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SIMI VALLEY COUNTY SANITATION DISTRICT

FINAL

SEWER MASTER PLAN UPDATE

1

JUNE, 1985

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ACP - asbestos cement pipe
RCP - reinforced concrete pipe
VCP - ?
PVC - polyvinylchloride

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EXECUTIVE SUMMARY

In January 1983, a comprehensive study of the Simi Valley County Sanitation District (SVCSD) Sewer System was begun. This project entitled, "Sewerage Master Plan Update and Preliminary Design and Engineering for Expansion of the Simi Valley Water Quality Control Plant", had the overall objective of establishing the technical, economic, and environmental bases for future policy decisions and designs.

An integral part of the project is the Sewer Master Plan Update. This report summarizes the results of the engineering study to update the plan and it presents a recommended plan for future improvements. The information contained in this report is based upon conditions as of May, 1983.

The report contains a complete discussion on pertinent Study Area characteristics as well as sewer design and cost estimating criteria. This information forms the basis for development and analysis of master plan alternatives. The significant findings and recommendations of the report are:

STUDY AREA CHARACTERISTICS

- The Study Area includes the sphere of influence of both the SVCSD and the City of Simi Valley, as well as the gravity drainage area of the existing treatment plant.

- The Study Area is approximately 50% developed at present. It is anticipated that ultimate development will occur sometime after 2010, and will result in a Study Area population of 173,250 persons.

WASTEWATER CHARACTERISTICS

- Residential wastewater contributions have been estimated at 80 gpcd or 275 gallons per equivalent dwelling unit.

- Other wastewater contributions have been estimated at:

  Industrial: 1200 gpad
  Commercial: 1000 gpad
  Institutional: 500 gpad

- Peak flow factors were determined from analyses of actual flow records and a survey of other communities. Peaking factors for the SVCSD range from 2 to 3.5 depending upon location and contributory flow.

EXISTING SEWER SYSTEM

- The system was found to be in generally good to excellent condition.

- None of the local sewers require immediate relief, although a few small sewers are currently operating at or near their design capacity.

- The most significant and pressing problem was found on Walnut Street east of the Tapo Street. In this area, the sewer has previously experienced severe sulfide corrosion due to the discharge from a pumping station which is no longer in service. This sewer should be replaced as soon as possible.

ALTERNATIVE DEVELOPMENT

- The 1967 Master Plan forms the basis for this study. The backbone trunk and interceptor system is essentially that proposed in the 1967 Report by Brown and Caldwell.

- Alternatives were developed to allow the system to function adequately from the present to ultimate development. These alternatives were analyzed on the

basis of cost effectiveness and qualitative performance, with the highest ranking alternatives selected as the apparent best system of improvements.

RECOMMENDED IMPROVEMENTS

- The improvements required to allow the trunk and interceptor system to function effectively and efficiently at ultimate development have been estimated at approximately $3.5 million. This is based upon an ENR-CCI of 5000 and includes 35% for engineering, administration and contingencies.

- The near future improvements (1984-1990) are estimated at approximately $2.3 million.

- The future improvements (1990-2010) are estimated at approximately $0.95 million.

- The ultimate improvements (after 2010) are estimated at $0.2 million.

CHAPTER 1

INTRODUCTION

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In January 1983, a comprehensive study of the Simi Valley County Sanitation District (SVCSD) Sewer System was begun. The project entitled, "Sewerage Master Plan Update and Preliminary Design and Engineering for Expansion of the Simi Valley Water Quality Control Plant", has the overall objective of establishing the technical, economic, and environmental bases for future policy decisions and designs.

An integral part of the project is the Sewer Master Plan Update. This report summarizes the results of the engineering study to update the Sewer Master Plan. It contains technical data on the Study Area and the existing sewer system, and it presents a recommended plan for future improvements.

1.1 AUTHORIZATION

This report was prepared in accordance with an Engineering Services Agreement between the Simi Valley County Sanitation District and C M Engineering Associates for the Sewerage Master Plan Update and Preliminary Design and Engineering for Expansion of the Simi Valley Water Quality Control Plant, dated December 20, 1982, which was subsequently assigned to John S. Murk Engineers, Inc. on July 25, 1983.

1.2 PURPOSE AND SCOPE

The purpose of this report is to present the technical data developed on the Study Area and existing sewer system, as well as a recommended plan for future improvements. The scope of the information presented herein is limited to:

- A determination of Study Area characteristics including Study Area Boundaries; Physical Environment Characteristics, and Development and Economic Activity.
- A determination of water and wastewater characteristics.
- An analysis of the existing sewer system including an identification of sewers; a determination of existing flows; an analysis of unused capacity, and a problem area analysis.
- A review of design criteria and construction standards.
- Development of cost estimating criteria for future sewer construction.
- Development and analysis of alternatives for future sewer system improvements.
- Ranking of alternatives and selection of recommended plan for future improvements.

1.3 PROJECT STUDY TEAM

This report was prepared under the direction of Ronald C. Coons, District Engineer of the Simi Valley County Sanitation District.

John S. Murk, Vice President, John S. Murk Engineers, Inc. served as Project Manager.

Jerry L. Frieling, Vice President, John S. Murk Engineers, Inc. served as Project Engineer, Primary Investigator, and Principal Author.

John S. Redner, served as Special Sewer System Consultant.

In addition, the SVCSD engineering staff provided valuable assistance in the collection of technical data. The SVCSD sewer maintenance staff were major participants in the field work associated with this project. Special recognition is given to Michael Kleinbrodt, Conrad Lee, Ruben Delgado, and the Sewer Maintenance Crew Members.

CHAPTER 2

SUMMARY

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SUMMARY

2.1 INTRODUCTION

In January, 1983, a comprehensive study of the Simi Valley County Sanitation District (SVCSD) sewer system and treatment plant was begun. An integral part of the project is the Sewer Master Plan Update. This report summarizes the results of the engineering study to update the Sewer Master Plan. It contains technical data on the Study Area and the existing sewer system, and it presents a recommended plan for future improvements.

2.2 STUDY AREA CHARACTERISTICS

The Study Area is located in Ventura County approximately 30 air miles northwest of the City of Los Angeles and approximately 30 air miles east of the City of Ventura. The area of investigation for this study includes the existing sphere of influence of the SVCSD, supplemented by those areas outside of the sphere, but tributary to the existing treatment facility.

The Simi Valley is about 9 miles long and lies between generally east-west trending ranges within the Transverse Physiographic Province. The width of the valley varies from roughly 1 to 3 miles. The floor of the valley ranges in elevation from a low of 700 feet Mean Sea Level (MSL) at its western end to a 1100 feet MSL near the eastern end. To the north of the valley, the Santa Susana Mountains rise to an elevation of

roughly 3000 feet MSL. To the south, the Simi Hills rise to an approximate elevation of 2000 feet MSL. The Arroyo Simi lies on the southern side of the valley and drains toward the west.

Known earthquake faults within the Simi Valley area include the Simi-Santa Rosa and Santa Susana Faults. Both are considered to be potentially active. The San Andreas Fault passes through much of the length of California and is considered active. The segment of this fault, which is nearest the Study Area, has not been active since the 1857 Fort Tejon earthquake, and it is generally considered to be the segment capable of generating an earthquake with the greatest magnitude.

The shallowness of groundwater within the Study Area has been of concern due to the possibility of liquefaction of subsoils during an earthquake. Within the Study Area, land just west of Chain Drive has been rated as having a high liquefaction susceptability. Other areas, adjacent to Madera Road, were identified as having a "moderately high" susceptability to liquefaction. A groundwater dewatering program is currently underway in the west end of the valley.

The major drainage course in the Study Area is the Arroyo Simi, which flows from east to west. It receives drainage from several canyon streams emerging from the surrounding mountains. Most of these streams are intermittant and even the Arroyo Simi does not surface flow at its eastern end during the summer months. Many of the natural stream channels, including the Arroyo Simi reportedly cannot accommodate a 100-year flood.

Flood danger still persists at several points along the channel.

Groundwater basins are situated beneath the entire valley floor. Depth to groundwater varies from less than 20 feet to more than 100 feet, with the total depth of water bearing sediments estimated at several thousand feet. Groundwater quality in Simi Valley has been historically poor with total dissolved solids (TDS) levels often greater than 2,000 mg/l.

The climate of Simi Valley is classified as a dry summer subtropical. The average temperature throughout the year is 61.9^{o}F, with recorded extremes of 105°F in July and 28°F in January and February. Rainfall averages 13 inches per year at the west end of the valley and almost 15 inches annually at the east end of the valley.

Most of the developed land in the Study Area is located in the City of Simi Valley. The remainder of the Study Area is either devoted to agriculture or is undeveloped. As of May, 1983, there were an estimated 24,175 dwelling units in the City, 88 percent of which were single family detached. The City's Department of Community Development estimates that approximately 360 acres of land are devoted to commercial uses, with 266 acres used for industrial purposes.

Future land use in the Study Area is guided by the Comprehensive General Plan of the City which sets forth the goals, policies, standards, and plans for the physical, social and economic development of the community. It has been estimated that approximately 52,500 dwelling

units will be in place in the Study Area at ultimate development. Of these, 28,430 dwelling units remain to be developed. Department of Community Development staff estimates that 905 acres of commercial development and 4189 acres of industrial development will exist at ultimate buildout.

Established population forecasts indicate the following:

Year	Study Area Population
1985	91,200
1990	103,000
1995	112,000
2000	122,000
2010*	145,000
Ultimate*	173,250

*Estimates of 2010 and ultimate population were generated as part of this study.

2.3 WATER AND WASTEWATER CHARACTERISTICS

Water is supplied to the Study Area by two principal purveyors. These are Ventura County Water Works District No. 8 and the Southern California Water Company. Ninety-eight percent of the water supplied to the area is imported from Northern California via the Calleguas Municipal Water District.

Excluding agricultural usage, the average annual per capita water usage from 1980-1982 was approximately 190 gallons per day. Assuming that the minimum winter per capita usage approximates the normal water use which reaches the sewer, the gross per capita sewage contribution is estimated at 101 gallons per capita per day. The present gross per capita wastewater contribution is typical of a Southern California city with a normal balance of residential, commercial, and industrial land uses, and it is expected to prevail in the future.

Unit quantities for the various components affecting both the quantity and quality of the wastewater have been determined. The domestic per capita sewage contribution has been estimated at 80 gallons per day, with the average single family detached home producing 275 gallons per day. Commercial sewage contributions are estimated at 1000 gallons per acre per day. The present industrial contribution for the Study Area is 1800 gallons per acre per day, but it is expected to decrease to 1200 gallons per acre per day at ultimate development. Institutional contribiutions are estimated at 500 gallons per acre per day.

It is projected that flows to the Water Quality Control Plant will increase as follows:

Year	Average Dry Weather Flow (mgd)	Peak Dry Weather Flow (mgd)
1985	9.20	21.6
1990	10.40	24.4
1995	11.30	25.4
2000	12.30	27.1
2010	14.60	30.7
Ultimate	17.50	35.9

The ratio of peak wet weather flow to average dry weather flow, presently estimated at 2.50, is expected to decrease to 2.05 by ultimate development because there is a peak flow dampening effect as the system grows.

dampening

Wastewater quality at the influent to the Water Quality Control Plant is projected to be approximately 220 mg/l BOD_5 and 250 mg/l suspended solids.

An equivalent dwelling unit system has been developed for the SVCSD. The basic unit of this system is the equivalent dwelling unit, estimated to be 275 gallons per day.

2.4 EXISTING SEWER SYSTEM ANALYSIS

An analysis of the existing SVCSD sewer system was conducted. The first step in this evaluation was the identification of sewers. A 500-scale sewer map was developed from available as-built drawings and is provided to the SVCSD as a wall map. Sewer sizes range from 6 inches to 48 inches in diameter, with the system being composed primarily of 8-inch lines. The majority of the existing sewers are ACP with some RCP and VCP found in isolated areas. In recent years, PVC pipe has been used for some small sewers.

Existing flows were determined for the entire system and are summarized in Plate 5-2 of this report. During the course of the flow measurements, no surcharged sewers were encountered. In fact, there were only six locations where the depth of flow exceeded 50 percent of the pipe diameter. Several areas are currently experiencing localized retardation of flow, generally associated with a rapid change in sewer grade. None of the sewers encountered require immediate relief.

An assessment of the physical condition of the sewer sytem was conducted. The condition of the sytem was generally found to be good to excellent. The two major interceptors in the system are experiencing only a moderate amount of deterioration due to corrosion, and a long remaining life can be expected.

Severe sulfide corrosion was encountered on the Walnut Street sewer east of Tapo Street. The pipe is in a structurally unsafe condition in this area and should be replaced. In addition, there is a large void in the crown of the pipe 30 feet upstream of the first manhole west of Austin on Walnut. A temporary repair should be immediately undertaken at this location. Because of the condition of the pipe and the amount of root infiltration on Walnut Street, it is recommended that the sewer be replaced and the existing sewer filled with mud and abandonded. The replacement sewer should not experience future sulfide corrosion because the historic cause has been eliminated.

2.5 DESIGN CRITERIA AND CONSTRUCTION STANDARDS

In a study of this type, it is necessary to develop criteria for preliminary design and standards for future construction in order to accurately evaluate alternatives.

Design Period is the length of time that the capacity of sanitary sewer will be adequate, and it is tied to the design life of the sewer. In this study a design, period of 50 years was used. For improvement staging purposes, three categories of improvements were selected. These are:

1. Near Future Improvement - Present to 1990
2. Future Improvement - 1990 to 2010
3. Ultimate Improvement - Build-out

The components of the sewage collection system were divided into five categories based upon function rather than size. These are:

1. Lateral
2. Local
3. Main Sewer
4. Trunk Sewer
5. Major Trunk Sewer

Of these, trunk and major trunk sewers are of concern when considering a Master Plan.

For gravity sewers, the significant design criteria are:

1. Design Flow - Ultimate peak wet weather flow from tributary area.

2. Material - Depends upon requirements for a given application.

3. Depth of Installation - Minimum depth is 6-7 feet.

4. Velocity - Minimum velocity of 2-2.5 feet per second.

5. Design Depth of Flow - Maximum of of 1/2 to 3/4 times diameter.

Force mains and siphons have slightly different requirements. They are generally designed based upon maintenance of minimum velocity, with parallel pipelines added as flows increase.

Pumping station design is less amenable than pipeline design to a given set of standards. Pumping stations should be custom designed for the specific conditions encountered.

2.6 COST ESTIMATING CRITERIA

Cost estimating criteria were developed for both construction costs and operation and maintenance expenses. The Engineering News Record Construction Cost Index was used as a basis for all construction costs,

while the consumer price index was used as a basis for operation and maintenance costs. In the development of cost estimates, an allowance of 15% was made for contingencies. Engineering and administrative costs were estimated at 20%.

2.7 ALTERNATIVE DEVELOPMENT

Alternatives were developed in a systematic manner using the previously discussed technical data on the Study Area as a basis. The Study Area was first divided into gravity drainage basins and sub-drainage areas. The anticipated ultimate land use was then used to develop the design flows for each area, allowing for potential density bonuses as provided for in the General Plan.

The sewer system master plan previously prepared for the Study Area by Brown and Caldwell in 1967 has largely been implemented and forms the backbone sewer system. This system is generally of adequate capacity and is currently functioning well. Therefore, it was not necessary to develop system wide alternatives. However, localized deficiencies in the existing trunk and interceptor system were identified and alternatives were developed and analyzed to correct these deficiencies.

Alternatives were analyzed based upon cost effectiveness and qualitative performance. The alternatives to correct each deficiency were then ranked with the highest ranking alternative selected as the apparent best.

2.8 RECOMMENDED IMPROVEMENT PROGRAM

A detailed description of the recommended improvement program was developed, along with a summary of the basis for the master plan. Large amounts of technical data were developed on the wastewater generating characteristics of the Study Area. In order to provide for a complete understanding of the recommended plan, the more significant technical data and basis for the plan are presented in Table 2-1.

The improvements required to allow the existing system to meet the Study Area's ultimate development needs are presented in Table 2-2. Trunk sewers have been proposed for four presently undeveloped portions of the service area. These are areas for which projected peak wet weather flows are expected to exceed 1 mgd. Improvements have been proposed to relieve present and future undercapacity sewers by either paralleling the existing line or by diverting sewage from upstream sections. Where alternate routes were available, trunk locations were individually compared and selected. It should be noted that the backbone sewer system was laidout to function without the need for wastewater pumping stations. This, however, does not preclude the possibility that some small areas will require service via local pumping systems. The cost of the complete improvement program is estimated at approximately $3.5 million, based upon an ENR-CCI of 5000 for Los Angeles.

Based upon land use and population forecasts for the Study Area, an implementation program for the recommended improvements has been proposed. This program is summarized in Table 2-3 through 2-5.

TABLE 2-1

SUMMARY OF TECHNICAL BASIS FOR MASTER PLAN UPDATE

ITEM	BASIS
Study/Service Area Boundaries	o Entire sphere of influence of both the Simi Valley County Sanitation District and the City of Simi Valley, supplemented by areas with natural drainage tributary to the City and other areas with need and desire for service.
	o January, 1983, LAFCO sphere of influence maps.
	o USGS and Ventura County Public Works Agency topographical maps.
Existing Land Use	o Information contained in the Housing elements of the General Plan, dated January, 1983.
	o Generalized existing land map obtained from City of Simi Valley - Department of Community Development, January, 1983.
Future Land Use	o General Plan for City of Simi Valley, dated March, 1980, plus amendments through Amendment 82-2.
	o Residential development in excess of target density anticipated due to current trends; see Section 3.4.2.
Population	o Projections established by the 201 Water Quality Management Plan and Air Quality Maintenance Plan for Ventura County.
	o Population for the year 2010 established by extending 1985-2000 rate of population growth.
	o Horizon population established using 52,500 residential units at buildout with 3.30 persons per unit.

TABLE 2-1 (Cont.)

SUMMARY OF TECHNICAL BASIS FOR MASTER PLAN UPDATE

ITEM	BASIS
Water Supply Characteristics	o Information provided by Ventura County water Works District No. 8 and the Southern California Water Company.
Residential Wastewater Generation	o 80 gallons per capita per day from strictly domestic sources at buildout.
	o Determined from analysis of water usage records and projections of recent trends.
Commercial Wastewater Generation	o 1000 gallons per acre per day for all types of commercial uses.
	o Determined from survey of Southern California Sewering Agencies and verified from analysis of four Simi Valley Commercial Centers.
Industrial Wastewater Generation	o 1200 gallons per day per acre for all types of industrial land.
	o Determined from survey of Southern California sewering agencies and industrial developers.
Institutional Wastewater Generation	o 500 gallons per day per acre for water using institutional land uses.
	o Determined from analysis of potential uses.
Infiltration/Inflow	o Determined from previous studies (17) and field observations.
Peak Flow Factors	o Determined from analysis of treatment plant flow records; flow measurements made throughout the system and data published in the literature.
Equivalent Dwelling Units	o 275 gallons per day per equivalent dwelling unit.
	o Determined from typical household characteristics in SVCSD.

TABLE 2-1 (Cont.)

SUMMARY OF TECHNICAL BASIS FOR MASTER PLAN UPDATE

ITEM	BASIS
Sewer Design Criteria for Planning	o Roughness Factors, n=0.013
	o Design depth of flow equal to 75 percent of diameter.
	o An existing sewer is allowed for flow full at peak prior to relief.
Cost Estimate Criteria	o Construction Cost Index is Engineering News Record index for Los Angeles.
	o Unit Construction costs are based upon an LA ENR-CCI of 5000.
	o Operation and Maintenance costs are based upon a CPI of 295.

TABLE 2-2

SUMMARY OF RECOMMENDED IMPROVEMENTS

IMPROVEMENTS	ESTIMATED ULTIMATE FLOW mgd ADWF	PWWF	DESCRIPTION	ESTIMATED COST $
SI3(1)	0.74	2.20	100 LF of 12 inch sewer at approximately 1% slope; average cut 15-18 feet; junction manhole on existing 24 inch Los Angeles Avenue Interceptor.	18,000
SI3(2)	6.20	15.50	220 LF of 36 inch inverted siphon; appurtenances including automatic gates and controls.	169,000
AS1	N/A	N/A	Relocate 400 LF of 20 inch sewer, average cut 15-18 feet, and 800 LF 12 inch sewer, average cut 15-18 feet.	60,000
M1(1)	0.31	1.09	2500 LF of 10 inch sewer at 1.5-2%; average cut 12-15 feet.	83,000
M1(2)	0.75	2.25	5000 LF of 15 inch sewer at 1-2%; average cut 12-15 feet.	225,000
M1(3)	N/A	1.14	3000 LF of 12 inch sewer at 0.65%; average cut 12-15 feet.	144,000
M1(4)	N/A	2.31	1200 LF of 15 inch sewer at 0.4%; average cut 12-15 feet.	68,000
M1(5)	N/A	3.23	1300 LF of 18 inch sewer at 0.28%; average cut 12-15 feet.	87,000

TABLE 2-2 (Cont.)

SUMMARY OF RECOMMENDED IMPROVEMENTS

IMPROVEMENTS	ESTIMATED ULTIMATE FLOW mgd ADWF	PWWF	DESCRIPTION	ESTIMATED COST $
GF2	0.21	0.67	2800 LF of 10 inch sewer at 0.36%; average cut 10-12 feet.	112,000
RF2	N/A	0.10	400 LF of 8 inch sewer at 0.4%; average cut 8-10 feet.	13,000
AC1	0.48	1.55	4500 LF of 10 inch sewer at 1.7 to 3.3%; average cut 12-15 feet.	207,000
B1(1)	0.51	1.52	5000 LF of 12 inch sewer at 1-3.5%; average cut 12-15 feet.	215,000
B1(2)	0.57	1.70	3500 LF of 12 inch sewer at 2-3%; average cut 12-15 feet.	136,000
NF1(1)	N/A	1.45	1200 LF of 10 inch sewer at 1.3%; average cut 12-15 feet.	52,000
NF1(2)	N/A	0.46	800 LF of 8 inch sewer at 2.7%; average cut 12-15 feet.	30,000
NF1(3)	0.50	1.63	1200 LF of 10 inch sewer at 3-5%; average cut 15-20 feet.	64,000
NF1(4)	0.39	1.26	2500 LF of 12 inch sewer at 0.3-0.4%; average cut 10-20 feet.	125,000

TABLE 2-2 (Cont.)

SUMMARY OF RECOMMENDED IMPROVEMENTS

IMPROVEMENTS	ESTIMATED ULTIMATE FLOW mgd ADWF	PWWF	DESCRIPTION	ESTIMATED COST $
G1	N/A	0.27	1100 LF of 8 inch sewer at 0.5; average cut 12-15 feet.	42,000
NS1	N/A	1.01	3500 LF of 15 inch sewer at 0.5 to 0.6%; average cut 15-18 feet.	217,000
R1	N/A	0.25	2500 LF of 8 inch sewer at 0.3 to 0.4%; average cut 12-15 feet.	95,000
SC2(1)	0.32	1.03	3900 LF of 10 inch sewer at 2-3%; average cut 10-12 feet.	156,000
SC2(2)	0.32	1.03	1700 LF of 10 inch sewer at 0.8-1%; average cut 12-15 feet.	77,000
SC2(3)	N/A	0.78	1000 LF of 10 inch sewer at 0.8-1%; average cut 12-15 feet.	45,000
WM1	N/A	N/A	3800 LF of 8 inch replacement sewer at various slopes; average cut 8-10 feet.	125,000
			Subtotal	$2,565,000
			Contingencies @ 15%	385,000
			Engineering & Administration @ 20%	513,000
			Total	$3,463,000

Note: For specific locations see Plate 9-1.

TABLE 2-3

NEAR FUTURE IMPROVEMENTS
(1984 - 1990)

IMPROVEMENT	ESTIMATED COST
SI3(2)	$169,000
AS1	60,000
M1(1)	83,000
M1(2)	225,000
M1(4)	68,000
M1(5)	87,000
GF(2)	112,000
RF2	13,000
AC1	207,000
B1(2)	136,000
NF1(2)	30,000
NF1(1)	52,000
G1	42,000
NS1	217,000
R1	95,000
WM1	125,000
Subtotal	1,721,000
Contingencies @ 15%	258,000
Engineering & Administration @ 20%	344,000
Total	$2,323,000

TABLE 2-4

FUTURE IMPROVEMENTS
(1990-2010)

IMPROVEMENT	ESTIMATED COST
M1(3)	$144,000
B1(1)	215,000
NF1(3)	64,000
SC2(1)	156,000
SC2(2)	77,000
SC2(3)	45,000
Subtotal	$701,000
Contingencies @ 15%	105,000
Engineering & Administration @ 20%	140,000
Total	$946,000

TABLE 2-5

ULTIMATE IMPROVEMENTS
(AFTER 2010)

IMPROVEMENTS	ESTIMATED COST
SI3(1)	$ 18,000
NF1 (4)	125,000
Subtotal	$ 143,000
Contingencies @ 15%	21,000
Engineering & Administration @ 20%	29,000
Total	$ 193,000

CHAPTER 3

STUDY AREA CHARACTERISTICS

CHAPTER 3

STUDY AREA CHARACTERISTICS

The development of a plan for wastewater facilities requires an adequate knowledge of the physical and economic characteristics of the area to be served. An estimate of anticipated long-range urban development within the Study Area is essential in the preparation plans, particularly in view of the long life of the physical facilities which are part of a sewerage system. Thus, an evaluation of the Study Area and its characteristics is a primary requirement of a Sewer Master Plan.

3.1 STUDY/SERVICE AREA BOUNDARIES

The Study Area is located approximately 30 air miles northwest of the City of Los Angeles and approximately 30 air miles east of the City of Ventura (See Figure 3-1). Situated in the southeastern corner of Ventura County, the City of Simi Valley is adjacent to Los Angeles County, and it encompasses a major portion of the drainage basin of the Arroyo Simi.

A detailed Study Area Map is presented in Plate 3-1. This map shows the existing SVCSD boundaries and sphere of influence as reported by the Ventura County Local Agency Formation Committee (LAFCO)(1), as well as the gravity drainage area of the existing treatment facility. For this study, the area of investigation includes the existing sphere of influence supplemented by those areas outside of the sphere but tributary to the existing treatment facility.

LOCATION MAP

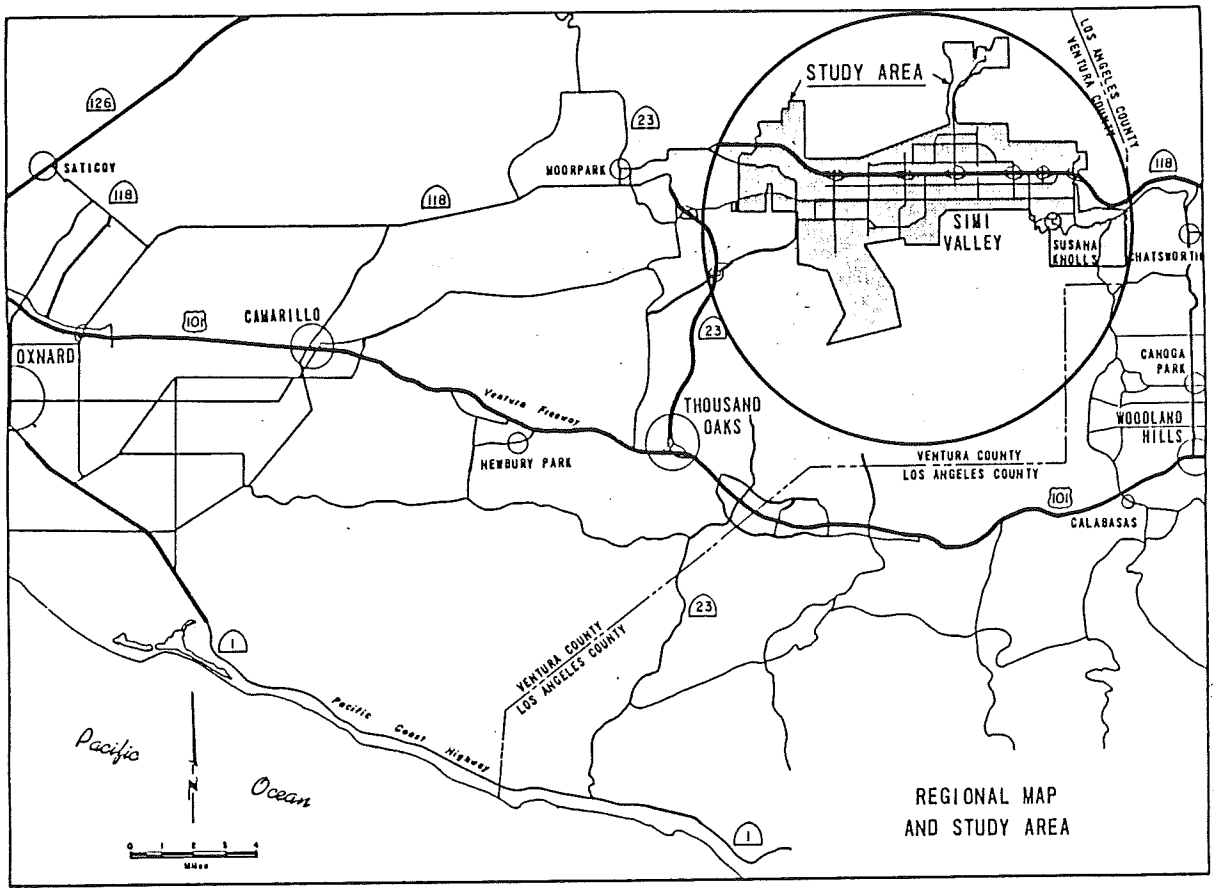


FIGURE 3-1

Areas west of the gravity drainage basin and outside of the sphere of influence were also considered in this study due to their potential desire for service from the SVCSD. It was determined through communication with staff (2) that the Moorpark County Sanitation District (MCSD) has an existing sewer line approximately 1 mile west of SVCSD treatment facility, and the MCSD can provide sewerage services to its sphere of influence which abuts the SVCSD sphere on the west. Thus, the Study Area was limited to the area shown in Plate 3-1 and described above.

3.2 PHYSICAL ENVIRONMENT

The physical characteristics of the Study Area are important in the location and design of wastewater facilities. Of particular significance are the geotechnical, hydrological, and climatological data which serve to define the Simi Valley area. These characteristics are discussed in the following paragraphs.

3.2.1 Physiography and Geology

Simi Valley is about 9 miles long, and lies between generally east-west trending mountain ranges within the Transverse Physiographic Province. Hills and valleys in this portion of the Transverse Ranges have been formed by a combination of folding and faulting over a broad area during a period of general regional uplift. The width of the valley (north-south) varies from roughly 1 to 3 miles. The mountains on the north and south of Simi Valley have been thrust upward, but Simi Valley itself, formed as an alluvial trough, has risen much slower than the surrounding mountains. The floor of the Simi Valley ranges in elevation from a low of 700 feet Mean Sea Level (MSL) at its western end to 1100

feet near the eastern end. To the north of the valley, the Santa Susana Mountains rise to an elevation of roughly 3000 feet MSL. To the south, the Simi Hills rise to an approximate elevation of 2000 feet MSL. Arroyo Simi lies on the southern side of the valley and drains toward the west.

The mountains surrounding the valley are cut in several places by intermittent stream canyons, the largest of which include the Alamos, Brea, Simi North, Dry, Chivo, Tapo, Las Llajas, and Hummingbird to the north, and the Sycamore, Oak, Bud Runkle, Meier, and Black to the south.

The floor of Simi Valley consists of recent alluvium. It varies in depth from 500 feet below the surface in certain areas west of Stearns Street to less than 100 feet average depth further east. It was formed by fans of alluvial material emanating from the canyons.

Soils within the valley consist primarily of loams. They are generally well drained and poorly developed, except on terrace areas, where older soils are present. Soils of high clay content are found in the west end of the valley and clay lenses exist throughout the basin.

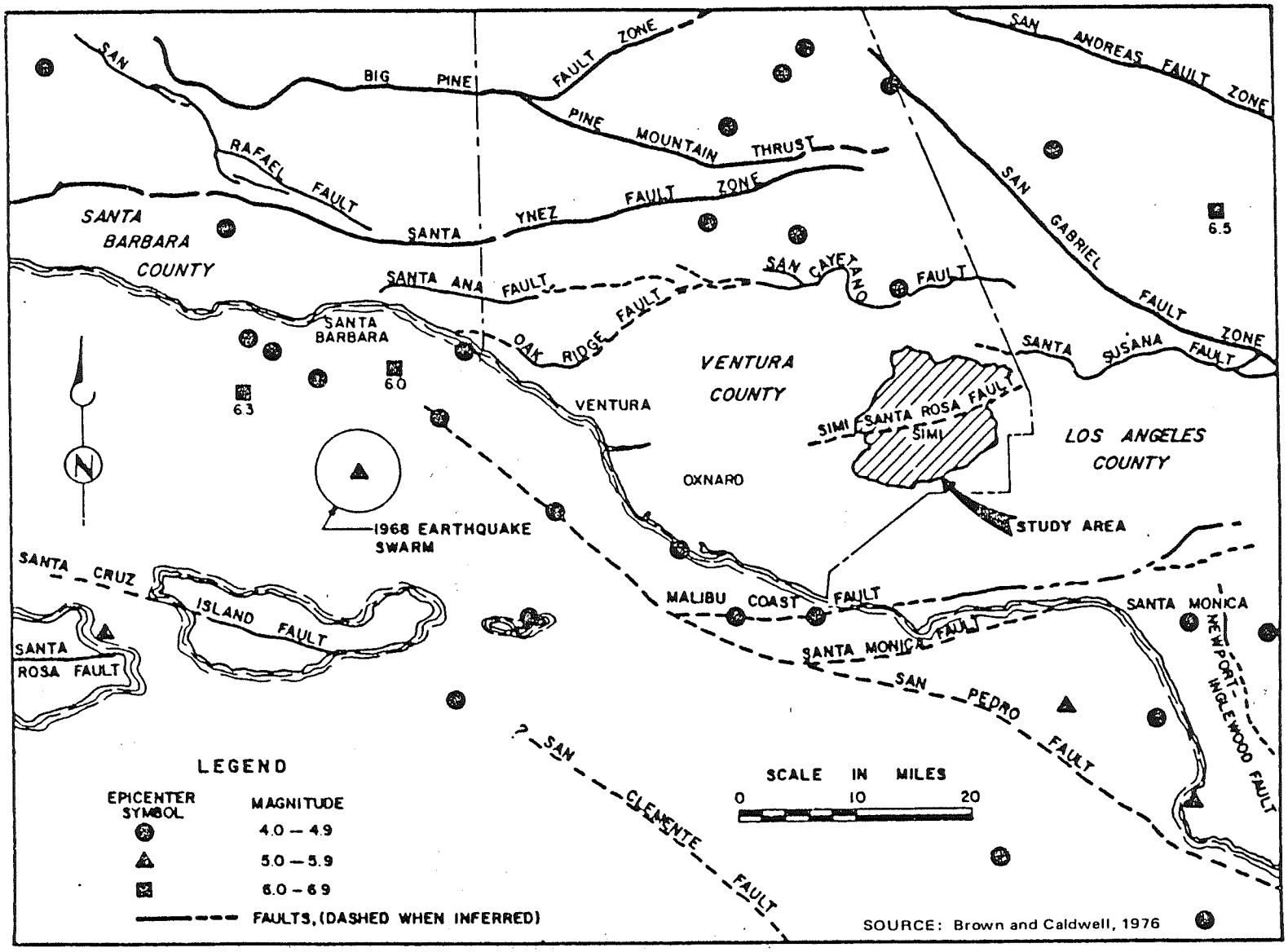
Marine and non-marine sandstone, shale, and conglomerate which date from the Oligocene and Eocene Age form the surrounding mountain and hills. Remnant Pleistocene terrace formations are present around the edge of the Simi Valley, except at its extreme

eastern end. Bedrock formations to the north of the valley are dominated by the Sespe and other Tertiary formations, however, certain areas to the east consist of Cretaceous sedimentary formations. The Sespe Formation also is dominant along the southern side of the valley west of Yosemite Avenue. North of Olsen Road and south of Tierra Rejada Road, geologic formations are dominated by the Conejo Volcanics. Tertiary formations consist primarily of poorly consolidated sand and siltstones with occasional strata of clayey sands (red beds) and conglomerates. The Sespe Formation is thought to have been formed some 60 million years ago. It is highly erodible and subject to slumping where strata of clayey sands occur. Cretaceous formations are dominated by indurated, sandstones which form highly visible rock formations at the eastern end of the valley.

3.2.2 Seismicity

Southern California is located in one of the most active seismic areas in the United States. The Study Area lies within the Circum-Pacific seismic and volcanic belt which has been tectonically active during much of Cenozoic time.

Known earthquake faults within the Simi Valley area include the Simi-Santa Rosa and the Santa Susana faults. Both are considered to be potentially active. The Simi-Santa Rosa Fault extends from Los Angeles County westward to Oxnard, where it is concealed below alluvial deposits. As shown in Figure 3-2, this fault passes directly through the Study Area.

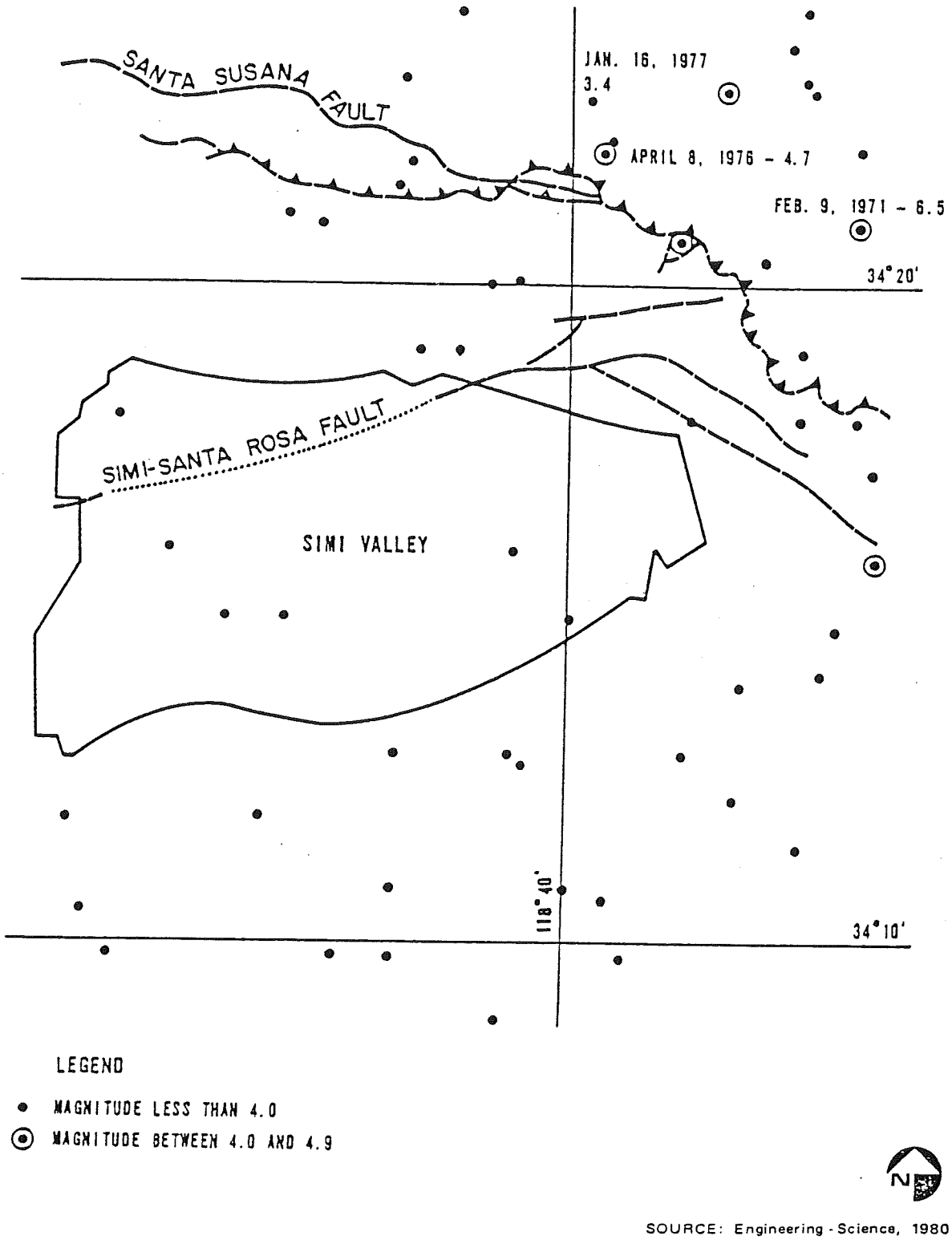


MAJOR FAULTS AND EPICENTERS

FIGURE 3-2

The Santa Susana fault was used in the City's of Simi Valley "Seismic Safety Element" as the design fault for structures, due primarily to its proximity to Simi Valley, and its great length. In addition, at the time that the element was prepared, little was known about its activity status. This fault crosses the Santa Susana Mountains from east to west, roughly 4 miles north of the Simi Valley community (see Figures 3-2 and 3-3). Recent evidence suggests that this fault has not experienced surface rupture since the late Pleistocene Epock (100,000 years). Nevertheless, the fault is still considered potentially active, in that evidence suggests a surface rupture within the past several hundred thousand years, however, it is doubtful that it represents Simi Valley's most significant seismic hazard.

The San Andreas Fault passes through much of the length of California and is considered active. It has the potential to cause an earthquake with a maximum magnitude of 8 to 8.5 in the near future. The segment of this fault, which is nearest the Study Area, has not been active since the 1857 Fort Tejon earthquake, and it is generally considered to be the segment capable of generating an earthquake with the greatest magnitude. Since this is also the fault with the greatest likelihood of occurrence it is now used in the City's "Seismic Safety Element" as the design fault for potential groundshaking in the Simi Valley area. As shown on Table 3-1 the San Andreas fault is located roughly 34 miles northeast of Simi Valley. Because of this



SOURCE: Engineering - Science, 1980

NEARBY FAULTS AND KNOWN EPICENTERS (1932-1978)

FIGURE 3-3

TABLE 3-1

NEARBY FAULTS

	Distance from Simi Valley (Miles)	Expected Magnitude (Richter)	Maximum Ground Acceleration on Firm Ground (Gravity	Approximate Probability of Occurrence (100-Year Period)
Active Faults:				
Malibu Coast-Hollywood	15 - 18	5.5 - 6.5	0.10 - 0.20	Intermediate
Newport-Inglewood	22	6.0 - 6.5	0.10 - 0.15	Intermediate
San Andreas	32	8.0 - 8.5	0.20 - 0.30	Likely
Big Pine	38	5.5 - 6.5	0.05 - 0.08	Intermediate
Potentially Active Faults:				
Santa Susana	3 - 10	6.5 - 7.5	0.30 - 1.0+	Very Low
Simi-Santa Rosa	0 - 3	6.0 - 7.0	0.50 - 1.0+	Very low
Pine Mountain	20	6.0 - 7.0	0.12 - 0.24	Very Low
Santa Ynez	22	6.0 - 7.0	0.10 - 0.20	Low

Source: Engineering-Science, 1980.

distance, any groundshaking from a major event on the San Andreas fault would probably be of lesser intensity than that from a design earthquake emanating from the Santa Susana fault. However, it is believed that any groundshaking from movement along the San Andreas Fault would be of longer duration and of a rolling nature.

Other known active and potentially active faults include the Malibu Coast-Hollywood, Newport-Inglewood, Big Pine, Pine Mountain, and Santa Ynez. These faults are listed in Table 3-1 along with the earthquake-generating capabilities which might affect Simi Valley.

In summary, ground surface rupture due to faulting is not considered to be a significant hazard within the urbanized area of Simi Valley, but it cannot be ruled out entirely. A more likely hazard than actual surface rupture would be earthshaking caused by a seismic event on one of the active or potentially active faults listed in Table 3-1. These hazards can be minimized considerably through the use of established building code requirements in the design of structures.

3.2.3 Liquefaction and Differential Settlement

The shallowness of groundwater within the Study Area has been of concern due to the possibility of liquefaction of subsoils during earthquakes. Liquefaction is the sudden loss of cohesive strength within saturated soil (predominantly fine-grained sand). This

loss of strength may be caused by shock or strain, such as that which could occur during an earthquake. Groundshaking may cause compaction of water bearing materials, and if the soil is already saturated, compaction of soil grains will force water out of the formation with a resulting transformation of the soil to a fluidized mass. If this liquefying layer lies near the surface of the earth, resultant effects resemble quicksand. More commonly, however, differential settlement of the ground surface tends to occur. Where relatively shallow zone liquefaction occurs (within the upper 15 feet), major damage to structures and improvements can occur. Where liquefaction occurs beyond this (20 to 50 feet below the surface), differential settlement rather than liquefaction would typically result.

Within the Study Area, land just east of Chain Drive has been rated as having a "high" liquefaction susceptibility. Other areas, adjacent to Madera Road, were identified as having a "moderately high" susceptibility to liquefaction.

In the eastern end of the Study Area, several soil borings and analyses have been conducted. Soils in this area have generally exhibited high relative compaction and an unfavorable grain size distribution for liquefaction to occur. Thus, although liquefaction is possible in this area, maximum repeatible ground accelerations would have to be very high for it to occur. Therefore, liquefaction of subsoils is considered to be much less of a hazard at the east end of the valley than at the west end, where the hazard is much greater. Reduction of water table levels

to 30 feet beneath the surface or below would minimize the potential for liquefaction considerably, although the potential for differential settlement would still exist.

3.2.4 Slope Stability and Landslide Potential

Based on a 1971 study (of southern Ventura County), by the California Division of Mines and Geology more than half of the Simi Valley area is classified as having a "high" landslide risk. The study stated that areas within the City composed of Recent alluvium have no landslide risk, those composed of Pleistocene alluvium have a "low" risk factor, those of Cretaceous bedrock have a "moderate" landslide risk, and those of volcanic and Tertiary aged bedrocks have a "high" landslide risk. Most of this latter category (Tertiary aged geologic formations) occurs within the Sespe Formation. This formation is generally stable, except where strata of blue and red clayey sands are present. Landslides which have occurred around the valley are primarily confined to these areas of blue and red clayey sands.

3.2.5 Surface Water Hydrology

As mentioned earlier, the major drainage course in Simi Valley is the Arroyo Simi, which flows from east to west. It receives drainage from the several canyon streams emerging from the surrounding mountains. Most of these streams are intermittent, and even the Arroyo Simi does not surface flow at its eastern end during the summer months. The Santa Susana Mountains to the

north constitute the majority of the water shed due to their larger area and high elevation. Higher stream discharge volumes coupled with alluvial deposition from these mountains have forced the Arroyo Simi to the south side of the valley proper.

Temporary increases in stream flow have produced major flooding, earthslides, and mudflows in the valley. Many of the channels reportedly cannot accommodate a 100-year flood. Most of the Arroyo Simi has been channelized to reduce this flood hazard but flood danger still persists at several points along the stream.

The City of Simi Valley has been designated as a flood prone area by the federal government. This allows the City to participate in the Federal Flood Insurance Administration (FIA) program. Under the terms of the City's agreement with the FIA, residents of Simi Valley are eligible to purchase flood insurance at a 90 percent subsidized rate. In exchange, with some exceptions in the "Floodway Fringe", the City agrees not to approve new residential projects within the area impacted by the 100-year flood unless those residences can be protected without significantly aggravating the flood hazard elsewhere.

Following the formation of the Callegaus Municipal Water District, high quality water began to be imported to the valley. The subsequent reduction of well water use on the valley floor resulted in a recharging of the groundwater table and produced relatively high groundwater levels. One dewatering well is

now being used to lower the groundwater level by extracting water from the ground and pumping it into the Arroyo Simi causing a perennial surface water flow in the western end of the Simi Valley.

3.2.6 Groundwater Hydrology

Underground aquifers within the Simi Valley are composed of sand and gravel alluvial deposits. Primary recharge of these aquifers occurs through infiltration along streambeds and drainage courses following winter storms. Much of the area's groundwater enters the valley floor area as subsurface flow through the alluvial deposits from several of the canyons in the surrounding hills and mountains. Groundwater basins are situated beneath the entire valley floor. Depth to groundwater in most of the valley varies from less than 20 feet to approximately 100 feet, with the total depth of the water bearing sediments estimated at several thousand feet. A sedimentary stratum which is relatively impervious to groundwater movement has created a perched water table in the west end of the valley at roughly 18 inches below ground surface.

The groundwater basin in the eastern part of the valley is relatively shallow due to a high topographic bedrock formation. Water tends to build behind this natural barrier until it spills over into the western basin. Groundwater depth in this area averages about 10-20 feet. In addition, the Simi-Santa Rosa Fault crosses the west end of the valley just upstream from the Brea Wash. Uplift along this fault serves to block the flow of groundwater, and causes it to rise until the level of the water

table is high enough to spill over this subsurface obstruction just below the surface of the Arroyo Simi. As a result, surface flows in the Arroyo continue year-round at the extreme west end, beginning about a mile upstream from the SVCSD's wastewater discharge point.

Groundwater was the prime source of water for domestic and agricultural uses until the 1950's. In recent years, imported water has become the primary source of supply, resulting in rising groundwater levels throughout the valley. This has resulted in the implementation of a groundwater dewatering program in the west end of the valley.

3.2.7 Groundwater Quality

Groundwater quality in Simi Valley has been historically poor, with very high levels of total dissolved solids (TDS) existing throughout the basin (often greater than 2000 mg/l). The highest TDS concentrations are found in the western part of the Study Area, with the lowest located in the southeast, adjacent to the Simi Hills.

3.2.8 Climate

The climate of Simi Valley is classified as a dry summer subtropical (Köppen system). It is also referred to as a "Mediterranean Climate" because of its similarity to the climate of countries bordering on the Mediterranean Sea. This climate is characterized by mild wet winters, dry warm summers, with cool summer nights.

Monthly mean temperatures range from 52.5°F in January to 74°F in August. The average temperature throughout the year is 61.9°F. The recorded extremes are 105°F in July and 28°F in January and February. Rainfall averages 13 inches per year at the west end of the Valley and almost 15 inches annually at the east end of the valley. Most of the precipitation occurs during the winter storms which emanate from middle latitude subtropical cyclones in the North Pacific during the months of November through April.

3.2.9 Air Quality

The principal meterological phenomena occuring in Simi Valley which impact air quality include the following:

- The semi-permanent Pacific High Pressure Cell, which results from subsidence inversions.
- Land-sea breezes
- Santa Ana winds
- Middle latitude cyclonic storms

Each of these and their effects on air quality in the Study Area have been discussed at length in prior documents (3), (4), (5), (8), and are therefore not reiterated here.

Ventura County violates the national ambient air quality standards (NAAQS) for ozone and total suspended particulates (TSP). Table 3-2 depicts the air pollutant maxima obtained at each air quality monitoring facility in the County (including Simi Valley) between 1979 and 1981. County-wide trends for each of the pollutants for which there is an NAAQS and/or California standards are described briefly below (9):

- Ozone and TSP: "Ambient concentrations of ozone and TSP - the two pollutants that exceed the primary NAAQS and, thus, the principal concerns of the AQMP - have been controlled substantially over nearly a decade of implemented APCD Rules and Regulations. These pollutants are expected further to decrease county-wide under conditions of recently implemented controls and controls that have been adopted or are scheduled for adoption but not yet implemented. However, attainment of standards for these two pollutants will not occur without application of additional controls."

- Sulfates, Nitrogen Dioxide, Lead: "State Standards for these three pollutants have been infrequently exceeded in the County. However, attainment of each standard is expected due principally to changes in fuel composition and combustion processes."

TABLE 3-2

VENTURA COUNTY
AIR POLLUTANT MAXIMA, 1979-1981, NAAQS SAMPLING REQUIREMENTS

	OZONE, ppm			TSP, µg					NITROGEN DIOXIDE, ppm				SULFUR DIOXIDE, ppm				CARBON MONOXIDE, ppm			
	79	80	* 81	79		80		* 81	79		80		79		80		79		80	
	1 H	1 H	1 H	75 AGM	260 24H	AGM	24H	24H	AA	1H	AA	1H	AA	1H	AA	1H	8H	1H	8H	1H
Ventura		.13	.15					157												
Port Hueneme	.19	.13																		
Thousand Oaks	.18	.19		62.2	340	66.2	144													
El Rio	.23	.13	.16			62.5	216	144				-	.004	.04	.001	.03				
Ojai	.18	.18	.20	67.1	131	64.9	154													
Piru	.22	.21	.19	65.3	246	78.3	156	255												
Simi	.19	.18	.23	68.3	163	73.2	182	166	.030	.15	.026	.15	.001	.06	.002	.03	6.8	18	7.1	28

* January through October, 1981 (through period of data availability for this AQMP).

1 H = 1 Hour Average
AGM = Annual Geometric Mean
24 H = 24 Hour Average
AA = Annual Average
8 H = 8 Hour Average

Ventura
TSP Samples invalid due to marine salt intrusion.

Simi
CO, SO_2, NO_2 - Temporarily closed 10/15/80 - present

Port Hueneme
Station closed 10/15/80; TSP invalid due to marine salt intrusion

Thousand Oaks
O_3 - Temporarily closed 10/15/80 - present
TSP - Closed 1/1/81

Ojai
O_3 - Temporarily closed 10/15/80 - 3/4/81
TSP - Temporarily closed 10/15/80 - present

Piru
O_3 - Temporarily closed 10/15/80 - 4/23/81
TSP - Temporarily closed 10/15/80 - 5/15/81

SOURCE: Ventura County, 1982

- Carbon Monoxide: "About two thirds of the county's emissions occur in auto exhaust. Although standards have not been exceeded, they have been approached, and there is a reasonable probablity that, under certain adverse meteorological conditions, they may be infrequently exceeded in the future."

- Sulfur Dioxide: "Ambient levels remain substantially below standards. Levels are expected to remain low: around 85% of the County's SO_2 emissions derive from fossil fuel burned in power plants, and the sulfur content of the fuel has been reduced about 40 percent over the past few years."

Under the provisions of the Federal Clean Air Act Amendment of 1977, Ventura County has developed an Air Quality Management Plan (AQMP) for attaining National Ambient Air Quality Standards. The AQMP includes the following controls, which, when implemented, are projected to reduce emissions to levels which would allow for attainment of the ozone standards in 1987.

- Reasonably available control measures (RACM's)

- Implementation of the California Motor Vehicle emission standards

- The California Motor Vehicle Inspection Program (MVIP)

- Development of transportation control measures

In addition to the AQMP, annual progress reports must be prepared for those areas exceeding air quality standards. The primary objective of the annual Reasonable Further Progress (RFP) reports is to demonstrate that the AQMP's are being implemented, and should demonstrate that annual incremental reductions in emissions are being made which are sufficient to provide for attainment of the ozone standard by 1987. The most recent report indicates that the RFP for ozone in Ventura County has not been met (9).

The reasons for this involve reporting differences between the 1977 and 1979 emission inventories. The fact that petroleum production related sources constituted a larger portion of both ROC and NO_x emissions than projected in the 1979 AQMP and the assumed adoption of control measures by the Air Resources Board which have not occurred.

The Environmental Protection Agency (EPA) requires that shortfalls in emission reductions identified in RFP reports be compensated by adopting additional control measures. Therefore, the following actions have or will occur as a result of failure to demonstrate reasonable further progress (9):

- The Ventura County APCD has prepared a 1982 AQMP which commits the County to adopt additional control measures directed towards attaining the NAAQS for ozone.

- An updated, 1983 AQMP will be prepared although it is not mandated. The plan will include an evaluation of all new data relating to ozone levels throughout the County, including developments regarding the use of a verified photochemical model. This model is expected to increase substantially the accuracy of estimates of ROC and NO_x emission reductions required to attain the NAAQS.

- Annual RFP reports will be prepared . These will include annual updating of data on which the RFP is based, such as updated ozone design values and effectiveness of emission controls. Attainment dates are expected to be developed (or modified) as the annual RFP process continues.

- The APCD also commits to review existing rules to assess the possibility of increasing their effectiveness.

Further discussion of air pollution and measures being undertaken to achieve air quality standards can be found in the Ventura County Air Quality Management Plan, which is incorporated herein by reference. The AQMP is available for review at the Air Pollution Control District Office at 800 South Victoria Avenue in Ventura, California, or at local public libraries.

3.3 BIOLOGICAL ENVIRONMENT

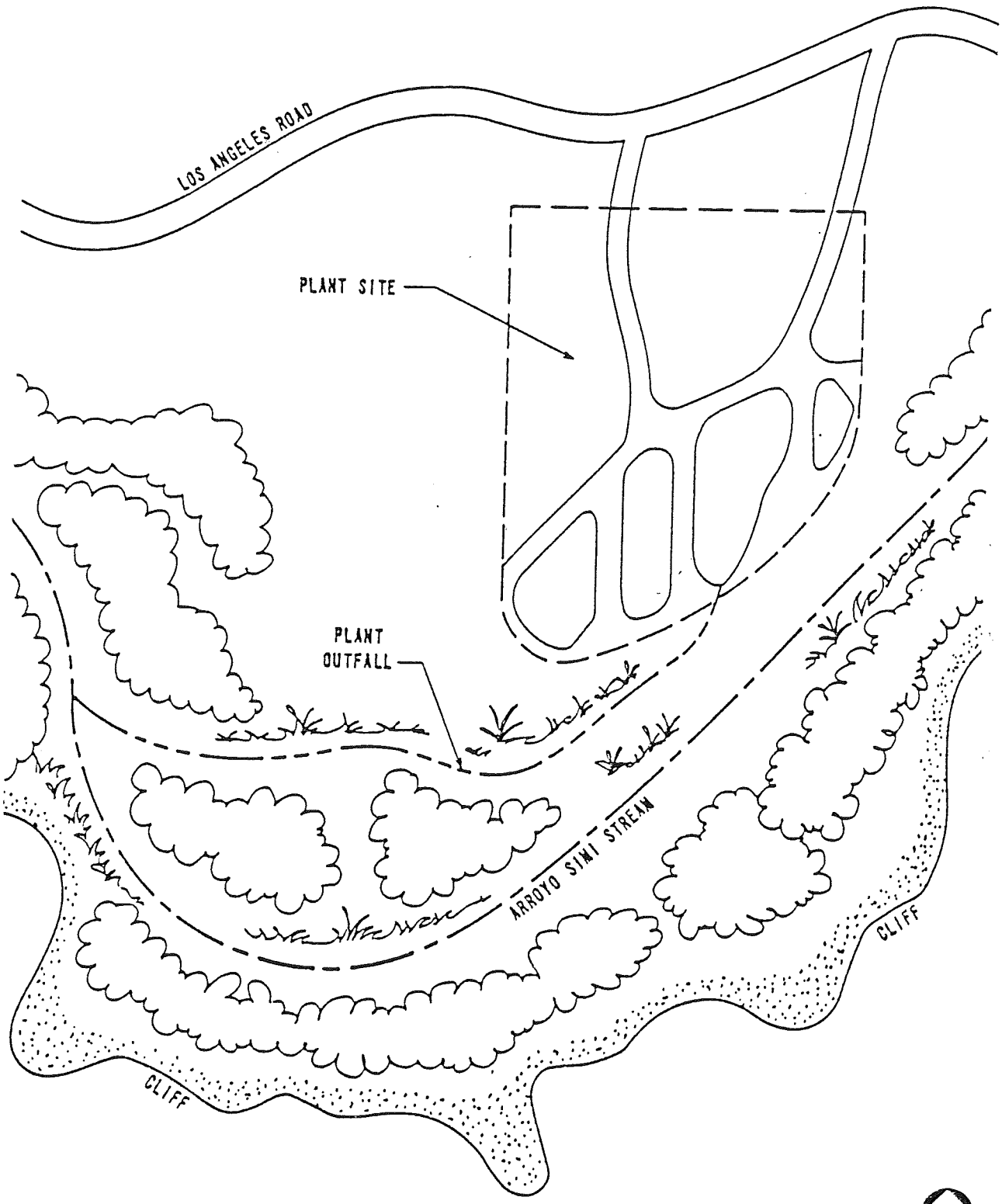
The biological environment of the Study Area is characterized by the native vegetation, the native wildlife and the resident sensitive species. These are discussed below.

3.3.1 Native Vegetation

A number of vegetative communities occur in and around the Simi Valley including Coastal Sage Scrub, Chaparrall, and Oak Woodland. The Oak Woodland community is composed of a Valley Oak Savannah and a Southern Oak Forest association. These communities exist in undistrubed land on the valley floor and within the surrounding foothills. The south-facing slopes of the Santa Susana Mountains tend to exhibit Coastal Sage Scrub vegetation, while the north-facing slopes of the Simi Hills exhibit a more dominant Chaparral. Large portions of foothill and valley floor areas have suffered frequent fires, overgrazing and chemical treatment of vegetation. This has resulted in a gradual transition to disturbed grassland in much of the valley. Coastal Sage Scrub commonly occupies drier sites using upper soil moisture

to survive. Most dominants are winter active and avoid summer drought by shedding their leaves. They function in a seral role to Chaparral species where Chaparral is predominantly a climax association. Along the valley floor, the waters of the Arroyo Simi provide for a riparian community.

A detailed biological analysis conducted in 1980 focused on the riparian vegetative community adjacent to the SVCSD Water Quality Control Plant and effluent outfall. Excerpts from that analysis are summarized below (3). Figure 3-4 depicts the relationship of the riparian community to the treatment plant. The heights of the plants in this community range from partially submerged grasses and rushes to 90-foot trees. The moisture requirements of the plants are met in several ways. The trees and shrubs are phreatophytes: plants that send their roots down to the water table or to the capillary fringe immediately overlying the water table and are then able to obtain a perennial and secure supply of water. The annuals, biennials, and herbaceous perennials grow very close to the shoreline and obtain water directly from the stream. All of the plants within this community depend on overbank flooding for the deposition of nutrients required for regeneration and establishment. Thus, this community is maintained by the shallow water table together with continuous flow of water through the water channel. A list of the species present in this riparian area and their approximate percent cover at the time of the survey earlier in 1979 is contained in the 1980 Engineering-Science Report(8). The most abundant species was Mule



SOURCE: Engineering Science, 1980

RELATIONSHIP OF SVCSD TREATMENT PLANT
TO RIPARIAN COMMUNITY

FIGURE 3-4

Fat (Baccharis glutinosa) which forms dense thickets up to 12 feet tall. Red Willow (Salix laevigata) was scattered throughout the thickets. Towering above these thickets were a few scattered cottonwood trees (Populus fremontii). All of these phreatophytes prefer localities where the depth to water does not exceed 15 to 20 feet. However, Mule Fat and Red Willow have been found to require a water table not lower than 10 feet from the ground surface.

The shoreline is vegetated with various low growing herbaceous plants including Hoary Nettle (Urtica holosericea), Mild Water Pepper (Polygonum hydropiperoides), Seaside Helitrope (Heliotropium curassavicum), and Western Bent-grass (Agrostis exarata). These species are most often found on exposed sand bars and flat sandy shores which are periodically inundated with water.

3.3.2 Wildlife

The riparian community adjacent to the treatment plant supports some of the most productive and diverse wildlife populations in the United States. Certain species of wildlife are restricted entirely to the riparian community for all of their life cycle such as food, water, cover and breeding sites. Numerous other species make use of these areas although they are not restricted to them. The riparian community also provides natural highways by which animals can move safely fom one place to another. This community is more important to wildlife in arid regions, like the Study Area, where water is at a premium. The riparian area also supports a diverse set of resident birds as well as numerous

migratory birds traveling between their breeding areas to the north and their winter ranges to the south. All birds sighted and potentially present within tne Study Area were listed in the 1980 Engineering-Science Report. Because the surveys were undertaken in the summer months, a few migratory birds were present.

The stream provides drinking water for all birds in the riparian community as well as in the surrounding communities. In addition, it supports a diverse inset fauna which supplies food for numerous birds including the Black Phoebe (Sayornis nigricans) and the Rough-winged Swallow (Stelgidopteryx ruficollis). These two species also make their nests along the stream bank. Herbaceous plants along the shoreline provide a valuable source of food for the many seed-eating bird species including thrushes, tanagers, towheeds, goldfinches, finches and sparrows.

Large quantities of insects living with the Mule Fat and willow thickets attract many perching birds including woodpeckers, nuthatches, orioles, jays, titmice, vireos, wrens, and Wrentit (Chamaea fasciata), kinglets, gnatcatchers, and warblers. Glycatchers and bluebirds perch on the exposed branches of tne thicket and fly out to catch insects. The thickets also provide sheltered nesting sites for many of the bird species which occur in this community. Litter (dead and/or decaying plant and animal material) accumulated beneath the thickets contain various food items sought after by quail, towhees, the Fox Sparrows (Passerella

iliaca), thrashers, thrushes, and the Roadrunner (Geococcyx californianus).

Tall cottonwood trees provide nest sites for predatory birds including owls, hawks, kites, and falcons which are occasionally seen flying overhead.

While few mammals restrict their activities to the riparian community, most if not all mammals require access to stream or lake margins for survival. This community provides the only source of water for mammals which live in the surrounding communities. It also provides food, cover and a corridor facilitating movement within a mammals home range (total area through which a mammal travels). All mammals observed or potentially present in the Study Area were listed in the 1980 Engineering-Science Report(3).

The most conspicuous mammal is the diurnally active Audubon's Cottontail Rabbit (Sylvilagus sudubonii). It hides in the Mule Fat and willow thickets and eats grass and leaves of various riparian plant species. The Beechet Ground Squirrel (Citellus beecheyi) is another common diurnal mammal in the Study Area which scavenges for seeds, nuts and fruit in open areas between the thickets. The large populations of these two species support foxes, bobcats, owls and coyotes which can be seen occasionally at dusk or dawn.

Numerous tracks indicate the presence of nocturnal mammals including racoons and coyotes. Additional mammals may be present but are seldom encountered due to their noctural or secretive behavior. The nocturnal or rarely encountered rodents if present, support hawks, owls, coyotes, foxes, badgers, weasels, skunks, and snakes.

Although the Mule Deer (Odocoileus hemionus) was not observed, it is abundant in the nearby chaparral community and requires drinking water supplied within the Study Area.

All the bats listed the 1980 Engineering-Science Report(3) are insectivorous and may forage for insects in the evenings above the water. Since all surveys were conducted during daylight hours, no bats were observed.

While amphibians are normally abundant in the riparian community, no species were observed during the earlier survey. Most, if not all amphibians are inactive during the summer months when both studies were conducted; however, some individuals can usually be spotted. All amphibians require still water for some part of their life cycle. This is primarily due to the abundance of food items including algae and aquatic insects which are restricted to this type of microhabitat. In arid regions this microhabitat is created during the spring and summer months after the subsidence of winter rains. However, the wastewater outfall and groundwater

pumping in the Study Area creates a rapid flow of water year round. It has been determined that sewage effluent disposal in streams and rivers is detrimental to riparian communities due to its effect on water flow rates. Still water and the likelihood of ponding is reduced with a subsequent reduction in amphibian habitat. Amphibians have been observed by local residents during the breeding season but their numbers may have dropped off. Amphibians in different parts of their life cycle provide an important food source for predatory snakes, birds and mammals. A decline in amphibian populations could create many changes in the riparian community.

No fish were observed in the stream. Fish also require still water for breeding. They are important to the riparian community since they provide food for many species of wildlife.

Lizards are abundant in the Study Area. They feed on insects and seek cover in the litter beneath the thickets. All amphibians and reptiles observed or potentially present in the Study Area were listed in the 1980 Engineering-Science Report(3).

3.3.3 High Interest Species

No endangered vegetative species have been identified within the Simi Valley Study Area; however, one rare plant, the Santa Susana Tarweed (*Hemizonia Minthornii*) is present among the sandstone outcroppings at the east end of the valley.

Native oak and Sycamore trees are considered to be desirable relicts of the natural landscape and highly desireable from an aesthetic perspective. Other mature trees are considered worthy of preservation because they also represent an aesthetic asset and resource. Native oak trees, almost entirely Valley Oaks (Quercus lobata) and California Live Oaks (Quercus agrifolia) are still prominent in the portions of the valley. These species are not reproducing well in this area or elsewhere in California, due largely to the impacts of cattle grazing, fires, and high rodent populations.

Two other native tree species occur in the valley and represent a resource worthy of preservation: Fremont Cottonwood (Populus fremontii), and Western Sycamore (Platanus racemosa).

No endangered species of animals have been identified within the Study Area. Golden Eagles (Aquila chrysaetos) are resident in both the Santa Susana Mountains and the Simi Hills. Black-shouldered Kites (Elanus Leucurus), California Condors (Gymnogyps californianus) and Ospery (Pandion haliaetus) are occasionally seen in the area. These species have experienced dramatic reduction in habitat with increasing urbanization and disturbance. The Black-shouldered Kite, however, has become adapted to feeding within freeway rights-of-way, and therefore, may have reversed its dwindling populations. Some other relatively rare birds are also present within the Study Area.

3.3.4 Wildfire Hazard

Wildfires in the natural vegetation of Southern California have occurred regularly for thousands of years. Plant species present today in these areas are those which recover quickly from fire. Wildfire hazards are particularly acute because of the prolonged late spring through fall drought experienced by Southern California and because of the occurrence of Santa Ana Winds beginning during the late Summer and extending into early Fall. Numerous brush and grass fires occur on the perimeter of Simi Valley each year. Usually, these fires are controlled quickly. However, fires which spread over thousands of acres can be expected in the area.

Several factors, other than weather, contribute to the relative fire risk of an area. Most important of these are fuel load and slope. Fuel load refers to the type and volume of plants. Volume is largely a factor of the number of years since the area last burned. The nature and timing of the previous winter's rains, and intensity of grazing if it occurred. In the field, fire risk is strongly correlated with the occurrence of hard and soft chaparral plant associations. The highest risk area is the hard chaparral plant association, which grows densely, emits volatile oils when heated, and contains shrubs such as chamise (*Adenostoma fasciculatum*), poison oak (*Rhus toxicodendron diversiloba*, various ceanothus (*Ceanothus* spp.) and sage (*Salvia* ssp.) species, scrub oak, (*Quercus dumosa*), sugar bush (*Rhus ovcata*) and toyon

(Hetermeles arbutifolia). The soft chaparral or coastal sage scrub association is rated as moderately hazardous because the shrubs are generally smaller, less densely spaced and somewhat less volatile. Grasslands, which are rated as low hazard areas, ignite easily and burn quickly. However, grassland fires produce much less heat than chaparral fires.

3.4 DEVELOPMENT AND ECONOMIC ACTIVITY

The growth of any urban area results in a gradual change in land use from rural or agriculture to residential, commercial or industrial activities. These activities inevitably produce a demand for municipal-type services, such as centralized wastewater disposal and/or reuse. In order to formulate a sound, long-range plan for sewerage facilities, estimates of future population, land use, and economic activity are essential. This is necessary because sewer system components have a useful life ranging from 30 to 100 years or more, and they must be able to accommodate future as well as present flows. Pertinent information on development and economic activity in the Simi Valley are discussed below.

3.4.1 Existing Land Use

Based upon information obtained from the City of Simi Valley, Department of Community Development(10), the amount of land currently devoted to specific uses has been estimated and is shown in Figure 3-5. Most of the developed land within the Study Area is located in the City of Simi Valley. The remainder of the Study Area is either devoted to agriculture or is undeveloped.

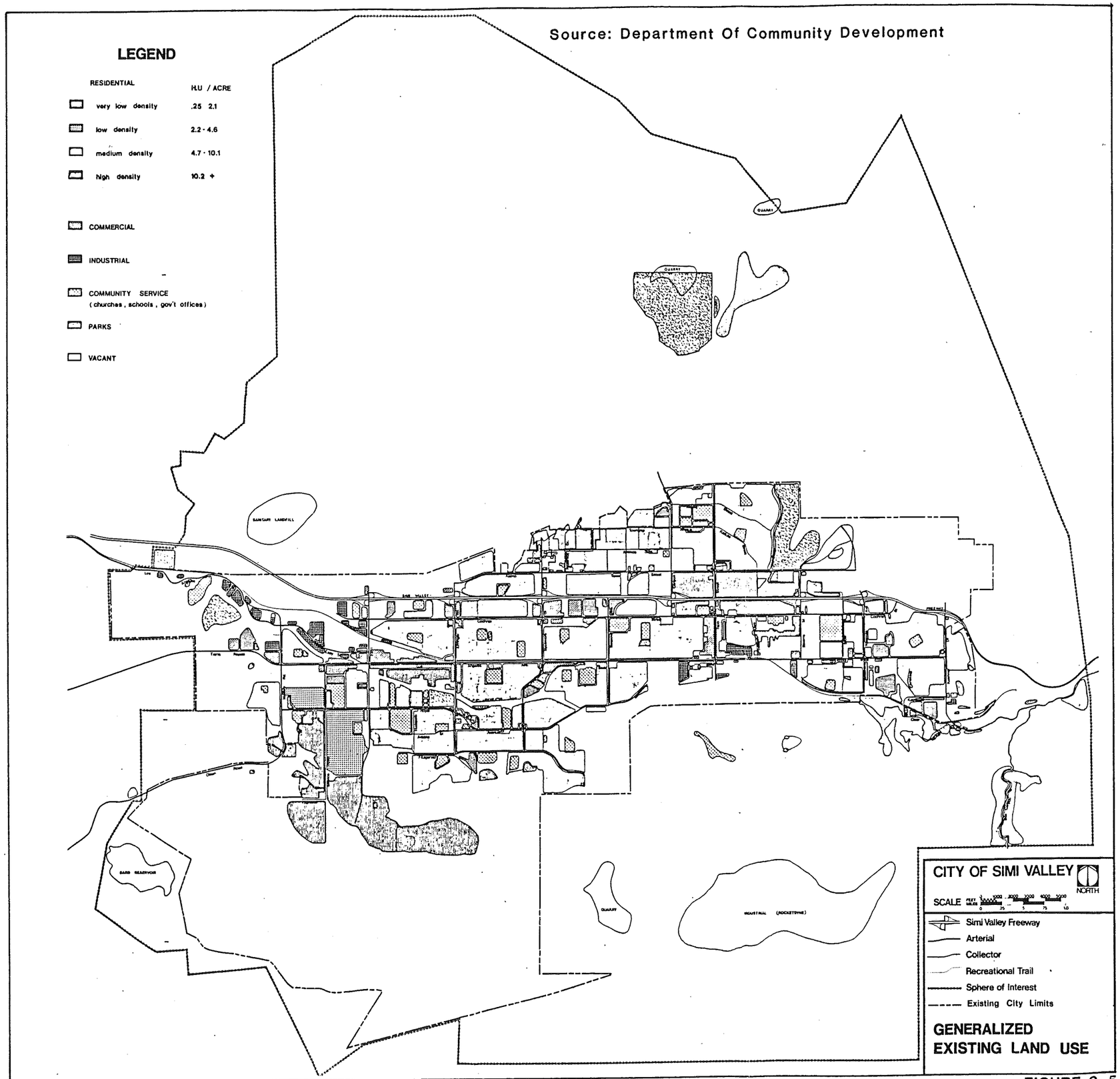

Source: Department Of Community Development
LEGEND
RESIDENTIAL
H.U / ACRE
very low density .25 2.1
low density 2.2 - 4.6
medium density 4.7 - 10.1
high density 10.2 +
COMMERCIAL
INDUSTRIAL
COMMUNITY SERVICE
(churches , schools , gov't offices)
PARKS
VACANT
SANITARY LANDFILL
QUARRY
INDUSTRIAL (ROCKETDYNE)
CITY OF SIMI VALLEY
NORTH
SCALE
Simi Valley Freeway
Arterial
Collector
Recreational Trail
Sphere of Interest
Existing City Limits
GENERALIZED
EXISTING LAND USE

FIGURE 3-5

Residential Uses. The Simi Valley residential land use patterns are typical of a suburban Southern California City. As of May, 1983, there were an estimated 24,715 dwelling units in the City. These units include the following mix of housing types.

Type	Units	Percentage
Single Family Detached	21,743	88.0
2-4 Units/Building	1,181	4.8
5+ Units/Building	940	3.8
Mobil Homes	849	3.4

Source: City of Simi Valley - Department of Community Development(11)

It has been estimated from recent aerial photos that an additional 300 units are located within the Study Area but outside of the Simi Valley City Limits. Most of these additional units are large-lot, single-family, detached type.

Commercial Uses. Commercial land uses in the Study Area are concentrated along Los Angeles Avenue; in the vicinity of Cochran Street and Erringer Road; in the vicinity of Cochran Street and Sycamore Drive; along Tapo Street between Cochran Street and Los Angeles Avenue; and at neighborhood shopping centers scattered throughout the developed areas. As of September, 1982, the City's Department of Community Development(10) estimated that approximately 396 acres of land were devoted to commercial uses,

most of which was general commercial in nature. This acreage accommodates some 2.6 million square feet of commercial building space in 345 separate projects. It is important to note that nearly 20% of the total commercial square footage was developed during 1982.

Industrial Uses. Existing industrial developments are found predominantly north of Los Angeles Avenue between First Street and the SVCSD Water Quality Control Plant. Newer and, to date, only partially occupied industrial development is located south of Los Angeles Avenue, both east and west of Tapo Street. In addition, 410 acres in the southern portion of the Study Area are devoted to the Rocketdyne facility. The City's Department of Community Development(10) estimates that as of September, 1982, 266 acres of industrial land had been developed within the city, consisting of some 1.86 million square feet of industrial building space. Of this, in excess of 35% was constructed in 1982.

3.4.2 Future Land Use

Future land use in the Simi Valley, as in any city in California, is guided by a comprehensive general plan which sets forth the goals, policies, standards and plans for the physical, social, and economic development of a community. The City of Simi Valley adopted its first General Plan in 1972, and subsequently approved the first full-scale update of that plan in May, 1980(12). The County of Ventura has adopted the Simi Valley General Plan for those areas which are outside of the City but within the Simi

Valley Planning Area. Therefore, the Simi Valley General Plan guides all land use within the Study Area.

It is the City's intention to undertake a full scale update of the General Plan approximately every five years so that the City's position, goals and policies can be reassessed. In addition, California law permits a General Plan to be amended upto ~~three~~ 4 times in a calendar year. Thus, the General Plan cannot be considered as a static road map of community development, but rather it is a dynamic planning guide.

Anticipated future land uses directly impact the planning of wastewater facilties, particularly sewers. Given the combination of the relatively long life of sewerage facilities and the dynamic nature of land use plans, it is necessary to anticipate development trends and plan sewerage facilities for generalized future conditions, allowing reasonable flexibility for future changes.

The present General Plan for Simi Valley is summarized in Figure 3-6. It is based upon the original plan adopted in 1972, and it is designed to deal with several new trends and issues, which have emerged both locally and nationally in the 1970's, and which impact land use in Simi Valley(12).

In the early 1970's, substantial land was still undeveloped on the valley floor, and there was little pressure to develop in the

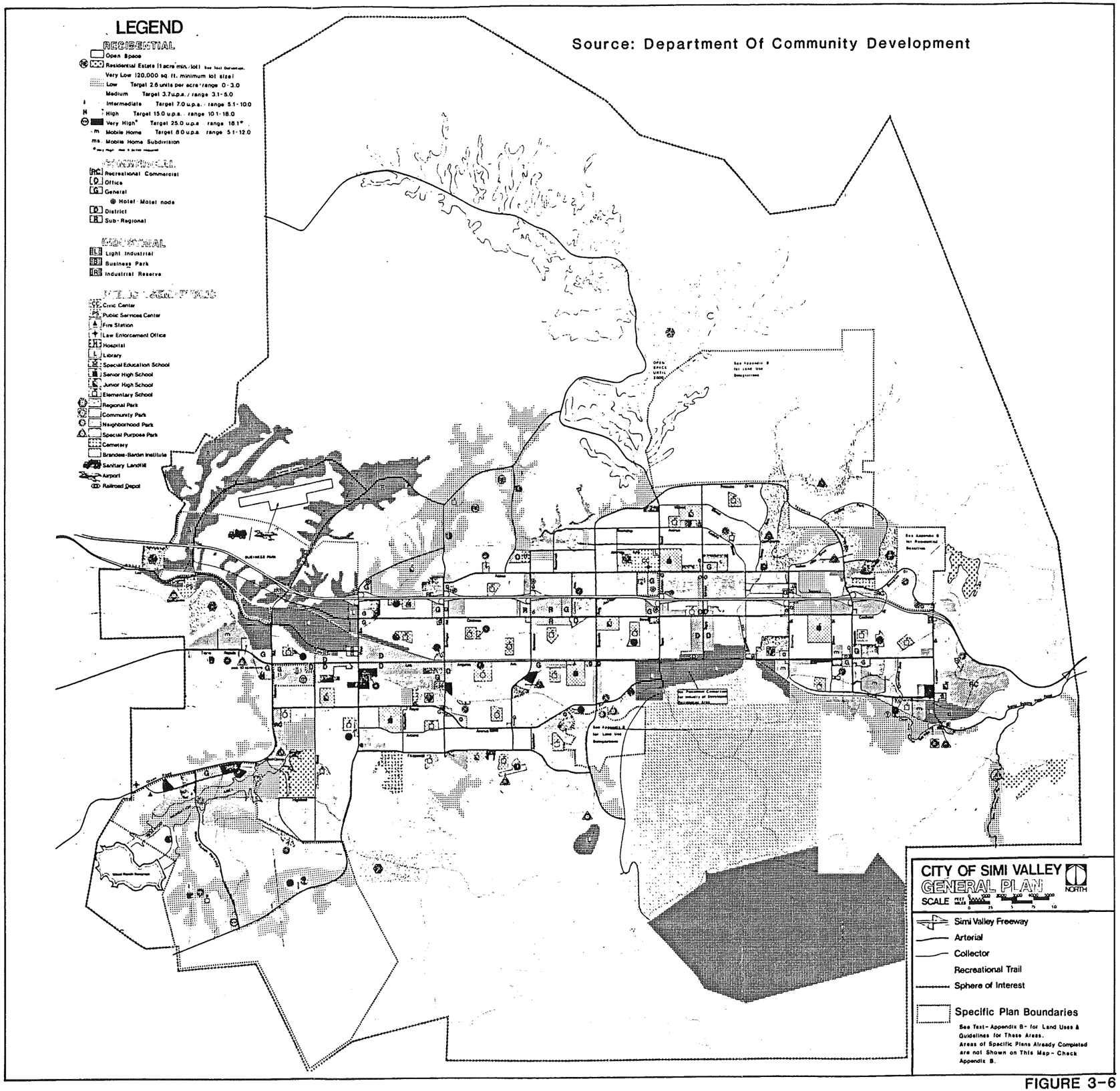

LEGEND
RESIDENTIAL
Open Space
Residential Estate (1 acre min. lot)
Very Low 120,000 sq. ft. minimum lot size
Low Target 2.6 units per acre range 0 - 3.0
Medium Target 3.7 u.p.a. range 3.1 - 5.0
Intermediate Target 7.0 u.p.a. range 5.1 - 10.0
High Target 15.0 u.p.a. range 10.1 - 18.0
Very High* Target 25.0 u.p.a. range 18.1*
Mobile Home Target 8.0 u.p.a. range 5.1 - 12.0
Mobile Home Subdivision
Recreational Commercial
Office
General
Hotel - Motel node
District
Sub - Regional
INDUSTRIAL
Light Industrial
Business Park
Industrial Reserve
Civic Center
Public Services Center
Fire Station
Law Enforcement Office
Hospital
Library
Special Education School
Senior High School
Junior High School
Elementary School
Regional Park
Community Park
Neighborhood Park
Special Purpose Park
Cemetery
Brandeis-Bardin Institute
Sanitary Landfill
Airport
Railroad Depot
Source: Department Of Community Development
CITY OF SIMI VALLEY
GENERAL PLAN
NORTH
SCALE
Simi Valley Freeway
Arterial
Collector
Recreational Trail
Sphere of Interest
Specific Plan Boundaries
See Text - Appendix B - for Land Uses & Guidelines for These Areas.
Areas of Specific Plans Already Completed are not Shown on This Map - Check Appendix B.

FIGURE 3-6

outlying canyon areas. By 1979, approximately 80% of the land on the valley floor had been developed or committed for development, and land in the outlying canyon areas was becoming more attractive for future development. This led to the adoption of Hillside Performance Standards, designed to maintain Simi Valley's natural backdrop. In addition, increased land costs have resulted in a trend towards higher density residential development. Together, these trends in residential development are expected to result in more intense development of older areas of the Study Area, with the gradual recycling of some land into higher densities.

As indicated in its text, the goals of the Simi Valley General Plan are:

- To provide a balanced community of all races, ethnic origins, creeds, age groups, different walks of life, diverse income levels, and wide ranging interests.

- To provide for its residents a good living environment including attractive, fully accessible, fully serviceable places to live, work and play.

- To accommodate a variety of land uses, and to achieve a balance of these land uses so that its residents may have the opportunity to work and shop in the community in which they live.

- To create and retain to the fullest extent feasible environmental and aesthetic assets consistent with economic realities and energy conservation.

- To create a community in which residents will take an active part in controlling their environment and, in so doing, will establish and maintain a continuing dialogue with the City's leadership.

The overall concept for future development in the Study Area is to concentrate the most dense and intense development on the valley floor with the density and intensity of land use generally decreasing in the outlying canyon and hillside areas. A more specific discussion of future land use by land use type follows.

Residential Uses. The General Plan lists ten separate residential land use designations. They are:

1. Open Space
2. Residential Estate
3. Very Low
4. Low
5. Medium
6. Intermediate
7. High
8. Very High

9. Mobile Home

10. Mobile Home Subdivision

Allowable densities range from 1 unit per 40 acres under the Open Space designation to in excess of 18.1 units per acre for the very high desgination. Each residential designation except for Open Space, Residential Estate, and Very Low Density has a target density. The target density is a standard which is expected unless a density bonus is granted.

The General Plan provides for the granting of density bonuses in order to provide an inducement for the achievement of City policies relating to design, afforable housing, and amenities. Density bonuses may be granted under the following conditions(10):

1. If a development contains provisions for low and moderate income housing, the number of dwelling units allowed at the target density may be exceeded to the degree that the development provides such housing. However, the range of the density category may not be exceeded except in the case of affordable housing for senior citizens as outlined in 2. below. The maximum density bonus will be given only for the provision of low and moderate income housing.

2. A density bonus may be awarded for the provision of smaller than normal sized units if these are

for senior citizens and include appropriate special design features. This bonus may exceed the maximum number of units allowed in the High Density and Very High Density residential ranges. The resulting intensity of land usage must be similar to that which could normally be expected in a family oriented development in High and Very High residential density ranges.

3. A density bonus may be awarded to encourage the provision of amenities which are of a community-wide value. Such a bonus shall be in direct proportion to the degree to which the whole community is benefited by the provisions of the amenity. Such amenities may include the provision of and full development of public parks over and above those normally required by the Parkland Dedication Ordinance, and recreational facilities currently in short supply in the community.

4. A density bonus may also be awarded to encourage design and architectural excellence in any development proposed.

5. In no case shall the awarding of density bonuses result in the maximum number of dwelling units allowed in the applicable density range being

exceeded, except as described in 2. above. These density bonus provisions shall not be construed as applying to any area not a part of a formal development application.

Thus, the above conditions provide for increases in residential densities considerably in excess of target densities. In addition, experience within the City since the adoption of the General Plan indicates that residential densities have increased locally through General Plan Amendments(10). Also of concern is recent State of California legislation which requires the granting of density bonuses up to 25% greater than maximum density when provisions are made for low income housing.

From information presented in the Housing Element of the General Plan, it has been estimated that approximately 52,500 dwelling units will be in place in the Study Area at ultimate development. This represents an approximate 12% increase in the estimated ultimate number of dwelling units published in the 1980 General Plan. This increase, according to staff, is due to density increases allowed by General Plan amendments adopted since 1980.

In this Study, an independent analysis was performed to determine the number of dwelling units at ultimate development. The General Plan map was reviewed to determine the number of residential units for each land use type. The total number of units was then

increased to allow for potential density bonuses. The increase for future density bonuses was determined using the following assumptions.

- Density bonuses will only be granted for land uses with densities greater than the low density designation.
- 50 percent of all developments with densities greater than the low density designation will develop to the target density.
- 25 percent of all developments with densities greater than the low density designation will develop at the maximum listed density.
- 25 percent of all developments with densities greater than the low density designation will achieve a density bonus of 25 percent over maximum due to provision for low income housing.

Using the above assumptions, it was estimated that approximately 52,100 dwelling units will be in place at ultimate development.

The housing mix at ultimate development, as published in the General Plan, is projected to be 78.8% single-family and 21.2% multiple family. If the trend toward an increase in residential density through General Plan Amendments and density bonuses continues, it can be expected that the residential mix at ultimate development will favor an even greater percentage of multi-family units.

Based upon Department of Community Development estimates, the Simi Valley Planning Area could yield an additional 28,430 dwelling units on the remaining undeveloped land. A complete breakdown of future residential development is presented in Table 3-3.

Commercial Uses. The General Plan divides the commercial land use designations into five categories. These are:

1. Subregional Center
2. District Center
3. General Commercial
4. Office Commercial
5. Recreational Commercial

The Department of Community Development staff(14) indicates that approximately 905 acres of commercial development will be in place at ultimate buildout. This area will be spread among the various commercial designations as shown in Table 3-4. It is expected that, by 1990, the market demand of the Study Area will be able to support a full range of commercial goods and services(12). Further, the General Plan concept is to have commercial facilities conveniently located to the area they serve, and to emphasize shopping centers over strip-type development.

TABLE 3-3

POTENTIAL RESIDENTIAL DEVELOPMENT
SIMI VALLEY STUDY AREA

RESIDENTIAL CATEGORY	ACRES	ASSUMED DENSITY	POTENTIAL UNITS
Low & Very Low	4,800	2.0	9,600
Medium & Intermediate	2,700	4.9	13,230
High	250	15.0	3,750
Very High	74	25.0	1,850
TOTAL			28,430

Source: City of Simi Valley, Housing Element of General Plan

TABLE 3-4

DISPOSITION OF COMMERCIAL LAND USE AT ULTIMATE DEVELOPMENT

DESIGNATION	ESTIMATED ACREAGE
General Commercial	227
District Commercial	350
Subregional Commercial	111
Office Commercial	25
Recreational Commercial	192
TOTAL	905

Source: Staff Communication, Department of Community Development

Industrial Uses. The General Plan lists three industrial land use designations. These are:

1. Light Industrial
2. Business Park
3. Industrial Reserve

It has been estimated that at ultimate development 4189 acres would be devoted to industrial uses. Of this total 2327 acres are part of the Rocketdyne facility, and, thus, they are in a separate classification due to its economic tie to the San Fernando Valley(12).

The City of Simi Valley has made a policy of actively encouraging industrial development in order to increase local employment opportunities for its residents. This policy is expected to continue and is evidenced by the recent increases in industrial development.

Other Uses. Other land uses include those associated with community services such as schools, parks, and churches. It is anticipated that such uses will develop at a rate consistent with overall community growth.

3.4.3 Population

Estimates of future population are necessary in order to tailor improvement programs to meet future community needs. A knowledge of the historical rate of population growth forms the foundation

for future growth and can assist the planner in developing projections.

Historical Population. Since the 1940's, the rate of growth in Ventura County has exceeded the average for the State. In fact from 1960 to 1970 the population of Ventura County increased by 89 percent. The recent growth in the County has been centered in the southeastern portion, of which the Study Area is a major part.

The Simi Valley has experienced a full ten fold population increase since 1960. In 1960, the population of Simi Valley was estimated at 8,100. As of June 1, 1983, the population of the area was 85,371 as published in the City's Department of Community Development Population and Housing Memo(11). The projected population for the Simi Valley Growth Area is well established. The City of Simi Valley uses the population projections established by the 208 Water Quality Management Plan(15) and Air Quality Maintenance Plan(9) for Ventura County. A summary of this population projection is presented in Table 3-5.

The currently available population projections do not extend beyond the year 2000. For the purposes of this study, it was necessary to project population to the year 2010. This was accomplished by extending the 1985-2000 rate of population growth to the year 2010.

TABLE 3-5

POPULATION FORECAST

YEAR	SIMI VALLEY GROWTH AREA	VENTURA COUNTY
1985	91,200	612,266
1990	103,000	676,706
1995	112,000	736,016
2000	122,000	811,305
2010	145,000[1]	--

Source: County of Ventura, Resource Management Agency

1. Based upon a projection of 9% population increase per each five years through the year 2010.

Horizon Population. The horizon or saturation population is the resident population that can be expected at ultimate buildout of the Study Area. As indicated under the future land use discussion, it is estimated that at ultimate development approximately 52,500 dwelling units will be in place in the Study Area. The number of people that these units will house will depend upon the household characteristics. At present, the Study Area has an average household size of 3.32 persons(13). This is a decrease of 0.95 persons from 1970 when the average household size was 4.25 persons(12), and it reflects the ongoing trend toward smaller households(13). The above, coupled with the previously discussed trend toward multi-family developments at higher densities, makes estimation of the horizon population difficult at best.

For the purposes of this study, it has been assumed that future decreases in household size will be balanced by the trend toward higher density developments. Thus, the horizon population is estimated to be 173,250.

Summary. A summary of the historical and projected population for the Simi Valley Planning Area is presented in Table 3-6.

3.4.4 Commerce and Industry

The rapid population increase in the Simi Valley since 1960 has been followed by commercial and industrial development. Data

TABLE 3-6

HISTORICAL AND PROJECTED POPULATION SUMMARY
SIMI VALLEY PLANNING AREA

YEAR	POPULATION
1970	62,250
1975	72,570
1977	75,250
1980	81,000
1983 (June)	85,371
1985	91,200
1990	103,000
1995	112,000
2000	122,000
2010	145,000
ULTIMATE	173,250

on recent commercial and industrial development indicate that such activities are presently proceeding at the fastest rate in the area's history and reflect the City's attitude of encouragement toward commerce and industry(10). The City of Simi Valley is committed to the preservation of its present and newly developed economic base and is actively attempting to attract new commercial and industrial development. These efforts are aimed at not only expanding the City's tax base, and reducing retail sales leakage to adjacent communities, but they are also pointed toward the provision of local jobs for the community's residents. The Simi Valley's proximity to major metropolitan markets, the expansion of local purchasing power, the quality of the local labor force, the extension of Route 118, and the local government's attitude toward growth are indicators of the development potential which can be expected to foster an increase in local commerce and industry.

3.4.5 Education

Public education within the Study Area is under the jurisdiction of the Simi Valley Unified School District. In 1982, the district operated twenty-three elementry schools, four junior high schools, two senior high schools and two continuation schools, and one adult education facility(13). As in many communities in Southern California, decline in enrollment and budget constraints will force the closure of several schools in the near future. In addition to the public schools, a number of private schools,

mostly church related, are located in the Study Area. The demand for private school alternative education seems to be on the increase. One Junior college and two colleges are located nearby.

3.4.6 Parks and Recreation

The Rancho Simi Recreation and Parks District is responsible for park and recreation related matters in the Study Area. The District provides a full range of community recreation services through its several parks, swimming pools, and golf courses.

3.4.7 Transportation

Access to the Study Area via highway is provided principally by the Simi Valley - San Fernando Valley Freeway. Connection to U.S. Highway 101 is also possible via county roads.

Simi Valley Transit operates the public tansportation in the Study Area. The transit district operates five 45-passenger buses and one 15-passenger van. The system functions on four fixed routes, two of which exist entirely within the valley and the remaining two routes connect Simi Valley with both the San Fernando Valley and Moorpark, including Moorpark College.

3.4.8 Institutions

In the Study Area, management of water quality involves the coordination of several institutions. The relationships and jurisdiction of the wastewater planning and management agencies must be understood in order to understand the wastewater facilities needs of the community.

Simi Valley County Sanitation District. The Simi Valley County Sanitation District was formed in 1968 under the provisions of the Health and Safety Code of the State of California. The City of Simi Valley Council sits as the SVCSD's Board of Directors to govern the District. At the time of formation, wastewater services were provided to approximately 60 percent of the area through two private sanitation companies. The SVCSD has purchased both of these companies and is currently responsible for all wastewater services in the area.

City of Simi Valley. The City of Simi Valley is the only municipality in the Study Area and contains in excess of 95 percent of the area population. As previously indicated, the City presides over the functions of the SVCSD.

RWQCB. The California Regional Water Quality Control Board - Los Angeles Region is one of nine regional boards in California. The RWQCB sets up standards and regulates the discharge of effluent to ground and surface waters in the Study Area. The Board also has regulatory powers concerning water reclamation and reuse.

County of Ventura. Along with the City of Simi Valley, the County of Ventura has planning and zoning authority in the Study Area. It is anticipated that within the Study Area, planning and zoning responsibilities will fall under the City's jurisdiction through incorporation of adjacent lands.

CHAPTER 4

WATER AND WASTEWATER CHARACTERISTICS

CHAPTER 4

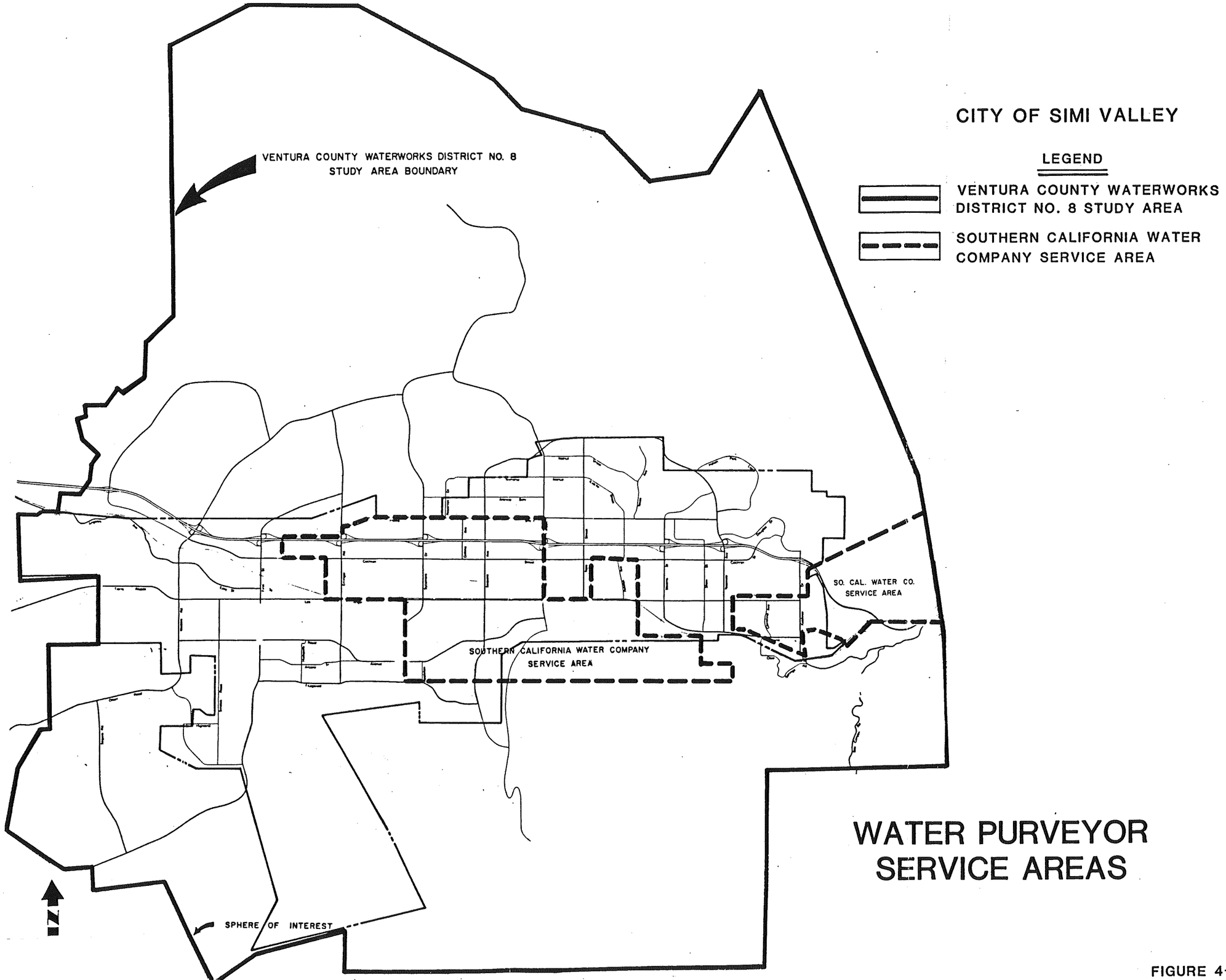
WATER AND WASTEWATER CHARACTERISTICS

In order for a sewerage system to meet the needs of its service area, it must be able to collect the sewage from the point of origin and convey it to the treatment facility. At the treatment facility, treatment processes must be employed which will produce an effluent which meets the discharge requirements. It is essential to have a firm grasp of the sewage quality and quantity characteristics, so that facilities can be properly designed. As the sewage quality and quantity is a direct function of the community's water supply, the characteristics of the potable water supply are also important. This chapter contains an examination of the existing and projected characteristics of the water and wastewater in the Study Area.

4.1 WATER SUPPLY CHARACTERISTICS

Water is supplied to the Study Area by two principal purveyors. These are Ventura County Waterworks District No. 8 and the Southern California Water Company. The Service Area of each purveyor is shown in Figure 4-1.

Ventura County Water Works District No. 8 (District No. 8) presently serves 54,481 acres in the Simi Valley(19). Water is received from two sources. Nearly 98 percent of District No. 8's supply is purchased from



WATER PURVEYOR SERVICE AREAS

FIGURE 4-1

the Calleguas Municipal Water District through the Metropolitan Water District (MWD) System. The MWD water is imported from Northern California and treated at the Jensen Water Treatment Plant prior to delivery to Ventura County. The remaining 2 percent of District No. 8's supply is from the Topo Canyon Well Field. Staff reports that the local water is treated via softening, chlorination and aeration, and it is blended 1:4 to 1:8 with MWD water when distributed(20).

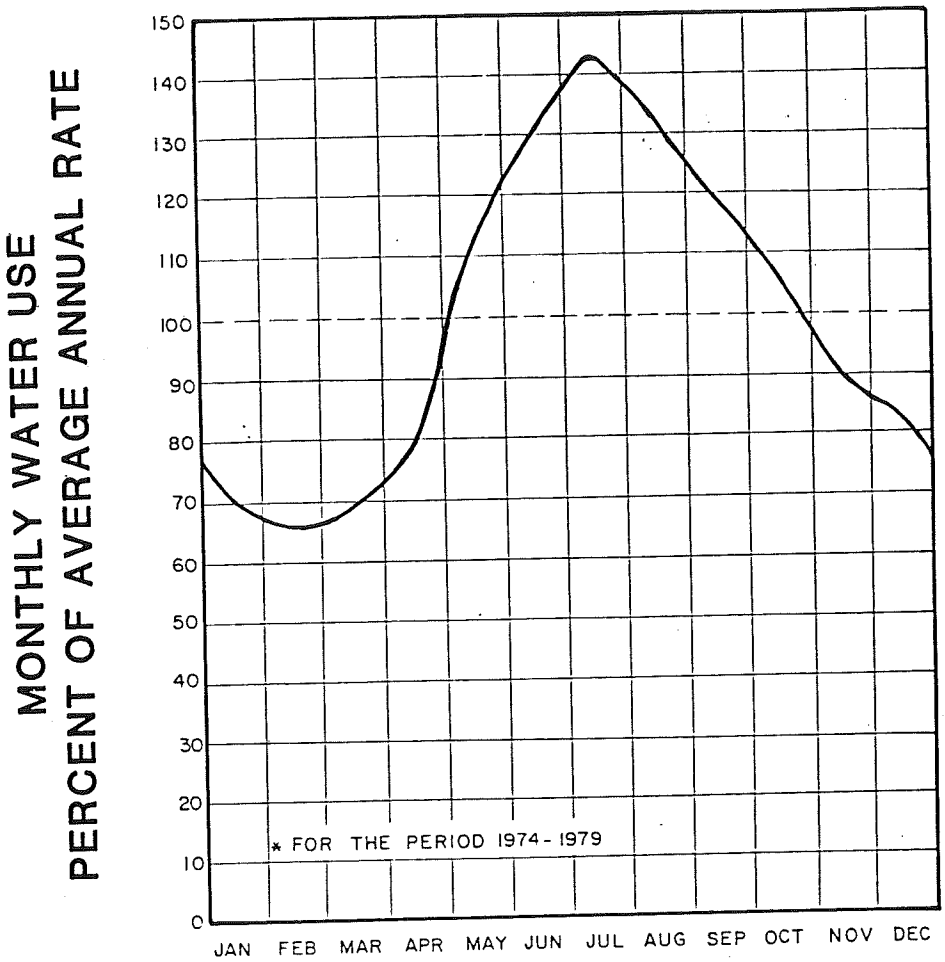
The Southern California Water Company (SCWC) also provides water to a portion of the Study Area. All of the SCWC water is received from the Calleguas Municipal Water District through the MWD system.

4.1.1 Water Supply Quantity

Water usage in the Study Area varies considerably during the year with the peak use occurring during the summer months due to an increased need for irrigation. The average monthly variation for District No. 8, as presented in the Master Plan for the District(19), is shown in Figure 4-2. This indicates that peak water usage occures in July and that minimum water usage occures in February.

The quantity of water supplied to the Study Area during the period of 1980-1982 is presented in Table 4-1. Using this data and the data presented in Table 4-2, it is possible to estimate the annual per capita water usage. Excluding agriculture, the average annual per capita water usage for 1980-1982 was approximately 190 gallons per capita per day (gpd). Assuming that the minimum winter per

AVERAGE MONTHLY VARIATION OF WATER USE



SOURCE: WATER SYSTEM MASTER PLAN
WATERWORKS DISTRICT NO. 8 MAY , 1981

FIGURE 4-2

TABLE 4-1

HISTORICAL WATER SUPPLY

SOURCE	1980	1981 (In Acre-Feet/Yr.)	1982
Ventura County Water Works District No. 8			
Local	249	392	226
Imported[1]	10,853	12,250	11,882
Southern California Water Company			
Local	-0-	-0-	-0-
Imported	5,546	6,390	6,100
Total	16,648	19,032	18,208

1. Approximately 2% of the water imported by District No. 8 is used for agriculture.

TABLE 4-2

MONTHLY VARIATION OF WATER USE

MONTH	PERCENT OF TOTAL ANNUAL PRODUCTION*		
	MINIMUM	MAXIMUM	AVERAGE
January	4.5	6.8	5.8
February	4.2	7.5	5.4
March	5.0	6.4	5.7
April	5.1	8.2	6.5
May	6.5	11.3	9.4
June	9.3	12.1	10.9
July	10.8	13.4	12.1
August	9.0	12.5	11.1
September	7.4	11.7	9.9
October	7.0	10.2	8.8
November	6.5	8.3	7.5
December	5.6	7.9	6.9
Maximum Month	10.8	13.4	12.1

*Based on water production records for 1974-1979

Source: Water System Master Plan Waterworks District No. 8, May, 1981.

capita usage approximates the normal water use which reaches the sewer, the gross per capita sewage contribution is estimated to be 101 gpd.

4.1.2 Water Supply Quality

The water supply to the Study Area consists of in excess of 98% imported water and less the 2% local supply. The imported water is provided via the Jensen Water Treatment Plant, and it has the water quality characteristics shown in Table 4-3. The local water supply is received from the Tapo Canyon Well Field, Well No. 31. The results of an analysis of the local water are presented in Table 4-4. Although the overall quality of the local water supply is somewhat less than that of the imported water, it is not supplied in sufficient enough quantity to effect the overall water supply quality.

4.1.3 Future Water Use

In the future, total water demand in the Study Area will continue to be dependent upon population growth and increases in commercial and industrial development. The present per capita water contribution to the sewage system is typical of a Southern California city with a normal balance of residential, commercial, and industrial land uses. Thus, it is expected that the per capita contribution will prevail in the future.

TABLE 4-3
WATER QUALITY CHARACTERISTICS
JENSEN WATER TREATMENT PLANT EFFLUENT

Constituent		Concentration 1980[1]	1981[2]	1982[3]	AVG
Silica	mg/l	14.4	14.9	13.8	14.4
Calcium	mg/l	45	51	37	44
Magnesium	mg/l	18.7	19.1	16.4	18.1
Sodium	mg/l	47	48	55	50
Potassium	mg/l	3.1	2.9	2.7	2.9
Carbonate	mg/l	0	0	0	0
Bicarbonate	mg/l	133	134	120	129
Sulfate	mg/l	126	129	89	115
Chloride	mg/l	47	46	64	52
Nitrate	mg/l	1.15	0.88	2.35	1.46
Fluoride	mg/l	0.41	0.42	0.26	0.36
Boron	mg/l	0.27	0.30	0.29	0.29
Total Diss. Solids	mg/l	375	378	341	365
Total Hardness ($CaCO_3$). .	mg/l	203	205	160	189
Total Alkalinity ($CaCO_3$). .	mg/l	109	110	98	106
Free Carbon Dioxide	mg/l	1.7	1.7	1.5	1.6
H^+ Concentration	pH	8.12	8.12	8.11	8.12
Specific Conductance . . .	mmho/cm	624	623	592	613
Turbidity	TU	0.16	0.14	0.17	0.16
Temperature	^oC	15.4	14.9	14.4	14.9
% State Proj. Waters	%	100	97	100	99

1. Based on 10 months of data
2. Based on 8 months of data
3. Based on 7 months of data

TABLE 4-4

WATER QUALITY CHARACTERISTICS
WELL No. 31

CONSTITUENT		CONCENTRATION[1]
Calcium	mg/l	62
Magnesium	mg/l	32
Potasium	mg/l	--
Carbonate		--
Bicarbonate	mg/l	189
Chloride	mg/l	20
Sulfate	mg/l	271
Nitrate		--
Total Hardness	mg/l	285
Total Dissolved Solids	mg/l	653
H^+	pH	7.9
Specific Conductance		880

1. Sample of local water treatment plant effluent on Well 31 water taken June 3, 1981.

It is most likely that future increases in water demand will be met by increases in water importation. Presently, two projects are in the planning stages which, if implemented, will reduce the amount of imported water required for future development. The first is a plan for development of a City-wide wastewater reclamation project which would result in up to 4800 acre-feet per year of reclaimed wastewater usage in the Study Area(18). The second project is a groundwater demineralization project which would provide local groundwater for potable purposes(21).

not likely

4.2 WASTEWATER CHARACTERISTICS

The design of wastewater collection and treatment facilities are normally based on estimated waste loadings for some time in the future. In making such projections, it is required that unit quantities for the various components affecting both the volume and composition of the waste be determined. Since characteristics may vary from one community to the next depending on the economic and physical environment, it is important that unit quantities be based on conditions in the Study Area.

For the most part, quantity and quality criteria presented herein have been determined from existing records and measured conditions in the Simi Valley.

4.2.1 Wastewater Sources

In projecting the quantity and quality of wastewater to be generated from a community, it is important to know the sources from which the waste is generated. These sources include:

1. Residential
2. Commercial
3. Industrial
4. Institutional
5. Infiltration/Inflow

On a unit basis, each source generates a different quantity of wastewater. Therfore, unit wastewater generation values have been developed for each and are presented below.

Residential. A previous study conducted in 1975(17) established the per capita sewage contribution from domestic sources at 85 gallons per day in the Study Area. Similar analyses conducted as part of this study, indicate that the domestic per capita contribution is currently between 80 and 85 gpcd. A lowering of the per capita contribution is to be expected due to the widespread use of water-saving fixtures in new residences. This trend is expected to continue. Thus, domestic the contribution used herein is 80 gpcd.

As discussed in Chapter 3, the Study Area is composed predominantly of single family detached units, and the average household size of 3.3 persons. Based upon the household

characteristics data for Simi Valley(13) and other similar communities(22), the estimated residential sewage contribution by residential type has been calculated and is presented in Table 4-5.

Commercial. Commercial wastewater contribution can vary widely, depending on the type of commercial establishment. For example, during February and March of 1983, the Vons Market on Los Angeles Avenue had an average water use of 3,000 gallons per day whereas, the U.S. Post Office located on Galena Street had an average water use of 1600 gallons per day. Each is a similar size facility on a similar size parcel. Thus, in order to precisely determine wastewater flows from a commercial establishment, the type of commercial facility must be known.

At the planning level of analysis, it is not always possible to know what type of facilities will be constructed under the commercial land use designation. Traditionally, these flows have been projected on a unit area basis, such as gallons per day per acre (GPAD). Commercial flow factors reported in the literature range from 500 gpad to 160,000 gpad(23)(24)(25). Previous studies prepared for the SVCSD have used 1000 gpad for commercial areas(16)(17). In this analysis, four representative commercial centers were investigated as to their respective contributions to the sewer system. The results of this are presented in Table 4-6. For those centers analyzed, sewage contribution ranged from a low of 450 gpad to a high of 1550 gpad. This data tends to substantiate the average unit area contribution of 1000 gpad used

TABLE 4-5

ESTIMATED RESIDENTIAL SEWAGE CONTRIBUTION - SIMI VALLEY

Residential Type	Household Size (Persons)	Per Capita Contribution (gpd)	Unit Sewage Flow (gpd)
Single Family Detached	3.42	80	275
Single Family Attached	2.50[1]	80	200
Mobile Home	2.00[1]	80	160

1. Estimated from available data on the Simi Valley and other Communities in Southern California(13)(22).

TABLE 4-6

REPRESENTATIVE COMMERCIAL SEWAGE CONTRIBUTIONS - SIMI VALLEY

Type & Location	Approximate Area (acres)	Gross[1] Sewage Contribution (gpd)	Unit Sewage Contribution (gpad)
Gemco Center at Cochran & Erringer	10	4,485	450
Farmer's Insurance at Galena & Cochran	18	23,100	1,280
Mervins Center at Cochran & Sycamore	18	11,575	640
Ralph's Center at Syamore & L.A. Avenue	8	12,400	1,550

1. Based upon water use data from December 1982, through April 1983(26).

in previous studies. A unit rate of 1000 gpad is used in this analysis, and it is expected that this rate will remain valid through ultimate development.

Industrial. Like commercial sewage flows, industrial contributions depend on the specific type of industry. Previous studies of the SVCSD have established a unit flow rate of 1,800 gpad for industrial land uses(16)(17). A review of industrial water users in the Study Area substantiates this unit rate(27)(28).

A survey of other Southern California communities revealed unit area rates ranging from 1000 gpad to nearly 2200 gpad for assorted types of water using industries(30)(31)(32). Since it is anticipated that future industrial development in the Study Area is expected to be of the dry-type, the previously established unit area rate of 1800 gpad is considered appropriate at present, but it is expected to approach 1200 gpad by ultimate development.

Institutional. Land Uses devoted to community services such as schools, churches, and government offices are included under the institutional classification. Like commercial and industrial uses, the sewage generated depends upon type of institution. These are considered similar but less than the commercial type and have been estimated at 500 gpad for this study.

Infiltration/Inflow. Flow which is not intentionally introduced into the sewerage system by man is considered infiltration/inflow. An infiltration/inflow analysis was performed by Brown and Caldwell for the 1976 Project Report(17). Significant findings of that analysis include:

- The rate of infiltration as measured at the treatment plant was 0.18 mgd. This translates to an infiltration rate of 50 gpad on the basis of the area provided with sewer service in 1975.

- A direct storm inflow rate of about 1.60 mgd, equivalent to 460 gpad, was measured during the period of heavy rains in January, 1974.

- The rate of infiltration/inflow in the Simi Valley is low and considered appropriate for a relatively new and well maintained system.

In this study, a detailed field investigation of the sewer system was conducted during the extremely wet period from January through March, 1983. (See Chapter 5). The recent investigation revealed the following:

- Some evidence of infiltration was found in the west end of the valley, generally west of First Street, and in the east end of the valley,

generally east of Tapo Street and south of Los Angeles Avenue. This roughly corresponds to the portions of the Study Area where the depth to groundwater is less than 20 feet.

- Random observations made during the rainstorms of February and March, 1983, did not reveal any particularly troublesome flooding spots which could result in significant localized inflow.

- Direct inflow of stormwater is only signficant during major storms such as the storm of March 1, 1983, which resulted in a rainfall of 4.5 inches in a 24 hour period.

- Evidence suggests that after several consecutive days of moderate rainfall, infiltration and inflow combine to increase flow in the sewerage system. For example, during the month of January, 1983, average flow at the treatment plant during the first 15 days of the month was 7.72 mgd. During the last 16 days of the month, the average flow to the treatment plant was 8.49 mgd during a period when 7 days of precipitation produced a total of 5.65 inches of rain. (See Figure 4-3.)

SIMI VALLEY WATER QUALITY CONTROL PLANT

VARIATION IN WASTEWATER FLOW

JANUARY, 1983

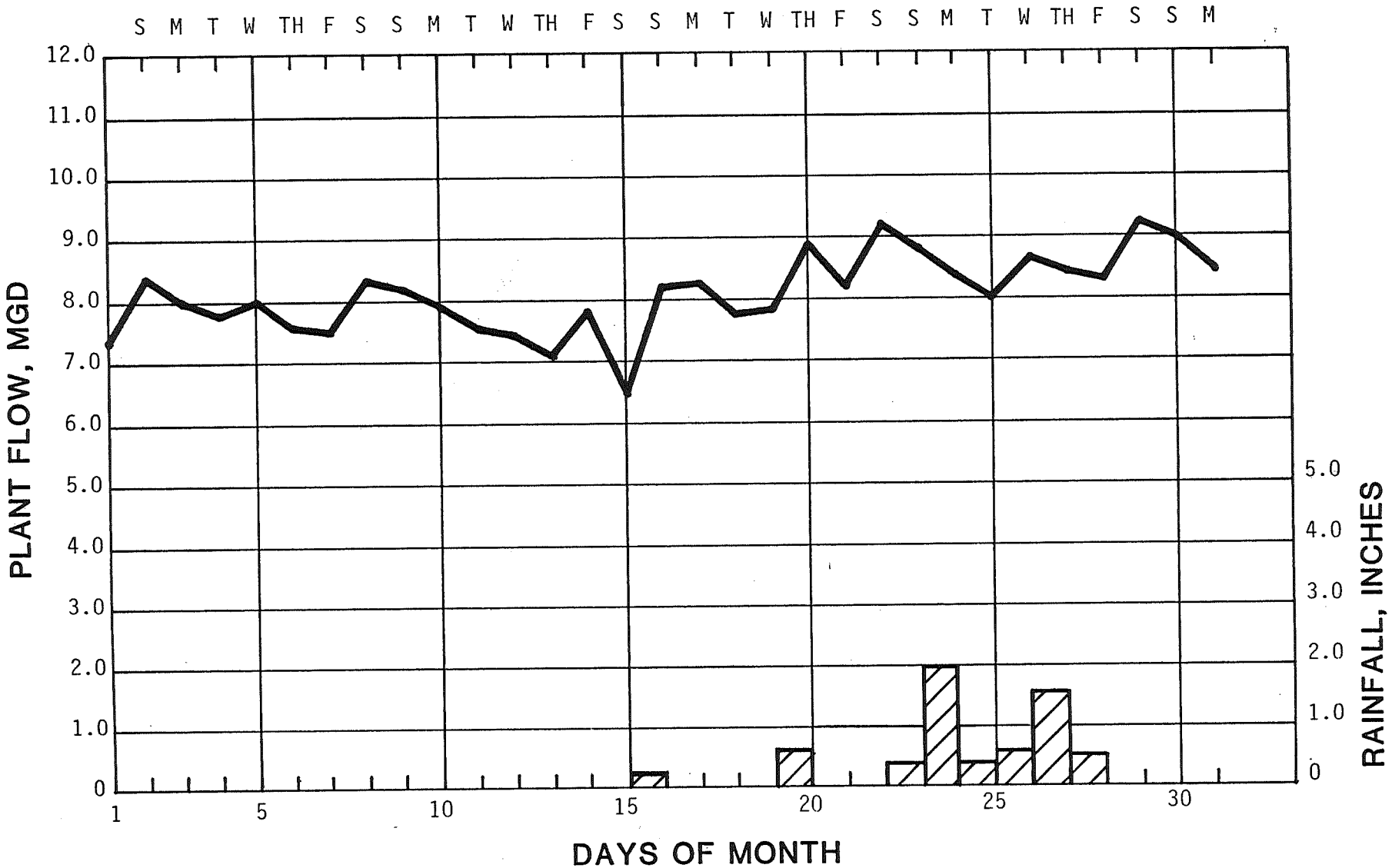


FIGURE 4-3

Considering the overall age and condition of the SVCSD sewerage system, it appears that the infiltration/inflow rates previously developed are still applicable. Most of the areas remaining to be developed are located outside of the areas of identified heavy infiltration. Only approximately 25% of the areas of heavy infiltration remain to be developed. Thus, based upon the previously developed data, an infiltration contribution at ultimate development of approximately 4 percent of average dry weather flow has been projected. It is felt that this rate will not result in an undue burden on the sewerage system and are well within the range of acceptable system performance.

4.2.2 Wastewater Volume

Recent historical wastewater flow data for the SVCSD system were developed as part of the Treatment Plant Assessment Report(33) and are presented in Table 4-7. These data indicate a steady increase in sewage flow over the past year, which is consistent with development activity.

Projections of future wastewater flows can be made from the basic population data presented in Chapter 3, along with the gross per capita sewage generation value. As discussed previously in this chapter, the gross per capita sewage contribution is estimated at 101 gallons per day. The projected average dry weather flow (ADWF) for the Study Area is presented in Table 4-8 and is based upon the following assumptions:

TABLE 4-7

RECENT HISTORICAL FLOW DATA
SIMI VALLEY WQCP

Month-Year	Average Daily Flow (mgd)
April 1982	7.93
May 1982	7.99
June 1982	7.97
July 1982	7.73
August 1982	7.71
September 1982	8.11
October 1982	8.16
November 1982	8.24
December 1982	7.90
January 1983	8.11
February 1983	8.50
March 1983	8.72
April 1983	8.79
May 1983	8.56

Source: Treatment Plant Assessment Report (33)

TABLE 4-8

PROJECTED AVERAGE DRY WEATHER
SEWAGE FLOW AT SIMI VALLEY WQCP

YEAR	AVERAGE DRY WEATHER FLOW[1] (mgd)
1985	9.20
1990	10.40
1995	11.30
2000	12.30
2010	14.60
Ultimate	17.50

1. Based upon established population projections and a unit sewage generation rate of 101 gallons per capita per day.

1. The residential, commercial and industrial growth within the community will balance over time to yield a gross sewage contribution of approximately 101 gallons per person per day.

2. The number of residential units in the Study Area not connected to the sewer system will be less than one percent of all residential units by 1990.

3. The open space areas, designated on the General Plan as not being developed until after the year 2000, will be developed at a gross density of 1 unit per 40 acres.

As indicated in Table 4-8, the average dry weather wastewater flow is projected to be 17.50 mgd at ultimate development. As this projection is based upon the population projections presented in Chapter 3, changes in land use and economic activity which result in a higher population, will also result in higher sewage flows.

4.2.3 Peak Flow Factors

Peak flows in a sewerage system occur due to normal diurnal flow variation and due to the combined effects of infiltration and inflow associated with wet weather conditions. Peaking factors vary with type of use and distance from the source of wastewater generation. Thus, they have been determined from actual measurements on both a local and Study Area wide basis.

System Peaking Factors. Peaking factors which are used to determine peak flows at the wastewater treatment plant are considered system peaking factors. These have been determined from historical flow data at the treatment facility and from flow measurements made approximatly 1/2 mile upstream of the treatment plant. (A detailed discussion of the flow measurement methods is presented in Chapter 5.)

In determining system peak dry weather flows (PDWF), flow records from the wastewater treatment plant from May through August 1982 were used. These data are presented in Figures 4-4 through 4-7. As expected for a "bedroom" community such as the Simi Valley, peak flows occur on the weekends with Saturdays being the highest. A summary of the PDWF data is presented in Table 4-9. These data indicate that the ratio of PDWF/ADWF ranged from 1.63 to 1.82 during the period of analysis. These peaking factors are within the range of 1.5-2.0 for dry weather flows reported in the literature(23)(24)(25). Flow measurements for a Saturday in February, 1983, following two days of very light rainfall revealed a peaking factor of approximately 1.8. For design purposes, a dry weather peaking factor of 1.8 is recommended.

More critical in the design of sewerage facilities is peak wet weather flow (PWWF). In this analysis, the wet weather season from September 1982 through May 1983 was studied. These data are presented in Figures 4-8 - 4-13. Fortunately, this period included two of the "wetest" months on record and provides an

SIMI VALLEY WATER QUALITY CONTROL PLANT

INFLUENT SEWAGE FLOWS

MAY 1982

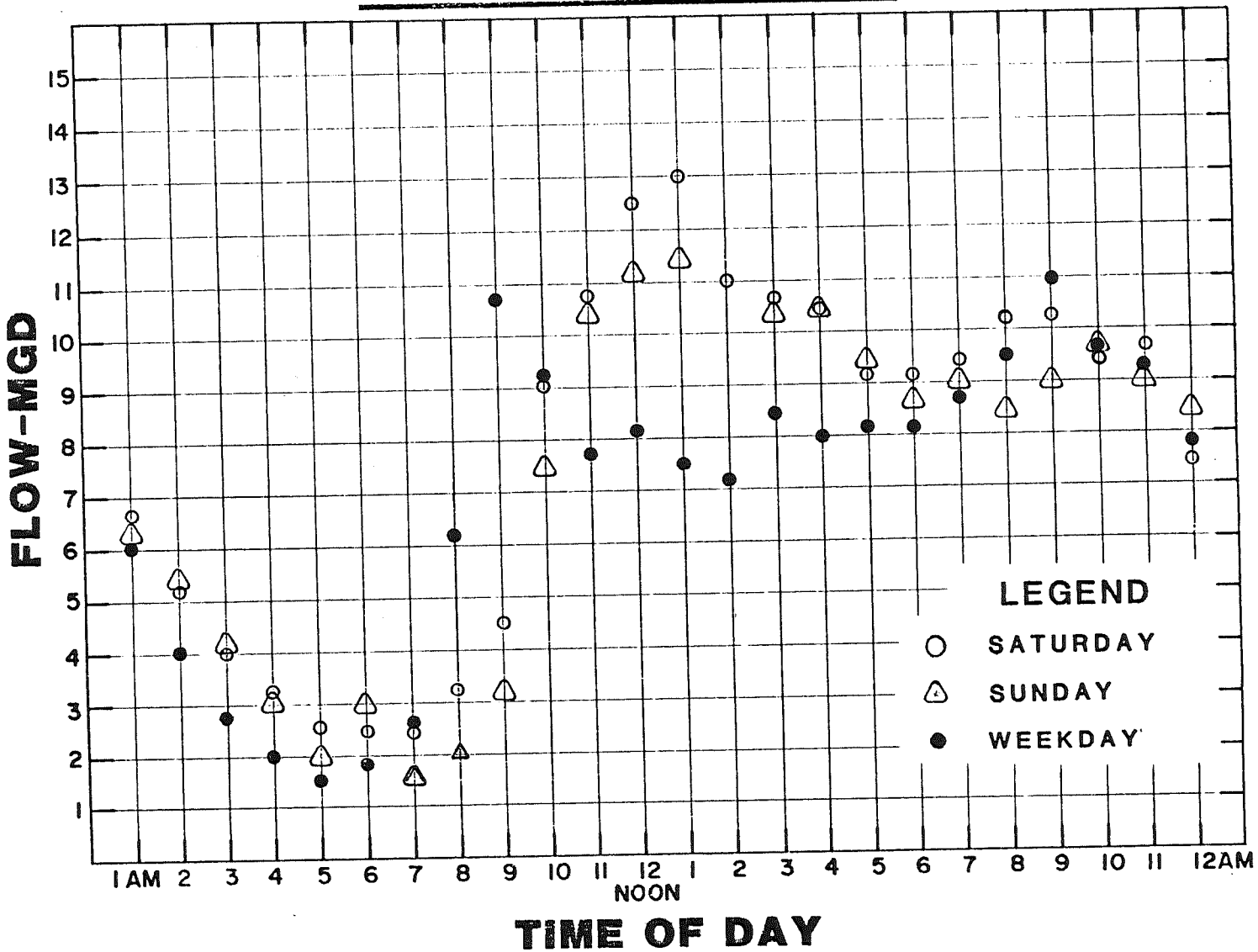


FIGURE 4-4

SIMI VALLEY WATER QUALITY CONTROL PLANT

INFLUENT SEWAGE FLOWS

JUNE 1982

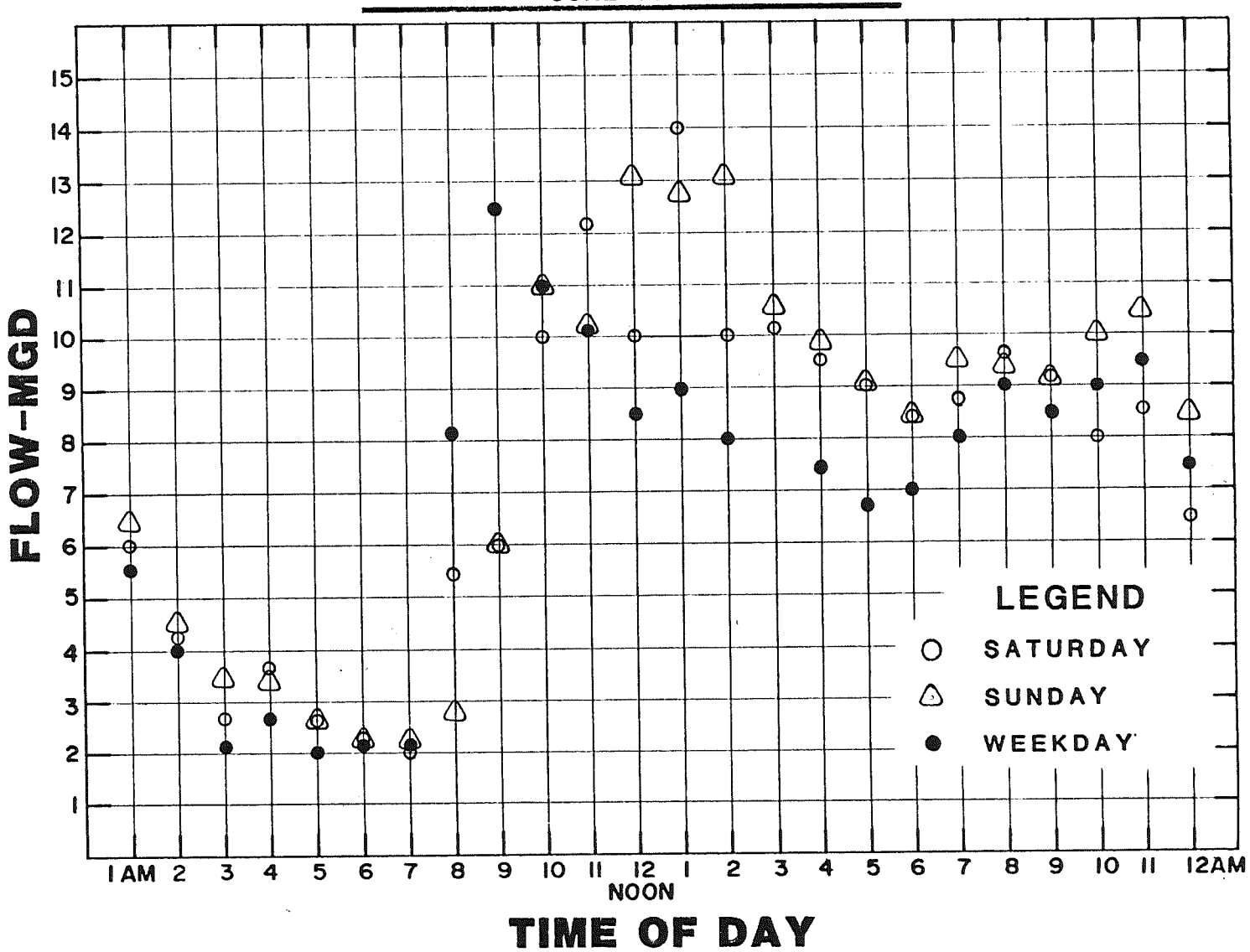


FIGURE 4-5

SIMI VALLEY WATER QUALITY CONTROL PLANT

INFLUENT SEWAGE FLOWS

JULY 1982

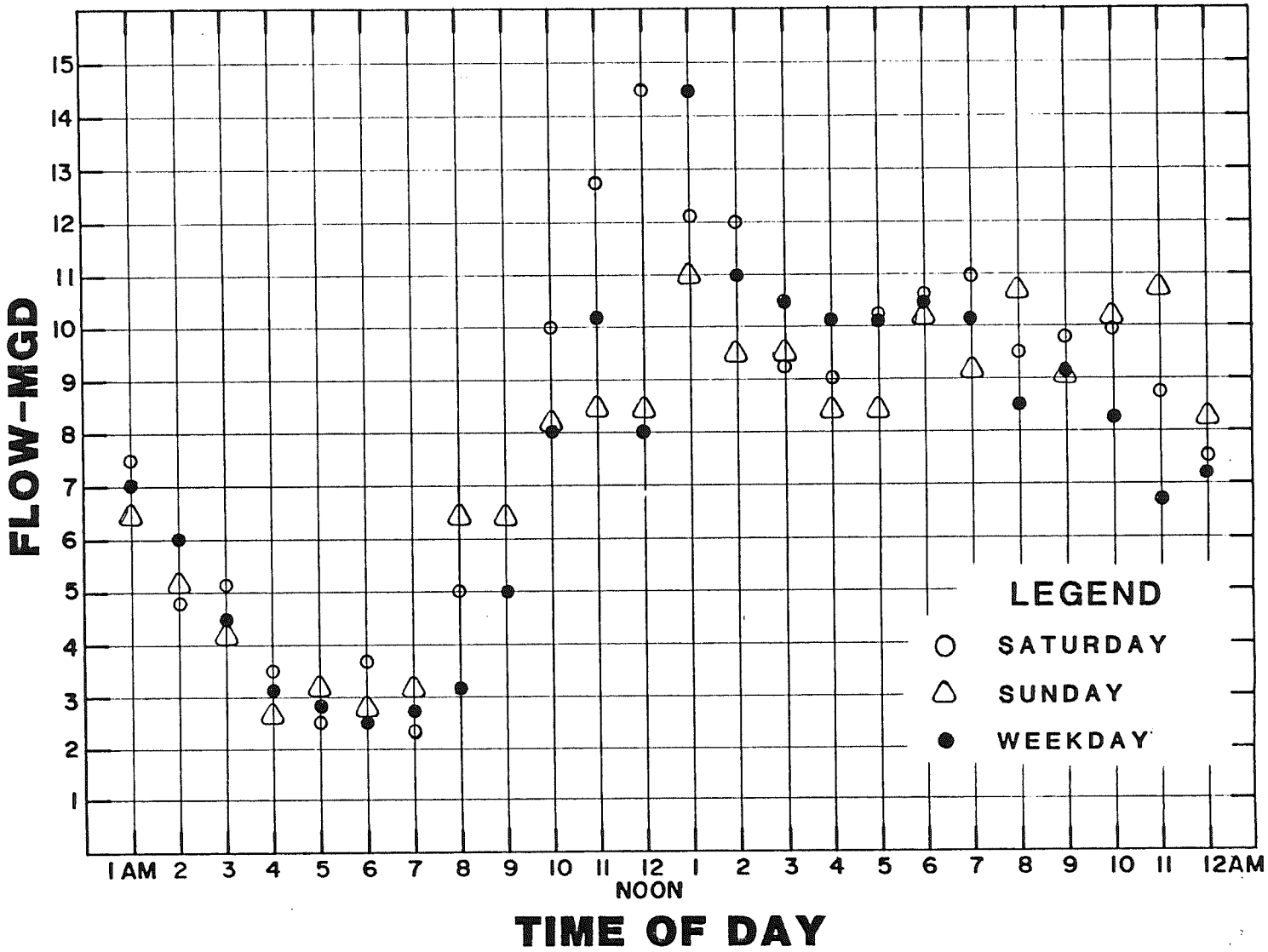


FIGURE 4-6

SIMI VALLEY WATER QUALITY CONTROL PLANT

INFLUENT SEWAGE FLOWS

AUGUST 1982

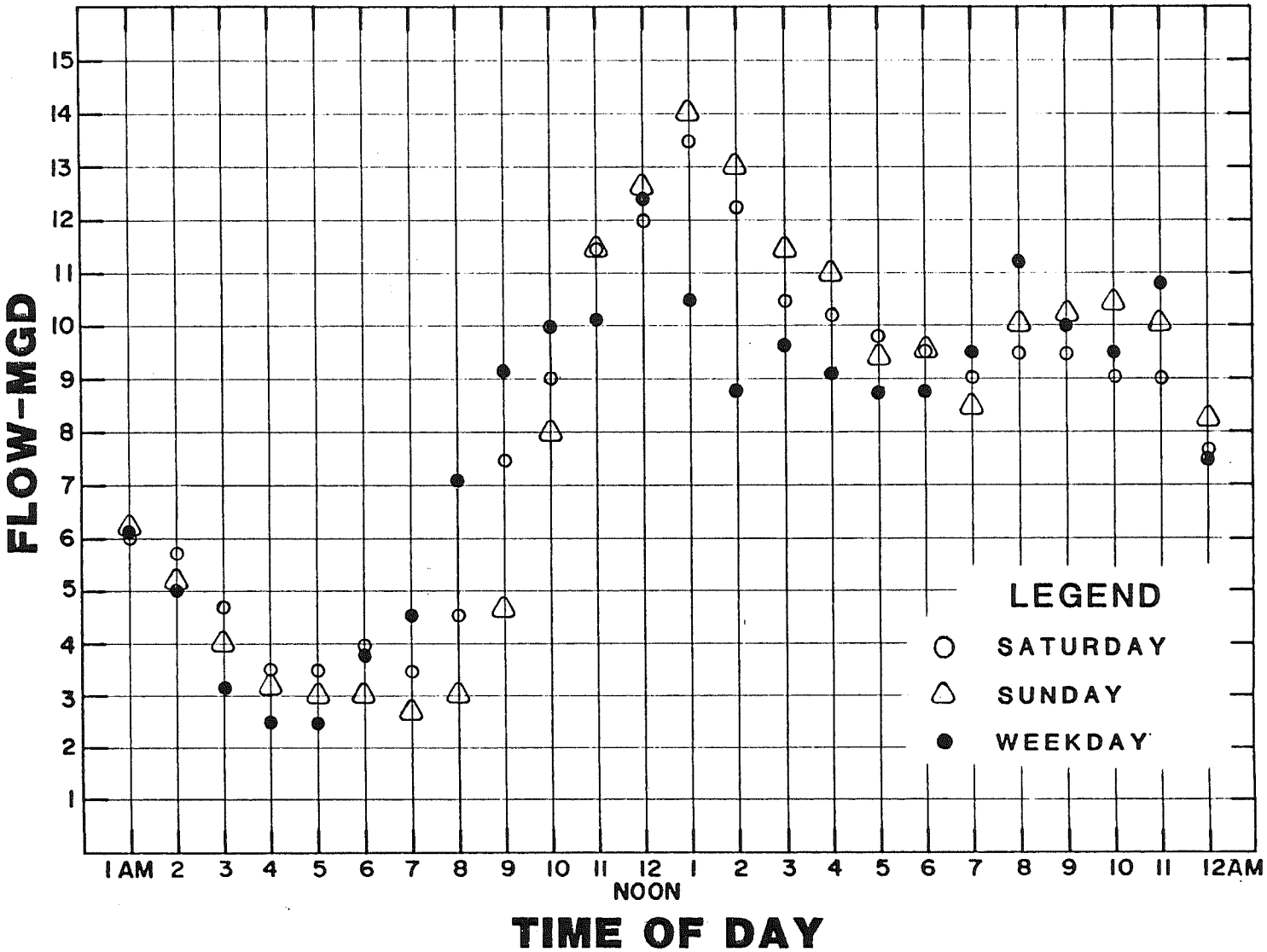


FIGURE 4-7

TABLE 4-9

SUMMARY OF PEAK DRY WEATHER FLOW DATA
SIMI VALLEY WQCP

Montn-Year	Total Precipitation (inches)	Average Daily Flow (mgd)	Recorded Peak Flow (mgd)
May 1982	0.06	7.99	13.0
June 1982	-0-	7.97	14.0
July 1982	-0-	7.73	14.0
August 1982	T	7.71	14.0

excellent data base. A summary of the PWWF data is presented in Table 4-10. These data indicate that the wet season peak flows resulted in PWWF/ADWF ratios ranging from 1.78 to 2.48.

Of particular interest is the peak flow of 20.7 mgd measured during the high intensity storm of February 28-March 1, 1983. This peak flow, which occurred on a Tuesday at approximately 8:00 am was the highest on record in the SVCSD system and represents conditions at the influent to the treatment plant. It should be noted that the plant flow meter, which measures flows at the effluent end of the plant, indicated a peak flow on the same day of 17.0 mgd. This suggests that some peak dampening may be occuring across the treatment plant at high flows and that influent peaks may be higher than those presently being recorded. Experience with other facilities indicates that this dampening phenomenon is to be expected and should increase with flow, depending upon the hydraulic capacities of the various plant components.

The PWWF ratios developed above were compared with other ratios reported in the literature(23)(24)(25). For a community the size of Simi Valley, the reported PWWF factors are well within the range of reported values. This is graphically represented in Figure 4-14.

As shown in Figure 4-14, the PWWF decreases as the service area population increases. If it is assumed that the SVCSD PWWF will

SIMI VALLEY WATER QUALITY CONTROL PLANT

INFLUENT SEWAGE FLOWS

SEPTEMBER 1982

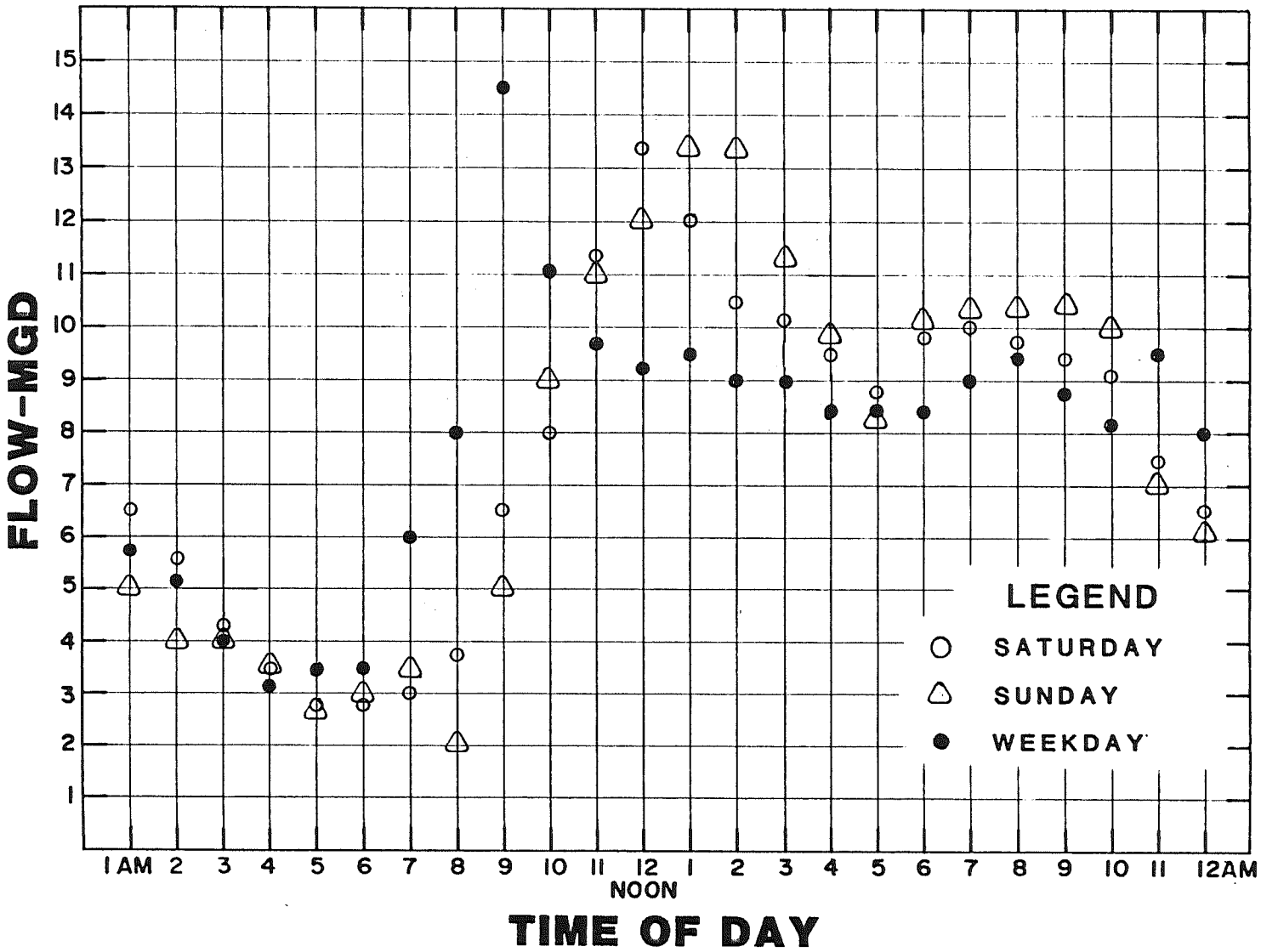


FIGURE 4-8

SIMI VALLEY WATER QUALITY CONTROL PLANT

INFLUENT SEWAGE FLOWS

OCTOBER 1982

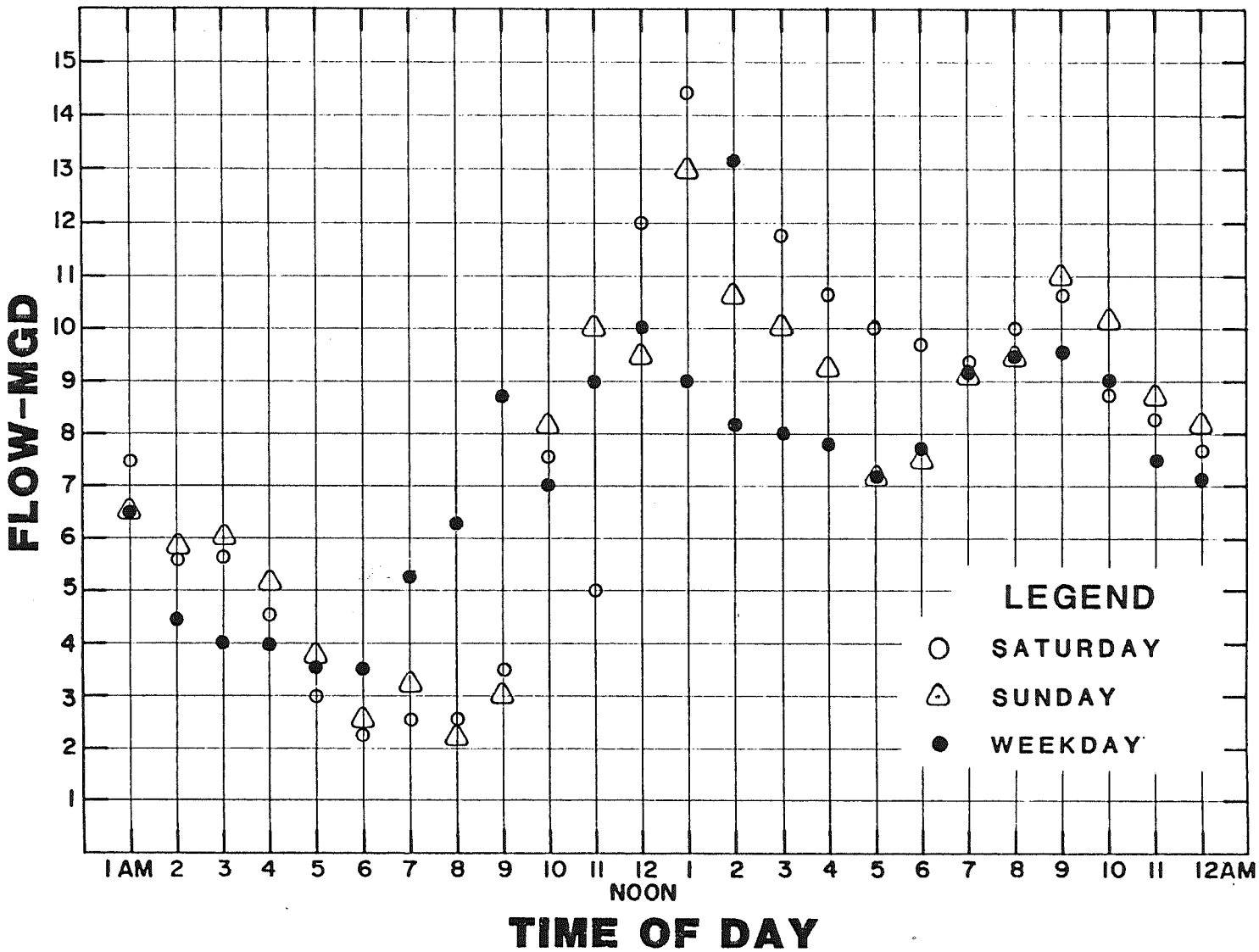


FIGURE 4-9

SIMI VALLEY WATER QUALITY CONTROL PLANT

INFLUENT SEWAGE FLOWS

NOVEMBER 1982

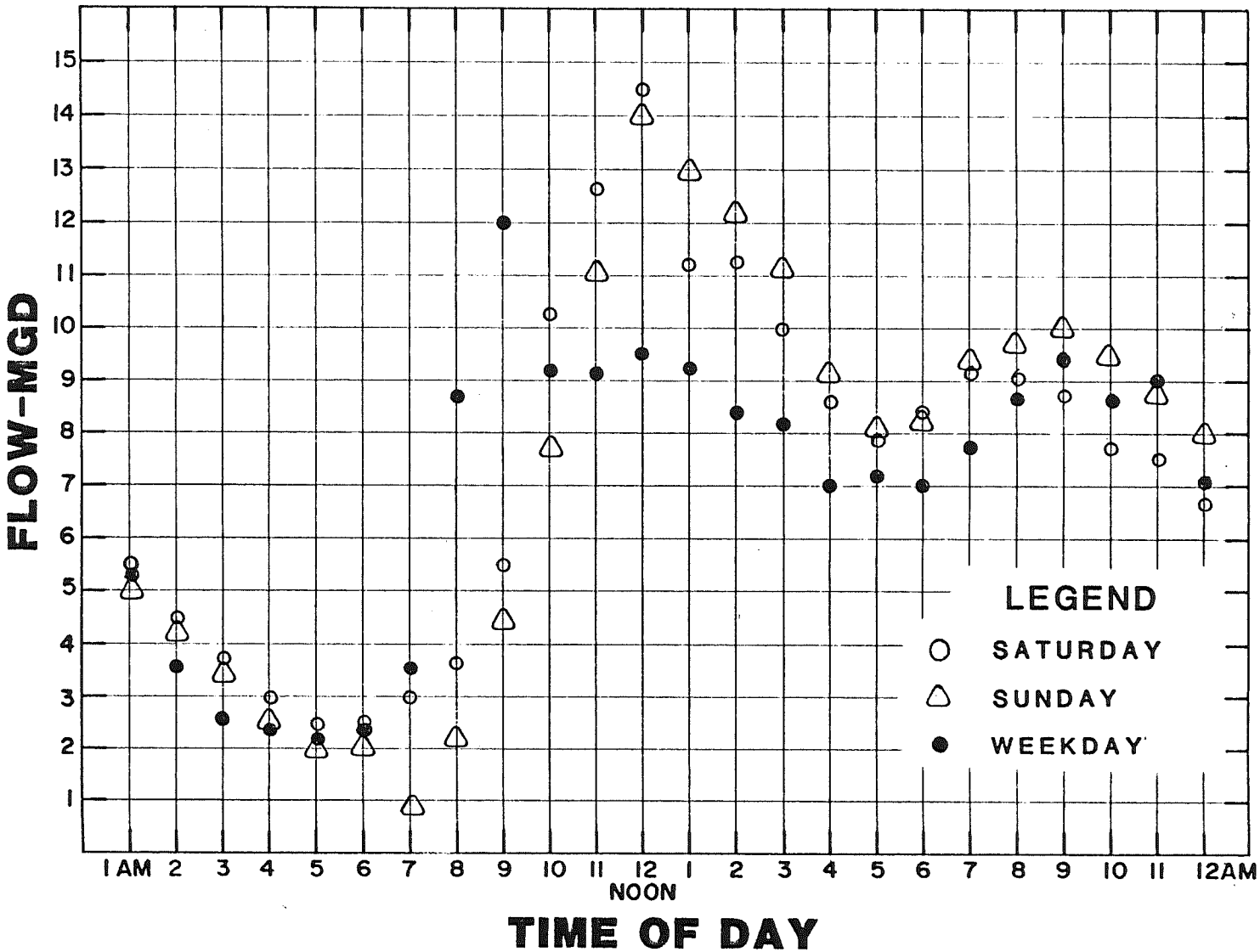


FIGURE 4-10

SIMI VALLEY WATER QUALITY CONTROL PLANT

INFLUENT SEWAGE FLOWS

DECEMBER 1982

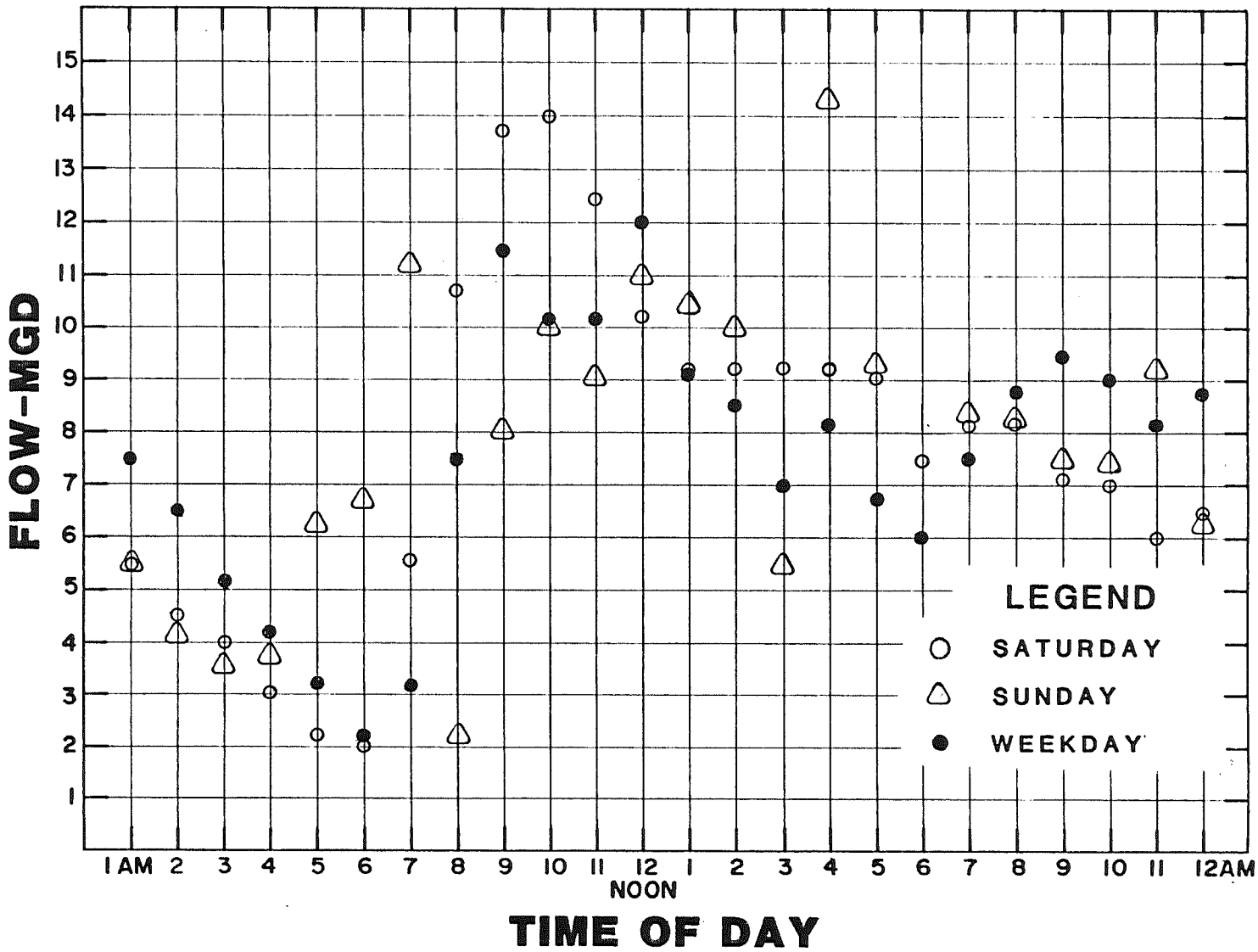


FIGURE 4-11

SIMI VALLEY WATER QUALITY CONTROL PLANT

INFLUENT SEWAGE FLOWS

JANUARY 1983

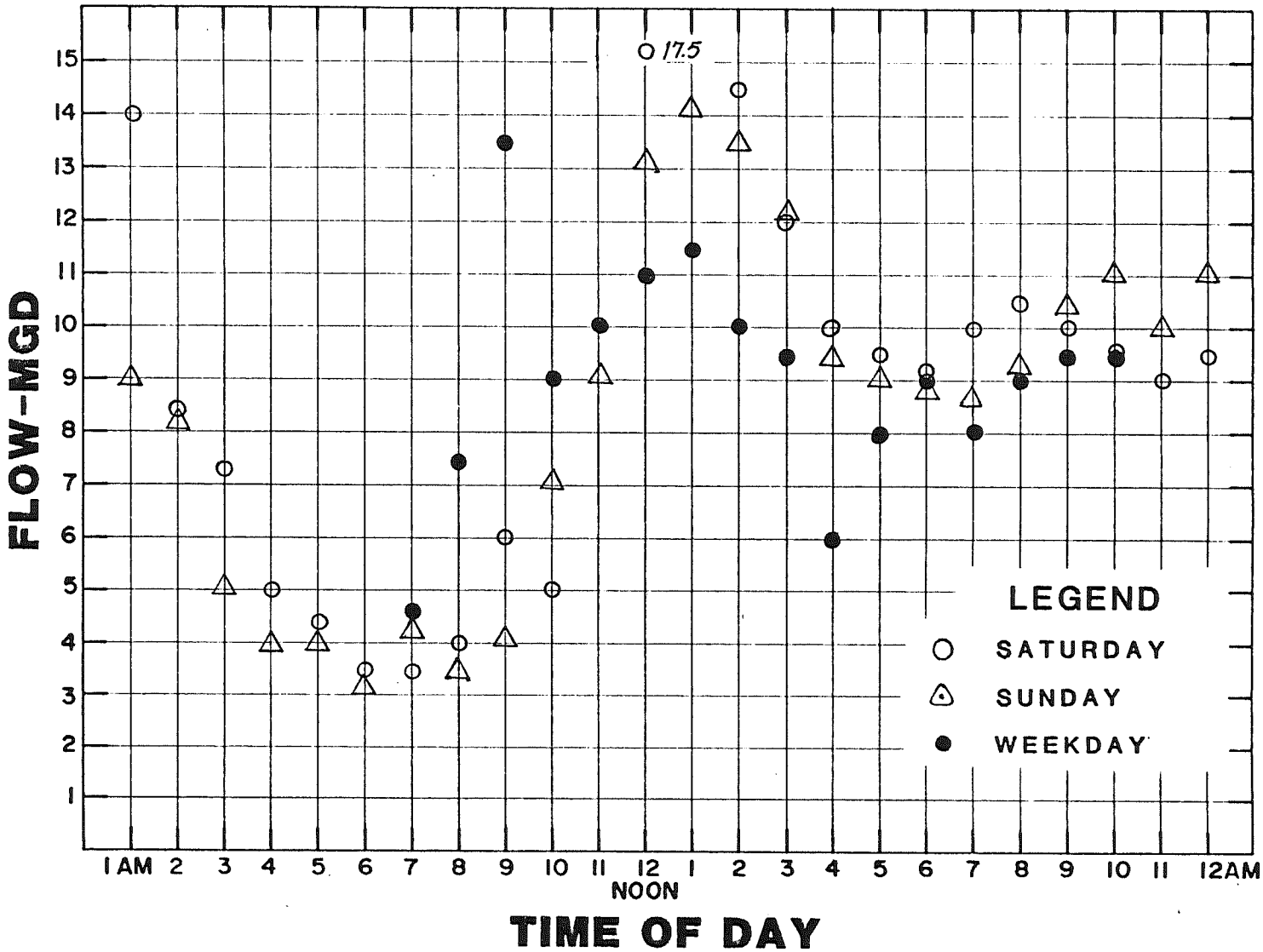


FIGURE 4-12

SIMI VALLEY WATER QUALITY CONTROL PLANT

INFLUENT SEWAGE FLOWS

FEBRUARY 1983

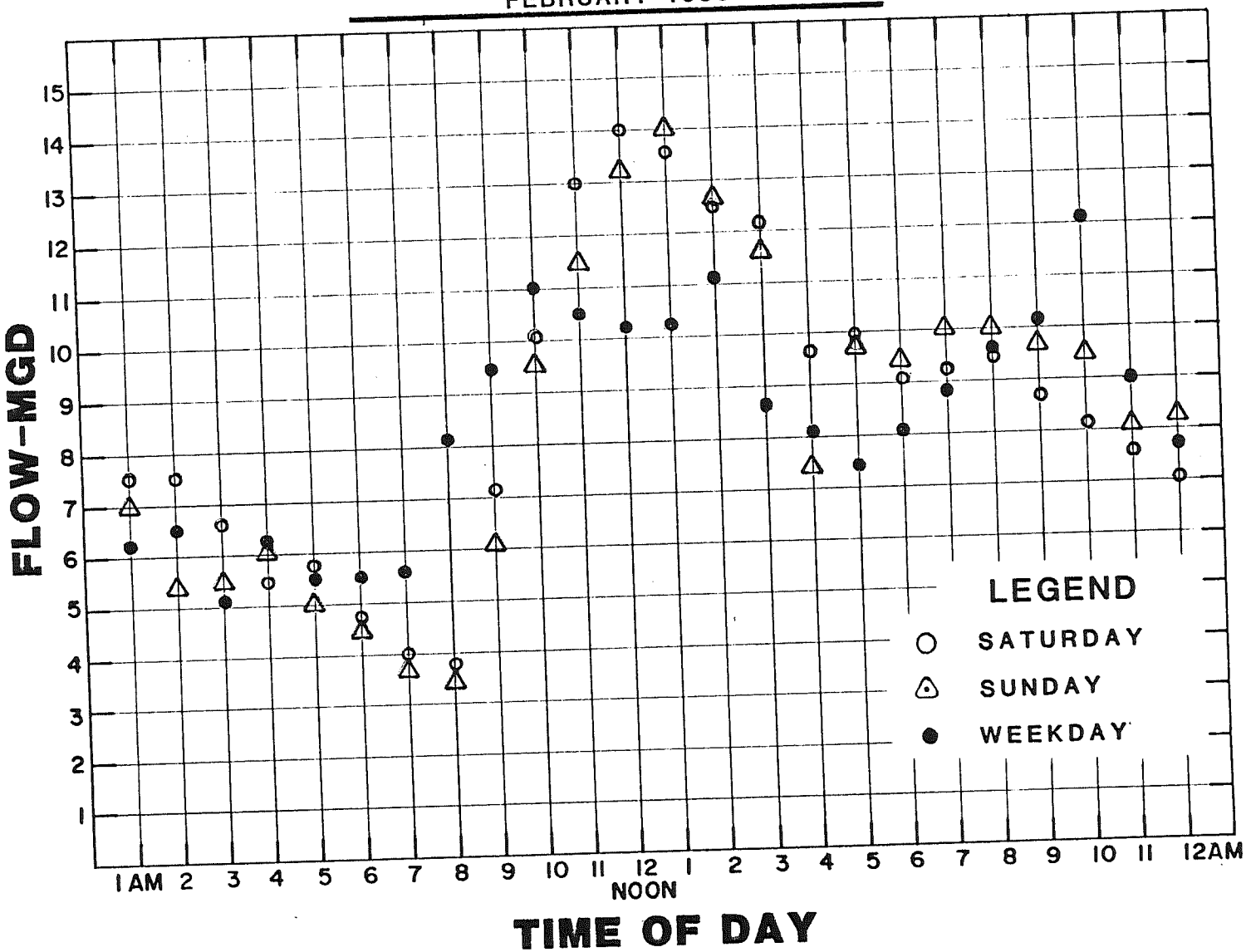


FIGURE 4-13

TABLE 4-10

SUMMARY OF PEAK WET WEATHER FLOW DATA

SIMI VALLEY WQCP

Month-Year	Total Precipitation (in)	Peak Day Precipitation (in)	EST ADWF (mgd)	Recorded Peak Flow (mgd)
September 1982	0.58	0.32	7.85	14.0[1]
October 1982	0.31	0.18	7.94	14.5[1]
November 1982	4.84	2.21	8.02	15.5[1]
December 1982	1.58	1.15	8.10	14.4[1]
January 1983	6.96	2.05	8.19	17.5[1]
February 1983	5.43	1.58	8.28	15.5[1]
March 1983	10.84	4.50	8.36	20.7[2]

1. Based upon treatment plant strip chart readings.

2. Based upon flow measurements taken approximately 1/2 mile upstream of the treatment plant on the morning of March 1. It should be noted that shortly after this peak was recorded, one interceptor washed out upstream at the Arroyo Simi.

follow the reported trend, the future PWWF factors can be projected as shown in Figure 4-14. Thus, the PWWF/ADWF ratio is projected to decrease from the present 2.48 to approximately 2.05 at ultimate. The projected system peak wet weather flows are summarized in Table 4-11.

Local Peaking Factors. Peaking factors which are used to determine PWWF at various locations throughout the sewer systems are called local peaking factors. Local peaking factors are a function of the type of land use and proximity to the source of waste generation. From the numerous flow measurements made in the SVCSD sewer system, a relationship has been developed for PWWF factors as a function of ADWF. For design purposes, these PWWF factors have been summarized into six specific ranges. These are presented in Table 4-12.

4.2.4 Wastewater Quality

The composition or quality of wastewater depends on the sources generating the wastewater and the quality of the water supply. The present composition of the influent to the treatment facility with regard to suspended solids and BOD_5 was established in the Treatment Plant Assessment Report(33) and is presented in Table 4-13. These data are less than design data developed in previous reports(16)(17) by approximately 10% for suspended solids, 27% for BOD_5. These previous reports made allowances for waste

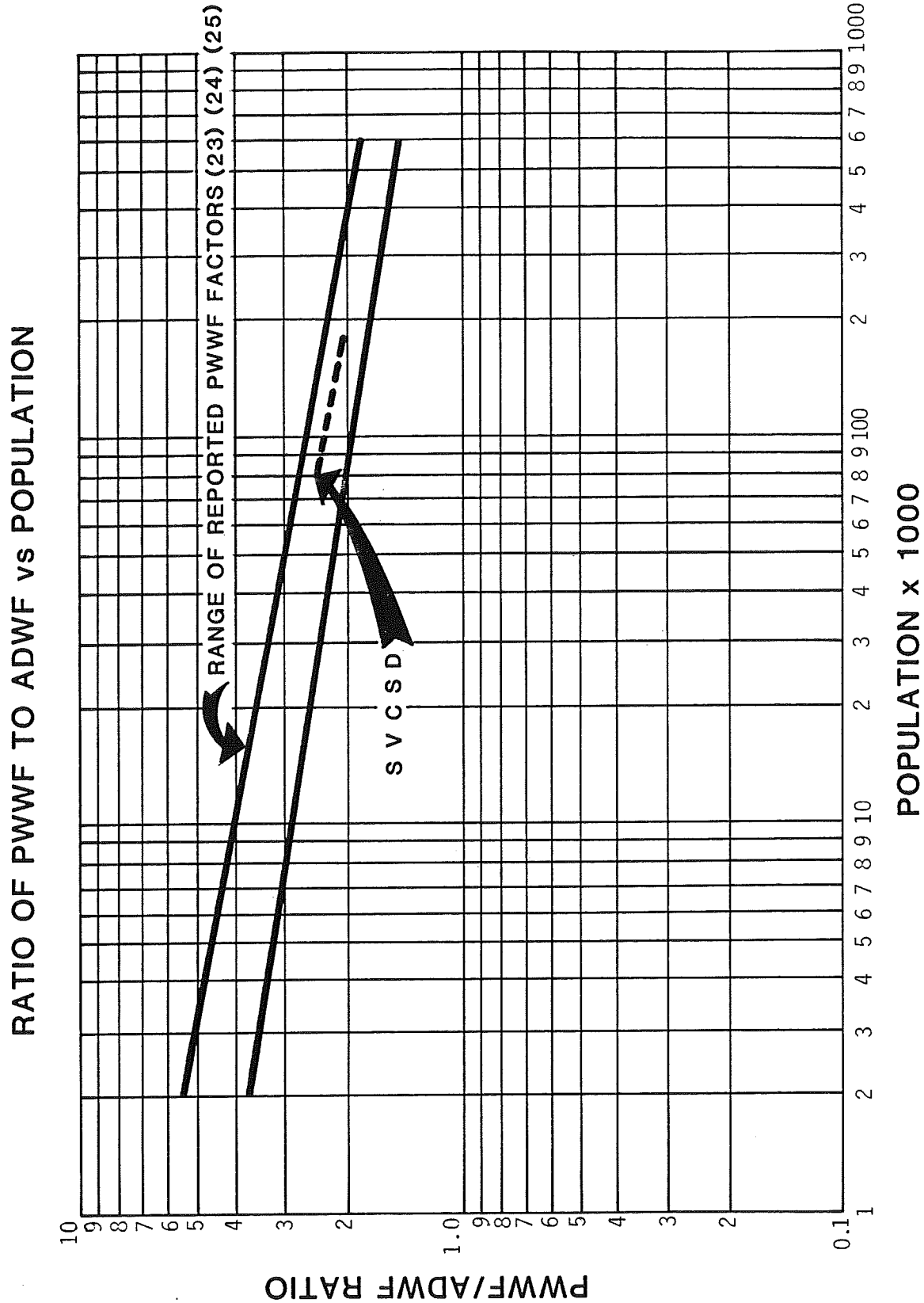

RATIO OF PWWF TO ADWF vs POPULATION
RANGE OF REPORTED PWWF FACTORS (23) (24) (25)
S V C S D
PWWF/ADWF RATIO
10
9
8
7
6
5
4
3
2
1.0
9
8
7
6
5
4
3
2
0.1
1
2
3
4
5
6
7
8
9
10
2
3
4
5
6
7
8
9
100
2
3
4
5
6
7
8
9
1000
POPULATION x 1000

FIGURE 4-14

TABLE 4-11

PROJECTED PEAK WET WEATHER FLOWS

SIMI VALLEY WQCP

Year	ADWF (mgd)	PWWF (mgd)
1985	9.2	21.6
1990	10.4	24.4
1995	11.3	25.4
2000	12.3	27.1
2010	14.6	30.7
Ultimate	17.5	35.9

TABLE 4-12

LOCAL PEAK WET WEATHER FLOW FACTORS

SIMI VALLEY COUNTY SANITATION DISTRICT

ADWF RANGE (mgd)	PEAKING FACTOR
0.2	3.50
0.2 - 0.5	3.25
0.5 - 1.0	3.00
1.0 - 3.0	2.75
3.0 - 9.0	2.50
9.0 -12.0	2.35
12.0-15.0	2.20
15.0	2.05

concentration due to inhousehold water conservation methods and the future increased use of household conveniences such as garbage grinders. The formerly used design data of 250 mg/l suspended solids and 220 mg/l BOD_5 were verified in this analysis and are considered valid projections of future conditions. They are used herein.

With respect to mineral constituents, the wastewater quality is a direct function of the water supply. As previously indicated the total dissolved solids (TDS) concentration of the water supply ranges from 350 to 400 mg/l. Previous studies have reported TDS concentrations of the plant effluent from 585 mg/l of 709 mg/l(18). This is consistent with the water supply characteristics. In the future it can be expected that the TDS concentration will be approximatey 300 to 350 mg/l higher than the water supply, which is normal for communities similar to the Simi Valley. The projected future wastewater composition is presented in Table 4-14.

4.2.5 Equivalent Dwelling Unit System

It is customary to base waste generation values on a common denominator such as the equivalent dwelling unit or domestic per capita flow. In this study, an equivalent dwelling unit system has been established.

TABLE 4-13

SIMI VALLEY WATER QUALITY CONTROL PLANT
ADJUSTED INFLUENT QUALITY

Month/Year	Suspended Solids[1] mg/l	BOD_5 [2] mg/l
March 1982	246	166
April 1982	267	167
May 1982	235	167
June 1982	217	149
July 1982	207	129
August 1982	204	128
September 1982	205	222[3]
October 1982	202	177
November 1982	218	167
December 1982	232	178
January 1983	229	174
Average	224	160

1. Adjusted as follows: $\frac{[S.S.\ (Table\ 4\text{-}2) \times 1.09 \times (QINF + QWBW] - QWBW\ (SSWBW)}{QINF}$

2. Adjusted as follows: $\frac{[BOD5\ (Table\ 4\text{-}2) \times 1.17 \times (QINF + QWBWB)] - QWBW\ (BOD5WBW}{QINF}$

3. Not used in average.

Source: Treatment Plant Assessment Report - May, 1983(33).

TABLE 4-14

PROJECTED WASTEWATER COMPOSITION

Consitutent	Concentration
Suspended Solids	250 mg/l
BOD_5	220 mg/l
Oil and Grease	70 mg/l
Total Dissolved Solids[1]	650-700 mg/l

1. Future TDS concentration will depend upon the water supply composition.

The term equivalent dwelling unit (edu) as used in this report is defined as the unit of measure which is based on the flow characteristics of an average single flamily residence in terms of sewage quantity and consitutent quality. The edu concept is a generally accepted unit of measure used in the development of sewerage system connection and user charges.

The use of the equivalent dwelling unit required the establishment of the discharge characeristics of an edu. For the Study Area the equivalent dwelling unit used herein was developed as follows:

Q_{EDU} = Waste Flow/edu

Q_{EDU} = 3.3 persons/edu x 80 gal/person/day

= 275 gallons/day/edu

The 3.3 persons per edu is the present value for persons per household in Simi Valley. The 80 gallons per capita per day is the residential contribution as previously discussed.

In addition to the average quantity of the discharge, the average quality must also be determined. Although many factors and constituents contribute to the overall quality of a waste, quality has traditionally been characterized by biochemical oxygen demand and suspended solids. Based on information presented above, the following average constitutent concentration has been established for the SVCSD.

Biochemical Oxygen Demand (BOD) = 220 mg/l

Suspended Solids (SS) = 250 mg/l

The discharge characteristics of an equivalent dwelling unit are summarized in Table 4-15.

The equivalent dwelling units assigned for various establishments are normally based on the amount and/or type of sewage generated compared to that normally generated by the average single-family dwelling unit. This is the system utilized by many cities, counties, and special districts(34)(35). A breakdown of equivalent dwelling unit assignments developed for the Study Area is shown in Table 4-16.

TABLE 4-15

DISCHARGE CHARACTERISTICS

EQUIVALENT DWELLING UNIT

PARMETER	SYMBOL	QUANTITY
Flow	Q_{EDU}	275 gpd
Biochemical Oxygen Demand	BOD	220 mg/l
Suspended Solids	SS	250 mg/l

TABLE 4-16
EQUIVALENT DWELLING UNIT ASSIGNMENT

Category	EDU's
Residential	
Single Family Detached	1.00
Single Family Attached	0.75
Mobile Home	0.60
Commercial	
Hotel/Motel/RV Court	
Per Unit Without Kitchen	0.33
Per Unit With Kitchen	0.55
Churches/Theaters/Auditoriums	
Per 110 Seats	1.00
Restaurants	
No Seating	2.75
Seating - Per Each 7 Seats	1.00
Automobile Service Stations	
Per each 2 pumps	1.00
Self-Service Laundries	
Per Each Washer	0.75
Stores and Offices (1)	
Each Unit Less Than 1,000 S.F.	1.00
Each Additional 1,000 S.F.	0.60
Other Uses	
Case-by-Case Determination	---
Gross Area, each acre	3.64
Industrial	
Dry Industry	
Per Each 14 Employees	1.00
Wet Industry	
Case-by-Case Determination	---
Gross Area, each acre	4.36
Institutional	
Elementary School	
Per Each 60 Students	1.00
Junior High School	
Per Each 50 Students	1.00
High School	
Per Each 30 Students	1.00
Hospital	
Per Bed	0.60
Gross Area, each acre	1.82

1. NOTE: Square Footage refers to actual building square footage.

CHAPTER 5

TREATMENT PLANT ASSESSMENT

CHAPTER 5

EXISTING SEWER SYSTEM ANALYSIS

A major portion of the Sewer Master Plan Update is the evaluation of the existing sewer system. The objective of this evaluation is twofold. First, the present condition of the sewer system must be assessed to determine its suitability for incorporation into the long range plans of the SVCSD. Secondly, basic data on the sewer system is required for development of the associated computer model. The results of the existing sewer system analysis are presented in this chapter.

5.1 IDENTIFICATION OF SEWERS

The last major analysis of the sewers in the Simi Valley Area was conducted in 1967. Since that time, the area population has increased dramatically and the sewage collection system has more than doubled in size. Thus, the first step in evaluating the existing system was the identification of sewers.

An office investigation was first conducted, using existing information, in order to develop a sewer system data base. The data base included the following information about the sewer system:

- Location
- Size
- Type
- Slope
- Direction of Flow

The primary source of information on the system was the set of as-built drawings on file at the Public Services Center. Working with SVCSD staff, these drawings were reviewed. Required data was listed on raw data sheets, design capacities were calculated, and sewer locations were plotted on a 500 scale street map of the Study Area. The 500 scale map was divided into four quadrants and forms the basis for the detailed sewer system map. The detailed sewer system map will be prepared in exhibit format and will be provided to the SVCSD as a wall map.

On the 500 scale sewer map a differentiation is made between four different types of sewers. These are:

1. Interceptor Sewers.

2. Trunk Sewers.

3. Main Sewers and Extendable Lateral Sewers.

4. Lateral Sewers which are not likely to be extended.

Sewer types 1, 2 and 3 are included in the computer model of the system. Lateral sewers which are not likely to be extended are excluded from the model.

Generally, the SVCSD sewers are located in the public streets, with some major lines in dedicated, off-site right-of-way. Sewer sizes range from 8 inches to 48 inches in diameter, with the system being composed of predominantly 8 inch lines. The majority of the existing sewers are ACP with some RCP and VCP found in isolated areas. In recent years, PVC pipe has been used on some lines. In a number of areas, the type of pipe has not been designated on the as-built drawings. In most of these cases, the pipe was found to be ACP. Specific data on the sewer system is not presented in this report, but it is stored in the computer as part of the system model program.

The existing interceptor and trunk sewer system is presented in Plate 5-1, along with pipe sizes and peak flow capacities. On the map, peak flow capacities are shown in units of million gallons per day. As indicated in the map legend, the corresponding equivalent dwelling unit capacity can be determined by multiplying the capacity in mgd by 3703.7. Peak flow capacities were determined based upon the following assumptions:

Roughness Factor, n = 0.013

Depth of Flow = 0.75 x Diameter

The depth of flow is based upon the generally accepted design depth of flow for sewers greater than 10 inches. As discussed in Chapter 6, the peak depth of flow used for design should not normally exceed 50 percent of pipe diameter for lines smaller than 10 inches. In the existing SVCSD system, a number of 8 and 10 inch lines function as trunk sewers. These lines have been analyzed in the alternative development part of the study to determine their ability to continue functioning as trunk sewers.

5.2 EXISTING SEWER FLOWS

An office and field analysis was conducted to determine the present flows in the main, trunk and interceptor sewers. In the office, average dry weather flows (ADWF) were estimated using the following information:

- Existing Land Use Map
- 500 Scale Sewer System Map
- Wastewater Flow Characteristics Presented in Chapter 4
- Recent (1981) Aerial Photographs
- Commercial and Industrial Water Use Records.

ADWF for a given area was calculated by an actual count of connected units when possible. An example of an ADWF calculation for a lateral sewer in a residential neighborhood is as follows:

[No. of EDU's x 275 gpd] + Infiltration = ADWF

The infiltration allowance is a product of area served and the estimated infiltration rate of 50 gpad. Existing ADWF for the trunk and interceptor system is presented in Plate 5-2. A more detailed breakdown of existing ADWF is stored in the computer as part of the modeling program.

In the field, flow measurements were made for selected sewers throughout the SVCSD to confirm estimated flows and to develop system-wide and local peaking factors. Tnree methods of flow measurement were employed in this

study. The simplest method involved the selection of flow monitoring manholes where uniform flow exists. Meaurements were not made at pipe size changes, changes in grade, or at junction structures. In this method, a manual measurement of the depth of flow in the sewer was made and the flow rate was calculated accordingly. This procedure is most effective when the sewage is flowing at a moderate velocity. In the SVCSD, the rapid fall in elevation across the valley from east to west produces velocities in many areas which approach 10 feet per second. In these areas, flow measurement is difficult at best as supercritical flow conditions and associated hydraulic jumps can develop.

The second method of flow measurement involved spot checks of the system using a Marsh-McBirney portable current meter. This method was used to verify the flows calculated from the level measurements. Velocities encountered ranged from 1.6 fps to 8.0 fps.

The third method of flow measurement was accomplished via the use of stage flow recorders. These recorders were utlized in several locations on the two main interceptors and in one location on the Marr Ranch Trunk sewer.

A record of the daily and weekly flow variation at each location was obtained with the flow recorders. Examples of the daily and weekly flow records obtained are presented in Figures 5-1 and 5-2.

MEASURED DAILY FLOW VARIATION

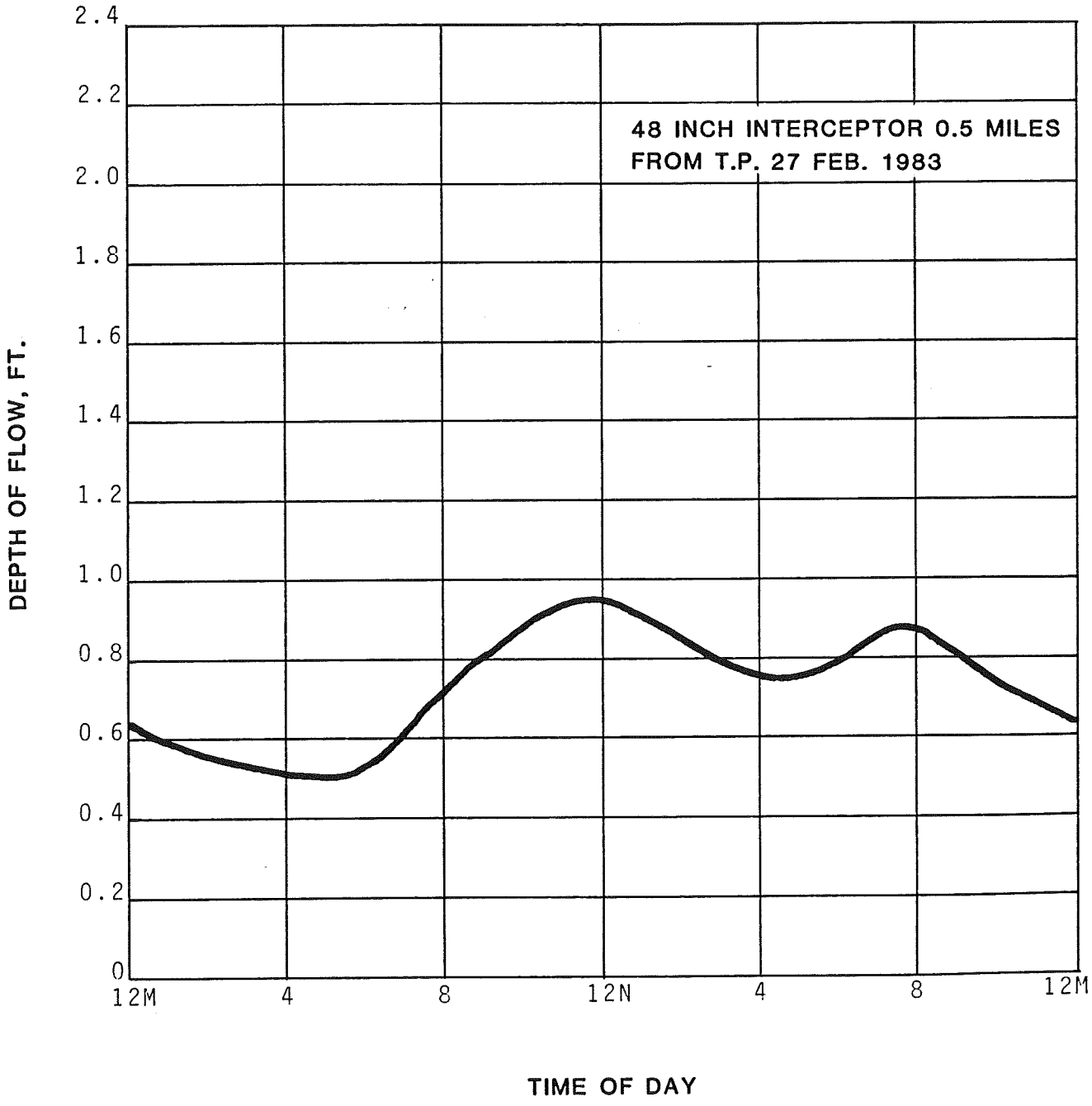


FIGURE 5-1

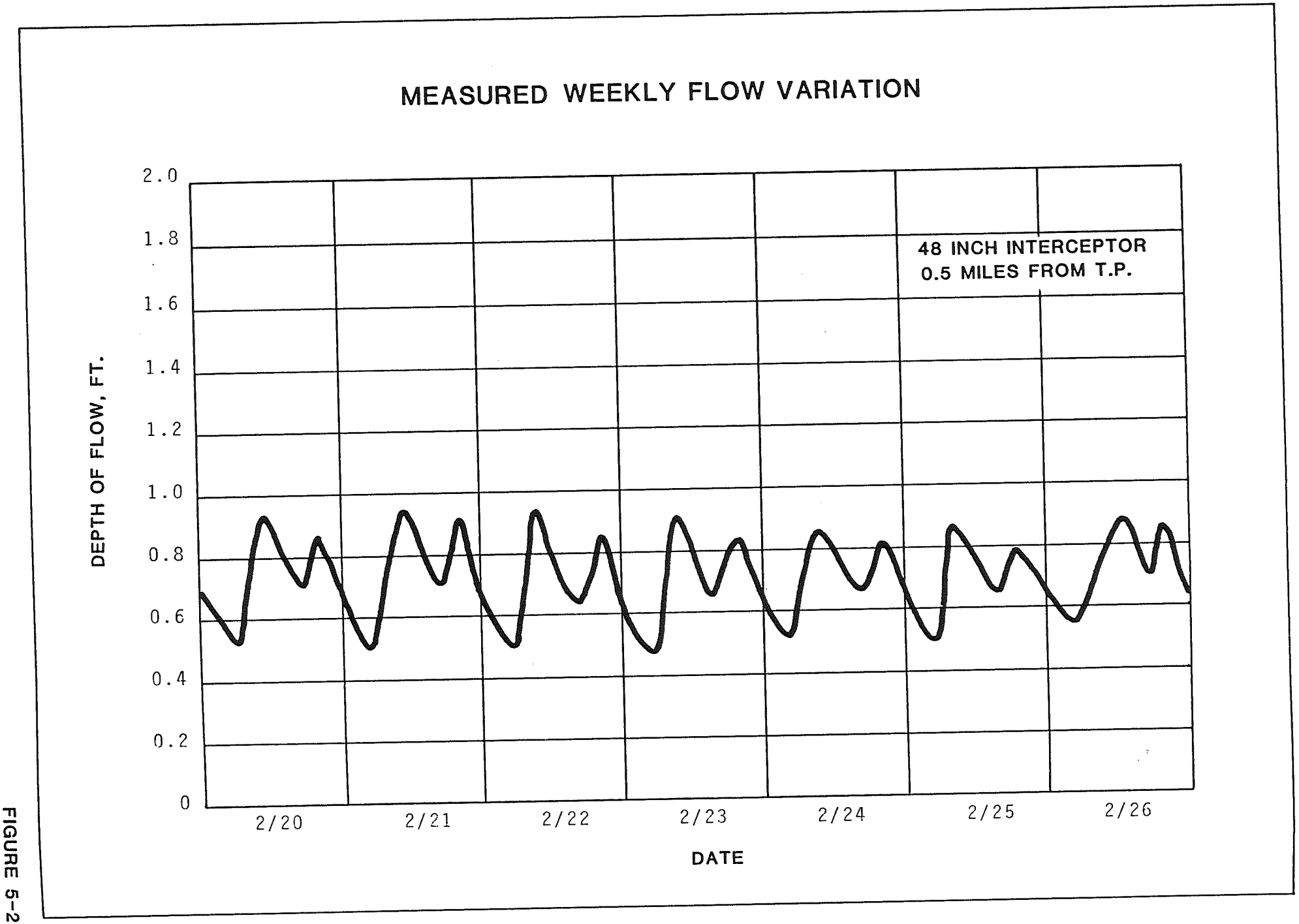

MEASURED WEEKLY FLOW VARIATION
48 INCH INTERCEPTOR
0.5 MILES FROM T.P.
DEPTH OF FLOW, FT.
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0
2/20
2/21
2/22
2/23
2/24
2/25
2/26
DATE

FIGURE 5-2

During the course of the flow measurements, no surcharged sewers were encountered. In fact, there were only six locations where the depth flow exceeded 50 percent of the pipe diameter. These measurements are summarized in Table 5-1. None of the locations listed in Table 5-1 constitutes a critical problem at present. The ability of these sewers to convey future flows is discussed in Chapter 8.

Several areas where excessive flow conditions have been reported(37) are discussed below.

1. East Marie and Loretta. At this location, there is an abrubt change in slope and resultant reduction in the velocity of the flow stream. This creates the appearance of a lack of downstream capacity. However, analysis indicates that there is sufficient downstream capacity and that the observed condition is localized only.

2. Galena Avenue. At Galena Avenue north of Los Angeles Avenue there is an abrubt change in slope and major intersection of flow. This also creates the appearance of a lack of downstream capacity. However, analysis indicates that capacity is sufficient and that the observed condition is localized.

3. Borden and Parkhurst. In this area, flat slopes and low velocities result in sluggish appearing flow. However, capacity is presently sufficient.

TABLE 5-1
SUMMARY OF HIGH FLOW MEASUREMENTS

DESIGNATION	LOCATION	d/D[1]
S1	33" Interceptor ± 1/2 mile from WQCP	0.53
S6	24" Interceptor On Royal. 1st Manhole east of Buckskin	0.60
S4	27" Interceptor On Los Angeles Avenue 3rd Manhole east of Madera	0.54
S2	24" Interceptor On Los Angeles Avenue Manhole east of Bishop Lane	0.66
M3	21" Trunk On Rebecca at Gertrude	0.58
R5	24" Interceptor On First Street 1st Manhole N/O Royal	0.78

1. d/D is the ratio of the measured depth of flow to the pipe diameter.

4. Newman and Gantlin. In this area flat slopes also result in a sluggish flow stream. Present flows are approaching the design capacity of the 8 inch sewer, which is functioning as a trunk sewer. This may result in full pipe flow in localized areas. If this sewer is required to carry additional flow in the future, relief will be required.

5. Sutter and Newman. See above discussion for Newman and Gantlin.

6. Justin and Cochran. At this location, the observed condition is the result of a poorly designed junction structure. It is discussed in detail in Section 5.4.

7. Morely Street. On Morely Street west of Sycamore, flat slopes and low velocities, along with existing flows which locally approach design capacities produce the observed condition. If this sewer is required to carry additional flow in the future, relief will be required.

The remainder of the SVCSD sewer system does not exhibit any capacity deficiencies. Immediate corrections are not required to increase flow capacities.

As part of the flow measurement task, peaking factors have been developed. These factors are based upon conditions observed in the SVCSD system and are presented in Plate 5-2. Peaking Factors are discussed in greater detail in Chapter 4.

5.3 UNUSED CAPACITY ANALYSIS

The unused capacity of the existing sewer system is readily determined as the difference between design capacity and existing flow. The unused capacity can vary from pipe segment to pipe segment and must be individually calculated. The computer model being developed for the SVCSD system will perform these calculations from the design capacity and existing flow data input to the model.

At this level of anaysis, existing flows were compared to design capacities to determine locations where design capacities are presently being exceeded. This analysis was discussed in Section 5.2 above.

Unused capacity is composed of committed capacity and available capacity. Committed capacity is that portion of the unused capacity which is dedicated to residential, commercial and industrial units not presently connected to the system. Committed capacity includes unconnected septic systems and developments that have completed the planning process.

Staff reports(37) that in 1980, approximately 500 septic systems remained unconnected to the SVCSD system. Of these, the majority will soon become part of the system via Assessment District 83-1 (AD 83-1). Upon completion of AD 83-1 the remaining unconnected septic units to which system capacity has been committed will be a minor and negligible portion of the system.

The current developments in process are published every other month by the City's Department of Community Development. This published information is presented in Appendix C. It will be input to the computer model for calculations of committed capacity during debugging of the computer model, and it will be included in the Final Master Plan Report.

5.4 PHYSICAL CONDITION ASSESSMENT

The existing sewer system was reviewed to determine the actual physical condition of the in-place facilities. This review was conducted in three steps. These are:

1. Office Analysis
2. Top Side Inspections
3. Internal Inspections

Each of the phases of the physical condition assessment is discussed below.

5.4.1 Office Analysis

Since it was not possible nor practical to physically inspect each manhole in the system, even from topside, an office analysis was conducted to determine candidate problem areas for physical inspections.

An initial meeting was held with the SVCSD staff(37) to discuss previously identified sewer maintenance problems. At that meeting, it was indicated that there are currently no persistent odor problems in the system and that no sewer overflows have been reported during wet weather. However, some 21 problems areas in the system were identified, and these are listed in Table 5-2.

Following the meeting with SVCSD staff, the 1978 Sewer System Map was reviewed to determine other candidate problem areas. The criteria used in this determination was to identify potential points of turbulence. Turbulence occurs at all junction structures, drop manholes and angle points. Identified points of turbulence as well as all manholes at which flow measurements were taken were added to the list of manholes scheduled for topside inspection.

5.4.2 Top Side Inspection

A top side manhole inspection is a short duration inspection which can be accomplished in approximately 10 minutes. Such inspections require a two person crew unless unusually heavy traffic is encountered.

TABLE 5-2
PROBLEM AREAS IDENTIFIED BY SVCSD STAFF

LOCATION/DESCRIPTION		IDENTIFIED PROBLEM
1.	8" Sewer on Beaver Street 357 ft. S. of Fitzgerald	Frequent Blockages
2.	8" Sewer on L. A. Avenue East of Suede 190 ft.	Frequent Blockages
3.	12" Sewer on Galena West of Sebring - 271 ft.	Frequent Blockages
4.	8" Sewer on Cochran West of Justin 375 ft.	Frequent Blockages
5.	8" Sewer on Brower East of Manhole @ 2217-305 ft.	Frequent Blockages
6.	8" Sewer on Talbert Northwest to Fitzgerald - 180 ft.	Frequent Blockages
7.	10" Sewer from Friendly Village Trailer Court Across Arroyo Simi - 280 ft	Frequent Blockages
8.	8" Sewer on Walnut East of Tapo Street from Waco to Austin - 772 ft.	Frequent Blockages
9.	8" Sewer on Hudspeth between Sutter and Kearney - 264 ft.	Frequent Blockages
10.	18" Sewer on Los Angeles Avenue East of Tapo Street - 300 ft.	Frequent Blockages
11.	8" Sewer on Texas Street South of Walnut - 362 ft.	Frequent Blockages
12.	East Main and Loretta	Excessive Flow
13.	Galena and Galena	Excessive Flow
14.	Borden and Parkhurst	Excessive Flow
15.	Newman and Gantlin	Excessive Flow
16.	Sutter and Newman	Excessive Flow
17.	Justin and Cochran	Excessive Flow
18.	Morely - West of Sycamore	Excessive Flow
19.	Los Angeles Avenue - East of Tapo Street	Retardation of Flow
20.	Erringer - North of Arroyo Simi	Retardation of Flow
21.	Glassel and Deacon	Retardation of Flow

From top side, observations are made of the following:

- Condition of Manhole Frame and Cover
- Condition of Manhole Shaft, Steps and Channel
- Number and Type of Connections
- Velocity, Turbulence and Depth of the Flow Stream

Measurements are made of the following:

- pH of the condensate on the crown of the pipe either upstream or downstream of the manhole

- Amount of sand or other material in the flow channel

Information obtained from regular top side inspections is used to schedule repairs and/or grade adjustments to manhole frames and covers; to schedule sewer line cleaning; and to document cases of sulfide attack. In this study, of particular interest was the data on sulfide generation.

The pH of the condensate on the crown of the pipe gives an indication of the amount of acid formation occurring as a result of the evolution of hydrogen sulfide from the wastewater. When pH levels are between 1 and 2, there is a substantial buildup of acid and the rate of corrosion is high. Moderate acid formation and a moderate corrosion rate is indicated by pH levels between 3 and

4. A pH between 5 and 6 indicates only a slight rate of corrosion. When pH levels higher than 7 are measured, there is minimal to no acid formation and no corrosion is occurring.

Top side inspections were performed on a total of 59 manholes throughout the system. In general, the condition of these manholes was good to excellent.

Most of the manholes inspected exhibited dry sewer crowns or moist sewer crowns with neutral pH. Several pH measurements were in the range of 5.0 to 6.0 indicating only a slight rate of corrosion. These were located generally along the SVCSD's southern interceptor (Sanitation Inc. Interceptor). Only one pH measurement was in the moderate corrosion range of 3.0 to 4.0. This was the manhole on the Los Angeles Avenue Interceptor at Easy Street and Agate Court. This manhole was poorly constructed but in otherwise acceptable condition.

5.4.3 Internal Inspections

Internal inspection of a sewer system is accomplished in two ways. These are:

1. Video inspection of a sewer line via a remotely operated television camera.

2. Physical entry of a manhole to observe upstream and downstream conditions.

In February and March of 1983, television inspections were performed on several of the problem areas identified in Table 5-2. These inspections were performed for the SVCSD under separate contract by Video Inspection Specialists, Inc. A summary of the observations made during a review of these video tapes is presented in Table 5-3. The most persistent problem encountered was heavy grease build up. Considering that these areas were cleaned by the sewer maintenance crew prior to video inspection, this verifies the need for sewer cleaning equipment specifically designed to combat grease.

The most significant problem was found on Walnut Street east of Tapo Street. In this area, there is significant deterioration in the ACP pipe and joints, including a large hole in the top of the pipe between Waco Street and Austin Street. The pipe and joint deterioration is most severe immediately east of Tapo Street, and it improves moving easterly toward Texas Street.

Based upon the information obtained from the top side inspections, and after a review of the video tapes, detailed internal inspections were made at 12 manholes.

Detailed internal inspections were made by physically entering the manhole. They required a minimum crew of three, and all safety precautions associated with entering a confined space were observed. While in the manhole, an evaluation of the structural integrity of the manhole shaft, channels, and pipes was made. Additional measurements of the pH of the condensate of the manhole

TABLE 5-3
SUMMARY OF VIDEO INSPECTIONS

LOCATION	OBSERVATIONS
1. Walnut Street East of Tapo between Waco and Austin (8 inch)	Major deterioration of pipe and joints including one large hole in the sewer crown; localized root intrusion.
2. Los Angeles Avenue east of Suede (8 inch)	Heavy grease buildup on top of pipe.
3. Section from Talbert N.W. to Fitzgerald (8 inch)	Approximate 4 inch dip in pipe extending some 60 feet; heavy grease build up in dip.
4. On Beaver North to Fitzgerald (8 inch)	Heavy grease buildup associated with dip in the pipe.
5. Walnut Street between Austin and Big Springs	Pipe and joints show signs of deterioration; some localized grease buildup and root intrusion.
6. Walnut Street between Big Springs and Dalhart (8 inch)	Moderate pipe and joint deterioration
7. Texas Street South of Walnut (8 inch)	Major grease blockage at Walnut and Texas
8. Brower Street from 2261 to 2217 (8 inch)	No apparent problem.
9. On Los Angeles Avenue East of Tapo Street (18 inch)	Some sign of joint deterioration.
10. One Cochran Easte to Justin (8 inch)	Heavy grease buildup; dip in line approximately 1/2 full of sludge.
11. Hudspeth between Sutter and Kearney (8 inch)	Some slightly offset joints; dip of over 4 inches extending approximately 100 feet.
12. Galena west to Sebring (10 inch)	Plugged 10 inch line; camera under water at start of run.
13. On Woodrow between Wanda and Woodrow Court (8 inch)	Major grease buildup.
14. On Alpine between Marshall and and Fig (8 inch)	Dip of over 4 inches extending approximately 60 feet; some grease buildup.
15. On Rosalie between Burrell and Guerne (8 inch)	Plugged 10 inch line; some deterioration of pipe lining.

and pipe were made to determine if active corrosion was taking place and to quantify the relative strength of the corrosion. Measurements were made of both the horizontal and vertical dimensions of the inlet and outlet pipe for reference purposes, as well as to provide a crude indication of the amount of remaining pipe thickness. The pipe surface was physically touched and scraped to determine the extent of any corrosion. The product removed from the pipe wall was checked for the presence of any pipe material. The manholes and pipelines were photographed with a standard 35mm camera with flash attachment for additional documentation. Samples of the sewage were analyzed for dissolved sulfide concentration, as another indication of the corrosion potential. The more critical internal inspections are discussed below.

Los Angeles Avenue Interceptor. The interceptor was inspected at three locations from the east to west end of the valley. Generally, the pipe is in good to excellent condition. Some acid formation was observed on the pipe crown near the treatment plant, but the pH levels indicate only a mild buildup of acid. Only minor corrosion was observed near the treatment facility.

The importance of the physical inspections is illustrated in the two photographs presented in Figures 5-3, and 5-4. The first was taken in the 48" ACP line upstream of the manhole located in the right-of-way near the Malabar Hydraulic Company (approximately 0.5 miles from the treatment plant). The pipe is in good condition,

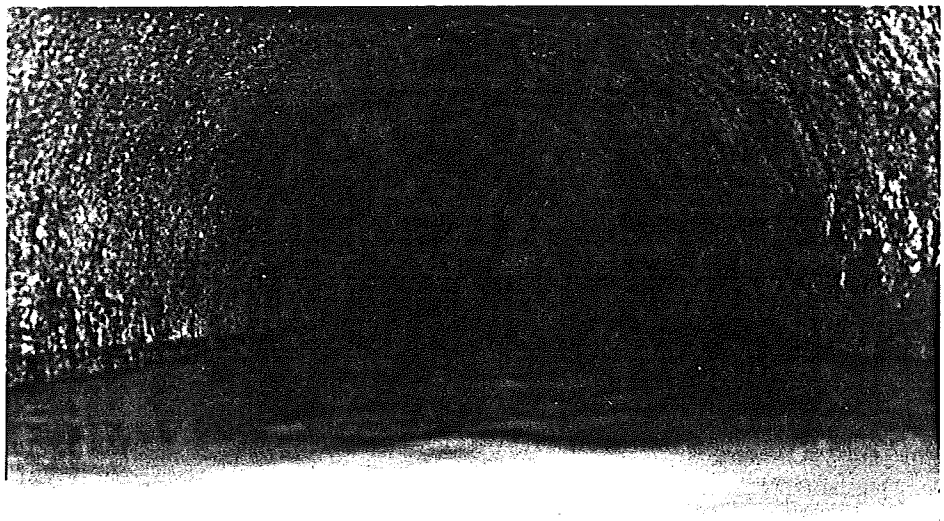


FIG. 5-3: VIEW 25 FT. UPSTREAM 48 IN. ACP

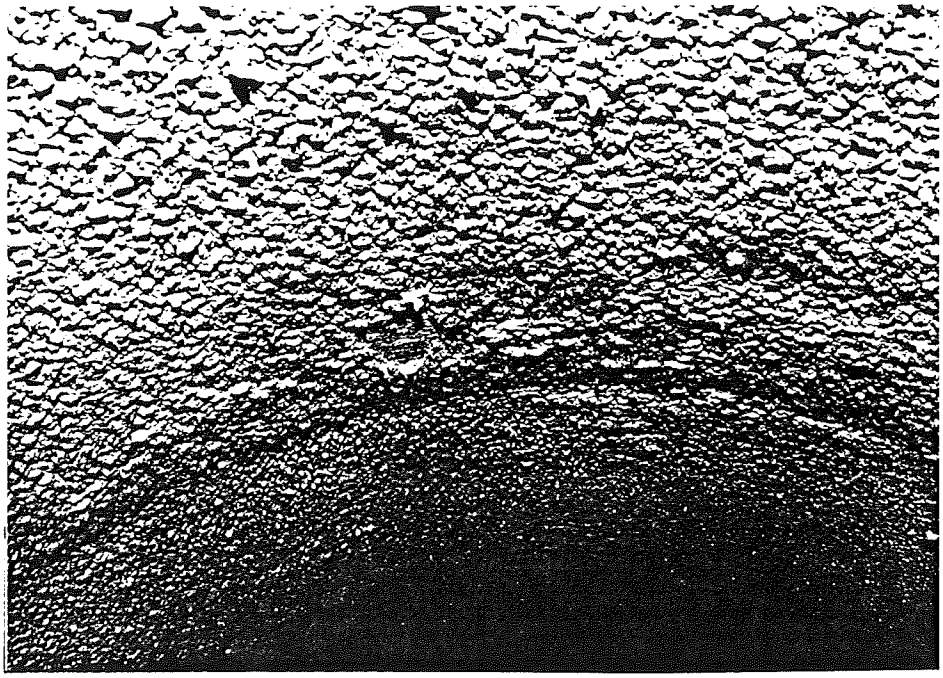


FIG. 5-4: CLOSE-UP VIEW OF UPSTREAM CROWN OF 48 IN. ACP SHOWING AREA WHERE CORROSION PRODUCT WAS REMOVED

as illustrated in Figure 5-3. A similar indication would be obtained with the use of a television camera. Upon close inspection however, it was determined that the surface of the pipe has undergone corrosion as illustrated in Figure 5-4. A small area of the pipe surface was scraped away to illustrate the corrosion product.

The corrosion product is currently between 1/8" and 1/4" thick. The thickness of the corrosion product, of course, does not indicate the actual amount of corrosion. The cement binder in the pipe together with the sulfuric acid deposited on the crown results in the formation of calcium sulfate. Following hydration, the calcium sulfate expands. As a result, the corrosion product left is substantially thicker than the original amount of deteriorated pipe. The pH on the surface of the pipe was 5, indicating a slow rate of corrosion.

More accurate documentation of the amount of corrosion can only be obtained by core sampling. Core samples at the crown of the pipe, or wherever the corrosion appears to be the most severe, can be compared with core samples from the same pipe taken where there is no corrosion (below the high water mark). The difference in thickness of the two cores indicates the amount of corrosion that has taken place over the life of the pipe. This overall corrosion rate must be carefully viewed as it does not necessarily indicate the ongoing corrosion rate. The observed corrosion may have

occurred very early in the life of the pipe or may be occuring at the present time. The pH measurements of the condensate as well as the dissolved sulfide levels in the sewage are useful in determining whether corrosion is historic or current.

For the Los Angeles Avenue Interceptor the absence of any dissolved sulfide in the sewage indicates that the corrosion potential is minimal. The existence of some corrosion product may reflect a more corrosive environment in the early life of the pipe.

Sanitation Inc. Interceptor. This interceptor was inspected at 5 locations between Tapo Street and the treatment facility. While this interceptor exhibited slightly more corrosion than the Los Angeles Avenue Interceptor, the pipe remains in good condition. It appears that much of the existing corrosion probably occurred during the early life of the sewer. For illustration purposes, two photographs are presented in Figures 5-5 and 5-6. The first photograph illustrates the appearance of the 33" ACP in the right-of-way east of Malabar Hydraulic Co. A closer inspection of the pipe surface, as presented in Figure 5-6, shows a section of the pipe wall with the corrosion product scraped away. The soft corrosion product definitely has asbestos fibers impregnated in it from the ACP pipe. The depth of penetration is estimated to be 1/4" at this time. The pH of the condensate on the down stream pipe was 4 indicating a moderate rate of acid formation. The measurement was probably tempered by the fact that little flow existed in the interceptor during the inspection as a result of

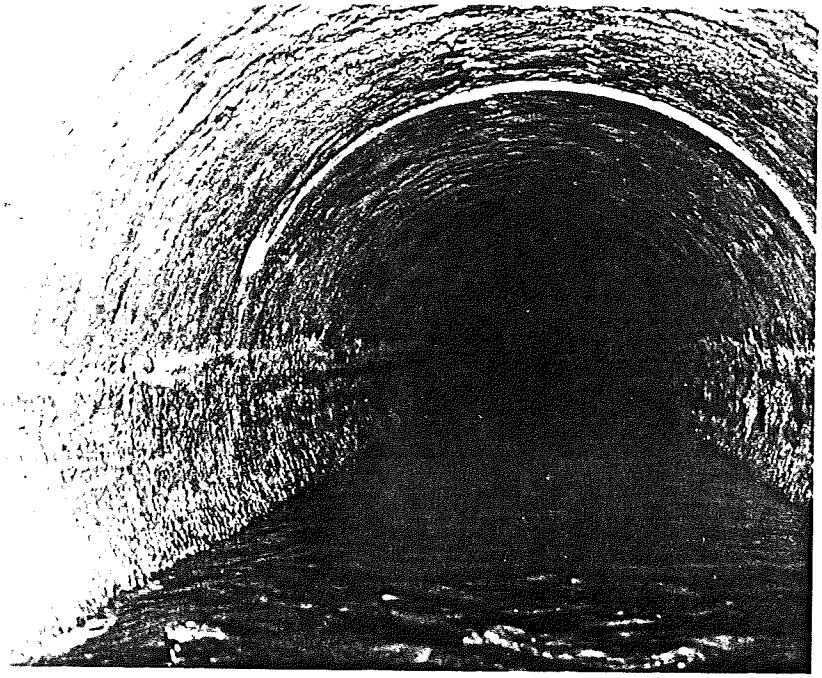


FIG. 5-5: VIEW 8 FT. DOWNSTREAM OF 33 IN. ACP

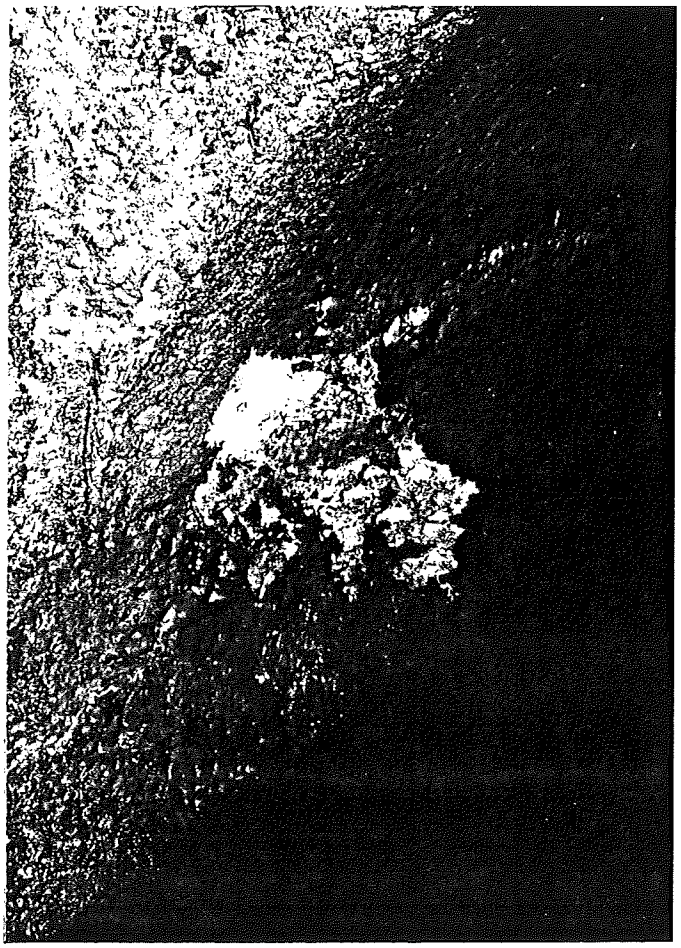


FIG. 5-6: CLOSE-UP VIEW OF CORROSION PRODUCT SCRAPED AWAY FROM SIDE OF PIPE JUST ABOVE THE HIGH WATER MARK

the sewer line break that occurred at the Arroyo Simi crossing during March 1983. A moderate build up of rock and sand was observed in the invert of the pipe, probably the result of the line break at the Arroyo Simi.

Justin Avenue Trunk. This trunk sewer was inspected at Cochran and Justin where a rather poor junction of 4 influent sewers exists. Considerable turbulence caused by the flow from the east retards the flow from the remaining three connections, thereby allowing grease to form and build up.

The flow in this portion of the sewer system is low but the poor design of the manhole as well as the approaching slopes does not allow the influent flow to properly exit the manhole. The photograph in Figure 5-7 indicates the hydraulics of this manhole. Turbulence such as this can make this location a prime candidate for a serious corrosion problem. However, no generation of sulfide was detected or is evident at this location.

Without modification, steady maintenance will be required at this manhole to control the build up of grease and to prevent partial stoppages and overflows of sewage. As the flows increase in this area, the problem will become more severe. At that time, redesign of this manhole should definitely be considered.

FIG. 5-7: VIEW OF HYDRAULIC PROBLEM AT JUSTIN AND COCHRAN

Several concepts are offered for the design alternative for this manhole. First, the grade on the influent pipe from the east should be reduced prior to entry into the manhole. This will allow for a much smoother transition for the flow from east to south. Construction of a vertical curve on the east sewer prior to its reaching the manhole would be one method of reducing the slope. Certainly a larger diameter manhole would assist in the transition for all four influent sewers. Consideration should also be given to bringing the easterly flow through a vertical curve to a new manhole constructed on Justin south of Cochran.

Walnut Street Sewer. This sewer was inspected at three locations between Tapo Street and Texas Avenue. The severe sulfide corrosion that has occurred in this section of 8 inch ACP sewer has been well documented in the T.V. inspections previously discussed. The physical inspections indicate however, that this sulfide attack is no longer an ongoing condition. During the early life of this sewer, a pump station and force main from a small subdivision discharged in the vicinity of Tapo Street. This type of condition typically results in significant generation of sulfides. The effect of this previous discharge on the 8 inch ACP sewer is well documented. The photograph shown in Figure 5-8 illustrates one joint where the pipe ends have corroded to the point where the rubber gaskets in the coupling used to join the ends of the pipe are exposed.

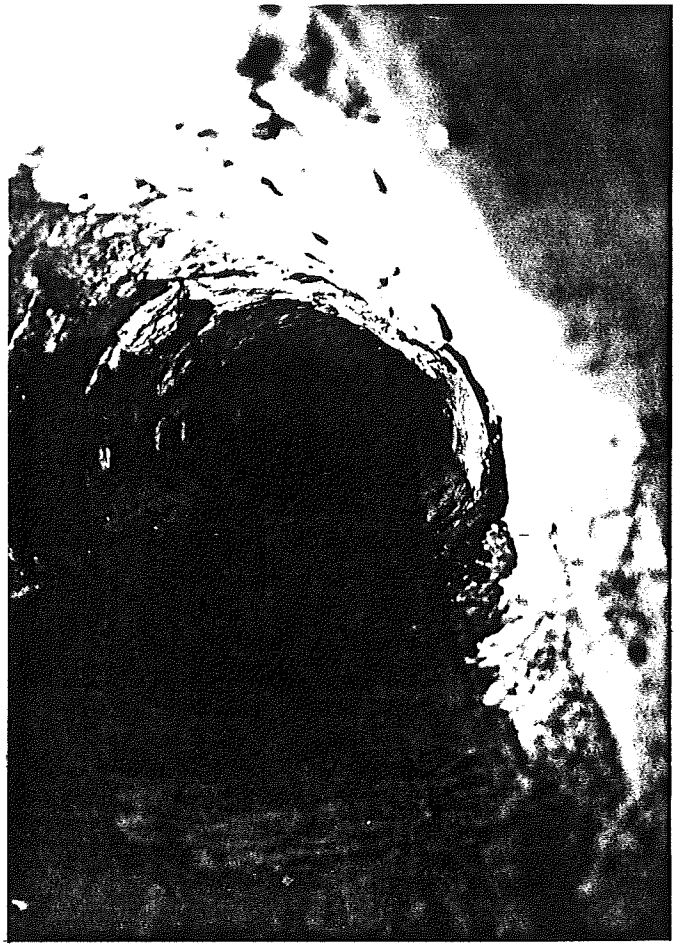


FIG. 5-8: VIEW 4 FT. UPSTREAM FROM MANHOLE AT WALNUT AND WACO

This pipe is in a structurally unsafe condition in this area and should be replaced. In addition there is a large void in the crown of the pipe 30 feet upstream of the first manhole west of Austin on Walnut. A temporary repair should be immediately undertaken at this location. Because of the condition of the pipe and the amount of root infiltration, it is recommended that the sewer be replaced and the existing sewer filled with mud and abandoned. The replacement sewer should not experience any sulfide corrosion, as the pump station inlet to this system no longer exists.

The junction manhole at Walnut Street and Texas Avenue should also be reconstructed. The existing channeling in this manhole is extremely poor and the hydraulics are unacceptable. Considerable grease buildup occurs in this manhole and is apparently reponsible for the frequent stoppages observed in the area. The slope of the outlet pipe at this manhole is relatively flat but hydraulic conditions south of Walnut Street on Texas Avenue appear to be good.

The slope of the inlet pipe coming from the north on Texas Avenue is extremely steep. In fact, the north inlet pipe is nearly buried in the manhole. It is suggested that the slope of the north inlet be re-evaluated and flattened prior to entry into the manhole. The channeling in the manhole should be reconstructed to provide a smoother transition, and a larger outlet pipe may be desireable.

CHAPTER 6

REGULATORY REQUIREMENTS

CHAPTER 6

DESIGN CRITERIA AND CONSTRUCTION STANDARDS

In a study of this type, it is necessary to develop criteria for preliminary design and standards for future construction in order to accurately evaluate alternatives. These criteria are presented in the following paragraphs.

6.1 DESIGN PERIOD AND STAGING

The design period is the length of time that the capacity of sanitary sewers will be adequate. This must be established prior to the design of the needed facilities. For sewers, design periods of up to 50 years are considered acceptable. In the Study Area, build-out or ultimate development can be expected to occur within the next 50 years. Therefore, collection system components should be planned and designed to service the ultimate build-out. However, it is not necessary that all system components be constructed at once. As previously indicated, it is the goal of the General Plan to have the community grow outward from the valley's central core in an orderly manner. Thus, if this pattern is followed, the construction of new sewers can be accomplished in an orderly and cost-effective manner.

Sewerage system improvements are divided into three categories. These are:

1. Near Future Improvements are those designed to upgrade present system deficiences and provide service to the anticipated 1990 service area.
2. Future Improvements are those required to provide sewerage services to the anticipated 2010 service area.
3. Ultimate Improvements are those required to provide sewerage services to the ultimate service area.

It must be remembered that major changes in the land use plans for the Study Area will require an update of the Sewer Master Plan.

6.2 COLLECTION SYSTEM COMPONENTS

The SVCSD collection system is composed of five major components. These are:

1. Lateral is a sewer which conveys wastewater from a building to the public sewer system.
2. Local Sewer is a sewer which discharges into a main, trunk, or interceptor sewer and which has no other sewers tributary to it.
3. Main Sewer is a sewer which collects the wastewater from several laterals and conveys it to a trunk or interceptor sewer.

AB punch

4. Trunk Sewer is a large sewer that is used to convey wastewater from several tributary mains to an interceptor sewer or treatment facility.

5. Major Trunk Sewer is a large sewer which intercepts the flow from several mains or trunks and conveys it to the treatment plant.

The SVCSD system has each of the above elements. Other components of a wastewater collection system include siphons, pumping stations, and force mains. Each of these serves a special function within a given system. While the existing SVCSD system does not contain siphons or pumping stations, the design criteria and construction standards for each are discussed below.

6.3 GRAVITY SEWER DESIGN

Gravity sewers must be designed to meet the range of conditions which can be expected during their relatively long life. The more pertinent design parameters required for a properly functioning system are described below.

6.3.1 Design Flows

Sewers must be designed to convey the ultimate peak wet weather flow (PWWF)from its tributary area. As discussed in Chapter 3, tne ultimate PWWF will vary depending upon the size and composition of the tributary area. Many state and regulatory

agencies have established minimum peaking factors (PWWF/ADWF) of 4 for laterals and mains and 2.5 for trunks and interceptors(25). The Ventura County Sewerage Manual(38) requires that a peaking factor of 2.65 be used in the design of all sewers, with other Southern California communities generally requiring a minimum design factor of 2.5. For the Study Area, peaking factors have been specifically determined and are presented in Chapter 4.

6.3.2 Materials

The commonly accepted pipe materials available for sewer construction can be generally classified as rigid or flexible. Rigid pipe derives a substantial part of its earth load carrying capacity from the structural strength of the pipe walls. The most widely used rigid pipes are:

1. Asbestos Cement Pipe (ACP) is produced from asbestos fibers and cement and is available in diameters up to 36 inches. Its advantages are that it can be placed in long lengths; it is available in a wide range of strengths; and a wide range of fittings are available. The major disadvantages of ACP are that it is subject to acid-type corrosion; it can break easily if improperly bedded; and it has a low beam strength.

2. Cast Iron Pipe (CIP) was formerly used for both gravity and pressure sewers. However, its availability is limited due to manufacturer conversion to ductile iron production and is no longer considered a good candidate for gravity sewers.

3. Concrete Pipe (CP) or Reinforced Concrete Pipe (RCP) is available as CP in diameters up to 36 inches and as RCP in diameters up to 200 inches. The major advantages of concrete pipe include its wide range of structural and pressure strengths; its wide range of nominal diameters; and its wide range of laying lengths. Its potential disadvantages include its high weight; its tendency toward acid-type corrosion; and its tendency to shear and break when improperly bedded.

4. Vitrified Clay Pipe (VCP) is manufactured from clay and shale and is available in diameters up to 36 inches. VCP exhibits a high resistance to chemical corrosion and abrasion and has a wide range of available fittings. However, it has a limited range of available sizes, is high in weight, and is subject to breakage when improperly bedded.

Flexible pipe derives its load carrying capacity from the pipe-soil interaction by the deflection of the pipe to the point of equilibrium. The most widely used flexible pipes are:

1. Ductile Iron Pipe (DIP) is manufactured by adding ceruim or magnesium to cast iron pipe just prior to the pipe casting process. It is available in diameters up to 54 inches and in lengths up to 20 feet. The major advantages of DIP include its high pressure and load bearing capacity; its high impact strength; and its high beam strength. Its major disadvantages are that it is subject to acid-type corrosion; it is subject to chemical attack in corrosive soils; and it is very heavy.

2. Acrylonitrile-Butadiene-Styrene Pipe (ABS) is a thermoplastic pipe available in diameters up to 12 inches and lengths up to 35 feet. The advantages of ABS pipe are its light weight, long laying lengths, high impact strength, and ease of construction. Its disadvantages are the limited range of available sizes; its tendency toward environmental stress cracking; the potential for excessive deflection when poorly bedded; and its vulnerability to attack by certain organic chemicals.

3. Polyvinyl Chloride Pipe (PVC) is a thermoplastic pipe available in diameters up to 27 inches. Its advantages and disadvantages are similar to those of ABS pipe.

4. Reinforced Thermosetting Resin Pipe (RTR) is a thermoset plastic pipe available in a variety of lengths. Its advantages include its light weight and long available laying lengths. However, RTR is subject to strain corrosion in some environments; it can deflect excessively when improperly bedded; and it is subject to attack by certain organic chemicals.

5. Reinforced Plastic Mortar Pipe (RPM) is a thermoset plastic pipe available in diameters up to 144 inches. Its advantages and disadvantages are similar to those of RTR pipe.

No single pipe product will provide optimum capability for every design condition. However, in most communities in situ conditions are normally sufficiently consistent to allow one or two products to fit most needs.

In the SVCSD existing system, sewer lines are generally either ACP or VCP. In recent years, some small diameter PVC lines have been constructed. It is usually considered advantagous from a

maintenance point of view to limit the number of different pipe materials used in a community. The Ventura County Sewerage Manual(38), presently used by the SVCSD, allows nearly all of the previously described pipe materials to be used. This may be considered a disadvantage which the District may wish to eliminate.

6.3.3 Depth of Installation

In general, sewers should be installed sufficiently deep to accept the tributary flows by gravity. It is generally good engineering practice to locate sewers at minmum depths of 6-7 feet below street grade.

6.3.4 Velocity

The function of a sewer is to convey peak discharge and to transport wastewater solids in a manner which keeps solids deposition at a minimum. Thus, a sewer must have adequate peak flow capacity and still, function at minimum flows without excessive problems.

Accepted standards require a minimum velocity of 2-2.5 feet per second (fps). In this velocity range organic and inert material will tend to stay in suspension. It must be remembered that sewers are designed for peak flows which are normally not expected for many years. Therefore, special attention must be given to the early years when velocities may be well below the minimum.

For these cases, it may be desireable to design for a greater slope or initiate a line cleaning program planned to alleviate the problem of solids build up.

To control this problem, many agencies choose to adopt a minimum slope standard for gravity sewers. However, such standards are normally aimed at achieving minimum velocity at design flow within individual subdivisions. Thus, whenever a major line is considered, a review of all conditions is recommended. Just as minimum velocities are critial, maximum velocities should also be limited. Generally, when peak velocities of 8 to 10 fps at design flow cannot be avoided, consideration must be given to the type of pipe, the abrasive nature of the sewage, turbulence, and thrust conditions at changes in direction. Further, if high velocities and low depths of flow are present in small diameter pipe, large objects may cause frequent blockages.

6.3.5 Design Depth of Flow

Gravity sewers are normally designed with some reserve capacity. This is accomplished by specifying the design depth of flow at some percentage of the pipe diameter.

Hydraulics of gravity flow pipelines dictate that peak carrying capacity is achieved when the design depth of flow is 90 percent of the pipe diameter. Thus, if reserve capacity is to be achieved, the design depth of flow must be less than 90 percent of

the pipe diameter. Generally, small sewers (less than 10-12 inches) are designed to flow from 1/2 to 2/3 full at peak, with larger sewers designed to flow 3/4 full at peak.

6.3.6 Appurtenances

Sewer systems require certain appurtenances in order to function properly. These include manholes, cleanouts, building connections, and junction chambers. State and local governments, as well as private engineering firms, have their own standards for the design of sewer appurtenances. Thus, as can be expected, many design variations exist. General design considerations for appurtenances are discussed below.

Manholes. It is customary to locate manholes at changes in size, slope and direction of a sewer. In addition, manholes should be located at regular intervals along a sewer to provide accesss for maintenance and emergency service. Typical manhole spacing is from 300 to 500 feet with spacing in very large sewers reaching up to 1000 feet. It is important that manholes be located in conveniently accessable places, avoiding low areas where inflow can occur.

Vertical drops in the flowing sewage should be avoided in order to minimize turbulence. Further, when a standard-type manhole is used as a junction structure, right angle intersections should be avoided and the number of connections should be limited to two inlet and one outlet.

Cleanouts. Terminal cleanouts are often used at the upstream end of a sewer line when a manhole is not otherwise needed. A cleanout should be designed to allow the insertion of cleaning and maintenance tools, and they should be allowed only within 200 feet of a manhole.

Building Connections. Building connections are normally 4-6 inches in diameter and placed on a slope of 1-2 percent. Requirements for building connections are well established in the Uniform Plumbing Code(42).

Overflow Control. Sewers occasionally overflow due to line blockages. In most cases, this will cause sewage to flow out of a manhole and into a street without long term damage. However, when the floor of a building is lower than the top of the next upstream manhole, a sewer blockage can result in the overflow of sewage into the building. Devices which are available to control such overflows include backflow preventers, check valves, and relief overflows, none of which is foolproof. When the potential for overflow is great, a check valve is normally used.

Junction Structures. While junctions in small sewers can be accomplished in an ordinary manhole, separate junction structures are recommended for larger lines. Such structures are specifically designed to minimize turbulence and to reduce or eliminate release of dissolved gases.

6.3.7 Ventilation.

Oxygen is required in a sanitary sewer atmosphere. Normally, natural ventilation is sufficient to provide the proper atmosphere. However, when conditions dictate the need for forced ventilation, it must be designed specifically for the localized conditions, giving proper consideration to odor control.

6.3.8 Sulfide Control

A sanitary sewer is considered a potentially corrosive environment due to the tendency for hydrogen sulfide (H_2S) generation. H_2S can cause a variety of problem conditions odors, human hazards, and corrosion of pipe materials, A well designed system can minimize the effects of H_2S. The design considerations used to control H_2S generation include:

1. Flow velocities should be established which will prevent solids deposition for the full range of expected flows.
2. When dissolved sulfides in excess of 0.2 mg/l are expected, turbulent conditions should be avoided.
3. H_2S generation can be controlled through the addition of certain chemicals, but such methods are normally impractical outside of a treatment plant.

4. Where sulfide generation is the result of a force main discharge, air injection in the force main can be an effective control.

5. Ventilation, as previously discussed, can be used to remove H_2S gas from a sewer system before it causes corrosive conditions to develop.

6.4 FORCE MAIN AND SIPHON DESIGN

Force mains and inverted siphons differ from gravity sewers in that they always flow full. Thus, they must be designed to prevent the permanent deposition of solids. Consideration for proper design of force mains and inverted siphons are discussed below.

6.4.1 Design Flows

Unlike gravity sewers, the design flow of a force main or siphon cannot be determined solely upon ultimate need. Instead consideration must be given to the diurnal variation, as well as the projected range of flows over the life of the pipeline. For this reason, it is often necessary to use multiple lines in order to maintain adequate minimum velocities.

6.4.2 Materials

Most of the pipe materials discussed in paragraph 6.3.2 can be used for force mains and siphons. It is often necessary to design

for corrosion resistance due to the high potential for corrosive elements to develop in pressure pipelines. The most common materials used for sewer mains and siphons include:

- Reinforced Concrete Pipe
- Concrete lined and coated steel pipe
- Ductile Iron Pipe
- Asbestos Cement Pipe
- Reinforced Plastic Mortar Pipe

The most suitable material must be determined for each application.

6.4.3 Depth of Installations

Force mains can be installed at relatively shallow depths. Normally, a minimum of 3 feet of cover over a force main is considered good design.

A siphon, on the other hand, is by its nature a depressed sewer, designed to carry wastewater under an obstruction. Thus, siphons are often installed at great depths with the design depth dictated by the economics of each application.

6.4.4 Velocity

The most critical factor in the design of full flowing sewer pipes is velocity. As previously discussed, velocities of 2-2.5 fps are normally sufficient to prevent the settling out of most sewage solids. In force mains and siphons, the flow stream may frequently stop, sometimes for extended periods of time. Therefore, velocities must be achieved which can resuspend materials which settle out during no flow periods. A minimum velocity of 2.5-3 fps is normally required for flushing. If flushing velocities are achieved at least once each day, it is not likely that excessive deposits will develop.

6.4.5 Appurtenances

A variety of appurtenances are associated with force mains and siphons. These include:

- Air Release Valves
- Surge Tanks
- Check Valves
- Air Jumpers
- Odor Control Equipment

The application of these appurtenances requires specialized design applied to each unique situation.

6.5 PUMPING STATION DESIGN

The design of a wastewater pumping station is a complex task. It requires an understanding of several technical disciplines including sanitary, hydraulic, mechanical, electrical, control system, and structural engineering, as well as architecture. Design considerations for pumping stations are discussed in general below.

6.5.1 Design Flows

Pumping stations are normally designed to handle peak wet weather flow from the tributary area. When the time between pump station construction and ultimate peak flow is several years, pumps are installed incrementally as required by specific local conditions.

An adequate number of pumps should be installed to provide 100% standby capacity. Pumps and force main should be designed as a single, cost-effective unit considering the capital and operating cost over the design life of the pumping station including power costs for pumping.

6.5.2 Pumping Station Type

The types of pumping stations can be broken down in several ways. From an operating point of view there are three basic types, submersible, dry-pit and self-priming.

In a submersible pumping station, the pumps are placed below ground, directly into the wet well, which in the case of smaller stations can be an oversized manhole. The advantages of a submersible station are simplicity of structure and low cost. The disadvantage is that the pumps must be witndrawn from the wet well for servicing.

In a dry-pit pumping station the pumps are located in a "dry well" below ground adjacent to the wet well. This type of station has the advantage of having the pumps accessible for servicing in an area separated from the sewage. The disadvantages are that it requires a more complex, expensive structure. Dry-pit pumping stations are usually only used where a large capacity station is required.

Self-priming pump stations use a small wet well similar to a submersible station, with self-priming pumps located above ground. The advantages of this type of station are that it requires a simple, inexpensive structure; the pumps are located above ground for ready access and the pumps can use a less expensive motor than submersible pumps. The disadvantages are a potential for noise, since the pumps and motors are above ground; and a limitation on depth, since self-priming pumps depend on atmospheric pressure to lift the flow to the pump.

From a construction point of view there are two types of pumping stations, those constructed on-site and those prefabricated in a factory.

Large permanent stations are normally constructed of reinforced concrete at the site. Smaller pumping stations serving local areas are usually more economical when factory built. Such "packaged" units are commonly available in a wide range of capacities and types and can be installed with relative ease. Factory built pumping stations have the advantage of being moveable and reuseable when used for interim facilities.

6.5.3 Environmental Considerations

Pumping stations, if not properly designed and maintained can cause a variety of environmental problems, even while operating reliably.

The main environmental considerations are noise, odors and appearance. The main source of noise is usually the pump drive, including motor and variable speed coupling. When motors are mounted above grade in a residential area, sufficient sound insulation must be provided to insure that noise levels are kept at acceptable levels.

Odors can be controlled by keeping turbulence to an absolute minimum in the wet well and surrounding sewers, particularly at

the downstream end of the force main. Activated carbon can also be used to adsorb any odors from air escaping from the station or sewers. Passive (without ventilation fans) carbon adsorption units are usually adequate and can be obtained from several manufacturers as prefabricated units.

The visual appearance of a pumping station should be in keeping with its surroundings. Above ground units should be housed in attractive structures with landscaping provided where appropriate.

6.5.4 Wet Wells

The purpose of a wet well is to provide adequate storage for the pumping cycle and to provide proper inlet conditions for the pumps. In the case of fill and draw pump stations, adequate storage must be provided to prevent frequent cycling of the pump motors, which can cause overheating, and eventually, motor failure. Wet wells for large stations (greater then 3,000 gallons per minute per pump) should be designed using the sump dimensions recommended in the Hydraulic Institute Standards. In every case, wet wells should be designed to minimize turbulence and sewage should not be allowed to fall any further than necessary. In areas where sulfides are present or are expected to be present, protection for concrete wet wells should be provided. Epoxy coatings and PVC liner plate have been successfully used for this application.

Where wet wells are to be constructed below the expected groundwater level, measures must be taken to prevent floating of the wet well. This can be done by using piles or by providing sufficient weight to prevent flotation.

6.5.5 Dry Wells

Dry wells provide an environment conducive to proper operation and maintenance of pumps. Access must be provided, not only for personnel but for pumps, other mechanical equipment and tools. Ventilation and lighting to provide a safe working environment must be installed. Adequate drainage to carry away pump leakage and washwater is usually provided in the form of a sump and pump. Floors should be sloped to prevent ponding of water and pump drainage should not be allowed to flow across walking areas.

Because of the potential for flooding, critical electrical equipment should not be placed in dry wells below the maximum potential water level. Where dry wells are to be constructed below the expected groundwater level, measures must be taken to prevent floating, as described above.

6.5.6 Station Piping

Piping must be adequately sized to prevent clogging, excessive head loss and be of adequate strength to resist working pressure and any potential water hammer. Usually steel piping is used with steel or cast iron fittings.

Each pump must be provided with a check valve and isolating valve so that the pump can be removed from service while the station remains in operation. All valves should be of a non-clog design.

Suction piping should be designed with as few bends and other disturbances as possible and be as short as possible.

6.5.7 Electrical and Instrumentation

Electrical systems in pumping stations must be safe and reliable. Safety must be provided for operating personnel and for any other persons who may be in the proximity of the station. Reliability may be provided in the form of independent power sources such as standby generators or separate sub-station feeders. Standby generators may be on-site, or portable generators can be brought to the site in the event of a power failure. Standard facilities for connecting such portable generators should be provided, if that method is chosen for standby power.

Pump station controls should be completely automatic including starting of standby pumps(s) in the event of pump failure or extremely high flows. Alarms should be provided to indicate failure of critical systems and alarm signals should be transmitted to a central point where 24 hours surveillance is available.

CHAPTER 7

PROJECT ALTERNATIVE ANALYSIS

CHAPTER 7

COST ESTIMATING CRITERIA

In order to fully analyze master plan alternatives, cost estimates must be developed for the various alternatives based upon preliminary layouts of the proposed improvements. Cost estimating criteria have been developed for both construction costs and operation and maintenance expenses and are presented in this chapter. These criteria will provide a means of comparing alternatives and establishing budgetary requirements.

7.1 COST INDEXES

Construction costs as well as annual costs can be expected to undergo long term changes in keeping with inflation/deflation. Therefore, an appropriate indexing system must be chosen for all cost estimates.

7.1.1 Construction Cost Index

Several indexes are available to gauge long-term changes in the cost of construction. The most widely accepted index is the Engineering News Record-Construction Cost Index (ENR-CCI)(43). The ENR-CCI is published monthly by the McGraw-Hill Company and is calculated for 20 cities in the United States, including Los Angeles. It is calculated from the sum of the following:

200 hrs.	Common Labor at the Local Rate
25 cwt.	Standard Structural Steel Shapes at the mill price
22.56 cwt.	Portland Cement at the Local Price.
1,088 board ft.	2 x 4 lumber at the local price

The ENR-CCI is based on a value of 100 in the year 1913 and is considered a good barometer of general construction cost increases.

Also published by the McGraw-Hill Company on a quarterly basis are the municipal wastewater treatment plant and urban sewer system indexes which are established by the Environmental Protection Agency (EPA). These indexes are based on three hypothetical sewerage projects, and they include wages and fringe benefits for common labor, rebar workers, cement finishers, carpenters, electricians, pipefitters, and equipment operators. Material costs are based on prices for ready-mix concrete, reinforcing bars, plywood, and cast iron pipe. In an effort to reduce costs, the EPA will in the future, only publish this cost information twice each year. Thus, the availability of these indexes will be reduced.

A comparaison of the EPA indexes and the ENR-CCI for Los Angeles from 1980 to 1983 revealed the following:

Index	1980-1983 % Change	1982-1983 % Change
ENR-CCI	+ 20.3	+ 9.1
EPA-Urban Sewer System	+ 25.8	+ 10.3
EPA-50 mgd Treatment Plant	+ 24.1	+ 6.6

Since cost estimates for comprehensive studies such as this are considered order of magnitude estimates as defined by the American Association of Cost Engineers, all of these indexes should be considered appropriate. Since the ENR-CCI is the most widely accepted and most frequently published index, it will be used herein.

The recent historical trend of the ENR-CCI for Los Angeles is graphically displayed in Figure 7-1. In using this index, it is important to recognize its limitations. Prior to 1970, when inflation rates were low, the index was very accurate. High inflation rates, as experienced in the 1970's, tended to reduce the accuracy of the index, and it was not able to reflect the dynamic changes in the economy. This is particularly true when the economy moves in and out of recessionary periods as it has in the last few years. During such times, the bidding climate can have a greater impact than inflation on the cost of a project.

7.1.2 Operation and Maintenance Cost Index

Operation and maintenance (O & M) costs consist primarily of labor, energy and consumables. Changes in O & M costs have historically been indexed to the Consumer Price Index (CPI). The

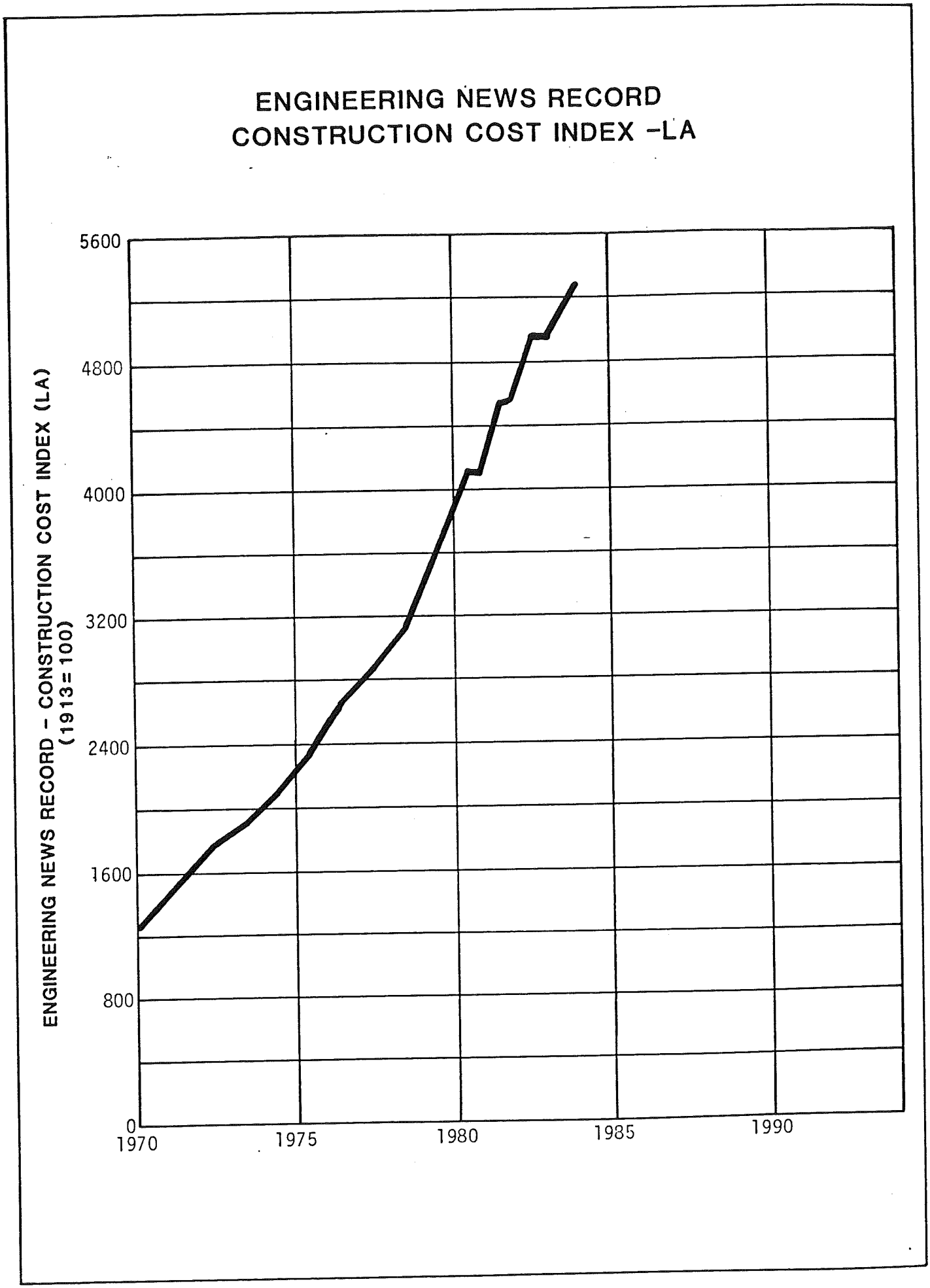

ENGINEERING NEWS RECORD
CONSTRUCTION COST INDEX -LA
ENGINEERING NEWS RECORD - CONSTRUCTION COST INDEX (LA)
(1913=100)
5600
4800
4000
3200
2400
1600
800
0
1970
1975
1980
1985
1990

FIGURE 7-1

CPI has been an accurate reflection of O & M cost changes, and it is expected that this accuracy will continue. The recent historical trend of the CPI is graphically presented in Figure 7-2.

7.2 UNIT CONSTRUCTION COSTS

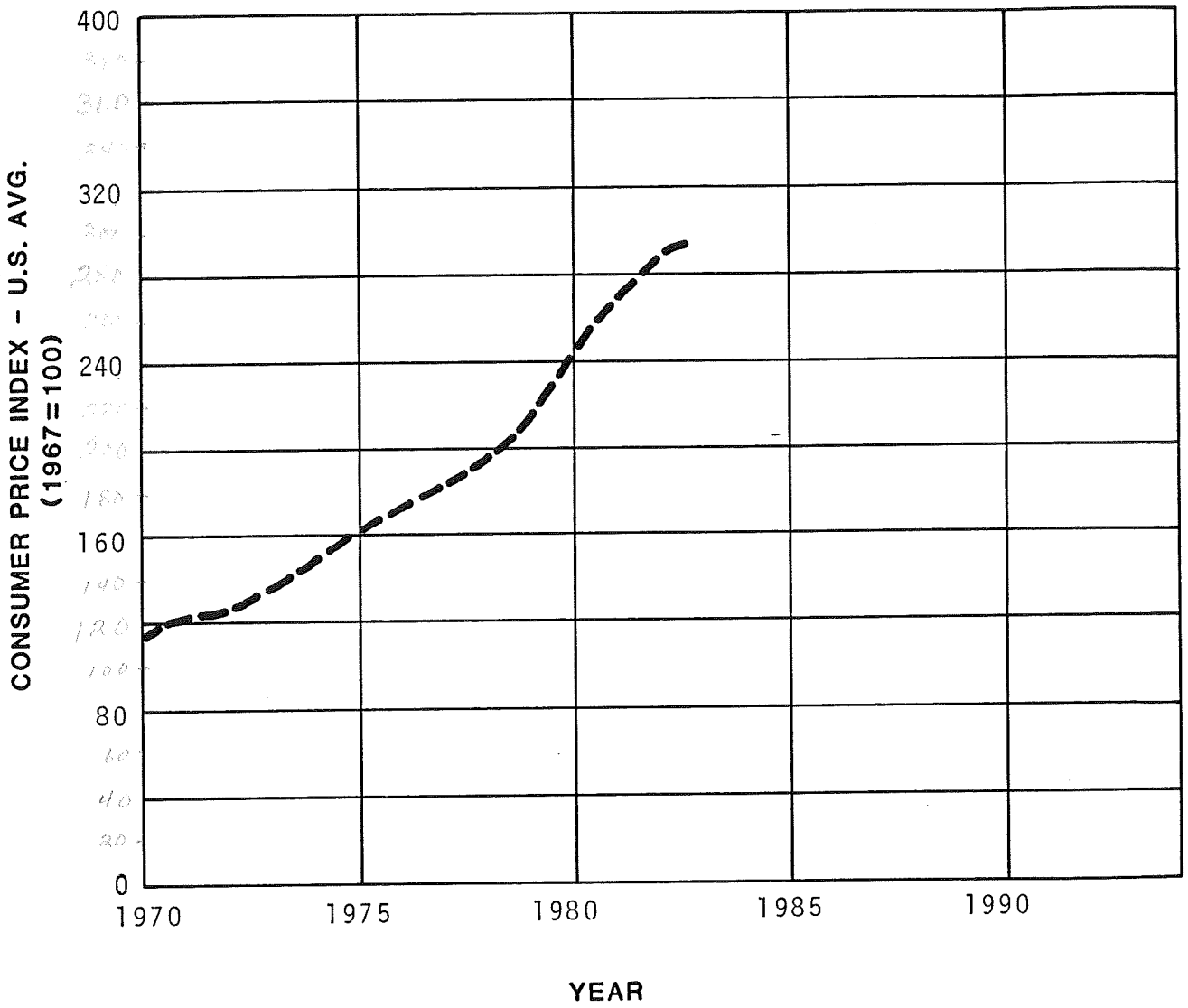
Unit costs for the construction of sewer system improvments have been developed from previous bids and published cost data. These unit costs are discussed below.

7.2.1 Gravity Sewers

The estimated construction costs for gravity sewers developed for this project are based upon the use of vitrified clay pipe (VCP) or asbestos cement pipe (ACP) for sizes up to 36 inches. For larger sizes, reinforced concrete pipe was used.

The unit cost information for gravity sewers is presented in Figures 7-3 through 7-12. These costs include excavation, pipe, laying and jointing, manholes, imported bedding material, backfill, cleanup and testing, contractor's overhead and profit. A separate curve is shown for work within existing streets. All costs are based upon an ENR-CCI of 5000.

CONSUMER PRICE INDEX U.S. AVG.



1985 = 315

FIGURE 7-2

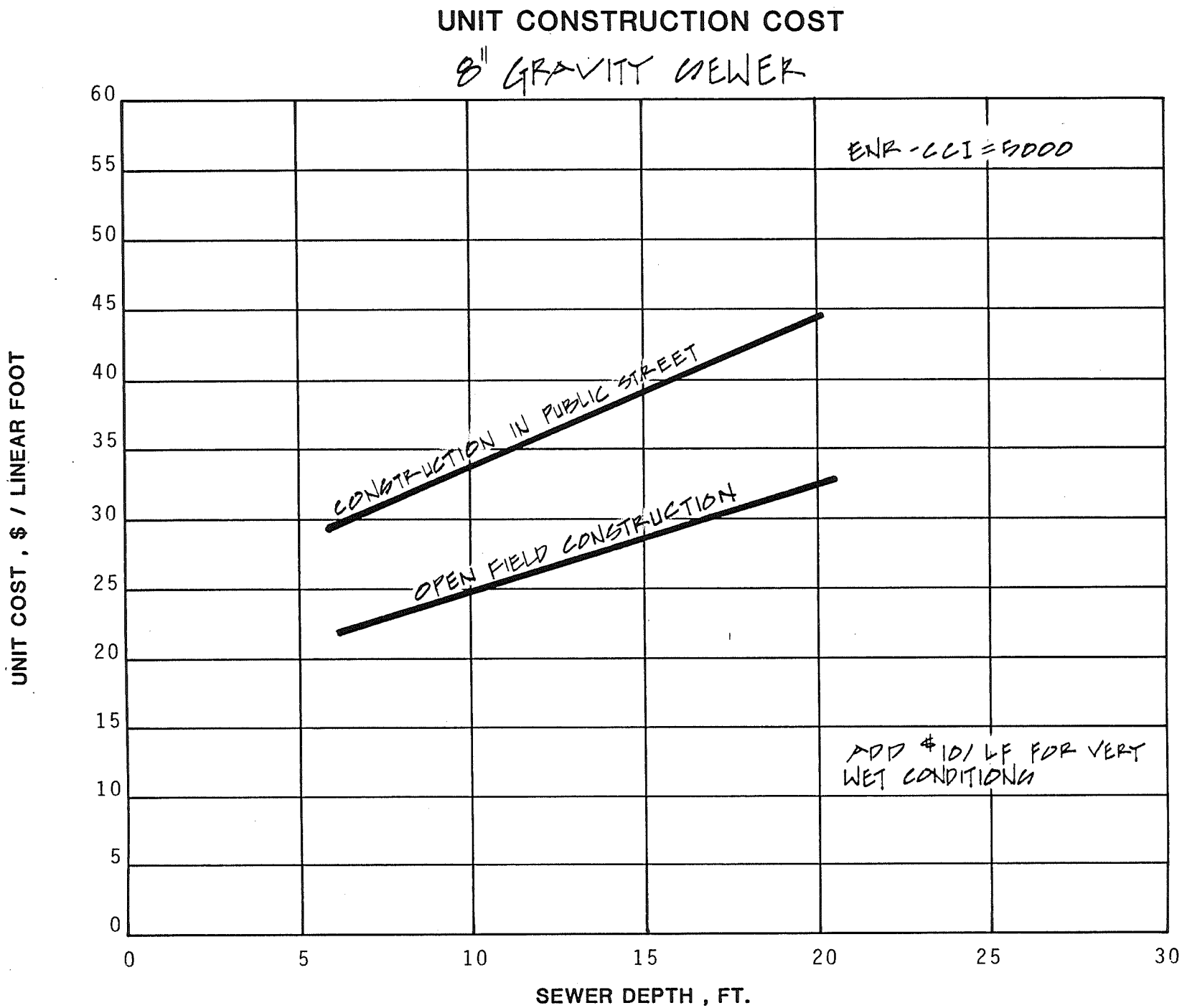

UNIT CONSTRUCTION COST
8" GRAVITY SEWER
ENR-CCI=5000
CONSTRUCTION IN PUBLIC STREET
OPEN FIELD CONSTRUCTION
ADD $10/LF FOR VERY WET CONDITIONS
UNIT COST, $ / LINEAR FOOT
0
5
10
15
20
25
30
35
40
45
50
55
60
SEWER DEPTH, FT.

FIGURE 7-3

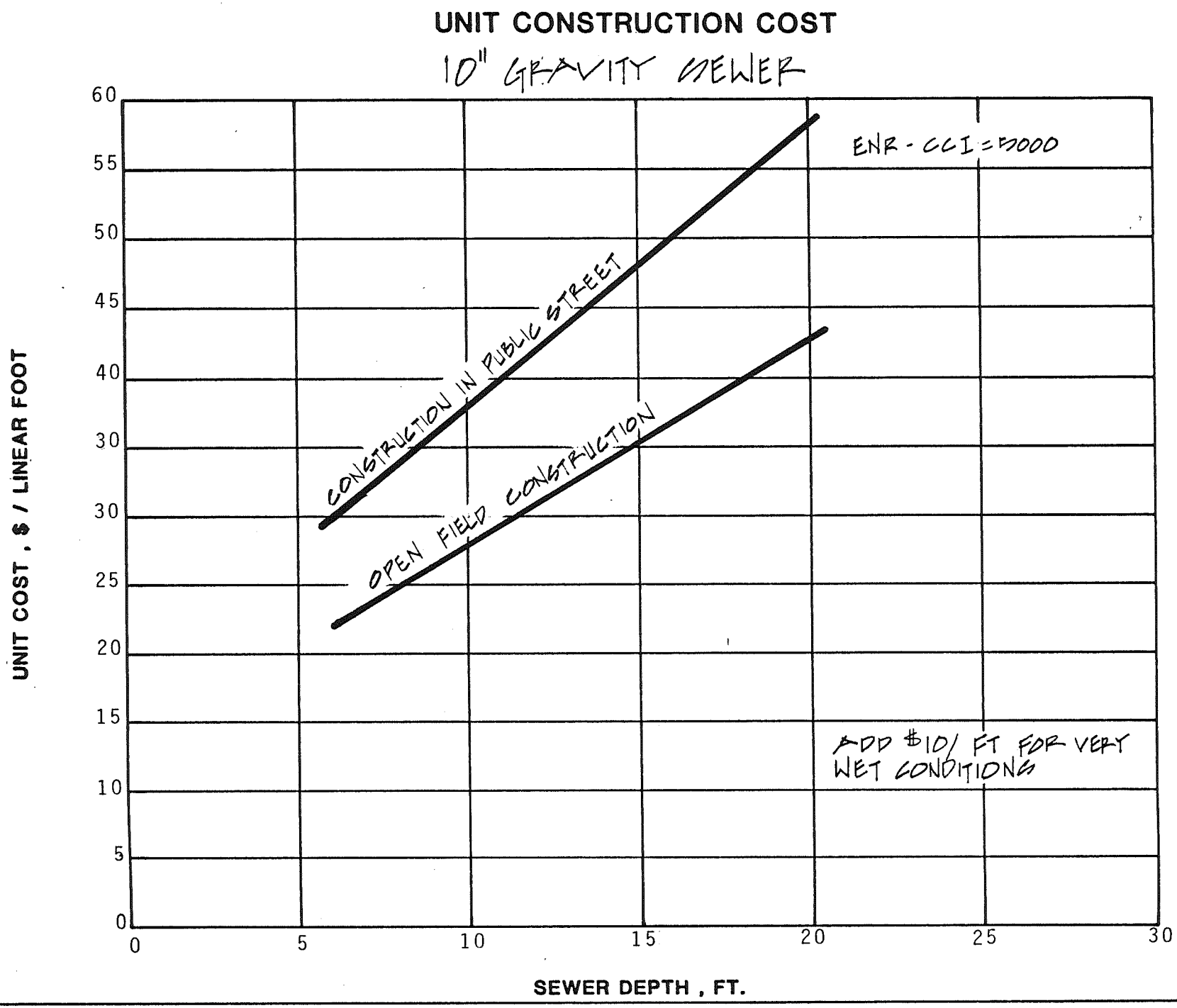

UNIT CONSTRUCTION COST
10" GRAVITY SEWER
ENR - CCI = 5000
CONSTRUCTION IN PUBLIC STREET
OPEN FIELD CONSTRUCTION
ADD $10/ FT FOR VERY WET CONDITIONS
UNIT COST , $ / LINEAR FOOT
0
5
10
15
20
25
30
35
40
45
50
55
60
SEWER DEPTH , FT.
0
5
10
15
20
25
30

FIGURE 7-4

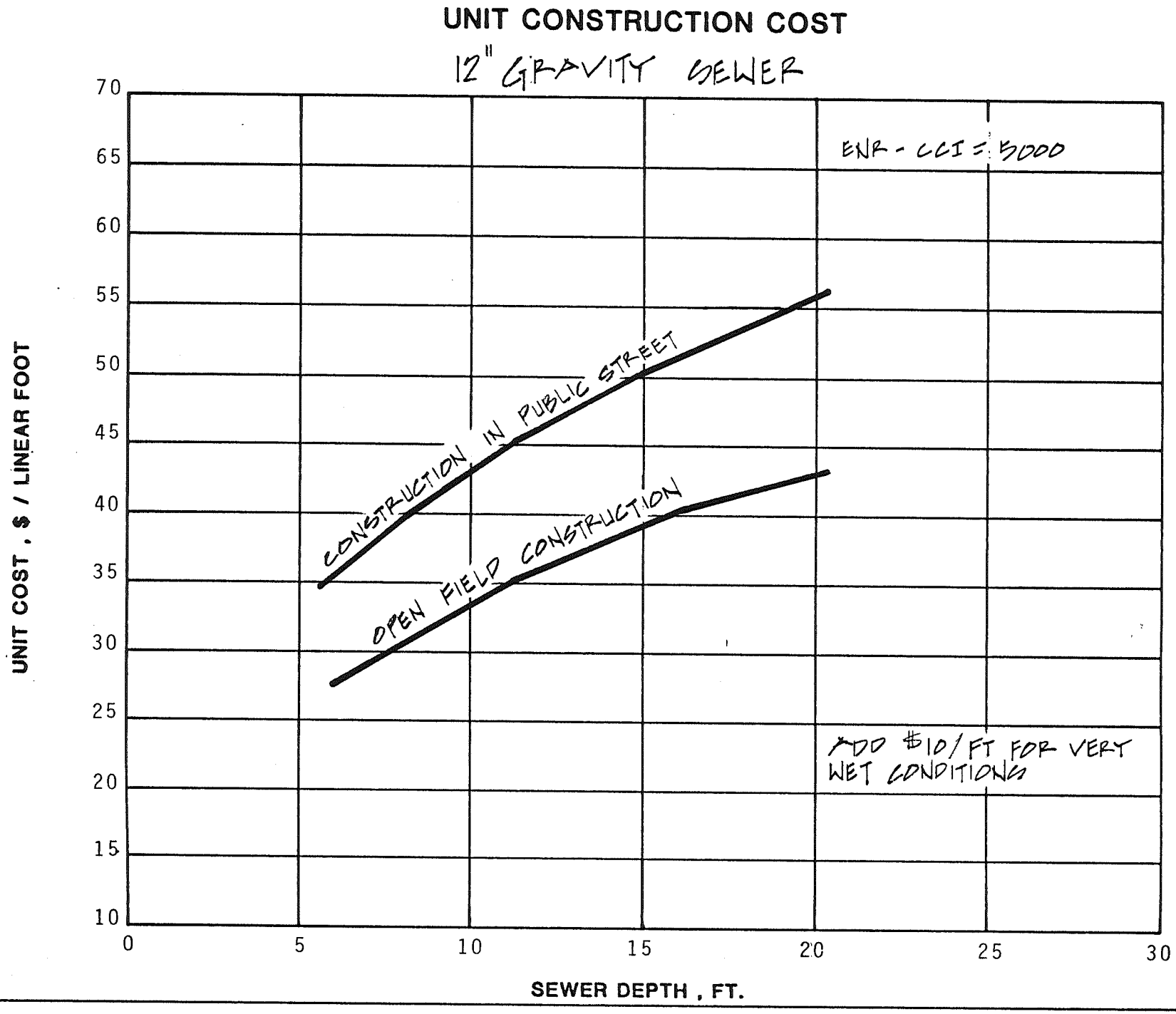

UNIT CONSTRUCTION COST
12" GRAVITY SEWER
ENR - CCI = 5000
CONSTRUCTION IN PUBLIC STREET
OPEN FIELD CONSTRUCTION
ADD $10/FT FOR VERY WET CONDITIONS
UNIT COST, $ / LINEAR FOOT
70
65
60
55
50
45
40
35
30
25
20
15
10
0
5
10
15
20
25
30
SEWER DEPTH, FT.

FIGURE 7-5

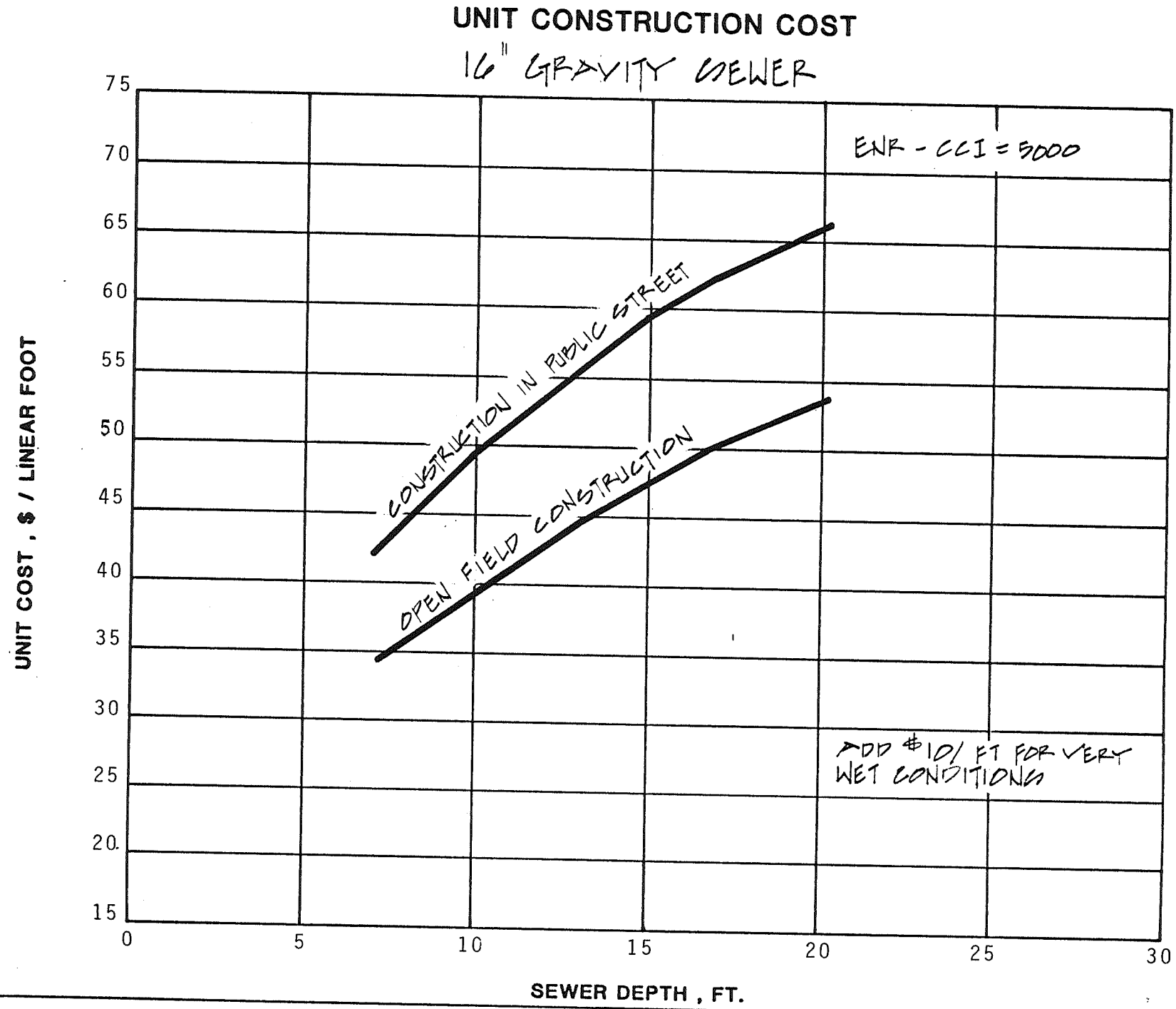

UNIT CONSTRUCTION COST
16" GRAVITY SEWER
ENR - CCI = 5000
CONSTRUCTION IN PUBLIC STREET
OPEN FIELD CONSTRUCTION
ADD $10/ FT FOR VERY WET CONDITIONS
UNIT COST , $ / LINEAR FOOT
75
70
65
60
55
50
45
40
35
30
25
20
15
0
5
10
15
20
25
30
SEWER DEPTH , FT.

FIGURE 7-6

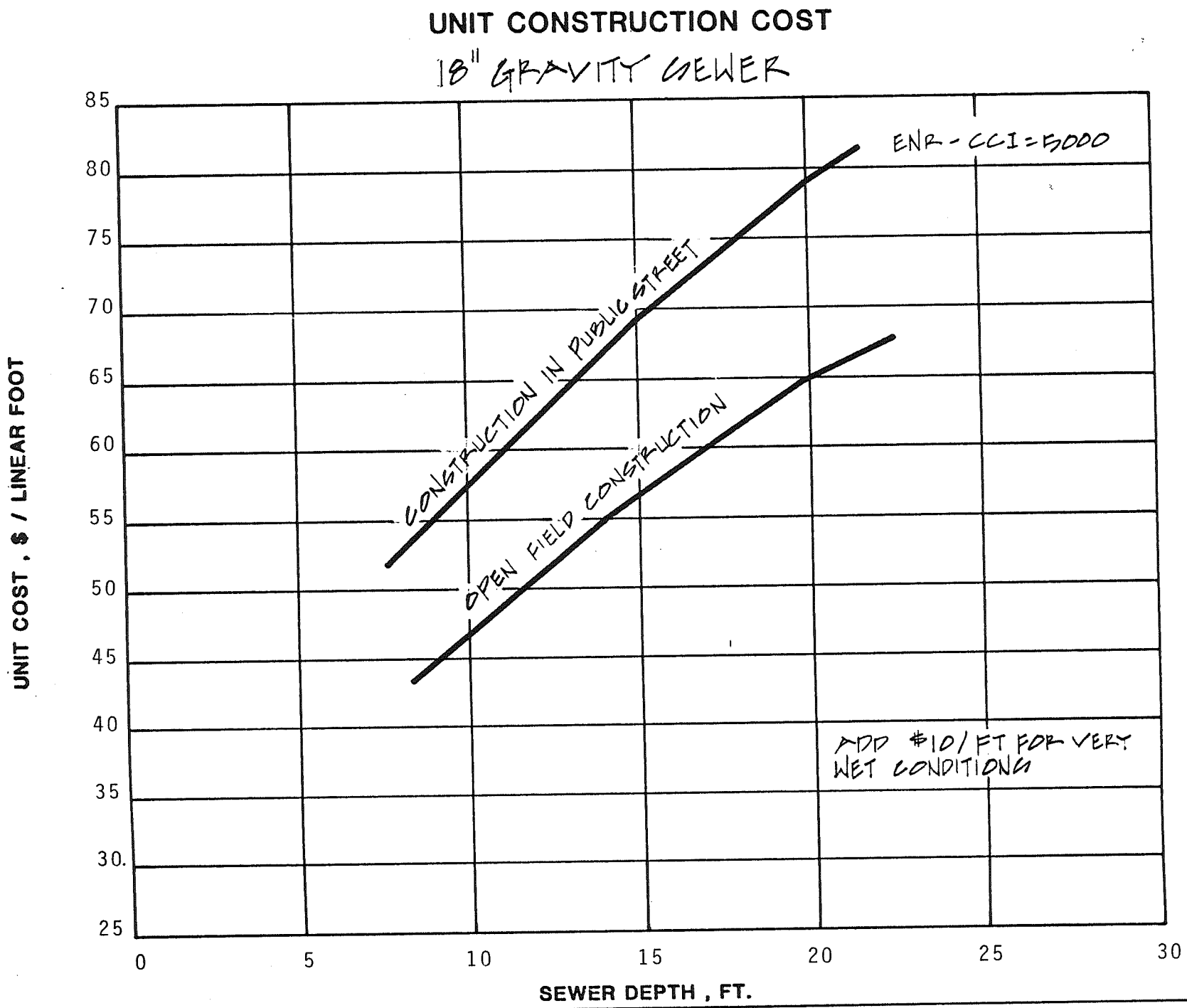

UNIT CONSTRUCTION COST
18" GRAVITY SEWER
ENR - CCI = 5000
CONSTRUCTION IN PUBLIC STREET
OPEN FIELD CONSTRUCTION
ADD $10/FT FOR VERY WET CONDITIONS
UNIT COST, $ / LINEAR FOOT
85
80
75
70
65
60
55
50
45
40
35
30.
25
0
5
10
15
20
25
30
SEWER DEPTH, FT.

FIGURE 7-7

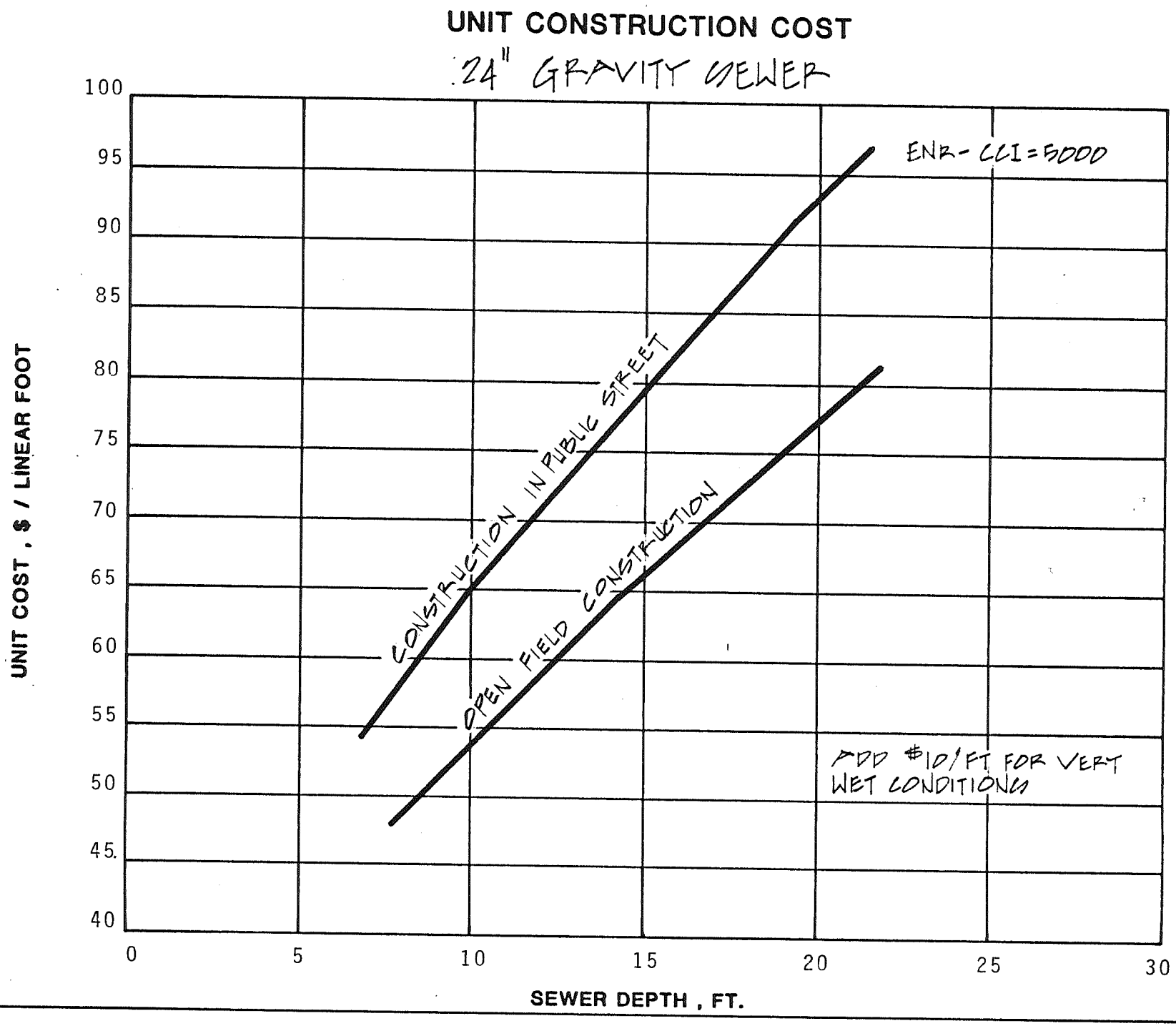

UNIT CONSTRUCTION COST
24" GRAVITY SEWER
ENR-CCI=5000
CONSTRUCTION IN PUBLIC STREET
OPEN FIELD CONSTRUCTION
ADD $10/FT FOR VERY WET CONDITIONS
UNIT COST, $ / LINEAR FOOT
100
95
90
85
80
75
70
65
60
55
50
45
40
0
5
10
15
20
25
30
SEWER DEPTH, FT.

FIGURE 7-8

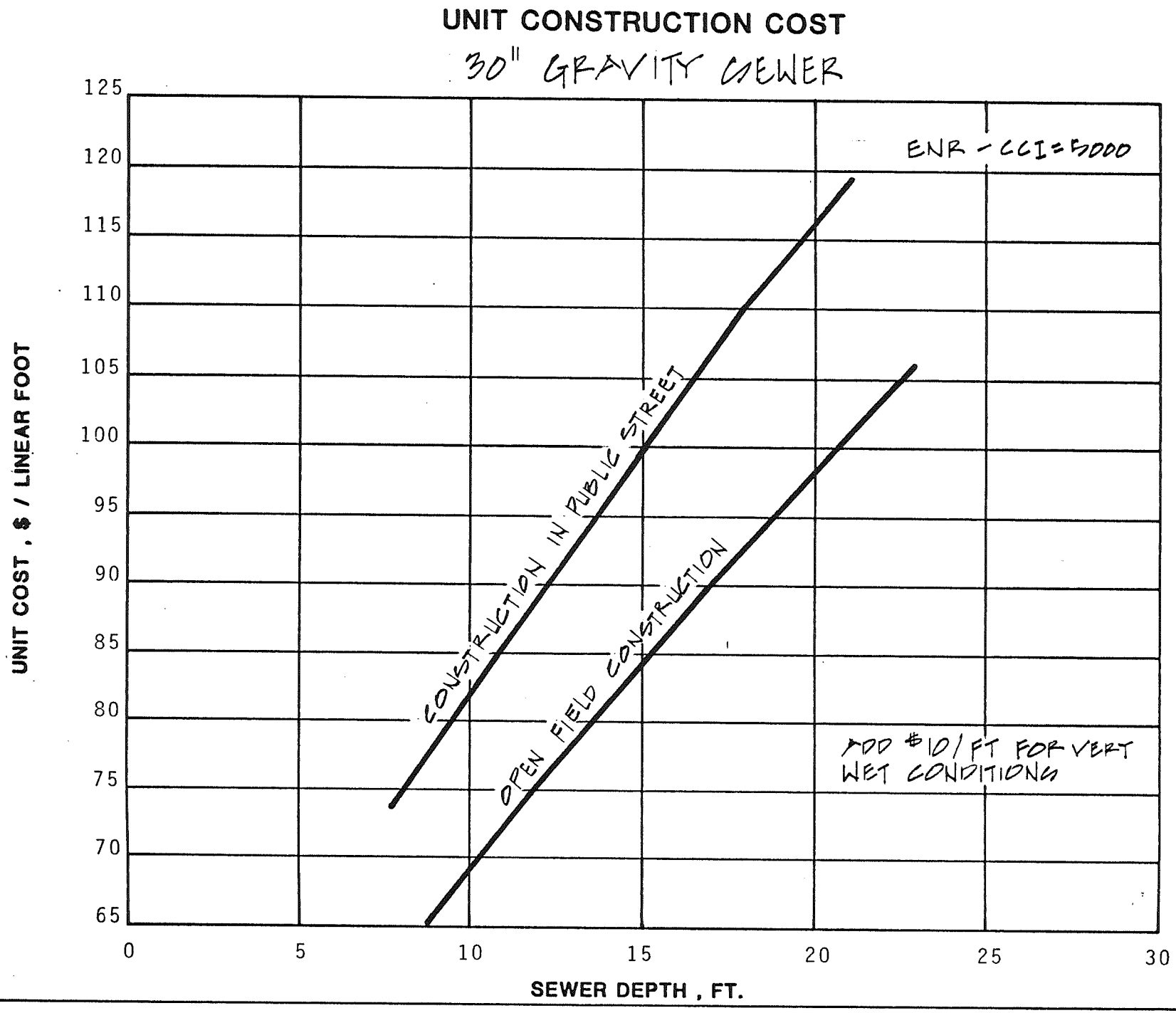

UNIT CONSTRUCTION COST
30" GRAVITY SEWER
ENR - CCI = 5000
CONSTRUCTION IN PUBLIC STREET
OPEN FIELD CONSTRUCTION
ADD $10/FT FOR VERY WET CONDITIONS
UNIT COST, $ / LINEAR FOOT
125
120
115
110
105
100
95
90
85
80
75
70
65
0
5
10
15
20
25
30
SEWER DEPTH, FT.

FIGURE 7-9

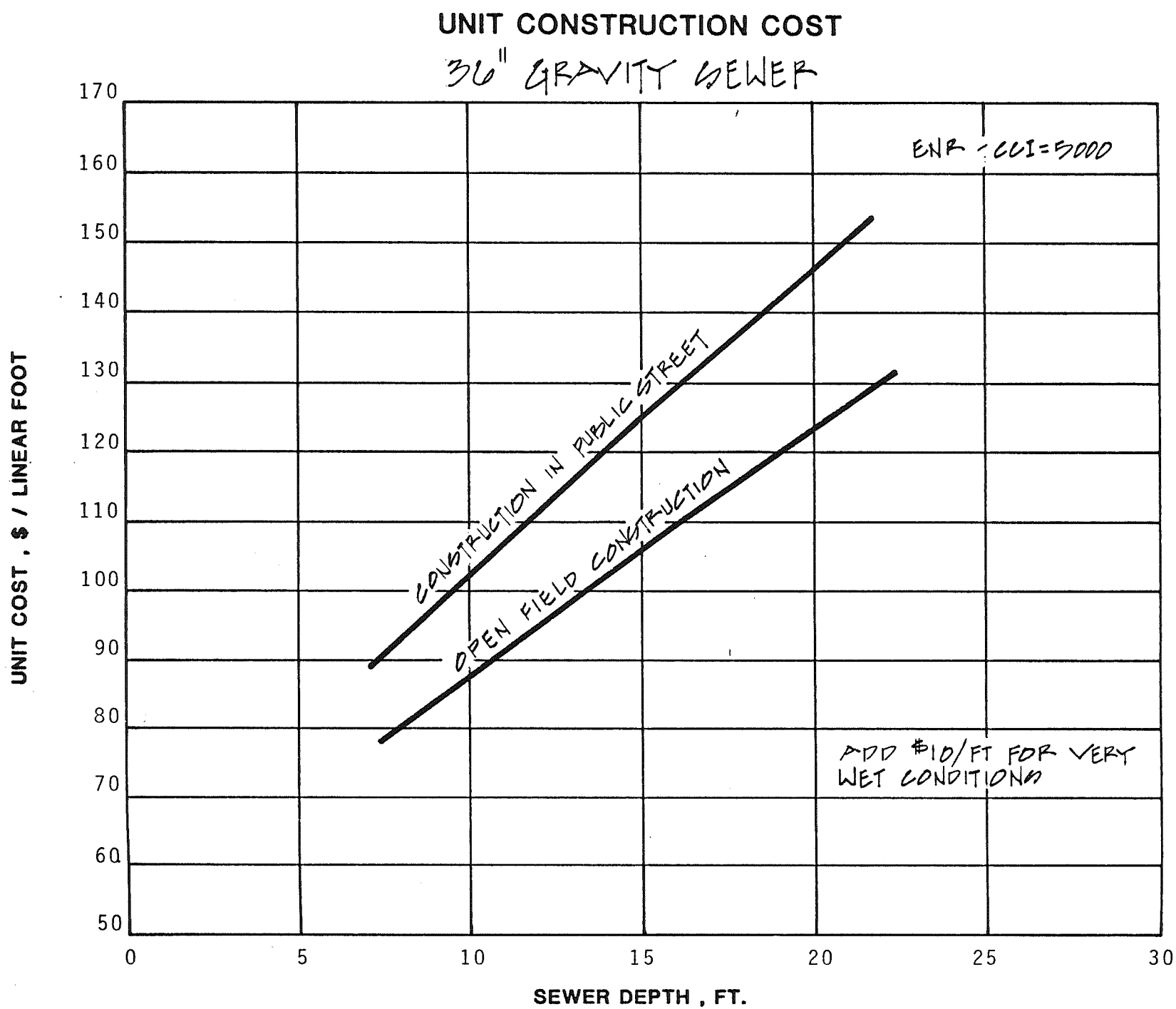

UNIT CONSTRUCTION COST
36" GRAVITY SEWER
ENR - CCI = 5000
CONSTRUCTION IN PUBLIC STREET
OPEN FIELD CONSTRUCTION
ADD $10/FT FOR VERY WET CONDITIONS
UNIT COST, $ / LINEAR FOOT
170
160
150
140
130
120
110
100
90
80
70
60
50
0
5
10
15
20
25
30
SEWER DEPTH, FT.

FIGURE 7-10

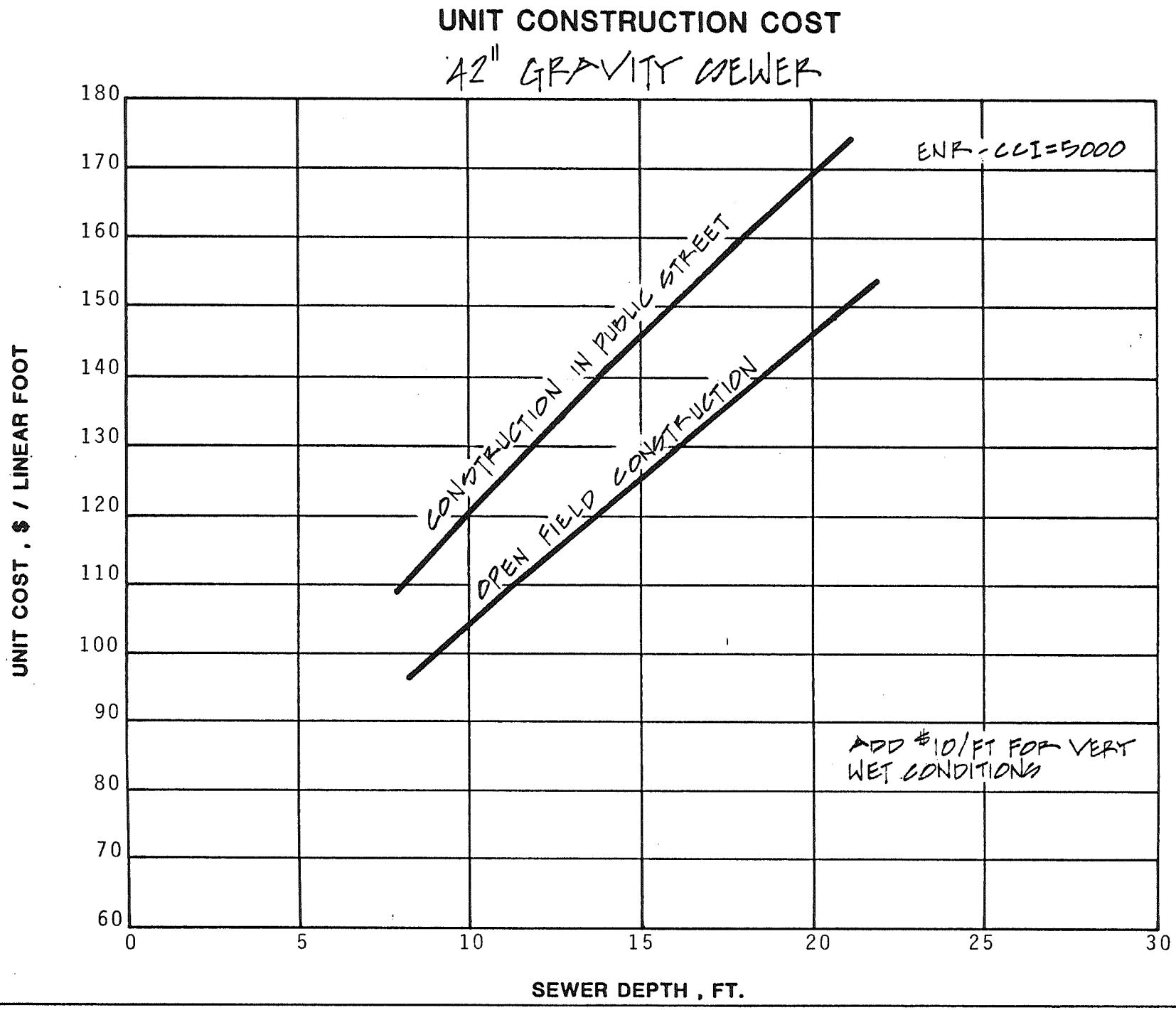

UNIT CONSTRUCTION COST
42" GRAVITY SEWER
ENR - CCI=5000
CONSTRUCTION IN PUBLIC STREET
OPEN FIELD CONSTRUCTION
ADD $10/FT FOR VERY WET CONDITIONS
UNIT COST , $ / LINEAR FOOT
180
170
160
150
140
130
120
110
100
90
80
70
60
0
5
10
15
20
25
30
SEWER DEPTH , FT.

FIGURE 7-11

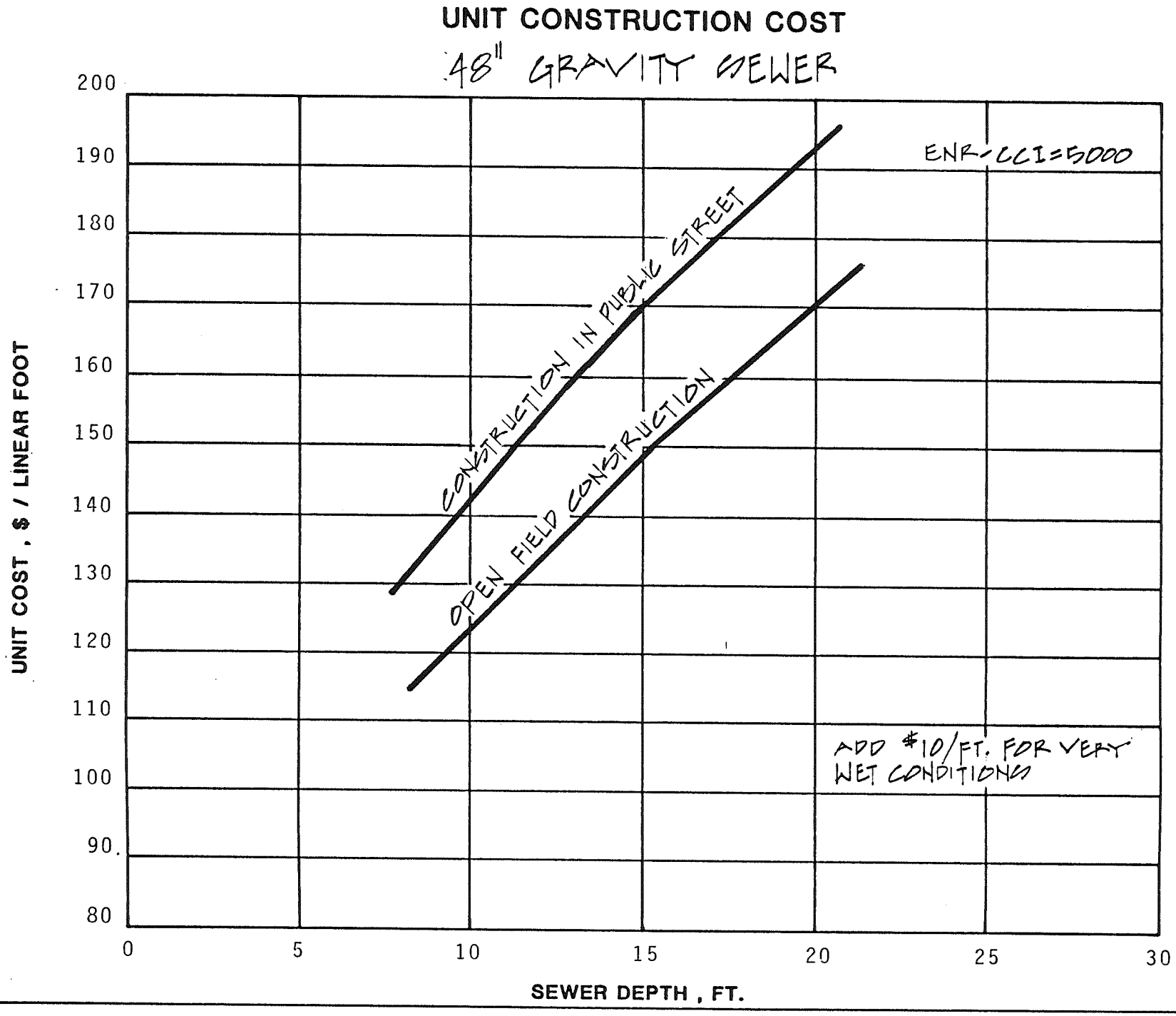

UNIT CONSTRUCTION COST
48" GRAVITY SEWER
ENR-CCI=5000
CONSTRUCTION IN PUBLIC STREET
OPEN FIELD CONSTRUCTION
ADD $10/FT. FOR VERY WET CONDITIONS
UNIT COST, $ / LINEAR FOOT
200
190
180
170
160
150
140
130
120
110
100
90
80
0
5
10
15
20
25
30
SEWER DEPTH, FT.

FIGURE 7-12

7.2.2 Force Mains

The estimated construction costs for force mains and other pressure sewer lines have been developed based upon the use of ductile iron pipe, reinforced concrete pipe, or concrete lined and coated steel pipe. The unit costs for force mains are presented in Figure 7-13. These costs include excavation, pipe, and fittings, laying and jointing, imported bedding, backfill, cleanup and testing, and contractor's overhead and profit. An alternate curve is shown for work within existing streets. All costs are based upon an ENR-CCI of 5000.

7.2.3 Pumping Stations.

Pumping stations can exhibit a great variation in cost, depending upon the type of station and conditions encountered. Cost curves developed for pumping stations have seldom proven accurate. Therefore, if pumping stations become necessary as part of the alternative development, individual cost estimates will be developed for each.

7.2.4 Contingency Factors

In developing cost estimates and budgets for comprehensive studies such as this, it is important to recognize that such cost estimates have limitations. In order to accommodate variations in

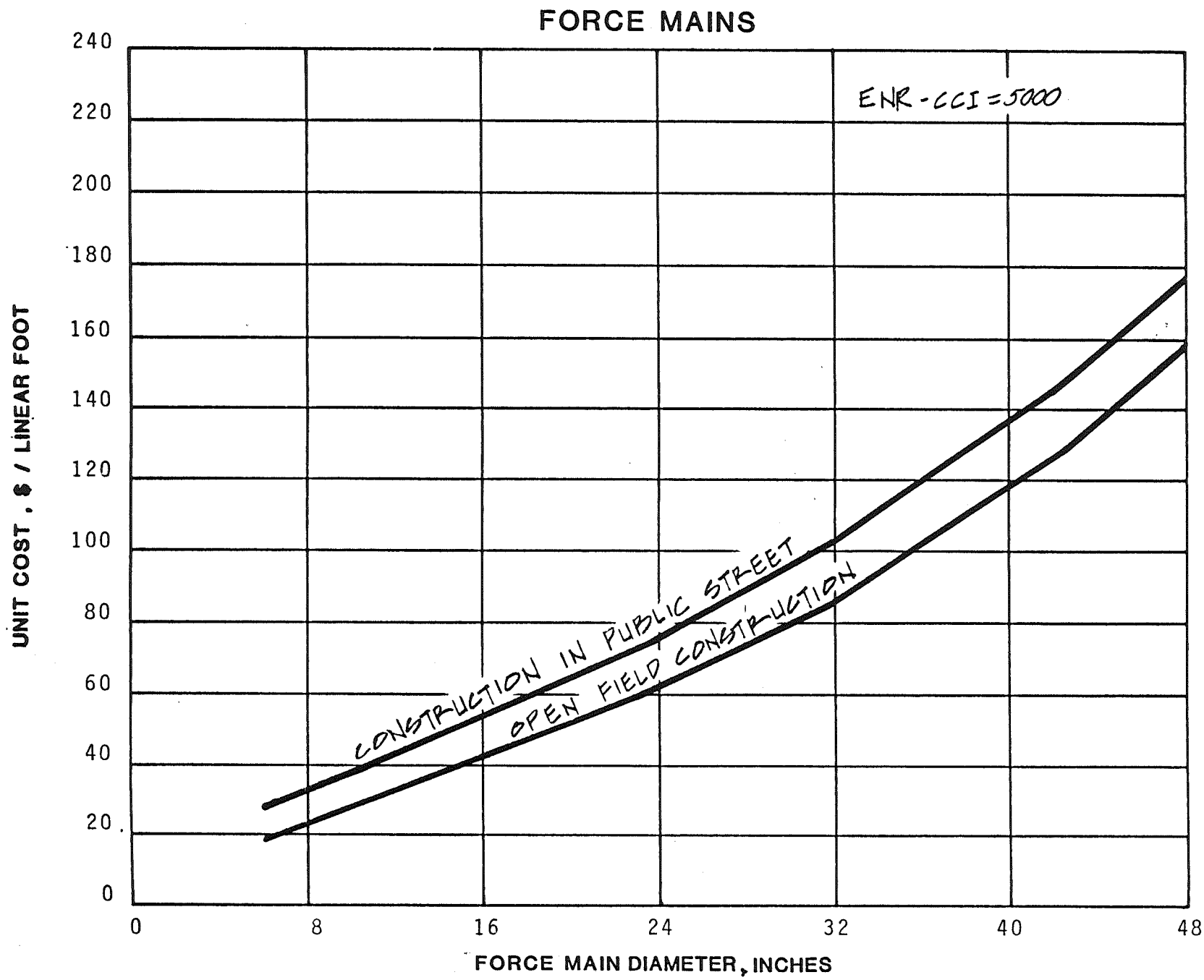

UNIT CONSTRUCTION COST
FORCE MAINS
ENR-CCI=5000
CONSTRUCTION IN PUBLIC STREET
OPEN FIELD CONSTRUCTION
UNIT COST, $ / LINEAR FOOT
240
220
200
180
160
140
120
100
80
60
40
20
0
0
8
16
24
32
40
48
FORCE MAIN DIAMETER, INCHES

FIGURE 7-13

line length and depth as well as unforeseen difficulties, a contingency factor is normally utilized. Contingency factors typically range from 10 to 25 percent. For this study, a moderate contingency factor of 15 percent has been selected.

7.2.5 Engineering and Administration

Engineering services for major construction projects can include pre-design investigations and reports, surveys, soils investigations, preliminary designs, plans and specifications preparation, and construction management and inspection. Depending on the size of the project and the extent of the services required, engineering costs can range from 5-20 percent of the construction cost. For this study, engineering costs are based upon 15 precent of the construction cost.

Administration of construction projects includes legal services, accounting services, and District staff time. In this study, administration services are estimated at 5 percent of the construction cost.

7.3 OPERATION AND MAINTENANCE COSTS

Operation and maintenance costs have been developed for the SVCSD collecton system. These costs include labor, energy, materials and supplies, and overhead and administration. Since the SVCSD system

presently has no pumping stations, these costs have been developed for line maintenance only.

Available cost data(22)(46) indicates that sewer system operation and maintenance typically ranges from $700.00 to $1500.00 per mile of sewer depending upon the age, condition, and size of the system. The O & M cost criteria developed for the SVCSD system is presented in Figure 7-14 and is based upon a Consumer Price Index of 295.

COLLECTION SYSTEM OPERATION AND MAINTENANCE COSTS

(EXCLUDING PUMPING STATIONS)

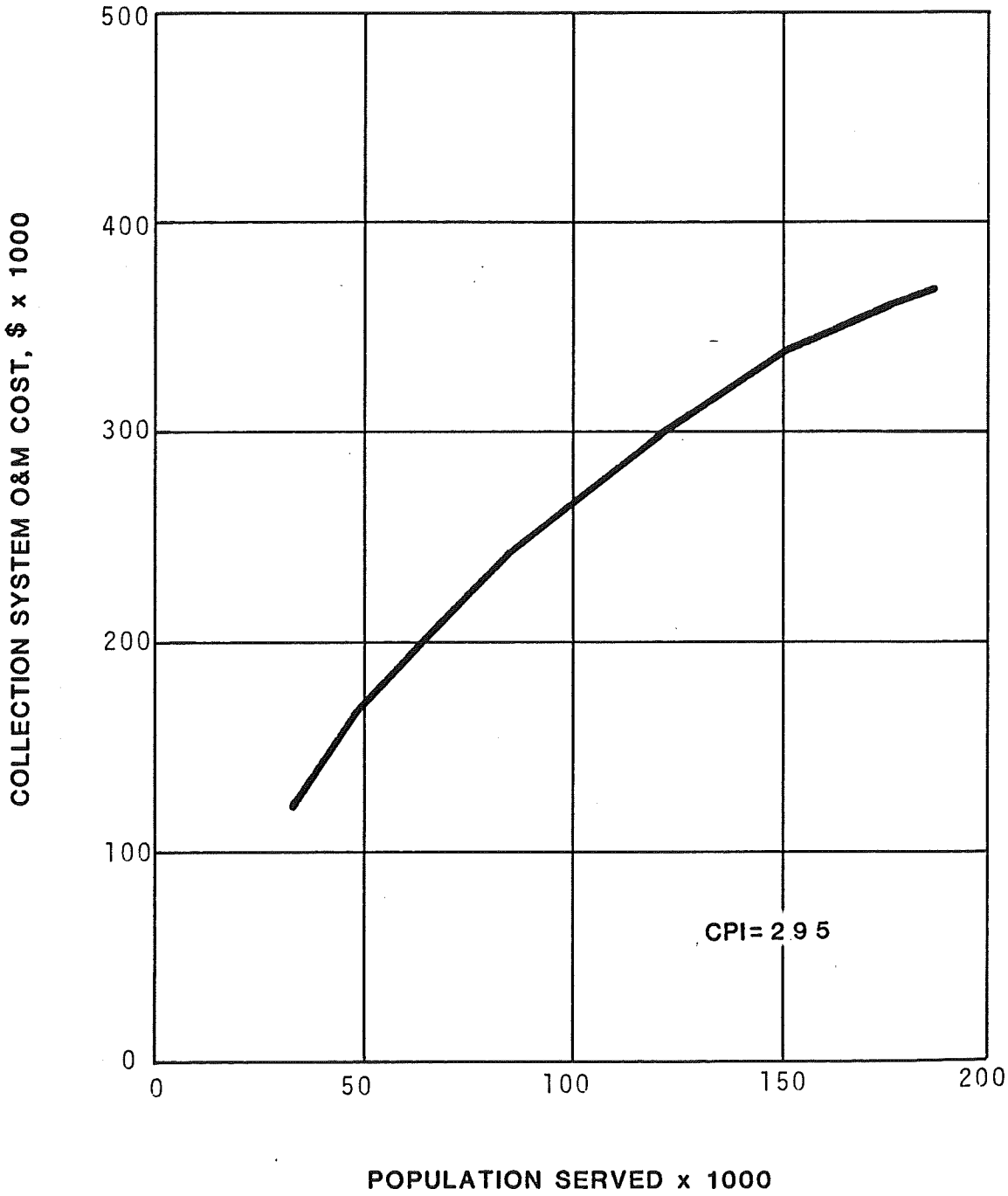


FIGURE 7-14

CHAPTER 8

DEVELOPMENT OF MOST VIABLE ALTERNATIVES

CHAPTER 8

ALTERNATIVE DEVELOPMENT

The preceding chapters have described the various factors which influence the planning of sewers in the Simi Valley area. These factors are utilized in this chapter for the systematic development of a sewer plan.

The chapter begins with the deliniation of sewer service areas and the development of ultimate wastewater flows. The development, analysis and ranking of alternatives is discussed next, with the chapter culminating with the selection of the apparent best alternative.

8.1 SEWER SERVICE AREAS

In planning improvements to a sewer system, the first step is to divide the Study Area into units which can be used to evaluate the ultimate capabilities of existing sewers and to layout new sewers. In this Study, the service area was first divided into gravity drainage basins. These drainage basins were then broken down into subdrainage areas, laid out such that the wastewater generated in the area could be conveyed through a local collection system to a trunk or interceptor sewer. The boundaries of the drainage basins and subdrainage areas are defined by topographic features and are presented in Plate 8-1.

The drainage basins and subdrainage areas in the undeveloped portions of the Study Area were defined strictly by topographic features. Since existing sewers generally follow natural drainage courses, and since developers normally make optimum use of existing topography, it follows that future sewers will be located accordingly.

In the developed portions of the Study Area, drainage basins and subdrainage areas were defined by a combination of topographical features and location of existing facilities. In such areas, the location of existing sewers tends to dictate the location of future improvements.

In the Study Area, drainage is essentially to the center of the valley from the north and the south. At the center of the valley, drainage is to the west along the course of the Arroyo Simi. With the exception of the area west of the Water Quality Control Plant, the Study Area can drain by gravity to the existing treatment facility.

8.2 DEVELOPMENT OF WASTEWATER FLOWS

Using as a basis for information on projected land use obtained from the City's Department of Community Development, wastewater flows were developed for each drainage basin and subdrainage area. This was accomplished by superimposing the General Plan Land Use Map on the drainage basin map. An inventory of land uses was then developed for each drainage basin and subdrainage area. The unit wastewater generation

TABLE 8-1

DRAINAGE BASIN CHARACTERISTICS

DRAINAGE BASIN	EST. AREA (AC)	COMMERCIAL AREA (AC)	INDUSTRIAL AREA (AC)	INSTITUTION AREA (AC)	ADWF mgd	PWWF mgd
A	2,780	15			1.14	3.14
B	1,830				.44	1.43
C	2,240			25	.44	1.43
D	970	5		10	.34	1.11
E	1,470		40		.20	.70
F	220			25	.18	.63
G	4,180		150	380	.39	1.27
H	660	10		35	.97	2.91
I	960	20	50	10	.64	1.92
J	2,000	220	80	10	.44	1.43
K	1,200	10		10	.40	1.30
L	1,380	15		15	.68	2.04
M	4,600	5			.09	.32
N	550	5			.43	1.40
O	310	15		50	.33	1.07
P	2,550	15		10	.19	.67
Q	1,160				.92	2.76
R	640	40		140	.60	1.80
S	160		140		.20	.70
T	950			35	.84	2.52
U	11,160				.19	.67
V	240	25		15	.38	1.24
W	360	95			.36	1.17
X	1.320	35		35	.79	2.37
Y	370	25		50	.49	1.59
Z	160	15		10	.19	.67
AA	110				.16	.56
BB	570	35	60	85	.73	2.19
CC	300				.27	.88
DD	40		40		.06	.21
EE	240	135	10		.49	1.59
FF	240	25			.26	
GG	1,280	90	20	25	.99	2.97
HH	420	5	330		.42	1.37
II	1,190		440		.57	1.71
JJ	430		40		.06	.21
KK	3,640		420		.56	1.68
LL	640	85		10	.46	1.50
MM	150		40	10	.07	.25
NN	80	35	30		.09	.32
OO	40		10		.09	.32
Total	53,790	980	1900	995	17.5	35.9

values presented in Chapter 4 were combined with the inventoried land uses to generate the flow characteristics of each area. These are summarized in Table 8-1.

The wastewater flows presented in Table 8-1 were developed using the land use and flow data presented in Chapters 3 and 4. In addition, allowances have been made to reasonably compensate for the granting of density bonuses. It should be noted that a large part of the Study Area is currently designated as Open Space (1 residential unit per 40 acres) and is not scheduled for development until after the year 2000. In this analysis, it was not anticipated that the General Plan would be revised to significantly increase the development densities in these areas.

8.3 USE OF EXISTING FACILITIES

The sewer system master plan previously prepared for the Study Area by Brown and Caldwell in 1967 (16) presented a program for construction of future trunk sewers. Most of the previously planned trunk sewers have been constructed over the past 16 years and are now in place. Only a small portion remain to be constructed. The previous planning effort utilized the gravity flow capacity in the then existent sewers in the Simi Valley and those sewers are now part of the District's backbone system.

In this study, effort has been made to fully utilize the in-place sewer capacity of the District. In addition, the former trunk and interceptor sewer plan (16) forms the basis for this effort.

In certain sections of the existing system, capacity deficiencies have been identified. These deficienceis are both short-term and long-term in nature.

Short-term deficiences are those which are now or presently will become troublesome. Such deficiencies are discussed in Chapter 5. Long term deficiencies are those which will become troublesome at some time prior to ultimate development. All such identified capacity deficiencies have been addressed in this study.

8.4 ALTERNATIVE SYSTEMS

In the development of alternative sewer systems, it is important to fully recognize the value of existing facilities. The previous sewer plan (16) analyzed and compared two system-wide sewering alternatives. The two systems were designed for the planned maximum development of the Study Area, as invisioned in 1967, and differed only with respect to major interceptor layout. The 1967 system alternatives are summarized in Table 8-2. The recommended plan selected in the previous study was Alternative I and is, with minor changes, the sewer system currently in place. The present sewer network is generally of adequate capacity for future development and is currently functioning well (See Chapter 5). Thus, considering the significant capital investment in the existing systems, there was no apparent need to re-plan the overall sewering concept.

Alternatives have been developed to answer two main questions. These are:

TABLE 8-2

SUMMARY OF SEWER SYSTEM ALTERNATIVES
FROM 1967 SIMI SEWERAGE SURVEY

ALTERNATIVE	DESIGNATION	MAJOR ELEMENTS
Single Major Interceptor	I	o Los Angeles Avenue Interceptor from Kuehner to SVWQCP. o Use of the Sanitation Inc. Trunk Sewer, located generally along Royal Avenue, as a secondary interceptor. o Conveyance of drainage basin flows to the two interceptors via five major trunk sewers.
Two Major Interceptors	II	o Los Angeles Avenue Interceptor from Kuehner to SVWQCP. o Cochran Street Interceptor from Stow to Madera Road. o Use of the Sanitation Inc. Trunk Sewer, located generally along Royal Avenue, as a secondary interceptor. o Conveyance of drainage basin flows to the three interceptors via six major trunk sewers.

1. How will future areas of development be conveyed to the SVWQCP?

2. What improvements to the existing sewer system are required to service future development?

In this analysis, trunk lines have been laid out to service the new development areas. The extent of trunk sewer extensions has been limited to minimum local subdrainage areas producing peak flows of approximately 1.0 mgd or greater. A flow of 1.0 mgd roughly approximates the maximum flow that can be accommodated in a 10 inch sewer with a minimum velocity of 3 feet per second. The above criteria differ from that used in the former Master Plan (16) in that the former plan limited trunk line extensions to areas producing a peak flow to 2.0 mgd. The new criteria provides for a more defined master plan with respect to trunk sewers. Topographic maps from the United States Geological Survey (USGS) and the Ventura County Public Works Agency were available for this study. All layout and preliminary design computations were based upon these maps. While adequate for this level of analysis, it can be expected that some modifications will be required at final design.

In determining the improvments required to allow the existing sewer system to function at ultimate development, the existing sewer system capacities were compared with anticipated ultimate flows. From this, a list of areas requiring relief was developed. These areas are discussed individually below.

8.4.1 Trunk and Interceptor Identification

The existing and required major trunk and interceptor sewers were first identified according to area served and location. The trunk and interceptor identification is presented in Table 8-3 and Plate 8-2. Also included in Table 8-3 are the noted deficiencies within each trunk and interceptor system.

8.4.2 Improvement Alternatives

Alternative plans have been developed to permit a comparison and evaluation of different methods of alleviating each identified deficiency. These are discussed individually below.

Sanitation Inc. Interceptor. Three alternatives were identified to alleviate the capacity deficiency from Los Angeles Avenue and Madera Road to the Arroyo Simi. Each alternative includes the same method of correcting the flood-prone portion of the interceptor at the Arroyo Simi. The method of correcting the flood-prone section is the subject of a separate report and analysis, which is included here by reference (36). The identified alternatives are:

TABLE 8-3

SUMMARY OF TRUNK AND INTERCEPTORS

NAME	DESIGNATION	DEFICIENCY
Los Angeles Interceptor	LA	None
Sanitation Inc. Trunk	SI	o Insufficient Capacity for ultimate flow from LA Avenue and Madera to the Arroyo Simi. o Insufficient protection from wshout due to errosion at Arroyo Simi Crossing.
Arroyo Simi Interceptor	AS	o Subject to washout due to errosion from flood flows in the Arroyo Simi.
Madera Road Trunk	M	o Existing line in Madera Road has insufficient capacity for ultimate flow. o Extension required to serve Wood Ranch and developments in Oak Canyon.
Sinaloa Trunk	S	None
Gantlin/ Fitzgerald Trunk	GF	o Insufficient capacity for ultimate flow from Fitzgerald to First Street.
Roldan/ Fitzgerald Trunk	RF	o Insufficient capacity for ultimate flow from Fitzgerald to Royal on Roldan.
Sycamore/Talbert Trunk	ST	None
Appleton/ Fitzgerald Trunk	AF	None
South Sequoia Trunk	SS	None

TABLE 8-3 (Cont.)

SUMMARY OF TRUNK AND INTERCEPTORS

NAME	DESIGNATION		DEFICIENCY
East Royal Trunk	ER		None
East Arroyo Simi Trunk	EAS		None
Terra Rejada Trunk	TR	o	Insufficient capacity for ultimate flow if depth of flow is limited to 75% of diameter; capacity is adequate if allowed to flow full at peak.
Almos Canyon Trunk	AC	o	New trunk line required to service future development.
Brea Canyon Trunk	BC	o	New trunk line required to service future development
South First Street Trunk	SF		None
North First Street Trunk	NF	o	Insufficient capacity for ultimate flow in existing line.
North Erringer Trunk	NE		None
Heywood Trunk	H		None
Elizondo Trunk	E		None
Justin Trunk	J	o	Insufficient capacity for ultimate flow if depth of flow is limited to 75% of diameter; capacity is adequate if allowed to flow full at peak.
		o	Revision of junction at Cochran and Justin is required.

TABLE 8-3 (Cont.)

SUMMARY OF TRUNK AND INTERCEPTORS

NAME	DESIGNATION		DEFICIENCY
Sycamore/Galena Trunk	SG		None
Galena Trunk	G	o	Insufficient capacity for increased flows on Galena near Sycamore.
North Sequoia Trunk	NS	o	Insufficient capacity for ultimate flows from Simi Valley Freeway to Rosalie.
Tapo Canyon Trunk	TC		None
Marr Ranch Trunk	MR		None
Ralston Trunk	R	o	Insufficient capacity for ultimate flows on Ralston.
Stearns Trunk	SA		None
Stow/Cochran Trunk	SC	o	Insufficient Capacity for ultimate flow near LA Avenue connection.
		o	Extension required to service future development.
Christine Trunk	C		None
Anastasia/ Kuehner Trunk	AK		None

Alternative SI1:

- o Parallel undersized section of sewer
- o Construct inverted siphon at Arroyo Simi Crossing

Alternative SI2:

- o Relieve undersized section by extending the Madera Road Trunk to the Los Angeles Avenue Interceptor at Madera Road and Easy Street,
- o Construct inverted Siphon at Arroyo Simi Crossing.

Alternative SI3:

- o Relieve undersized section by connecting upstream portion of the line to the Los Angeles Avenue Interceptor at Ralston.
- o Construct inverted siphon at Arroyo Simi Crossing.

Arroyo Simi Interceptor. Two alternatives were identified to protect sections of the line susceptible to washout from flood flows in the Arroyo Simi. These are:

Alternative AS1:

- Relocate and/or construct protection for sections susceptible to washout.

Alternative AS2:

- Abandon sewer and provide connection for existing discharges to Los Angeles Avenue Interceptor.

Madera Road Trunk. Only one alternative is available to provide adequate capacity for ultimate flows and to provide service to Wood Ranch and Oak Canyon. The alternative is:

Alternative M1:

- Extend existing trunk line into Oak Canyon.
- Construct western branch of trunk line to service Wood Ranch.
- Construct new line on Madera Road from Vista Lago Drive to Los Angeles Avenue.

Gantlin/Fitzgerald Trunk. Three alternatives were identified to alleviate the capacity deficiency from Fitzgerald to First Street. These are:

Alternative GF1:

- Relieve undersized section by constructing new sewer from Fitzgerald and Hudspeth to First Street.

Alternative GF2:

- Relieve undersized section by constructing new connection to the Sanitation Inc. Interceptor in Royal Avenue, upstream of Fitzgerald and Hudspeth.

Alternative GF3:

- Relieve undersized section by constructing parallel sewer along existing alignment from Fitzgerald Road to First and Sutter.

<u>Roldan/Fitzgerald Trunk:</u> Two alternatives were identified to alleviate the capacity deficiency at ultimate flow on Roldan. These are:

Alternative RF1:

- Relieve undersized section by construction parallel sewer on Roldan.

Alternative RF2:

- Relieve undersized section by constructing connection from Roldan and Fitzgerald to sewer at Roldan and Erringer.

Tierra Rejada Trunk. The tributary flow to the Tierra Rejada trunk is, at peak approximately equal to the full pipe capacity of the existing sewer. This exceeds the design depth of flow criteria established in Chapter 6. However, since the sewer will only flow full under peak wet weather conditions at ultimate development, relief is not considered necessary.

Alamos Canyon Trunk. The new trunk sewer required to service future development in the Alamos Canyon Drainage Basin would logically be constructed generally along the alignment of the future arterial serving the area. The only logical alterative is:

Alternatives AC1:

- Construct new trunk sewer along alignment of future major arterial.

- Tie new trunk line directly into existing junction structure at the SVWQCP.

Brea Canyon Trunk. The new trunk sewer required to service future development in the Brea Canyon Drainage Basin would logically be constructed along the future alignment of the northerly extension of Madera Road. At a point approximatey 0.5 miles north of the Simi Valley Freeway, the new trunk line would turn southwesterly along the natural drainage course of Brea Canyon to the Los Angeles Avenue Interceptor. The Alternative is:

Alternative B1:

- Construct new trunk sewer generally along the natural drainage course of Brea Canyon using the alignment of future Madera Road where feasible.

North First Street Trunk. Two alternatives were identified to alleviate the capacity deficiency along First Street north of Easy Street, and to service future developments to the north. These are:

Alternative NF1:

- Relieve undersized section by constructing parallel sewer in First Street.

- Tie parallel sewer into Los Angeles Avenue Interceptor at First Street and Easy Street.

- Extend new sewer along First Street to point north of Simi Valley Freeway. Construct trunk line extension north easterly from intersection of First Street and Simi Valley Freeway to service new development in Subdrainage areas GG-2 and GG-3.

Alternative NF2:

- Relieve undersized section by constructing parallel sewer in First Street.

- Tie parallel sewer into Los Angeles Avenue Interceptor at First Street and Easy Street.

- Extend new sewer along First Street to point north of Simi Valley Freeway.

- Provide service to subdrainage area GG-2 via trunk line extension from existing trunk line in Cochran Street, east of First Street.

Justin Trunk. The tributary flow to the Justin Trunk in the vicinity of Los Angeles Avenue is, at peak, approximately equal to the full pipe capacity of the existing sewer. This exceeds the design depth of flow criteria established in Chapter 6. However, since the sewer will only flow full under peak wet weather

conditions at ultimate development, relief is not considered necessary. However, as previously discussed in Chapter 5, the poorly constructed junction structure at Cochran and Justin should be modified.

Galena Trunk. Two alternatives were identified to alleviate the capacity deficiency on Galena near the connection to the sewer in Sycamore. These are:

Alternative G1:

- Relieve undersized section by constructing parallel line along Galena.

Alternative G2:

- Relieve undersized section by connecting the sewer which ties into the Galena Trunk from the east, directly into the Los Angeles Avenue Interceptor.

North Sequoia Trunk. Only one method in logically available to relieve the undersized section of sewer from the Simi Valley Freeway to Rosalie Street. That method is:

Alternative NS1:

- Construct new sewer line in Sequoia Street from the Simi Valley Freeway to Rosalie Street.

Ralston Trunk. Only one method is logically available to relieve the undersized sewer on Ralston. That method is:

Alternative R1:

- Construct parallel sewer in Ralston from Cochran to Los Angeles Avenue.

Stow/Cochran Trunk. Two alternatives were identified to relieve the undersized sections of sewer and to provide service to future developments. These are:

Alternative SC1:

- Relieve undersized sections by constructing new parallel sewer.

- Extend trunk sewer easterly along Cochran to new development area.

Alternative SC2:

- Relieve undersized sections and provide for new development by constructing new trunk line from new development area to Los Angeles Avenue Interceptor, following an alignment along Cochran to Stow and southerly on Stow to Los Angeles Avenue.

Walnut Street Main. As previously discussed in Chapter 5, the section of sewer on Walnut Steeet easterly of Tapo Street requires immediate replacement. Due to the nature of the deterioration in the existing line, the only method available to correct the problem is to construct a new parallel sewer and abandon the deteriorated sewer. These improvements are designated Alternative WM1.

8.5 EVALUATION OF ALTERNATIVES

The alterative plans for alleviating each identified sewer system deficiency were systematically evaluated. This evaluation was aimed at determining how well each alternative would meet the needs of the Study Area, and how much each alterative would cost.

Information required for a systematic evaluation was developed. In this regard, the evaluation parameters on which each alternative was judged were grouped into the following categories:

- Cost Effectiveness
- Qualitative Performance Factors

These categories are discussed in the following paragraphs.

8.5.1 Cost Effectiveness

The cost effectiveness of an engineering project is normally based on capital costs, annual cost, and economy of scale. Each of these cost effectiveness factors logically applies to system-wide sewering alternatives. However, when considering alternate trunk sewer routes and alternate methods of relieving undersized sewers, the difference in operation and maintenance costs is ususally indiscernable. In addition, economy of scale seldom applies. Therefore, for most alternatives, cost effectiveness was limited to a comparison of capital costs. Annual costs were compared only when the difference in operation and maintenance costs was significant.

The improvements and costs for each alternative identified in Subsection 8.4.2 have been summarized and are presented in Table 8-4 through 8-25.

TABLE 8-4

ALTERNATIVE S11
SUMMARY OF IMPROVEMENTS AND COSTS

Location

Sanitation Inc. Interceptor

Improvements

1. 3600 LF of 12" Sewer at .75 to .80%; average cut 12 to 15 feet.

2. 220 LF of 36" inverted siphon; appurtenances including automatic gates and controls.

Capital Costs

1.	Construction	$342,000
2.	Contingencies	51,000
3.	Engineering & Administration	69,000
	Total	$462,000

TABLE 8-5

ALTERNATIVE SI2
SUMMARY OF IMPROVEMENTS AND COSTS

Location

Sanitation Inc. Interceptor

Improvements

1. 2400 LF of 18" Sewer at 0.4 to 0.5%; average cut 15 to 18 feet.

2. 220 LF of 36" inverted siphon; appurtenances including automatic gates and controls.

Capital Costs

1.	Construction	$344,000
2.	Contingencies	52,000
3.	Engineering & Administration	69,000
	Total	$465,000

TABLE 8-6

ALTERNATIVE SI3
SUMMARY OF IMPROVEMENTS AND COSTS

Location

Sanitation Inc. Interceptor

Improvements

1. 100 LF of 12" Sewer at approximately 1%; average cut 15 to 18 feet; junction manhole on existing 24" Los Angeles Avenue Interceptor.

2. 220 LF of 36" inverted siphon; appurtenances including automatic gates and controls.

Capital Costs

1.	Construction	$187,000
2.	Contingencies	28,000
3.	Engineering & Administration	37,000
	Total	$252,000

TABLE 8-7

ALTERNATIVE AS1
SUMMARY OF IMPROVEMENTS AND COSTS

Location

Arroyo SImi Interceptor

Improvements

1. 400 LF of 20" Sewer; average cut 15 to 18 feet.

2. 800 LF of 12" sewer; average cut 15-18 feet.

Capital Costs

1.	Construction	$ 60,000
2.	Contingencies	9,000
3.	Engineering & Administration	12,000
	Total	$ 81,000

TABLE 8-8

ALTERNATIVE AS2
SUMMARY OF IMPROVEMENTS AND COSTS

Location

Arroyo Simi Interceptor

Improvements

1. Abandon Arroyo Simi Interceptor by diverting existing connections along Easy Street to Los Angeles Avenue Interceptor.

Capital Costs

1. Indeterminant at this level of study; should be determined at final design.

TABLE 8-9

ALTERNATIVE M1
SUMMARY OF IMPROVEMENTS AND COSTS

Location

Madera Road Trunk

Improvements

1. 2500 LF of 10" sewer at 1.5 to 2.0%; average cut 12 to 15 feet.
2. 5000 LF of 15" sewer at 1 to 2%; average cut 12-15 feet.
3. 3000 LF of 12" sewer at 0.65%; average cut 12-15 feet.
4. 1200 LF of 15" sewer at 0.4%; average cut 12-15 feet.
5. 1300 LF of 18" sewer at 0.28%; average cut 12-15 feet.

Capital Costs

1.	Construction	$607,000
2.	Contingencies	91,000
3.	Engineering & Administration	121,000
	Total	$819,000

TABLE 8-10

ALTERNATIVE GF1
SUMMARY OF IMPROVEMENTS AND COSTS

Location

Gantlin/Fitzgerald Trunk

Improvements

1. Pumping Station with PWWF capacity of 0.67 mgd.

2. 2800 LF of 8" force main.

Capital Costs

1.	Construction	$170,000
2.	Contingencies	26,000
3.	Engineering & Administration	34,000
	Total	$230,000

TABLE 8-11

ALTERNATIVE GF2
SUMMARY OF IMPROVEMENTS AND COSTS

Location

Gantlin/Fitzgerald Trunk

Improvements

1. 2800 LF of 10" sewer at 0.36% average cut 10-12 feet.

Capital Costs

1.	Construction	$112,000
2.	Contingencies	17,000
3.	Engineering & Administration	22,000
	Total	$151,000

TABLE 8-12

ALTERNATIVE GF3
SUMMARY OF IMPROVEMENTS AND COSTS

Location

Gantlin/Fitzgerald Trunk

Improvements

1. 2900 LF of 8" sewer at 0.6% to 1.8% ;average cut 8-10 feet.

2. 2,000 LF of 8" sewer at 0.5 to 0.7%; average cut 8 to 10 feet.

Capital Costs

1.	Construction	$162,000
2.	Contingencies	24,000
3.	Engineering & Administration	32,000
	Total	$218,000

TABLE 8-13

ALTERNATIVE RF1
SUMMARY OF IMPROVEMENTS AND COSTS

Location

Roldan/Fitzgerald Trunk

Improvements

1. 1300 LF of 8" sewer at 0.5%; average cut 8-10 feet.

Capital Costs

1.	Construction	$ 43,000
2.	Contingencies	6,000
3.	Engineering & Administration	9,000
	Total	$ 58,000

TABLE 8-14

ALTERNATIVE RF2
SUMMARY OF IMPROVEMENTS AND COSTS

Location

Roldan/Fitzgerald Trunk

Improvements

1. 400 LF of 8" sewer at 0.4%; average cut 8-10 feet.

Capital Costs

1.	Construction	$ 13,000
2.	Contingencies	2,000
3.	Engineering & Administration	3,000
	Total	$ 18,000

TABLE 8-15

ALTERNATIVE AC1
SUMMARY OF IMPROVEMENTS AND COSTS

Location

Alamos Canyon Trunk

Improvements

1. 4500 LF of 10" sewer at 1.7% to 3.3%; average cut 12-15 feet.

Capital Costs

1.	Construction	$207,000
2.	Contingencies	31,000
3.	Engineering & Administration	41,000
	Total	$279,000

TABLE 8-16

ALTERNATIVE B1
SUMMARY OF IMPROVEMENTS AND COSTS

Location

Brea Canyon Trunk

Improvements

1. 5500 LF of 12" sewer at 1 to 3.5%; average cut 12-15 feet.

2. 3500 LF of 12" sewer at 2 to 3%; average cut 12 to 15 feet.

Capital Costs

1.	Construction	$351,000
2.	Contingencies	53,000
3.	Engineering & Administration	70,000
	Total	$474,000

TABLE 8-17

ALTERNATIVE NF1
SUMMARY OF IMPROVEMENTS AND COSTS

Location

North First Street Trunk

Improvements

1. 1200 LF of 10" sewer at 1 to 1.3%; average cut 12-15 feet.

2. 800 LF of 8" sewer at 2.7%; average cut 12 to 15 feet.

3. 1200 LF of 10" sewer at 3 to 5%; average cut 15 to 20 feet.

4. 2500 LF of 12" sewer at 0.3 to 0.4 %; average cut to 20 feet.

Capital Costs

1.	Construction	$271,000
2.	Contingencies	41,000
3.	Engineering & Administration	54,000
	Total	$366,000

TABLE 8-18

ALTERNATIVE NF2
SUMMARY OF IMPROVEMENTS AND COSTS

Location

North First Street Trunk

Improvements

1. 1200 LF of 10" sewer at 1 to 1.3%; average cut 12-15 feet.

2. 800 LF of 8" sewer at 2.7%; average cut 12 to 15 feet.

3. 1200 LF of 8" sewer at 3 to 5%; average cut 12 to 15 feet.

4. 1500 LF of 10" sewer at 3 to 5%; average cut to 12 to 15 feet.

5. 1200 LF 10" sewer at 1.5 to 2%; average cut 12 to 15 feet.

Capital Costs

1.	Construction	$271,000
2.	Contingencies	41,000
3.	Engineering & Administration	54,000
	Total	$366,000

TABLE 8-19

ALTERNATIVE G1
SUMMARY OF IMPROVEMENTS AND COSTS

Location

Galena Trunk

Improvements

1. 1100 LF of 8" sewer at 0.5%; average cut 12-15 feet.

Capital Costs

1.	Construction	$ 42,000
2.	Contingencies	6,000
3.	Engineering & Administration	8,000
	Total	$ 56,000

TABLE 8-20

ALTERNATIVE G2
SUMMARY OF IMPROVEMENTS AND COSTS

Location

Galena Trunk

Improvements

1. 400 LF of 8" sewer at variable slopes; average cut 15 to 20 feet; extremely difficult construction along lined drainage channel and under railroad tracks.

Capital Costs

1.	Construction	$ 40,000
2.	Contingencies	6,000
3.	Engineering & Administration	8,000
	Total	$ 54,000

TABLE 8-21

ALTERNATIVE NS1
SUMMARY OF IMPROVEMENTS AND COSTS

Location

North Sequioa Trunk

Improvements

1. 3500 LF of 15" sewer at 0.5 to 0.6%; average cut 15 to 18 feet.

Capital Costs

1.	Construction	$217,000
2.	Contingencies	33,000
3.	Engineering & Administration	43,000
	Total	$293,000

TABLE 8-22

ALTERNATIVE R1
SUMMARY OF IMPROVEMENTS AND COSTS

Location

Ralston Trunk

Improvements

1. 2500 LF of 8" sewer at .3 to .4%; average cut 12 to 15 feet.

Capital Costs

1.	Construction	$ 95,000
2.	Contingencies	14,000
3.	Engineering & Administration	19,000
	Total	$128,000

TABLE 8-23

ALTERNATIVE SC1
SUMMARY OF IMPROVEMENTS AND COSTS

Location

Stow/Cochran Trunk

Improvements

1. 2000 LF of 8" sewer at 1 to 1.5%; average cut 10 to 12 feet.

2. 1500 LF of 10" sewer at .8 to 1.0%; average cut 12 to 15 feet.

3. 2700 LF of 10" sewer at 2-3%; average cut 12 to 15 feet.

Capital Costs

1.	Construction	$259,000
2.	Contingencies	39,000
3.	Engineering & Administration	52,000
	Total	$350,000

TABLE 8-24

ALTERNATIVE SC2
SUMMARY OF IMPROVEMENTS AND COSTS

Location

Stow/Cochran Trunk

Improvements

1. 3900 LF of 10" sewer at 2 to 3%; average cut 10 to 12 feet.

2. 1700 LF of 10" sewer at .8 to 1%; average cut 12 to 15 feet.

3. 1000 LF of 10" sewer at .8-1%; average cut 12 to 15 feet.

Capital Costs

1.	Construction	$278,000
2.	Contingencies	42,000
3.	Engineering & Administration	56,000
	Total	$376,000

TABLE 8-25

ALTERNATIVE WM1
SUMMARY OF IMPROVEMENTS AND COSTS

Location

Walnut Street Trunk

Improvements

1. 3800 LF of 8" sewer at various slopes; average cut 8 to 10 feet.

Capital Costs

1.	Construction	$125,000
2.	Contingencies	19,000
3.	Engineering & Administration	25,000
	Total	$169,000

8.5.2 Qualitative Performance Factors

Assuming that the SVCSD can afford the capital costs, factors other than cost may determine which alternative is most desireable. Such criteria include socio-economic factors and environmental impacts. These are:

- Land Use Compatibility

  Compatibility with existing plans for land use and development.

- Flexibility

  Ability to adapt to changes in population.

  Capacity for revision to accommodate changing development and land use patterns.

- Reliability

  Ability to perform as expected.

  Capacity to perform with minimum consequences due to systems failures.

- Public Acceptability

  Public attractiveness.

  Acceptability to local public groups.

- Ease of Operation

  Degree of attention required by operation and maintenance personnel.

- Ease of Construction

  Degree of difficulty and complexity of required construction.

- Protection of Aesthetics

  Ability to protect visual and other aesthetics.

- Nuisances

  Potential to create nuisances such as odors.

- Ability for Staged Construction

  Ability to be constructed in a fashion to accommodate growth as it occurs.

- Conservation of Scarce Resources

  Ability to conserve scarce and endangered resources.

- Impacts on Land Use Patterns

  Potential to influence future land use patterns.

The evaluation of alternatives according to the qualitative performance factors was achieved by a "-", "0", "+" procedure. A "-" rating signifies a negative impact on the performance factor. A "0" indicates a neutral or insignificant impact. A "+" rating indicates a positive or most beneficial impact.

A summary of the qualitative performance factor ratings for each alternative is presented in Table 8-26. It should be noted that for those required improvements for which only one viable method is available, all ratings are "0", unless an extremely negative performance is expected. For those singular alternatives presented here, no overriding negative impacts were encountered.

TABLE 8-26
SUMMARY OF QUALITATIVE PERFORMANCE FACTORS

SEWER	IMPROVEMENT ALTERNATIVE	ENGINEERING				IMPLEMENTATION			ENVIRONMENTAL				TOTAL POINTS
		FLEXIBILITY	RELIABILITY	EASE OF OPERATION	LAND USE COMPATIBILITY	EASE OF CONSTRUCTION	PUBLIC ACCEPTABILITY	ABILITY FOR STAGED CONSTRUCTION	PROTECTION OF AESTHETICS	CONSERVATION OF RESOURCES	IMPACT ON LAND USE PATTERN	NUISANCES	
Sanitation Inc. Interceptor	SI1	0	0	0	+	0	0	+	0	0	0	0	+3
	SI2	-	+	+	+	0	0	0	0	0	-	0	+1
	SI3	-	+	+	+	+	0	0	0	0	-	0	+3
Arroyo Simi Interceptor	AS1	+	-	0	0	-	0	0	0	0	0	0	0
	AS2	-	+	0	0	-	-	0	0	0	0	0	-1
Madera Road Trunk	M1	0	0	0	0	0	0	0	-0	0	0	0	0
Gantlin/Fitzgerald Trunk	GF1	+	-	-	0	-	-	0	-	-	0	-	-6
	GF2	0	+	+	0	+	0	0	0	0	0	0	+3
	GF3	+	+	+	0	0	0	+	0	0	0	0	+4
Roldan/Fitzgerald Trunk	RF1	0	0	0	0	0	0	0	0	0	0	0	0
	RF2	0	0	0	0	+	0	0	0	0	0	0	+1
Alamos Canyon Trunk	AC1	0	0	0	0	0	0	0	0	0	0	0	0
Brea Canyon Trunk	B1	0	0	0	0	0	0	0	0	0	0	0	0
North First Street Trunk	NF1	+	0	0	0	0	0	0	0	0	0	0	+1
	NF2	0	0	-	0	-	0	+	0	0	-	0	-2
Galena Trunk	G1	+	0	0	0	0	0	0	0	0	-	0	0
	G2	0	0	0	0	-	0	0	0	0	0	0	-1
North Sequoia Trunk	NS1	0	0	0	0	0	0	0	0	0	0	0	0
Ralston Trunk	R1	0	0	0	0	0	0	0	0	0	0	0	0
Stow/Cochran Trunk	SC1	0	0	0	0	-	0	+	0	0	0	0	0
	SC2	+	0	0	0	0	0	0	0	0	0	0	+1
Walnut Street Main	WM1	0	0	0	0	0	0	0	0	0	0	0	0

8.6 RANKING AND SELECTION OF APPARENT BEST IMPROVEMENT PROGRAM

The cost effectiveness and qualitative performance evaluation indicates that any combination of improvement alternatives will allow the existing sewer system to adequately serve the SVCSD at ultimate development. The selection of the recommended system should, therefore, be based upon superior performance in both the monetary and qualitative aspects. In this regard, each improvement alternative has been ranked based upon cost effectiveness and qualitative performance. This ranking is presented in Table 8-27.

From the ranking presented in Table 8-27, the apparent best system of improvments was developed and is presented in the same table. In most cases, the best method of correcting an identified deficiency was obvious. In two cases, however, the differences between alternatives was not readily discernible at this level of analysis. In these cases, both alternatives should be studied further at final design so that the least costly improvement method is selected. In the case of the Gatlin/Fitgerald Trunk, the quantitative performance ratings of Alternatives GF2 and GF3 were slightly different. The lower rated Alternative GF2, however, was significanly less in capital cost, and it was judged best on the basis of cost.

TABLE 8-27
RANKING AND SELECTION OF APPARENT BEST IMPROVEMENT PROGRAM

SEWER	IMPROVEMENT ALTERNATIVE	CAPITAL COST	QUALITATIVE PERFORMANCE RATING	RANK	APPARENT BEST SYSTEM
Sanitation Inc. Interceptor	SI1	$462,000	+3	2	
	SI2	$465,000	+1	3	SI3
	SI3	$252,000	+3	1	
Arroyo Simi Interceptor	AS1	$ 81,000	0	1	AS1*
	AS2	?	-1	1	
Madera Road Trunk	M1	$819,000	0	1	M1
Gantlin/Fitzgerald Interceptor	GF1	$230,000	-6	3	
	GF2	$151,000	+3	1	GF2**
	GF3	$218,000	+4	1	
Roldan/Fitzgerald Interceptor	RF1	$ 58,000	0	2	RF2
	RF2	$ 18,000	+1	1	
Alamos Canyon Trunk	AC1	$279,000	0	1	AC1
Brea Canyon Trunk	BC1	$474,000	0	1	BC1
North First Street Trunk	NF1	$366,000	+1	1	NF1
	NF2	$366,000	-2	2	
Galena Trunk	G1	$ 56,000	0	1	G1
	G2	$ 54,000	-1	2	
North Sequoia Trunk	NS1	$293,000	0	1	NS1
Ralston Trunk	R1	$128,000	0	1	R1
Stow/Cochran Trunk	SC1	$350,000	0	1	
	SC2	$376,000	+1	1	SC2*
Walnut Street Main	WM1	$169,000	0	1	WM1

* The difference between alternatives is not readily discernible at this level of analysis. Further study should be made at the Final Design stage.

** Differences in qualitative performance is insufficient to overcome the cost savings attributed to Alternative GF2.

CHAPTER 9

RECOMMENDED PROJECT

CHAPTER 9

RECOMMENDED IMPROVEMENT PROGRAM

The previous chapters in this report have described the various factors which influence the planning of sewers in the Simi Valley and have systematically developed a master plan for improvements. In this chapter, a detailed description of the recommended improvement program is presented, along with a summary of the basis for the master plan. In addition, recommendations are made for improvement staging and overall master plan management.

9.1 BASIS OF MASTER PLAN UPDATE

In updating the Sewer Master Plan, it was necessary to set forth the various improvement alternatives in sufficient detail to permit comparisons of performance and costs. This required the development of large amounts of technical data on the wastewater generating characteristics of the Study Area. In addition, criteria applicable to the preliminary design of facilities and basic cost data were needed. This information was presented in detail in Chapters 3 through 7. In order to provide for a complete understanding of the recommended plan, the more significant technical data and basis for the plan development were summarized and are presented in Table 9-1.

TABLE 9-1

SUMMARY OF TECHNICAL BASIS FOR MASTER PLAN UPDATE

ITEM	BASIS
Study/Service Area Boundaries	o Entire sphere of influence of both the Simi Valley County Sanitation District and the City of Simi Valley, supplemented by areas with natural drainage tributary to the City and other areas with need and desire for service.
	o January, 1983, LAFCO sphere of influence maps.
	o USGS and Ventura County Public Works Agency topographical maps.
Existing Land Use	o Information contained in the Housing elements of the General Plan, dated January, 1983.
	o Generalized existing land map obtained from City of Simi Valley - Department of Community Development, January, 1983.
Future Land Use	o General Plan for City of Simi Valley, dated March, 1980, plus amendments through Amendment 82-2.
	o Residential development in excess of target density anticipated due to current trends; see Section 3.4.2.
Population	o Projections established by the 201 Water Quality Management Plan and Air Quality Maintenance Plan for Ventura County.
	o Population for the year 2010 established by extending 1985-2000 rate of population growth.
	o Horizon population established using 52,500 residential units at buildout with 3.30 persons per unit.

TABLE 9-1 (Cont.)

SUMMARY OF TECHNICAL BASIS FOR MASTER PLAN UPDATE

ITEM	BASIS
Water Supply Characteristics	o Information provided by Ventura County water Works District No. 8 and the Southern California Water Company.
Residential Wastewater Generation	o 80 gallons per capita per day from strictly domestic sources at buildout.
	o Determined from analysis of water usage records and projections of recent trends.
Commercial Wastewater Generation	o 1000 gallons per acre per day for all types of commercial uses.
	o Determined from survey of Southern California Sewering Agencies and verified from analysis of four Simi Valley Commercial Centers.
Industrial Wastewater Generation	o 1200 gallons per day per acre for all types of industrial land.
	o Determined from survey of Southern California sewering agencies and industrial developers.
Institutional Wastewater Generation	o 500 gallons per day per acre for water using institutional land uses.
	o Determined from analysis of potential uses.
Infiltration/Inflow	o Determined from previous studies (17) and field observations.
Peak Flow Factors	o Determined from analysis of treatment plant flow records; flow measurements made throughout the system and data published in the literature.
Equivalent Dwelling Units	o 275 gallons per day per equivalent dwelling unit.
	o Determined from typical household characteristics in SVCSD.

TABLE 9-1 (Cont.)

SUMMARY OF TECHNICAL BASIS FOR MASTER PLAN UPDATE

ITEM	BASIS
Sewer Design Criteria for Planning	o Roughness Factors, n=0.013
	o Design depth of flow equal to 75 percent of diameter.
	o An existing sewer is allowed for flow full at peak prior to relief.
Cost Estimate Criteria	o Construction Cost Index is Engineering News Record index for Los Angeles.
	o Unit Construction costs are based upon an LA ENR-CCI of 5000.
	o Operation and Maintenance costs are based upon a CPI of 295.

9.2 DESCRIPTION OF RECOMMENDED IMPROVEMENTS

As previously discussed, the Sewer Master Plan Update was concerned with determination of the capacities and locations for major trunks and interceptors. Local laterals and collectors sewers (mains) were not considered as they are a function of final tract design. The major trunks and interceptors form the backbone of the entire collection system and therefore are of primary importance.

The general configuration of the SVCSD sewer system was established in the 1967 Brown and Caldwell Report (16). Implementation of the 1967 plan has resulted in a nearly complete and adequate backbone system. Only a relatively minor number of improvements to the existing trunk and interceptor system were determined to be necessary to service the ultimate development of the Study Area.

The improvements required to allow the existing system to meet the Study Area's ultimate development needs are presented in Plate 9-1. These recommended improvements are summarized in Table 9-2.

Trunk sewers have been proposed for four presently undeveloped portions of the service area. These are areas from which projected peak wet weather flows are expected to exceed 1 mgd. For the purpose of identification, each trunk and interceptor improvement has been given a name and designation, keyed to its location or service area.

TABLE 9-2

SUMMARY OF RECOMMENDED IMPROVEMENTS

IMPROVEMENTS	ESTIMATED ULTIMATE FLOW mgd ADWF	PWWF	DESCRIPTION	ESTIMATED COST $
SI3(1)	0.74	2.20	100 LF of 12 inch sewer at approximately 1% slope; average cut 15-18 feet; junction manhole on existing 24 inch Los Angeles Avenue Interceptor.	18,000
SI3(2)	6.20	15.50	220 LF of 36 inch inverted siphon; appurtenances including automatic gates and controls.	169,000
AS1	N/A	N/A	Relocate 400 LF of 20 inch sewer, average cut 15-18 feet, and 800 LF 12 inch sewer, average cut 15-18 feet.	60,000
M1(1)	0.31	1.09	2500 LF of 10 inch sewer at 1.5-2%; average cut 12-15 feet.	83,000
M1(2)	0.75	2.25	5000 LF of 15 inch sewer at 1-2%; average cut 12-15 feet.	225,000
M1(3)	N/A	1.14	3000 LF of 12 inch sewer at 0.65%; average cut 12-15 feet.	144,000
M1(4)	N/A	2.31	1200 LF of 15 inch sewer at 0.4%; average cut 12-15 feet.	68,000
M1(5)	N/A	3.23	1300 LF of 18 inch sewer at 0.28%; average cut 12-15 feet.	87,000

TABLE 9-2 (Cont.)

SUMMARY OF RECOMMENDED IMPROVEMENTS

IMPROVEMENTS	ESTIMATED ULTIMATE FLOW mgd ADWF	PWWF	DESCRIPTION	ESTIMATED COST $
GF2	0.21	0.67	2800 LF of 10 inch sewer at 0.36%; average cut 10-12 feet.	112,000
RF2	N/A	0.10	400 LF of 8 inch sewer at 0.4%; average cut 8-10 feet.	13,000
AC1	0.48	1.55	4500 LF of 10 inch sewer at 1.7 to 3.3%; average cut 12-15 feet.	207,000
B1(1)	0.51	1.52	5000 LF of 12 inch sewer at 1-3.5%; average cut 12-15 feet.	215,000
B1(2)	0.57	1.70	3500 LF of 12 inch sewer at 2-3%; average cut 12-15 feet.	136,000
NF1(1)	N/A	1.45	1200 LF of 10 inch sewer at 1.3%; average cut 12-15 feet.	52,000
NF1(2)	N/A	0.46	800 LF of 8 inch sewer at 2.7%; average cut 12-15 feet.	30,000
NF1(3)	0.50	1.63	1200 LF of 10 inch sewer at 3-5%; average cut 15-20 feet.	64,000
NF1(4)	0.39	1.26	2500 LF of 12 inch sewer at 0.3-0.4%; average cut 10-20 feet.	125,000

TABLE 9-2 (Cont.)

SUMMARY OF RECOMMENDED IMPROVEMENTS

IMPROVEMENTS	ESTIMATED ULTIMATE FLOW mgd ADWF	PWWF	DESCRIPTION	ESTIMATED COST $
G1	N/A	0.27	1100 LF of 8 inch sewer at 0.5; average cut 12-15 feet.	42,000
NS1	N/A	1.01	3500 LF of 15 inch sewer at 0.5 to 0.6%; average cut 15-18 feet.	217,000
R1	N/A	0.25	2500 LF of 8 inch sewer at 0.3 to 0.4%; average cut 12-15 feet.	95,000
SC2(1)	0.32	1.03	3900 LF of 10 inch sewer at 2-3%; average cut 10-12 feet.	156,000
SC2(2)	0.32	1.03	1700 LF of 10 inch sewer at 0.8-1%; average cut 12-15 feet.	77,000
SC2(3)	N/A	0.78	1000 LF of 10 inch sewer at 0.8-1%; average cut 12-15 feet.	45,000
WM1	N/A	N/A	3800 LF of 8 inch replacement sewer at various slopes; average cut 8-10 feet.	125,000
			Subtotal	$2,565,000
			Contingencies @ 15%	385,000
			Engineering & Administration @ 20%	513,000
			Total	$3,463,000

Note: For specific locations see Plate 9-1.

Improvements have been proposed to relieve present and future undercapacity sewers by either paralleling the existing line or by diverting sewage from upstream sections. Where alternate routes were available, trunk locations were individually compared and selected.

It should be noted that the backbone sewer system has been laid out to function without the need for wastewater pumping stations. This however, does not preclude the possibility that some small areas will be serviced via local pumping systems. Such systems should be avoided whenever possible.

The cost of the complete improvment program is estimated at approximately $3.5 million. This cost is based upon an ENR-CCI of 5000 for Los Angeles, and it assumes a 15% contingency allowance and a 20% engineering and administration allowance.

9.3 STAGING OF IMROVEMENTS

As a final step in updating the sewer master plan, a schedule for the logical and orderly construction of the recommended improvements on a staged basis was developed. Because not all of the facilities included in the plan will be requried immediately, it will be possible to construct them over a period of time.

In order to establish the program for staged construction, it was necessary to determine the near-term facility needs and to estimate when in the future the other improvements will be required. The land use and

population forecasts discussed in Chapter 3 were used to determine the long-term needs for improvements. On the other hand, the short-term needs were largely determined by the present and pending deficiencies o the existing system.

The implementation progam for the recommended improvements has been broken down into three stages. Each of these stages is discussed below.

9.3.1 Near Future Improvements

Near Future Improvements are defined as those required for proper functioning of the trunk and interceptor system between 1984 and 1990. Due to the manner in which the service area is presently developing, most of the recommended improvements will be required during the near future period. The Wood Ranch Development is expected to require extension and relief of the Madera Road Trunk during this period. In addition, the pending industrial development in the northwest portion of the service area will require construction of the Alamos Canyon Trunk and portions of the Brea Canyon Trunk. A listing of the near future improvements and costs is presented in Table 9-3 and described in greater detail in Table 9-3A.

9.3.2 Future Improvements

Future improvements are defined as those required for proper functioning of the trunk and interceptor system between 1990 and 2010. During this period, continued development of the Wood Ranch

TABLE 9-3

NEAR FUTURE IMPROVEMENTS
(1984 - 1990)

IMPROVEMENT	ESTIMATED COST
SI3(2)	$169,000
AS1	60,000[1]
M1(1)	83,000
M1(2)	225,000
M1(4)	68,000
M1(5)	87,000
GF(2)	112,000
RF2	13,000
AC1	207,000
B1(2)	136,000
NF1(2)	30,000
NF1(1)	52,000
G1	42,000
NS1	217,000
R1	95,000
WM1	125,000
Subtotal	1,721,000
Contingencies @ 15%	258,000
Engineering & Administration @ 20%	344,000
Total	$2,323,000

1. Work has been completed.

TABLE 9-3A
NEAR FUTURE IMPROVEMENTS
(1984-1990)

IMPROVEMENT	LOCATION (REF. PLATE 9-1)	DESCRIPTION	ESTIMATED COST (ENR 5000)	ANTICIPATED YEAR OF IMPLEMENTATION
SI3(2)	Sanitation Inc. Major Trunk at Arroyo Simi Crossing	220 LF of 36 inch inverted siphon; appurtenances including automatic gates and controls.	$228,000	FY 1984/85
AS1[1]	Arroyo Simi Trunk at Easy Street	Relocate 400 LF of 20 inch sewer, average cut 15-18 feet, and 800 LF of 12 inch sewer, average cut 15-18 feet.	$81,000	FY 1984/85
M1(1)	Madera Road Trunk Sewer Extension on Valley Road West on Sinaloa	2,500 LF of 10 inch sewer at 1.5-2%; average cut 12-15 feet.	$112,000	As Required to Serve New Development
M1(2)	Madera Road Trunk Extension to Sewer Wood Ranch.	5,000 LF of 15 inch sewer at 1-2%; average cut 12-15 feet.	$304,000	As Required to Serve New Development
M1(4)	Madera Road Trunk-North of Royal Avenue	1200 LF of 15 inch sewer at 0.4%; average cut 12-15 feet.	$92,000	As Required to Serve New Development
M1(5)	Madera Road Trunk-South of Los Angeles Avenue	1300 LF of 18 inch at 0.4%; average cut 12-15 feet.	$117,000	As Required to Serve New Development
GF2	Gantlin/Fitzgerald Trunk-Connection along Hudspeth to Royal Avenue	2800 LF of 10 inch sewer at 0.36%; average cut 10-12 feet.	$151,000	FY 1985-86
RF2	Roldan/Fitzgerald Trunk at Roldan and Fitzgerald	400 LF of 8 inch at 0.4%; average 8-10 feet.	$18,000	FY 1985-86

TABLE 9-3
NEAR FUTURE IMPROVEMENTS
(1984-1990)

(cont.)

IMPROVEMENT	LOCATION (REF. PLATE 9-1)	DESCRIPTION	ESTIMATED COST (ENR 5000)	ANTICIPATED YEAR OF IMPLEMENTATION
AC1	Los Alamos Canyon Trunk Sewer	4500 LF of 10 inch sewer at 1.7 to 3.3%; average cut 12-15 feet.	$279,000	As Required to Serve New Development
B1(2)	Brea Canyon Trunk Sewer	3500 LF of 12 inch sewer at 2-3%; average cut 12-15 feet.	$184,000	As Required to Serve New Develoment
NF1(2)	North First Street Trunk South of Cochran	800 LF of 8 inch sewer at 2.7%; average cut 12-15 feet.	$41,000	As Required to Serve New Development
NF1(1)	North First Street Trunk North of Easy Street	1200 LF of 10 inch sewer at 1.3% average cut 12-15 feet.	$70,000	As Required to Serve New Development
G1	Galena Trunk Sewer-Near Sycamore Connection	1100 LF of 8 inch sewer at 0.5% average cut 12-15 feet.	$57,000	FY 1985-86
NS1	North Sequoia Trunk-North of Los Angeles Avenue to Freeway	3500 LF of 15 inch sewer at 0.5 to 0.6%; average cut 12-15 feet.	$293,000	FY 1984-85
R1	Ralston Trunk-North of Los Angeles Avenue	2500 LF of 8 inch sewer at 0.3 to 0.4%; average cut 12-15 feet.	$128,000	FY 1985-86
WM1	Walnut Street Sewer Main	3800 LF of 8 inch replacement sewer at various slopes; average cut 8-10 feet.	$169,000	FY 1984-85

1. Work has been completed

and adjacent areas is expected to required relief of the final section of the Madera Road Trunk. The northern portion of the Brea Canyon is expected to develop requiring completion of the Brea Canyon Trunk.

In addition, development of the Douglas Ranch is expected to require upgrading of the Stow/Cochran Trunk. A listing of the Future Improvements and costs is presented in Table 9-4.

9.3.3 Ultimate Improvements

Ultimate Improvements are defined as those required for proper function of the trunk and interceptor system after the year 2010. Due to the manner in which the service area is expected to develop, only minior improvements will be required after 2010. These improvements are summarized in Table 9-5.

9.4 RECOMMENDED MANAGEMENT PROGRAMS

Successful implementation and continued effectiveness of a recommended improvement program requires a closely coordinated management program to monitor the planning, design, construction and financing of the needed improvements. It is vital that related management programs be adopted and implemented so that all stages of the plan will be compatible with future charges in planning factors resulting from changes in:

TABLE 9-4

FUTURE IMPROVEMENTS
(1990-2010)

IMPROVEMENT	ESTIMATED COST
M1(3)	$144,000
B1(1)	215,000
NF1(3)	64,000
SC2(1)	156,000
SC2(2)	77,000
SC2(3)	45,000
Subtotal	$701,000
Contingencies @ 15%	105,000
Engineering & Administration @ 20%	140,000
Total	$946,000

TABLE 9-5

ULTIMATE IMPROVEMENTS
(AFTER 2010)

IMPROVEMENTS	ESTIMATED COST
SI3(1)	$ 18,000
NF1 (4)	125,000
Subtotal	$ 143,000
Contingencies @ 15%	21,000
Engineering & Administration @ 20%	29,000
Total	$ 193,000

- Wastewater Technology
- Development Pattern
- Resident Life Style
- Institutional Arrangements
- Regulatory Requirements
- Regional and National Economy

Three programs that can be utilized in the overall sewer system management are discussed below.

9.4.1 Operation and Maintenance

This update of the SVCSD Sewer Master Plan is predicated upon the ability of the existing system to function effectively for many years. In order to assure this capability, an adequate program of operation and maintenance (O & M) is essential. Such a program should be one of action, not reaction. That is, the O & M program should focus on preventive maintenance and regular cleaning. An effective and efficient program should include the following:

- A routine preventive maintenance plan which precludes the interruption of service and protects existing facilities.

- A system for prompt investigation and correction of complaints.

- Continuous and routine monitoring program designed to find physical damage and identify potential problem spots; rapid correction of problems and elimination of causes.

- Adequate safety program.

- A community education program to prevent improper use.

- A community relations program.

The development of an effective and efficient O & M program is as important as the construction of new sewers. Therefore, it should be budgeted in light of the sizeable capital investment it is required to protect.

9.4.2 Flow and Growth Monitoring

Wastewater flows and the pattern of community growth should be periodically reviewed, as they are the basis for system sizing and project staging. Proper monitoring can prevent premature capital expenditures.

Flow monitoring records can provide management and decision making information for the effective implementation of future improvements and for the efficient provision of maintenance. At present, a data base of historical flows does not exist for the SVCSD system. Systematic monitoring of flows at key locations in the collection system will allow development of such a data base. Such a program was developed in conjunction with the computer simulation.

Due to the complex interrelationship between land use and sewerage system planning, random construction of facilities can result in haphazard developments and premature capital expenditure. Thus, it is important that a program be developed to track the community growth pattern. This should begin with clear and open communication between the City's Department of Community Development and the SVCSD staff, and should result in a logical method of altering the Master Sewer Plan in response to land use changes.

9.4.3 Emergency Preparedness

It is essential that the sewer system function as effectively as possible in the time of a natural or other disaster such as an earthquake, fire, or flood. To provide for this, an emergency preparedness plan is required. Such a plan has been developed for the SVCSD and is provided under separate cover.

APPENDIX A

GLOSSARY OF TERMS

GLOSSARY

Activated Sludge: Sludge particles produced in raw or settled wastewater (primary effluent) by the growth of organisms (including zoogleal bacteria) in aeration tanks in the presence of dissolved oxygen. The term "activated" comes from the fact that the particles are teaming with bateria, fungi, and protozoa.

Activated Sludge Process: A biological wastewater treatment process in which a mixture of wastewater and activated sludge is aerated and agitated. The activated sludge is subsequently separated from the treated wastewater (mixed liquor) by sedimentation, and wasted or returned to the process as needed.

Advanced Waste Treatment: Any process of water renovation that upgrades water quality to meet specific reuse requirements. May include general cleanup of water or removal of specific parts of wastes insufficiently removed by conventional treatment processes.

Aeration Basin: The same as aeration tank. The tank where raw or settled wastewater is mixed with return sludge and aerated.

Aeration Liquor: Mixed liquor. The contents of the aeration tank, which is composed of living organisms plus material carried into the tank by the untreated wastewater or primary effluent.

Aerobic: A condition in which "free" or dissolved oxygen is present in the aquatic environment.

Aerobic Bacteria: Bacteria which live and reproduce only in an environment containing oxygen which is available for their respiration (breathing), such as atmospheric oxygen or oxygen dissolved in water. Oxygen combined chemically, such as in water molecules, H_2O cannot be used for respiration by aerobic bacteria.

Aerobic Decomposition: Decomposition and decay of organic material in the presence of "free" or dissolved oxygen.

Aerobic Process: A waste treatment process conducted under aerobic (in the presence of "free" or dissolved oxygen) conditions.

Ambient Temperature: Temperature of the surroundings.

Amperometric: A method of measurement that records electric current flowing or generated, rather than recording voltage.

Anaerobic: A condition in which "free" or dissolved oxygen is not present in the aquatic environment.

Anaerobic Bacteria: Bacteria that live and reproduce in an environment containing no "free" or dissolved oxygen. Anaerobic bacteria obtain their oxygen, supply by breaking down chemical compounds which contain oxygen, such as sulfates (SO_4).

Anaerobic Decomposition: Decomposition and decay of organic material in an environment containing no "free" or dissolved oxygen.

Anaerobic Digestion: Wastewater solids and water (about 5% solids, 95% water) are placed in a large tank where bacteria decompose the solids in the absence of dissolved oxygen. At least two general groups of bacteria act in balance: (1) Saprophytic bacteria break down complex solids to volatile acids, and (2) Methane Fermenters break down the acids to methane, carbon dioxide, and water.

BOD: See Biochemical Oxygen Demand.

BTU: British Thermal Unit. The amount of heat required to raise the temperature of one pound of water one degree Fahrenheit.

Bacteria: Bacteria are living organisms, microscopic in size, which consist of a single cell. Most bacteria utilize organic matter for their food and produce waste products as the result of their life processes.

Biochemical Oxygen Demand or BOD: The BOD indicates the rate of oxygen utilized by wastewater under controlled conditions of temperature and time.

Bulking: Bulking occurs in activated sludge plants when the sludge becomes too light and will not settle properly.

Catnodic Protection: An electrical system for prevention of rust, corrosion, and pitting of steel and iron surfaces in contact with water and wastewater.

Chlorine Demand: Chlorine demand is the difference between the amount of chlorine added to wastewater and the amount of residual chlorine remaining after a given contact time. Chlorine demand may change with dosage, time, temperature, pH, nature, and amount of the impurities in the water.

Chlorine Requirement: The amount of chlorine which must be added to produce the desired result under stated conditions. The result (the purpose of chlorination) may be based on any number of criteria, such as a stipulated coliform density, a specified residual chlorine concentration, the destruction of a chemical constituent, or others. In each case, a definite chlorine dosage will be necessary. This dosage is the chlorine requirement.

Clarifier: Settling Tank, Sedimentation Basin. A tank or basin in which wastewater is held for a period of time, during which the heavier solids settle to the bottom and the lighter material will float to the water surface.

Coagulants: Chemicals added to destabilize, aggregate and bind together colloids and emulsions to improve settleability, filterability, or drainability.

Coliform: The coliform group of organisms is a baterial indicator of contamination. This group has as one of its primary habitats the intestinal tract of human beings. Coliform also may be found in tne intestinal tract of warm-blooded animals, and in plants, soil, air, and the aquatic environment.

Colloids: Very small solids (particulate or insoluble material) in a finely divided form that remain dispersed in a liquid for a long time due to their small size and electrical charge.

Composite (Proportional) Samples: Samples collected at regular intervals in proportion to the existing flow and then combined to form a sample representative of the entire period of flow over a given period of time.

Coning: A condition that may be established in a sludge hopper during sludge withdrawal when part of the sludge moves toward the outlet while the remainder tends to stay in place. Development of a cone or channel for moving liquid surrounded by relatively stationary sludge.

DO: Abbreviation of Dissolved Oxygen. DO is the atmospheric oxygen dissolved in water or wastewater.

Density: The weight per unit volume of any substance. The density of water (at 4°C) is 1.0 gram per cubic centimeter (gms/cc) or about 62.4 lbs. per cubic foot.

Detention Time: The time required to fill a tank at a given flow or the theoretical time required for a given flow of wastewater to pass through a tank.

Dewaterable: A material is considered dewaterable if water will rapidly drain from it.

Diffused Air Aeration: A diffused air activated sludge plant takes air, compresses it, and then discharges the air below the water surface of the aerator through some type of air diffusion device.

Diffuser: A diffuser is a device (porous plate, tube, bag) used to break the air stream from the blower system into fine bubbles in the mixed liquor.

Digester: A tank in which sludge is placed to allow sludge digestion to occur. Digestion may occur under anaerobic (more common) or aerobic conditions.

Disinfection: The process by which pathogenic (disease) organisms are killed. There are several ways to disinfect, but chlorination is the most frequently used method in water and wastewater treatment.

Dissolved Oxygen: Atmosphere oxygen dissolved in water or watewater, usually abbreviated DO.

Effluent: Wastewater or other liquid--raw, partially or completely treated--flowing from a basin, treatment process, or treatment plant.

Endogenous: A diminished level of respiration in which materials previously stored by the cell are oxidized.

Facultative: Facultative bacteria can use either molecular (dissolved) oxygen or oxygen obtained from food materials. In other words, facultative bacteria can live under aerobic or anaerobic conditions.

Filamentous Bacteria: Organisms that grow in a thread or filamentous form.

Flights: Scraper boards, made from redwood or other rot-resistant woods, or plastic used to collect and move settled sludge or floating scum.

Floc: Groups or "clumps" of bacteria that have come together and formed a cluster. Found in aeration tanks and secondary clarifiers.

Flocculated: An action resulting in the gathering of fine particles for form larger particles.

Grit: The heavy mineral material present in wastewater such as sand, eggshells, gravel, and cinders.

Grit Removal: Grit removal is accomplished by providing an enlarged channel which causes the flow velocity to be reduced and allows the heavier grit to settle to the bottom of the channel where it can be removed.

Influent: Wastewater or other liquid--raw or partially treated--flowing into a reservoir, basin, treatment process, or treatment plant.

Inorganic Waste: Waste material such as sand, salt, iron, calcium, and other mineral materials which are not converted in large quantities by organism action. Inorganic wastes are chemical substances of mineral origin and may contain carbon and oxygen, whereas organic wastes are chemical sustances of animal or vegetable origin and contain mainly carbon and hydrogen along with other elements.

Launders: Sedimentation tank effluent troughs.

MCRT: Mean Cell Residence Time. The average time activated sludge solids are held in the system.

MPN: MPN is the Most Probable Number of coliform group organisms per unit volume expressed as a density of organisms per 100 ml.

Mesophillic Bacteria: Medium temperature: A group of bateria that thrive in a temperature range between 68°F and 113°F.

Microorganisms: Very small organisms that can be seen only through a microscope. Some microoganisms use the wastes in wastewater for food and thus remove or alter much of the undesirable matter.

Milligrams Per Liter, mg/l: A measure of the concentration by weight of a substance per unit volume. For practical purposed, one mg/l is equal to one part per million parts (ppm). Thus a liter of water with a specific gravity of 1.0 weighs one million milligrams, and if it contains 10 milligrams of dissolved oxygen the concentration is 10 milligrams per million milligrams, or 10 milligrams per liter (10 mg/l), or 10 parts of oxygen per million parts of water, or 10 parts per million (10 ppm).

Mixed Liquor: When the activated sludge in an aeration tank is mixed with primary effluent or the raw wastewater and return sludge, this mixture is then referred to as mixed liquor as long as it is in the aeration tank. When the mixed liquor flows from the aeration tank it goes into the secondary clarifiers or final sedimentation tank.

Nitrification: The biochemical conversion of unoxidized nitrogenous matter (ammonia and organic nitrogen) to oxidized nitrogen (usually nitrate). The second-stage BOD is sometimes referred to as the nitrification stage (first-stage BOD is called the carbonaceous stage--carbon compounds oxidized to CO_2).

Nutrients: Substances which are required to support living plants and organisms. Major nutrients are carbon, hydrogen, oxygen, sulfur, nitrogen and phosphorus. Nitrogen and phosphorus are difficult to remove from wastewater by conventional treatment processes because they are water soluble and tend to recycle.

Organic Waste: Waste material which comes from animal or vegetable sources. Organic waste generally can be consumed by bacteria and other small organisms. Inorganic wastes are chemical substances of mineral origin and may contain carbon and oxygen, whereas organic wastes contain mainly carbon and hydrogen along with other elements.

Oxidation: Oxidation is the addition of oxygen, removal of hydrogren, or the removal of electrons from an element or compound. In wastewater treatment organic matter is oxidized to more stable substances.

Pathogenic Organisms: Bacteria or viruses which can cause disease (typhoid, cholera, dysentery). There are many types of bacteria which do not cause disease and which are not called pathogenic. Many beneficial bacteria are found in wastewater treatment processes actively cleaning up organic wastes.

Percent Saturation: Liquids can contain in solution limited amounts of compounds and elements. 100% saturation is the maximum theoretical amount that can be dissolved in the solution. If more than the maximum theoretical amount is present, the solution is supersaturated.

$$\text{Percent Saturation} = \frac{\text{Amount in Solution}}{\text{Maximum Theoretical Amount in Solution}} \times 100\%$$

pH: pH is an expression of the intensity of the alkaline or acidic strength of water. The pH may range from 0-14, where 0 is most acid, 14 most alkaline, and 7 neutral. Natural waters usually have a pH between 6.5 and 8.5.

Postchlorination: Chlorination of the plant discharge or effluent following plant treatment.

Preaeration: A preparatory treatment of wastewater consisting of aeration to freshen the wastewater, remove gases, add oxygen, and promote flotation of grease.

Prechlorination: Chlorination at the headworks of the plant; influent chlorination prior to plant treatment.

Pretreatment: Use of racks, screens, comminutors, and grit removal devices to remove metal, rocks, sand, eggshells, and similar materials which may hinder operation of a treatment plant.

Primary Treatment: A wastewater treatment process consisting of a rectangular or circular tank which allows those substances in wastewater that readily settle or float to be separated from the water being treated.

Rack: Parallel metal bars or rods evenly spaced and placed at an angle in the influent channel that remove rags, rocks and cans from wastewater.

RAS: Return Activated Sludge is the portion of settled solids in the secondary clarifiers that is returned to the aeration basin.

Raw Wastewater: Plant influent or watewater before any treatment.

Receiving Water: A stream, river, lake, or ocean into which treated or untreated wastewater is discharged.

Recirculation: The return of part of the effluent from a treatment process to the incoming flow.

Representative Sample: A portion of material or water identical in content to that in the larger body of material or water being sampled.

Residual Chlorine: Residual chlorine is the amount of chlorine remaining after a given contact time and under specified conditions.

Screen: A device with openings generally uniformly sized to retain or remove suspended or floating objects in wastewater larger than the openings. A screen may consist of bars, rods, wires, gratings, wire mesh, or perforated plates.

Secondary Treatment: A wastewater treatment process used to convert dissolved or suspended materials into a form more readily separated from the water being treated.

Septic: A condition produced by the growth of anaerobic organisms. If severe, the wastewater turns black, giving off foul odors and creating a heavy oxygen demand.

Shock Load: The arrival at a plant of a waste which is toxic to organisms in sufficient quantity or strength to cause operating problems. Organic or hydraulic overloads also can cause a shock load.

Sludge: The settleable solids separated from liquids during processing or deposits on bottoms of streams or other bodies of water.

Sludge Digestion: A process by which organic matter in sludge is gasified, liquefied, mineralized, or converted to a more stable form by anaerobic (more common) or aerobic organisms.

Sludge Gasification: A process in which soluble and suspended organic matter are converted into gas. Sludge gasification will form bubbles of gas in the sludge and cause large clumps of sludge to rise and float on the water surface.

Specific Gravity: Weight of a particle or substance in relation to the weight of water. Water has a specific gravity of 1.000 at 4°C (or 39°F). Wastewater particles usually have a specific gravity of 0.8 to 2.6.

Stablize: To convert to a form that resists change. Organic material is stablized by bacteria which convert the material to gases and other relatively inert substances. Stablized organic material generally will not give off obnoxious odors.

Supernatant: Liquid removed from settled sludge. - Supernatant commonly refers to the liquid between the sludge on the bottom and the scum on the surface of an anaerobic digester or a sludge storage lagoon. This liquid is usually returned to the influent wet well or the primary clarifier.

Tertiary Treatment: See Advanced Waste Treatment.

Thermophillic Bacteria: Hot temperature: A group of bacteria that thrive in temperatures above 113°F.

Thief Hole: A digester sampling well.

Totalizer: A totalizer continuously sums or adds up the flow into a plant in gallons or million gallons or some other unit of measurement.

Toxicity: A condition that may exist in wastes that will inhibit or destroy the growth or function of any organism.

TWAS: Thicken Waste Activated Sludge is waste activated sludge that has been thickened.

Wastewater: The used water and solids from a community that flow to a treatment plant. Storm water, surface water, and groundwater infiltration also may be included in the wastewater that enters a plant. The term sewage usually refers to household wastes, but this word is being replaced by the term wastewater.

Weir: A vertical obstruction, such as a wall, or plate, placed in an open channel and calibrated in order that a depth of flow over the weir can easily be converted to a flow rate in mgd (million gallons per day).

Weir Diameter: Circular clarifiers have a circular weir within the outside edge of the clarifier, and all of the water leaving the clarifier flows over this weir. This diameter is the length of a line from one edge of a weir to the opposit edge and passing through the center of the circle formed by the weir.

WAS: Waste Activated Sludge is that portion of the activated sludge solids that are removed from the activated sludge system.

APPENDIX B

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BIBLIOGRAPHY

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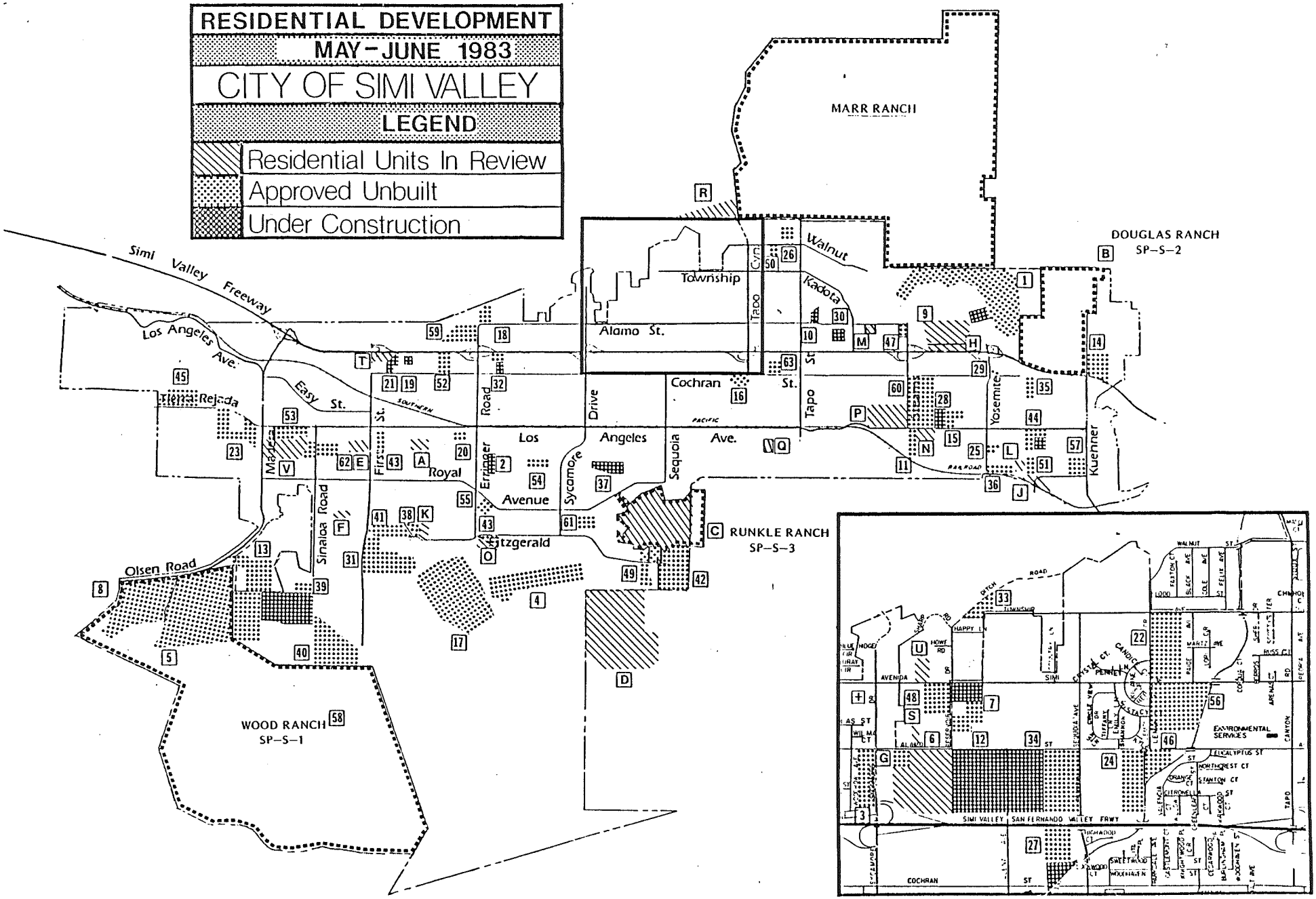
APPENDIX C

DEVELOPMENTS IN PROCESS

RESIDENTIAL DEVELOPMENT
MAY-JUNE 1983
CITY OF SIMI VALLEY

LEGEND

- Residential Units In Review
- Approved Unbuilt
- Under Construction



RESIDENTIAL

APPROVED UNBUILT UNITS

Map Number	Case Number	Type Const.	Number Units	Case Planner	Applicant
1	PD-S-245/TT2622	SF	751	Ascher	Mayer Construction Co., 8121 Florence St., Downey, CA (213)927-3341
2	PD-S-396/TT3370	M	48	Freed	Westoaks Inv., 660 Hampshire Rd., Westlake, CA (805)497-4557
3	PD-S-385/TT3296	M	60	Ascher	Insured Dev., P.O. Box 90777, L.A., CA (213)776-1146
4	PD-S-337/TT3045	SF	166	Ascher	Stonecraft, 511 S. Westgate, Santa Monica, CA (213)476-1231
		M	68		
5	PD-S-449/TT3513	M	1151	Freed	Olympia/Roberts Co., 863 Madera Road, Simi Valley, CA 93065
		SF	415		(805)581-3651
6	PD-S-383/TT3269	SF	126	Ascher	Larwin So. Ca., 16255 Ventura Blvd., Encino, CA (213)986-8890
7	PD-S-252/TT2615	SF	65	Evans	JBR, 8383 Wilshire Blvd., Beverly Hills, CA (213)653-6100
8	Maj.Mod. PD-S-468/	SF	122	Freed	Olympia/Roberts Co., 863 Madera Road, Simi Valley, CA 93065
	TT3746	M	387		(805)581-3651
9	PD-S-523	SF	94	Stafford	Mayer Constr. Co., 9171 Wilshire Blvd., Ste.310, Beverly Hills, CA (213)274-5553
10	Maj.Mod. PD-S-290/ TT3850	M	92	Cottle	Barratt Los Angeles, 5955 DeSoto Ave., Ste. 200, Woodland Hills, CA (213)703-7989
11	PD-S-335/TT3023	M	60	Stafford	Ronald Levine Const., 9348 Santa Monica Blvd., Beverly Hills, CA (213)274-8263
12	PD-S-317/TT2970	SF	22	Ascher	Deerwood Estates, 2710 Winona, Burbank, CA (213)507-5026
13	PD-S-405/TT2971	SF	48	Ascher	Cricketfoot Estates, c/o Byron Johnson, 4545-5M Industrial St., Simi Valley, CA (805)522-3366
14	PD-S-438/TT2908	M	116	Ascher	Simi Valley Associates, P.O. Box 2153, Santa Monica, CA (213)393-1431
15	PD-S-315	MH	100	Ascher	Robert Barker, 761 Calle Sequior, Thousand Oaks, CA (805)498-1888
16	PD-S-444/TT3608	M	83	Chien	Larwin Construction Co., 16255 Ventura Blvd., Encino, CA (213)986-8890
17	PD-S-235/TT2576	SF	215	Schoetz	Bridle Path Homes, 9777 Wilshire Blvd., Ste. 818, Beverly Hills, CA (213)271-5257
18	PD-S-433/TT3040	M	34	Ascher	R-C Builders, 28215 W. Agoura Rd., Ste. 2, Agoura, CA (213)991-5712
19	PD-S-304/TT2879	SF	31	Schoetz	Ceeco Dev. Co., 160 Town & Country St., Orange, CA (714)547-5812
20	PD-S-465/TT3709	M	24	Evans	Preece & Iacobellis Inc., 22916 Lyons Ave., Ste. 2A, Newhall, CA (805)259-4318
21	PD-S-392/TT3177	M	31	Ascher	Barratt Los Angeles, 5955 DeSoto Ave.,Ste.200,Woodland Hills,CA. (213) 703-7989
22	PD-S-273/TT2648	SF	63	Schoetz	JBR, 8383 Wilshire Blvd., Beverly Hills, CA (213)653-6100
23	PD-S-450/TT3565	M	266	Freed	Moreland Dev. Co., 5775 E. L.A. Ave., Ste. 111, Simi Valley, CA (805)526-4255
		SF	3		
24	PD-S-296/TT2852	SF	42	Ascher	Griffin Dev., 19436 Ventura Blvd., Tarzana, CA (213)881-5200
25	PD-S-415	M	23	Lawson	M. Trenouth, 2207 Lupin St., Simi Valley, CA (805)529-1469
26	PD-S-459/TT3667/ LD-S-222	SF	7	Chien	Spectrum Land Planning, Inc., 5775 L.A. Ave., Ste. 210, Simi Valley, CA (805)522-6004
27	PD-S-297/TT2874	SF	63	Freed	Griffin Dev., 19436 Ventura Blvd., Tarzana, CA (213)881-5200
		M	136		
28	PD-S-292/TT2637	SF	55	Freed	Griffin Dev., 19436 Ventura Blvd., Tarzana, CA (213)881-5200
29	PD-S-462/TT3676	M	32	Cottle	Pauline E. Amond & Assoc., 6454 Van Nuys Blvd., Ste.37, Van Nuys, CA (213)781-9922
30	LD-S-247	--	--	Chien	Al Rosen, 4737 Barnard St., Simi Valley, CA. (805)526-6772
31	PD-S-300/TT2783	SF	227	Freed	Shapell Industries, 8783 Wilshire Blvd., Beverly Hills, CA (213)655-7330

RESIDENTIAL

APPROVED UNBUILT UNITS (CONT'D.)

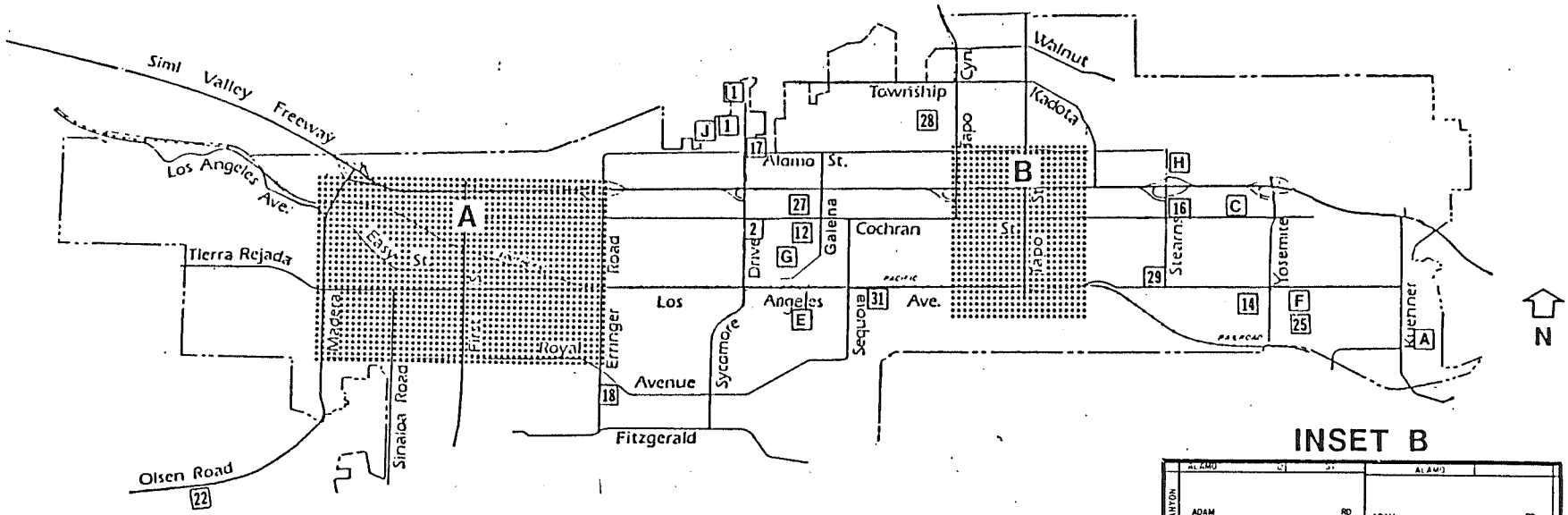
Map Number	Case Number	Type Const.	Number Units	Case Planner	Applicant
32	PD-S-275/TT2504	SF	40	Freed	Barratt Los Angeles, 5955 DeSoto Ave., Ste. 200, Woodland Hills, CA (213)703-7989
33	PD-S-456/TT3549	SF	9	Kuhn	Joseph Conti & Associates, 13160 Peach Hills Rd., Moorpark, CA (805)529-5359
34	PD-S-381/TT3163	SF	146	Ascher	Standard Pacific-Ventura, 32123 Lindero Canyon Road, Westlake, CA (805)484-5448
35	TT3110	SF	10	Stafford	Ann Welch, 1732 L.A. Ave., Simi Valley, CA (805)887-7770
36	PD-S-440/TT3379	M	21	Ascher	LBH Engineering, 1654 L.A. Ave., Simi Valley, CA (805)522-1900
37	PD-S-373/TT3197	M	44	Freed	Franklin Greenspan, 1429 Thousand Oaks Blvd., Thousand Oaks, CA (805)495-8808
38	PD-S-467/TT3713	M	12	Stafford	Calgind Inc., 6303 Wilshire Blvd., L.A., CA (213)651-2700
39	LD-S-253	--	--	Chien	Barbara Leddy, 290 Highland Ave., Simi Valley, CA (805)522-3073
40	PD-S-259 Maj.Mod. TT2950/TT2949/TT2595	SF	194	Freed	John D. Lusk Co., 17550 Gilette Ave., Newport Beach, CA (714)557-8220
41	PD-S-421,TT3187	M	40	Ascher	Calmark Properties, Inc., P.O. Box 2128, Santa Monica, CA (213)453-1721
42	PD-S-420/TT3459	SF	112	Ascher	Great West Homes,Inc., 27078 Malibu Cove Colony,Malibu,CA. (213)456-9811
43	PD-S-508/TT3764/ Z-S-284	M	30	Ascher	Jan Romanoff/Shoemaker/Rancho Simi Development Corp., 3654 Golden Leaf Dr., Westlake Village, CA (213)707-1050
44	PD-S-445/TT3610	M	231	Ascher	Majestic Housing, 6525 E. Telegraph Rd., L.A., CA (213)721-9744
45	PD-S-435/TT3535	M	172	Freed	Larwin Construction Co., 16255 Ventura Blvd., Encino, CA (213)926-8890
46	PD-S-446/TT3578	M	28	Ascher	Gary Levin, P.O. Box 448, Beverly Hills, CA (213)276-7931
47	PD-S-466/TT3704	M	28	Ascher	Ritter Dev. Corp., P.O. Box 377, Chatsworth, CA (213)998-7114
48	PD-S-458/TT3523	SF	17	Ascher	Hubert Much, 4026 Schuylkill Dr., Woodland Hills, CA (213)884-8501
49	LD-S-228	SF	4	Cottle	People's Empire Ranch, 8800 Wilshire Blvd., Beverly Hills, CA (213)657-5970
50	PD-S-488/TT3780	SF	16	Chien	Richard Hayward, 4192 Walnut Avenue, Simi Valley, CA (805)527-0260
51	PD-S-451/TT3027	M	78	Stafford	Ritter Dev.Co.,P.O.Box377, Chatsworth,CA. (213)998-7114
52	PD-S-500/TT3779	M	217	Lawson	Griffin Dev., 19436 Ventura Blvd., Tarzana, CA (213)881-5200
53	SP-S-5(Simi Village)	SP	304	Freed	Farrell, Koffman, Buccola, 8348 Penfield Ave., Canoga Park, CA (213)700-1142
54	PD-S-491/TT3791/ Z-S-277	SF	8	Ascher	Elvin C. Gaines, Equity Trust, 2951 Sycamore Dr., Simi Valley, CA (805)526-0457
55	Maj.Mod.SUP-2532	--	--	Ascher	First Baptist Church, 2000 Royal Ave., Simi Valley, CA. (805)526-8075
56	PD-S-490/CC-S-4	--	--	Cottle	Rancho Simi Rec. & Park District, 1692 Sycamore Dr., Simi Valley, CA (805)526-[illegible]60
57	PD-S-497/TT3807	M	168	Freed	D & S Co., 11650 Riverside Dr., North Hollywood, CA (213)506-1212
58	SP-S-1 (Wood Ranch)	SP	1945	Freed	Olympia/Roberts, 863 Madera Road, Simi Valley, CA 93065 (805)581-3651
59	PD-S-476/TT3705	M	90	Freed	Ritter Dev. Co., P.O. Box 377, Chatsworth, CA (213)998-7114
60	PD-S-503/TT3785	SF M	146 555	Alexander	Griffin Dev., 19436 Ventura Blvd., Tarzana, CA (213)881-5200
61	Maj.Mod. SUP-S-143	--	--	Chien	Simi Baptist Church, 1122 Appleton Rd., Simi Valley, CA (805)522-5075
62	Maj.Mod. SUP-S-201	--	--	Evans	Calvary Baptist Church, P.O. Box 310, Simi Valley, CA (805)526-6606
63	PD-S-495	--	--	Freed	Our Saviour Lutheran Church, 4191 Cochran St., Simi Valley, CA (805)526-7577

Subtotals: SF-3209 M-4325 SP-2249 MH-100

RESIDENTIAL

UNITS IN REVIEW

Map Number	Case Number	Type Const.	Number Units	Case Planner	Applicant
A	PD-S-520	--	--	Chien	Sunrise Pre-School, 1335 Patricia Ave., Simi Valley, CA (805)526-2702
B	SP-S-2 (Douglas Ranch)	SP	706	Ascher	Mayer Construction Group, 9171 Wilshire Blvd., 3rd Floor, Beverly Hills, CA (213)274-5553
C	SP-S-3 (Runkle Ranch)	SP	472	Freed	Dale Poe Dev. Corp., 28631 Canwood St., #P, Agoura, CA (213)889-2822
D	PD-S-514/TT3832/Z-S-286	SF	26	Ascher	George Muna & Nazih Khalil, 575 Kenwood St., Thousand Oaks, CA. (805)498-4239
E	PD-S-527/TT3771	M	376	Lawson	Ritter Development Co., P.O. Box 377, Chatsworth, CA (213)998-7114
F	LD-S-254	--	--	Chien	Richard Hartman, 1135 Balsamo Ave., Simi Valley, CA (805)581-1852
G	Maj.Mod. PD-S-383 TT3906	SF	206	Evans	Larwin Construction Co., 16255 Ventura Blvd., Encino, CA (213)986-8890
H	PD-S-484/TT3752	SF	11	Cottle	S./J. Allen, 5550 Barnard St., Simi Valley, CA (805)581-0676
J	PD-S-486/TT3706	M	108	Stafford	Ritter Dev. Co., P.O. Box 377, Chatsworth, CA (213)998-7114
K	LD-S-244	SF	--	Stafford	Calgind, Inc., 6303 Wilshire Blvd., L.A., CA (213)651-2700
L	PD-S-525/LD-S-260/ Z-S-292	M	4	Evans	Ritter Development Co., P.O. Box 377, Chatsworth, CA (213)998-7114
M	PD-S-513/TT3654/Z-S-285	SF	13	Chien	American Home Builders, 858 Pacific Avenue, Simi Valley, CA (805)522-9726
N	SUP-S-239/Z-S-295	M	--	Freed	S & P Investment Properties, P.O. Box 374, Tarzana, CA (213)470-1127
O	Maj.Mod. PD-S-443/ TT3573 Rev.	M	90	Alexander	Griffin Dev., 19436 Ventura Blvd., Tarzana, CA (213)881-5200
P	PD-S-526	Park	46 Ac.	Ascher	Rancho Simi Rec. & Park District, 1692 Sycamore Dr., Simi Valley, CA (805)526-3260
Q	PD-S-532	M	12	Cottle	Bob Bloch, 1792 Erringer Rd., Simi Valley, CA (805)522-1400 Jerry Conley, 330 E. Easy St., Simi Valley, CA (805)526-0420
R	LD-S-242	SF	4	Kuhn	John Toland, 5943 E. Marlies Ave., Simi Valley, CA (805)522-3557
S	PD-S-506/TT3851/ Z-S-283	SF	7	Ascher	Alexander Ballard, 11843 E. Pradera Road, Camarillo, CA (805)482-0664
T	Maj.Mod. PD-S-392/ TT3177/Z-S-290	M	264	Evans	EPAC Development, 5375 E. Second Street, Long Beach, CA (213)433-9908
U	PD-S-522/TT3865/ Z-S-291	SF	10	Kuhn	Barnett Dev. Corp., 233 E. Thousand Oaks Blvd., Thousand Oaks (805)496-6128
V	PD-S-521/TT3881	M	341	Freed	Farrell,Koffman,Buccola, 8348 Penfield Ave., Canoga Park, CA (213)700-1142
		Subtotals:	SF-273	M-1195	SP-1178



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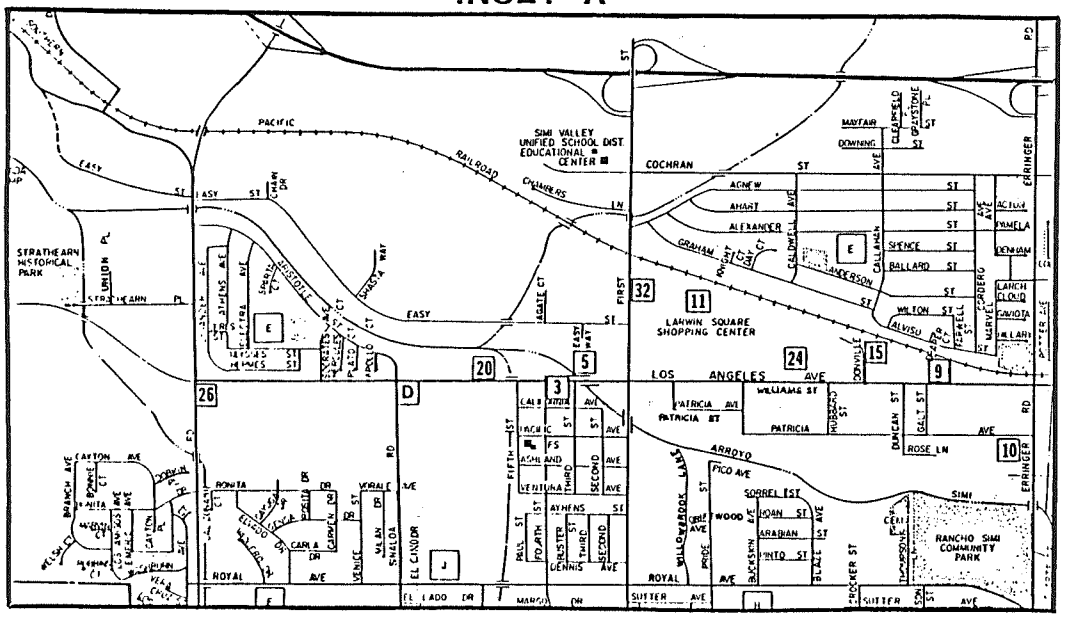

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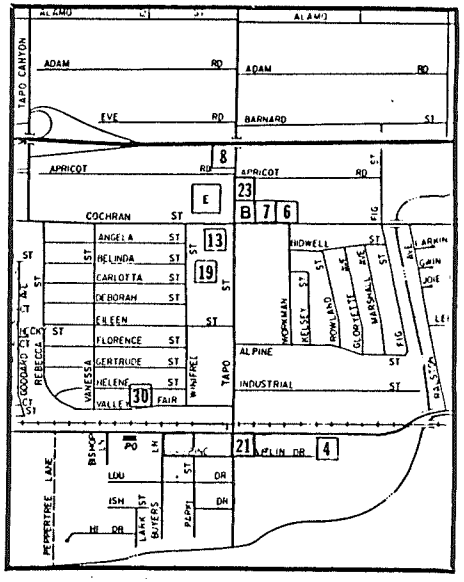


COMMERCIAL DEVELOPMENT

MAY – JUNE 1983

CITY OF SIMI VALLEY

COMMERCIAL

APPROVED OR UNDER CONSTRUCTION

	CASE	PLANNER	TYPE & SQ.FT.	APPLICANT	ASSESSOR'S NUMBER
1.	SUP-1832 MAJ.MOD.	Ascher	Hospital addition	Simi Valley Adventist Hospital 2975 N. Sycamore Dr. Simi Valley, CA 93065 (805)527-2462	S.W. corner of Avenida Simi & Sycamore Drive (615-201-32 & 53)
2.	MAJ.MOD. Number 2 PD-S-332	Ascher	Retail/Office Building Retail-4,750 sq.ft. Office-4,750 sq.ft.	Plaza West Building 1660 Wilshire Blvd. Los Angeles, CA 90017 (213)483-0530	N.E. corner of Racine and Sycamore (633-170-020)
3.	PD-S-505	Cottle	Midas Muffler Shop Retail-2,723 sq.ft.	Midas Realty Corp. 2555 E. Chapman Ave., Ste 702 Fullerton, CA 92631 (714)870-0411	S.E. corner of L.A. Ave. & Fourth Street (631-104-11 & 17)
4.	PD-S-399	Evans	2 buildings, 1 Story Retail-3,000 sq.ft. (Auto Repair)	Robert Amore & Assoc. 4545 Industrial St. Simi Valley, CA 93065 (805)522-3366	S.side of L.A. Ave., 550' E. of Tapo St. (644-112-07 & 41)
5.	PD-S-496/ LD-S-237	Ascher	Commercial Building Divide into 2 lots	Emery W. Shane 223 E. Thousand Oaks Blvd. Thousand Oaks, CA 91360 (805)496-4211	N.side of L.A. Ave., 200' W. of First St. (630-120-105)
6.	PD-S-367	Freed	Expansion of Existing Building Retail-540 sq.ft.	Bill Edwards 4473 Cochran St. Simi Valley, CA 93065 (805)527-2567	N.side of Cochran, 370' E. of Tapo St. (625-080-21)
7.	PD-S-402	Evans	2 Story Commercial Building Retail-9,703 sq.ft. Office-11,297 sq.ft.	Kirkby Development 6742 Van Nuys Blvd. Van Nuys, CA 91405 (213)782-2343	E.side of Tapo St., 140' N. of Cochran (625-08-28)
8.	PD-S-403	Evans	2 Story Commercial Building Retail-5,675 sq.ft. Office-8,765 sq.ft.	Kirkby Development 6742 Van Nuys Blvd. Van Nuys, CA 91405 (213)782-2343	N.W. corner of Tapo St. & Apricot (618-062-12)

COMMERCIAL

APPROVED OR UNDER CONSTRUCTION (CONT'D.)

	CASE	PLANNER	TYPE & SQ.FT.	APPLICANT	ASSESSOR'S NUMBER
9.	PD-S-404	Freed	1 building, 2 Story Office-7,140 sq.ft.	Burton Ward 4064 Cresthaven Dr. Westlake Village, CA 91361 (805)495-3030	N.side of L.A. Ave., 500' W. of Erringer (632-294-37 & 38)
10.	PD-S-499	Kuhn	Medical Offices Office-8,183 sq.ft.	Alan F. Schaub 1919 Stonegate Westlake Village, CA 91361 (805)497-2004	E. side of Erringer between Patricia Ave. & Heywood Street (632-050-12 & 15)
11.	MAJ.MOD. PD-S-10	Evans	Two Additional Movie Theatres	Great Western Theatres 22222 Sherman Way, Ste. 100 Canoga Park, CA 91303 (213)999-3223	N.W. corner of L.A. Ave. & First St. (Larwin Square Shopping Center) (632-032-06, 11, 16-18)
12.	PD-S-407	Ascher	2 buildings, Shopping Center Retail-162,000 sq.ft.	F.A.F. Investment Co. 505 N. Tustin Ave. Santa Ana, CA 92705 (714)541-5227	S.W. corner of Cochran & Galena St. (633-170-19 & 22)
13.	LD-S-238	Chien	Divide existing lot into 4 parcels	Edward Laurance 5515 Pacific Blvd. Marina del Rey, CA 90291 (213)396-8445	S.W. corner of Tapo St. and Cochran Street (618-160-21)
14.	MAJ.MOD. Number 3 PD-S-159	Freed	4 buildings Shopping Center Retail-68,248 sq.ft.	Griffin Dev. Co. 19436 Ventura Blvd. Tarzana, CA 91356 (213)881-5200	S.W. corner of Yosemite & L.A. Ave. (651-020-52)
15.	LD-S-204	Chien	2 Commercial Lots	L.B.H. Engineering 1652 L.A. Ave. Simi Valley, CA 93065 (805)522-1400	E.side of Donville Ave., 250' N. of L.A. Ave. (632-015-02)
16.	PD-S-504	Stafford	100 Room Hotel/Restaurant Retail-52,000 sq.ft.	Cal-Pacific Hotel Corp. 5850 Canoga Ave., Ste.400 Woodland Hills, CA 91367 (213)710-1112	S.E. corner of Stearns St. & Freeway (615-251-02 & 04)

COMMERCIAL

APPROVED OR UNDER CONSTRUCTION (CONT'D.)

	CASE	PLANNER	TYPE & SQ.FT.	APPLICANT	ASSESSOR'S NUMBER
17.	PD-S-498	Freed	Two-story Medical Building Office-4,825 sq.ft.	Dr. Caesar O. Julian 2273 Tapo Street Simi Valley, CA 93063 (805)526-1125	N.W. corner of Sycamore Drive and Alamo Street (611-050-14)
18.	PD-S-431 MAJ.MOD. Number 2	Ascher	Commercial-Office Building Office-11,618 sq.ft.	Dr. Raymond Bucci 805 E. L.A. Avenue Simi Valley, CA 93065 (805)522-5072	S.E. corner of Erringer & Royal Avenue (638-30-02)
19.	LD-S-230	Stafford	Divide Existing Lot into Two Parcels	Byron Johnson, Jr. 4545-5K Industrial St. Simi Valley, CA 93063 (213)349-1388	Between Tapo St. & Winifred, 600' S. of Cochran St. (618-16-14)
20.	PD-S-474	Evans	2 Story Retail Building Retail-11,100 sq.ft.	Dr. Raymond Bucci 585 L.A. Ave. Simi Valley, CA 93065 (805)522-5072	585 L.A. Ave. (630-070-23)
21.	MAJ.MOD. SUP-S-192	Ascher	Expansion of existing building and installation of gasoline pumps	Vangas, Inc. P.O. Box 12647 Fresno, CA 93727 (209)252-8811	S.E. corner of L.A. Ave. & Tapo St. (644-112-45)
22.	PD-S-449	Freed	Retail & Office Center Retail-100,000 sq.ft.	Olympia/Roberts Co. 863 Madera Road Simi Valley, CA 93065 (805)581-3651	S.E. corner of Olsen Rd. & Wood Ranch Parkway (500-40-12 & 14; 680-02-03 & 08; 685-01-02)
23.	PD-S-439	Chien	1 building, 2 Story Office-5,800 sq.ft. Retail-1,458 sq.ft.	Harry J. Peters 2060 Latham St. Simi Valley, CA 93065 (805)522-5230	S.E. corner of Tapo & Apricot Road (625-08-30)

COMMERCIAL

APPROVED OR UNDER CONSTRUCTION (CONT'D.)

	CASE	PLANNER	TYPE & SQ.FT.	APPLICANT	ASSESSOR'S NUMBER
24.	MAJ.MOD. Number 2 PD-S-425	Ascher	2 Story Permanent Bank	Simi Bank 1445 L.A. Ave. Simi Valley, CA 93065 (805)581-2800	L.A. Ave., W. of Donville Ave. (632-32-04)
25.	PD-S-481	Alexander	Pre-School	Happy Acre Pre-School 5902 L.A. Ave. Simi Valley, CA 93063 (805)526-8334	5902 L.A. Ave. (637-140-12)
26.	SP-S-5	Freed	Retail & Office Center Office-20,000 sq.ft. Retail-252,250 sq.ft.	Farrell, Koffman & Buccola 8348 Penfield Avenue Canoga Park, CA 91306 (213)700-1142	S.E. corner of L.A. Ave. & Madera (631-150-01)
27.	PD-S-516/LD-S-250	Chien	Storage Building 10,000 sq.ft. Divide into 2 lots	Farmers Insurance Group 4680 Wilshire Blvd. Los Angeles, CA. 90010 (213)932-3878	N.W. corner of Cochran & Galena Ave. (611-044-17)
28.	CC-S-3	Freed	Senior Citizens Center	City of Simi Valley 3200 Cochran St. Simi Valley, CA 93065 Attn: D. Davis-Crompton (805)522-1333	S.side of Avenida Simi, 700' W. of Tapo Cyn. Rd. (616-08-35)
29.	MAJ.MOD. Number 2 PD-545	Freed	Office-23,000 sq.ft. Retail-4,500 sq.ft.	Simvent Properties 21601 Devonshire St., Ste. 108 Chatsworth, CA 91311 (213)709-7515	N.W. corner of L.A. Ave. & Stearns Street (644-090-28 & 29)
30.	PD-S-501	Ascher	Two Story Office Building Office-30,976 sq.ft.	Donald A. Mertens 12128 Stewarton Dr. Northridge, CA 91326 (213)363-5173	Between Helene & Valley Fair, 300' W. of Winifred Street (618-145-105)

COMMERCIAL

APPROVED OR UNDER CONSTRUCTION (CONT'D.)

	CASE	PLANNER	TYPE & SQ.FT.	APPLICANT	ASSESSOR'S NUMBER
31.	PD-S-511	Chien	Shopping Center 25,000 sq.ft.	Sequoia Commercial Center, Ltd. 12233 W. Olympic Blvd., Ste.158 Los Angeles, CA 90064 (213)820-4621	S.E. corner of L.A. Ave & Sequoia (642-302-28)
32.	SUP-S-230	Ascher	Mini-Storage 115,800 sq.ft. 152 RV spaces	Robert L. Williams Co. 101 Moody Ct., Ste.A. Thousand Oaks,CA 91360 (805)496-1941	E. side of First St. 830' N. of L.A. Ave. (632-320-015)

Subtotal: Retail-677,947 sq.ft. Office-136,354 sq.ft.

COMMERCIAL

IN REVIEW

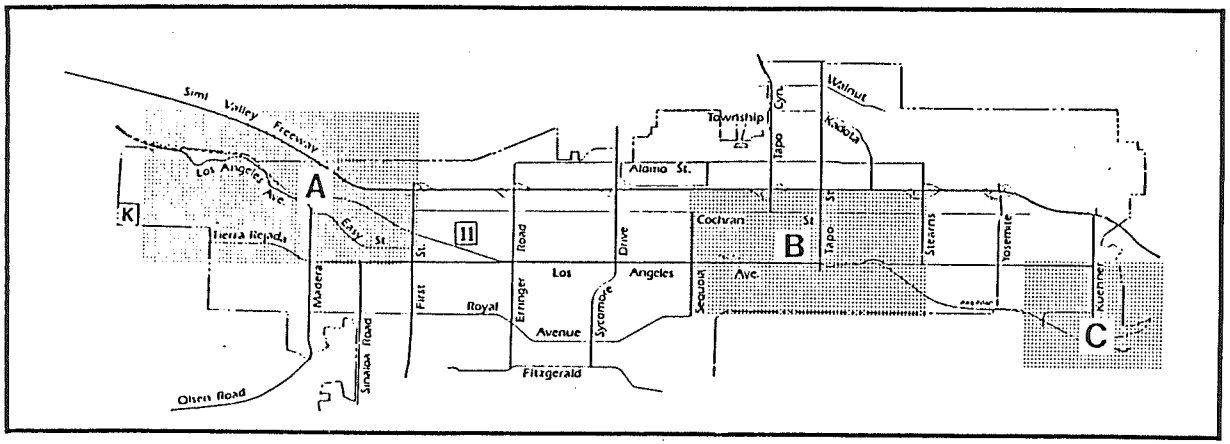
	CASE	PLANNER	TYPE & SQ.FT.	APPLICANT	ASSESSOR'S NUMBER
A.	MAJ.MOD. PD-S-86	Kuhn	Retail-4,000 sq.ft. Addition to Elk's Lodge (Private Club)	Walker Waite, Inc. 1777 Agnew St. Simi Valley, CA 93065 (805)526-9677	100' N. of Katherine St., on E. side of Kuehner Dr. (657-02-42)
B.	PD-S-531	Stafford	7-11 Market & Chief Auto Parts Retail-5,170 sq.ft.	Equitable Realty Group, Inc. 1611 S. Pacific Coast Hwy., Suite 206 Redondo Beach, CA 90277 (213)316-3870	N.E. corner of Tapo St. & Cochran Street (625-08-33 & -34)
C.	PD-S-530 LD-S-262 Z-S-294	Evans	Retail-8,240 sq.ft. Josephina's Restaurant	Ritter Development Co. P.O. Box 377 Chatsworth, CA (213)998-7114	N.W. corner of Stow St. & Cochran Street (615-263-05-07)
D.	SUP-S-234	Ascher	National Convenience Store	Convenience Market 803 N. Ventura Blvd. Ventura, CA 93001 (805)648-5939	S.E. corner of L.A. Avenue & Sinaloa Rd.
E.	PD-S-515	Stafford	Farmers Market	Simi Valley Certified Farmers Market 3178 Paige Avenue Simi Valley, CA 93063 (805)583-4115	School Street between Blackstock Ave. & Church St.
F.	SUP-S-238	Cottle	Time Extension for Yosemite Pre-school/ Daycare facility	Charles Meechan 1845 Oak Road Simi Valley, CA 93063 (213)347-6215	S. of L.A. Avenue, E. of Yosemite (1845 Oak Road) (637-140-43)
G.	MAJ.MOD. PD-S-407	Ascher	Roofline Adjustment	FAF Investment Company 505 N. Tustin Ave., Ste 282 Santa Ana, CA 92705 (714)953-0960	S.side of Cochran St. W. of Galena (633-170-26)

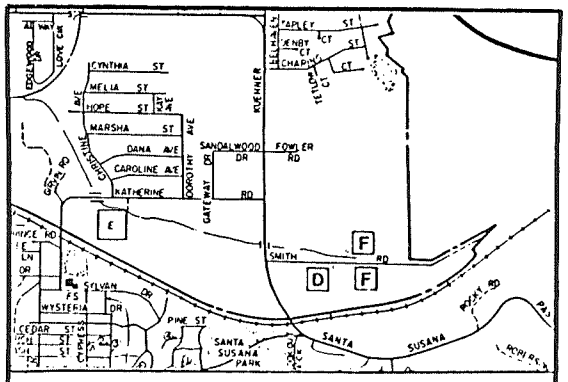
COMMERCIAL

IN REVIEW (CONT'D.)

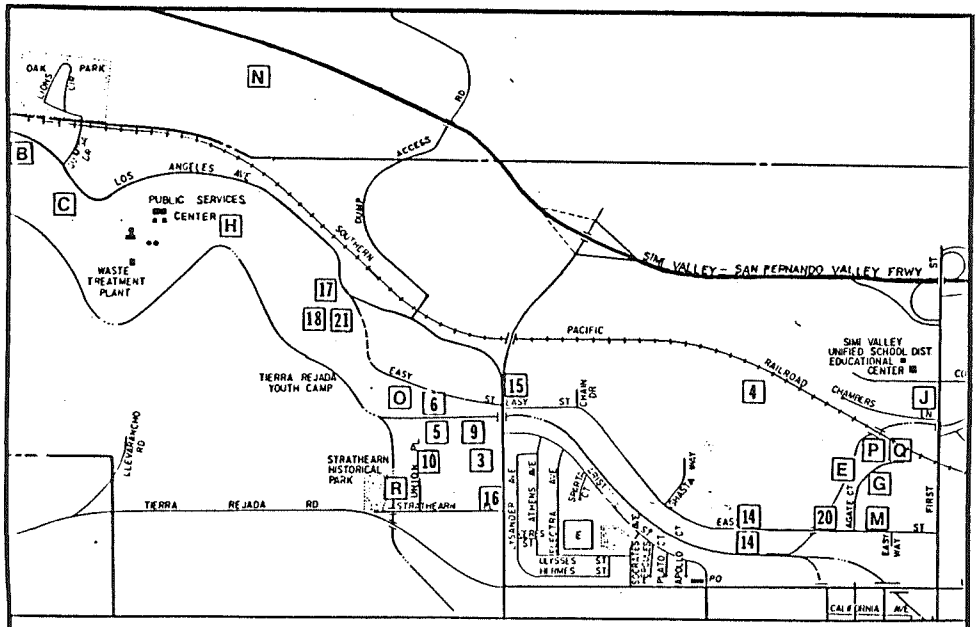
	CASE	PLANNER	TYPE & SQ.FT.	APPLICANT	ASSESSOR'S NUMBER
H.	PD-S-517	Stafford	Drive-thru Restaurant	In-N-Out Inc. 13502 E. Virginia Ave. Baldwin Park, CA 91706 (213)338-5587	E. side of Stearns N. of Freeway (615-252-01)
J.	PD-S-534	Cottle	Medical Office Building Office-9,145 sq.ft.	Family Health Care, Inc. 3015 N. Sycamore Drive Simi Valley, CA 93065 (805)527-6424	900' W. of Sycamore Dr., 600' N. of Alamo St. (615-201-55)

Subtotal: Retail-17,410 sq.ft. Office-9,145 sq.ft.

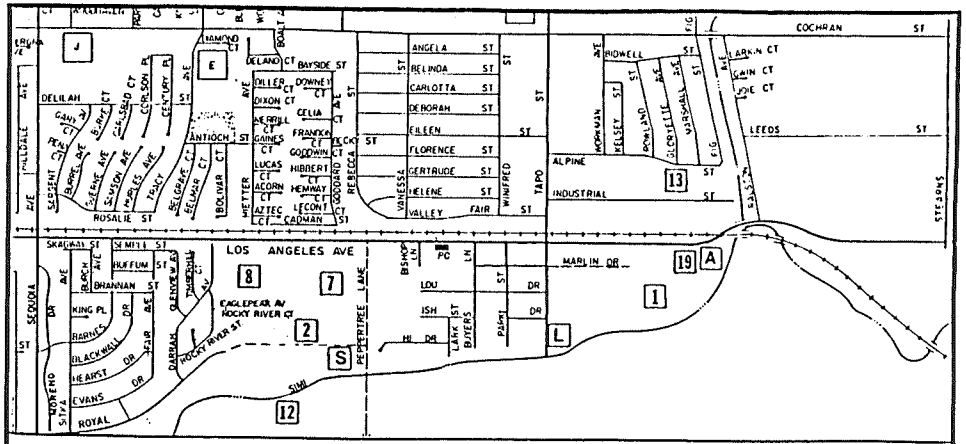




INSET C



INSET A



INSET B

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INDUSTRIAL DEVELOPMENT
MAY - JUNE 1983
CITY OF SIMI VALLEY

INDUSTRIAL

CONSTRUCTED OR UNDER CONSTRUCTION

	CASE	PLANNER	TYPE & SQ.FT.	APPLICANT	ASSESSOR'S NUMBER
1.	PD-S-417 MAJ.MOD.#1	Freed	325,000 sq.ft. (26 buildings)	Dunn Properties Corp. P.O. Box 1439 Santa Ana, CA 92702 (714)540-2100	E.side of Tapo St., 245' S. of L.A. Ave. (644-112-32) (644-140-39)
2.	PD-S-473	Evans	20,319 sq.ft. (1 building)	James Savage 1336 N. Laurel Ave. Upland, CA 91786 (714)621-0902	N.W. corner of Royal Ave. & Surveyor (626-04-26 pt.)
3.	PD-S-424	Freed	24,421 sq.ft. (1 building)	Madera Industrial Inv. 21201 Victory Blvd., No. 265 Canoga Park, CA 91303 (213)999-3073	S.W. corner of Madera & Moreland (500-380-85)
4.	PD-S-441 Maj.Mod.	Ascher	Industrial Building (for Vanguard Products)	Alfred Smith 8277 Lankershim Blvd. N. Hollywood, CA 91605 (213)877-1353	N.side of Easy St., 1650' W. of First St. (630-140-045)
5.	PD-S-489	Chien	2 Industrial/ Warehouse Buildings 59,400 sq.ft. 72,700 sq.ft.	Robert L. Carli & Assoc., Inc. 1608 W. Glenoaks Glendale, CA 91701 (213)507-0400	N.side of Moreland Rd. (500-380-75)
6.	PD-S-493	Stafford	Industrial Building 10,000 sq.ft.	Franz Wolf 250 Easy Street Simi Valley, CA 93065 (805)522-7558	S. side of Easy Street, 500' W. of Madera Road (579-01-06)
7.	MAJ.MOD. PD-S-510 SUP-S-232	Evans	Industrial Building 187,950 sq.ft., Phase II A Helistop	First Interstate Bancard 9733 Canoga Avenue Canoga Park, CA.91303 (213)703-1030	N.E. corner of Royal & Surveyor (626-320-02-07)
8.	PD-S-507	Evans	185,280 sq.ft. (1 building)	Tasker Systems of Whittaker Corp. 20131 Sunburst St. Chatsworth, CA 91311 (213)475-9411	N.W. corner of Royal & Voyager (626-330-06-10)
9.	PD-S-509	Chien	Industrial/Warehouse 65,390 sq.ft.	Invest Simi Development Corp. 2977 Willow Lane, Ste.201 Thousand Oaks, CA. 91361 (805) 497-9697	N.W. corner of L.A. Ave. & Moreland Road (500-380-75)

Subtotal: 9 projects; 950,460 sq.ft.

INDUSTRIAL

APPROVED

	CASE	PLANNER	TYPE & SQ.FT.	APPLICANT	ASSESSOR'S NUMBER
10.	PD-S-366	Freed	48,441 sq.ft. (3 buildings)	First Union Inv. 16650 Schoenborn St. Sepulveda, CA (213)893-7166	S.E. corner of Moreland Pl. & Union Pl. (500-380-80 & 81)
11.	SUP-S-208 MAJ.MOD.	Evans	Self-Storage Facility 41,130 sq.ft.	Gordon Koch 6261 Agnes Ave. N. Hollywood, CA 91606 (213)766-7321	100' S. of Graham & Callahan Intersection (626-010-06)
12.	TT-3286	Evans	Industrial Subdiv. 35 Acres	Michael Keston 16255 Ventura Blvd. Encino, CA 91361 (213)986-8890	S.side of Arroyo Simi, W.side of Peppertree Ln. (626-040-17)
13.	TT-3616	Chien	1 Industrial Lot	G.K.I., Inc. 6851 Camby Ave. Reseda, CA 91335 (213)705-4100	600' E. of Tapo & N. of Industrial St. (644-070-46, 47 & 48)
14.	TT-3249 (Maj.Mod. PD-S-441)	Ascher	5 Industrial Lots	Alfred Smith 8277 Lankershim Blvd. N. Hollywood, CA 91605 (213)877-1353	N. & S.sides of Easy St., 1650' W. of First St. (650-40-26, 27 & 28)
15.	PD-S-454	Evans	Industrial Building 29,100 sq.ft.	Barasch Arch. & Assoc. 25 N. Mentor Pasadena, CA 91106 (213)449-7214	N.E. corner of Madera & Easy St. (630-111-09)
16.	PD-S-472/ LD-S-235	Freed	Warehouse/Office 69,000 sq.ft. 2 Industrial Lots	Corham c/o Rea Taylor 1523 6th St. Santa Monica, CA 90401 (213)829-1832	N.W. corner of Madera & Strathearn Pl. (500-038-84)
17.	PD-S-436	Evans	39,000 sq.ft. (1 building)	Barasch Arch. & Assoc. 25 N. Mentor Pasadena, CA 91106 (213)449-7214	S.side of L.A. Ave., 1,800' W. of Madera (500-380-60)
18.	LD-S-233	Chien	4 Industrial Lots	Elizabeth Leone 4326 Park Fortuna Calabasas, CA 91302 (213)704-7244	W. of L.A. Ave., ¼ mile N.W. of Madera Road (500-38-87)

INDUSTRIAL

APPROVED (CONT'D.)

	CASE	PLANNER	TYPE & SQ.FT.	APPLICANT	ASSESSOR'S NUMBER
19.	PD-S-391	Freed	39,389 sq.ft. (2 buildings)	Felizian Paul Simi Valley Inv. 1901 Avenue of the Stars Suite 888, L.A., CA 90067 (213)367-6137	S.side of L.A. Ave., 1600' E. of Tapo St. (644-120-07 & 08)
20.	PD-S-388	--	21,232 sq.ft. (2 buildings)	Siegal & Associates 6700 Valjean Ave. Van Nuys, CA 91406 (213)781-4110	N.side of Easy St., 117' W. of Agate Ct. (630-15-17)
21.	PD-S-436 Maj.Mod.	Evans	Industrial Building 82,732 sq.ft.	Elizabeth Leone 4326 Park Fortuna Calabasas, CA 91302 (213)704-7244	S. side of L.A. Ave., 1800' W. of Madera Road (500-380-60)

Subtotal: 11 projects; 370,024 sq.ft.
1 project; 35 acres

INDUSTRIAL

IN REVIEW

	CASE	PLANNER	TYPE & SQ.FT.	APPLICANT	ASSESSOR'S NUMBER
A	LD-S-240	Cottle	2 Industrial Lots	Dunn Properties Corporation 28 Brookhollow Dr. Santa Ana, CA 92702 (213)687-0850	S. side of L.A. Ave., 500' W. of Ralston Ave. (644-12-05 & 10) (644-14-45)
B	SUP-S-204	Evans	Auto Salvage Yard	Simi Auto Wrecking 900 West L.A. Ave. Simi Valley, CA 93065 (805)522-5865	S.side of L.A. Ave., 300' W. of Quimisa Dr. (500-290-79)
C	LD-S-188	Evans	4 Industrial Lots	Cal.Glass Bending Co. 229 Broad Ave. Wilmington, CA 90744 (213)549-5255	S. of L.A. Ave. at Quimisa Dr. (500-29-78 & 79)
D	TT-3346	Cottle	9 Industrial Lots	Dichter Lumber Sales 242 S. Robertson Blvd. Beverly Hills, CA 90211 (213)655-9605	S.side of Smith Road, 800' E. of Kuehner (637-07-11)
E	PD-S-528	Evans	Industrial Building 11,398 sq.ft.	J. David Osborn 20969 Ventura Blvd. Woodland Hills, CA 91364 (213)346-1455	W. side of Agate Ct., 800' N. of Easy St. (630-160-04)
F	SP-S-6	Stafford	Smith Road Specific Plan 48 acres	Contact Staff Planner	N. & S.sides of Smith Road
G	PD-S-529	Evans	Industrial Building 14,069 sq.ft.	J. David Osborn 20969 Ventura Blvd. Woodland Hills, CA 91364 (213)346-1455	E. side of Agate Ct., 530' N. of Easy St. (630-160-11)
H	PD-S-512	Stafford	Caretaker Residen.	Charles Hewitt 400 W. L.A. Ave. Simi Valley, CA 93065 (805)522-1323	½ mile W. of Easy St. (500-380-40)
J	SUP-S-154 MAJ.MOD.	Stafford	Equipment Rental Yard & U-Cart Concrete	Simi U-Rent, Inc. 1050 Chambers Lane Simi Valley, CA 93065 (805)526-5261	N.W. corner of Chambers Lane & First Street (630-130-13)
K	TT-3742	Cottle	25 Industrial Lots 64 Acres	Robert and Joan Butler 18155 Medley Drive Encino, CA 91436 (805)257-3535	1250' N. of Tierra Rejada Rd., adj. to western City boundary (580-37-27)

INDUSTRIAL

IN REVIEW

	CASE	PLANNER	TYPE & SQ.FT.	APPLICANT	ASSESSOR'S NUMBER
L	SUP-S-228	Evans	Vehicle Storage & Equipment Yard	A.G. Tutor 15910 Ventura Blvd., Suite 1801 Encino, CA 91436 (213)990-9790	E.side of Tapo St., 557' S. of L.A. Ave. (644-140-41)
M	SUP-S-231	Cottle	Mini-Concrete Batch Plant	Gary Reed U-Kart Concrete P.O.Box 3727 Thousand Oaks, CA. 91359 (8050 496-4556	N. Side of Easy St. 200' E. of Agate Ct. (630-150-08)
N	TT3302	Evans	45 Industrial Lots	Moreland Development Co. 5775 E. Los Angeles Ave., Ste.111 Simi Valley, CA 93065 (805)526-4255	N. of S.P.R.R., between Madera Rd. and Oak Park
O	PD-S-533	Ascher	46,608 sq.ft. (3 buildings)	Franz Wolf 250 Easy Street Simi Valley, CA 93065 (805)522-7558	S. side of Easy St., 820' W. of Madera Rd. (579-010-165)
P	PD-S-535	Freed	12,860 sq.ft.	J.D.O. & Associates 20969 Ventura Blvd., Ste.208 Woodland Hills, CA 91364 (213)346-1455	N. side of Agate Ct. (Lot 7) (630-160-07)
Q	PD-S-536	Freed	11,900 sq.ft.	J.D.O. & Associates 20969 Ventura Blvd., Ste.208 Woodland Hills, CA 91364 (213)346-1455	N. side of Agate Ct. (Lot 8) (630-160-085)
R	PD-S-537 V-S-45	Evans	23,000 sq.ft.	Pozzo Development Co. 2894 Rowena Ave., Ste.200 Los Angeles, CA 90039 (213)660-6666	N.W. corner of Union Place and Strathearn Place (500-380-76)
S	PD-S-524 LD-S-261	Ascher	94,703 sq.ft. (4 buildings)	Pozzo Development Co. 2894 Rowena Ave., Ste.200 Los Angeles, CA 90039 (213)660-6666	S. side of Royal Ave., 140' E. of Voyager (626-310-04-07) (626-320-13)

Subtotal: 16 projects; 214,538 sq.ft.
2 projects; 112 acres