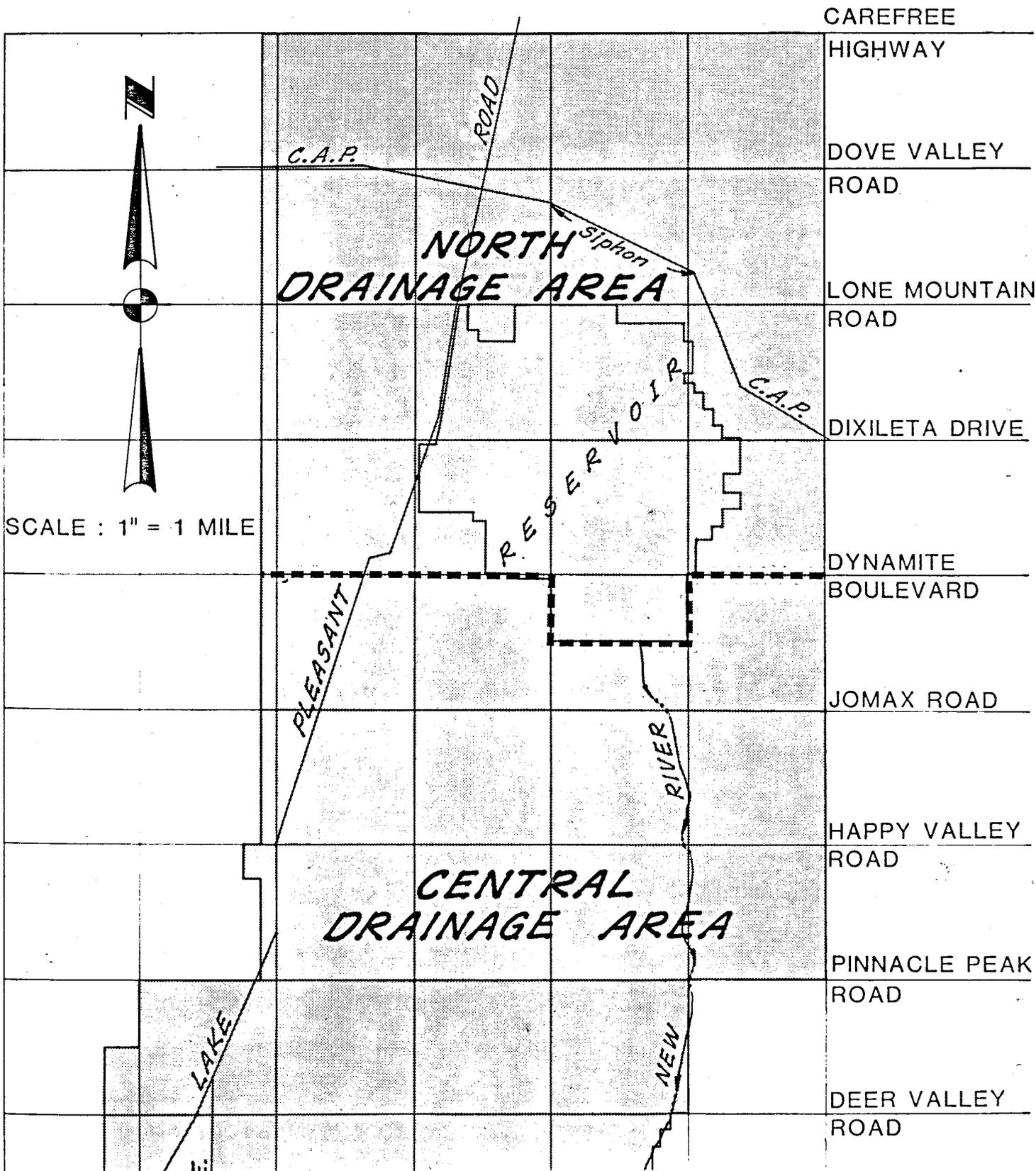
The sewer drainage areas described above are as shown on Figure 3 in this Chapter.



----- Area Boundary

FIGURE 3

SEWER DRAINAGE AREAS
CITY OF PEORIA, ARIZONA



3.2 POPULATION

The current estimated population totals which have been adopted by the Maricopa Association of Governments for the Peoria planning area are as follows:

<u>MID YEAR</u>	<u>POPULATION SOUTH OF BELL ROAD</u>	<u>POPULATION NORTH OF BELL ROAD</u>	<u>TOTAL POPULATION</u>
1980 (census)	14,670	1210	15,880
1985	20,950	2540	23,490
1990	31,480	4260	35,740
1995	42,860	8410	51,270
2000	56,410	14,820	71,230
2005	69,800	22,830	92,630
2010	84,610	32,540	117,150
2015	102,400	44,030	146,430

These MAG population totals are similar to population totals developed in 1983 by the City for the "CAP Water Treatment and Conveyance Planning Study", but, are less than City totals from about 1984 through the year 2015. For comparison, the City and MAG totals based on straight line projections for the City population estimates are as follows:

<u>YEAR</u>	<u>MAG POPULATION</u>	<u>CITY OF PEORIA CAP POPULATION ESTIMATE</u>
1985	23,490	25,636
1990	35,740	47,227
1995	51,270	68,818
2000	71,230	90,409
2005	92,630	112,000
2010	117,150	133,590
2015	146,430	155,182

In order to establish population totals to be used for planning purposes in this study, certain assumptions and data analyses were required. To be conservative, the higher City CAP population estimate totals were used and were prorated to the drainage areas defined for the planning area by using the MAG distributions of population for the traffic analysis zones and districts inside the planning area. The results of this analysis for population distribution by year in the planning are as follows:

Drainage Area	Population						
	1985	1990	1995	2000	2005	2010	2015
1. North Area (Dynamite Boulevard to Carefree Highway)	67	135	266	439	634	884	1,214
2. Central Area (Beardsley Road to Dynamite Boulevard)	2675	5431	10,895	18,155	26,655	35,773	44,829
3. South Area (Northern Avenue to Beardsley Road)	22,894	41,661	57,657	71,815	84,711	96,933	109,139
TOTAL	25,636	47,227	68,818	90,409	112,000	133,590	155,182

3.3 FLOWS

Flow data for March, 1984, through May, 1984, from the City of Peoria showed a total average daily flow of sewage of 2.265 million gallons per day. Officials of the City of Peoria have estimated that this flow was generated from 8148 connected residences. In developing the estimate of connected residences, the City officials subtracted the number of commercial customers so that a unit flow could be developed based on population or residences only. Using the average sewage flow and the estimated number of connected

residences, the per residence unit flow with an allowance for the existing commercial contribution is approximately 278 gallons per day per connected residence. Per City engineering officials, the estimated average number of people per residence Citywide is 2.8 people per home. Dividing the 278 gallons per day per connected residence by the number of people per home yields a per capita unit flow of approximately 100 gpcd. It should be remembered that this per capita flow does include some commercial flow in addition to the sewage generated in homes, apartments and mobile homes.

Water consumption during April, 1984, was 3.872 million gallons per day. Based on this consumption rate, the average water consumption rate per occupied residence was estimated to be 475 gallons per day. Based on the sewage flow in April of 2.255 million gallons per day and water consumption rates, the percent return of water to the sewer system is approximately 58 percent. This percent return of water to the sewer appears reasonable given the time of year and nature of the development in the City of Peoria.

Utilizing the per capita flow shown above, the estimated average daily sewage flows based on the selected City population estimates for the entire Peoria Planning Area are as follows:

YEAR	CITY OF PEORIA ESTIMATED FLOW (MGD)
1985	2.56
1990	4.72

YEAR	CITY OF PEORIA ESTIMATED FLOW (MGD)
1995	6.88
2000	9.04
2005	11.20
2010	13.36
2015	15.52

It should be noted that the above average daily sewage flows assume that the entire estimated population is connected to the sewer and that per capita sewage flows will remain constant throughout the planning period.

Since the north drainage area (Dynamite Boulevard to the Carefree Highway) consists of over 10,000 acres of land and is projected to have only 1214 people in the next 30 years, no sewage flows need be calculated for the area because sewerage the area is not economically feasible. Also, since there are two distinct drainage areas in the remainder of the Peoria Planning area, flows based on the above per capita flow were calculated separately as follows:

Year	Central Area Beardsley Road To Dynamite Boulevard (MGD)	South Area Northern Avenue To Beardsley Road (MGD)
1985	0.27	2.29
1990	0.54	4.17
1995	1.09	5.77
2000	1.82	7.18
2005	2.67	8.47
2010	3.58	9.69
2015	4.48	10.91

Again, it should be remembered that these flow figures are calculated on the basis of all people being connected to the sewer and that per capita flow including commercial and other sources will remain constant.

3.4 Sewer Master Plan Methodology

A method which is commonly used for developing a sewer master plan where land use planning has been done is to utilize the ultimate land use and zoning categories for each area of land, develop reasonable dwelling unit densities and occupancy levels for the different residential classifications, develop unit flows for all land use categories, generate ultimate flows throughout the planning area, and size sewer lines based on these ultimate flows. Once the facilities have sized for ultimate flows, timing for future development is estimated and staging of construction is determined.

The advantage of this type of approach to a sewer master plan is that timing of development is generally not critical if areas develop at a faster rate than is expected or develop fully sooner than anticipated because the sewer lines are sized to accommodate the ultimate flow. However, one disadvantage to this approach is that some sewer lines may end up being slightly oversized if the nature of development changes to a lower density. Another disadvantage is the capital expenditures required to install sewer lines which are sized for ultimate flows especially for the City and for small developers. This financial disadvantage, however, can be mitigated through "buy back" agreements as future development occurs. Additionally the financial impact of a sewer master plan

which is developed based on ultimate flows can be mitigated through design to provide for two parallel sewer lines to be constructed at different times during early development years and all of flow during complete "build out" years if the City desires to proceed in this manner.

Based on the considerations described in this section the approach taken in this report for development of the sewer master plan was to utilize the ultimate flows to size the sewer system.

Traditionally, sewage treatment plants have been sized based on the average daily flow expected from the connected population. Often, treatment facilities have been designed for a 20-year planning period. In other cases, plants have been sized for shorter periods by staging of construction. Given the fact that it normally takes 3 or more years to complete the planning, design and construction of a treatment facility, construction staging is generally not scheduled more frequently than every 5 years except in very special cases.

In order to develop a master plan for sewage treatment for a community, several factors have to be taken into account. Some of the key considerations concerning wastewater treatment for a community are as follows:

1. The nature and extent of the existing wastewater system in the community.
2. Existing agreements for wastewater collection and treatment.
3. State and Federal requirements concerning treatment levels and discharge or reuse of effluent.

4. Population and flow projections.
5. Financial resources and capabilities of the community.
6. Availability of treatment plant sites and the associated costs for the land.
7. Current or future availability of treatment capacity by other communities.
8. Environmental and aesthetic impacts.
9. Local acceptance of having a treatment facility in the vicinity.
10. Availability of grants or funding for completion of the facilities.
11. Availability of effluent discharge locations or reuse sites.

Although most of these considerations are beyond the scope of this study, they nevertheless must be taken into account before detailed design is undertaken.

The approach used for developing the treatment facility portion of the Peoria Wastewater Master Plan was to review the existing agreements for treatment capacity at the Tolleson Treatment Plant, study the nature and extent of the existing system, review State and Federal requirements concerning required treatment levels and effluent discharge, develop average daily flow projections based on connected population estimates through the year 2005, develop treatment plant capacity requirements for a 20-year planning period and analyze construction staging possibilities for providing the required facilities.

3.5 Design Criteria

For planning purposes, it is essential that criteria are selected which are conservative and provide for a master sewer plan which will have recommended line sizes which will be adequate for future needs. Based on an analysis of the current zoning, the adopted general land use plan and consultations with the City staff, the following flow criteria were selected for use in the Peoria Sewer Master Plan:

ZONING OR LAND USE CATEGORY	DENSITY (HOMES PER GROSS ACRE)	ESTIMATED OCCUPANCY PER HOME	ESTIMATED AVERAGE SEWAGE FLOW PER GROSS ACRE (GALLONS PER DAY)
R1 - 6	7	3	2100
R1 - 7	6	3	1800
R1 - 8	5	3	1500
R1 - 12	3.25	3	975
R1 - 18	2	3	600
R1 - 35	1	3	300
RMH	10	2.5	2500
RM - 1	12	2.0	2400
O	-	-	2000
C	-	-	2000
S	-	-	2000
I	-	-	2000
SP	-	-	100
OS	-	-	100

Other design criteria which were used included per capita sewage flow of 100 gallons per day and a Manning's "N" coefficient of 0.013 for all pipe regardless of size in accordance with Arizona Department of Health Services requirements. The final design criteria for calculating the capacity and size of the interceptor sewers was based on peak to average flow factors developed from the commonly used and well known Harmon's equation as follows:

$$Q_{\max} = 1 + \left[\frac{14}{4 + p \cdot 0.5} \right] Q_{\text{Ave.}}$$

Where Q = flow rate in gallons per day
P = population in thousands

It should be noted that the City of Peoria planning area north of Pinnacle Peak Road does not have a general land use plan. Based on discussions with the City staff, a sewage production figure based on 4 dwelling units per acre and 3 people per residence was used for planning purposes in the unplanned north area. This figure was 1200 gallons per day per gross acre and was applied uniformly to the north area on lands which were estimated to be developable.

CHAPTER 4

WASTEWATER MASTER PLAN

CHAPTER 4

WASTEWATER MASTER PLAN

4.1 Existing System Deficiencies

The existing sewer system for the City of Peoria was described in Chapter 2 of this report. Given the existing and possible agreements that the City has for treatment capacity, the existing system is adequate to accommodate present flows except in a few areas.

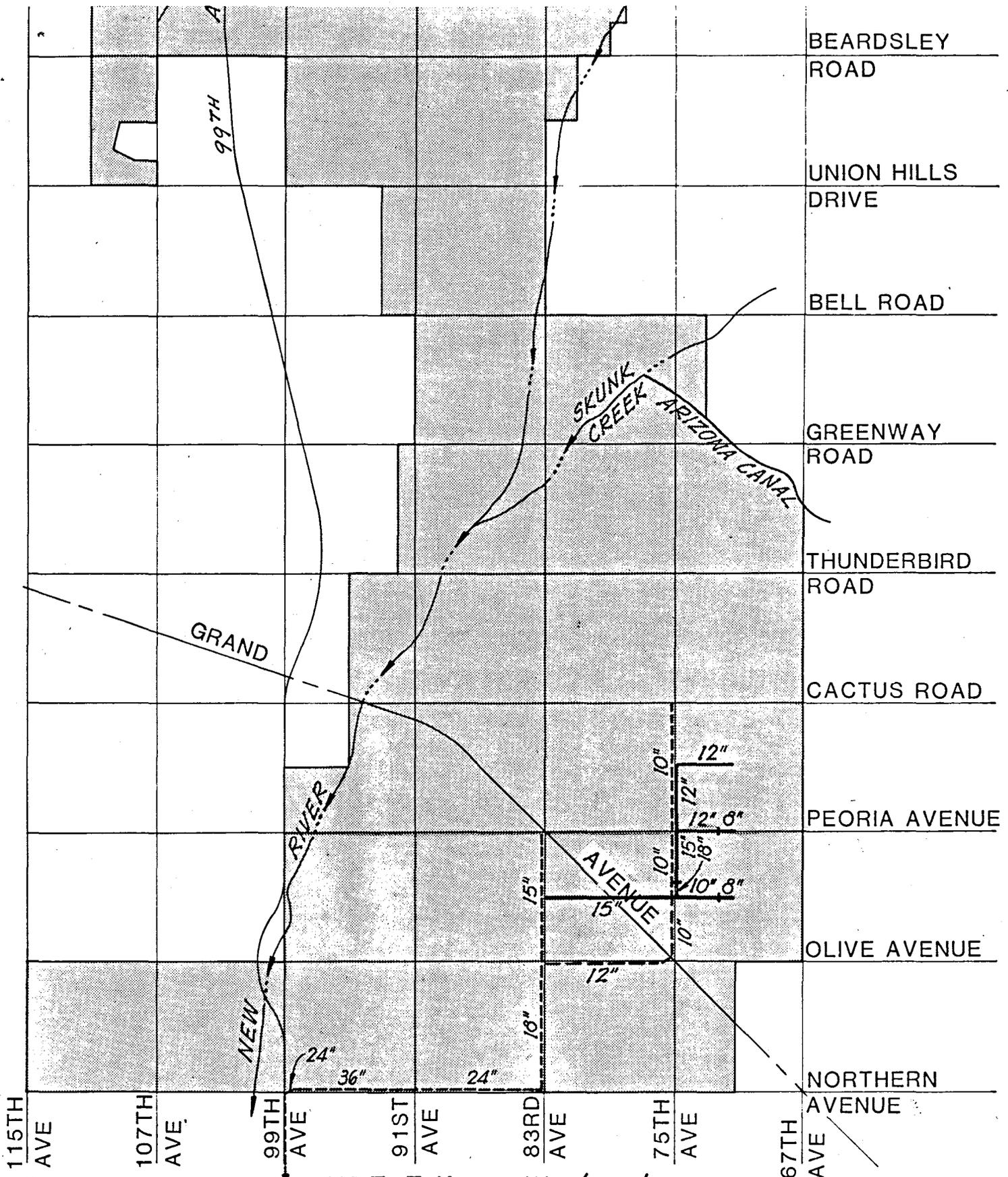
The sewer lines which are presently estimated to be at or approaching capacity due to existing or pending development are tabulated as follows:

<u>LOCATION</u>	<u>SIZE (inches)</u>	<u>LENGTH (miles)</u>
1. 75th Avenue from Cactus Road to Olive Avenue	10"	2
2. Olive Avenue from 75th Avenue to 83rd Avenue	12"	1
3. Peoria Avenue from 71st Avenue to 75th Avenue	8"	1/2
4. Mountain View Road from 71st Avenue to 75th Avenue	8"	1/2
5. 71st Avenue from Cholla Street to Peoria Avenue	8"	1/2
6. 91st Avenue from Peoria Avenue to Olive Avenue	10"	1
7. 91st Avenue from Olive Avenue to Northern Avenue	12"	1
8. Olive Avenue from 87th Avenue to 91st Avenue	10"	1/2
9. Northern Avenue at the connection to the 99th Avenue Interceptor	24"	50 Feet
10. Varney Road from 79th Avenue to 83rd Avenue	8"	1/2
11. 83rd Avenue from Varney Road to Peoria Avenue	10"	1/2

4.2 Recommended Sewer Projects To Correct Existing System Deficiencies And To Serve Immediately Developing Areas

The most serious of these system deficiencies is on the east side of Peoria in the 75th Avenue line from Cactus Road to Olive Avenue, the Peoria Avenue line from 71st Avenue to 75th Avenue, the 71st Avenue line from Cholla Street to Peoria Avenue, and the Mountain View Road line from 71st Avenue to 75th Avenue. Most of the area served by these lines is currently developed or developing. In cooperation with City officials, a plan was developed to alleviate the system deficiencies in the area in the near future. This plan includes permanent diversion of all flows along 75th Avenue north of Cactus Road into an existing 18-inch sewer in Cactus Road, construction of parallel sewers along Peoria Avenue, Cholla Street and Mountain View Road east of 75th Avenue, construction of a parallel sewer along 75th Avenue from Cholla Street to Mountain View Road and construction of a relief sewer line on Mountain View Road from 75th Avenue to the existing 15-inch diameter interceptor sewer on 83rd Avenue. This Mountain View Road relief sewer is intended to be utilized only temporarily until other sewer lines can be constructed to relieve the eastside system capacity deficiencies. Once these other lines are constructed, the Mountain View relief sewer will then be disconnected from the 75th Avenue system and used to serve the ultimate flow needs north of Mountain View Road between 75th and 83rd Avenues.

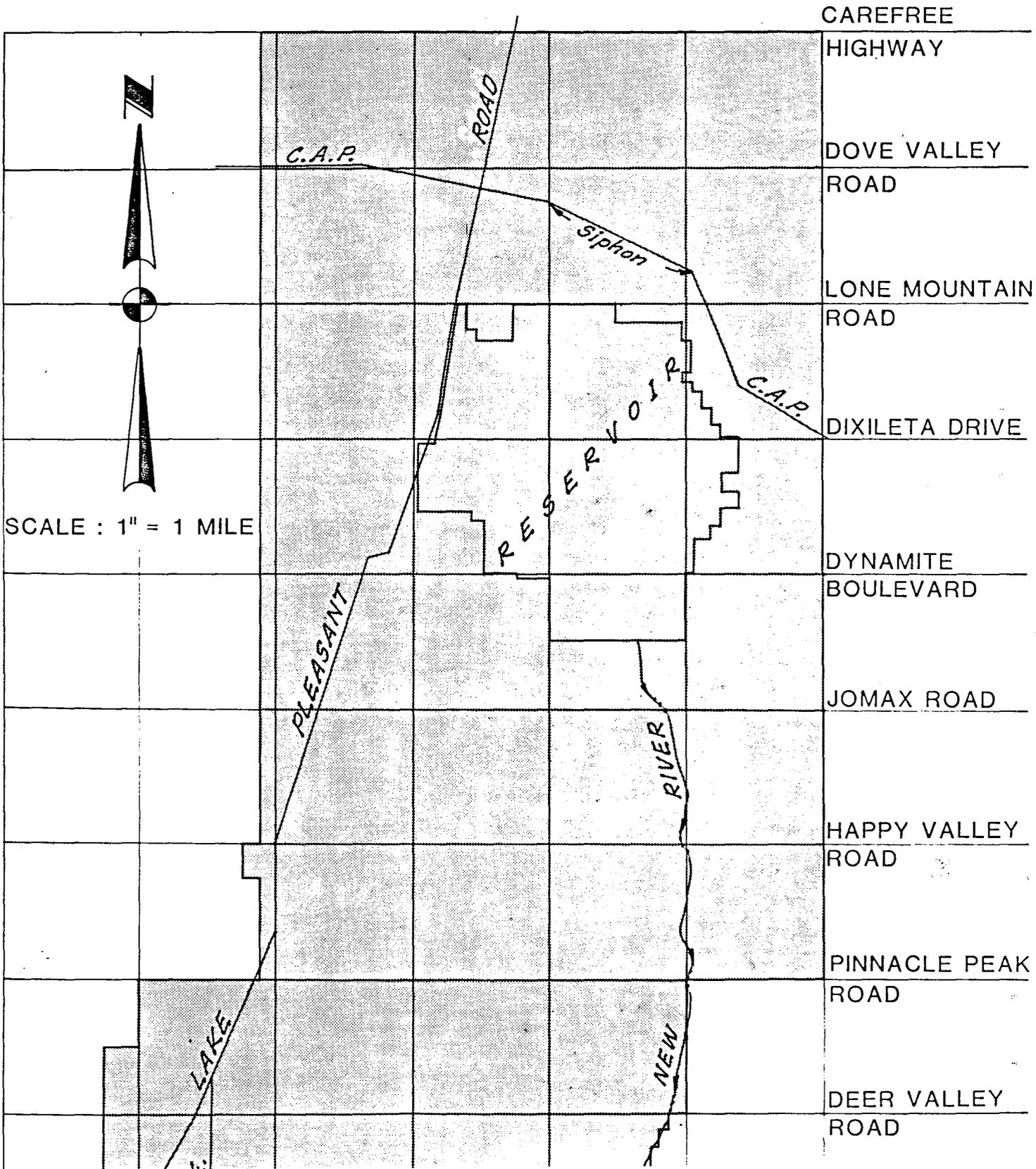
The proposed project as described above is as shown on Figure 4 in this chapter.



LEGEND

- Existing
- Proposed

FIGURE 4
 PROPOSED PROJECT I
 CITY OF PEORIA, ARIZONA



CAREFREE
HIGHWAY

DOVE VALLEY
ROAD

LONE MOUNTAIN
ROAD

DIXILETA DRIVE

DYNAMITE
BOULEVARD

JOMAX ROAD

HAPPY VALLEY
ROAD

PINNACLE PEAK
ROAD

DEER VALLEY
ROAD

C.A.P.

ROAD

Siphon

C.A.P.

RESERVOIR

PLEASANT

RIVER

LAKE

NEW



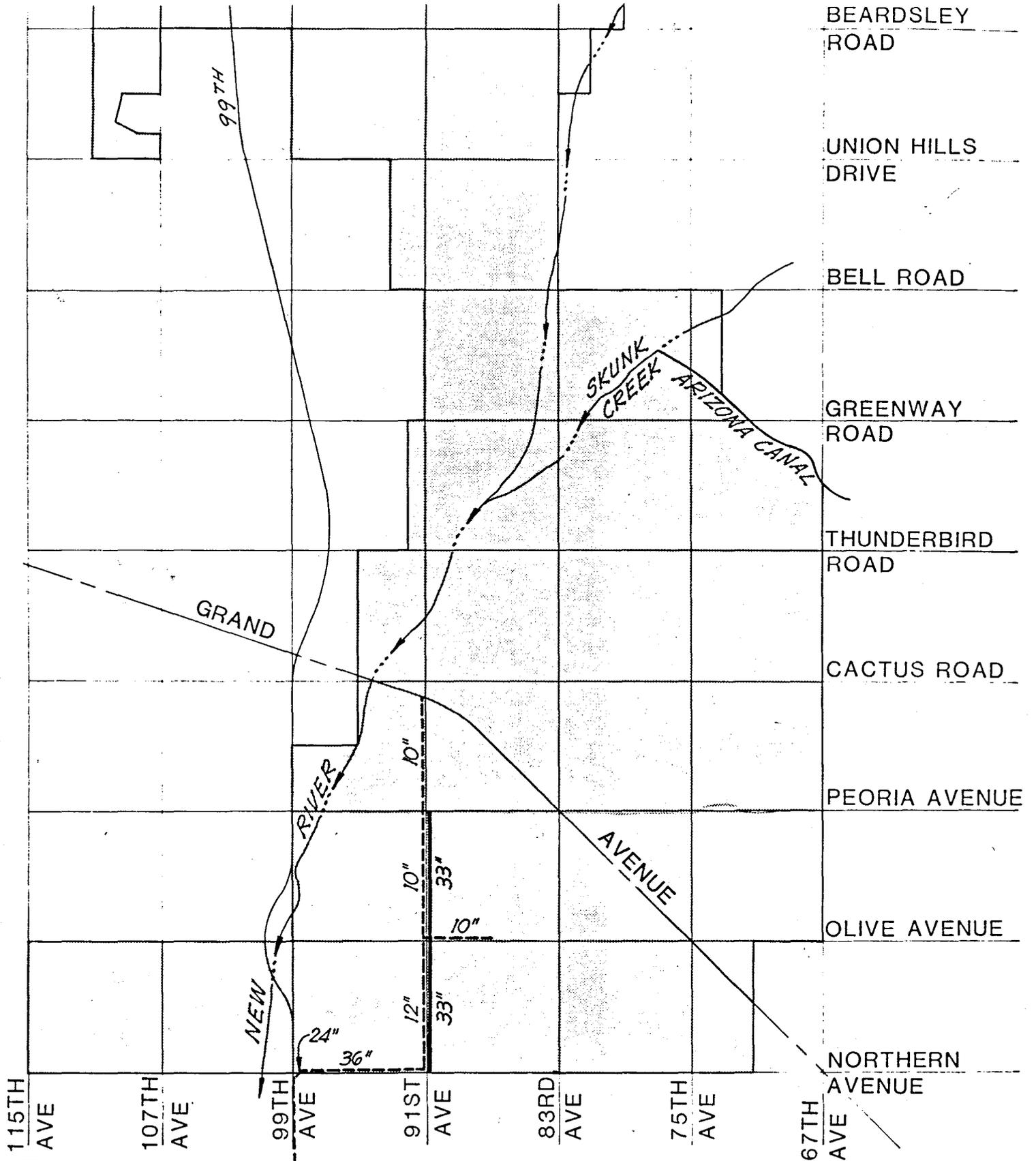
SCALE : 1" = 1 MILE

A second system deficiency was identified in the 91st Avenue line from Peoria Avenue to Northern Avenue and the Olive Avenue line from 87th Avenue to 91st Avenue.

The 91st Avenue line presently serves approximately 440 acres of developed commercial, residential and school property including much of the downtown area of Peoria. In addition, there is a major subdivision under design just north of Olive Avenue and east of 91st Avenue which will be connected to the 91st Avenue line. In order to alleviate the existing system deficiency problem along 91st Avenue and Olive Avenue and taking ultimate area needs into consideration, a plan was developed to construct a parallel sewer along 91st Avenue from Peoria Avenue to the existing 36-inch diameter interceptor in Northern Avenue. In addition this plan also includes the requirement that the pending subdivision just north of Olive Avenue and just east of 91st Avenue not connect to the Olive Avenue line as planned. In lieu of connecting to the Olive Avenue line, the plan would require the subdivision to construct a separate line to connect to the 91st Avenue line.

The proposed plan as described above is as shown on Figure 5 in this chapter.

A third existing system deficiency which was determined includes the Olive Avenue line from 75th Avenue to 83rd Avenue. Even with the diversion of all of the flows north of Mountain View Road from 75th to 83rd Avenue, this Olive Avenue line is not adequate to accommodate existing and pending development flows. In addition,



BEARDSLEY ROAD

UNION HILLS DRIVE

BELL ROAD

GREENWAY ROAD

THUNDERBIRD ROAD

CACTUS ROAD

PEORIA AVENUE

OLIVE AVENUE

NORTHERN AVENUE

115TH AVE

107TH AVE

99TH AVE

91ST AVE

83RD AVE

75TH AVE

67TH AVE

GRAND

NEW RIVER

SKUNK CREEK

ARIZONA CANAL

AVENUE

10"

10"

33"

10"

12"

33"

24"

36"

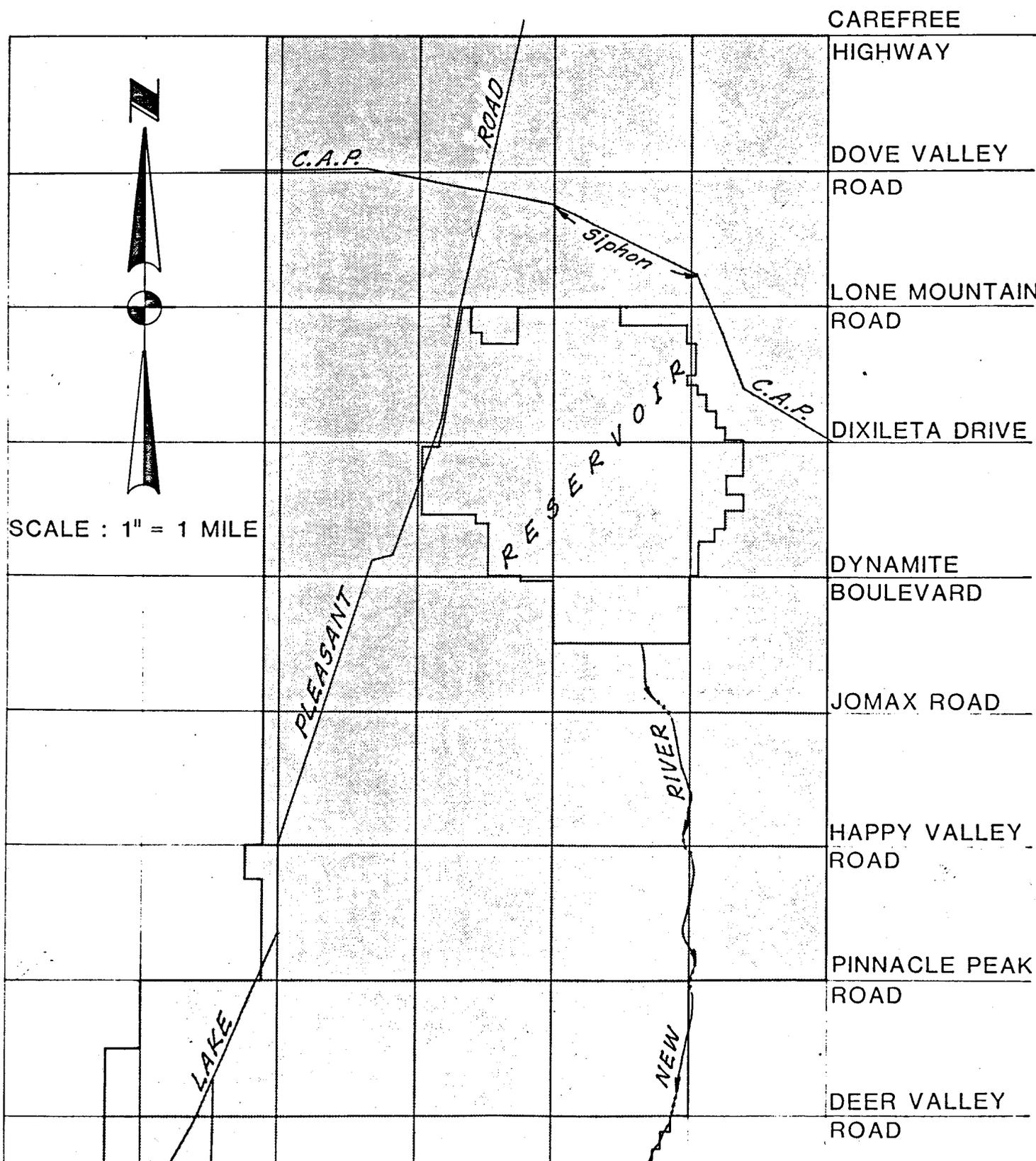
42" To Tolleson Wastewater Treatment Plant

LEGEND

- Existing
- Proposed

FIGURE 5

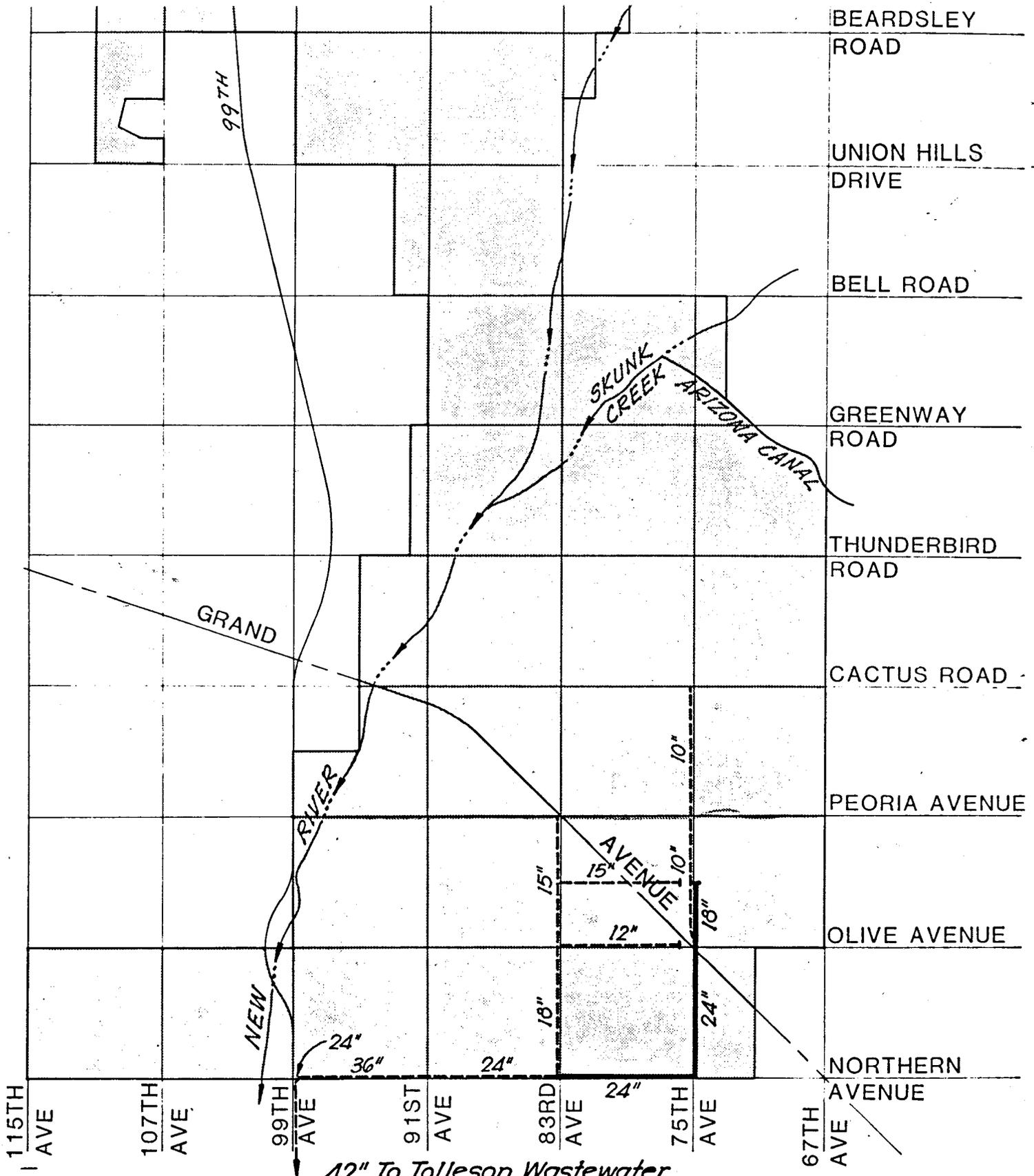
PROPOSED PROJECT 2
CITY OF PEORIA, ARIZONA



if diversion of eastside flows along Mountain View Road from 75th Avenue to 83rd Avenue is maintained on more than a temporary basis, a capacity deficiency will result in the 83rd Avenue line from Mountain View Road to Northern Avenue. In order to alleviate the capacity deficiency in the Olive Avenue line west of 75th Avenue and to prevent a capacity deficiency problem in the 83rd Avenue line south of Mountain View Road, a plan was developed to construct a parallel sewer in 75th Avenue from Mountain View Road to Olive Avenue, a new sewer along 75th Avenue from Olive Avenue to Northern Avenue and a new sewer along Northern Avenue from 75th Avenue to the existing 24-inch diameter sewer at 83rd Avenue. Also, this plan includes disconnection of the Mountain View Road relief sewer and the Olive Avenue sewer and the diversion of all 75th Avenue system flows south of Cactus Road into this new sewer system.

The proposed project as described above is as shown on Figure 6 in this chapter.

A fourth existing system deficiency which was identified includes a 50-foot reach of 24-inch diameter line which was installed on the Northern Avenue Interceptor where it connects into the 99th Avenue Interceptor sewer. In addition, a deficiency was identified due to existing and pending development in the Varney Road line from 79th Avenue to 83rd Avenue and the 83rd Avenue line from Varney Road to Peoria Avenue. To alleviate these deficiencies and taking ultimate capacity needs into consideration, a plan was developed to construct a 36-inch diameter parallel sewer in Northern Avenue at the connection to the 99th Avenue interceptor and parallel sewers in Varney Road and 83rd Avenue.

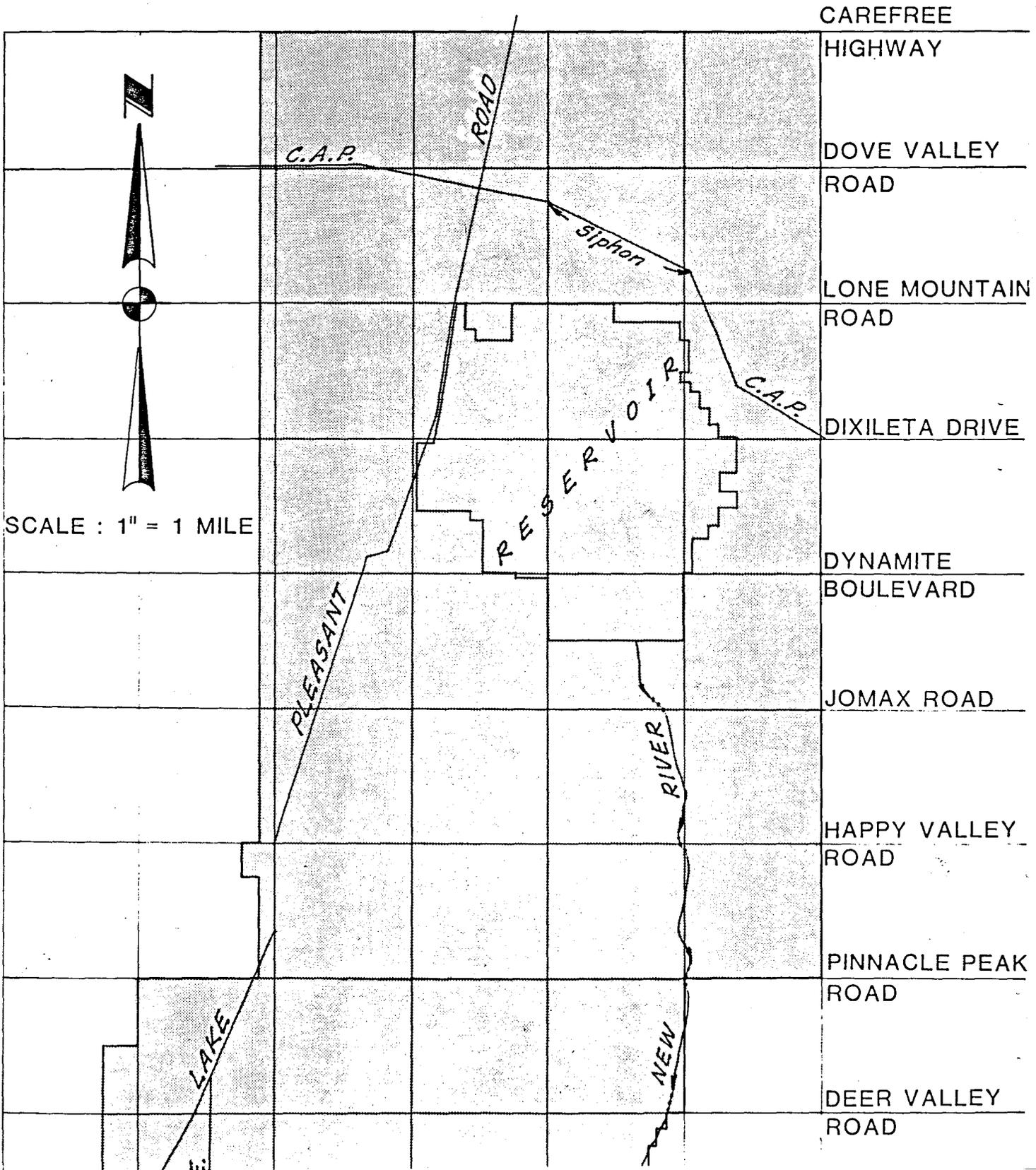


LEGEND

- Existing
- Proposed

FIGURE 6

PROPOSED PROJECT 3
CITY OF PEORIA, ARIZONA



CAREFREE
HIGHWAY

DOVE VALLEY
ROAD

LONE MOUNTAIN
ROAD

DIXILETA DRIVE

DYNAMITE
BOULEVARD

JOMAX ROAD

HAPPY VALLEY
ROAD

PINNACLE PEAK
ROAD

DEER VALLEY
ROAD

C.A.P.

ROAD

Siphon

RESERVOIR

C.A.P.

PLEASANT

RIVER

LAKE

NEW

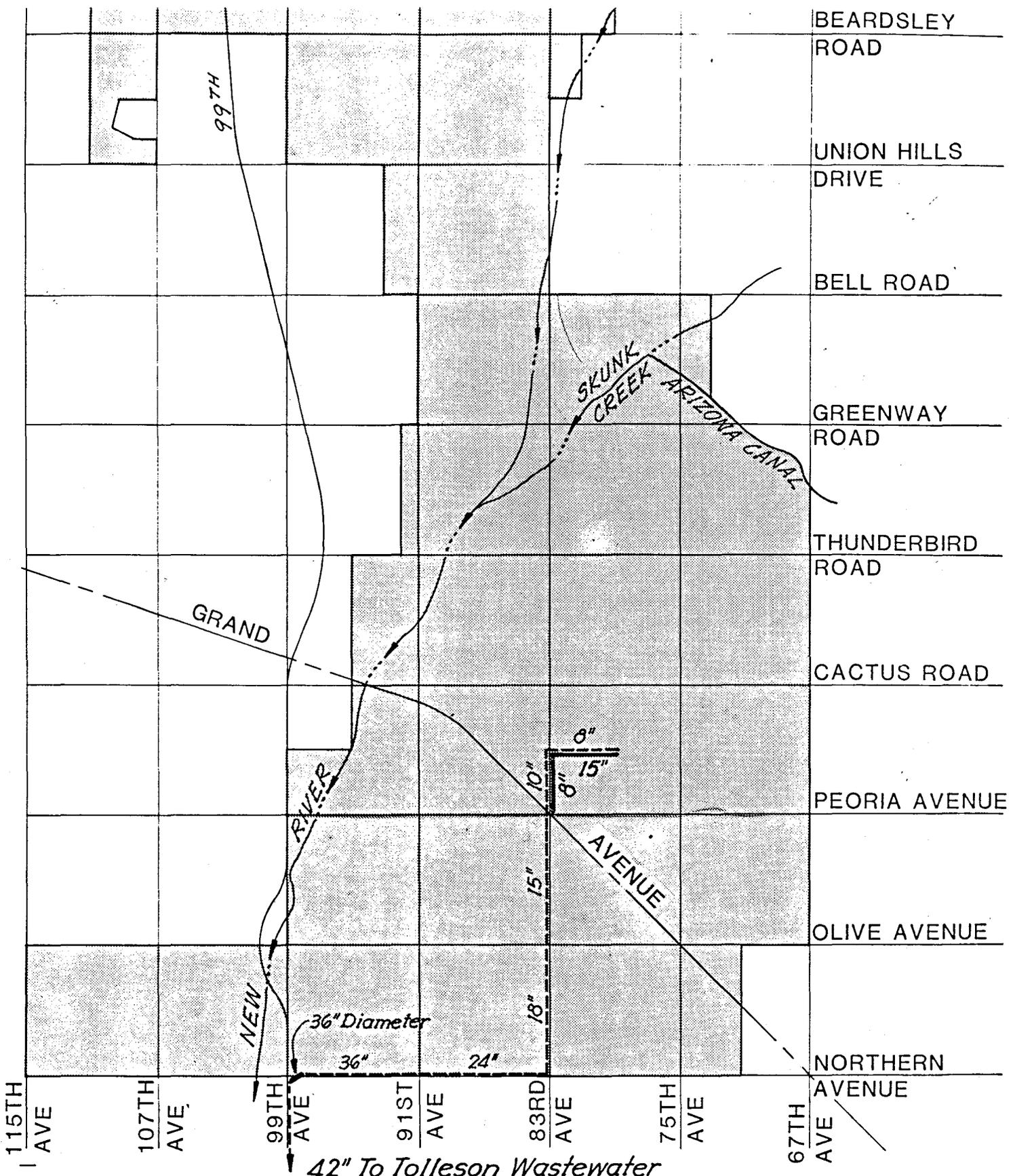
SCALE : 1" = 1 MILE



The proposed project as described above is as shown on Figure 7 in this chapter.

It should be pointed out that these existing system deficiencies are based on analyses using the planning criteria established in this report and estimates of developed and developing acres from 1984 aerial photographs of the area. The planning criteria used are conservative, but, do give a fairly reliable estimate of existing flows and deficiencies. Finally, these existing system deficiency analyses were based on sewer slopes determined in the field from measurements taken generally about one-half mile apart along the existing interceptor sewer lines. Thus, the deficiency analysis does not include individual short lengths of line which could have been installed at a flatter slope than the rest of the line.

A fifth project to provide additional capacity in the pending Beardsley Road Improvement District project was also identified. The Beardsley Road Improvement District project involves construction of an outfall sewer along Beardsley Road from 83rd to 111th Avenue and interceptor sewers in 83rd, 87th, 91st, 95th and 107th Avenues. Since the wastewater master plan developed in this report calls for the same system, but, includes a much larger service area, the size of the proposed sewers in the Beardsley Road Improvement District project should be increased to provide capacity in accordance with the master plan. The net cost for increasing the sewer sizes would be funded by the City and then recovered by the City as future development connects to the system.

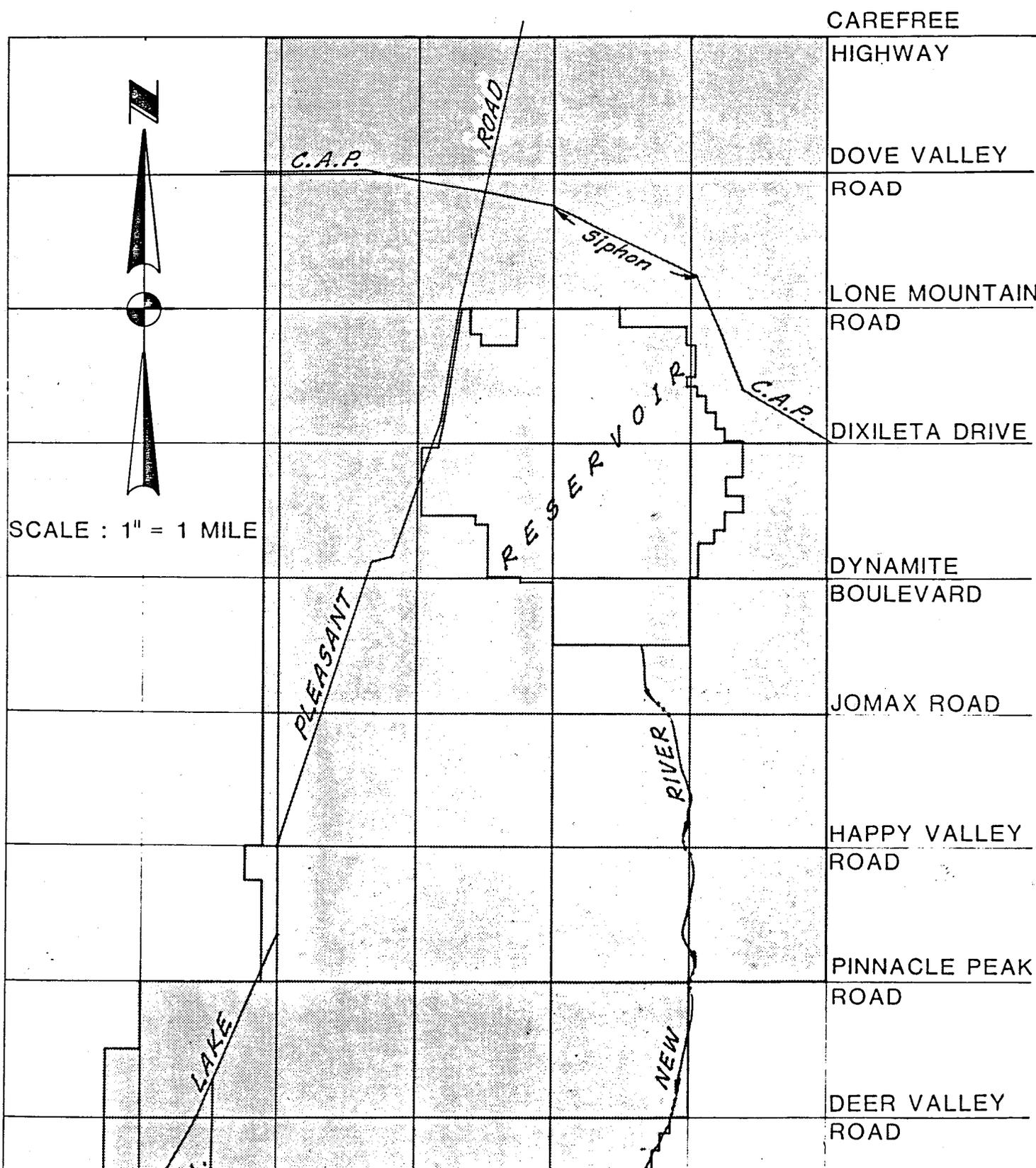


LEGEND

- Existing
- Proposed

FIGURE 7

PROPOSED PROJECT 4
CITY OF PEORIA, ARIZONA



CAREFREE
HIGHWAY

DOVE VALLEY
ROAD

LONE MOUNTAIN
ROAD

DIXILETA DRIVE

DYNAMITE
BOULEVARD

JOMAX ROAD

HAPPY VALLEY
ROAD

PINNACLE PEAK
ROAD

DEER VALLEY
ROAD

C.A.P.

ROAD

Siphon

RESERVOIR

C.A.P.

PLEASANT

RIVER

LAKE

NEW



SCALE : 1" = 1 MILE

The proposed project as described above is as shown on Figure 8 in this chapter.

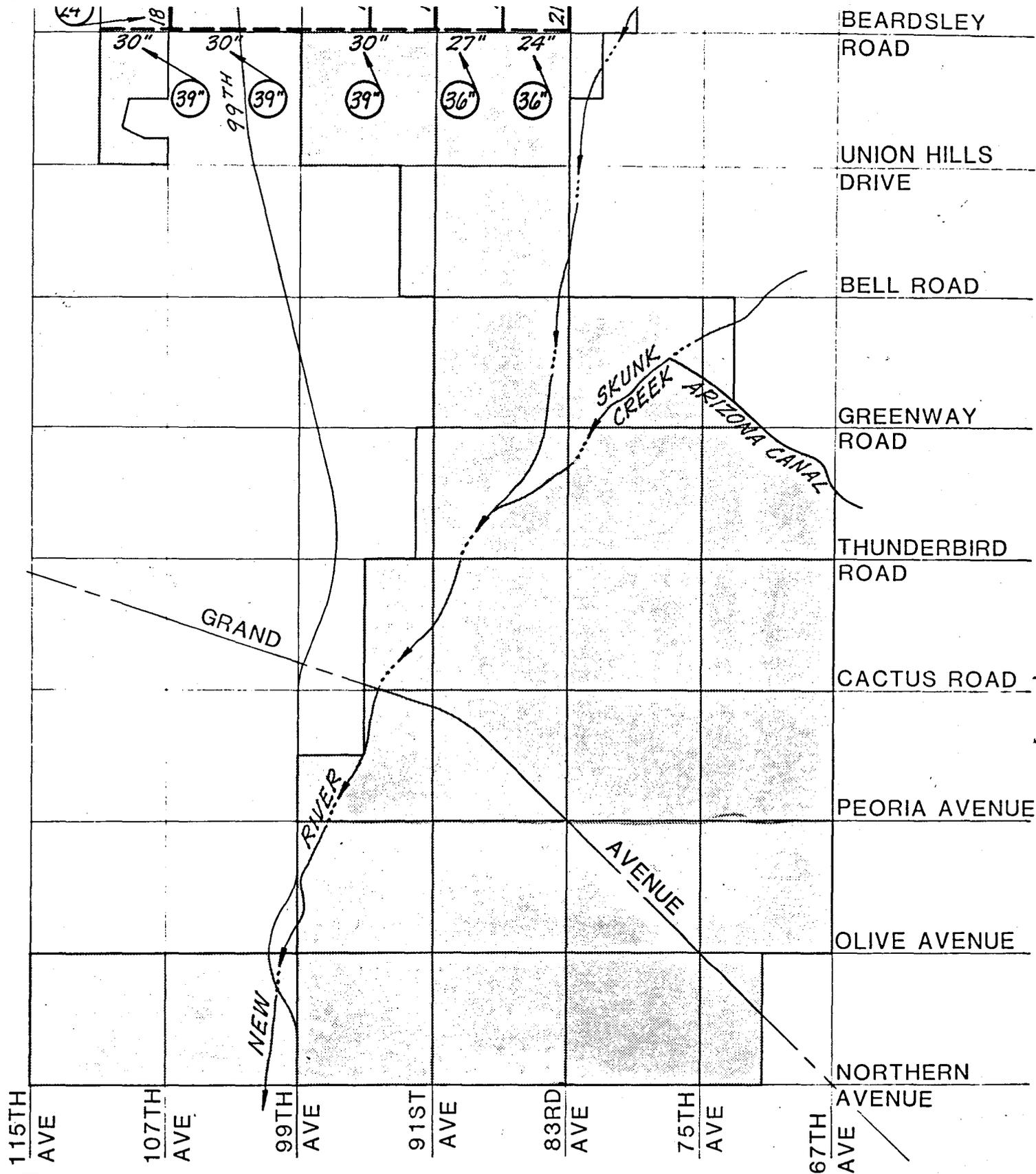
Cost estimates and a priority ranking for each of these proposed projects to alleviate the existing system deficiencies resulting from existing and pending development or to provide additional capacity in the Beardsley Road sewer system will be presented in the following chapter of this report.

4.3 Recommended Sewers For Future Areas

With the exception of the North Reach Interceptor Sewer, the 99th Avenue Sewer from Olive Avenue to Northern Avenue, the 30-inch diameter interceptor sewer along Olive Avenue from 97th Avenue to 99th Avenue, and the 18-inch diameter interceptor sewer along 97th Avenue from Peoria Avenue to Olive Avenue, none of the existing interceptor sewers in Peoria are adequate to serve the sewer needs of the City in the future. Thus, using the approach and methodology described in Chapter 3 of this report, a sewer system master plan was developed for the planning area.

Based on discussions with City officials, it was decided that only a conceptual sewage system would be developed for the north sewer drainage area (Dynamite Boulevard to the Carefree Highway) for the following reasons:

1. The area consists of over 10,000 acres and is projected to have a population of only 1214 in the next 30 years. Based on this population, a sewer system can not be justified economically.



LEGEND

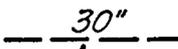
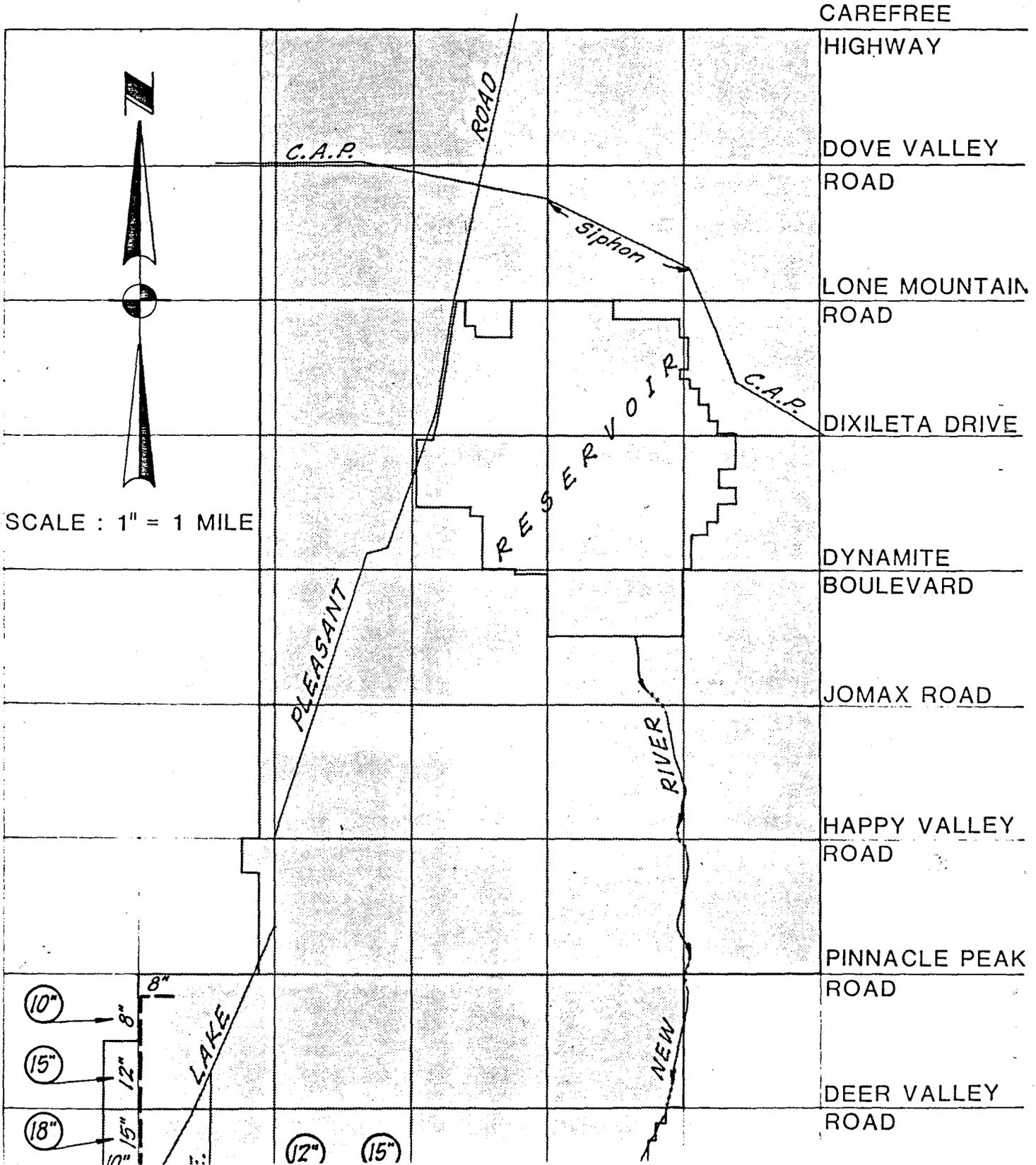
-  Proposed Beardsley I.D.
-  Proposed Size Per Master Plan

FIGURE 8
PROPOSED PROJECT 5
CITY OF PEORIA, ARIZONA

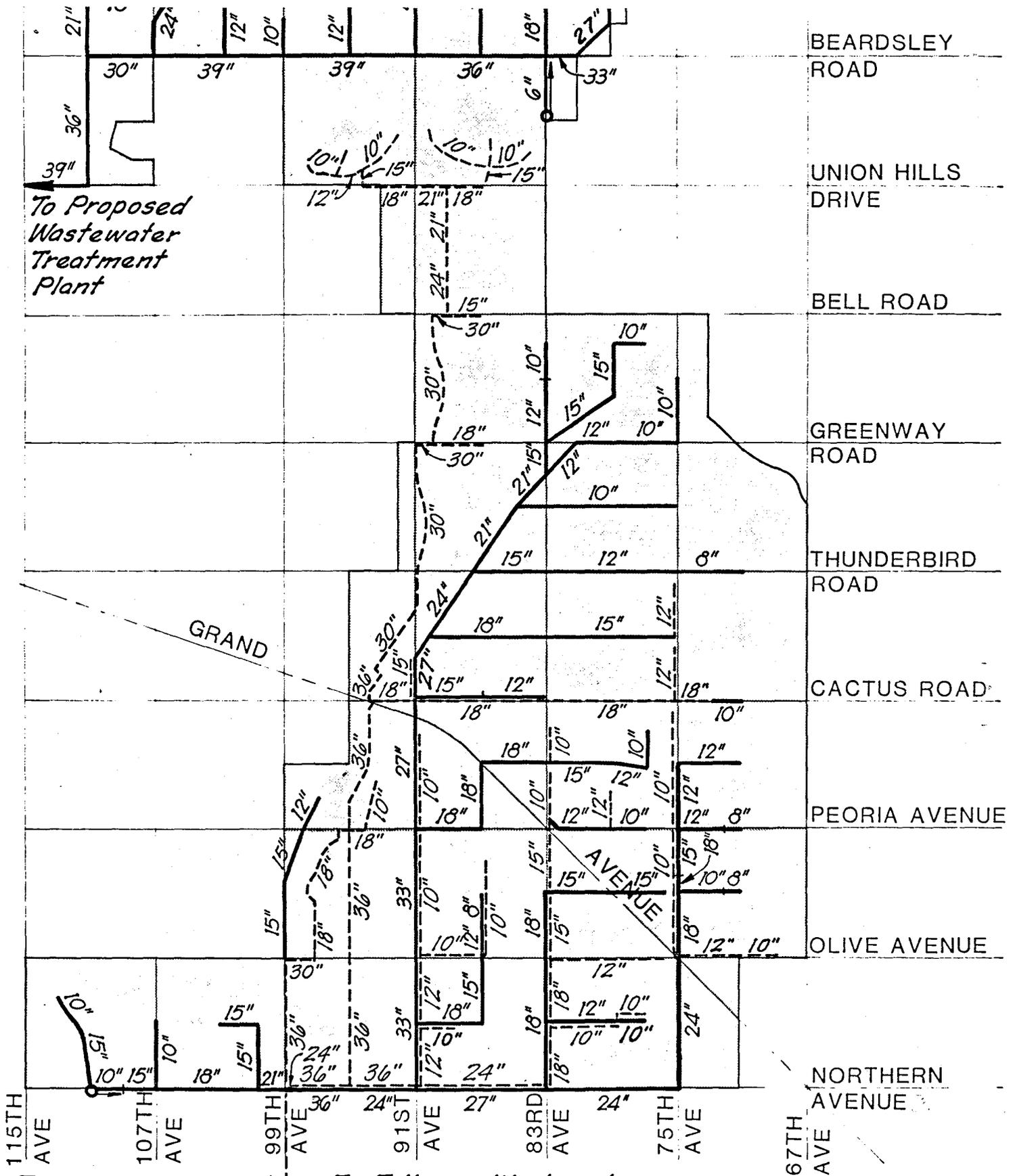


2. The area does not have a land use plan and there are major uncertainties as to how and when the area will develop.
3. The area has numerous manmade and natural constraints to planning which would limit the validity of any sewer plan which could be developed due to questions concerning when and how development will occur.

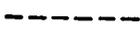
For the central and south sewer drainage areas, however, detailed master plans were developed and a computer model of these systems was prepared. The master plan for these two zones is depicted on Figure 9 in this chapter and includes the general features for each drainage area as described below.

For the south sewer drainage area (Northern Avenue to Beardsley Road), the master plan calls for a system of gravity sewers which drain to the existing 99th Avenue Interceptor Sewer at Northern Avenue. In addition, the plan also envisions one small pump station at 111th and Northern Avenues to accommodate a future average daily flow of 700,000 gallons per day at full development. Also, the plan for the south area includes new sewers which parallel existing sewers to accommodate future flows in several locations in the area bounded by Cactus Road and Northern Avenue.

For the central sewer drainage area (Beardsley Road to Dynamite Boulevard), the master plan calls for a system of gravity sewers which drain to a proposed new treatment plant located West of 115th Avenue between Beardsley Road and Union Hills Drive. The



LEGEND

-  Pump Station & Force Main
-  Proposed
-  Existing

42"  To Tolleson Wastewater Treatment Plant

FIGURE 9
WASTEWATER MASTER PLAN
CITY OF PEORIA, ARIZONA

Vertical text on the left margin, possibly a scale or index, including terms like "MILE", "FEET", "INCHES".

CAREFREE
HIGHWAY

DOVE VALLEY
ROAD

LONE MOUNTAIN
ROAD

DIXILETA DRIVE

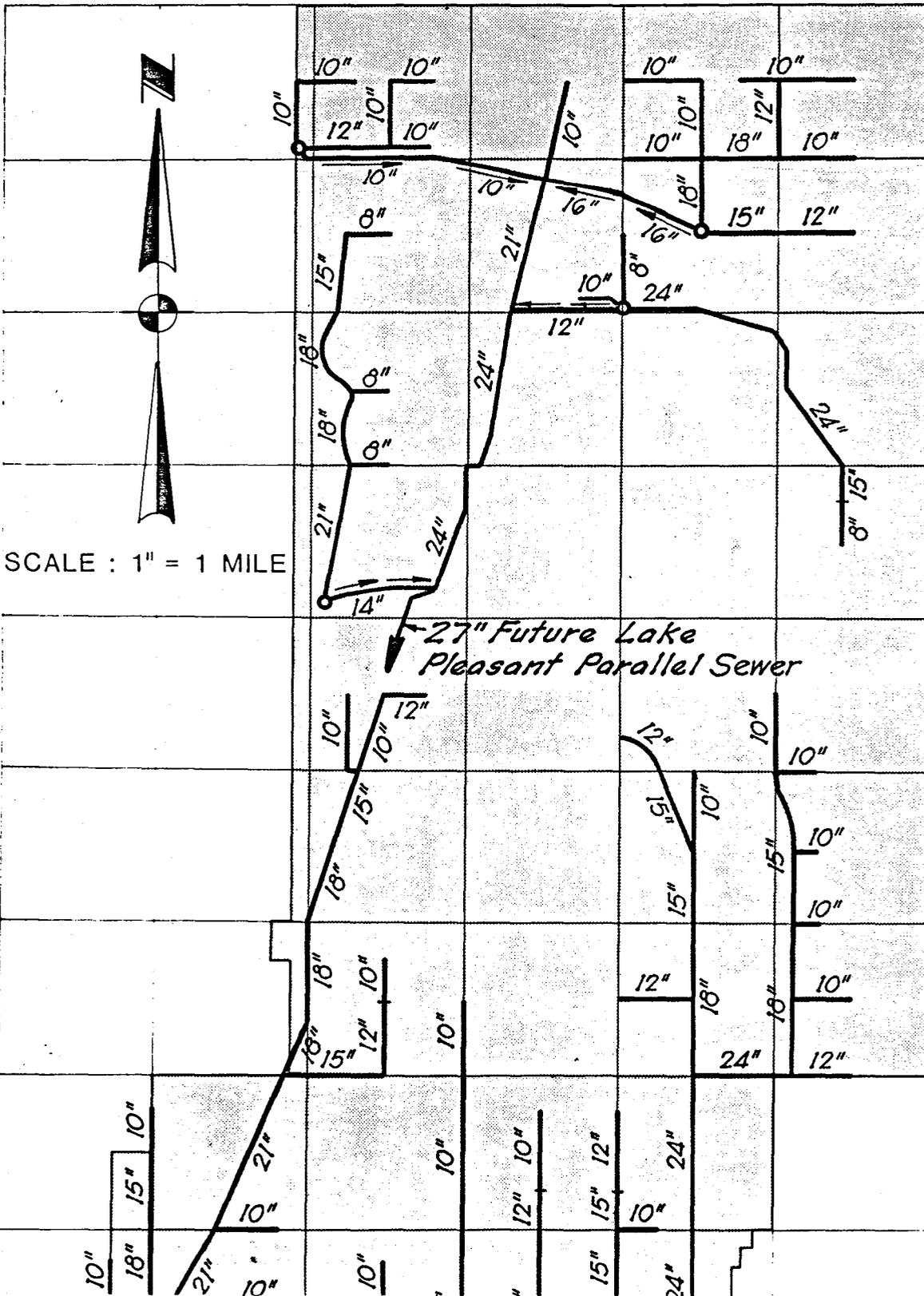
DYNAMITE
BOULEVARD

JOMAX ROAD

HAPPY VALLEY
ROAD

PINNACLE PEAK
ROAD

DEER VALLEY
ROAD



SCALE : 1" = 1 MILE

27" Future Lake Pleasant Parallel Sewer

plan also calls for one small pump station located one half mile south of Beardsley Road on 83rd Avenue to accommodate a future average daily flow of 110,000 gallons per day.

4.4 Required Treatment Plant Facilities

For the south sewer drainage area, the master plan calls for treatment and effluent disposal at the Tolleson treatment plant. The controlling element in this concept is Peoria's capacity in the 99th Avenue Interceptor Sewer because it appears that treatment capacity is available at Tolleson based on existing agreements, possible short-term lease agreements, the 2.0 mgd Peoria capacity expansion which is currently under design for the Tolleson plant and available room for expansion at the Tolleson plant in the future. Thus, the limiting factor is the average daily flow capacity which Peoria now owns or can obtain in the 99th Avenue Interceptor Sewer.

The current capacity agreement which exists for the 99th Avenue Sewer based on "as built" conditions defines Peoria's average daily flow capacity south of Northern Avenue as varying from 10.07 mgd to 7.29 mgd along the sewer line. The limiting reach is from Camelback Road to one quarter mile north of Indian School Road. In addition, based on the flow projection for the year 2005 from the south sewer drainage area (8.47 mgd) and the owned capacity allocations for the 99th Avenue Sewer, Peoria is slightly deficient in capacity in the interceptor sewer south of Glendale Avenue to the treatment plant between the year 2000 and 2005.

There are several possibilities concerning additional capacity to convey sewage from Peoria to the Tolleson Treatment Plant as follows:

1. It may be possible to obtain sufficient additional capacity from the City of Glendale since Glendale's owned capacity in the 99th Avenue Sewer includes future capacity allowances for El Mirage, Luke Air Force Base, Surprise, Youngtown and Sun City. These future capacity allowances amount to an average daily flow capacity of 5.81 mgd.
2. If additional capacity can not be obtained, it may be possible to construct a parallel sewer along 99th Avenue in the future to accommodate future flow requirements.

In addition to the above sewage conveyance requirements, flow projections for the south sewer drainage area indicate that Peoria will require additional treatment capacity at the Tolleson treatment plant after the year 2000. The flow projections indicate that approximately 1.1 mgd of additional capacity will be required for the 5-year period between the years 2000 to 2005.

For the central sewer drainage area, the master plan calls for a treatment plant to be located adjacent to the Agua Fria River in the vicinity of Beardsley Road to Union Hills Drive. At present, there

is a treatment plant located just north of Beardsley Road near the river which serves Sun City West. This treatment plant, discharges treated effluent to a 200-acre irrigated field just south of the plant for winter crop growth and to four golf courses in the development. Since this Sun City treatment plant exists in the vicinity, there are two possibilities for treatment of the future central sewer drainage area flows as follows:

1. Negotiate and obtain an agreement with the Sun City West Utilities Company to expand the existing treatment plant and reuse system.
2. Obtain sufficient land and build a Peoria treatment facility adjacent to the Agua Fria River flood plain between Beardsley Road and Union Hills Drive. Effluent from this plant would be discharged to the Agua Fria riverbed or possibly could be used for irrigation at the Sun City West sewage irrigation farm.

Although both of the treatment possibilities listed above are feasible, the alternative for an independent Peoria treatment plant was selected for presentation in this report. The reasons this alternative was selected are as follows:

1. Flows from the area south of Beardsley Road from 107th to 111th Avenue (approximately 0.27 mgd in the year 2005) would have to be pumped to the Sun City West plant.

2. In discussions with representatives of the Sun City West Utilities Company, it was determined that Peoria would have to purchase the land and pay the costs for design and construction of the expansion of the Sun City plant. The plant uses a secondary treatment process which is more expensive than other comparable methods of treatment and has special features such as covered basins, odor control facilities and aerobic sludge digestion which add to the cost of the facility.
3. If the Sun City West Plant was expanded to accommodate Peoria's flows, Peoria would have to pay whatever rates would be established by the Utilities Company for operation and maintenance of the plant. This would mean that the City of Peoria would not have control of establishment of treatment rates if increases had to be made in the future due to inflation and increased costs for labor, operation, maintenance and equipment replacement.
4. Since there are other methods of treatment which are less expensive, either alternative listed above would require Peoria to pay for the land and capital costs of a treatment facility, and control of the future treatment rates can be maintained by the City of Peoria only if an independent plant is built, representatives of the City have indicated their preference for a separate plant.

The selected treatment process for the Peoria Central Sewer Drainage Area Treatment Plant consists of preliminary treatment, oxidation ditch secondary treatment with provisions for nitrogen removal, ultraviolet disinfection, sludge drying beds for solids dewatering with ultimate disposal of dried solids at a sanitary landfill and effluent discharge to the Agua Fria River channel.

CHAPTER 5

**PROJECT PRIORITIES,
COST ESTIMATES AND STAGING**

CHAPTER 5

PROJECT PRIORITIES, COST ESTIMATES AND STAGING

5.1 Project Priorities

The projects which have the highest priority are the projects which will alleviate existing sewer and treatment system deficiency problems resulting from existing and pending development areas or will provide additional capacity for pending development in the area north of Beardsley Road. These proposed projects were identified in the previous chapter and are summarized as follows:

<u>Priority Ranking</u>	<u>Proposed Project No.</u>	<u>General Description</u>
1	1	75th Avenue system from Cactus to Mountain View Road and the 2.0 mgd expansion of the Tolleson Treatment Plant
2	2	91st Avenue system from Peoria to Northern Avenue
3	3	75th Avenue system from Mountain View Road to Northern Avenue and Northern Avenue system from 75th to 83rd Avenue
4	4	Northern Avenue system at 99th Avenue, Varney Road system from 79th to 83rd Avenue and 83rd Avenue system from Varney Road to Peoria Avenue
5	5	Beardsley Road system from 83rd to 111th Avenues

It is recommended that these projects be initiated as soon as funding can be obtained. It is especially critical that proposed project 1 be undertaken immediately since the existing 10-inch interceptor sewer in 75th Avenue is not adequate to accommodate the developed and developing areas which are connected to the 75th Avenue line. In addition, it is important that the City proceed with construction of the 2.0 mgd expansion of the Tolleson Treatment Plant which is

currently under design. Based on current flow records from Peoria, the City is approaching their 2.3 mgd capacity at the Tolleson plant. In addition, in the last 8 months, flows from Peoria not including the Youngtown flows have exceeded the 2.3 mgd capacity which Peoria now has at Tolleson during 3 of the months. Even though the City of Peoria has negotiated an agreement to utilize 300,000 gallons per day of excess capacity beginning in October and extending for 7 months at the Tolleson plant, there is insufficient capacity to accommodate projected flows from Peoria over the next few years. Furthermore, if proposed projects 2 and 3 are delayed for several years, capacity deficiency problems will become acute in the existing 91st Avenue line between Peoria and Northern Avenues, the existing Olive Avenue line between 75th and 83rd Avenues and the existing 83rd Avenue line between Mountain View Road and Northern Avenue. Also, proposed project 4 should be initiated as soon as practicable because existing and pending development will create capacity deficiency problems in these lines within the next few years. Finally, proposed project 5 should be funded in conjunction with the Beardsley Road Improvement District project to provide capacity for anticipated future growth north of Beardsley Road.

Cost estimates for these recommended projects are presented in the following section of this chapter.

5.2 Cost Estimates

For the recommended construction projects listed in Section 5.1 in this Chapter, cost estimates were prepared and are as presented below:

Proposed Project 1 - 75th Avenue System from Cactus To Mountain View Road and the 2.0 mgd expansion of the Tolleson Treatment Plant

Part A - Sewer System

ITEM NO.	ITEM	UNIT	QUANTITY	UNIT PRICE	TOTAL ESTIMATED COST
1.	8" Sewer Pipe	L.F.	2,160	\$ 15.00	\$ 32,400.00
2.	10" Sewer Pipe	L.F.	1,320	18.00	23,760.00
2.	12" Sewer Pipe	L.F.	7,090	24.00	170,160.00
4.	15" Sewer Pipe	L.F.	7,309	29.00	211,961.00
5.	18" Sewer Pipe	L.F.	660	40.00	26,400.00
6.	4' Manhole	Each	37	1,550.00	57,350.00
7.	5' Manhole	Each	22	1,850.00	40,700.00
8.	Type A Pavement Replacement	S.Y.	4,216	18.00	75,888.00
9.	Railroad and Grand Avenue Crossing	L.F.	300	230.00	69,000.00
Subtotal					<u>\$707,619.00</u>
Construction Contingencies @ 15%					106,143.00
Total Estimated Construction Cost					\$813,762.00
Engineering Design, Engineering Construction Services - Staking, Inspection, Administration and Incidentals					<u>122,064.00</u>
Total Estimated Sewer Project Cost					\$935,826.00

Part B - Tolleson Treatment Plant Expansion

10.	Tolleson Treatment Plant Expansion	Lump Sum			<u>\$3,680,000.00</u>
Total Estimated Treatment Plant Cost					<u>\$3,680,000.00</u>
TOTAL ESTIMATED PROJECT COST					\$4,615,826.00

Proposed Project 2 - 91st Avenue system from Peoria to Northern Avenue

ITEM NO.	ITEM	UNIT	QUANTITY	UNIT PRICE	TOTAL ESTIMATED COST
1.	33" Sewer Pipe	L.F.	10,560	\$ 79.00	\$834,240.00
2.	5' Manhole	Each	27	1,850.00	49,950.00
3.	Type A Pavement Replacement	S.Y.	6,160	18.00	<u>110,880.00</u>
				Subtotal	\$995,070.00
				Construction Contingencies @ 15%	<u>149,261.00</u>
				Total Estimated Construction Cost	\$1,144,331.00
				Engineering Design, Engineering Construction Services - Staking, Inspection, Administration and Incidentals	<u>171,650.00</u>
				TOTAL ESTIMATED PROJECT COST	\$1,315,981.00

Proposed Project 3 - 75th Avenue system from Mountain View Road to Northern Avenue and Northern Avenue system from 75th to 83rd Avenue

ITEM NO.	ITEM	UNIT	QUANTITY	UNIT PRICE	TOTAL ESTIMATED COST
1.	18" Sewer Pipe	L.F.	2,499	\$ 40.00	\$ 99,960.00
2.	24" Sewer Pipe	L.F.	10,644	57.00	606,708.00
3.	5' Manhole	Each	32	1,850.00	59,200.00
4.	Type A Pavement Replacement	S.Y.	6,294	18.00	113,292.00
5.	Railroad and Grand Avenue Crossing	L.F.	202	230.00	46,460.00

Proposed Project 3 - continued

Subtotal	<u>\$925,620.00</u>
Construction Contingencies @ 15%	<u>138,843.00</u>
Total Estimated Construction Cost	\$1,064,463.00
Engineering Design, Engineering Construction Services - Staking, Inspection, Administration and Incidentals	<u>159,669.00</u>
TOTAL ESTIMATED PROJECT COST	\$1,224,132.00

Proposed Project 4 - Northern Avenue system at 99th Avenue, Varney Road system from 79th to 83rd Avenue, and 83rd Avenue system from Varney Road to Peoria Avenue

ITEM NO.	ITEM	UNIT	QUANTITY	UNIT PRICE	TOTAL ESTIMATED COST
1.	8" Sewer Pipe	L.F.	2,200	\$ 15.00	\$ 33,000.00
2.	15" Sewer Pipe	L.F.	2,640	29.00	76,560.00
3.	36" Sewer Pipe	L.F.	80	85.00	6,800.00
4.	4' Manhole	Each	7	1,550.00	10,850.00
5.	5' Manhole	Each	10	1,850.00	18,500.00
6.	Type A Pavement Replacement	S.Y.	1,538	18.00	27,684.00
Subtotal					<u>\$173,394.00</u>
Construction Contingencies @ 15%					<u>26,009.00</u>
Total Estimated Construction Cost					\$199,403.00
Engineering Design, Engineering Construction Services - Staking, Inspection, Administration and Incidentals					<u>\$ 29,910.00</u>
TOTAL ESTIMATED PROJECT COST					\$229,313.00

Proposed Project 5 - Beardsley Road system from 83rd Avenue
to 111th Avenue

ITEM NO.	ITEM	UNIT	QUANTITY	NET UNIT PRICE	TOTAL ESTIMATED CITY COST
1.	39" Sewer Pipe	L.F.	13,200	\$ 20.00	\$264,000.00
2.	36" Sewer Pipe	L.F.	2,640	\$ 28.00	73,920.00
3.	36" Sewer Pipe	L.F.	2,640	\$ 17.00	44,880.00
4.	24" Sewer Pipe	L.F.	1,320	\$ 17.00	22,440.00
5.	18" Sewer Pipe	L.F.	2,640	\$ 11.00	29,040.00
6.	15" Sewer Pipe	L.F.	5,280	\$ 5.00	26,400.00
7.	12" Sewer Pipe	L.F.	2,640	\$ 6.00	15,840.00
8.	10" Sewer Pipe	L.F.	2,000	\$ 3.00	6,000.00
9.	5" Manhole	Each	12	\$300.00	<u>3,600.00</u>
			Subtotal		\$486,120.00
			Construction Contingencies @ 15%		<u>\$ 72,920.00</u>
			Total Estimated Construction Cost		\$559,040.00
			Engineering Design, Engineering Construction Services - Staking, Inspection, Administration and Incidentals		<u>\$ 83,860.00</u>
			TOTAL ESTIMATED PROJECT COST		\$642,900.00

These five priority projects which need to be initiated as soon as possible have a combined total estimated cost of \$8,028,152. In discussions with a City official, the method for financing these projects would be through general obligation or revenue bonds except for priority project 1 which will be financed directly by the City from sewer expansion fees and City revenues.

5.3 Future Sewer and Treatment Plant Projects

As discussed in Chapter 4 of this report, only the following sewers are adequate to accommodate wastewater flows in the future:

1. North Reach Interceptor Sewer System
2. 99th Avenue Interceptor Sewer from Olive Avenue to Northern Avenue
3. Olive Avenue Interceptor Sewer from 97th Avenue to 99th Avenue
4. 97th Avenue Interceptor Sewer from Peoria Avenue to Olive Avenue

All of the remaining interceptor sewers south of Beardsley Road are not adequate to accommodate future flows and major areas of undeveloped property exist with no sewers at all. As the area south of Beardsley Road develops, a considerable amount of sewer construction will be required as shown on the master plan in this report. For these future projects, no attempt was made to separate out individual projects due to major uncertainties as to when, where and how development will occur in the area. Instead, quantities for all future interceptor construction work which will be required in the south system of Peoria were tabulated and a total estimated cost for all of the work was prepared as follows:

ITEM NO.	ITEM	UNIT	QUANTITY	UNIT PRICE	TOTAL ESTIMATED COST
1.	36" Sewer Pipe	L.F.	2,641	\$ 85.00	\$ 224,485.00
2.	27" Sewer Pipe	L.F.	7,010	68.00	476,680.00
3.	24" Sewer Pipe	L.F.	6,860	57.00	391,020.00

ITEM NO.	ITEM	UNIT	QUANTITY	UNIT PRICE	TOTAL ESTIMATED COST
4.	21" Sewer Pipe	L.F.	6,125	\$ 49.00	\$ 300,125.00
5.	18" Sewer Pipe	L.F.	27,390	40.00	1,095,600.00
6.	15" Sewer Pipe	L.F.	34,610	29.00	1,003,690.00
7.	12" Sewer Pipe	L.F.	23,000	24.00	552,000.00
8.	10" Sewer Pipe	L.F.	25,435	18.00	457,830.00
9.	8" Sewer Pipe	L.F.	1,320	15.00	19,800.00
10.	4' Manhole	Each	128	1,550.00	198,400.00
11.	5' Manhole	Each	209	1,850.00	386,650.00
12.	Type A Pavement Replacement	S.Y.	25,597	18.00	460,746.00
13.	Pump Station	Each	1	26,000.00	26,000.00
14.	Flow Diversion Structure	Each	1	5,000.00	5,000.00
15.	Grand Avenue and Railroad Crossings	L.F.	400	230.00	92,000.00
Subtotal					\$5,690,026.00
Construction Contingencies @ 15%					\$ 853,504.00
Total Estimated Construction Cost					\$6,543,530.00
Engineering Design, Engineering Construction Services - Staking, Inspection, Administration and Incidentals					\$ 981,530.00
TOTAL ESTIMATED COST					\$7,525,060.00

In discussions with a City official, the above-mentioned future sewer projects would be financed with revenues generated from the City of Peoria's Sewer Expansion Fees. In addition, future new interceptor sewers north of Beardsley Road would also be financed in the same manner. Cost estimates for these Central Area System

interceptor sewers were not prepared because significant growth north of Deer Valley Road is not projected to occur in the next 5 to 10 years.

In addition to the sewer projects described above, it will be necessary for the City of Peoria to purchase allocated capacity at the Tolleson Treatment Plant in 1992, 1996, and the year 2000 in accordance with the agreement with the City of Glendale. These purchases of an additional total capacity of 3.1 mgd when coupled with the existing 2.3 mgd capacity and planned 2.0 mgd expansion in proposed project 1 will give the City a total capacity of 7.4 mgd capacity at the plant. Based on flow projections for the south Peoria drainage area, this 7.4 mgd capacity should be adequate through the year 2000. Once the flows from Peoria begin to approach the 7.4 mgd capacity limit it will be necessary for the City to fund additional capacity increases at Tolleson or to build its own treatment facility to accommodate additional future flows from the south Peoria sewer drainage area. As future growth occurs in the central Peoria sewer drainage area, it will also be necessary for Peoria to expand the proposed Beardsley Improvement District Treatment Plant to accommodate the flows.

Since these future treatment needs are not expected to occur in the next 5 years, cost estimates for the future treatment plant projects were not prepared. However, it is important that the City be cognizant of the fact that these treatment needs will occur, that flows and growth should be monitored on a routine basis,

planning and financing methods for expansions should be initiated in advance of capacity needs, and design and construction of required facilities must be completed to meet these future treatment needs.

5.4 Project Staging

In order to develop proposed project staging for the priority projects identified in this report, it was necessary to obtain City staff input regarding financial capability and when growth is projected to occur. Based on several discussions with the City of Peoria planning and engineering staff, the following project staging plan was developed.

1. Priority Project 1 - Currently under design with construction to begin in mid-1985
2. Priority Project 2, 3, 4, 5 - Initiate design as soon as possible once the method of funding (general obligation or revenue bonds) is assured. Construction of all projects would be complete by mid-1986.
3. Future Sewer and Treatment Plant Projects - Initiate design and construction as required based on future development patterns once funding is assured.

CHAPTER 6

SUMMARY AND RECOMMENDATIONS

CHAPTER 6

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6.1 Summary

The wastewater master plan which was developed in this study and has been presented herein is depicted on Figure 9 in Chapter 4. The general features of this plan are summarized below.

For the South sewer drainage area (Northern Avenue to Beardsley Road), the wastewater master plan calls for a system of gravity sewers which drain to the existing 99th Avenue Interceptor Sewer at Northern Avenue. In addition, the plan also includes one small pump station at 111th and Northern Avenue to accommodate a future average daily flow of 700,000 gallons per day at full development. Also, the plan for the south area includes new sewers which parallel existing sewers to accommodate future flows in several locations in the area bounded by Cactus Road and Northern Avenue. Finally, the plan calls for treatment of the sewage generated from this south sewer drainage area at the Tolleson Wastewater Treatment Plant.

For the central sewer drainage area (Beardsley Road to Dynamite Boulevard), the master plan calls for a system of gravity sewers which drain to a proposed new treatment plant located West of 115th Avenue between Beardsley Road and Union Hills Drive. The plan also calls for one small pump station located one half mile south of Beardsley Road on 83rd Avenue to accommodate a future average daily flow of 110,000 gallons per day.

For the north sewer drainage area (Dynamite Boulevard to the Carefree Highway), the conceptual master plan calls for a system of gravity sewers, four pump stations and a parallel gravity sewer along Lake Pleasant Road to the proposed new treatment facility which will serve the central sewer drainage area.

6.2 Recommendations

Based on the results of this study, there are several recommendations concerning sewage conveyance and treatment which have been developed. These recommendations are presented to the City of Peoria because the City is faced with projected rapid growth, dramatic increases in sewage conveyance and treatment needs and major capital expenditures for wastewater facilities in the next 5 to 10 years. Based on these considerations, the recommendations resulting from this study are as follows:

1. It is recommended that construction of proposed projects 1 through 5 which have been identified in this report be completed in the next 2 years if possible given the City's funding constraints. It is especially important that proposed project 1 on the existing 75th Avenue system and the Tolleson Treatment Plant expansion be constructed as soon as possible.
2. It is recommended that priority projects 2 through 5 be funded with general obligation bonds, revenue

bonds, or improvement district funds based on further analyses which are beyond the scope of this study.

3. It is recommended that the City of Peoria review and revise the existing sewer expansion fee schedule annually to insure that generated revenues are sufficient to fund needed sewer and treatment plant projects. The existing sewer expansion fee schedule was reviewed in this study and it was concluded that the existing fee schedule is adequate to fund future projects except for the sewer projects identified in priority projects 1 through 5.
4. It is recommended that the City of Peoria initiate negotiations with the City of Glendale to purchase as much additional capacity in the 99th Avenue Interceptor Sewer as possible. If no additional capacity can be obtained at present, it recommended that Peoria enter into an agreement with Glendale, if possible, to obtain any additional capacity which becomes available in the future if Glendale, El Mirage, Luke Air Force Base, Surprise, Youngtown or Sun City determine that their capacity allowances will not be required.
5. It is recommended that the City of Peoria enter into a long-term agreement with the City of Tolleson, if possible, which would grant Peoria the right to expand

the capacity of the Tolleson Wastewater Treatment Plant to meet Peoria's needs in the future. In discussions with an official of the City of Tolleson, it was learned that the plant could be expanded to a design flow of over 20 mgd at the existing site and that the City of Tolleson has rights to additional land around the existing site for additional expansions if necessary.

6. It is recommended that the City of Peoria and representatives of the Beardsley Sewer Improvement District initiate discussions and if possible execute a formal agreement with the Sun City Utilities Company to reuse part of all of the effluent from the proposed Peoria treatment plant near 111th Avenue and Union Hills Drive at the existing 200-acre sewage irrigation farm in the vicinity or the four golf courses currently being operated by the Utilities Company. In addition, it is also recommended that the City of Peoria and representatives of the Beardsley Sewer Improvement District initiate discussions and if possible execute a formal agreement with the owner of a proposed new plant nursery in the vicinity of the treatment plant. The concept behind this recommendation is that treated sewage effluent is a resource with value and that reuse of all or a portion of the effluent even on a part-year basis may be more acceptable than discharge to the residents who currently live in the vicinity of the proposed plant.

7. It is recommended that the City of Peoria and representatives of the Beardsley Sewer Improvement District initiate site selection and aquisition procedures for the proposed central drainage area treatment plant. These activities should result in a determination of the nature, extent and costs of sites which are available. Furthermore, it is recommended that the City of Peoria purchase additional land at the treatment plant site to accommodate future plant expansions.
8. It is recommended that the City of Peoria and representatives of the Beardsley Sewer Improvement District initiate activities to obtain a National Pollutant Discharge Elimination Permit for the proposed central drainage area treatment plant through the Arizona Department of Health Services and the United States Environmental Protection Agency. This permit is required if effluent is to be discharged to the Agua Fria River.
9. It is recommended that the City of Peoria update the wastewater master plan developed in this report at least every 2 or 3 years.
10. It is recommended that the City of Peoria revise the existing City Code to require a minimum 12-inch diameter sewer to be installed or paid for on all half mile streets by developers.
11. It is recommended that owners of undeveloped property and developers be notified that the City has a wastewater master plan which has been adopted.

The basis for the recommendations 4 and 5 shown above is that the south sewer drainage area flows will be treated at the Tolleson plant as far into the future as can reasonably be projected. As discussed previously in this report, the limiting factor is Peoria's owned capacity in the 99th Avenue Interceptor Sewer. Also, at a date projected to occur between the years 2000 and 2005, additional treatment capacity at Tolleson will also be required. If the City of Peoria can obtain additional capacity in the 99th Avenue Interceptor Sewer and can obtain the right to expand the Tolleson plant to accommodate the future needs, sewage conveyance and treatment needs for the south sewer drainage area in Peoria can be assured for the projected flows through the year 2005 and beyond depending on how much interceptor capacity can be obtained. Based on the past history of growth in other portions of the Phoenix Metropolitan area, this recommendation should be viewed as an opportunity by the City of Peoria to assure itself of adequate capacity for the long-term.