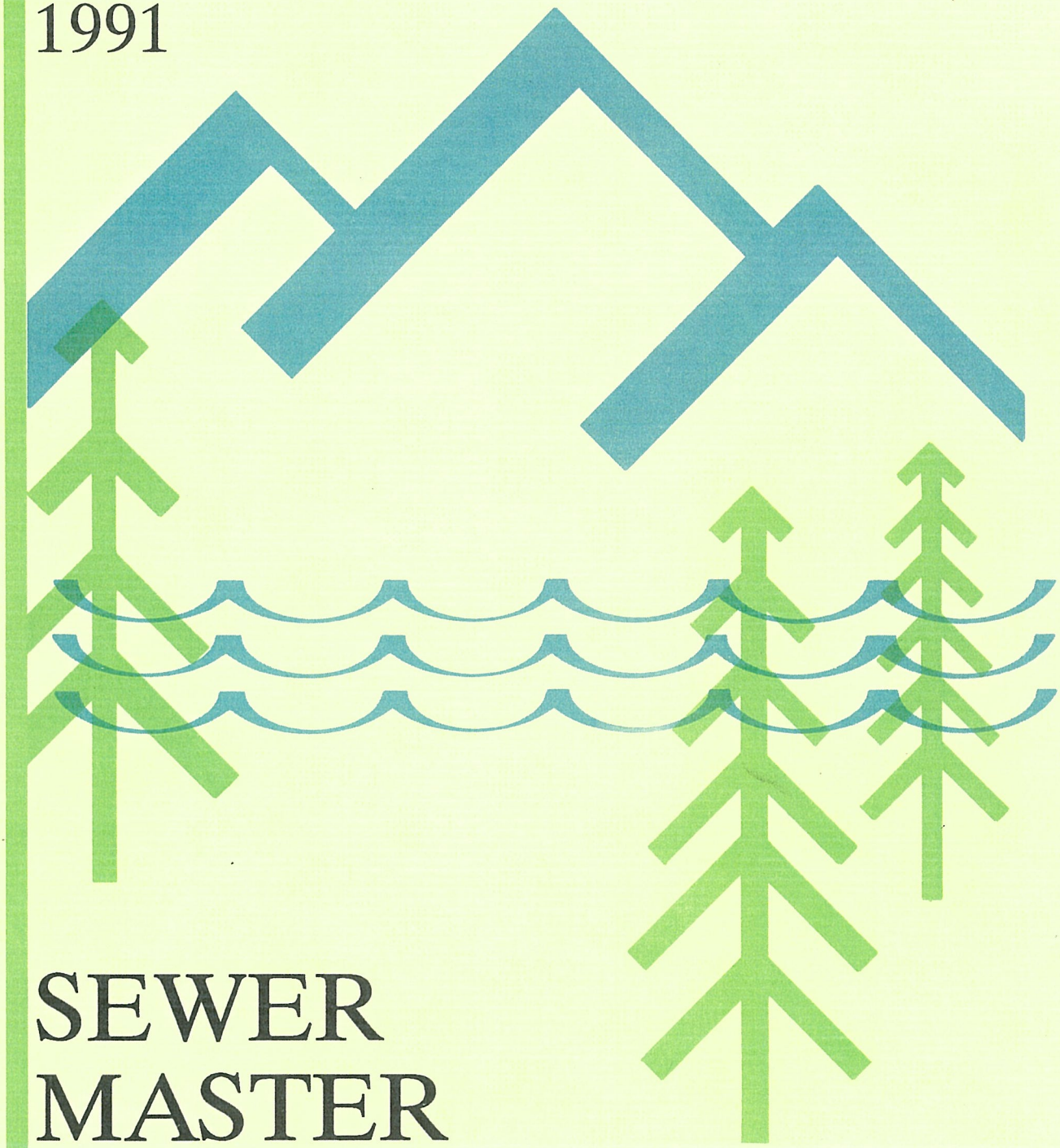
NORTH TAHOE PUBLIC UTILITY DISTRICT

1991



SEWER MASTER PLAN

NORTH TAHOE
PUBLIC UTILITY DISTRICT

SEWER MASTER PLAN

1991

Adopted November 13, 1991

NORTH TAHOE
PUBLIC UTILITY DISTRICT

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CHAPTER - 1

EXECUTIVE SUMMARY

ACTIVITY	FREQUENCY	ANNUAL QUANTITY
Lateral Testing	15 years	413 laterals
Structures (paint, HVAC)	10 years	1 building
Sewer Main TV Inspection	8 years	55,000 feet
Smoke Test System	7 years	62,000 feet
Sewer Main Cleaning	6 years	130,000 feet
Inspect/Clean Easements	3 years	43,000 feet
Seal Admin. Building	2 years	
Root Control	2 years	72,000 feet
Pump Station Tech Inspection	annually	18
Exercise Force Main Valves	annually	5
Satellite PS Clean Wetwells	semiannually	28
Main PS Clean Wetwells	quarterly	16
Pump Station Alarm Testing	monthly	216
Operate Stationary Generator	monthly	72
Test/Adjust Pump Operations	monthly	18

TOTAL LABOR HOURS FOR ABOVE = 9,800

Table 1-1

INFORMATION MANAGEMENT

The District needs an automated computer-driven preventive maintenance management system. This system would allow the District to plan, execute, and track the costs of preventive and corrective maintenance. This system would also allow the District to evaluate its own cost effectiveness versus the use of outside contractors for repairs and other maintenance activities.

I/I REDUCTION

Infiltration, the entrance of groundwater into the sewer system, and Inflow, the entrance of surface water into the sewer system, and collectively known as I/I, are common problems for sewer entities. I/I correction programs should be focused on areas where I/I is excessive and there is the likelihood that corrective measures will help the system. The following table illustrates the areas with excess I/I.

BASIN IDENTIFICATION	LOCATION	SDI/I & GWI mgd	SDI/I & GWI pdim
NT-13	Western Part of Downtown Kings Beach	0.18	3654
NT-03	Cedar Flat Area	0.07	2106
NT-09	Tahoe Marina/Tahoe Estates	0.11	2101
NT-14	Eastern Portion of Kings Beach and Brockway	0.20	1514
NT-11	Kingswood Estates	0.09	1195

Table 1-2

Continued effort should be made to prevent, identify, and eliminate roof leader and lot drains from the system. In addition, the District should continue with its lateral testing program that was implemented in 1986.

The District should initiate "pilot" projects to evaluate joint sealing techniques, slip-lining or inversion lining programs, lateral replacement and trunk line replacement. This should be a three year program so that I/I reduction projects can be completed within less than 10 years. The District has identified 20 sewer line replacement projects.

CAPITAL REPLACEMENT

The inventory value of the District's facilities totals $4.3 million. The estimated replacement value for the facilities is $41 million. Based on a value service life of 61 years, it would require an expenditure of at least $657,000 per year for maintenance. Anything less requires that a pump, pipeline or building remain in service beyond its normal life expectancy.

It is also important to budget for emergency repairs or replacements. There are three traditional ways that are used to identify what amount of reserve is prudent. They are:

- Percentage of replacement value
- Percentage of operating budget
- Arbitrary amount

This Master Plan proposes that between $30,000 and $60,000 be budgeted each year for emergency repairs and replacements. Also, $450,000 per year should be spent for repair and replacements.

FINANCING OPTIONS

Limited expenditures in the past require that the District spend greater amounts in the future. Unfortunately, the District lacks the necessary funds. Therefore, it is necessary to explore alternative funding mechanisms. These included general obligation bonds (GO), revenue bonds, sale of connection rights, Certificates of Participation (COP), reimbursement agreements, special assessment proceedings, community facility district special taxes, use of accumulated reserves, pay-as-you-go, or some combination of the listed mechanisms.

Connection charges will need to be increased. The calculation of the connection charge is based on the original construction cost of the system, divided by system flow rate resulting in a dollar per gallon value. Since the average flow rate in a single family residence is 180 gallons, the connection charge should be $3,463.

CONCLUSIONS AND RECOMMENDATIONS

It is recommended that the required repairs and replacements be spread over a seven year period, beginning in 1990. During the last six years of the program an average of 1,700 linear feet of sewer line would be replaced per year. Unfortunately, this will require that the useful life of the system be extended to 147 years.

A bond election is predicted in 1992 so that the capital improvements scheduled for 1993 and later would be financed through GO bond proceeds. A COP issue is needed to fund the 1990 through 1992 improvements.

To pay for this indebtedness, it is necessary to modestly increase the monthly sewer rates. The following table illustrates the recommended rate increases.

94 mi/os x5280 $\frac{ft}{mi.}$ = 496,320 LF

$\frac{496320\ LF}{1700\ LF/yr}$ = 292 years

PROJECTED SEWER SERVICE RATE ADJUSTMENTS

YEAR	CHANGE	RATE (MONTHLY)
1990/91		$13.86
1991/92	3.0%	$14.28
1992/93	3.9%	$14.84
1993/94	4.7%	$15.53
1994/95	4.8%	$16.28
1995/96	4.8%	$17.06
1996/97	.8%	$17.88
1997/98	5.0%	$18.77
1998/99	9.7%	$20.60
1999/2000	9.1%	$22.47

Table 1-3

SUMMARY RECOMMENDATIONS

This Master Plan describes a number of recommendations. Not all recommendations of this plan can be implemented due to their cumulative effects. For clarity, the following listing is used to identify the recommendations of the plan and the proposed actions.

Financial

Raise the connection fee to $3,460 --- the recommendation is modified to raise the connection fee by $1,000 to a total of $2,000 in order to take advantage of the lowering of the regional treatment plant's connection charge.

Repay reserve funds loaned to operating funds --- forgive loan.

Budget 1.25 times bond fund repayment excess in operating revenue --- incorporated for the COP portion of debt.

Board of Directors adopt by resolution election to participate in the Uniform Construction Cost Accounting Act procedures --- study and implement if appropriate.

Sell Certificates of Participation (COP) in an amount sufficient to fund 3 years of identified capital projects --- incorporated.

Hold bond election in 1992 to continue the tax rate for capital improvements --- incorporated.

Operational

Plan for an increase in preventive maintenance operations --- underway.

Complete survey of the condition of the untested portion of the collection system --- underway.

Implement management information system --- budgeted.

Maintain staffing level at that budgeted for 1990/91 --- incorporated.

Enforce existing grease control ordinance provisions --- incorporated.

Establish right-of-way control program --- incorporated.

Using the unit flow figures established, monitor extraneous flows entering the system --- delay subject to weather.

Survey the level and use of toxic and hazardous materials --- incorporated.

Capital

Budget for replacement of up to 4,300 linear feet of sewer main replacement annually --- adjusted to 1,700 linear feet.

Budget for the replacement of vehicles and equipment at the rate of approximately $90,000 annually --- sustained at $50,000.

Review annually the results of television inspection and test data for adjustments to the sewer line replacement schedule --- planned.

CHAPTER - 2

PURPOSE OF SEWER MASTER PLAN

CHAPTER 2

PURPOSE OF SEWER MASTER PLAN

The purpose of this plan is to formally identify the operating and facility needs of the Sewer Department of the North Tahoe Public Utility District and to develop a program of operations, capital replacements, and financing to address those needs.

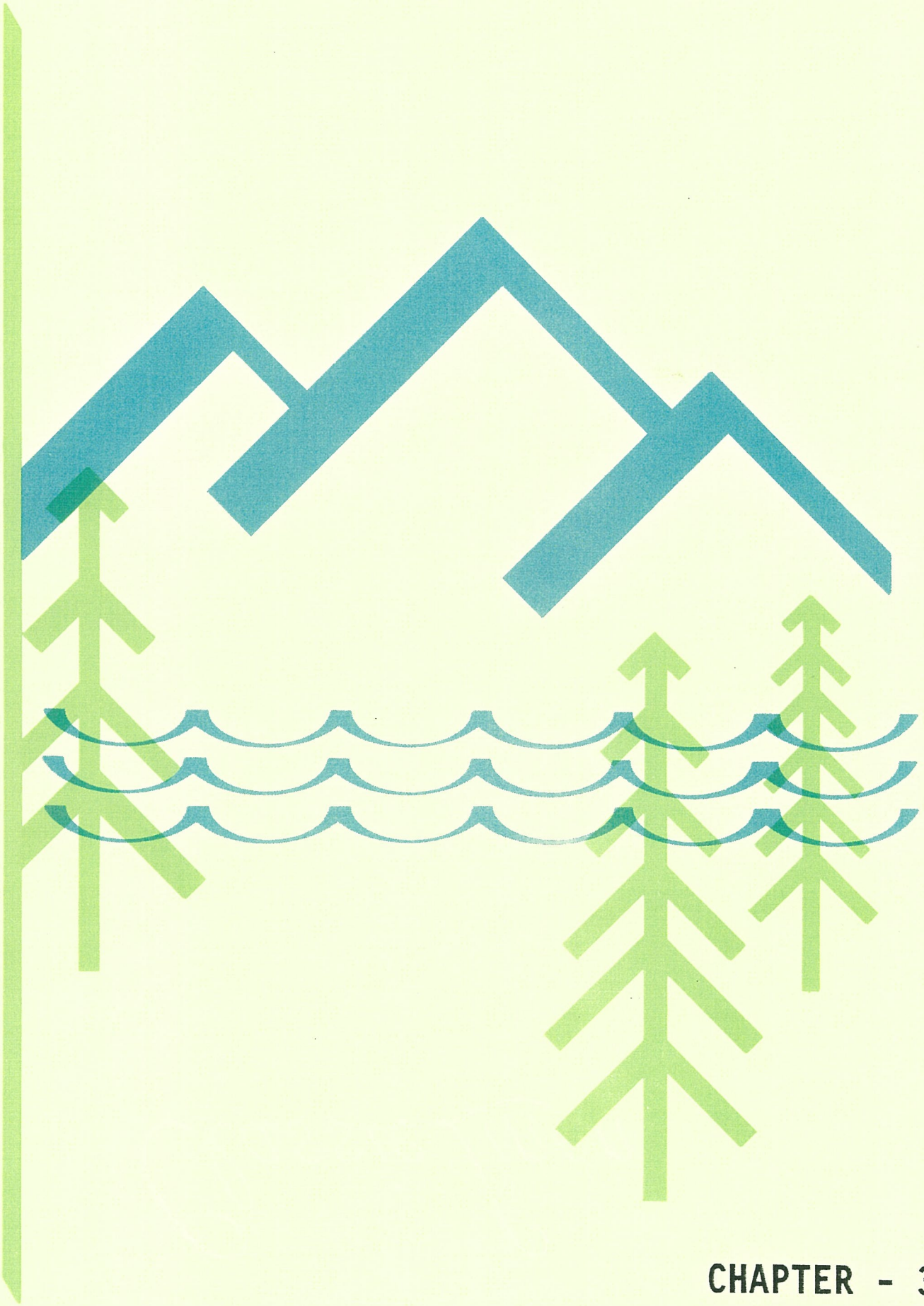
The needs arise from a variety of internal and external forces. These include:

- Strict environmental regulations,
- Increasing public health awareness,
- More stringent monitoring and reporting requirements,
- Aging collection and transport facilities,
- Decreasing tax allocations,
- Depletion of surplus assessment district funds,
- Limited future growth.

A portion of the sewer system was designed and constructed utilizing "modern" design and construction standards. The District recognizes that improvements in construction methods and materials, along with changing conditions in financing, human resources, and environmental protection, require a planning tool to assist the decision making process for both daily operations and long range policy decisions.

This Master Plan was preceded by an initial investigation entitled "Phase I - Preliminary Investigation and Study - Sewage Collection and Transport System Master Plan Development", by Kennedy/Jenks/Chilton, Inc., dated January 1986. From this investigation a scope of work was developed which forms the basis of this Master Plan. This plan incorporates input from present and former District staff and a financing options report prepared for this plan by the firm of Miller & Schroeder Financial, Inc.

The District consists of a Sewer Department, a Water Department, and a Recreation and Parks Department. Master planning for the Water Department and the Recreation and Parks Department is being accomplished by others. It is intended that the results of this master plan be integrated with the outcome of those other master plans into a comprehensive financial plan for the District. Therefore, an additional goal of this plan is to provide an accurate wastewater financial picture for the District Master Financial Plan.



CHAPTER - 3

GOALS OF MASTER PLAN

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GOALS OF MASTER PLAN

A goal is an end toward which effort is directed. The statement of a goal or goals is followed by statement of policies that describe courses of action that will result in the achievement of the goal. Finally there are specific actions that implement the policies.

A goal of the North Tahoe Public Utility District is to protect the health and safety of the residents on the north shore of Lake Tahoe from risk due to sewage generated by the businesses and residences within its boundary in a competent, reliable, and cost effective manner. The objective of the Sewer Master Plan is to provide the District with policies on which to develop actions in support of the goals of the District.

Having stated the District's goal, the Master Plan sets forth the following policies:

- Eliminate public exposure to wastewater,
- Correct existing problems or deficiencies,
- Plan for timely system rehabilitation projects,
- Extend the life of existing systems and facilities,
- Meet all local, state, and federal regulations,
- Provide suitable financial reserves,
- Structure financial system to service debt,
- Provide for an economical wastewater conveyance system for the future,
- Eliminate unexpected and high rate increases due to system failure.

CHAPTER - 4

OVERVIEW OF SEWERAGE SYSTEM AND OPERATIONS

CHAPTER 4

OVERVIEW OF SEWERAGE SYSTEM

AND OPERATIONS

GENERAL

The North Tahoe Public Utility District (NTPUD) was formed in 1948 for the purpose of collecting, treating, and disposing of wastewater from the Kings Beach, Brockway, and Tahoe Vista communities along the north shore of Lake Tahoe. These communities contained highly speculative real estate developments characterized by small lots aimed at the seasonal tourist. Failing septic systems which threatened the water quality of Lake Tahoe caused the local business community to form a public utility district as a solution to the sewage problem. A large portion of the original collection system remains in service to this day, not as a tribute to superior construction techniques, but as a result of extraordinary maintenance efforts. Wastewater was treated and disposed of in Tahoe Vista until 1970 when a joint treatment facility was opened in Tahoe City. Simultaneously, the District's service area expanded to include all developed lands. The expansion resulted in the District boundaries assuming their present configuration as shown in Figure 4-1. Beginning in 1978, all wastewater from the north and west shore portions of Lake Tahoe was conveyed to a new regional treatment facility in the Martis Valley.

SEWER FACILITIES

Because of the mountainous terrain surrounding Lake Tahoe, numerous pumping stations are required to transport the sewage from a number of small communities. Figure 4-2 shows the location of the sewer pumping facilities and the extent of developed communities within the District's boundaries. Sewage flows in gravity collection lines toward the lake where it is collected and pumped from east to west through one or more main pump stations. When the lowest point in a gravity system is too low to flow into a main station, a smaller or satellite pump station lifts the sewage into the main transport system.

There are fourteen satellite pump stations and four main pump stations. The satellites are identified by a letter and a number; the letter being the first letter of the name of the main pump station receiving the satellite's discharge. The number identifies the satellite station. For example, S-1 is a satellite that discharges into the Secline Main Pump Station collection area. Sequentially Secline Main Pump Station (P.S.) pumps to National Main P.S. which pumps to Carnelian Main P.S. which pumps to Dollar Main P.S. Dollar Main P.S. pumps the entire sewage flow of the District over Dollar Hill to a gravity interceptor that transports the NTPUD sewage, along with flows from other wastewater collection agencies, to the regional treatment facility in Truckee, California. The treatment facility is operated by the Tahoe Truckee Sanitation Agency (TTSA), an independent agency with its own rates and charges collected from NTPUD customers and customers of four other sewer agencies.

A tabulation of statistics relating to the sewer facilities and general District services and facilities is shown in Table 4-1.

RESPONSIBILITY

Today, the District is responsible not only for the wastewater system, but also for the water system serving approximately two-thirds of the sewer service area and the parks and recreation programs serving residents and tourists of this mountain community. The attraction of the area is Lake Tahoe, reputed to

be one of the three purest lakes in the world. The public expectation of the quality of utility service continues to grow.

Because the sewer function was the first and only activity of the NTPUD between 1948 and 1960 (when some contract water system maintenance was begun), all buildings, vehicles, and other tangible assets of the District were accounted for through the Sewer Department, with the other departments paying rents or leases for the use of these facilities and equipment. This practice has been changing. In recent years, the Water and Recreation and Parks departments have budgeted, purchased and retained ownership of new facilities and equipment. When a facility is used in common by multiple departments, it remains in the Sewer Department ownership. Even though this is one public entity, the reality is that the Water Department derives revenues from a different customer base than the Sewer Department and the Recreation and Parks Department, which share District-wide tax revenues. Therefore, the Sewer Department is responsible for maintenance of a number of District-wide facilities, and also their replacement when necessary.

It should be noted that the District is progressing into a general fund approach to budgeting. This method will result in administrative and general expenses funded by property tax revenues, and the sewer operating fund evolving into a self- supporting enterprise operation.

SYSTEM STATISTICS

Sewer Facilities

Service Area	4,158	Acres
Population	20,000 +	Estimated Seasonal Pop.
	8,000	Estimated Resident Pop.
Number of Connections	4,850	
Length of Gravity Mains	94	Miles
Size Range	6-36	Inches in Diameter
Length of Force Mains	6.25	Miles
Size Range	4-24	Inches in Diameter
Manholes	1,598	
Main Pump Facilities	4	
Satellite Pumping Facilities	14	
Aver. Daily Flow	95	Million gallons per day
Peak Daily Flow	3.8	Million gallons per day
Design Daily Flow	11	Million gallons per day
No. of Employees	11±	(based on hours charged)
Annual Operating Cost	$ 1,214,000	(Budgeted 90/91 FY)
Annual Non Op Cost	$ 188,000	(Budgeted 90/91 FY)

Support Facilities

Fleet	46	Vehicles
Mechanics	2	
Admin Personnel	4.3	
Admin Costs	$ 420,000	(Budgeted 90/91 FY)
Loans Outstanding:		
State of CA	$ 810,000	Repaid by B&I Tax
Reserve to Operating	$ 300,000	Repaid by Operating Revenues
Assessed valuation (1990)	$ 597,248,000	
Budget Process	Line Oriented	

Level of Service

No. of Spills/Overflows	Average less than one per year
Continuity of Operation	Sustained through climatic events without interruptions
State of Readiness	High level for normal operations Adequate for emergencies
Odor	Chlorine used to control odors Adequate results when working
Outstanding Regulatory Enforcement Actions	None
Apparent Problems	Lack of redundant force main piping Old age of parts of collection system Access to lines in easement areas Lack of Satellite PS backup power Enforcement of Grease Control Ordinance Moderate to low I/I in some areas Funding constraints & limitations Funding constraints & limitations Inability to cost account by task

TABLE 4-1

REVENUES

Prior to 1978, the Sewer Department was funded solely by a District-wide ad valorem tax rate. In 1978, California voters approved Proposition 13 limiting the total amount of revenue tax and reducing the tax rate to an earlier base. As a result, the District sought to recover operating revenue by the imposition of a sewer user fee of $100 per year per customer. The proposal drew a large reaction from the community which resulted in sewer user fee being established in November of 1978 at $50 per year per residence. The rate history that has followed is shown in Figure 4-3. This figure shows the change in the residential rate. Commercial rates were adjusted by the same percentages as the residential rate.

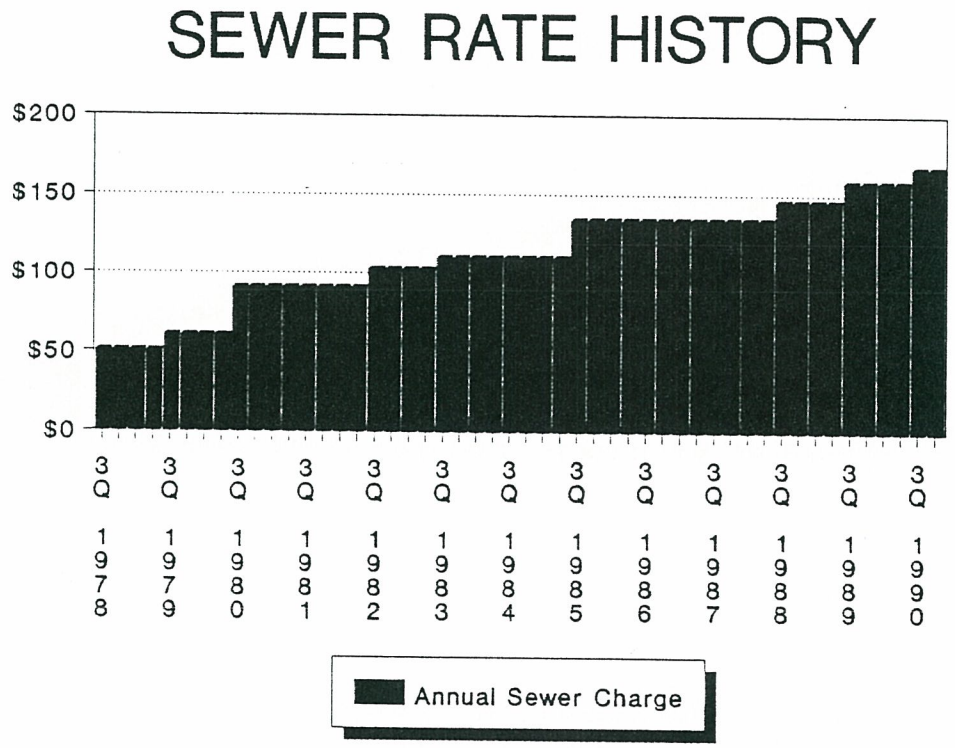


Figure 4-3

SERVICE LEVELS

The level of maintenance in the late seventies was inadequate resulting in numerous sewage spills each year and negative impacts on the environment. A Cease and Desist Order was imposed on the District by the California Regional Water Quality Control Board Lahontan Region, in 1979. A significant spill in December of 1981 brought the threat of civil penalties by the Regional Board. In response to this threat, the District, using the last of pre-Proposition 13 voter approved General Obligation Bonds, installed bypass hardware on the pressure discharge sewer pipes at National and Carnelian main pump stations and spearheaded a regional emergency response plan. To address the prevention of spills, the technical support staff was strengthened and more aggressive sewer cleaning schedules were established. The Cease and Desist Order was lifted as the spill history significantly improved.

The authority of the Regional Water Quality Board to impose fines without hearings has been initiated.Acting on the Board's behalf, the Executive Officer can levy fines up to $16,000 per day for spills. Since 1983, the frequency of spills has been reduced to one or less per year.

SEWER AGE DISTRIBUTION

The construction history of the sewer system is an indicator of the probable future needs for replacement and rehabilitation. Figure 4-4 shows the sewer age distribution for the collection lines within the North

Tahoe Public Utility District. There were three major periods of construction. The first occurred shortly after the formation of the District; the next around 1960. The final major construction period took place between 1967 and 1973.

The first two construction periods were noted for the use of clay pipe with short joint-to-joint spacing and questionable construction practices. The latter period used better construction techniques and pipe of longer joint-to-joint lengths and improved seals at the joints. The short jointed pipe is prone to root intrusion into the pipe often blocking flow. The shear number of joints and their aged condition contributes to an infiltration problem that has taxed the pumping facilities during heavy precipitation and snow melt. The newer pipe has significantly fewer problems.

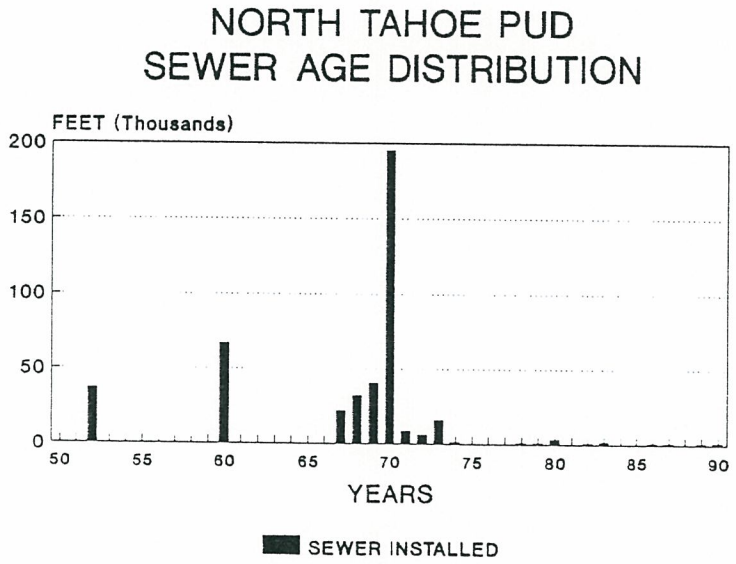


Figure 4-4

ORGANIZATION

A five person elected Board of Directors establishes the policy and sets the direction of the District. A General Manager implements the policies and directions of the Board through the human, financial and material resources of the District. Four department heads report to the General Manager as do the clerical/administrative staff. Sewer and water operations are managed by the Operations Director. The recreation programs, beaches and parks are managed by the Recreation and Parks Director. Support services of accounting and engineering are managed by the Chief Accountant and Chief Engineer respectively. This departmental structure is shown in Figure 4-5.

The Operations Department is responsible for a variety of tasks, including sewer collection line and water distribution line maintenance, maintenance of lake intakes, booster pump stations, and sewer pump stations, fleet and equipment maintenance, and building and grounds maintenance. The Department is comprised of a full time staff of 17 as illustrated in Figure 4-6.

North Tahoe Public Utility District

Department Organization Chart

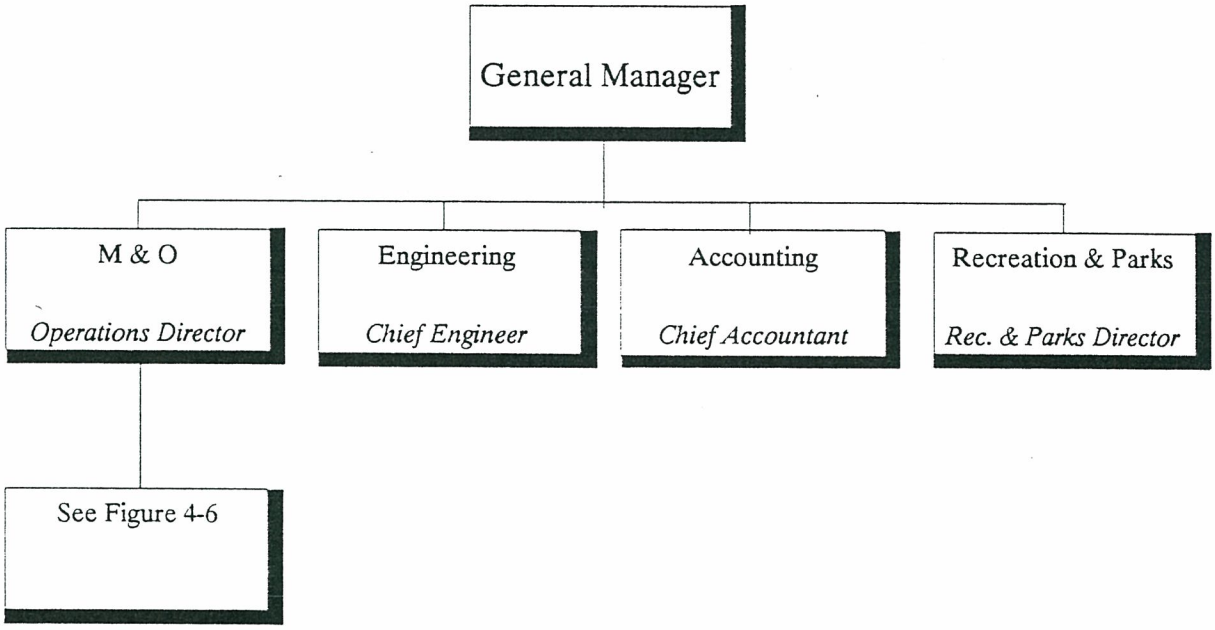
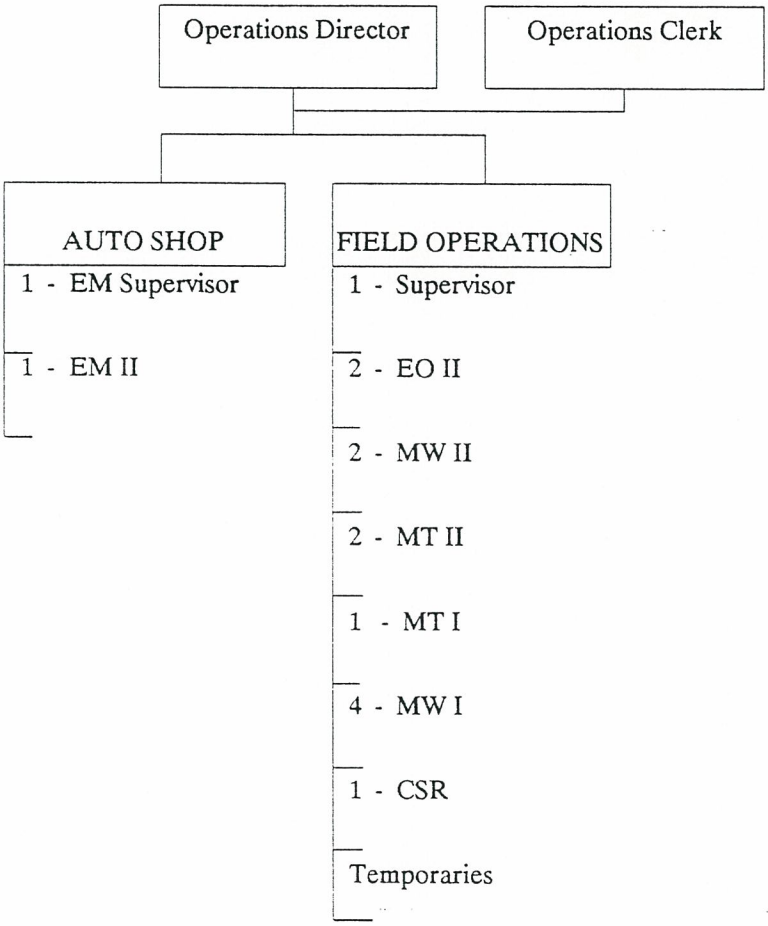


Figure 4-5

North Tahoe Public Utility District

Maintenance and Operation Department



Legend

EM-Equipment Mechanic

EO-Equipment Operator

MW-Maintenance Worker

MT-Maintenance Technician

CRS-Customer Service Rep.

Figure 4-6

CHAPTER - 5

IMMEDIATE NEEDS AND PROBLEMS

CHAPTER 5

IMMEDIATE NEEDS AND PROBLEMS

An evaluation of the District's facilities, operating history, records of operations, and interviews with staff revealed several issues of concern. They are listed below:

- Financial constraints/cost of providing service
- Preventive and corrective maintenance priorities
- Staffing levels and organization
- Grease control
- Right-of-way access
- Information management/cost accounting system
- Facilities replacement assessment and scheduling
- Capital cost recovery

FINANCIAL CONSTRAINTS/COST OF PROVIDING SERVICES

A pressing concern to the staff is the loss of departmental income caused by the exhaustion of sewer assessment district surplus construction funds. Also, there has been a reduction of tax revenues allocated to the Sewer Department. Figure 5-1 illustrates the historical distribution of tax revenues. These changes in the financial structure are occurring as the system maintenance requirements increase due to age of the facilities, poor quality initial construction, and a stricter regulatory climate.

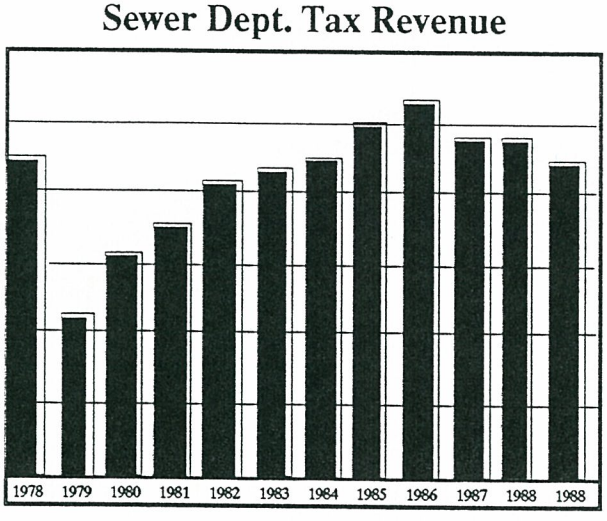


Figure 5-1

In addition to the decline in operating income, income traditionally designated for system replacement or expansion is not sufficient to fund an ideal capital improvement program. Income from connection fees is undependable. New connections are subject to regulatory agency permit processes which have been subjected to environmental, political and legal challenges. The uncertainty is reflected in connection fee income history for the last ten years as shown in Figure 5-2. It can also be seen that revenue from connection fees is too low to finance any but the smallest improvement.

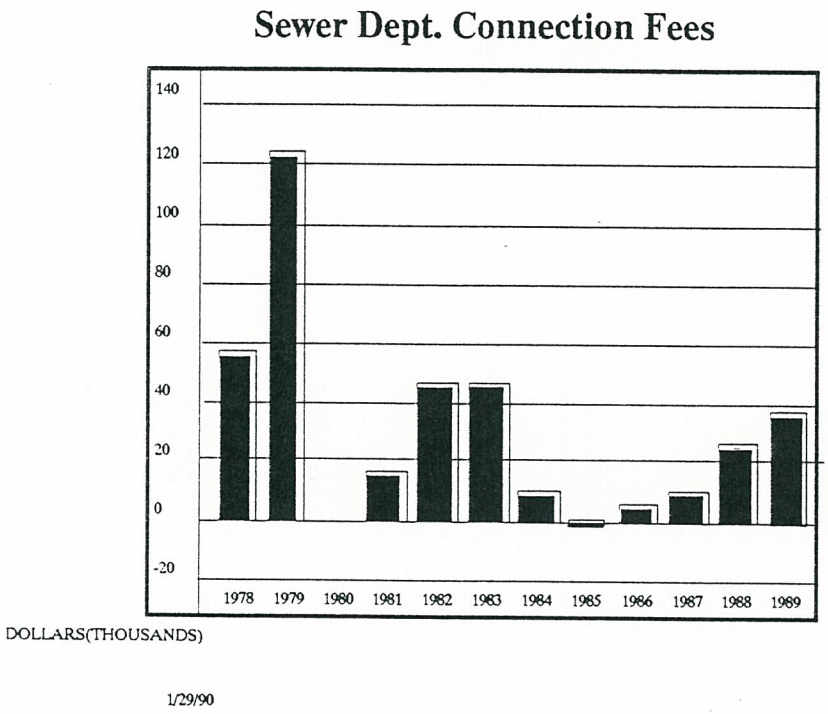


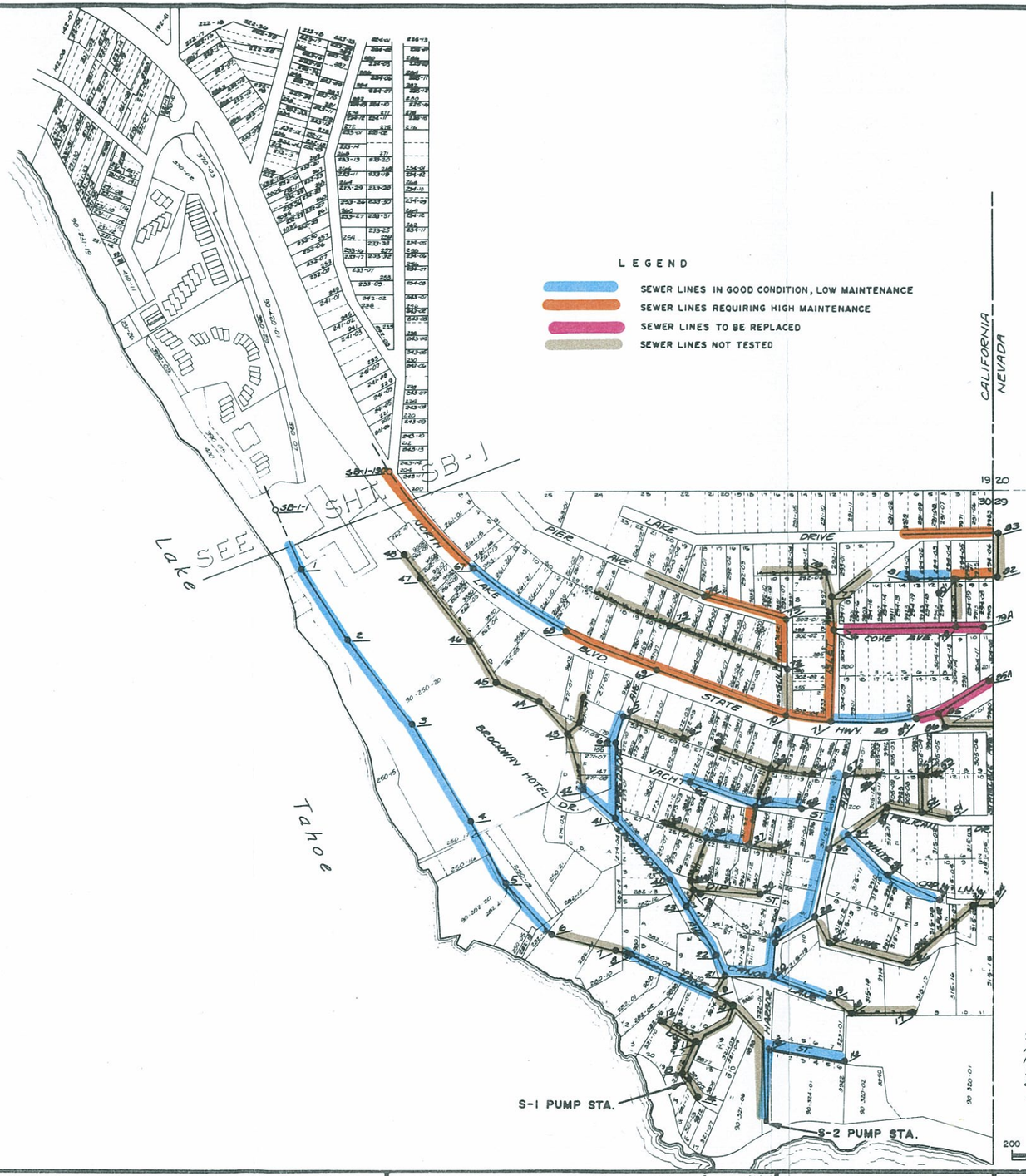
Figure 5-2

Efforts to make the building permit allocations more uniform and predictable have not yet been successful. Changing economic conditions, changing permit conditions, and periodic re- evaluation of environmental thresholds have impacted the establishment of long-term predictions of growth. Based on the experiences of the last decade this plan assumes that, although there are pressures to standardize the permit process, the predictable number of new connections to the sewer system is too few to generate significant levels of capital improvement funding.

PREVENTIVE AND CORRECTIVE MAINTENANCE PRIORITIES

A series of maps are included in this chapter to identify all the collection lines in the District. They are color coded to show lines that require low maintenance, high maintenance, or replacement, and lines for which the District has no record (approximately 45% of the line miles of sewer).

Low maintenance means that the lines are structurally sound, have water-tight joints and require only an occasional cleaning. Such items as cleaning and periodic testing make up a preventive maintenance program. High maintenance lines require frequent cleaning, and may have some joints which require root treatments periodically or joints that must be excavated and repaired, but which still have a useful service life given the appropriate maintenance effort. This category is an example of a combination preventive and corrective maintenance program. Replacement lines are those where the number of defects is such that it is no longer cost effective to maintain or repair the individual defects. It is more cost effective to replace the entire line. This is an example of corrective maintenance.



REVISION	DATE	DESCRIPTION	BY	APP'D

DRAWN BY: JB
CHECKED BY:
SUBMITTED BY:
RCE. NO.

NORTH TAHOE PUBLIC UTILITY DISTRICT

SEWER FACILITIES
BROCKWAY, LAKE VISTA

NORTH TAHOE PUBLIC UTILITY DISTRICT
APPROVED _____ General Manager Date
APPROVED _____ Chief Engineer Date

SURVEY:
PLAN
PROFILE
FILE NO.

DATE OCT. 1956
SHEET NO. SA-1

SEE SHT. SC-1

NORTH SHORE BLVD.

SPECKLED AVE.

CUTTHROAT AVE.

DOLLY VARDEN AVE.

LOCH LEVEN AVE.

STEELHEAD AVE.

GOLDEN AVE.

RAINBOW AVE.

TROUT AVE.

BROOK AVE.

SALMON AVE.

MINNOW AVE.

WOLF ST.

DEER ST.

BEAR ST.

COON ST.

FOX ST.

SECLINE ST.

CHIPMUNK ST.

BEAVER ST.

SALMON CT.

CHURCH AVENUE

DIRT RD.

PARK LANE

BEND AVE.

BROCKWAY VISTA AVE.

CHIPMUNK ST.

BROCKWAY HOTEL DR.

STATE HWY. 28

MATCH LINE

BEAVER ST. ASSESSMENT DISTRICT

METERING MANHOLE

SECLINE PUMP STA.

W.F.M.

BROCKWAY VISTA

STATE HIGHWAY 28

BROCKWAY VISTA AVE.

LAKE TAHOE

SEE SHT. SA-1

LEGEND

SEWER LINES IN GOOD CONDITION, LOW MAINTENANCE

SEWER LINES REQUIRING HIGH MAINTENANCE

SEWER LINES TO BE REPLACED

SEWER LINES NOT TESTED

LEGEND

UNPAVED ROAD (STREET)

STREET RIGHT-OF-WAY ONLY, NO EXISTING ROADWAY

MAN HOLE & NUMBER

DIRECTION OF FLOW

PIPE CONNECTED TO MH FOR CLEANING, NO FLOW OUT OF MH

KEY FLOW M.H. & SEWER REACH TO BE MONITERED

XX' DIMENSIONS BETWEEN MANHOLES, (FROM TV LOGS, AS-BUILTS & FIELD CHECKS)

SCALE IN FEET

200 0 200 400

DRAWN BY	DESIGN BY
JGA	
CHECK BY	
BY	R.C.E.

REVISION	DATE	DESCRIPTION	
	9-85	UPDATE MANHOLES & SS LINES	JB
	1-86	" BROCKWAY VISTA AVE. & CHIPMUNK	JB
	6-87	3-87 10-87	

RAYMOND VAIL AND ASSOCIATES
ENGINEERS · ARCHITECTS · PLANNERS · SURVEYORS
FAIR OAKS · TAHOE CITY · ANTIOCH · AUBURN · SONORA · CARSON CITY

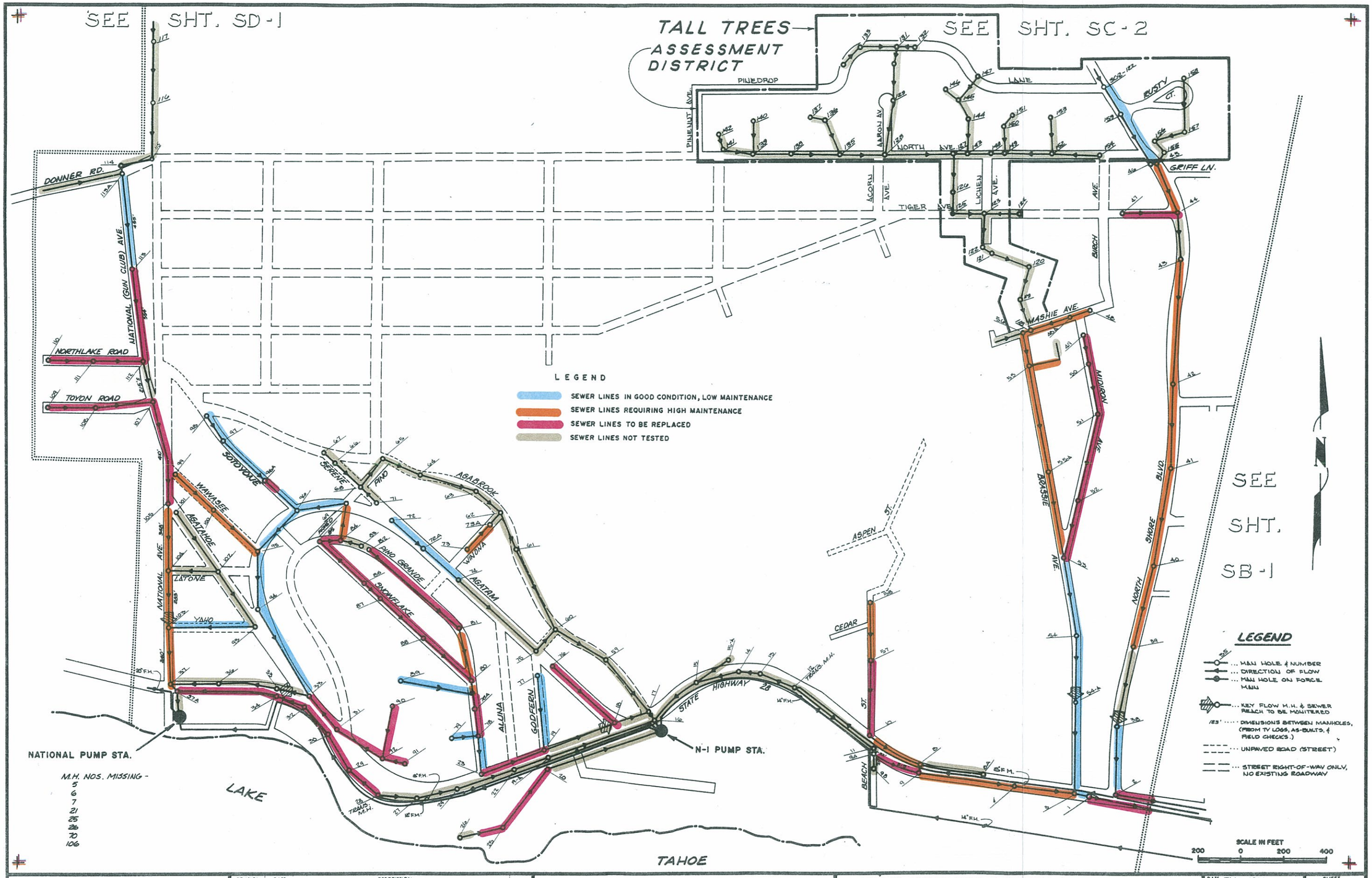
NORTH TAHOE PUBLIC UTILITY DISTRICT -

SEWER FACILITIES

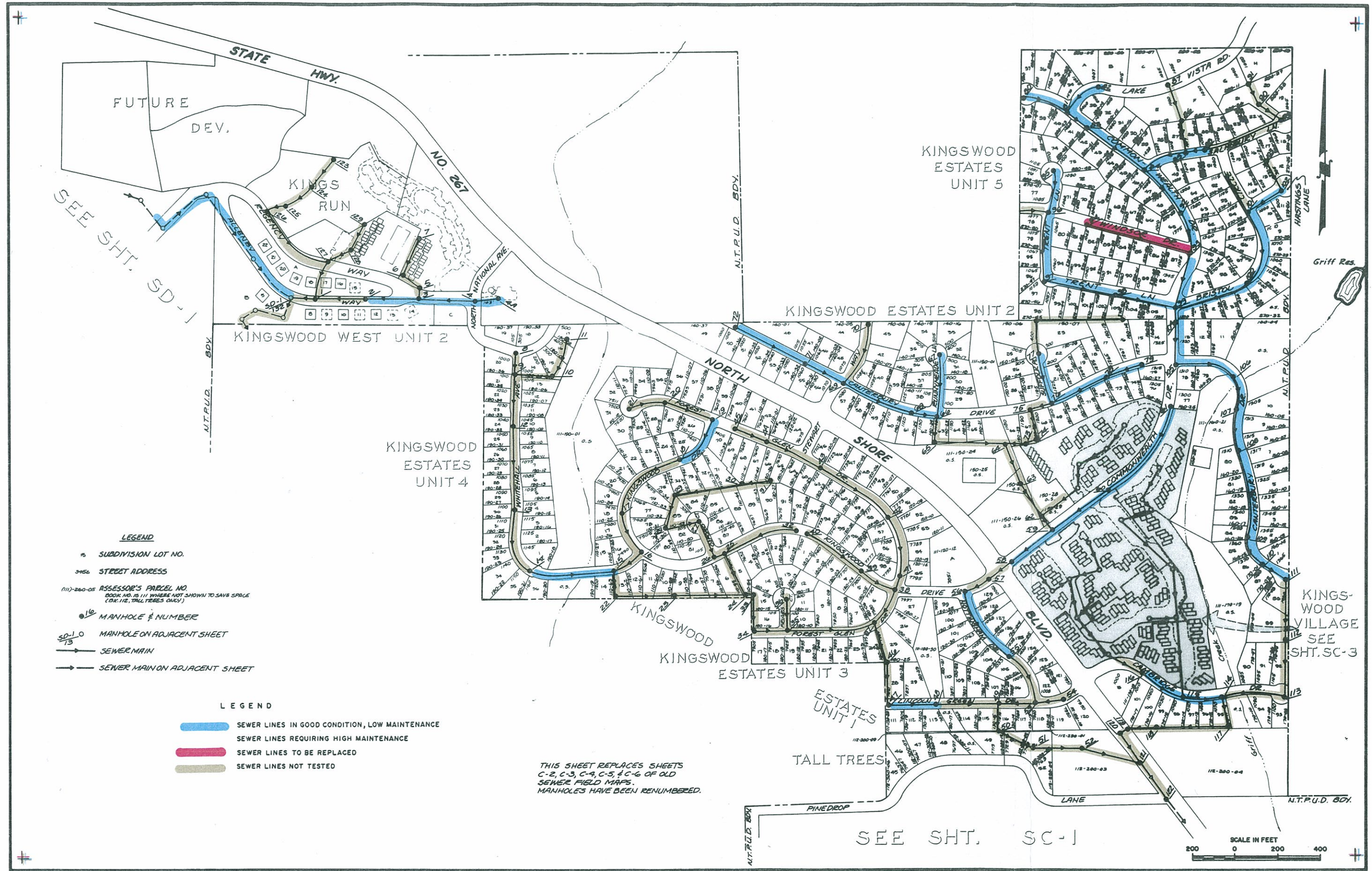
KINGS BEACH, BROCKWAY VISTA

DATE JANUARY 1976

SHEET SB-1



DRAWN BY G.Y. DESIGN BY CHECK BY J.T. BY RCE	REVISION DATE DESCRIPTION 9-83 UPDATE MANHOLES & SS LINES JB 9-86 ADD M.H.s 116 & 117. RENUMBER TALL TREES M.H.s 118-159 JB	RVA RAYMOND VAIL AND ASSOCIATES ENGINEERS · ARCHITECTS · PLANNERS · SURVEYORS FAIR OAKS · TAHOE CITY · ANTIOCH · AUBURN · SONORA · CARSON CITY	NORTH TAHOE PUBLIC UTILITY DISTRICT - **SEWER FACILITIES** TAHOE VISTA, WOODVISTA, TALL TREES	DATE JAN., 1976	SHEET SC-1



REVISION	DATE	DESCRIPTION	BY	APPD.
	1-87	ADD M.H.s 123-129 IN KINGS RUN	JB	
	10-87	ADD M.H. 4A		

DRAWN BY: JB
CHECKED BY:
SUBMITTED BY: RCE. NO.

NORTH TAHOE PUBLIC UTILITY DISTRICT

SEWER FACILITIES

KINGSWOOD ESTATES UNITS 1,2,3,4,&5, KINGSWOOD WEST UNIT 2, KINGS RUN, & POR. TALL TREES

NORTH TAHOE PUBLIC UTILITY DISTRICT

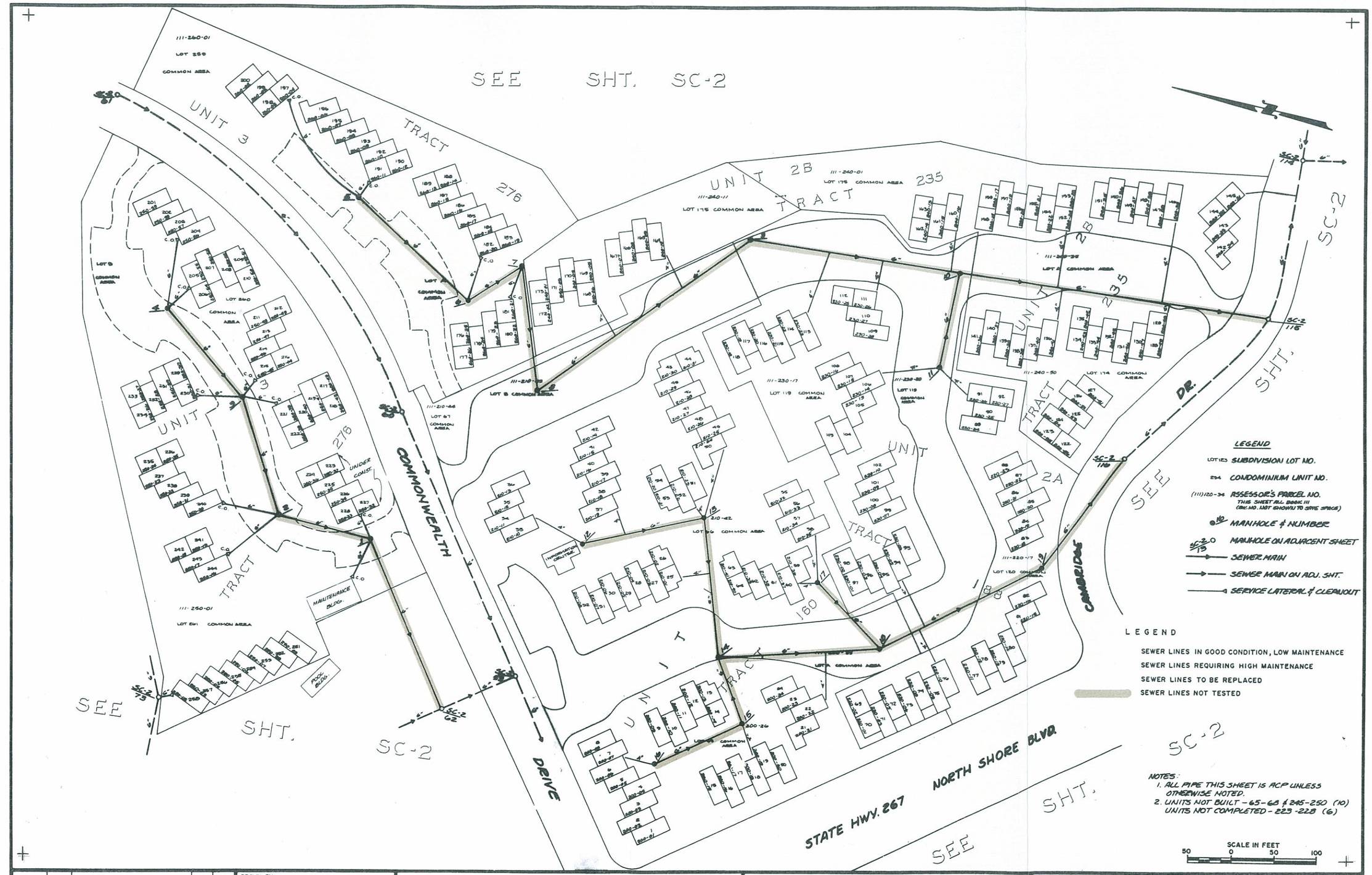
APPROVED _____ General Manager _____ Date

APPROVED _____ Chief Engineer _____ Date

FILE NO. _____

DATE SEPT. 1986

SHEET NO. SC-2



REVISION	DATE	DESCRIPTION	BY	APPD.

DRAWN BY: JC
CHECKED BY:
SUBMITTED BY: RCE NO.

NORTH TAHOE PUBLIC UTILITY DISTRICT

SEWER FACILITIES

KINGSWOOD VILLAGE - CONDOMINIUMS

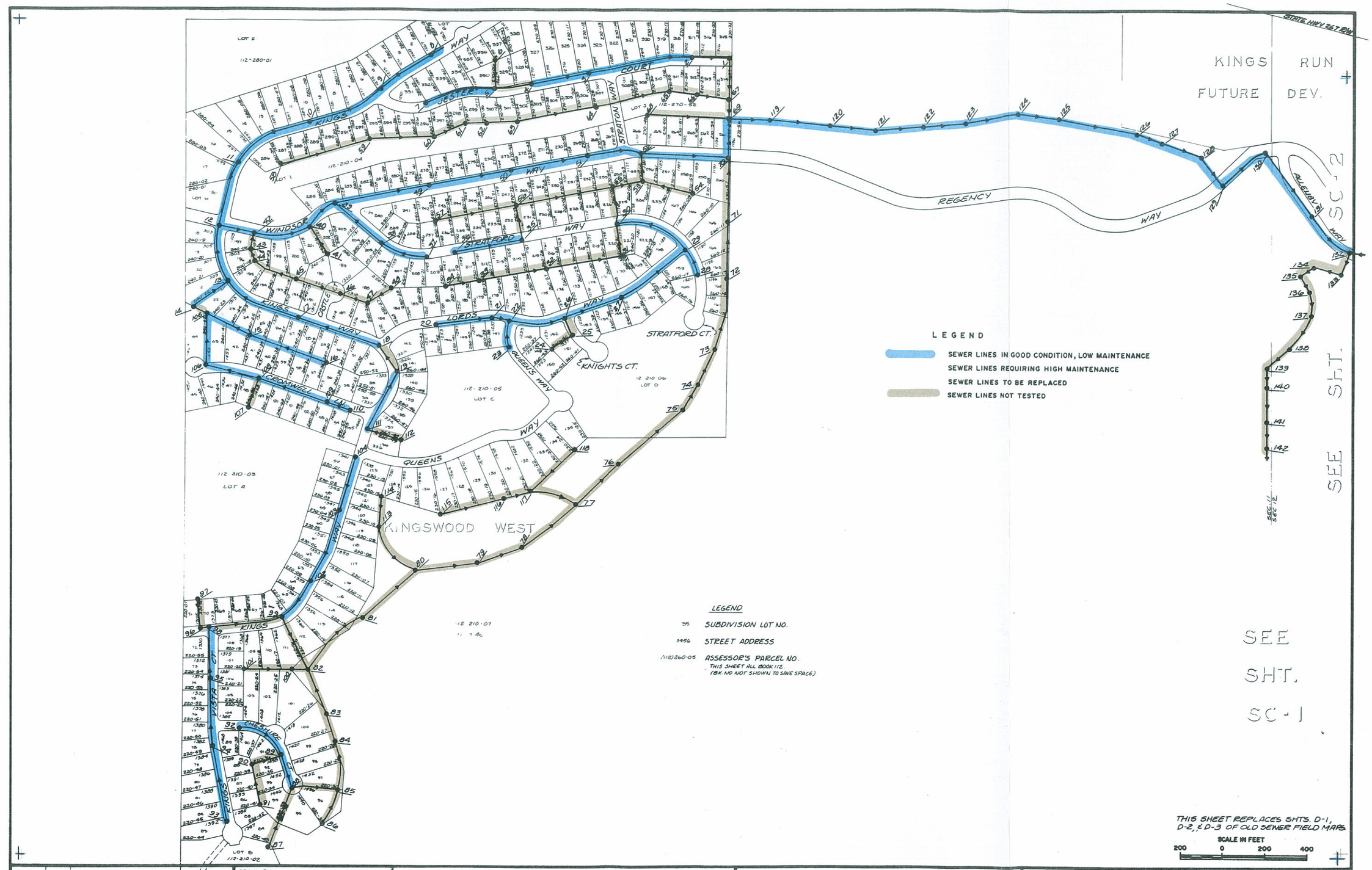
NORTH TAHOE PUBLIC UTILITY DISTRICT

APPROVED _____ General Manager Date

APPROVED _____ Chief Engineer Date

SURVEY:
PLAN
PROFILE
FILE NO.

DATE SEPT. 1986
SHEET NO. SC-3



REVISION	DATE	DESCRIPTION

DRAWN BY: JB
CHECKED BY:
SUBMITTED BY: RCE NO.

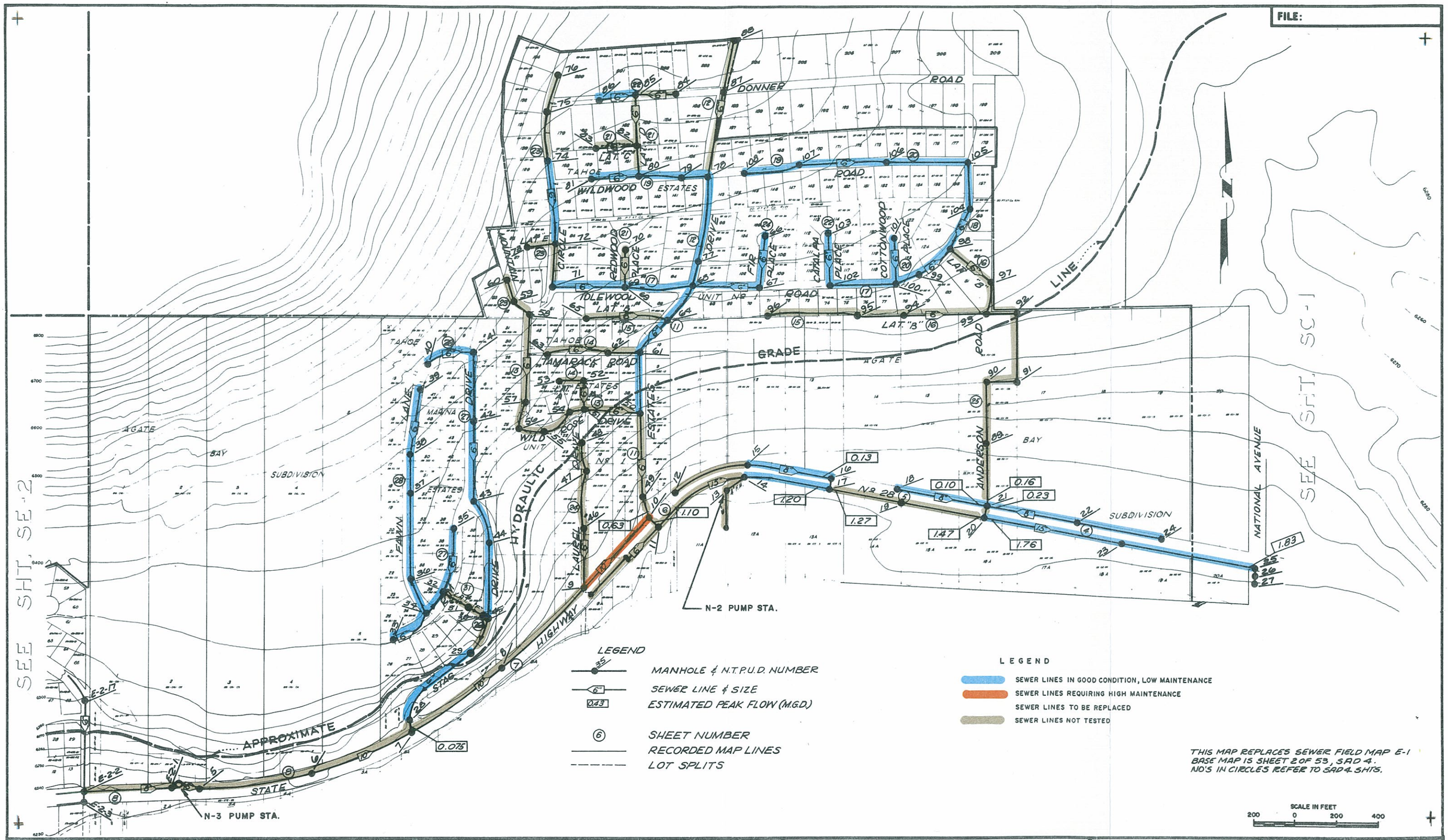
NORTH TAHOE PUBLIC UTILITY DISTRICT

SEWER FACILITIES

KINGSWOOD WEST & REGENCY WAY

NORTH TAHOE PUBLIC UTILITY DISTRICT
APPROVED _____ General Manager Date
APPROVED _____ Chief Engineer Date

DATE SEPT. 1986
SHEET NO. SD-1
FILE NO.



REVISION	DATE	DESCRIPTION	BY	APPD
	7-86	MOVE LAT. "F" TO CORRECT LOC.	JB	

DRAWN BY

CHECKED BY

SUBMITTED BY

R.C.E. NO.

NORTH TAHOE PUBLIC UTILITY DISTRICT

SEWER FACILITIES

TAHOE ESTATES & STATE HWY. 28 FROM NATIONAL AVE. WEST TO LIFT STATION

NORTH TAHOE PUBLIC UTILITY DISTRICT

APPROVED _____ General Manager _____ Date

APPROVED _____ Engineer _____ Date

SURVEY:

PLAN

PROFILE

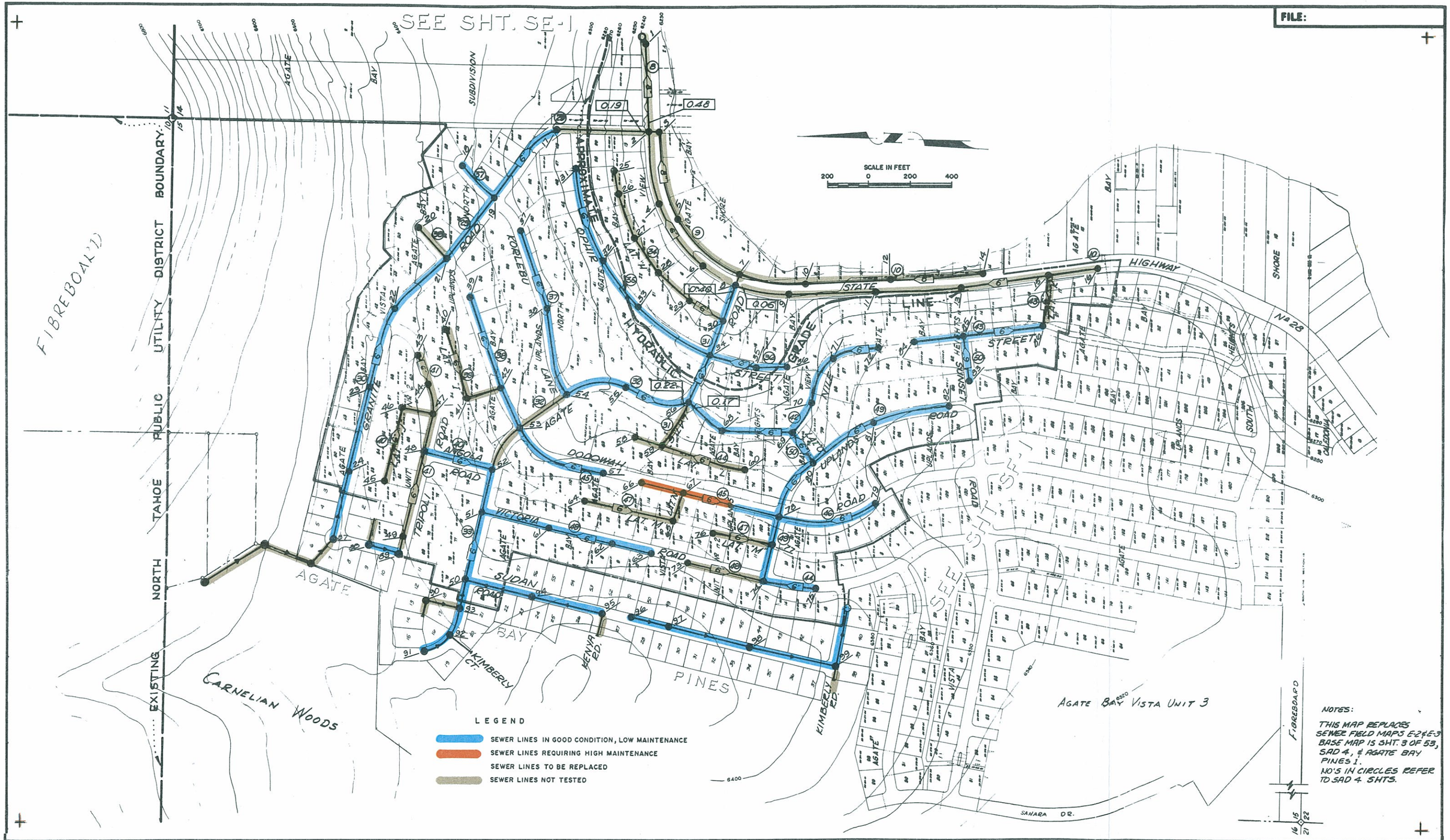
FILE NO.

DATE 6-86

SHEET NO. SE-1

BRUNING 44 137 3671U

FILE:



NOTES:
THIS MAP REPLACES SEWER FIELD MAPS E-2 & E-3
BASE MAP IS SHT. 3 OF 53, SAD 4, & AGATE BAY PINES 1.
NO'S IN CIRCLES REFER TO SAD 4 SHTS.

REVISION	DATE	DESCRIPTION	BY	APPD

DRAWN BY
CHECKED BY
SUBMITTED BY
R.C.E. NO.

NORTH TAHOE PUBLIC UTILITY DISTRICT

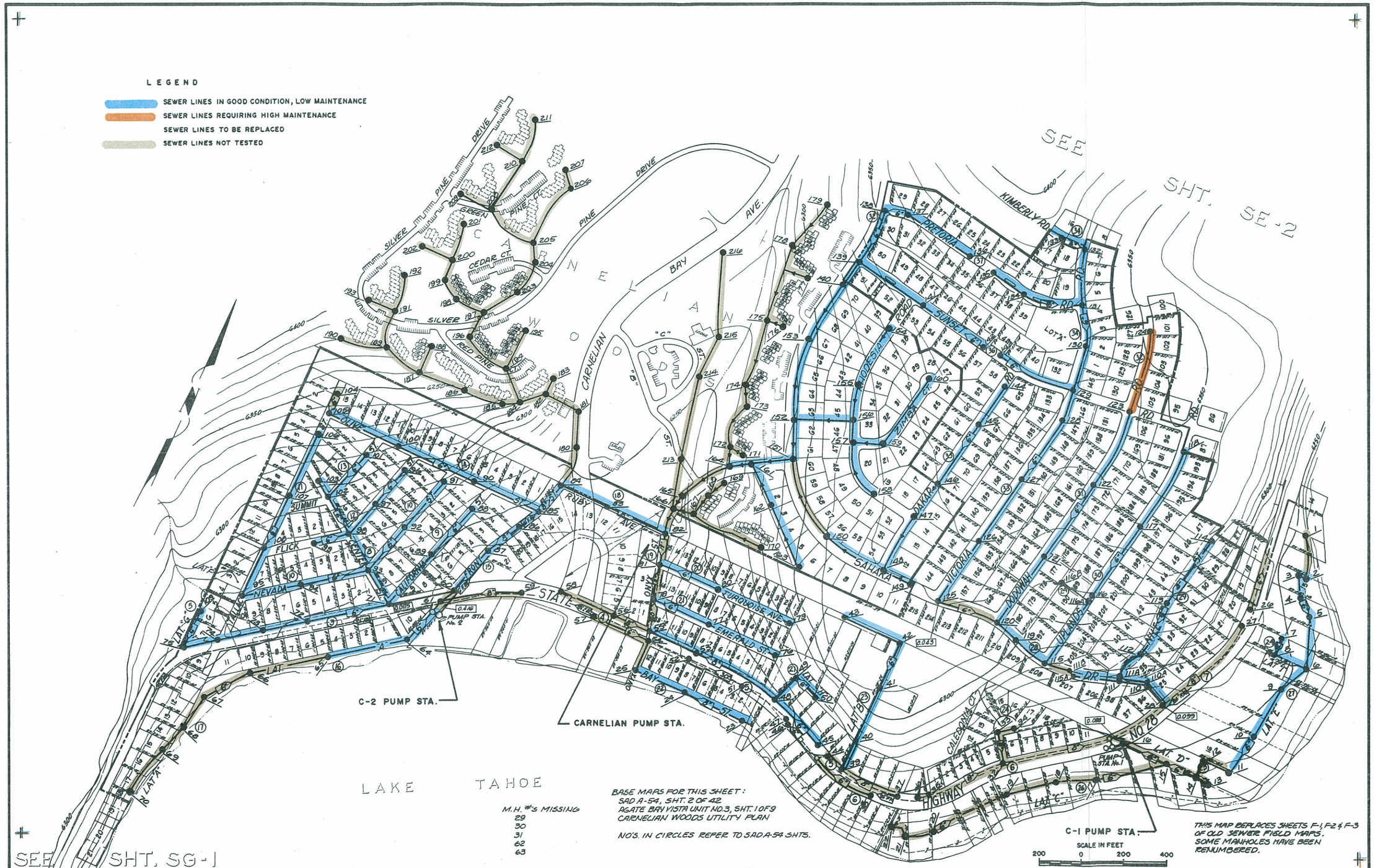
SEWER FACILITIES
AGATE BAY

NORTH TAHOE PUBLIC UTILITY DISTRICT
APPROVED _____ General Magager _____ Date
APPROVED _____ Engineer _____ Date

SURVEY:
PLAN
PROFILE
FILE NO.

DATE 6-86
SHEET NO. SE-2

BRUNING 44 131 1b710



REVISION	DATE	DESCRIPTION	BY	APPD.

DRAWN BY:
CHECKED BY:
SUBMITTED BY:
RCE. NO.

NORTH TAHOE PUBLIC UTILITY DISTRICT

SEWER FACILITIES

AGATE BAY, CARNELIAN BAY, CARNELIAN WOODS

NORTH TAHOE PUBLIC UTILITY DISTRICT

APPROVED _____ General Manager _____ Date

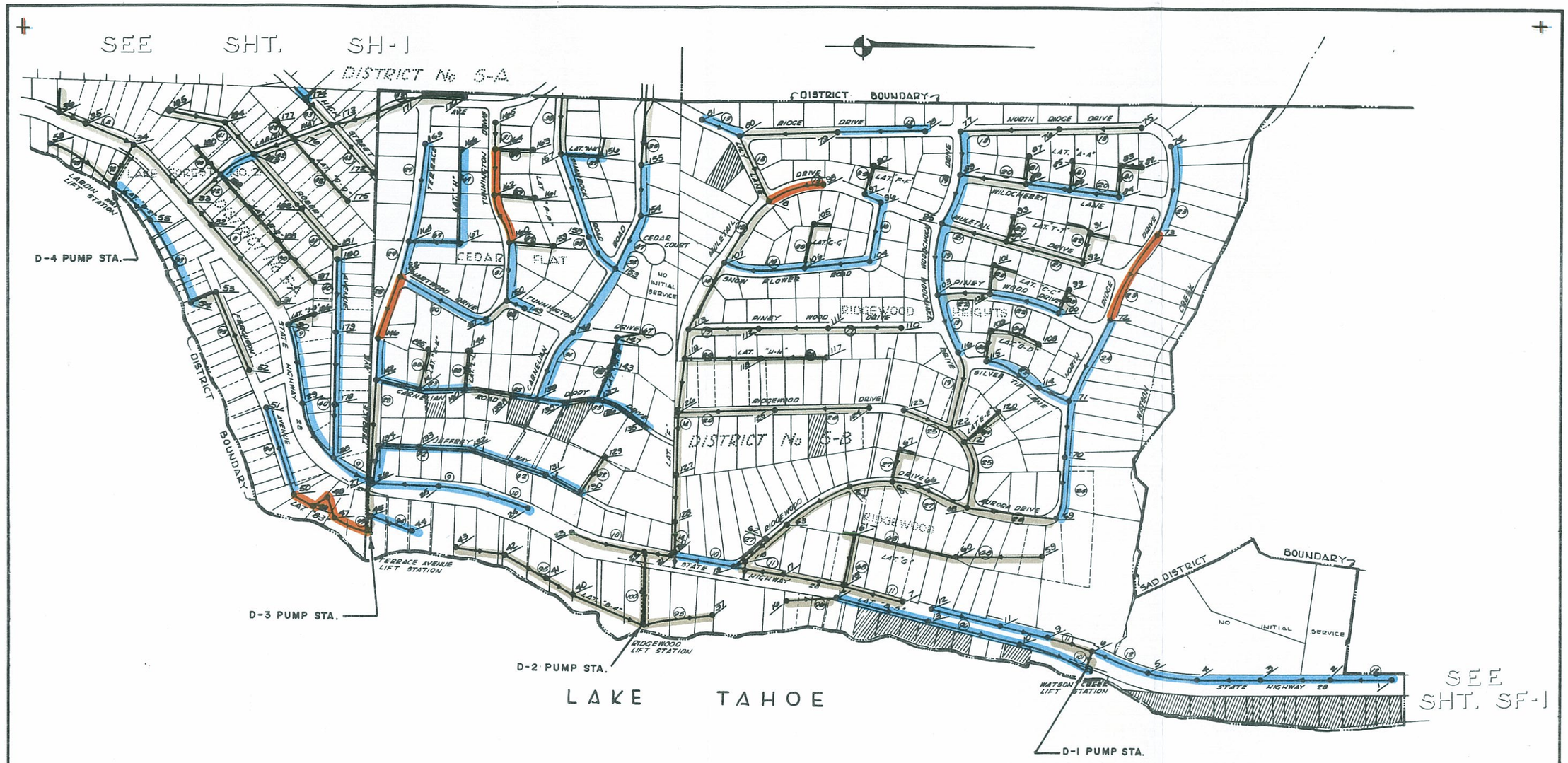
APPROVED _____ Chief Engineer _____ Date

SURVEY:
PLAN
PROFILE
FILE NO.

DATE 12/15/1986

SHEET NO. SF-1

BRUNTON 48 132
N3487



LEGEND

- SEWER LINES IN GOOD CONDITION, LOW MAINTENANCE
- SEWER LINES REQUIRING HIGH MAINTENANCE
- SEWER LINES TO BE REPLACED
- SEWER LINES NOT TESTED

THIS MAP REPLACES SEWER FIELD MAP G-1
BASE MAP IS SHEET 4 OF 104, SADS 5A & 5B

M.H. NOS. MISSING:
38
39
46
56
57

NO'S IN CIRCLES REFER TO SAD SHTS.

SCALE IN FEET
200 0 200 400

REVISION	DATE	DESCRIPTION	BY	APPD.
	7-87	ADD M.H. 139A (FIELD LOC.)	JB	

DRAWN BY:
CHECKED BY:
SUBMITTED BY:
RCE. NO.

NORTH TAHOE PUBLIC UTILITY DISTRICT

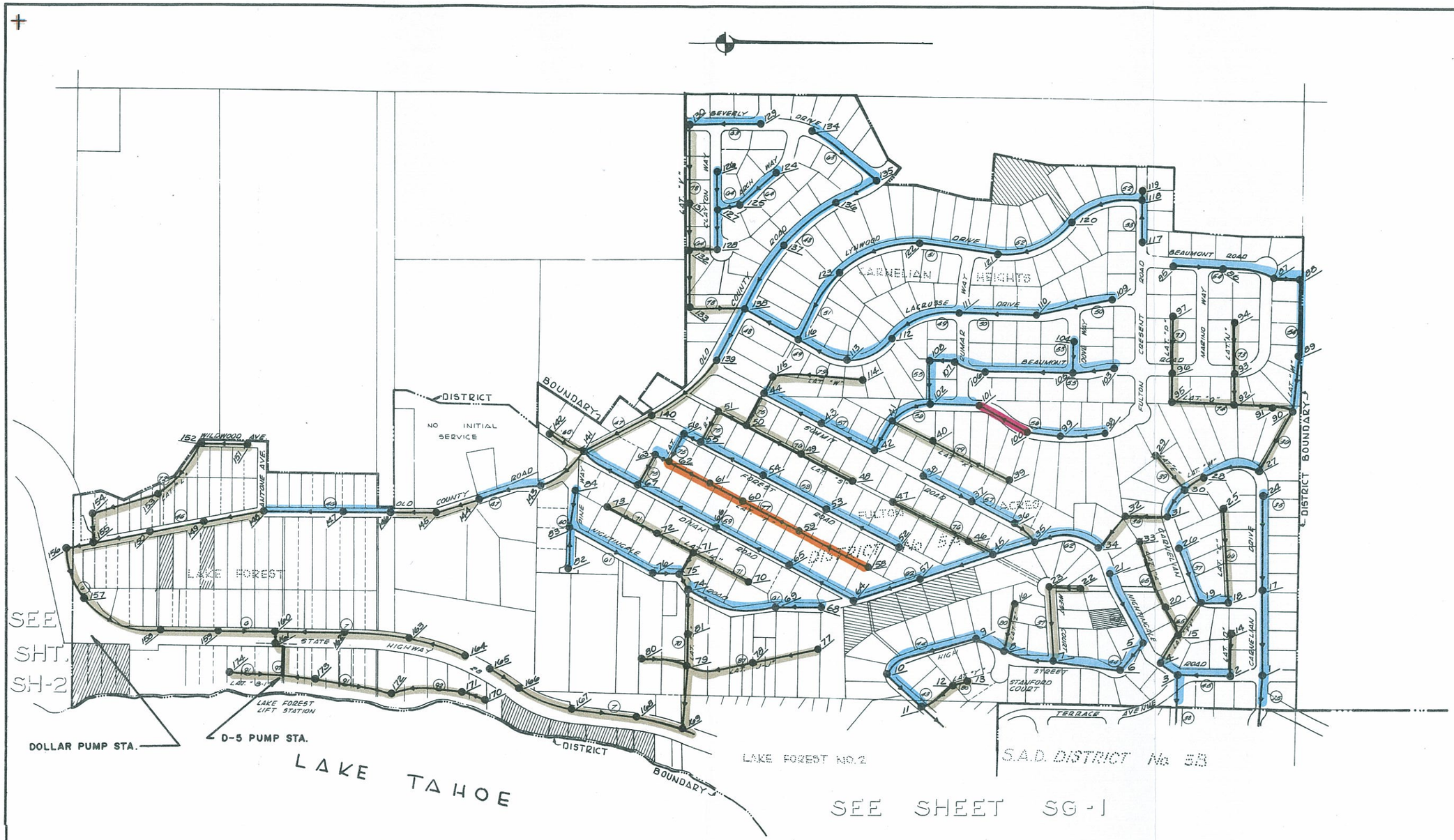
SEWER FACILITIES

RIDGEWOOD, CEDAR FLAT, LAKE FOREST NO. 2

NORTH TAHOE PUBLIC UTILITY DISTRICT
APPROVED _____ General Manager _____ Date
APPROVED _____ Chief Engineer _____ Date

SURVEY:
PLAN
PROFILE
FILE NO.

DATE 7-86
SHEET NO. SG-1



LEGEND

- SEWER LINES IN GOOD CONDITION, LOW MAINTENANCE
- SEWER LINES REQUIRING HIGH MAINTENANCE
- SEWER LINES TO BE REPLACED
- SEWER LINES NOT TESTED

THIS SHEET REPLACES SHT. M-1 OF OLD SEWER FIELD MAPS.

BASE MAP FOR THIS SHEET: SAD 5A, SHT. 3 OF 104. NUMBERS IN CIRLES ARE SHEET NO'S OF SAD 5A-5B MAPS.

SCALE IN FEET
200 0 200 400

REVISION	DATE	DESCRIPTION	BY	APPD

DRAWN BY
CHECKED BY
SUBMITTED BY
RCE NO.

NORTH TAHOE PUBLIC UTILITY DISTRICT

SEWER FACILITIES

LAKE FOREST NO. 3, FULTON ACRES, CARNELIAN HEIGHTS

NORTH TAHOE PUBLIC UTILITY DISTRICT

APPROVED _____ General Manager Date

APPROVED _____ Chief Engineer Date

SURVEY:
PLAN
PROFILE
FILE NO.

DATE AUG. 1995
SHEET NO. SH-1

It is desirable to have an active preventive maintenance program to avoid unpredictable and more costly corrective maintenance. Chapter 7 will discuss the topic of preventive maintenance more fully.

STAFFING LEVELS AND ORGANIZATION

District staffing levels responsible for sewer system maintenance and operation have varied in size during the years preceding this report. The maintenance and operations staffing level was 16 until the 1990-91 budget when an additional position was included in the budget. This staff is responsible for the sewer collection and pumping facilities, water source and storage, transmission and distribution facilities, fleet maintenance, building maintenance facilities, and some maintenance of the recreation and parks facilities. The operating history of virtually no sewer spills and the apparent integrity of both the sewer and water system indicate that the staffing level is adequate for the tasks. As needed, the staff is shifted between sewer and water, preventive and corrective maintenance. The adequacy of staffing to maintain the level of service currently enjoyed by the public is reviewed in relation to desired programs and goals in Chapter 7.

GREASE CONTROL

A relatively small number of commercial customers of the District discharge high concentrations of grease. The grease solidifies in the sewer mains which can cause spills of raw sewage resulting in possible enforcement actions by water quality officials. To counter this chain of events the District has, for nearly a decade, expended great effort to remove the grease from sewer lines. Considerable staff and Board time has also been spent discussing alternatives. These discussions have resulted in regulating ordinances which have been only partially successful in reducing grease problems.

RIGHT-OF-WAY ACCESS

The sewer facility maps reveal that approximately 45% of the line miles of sewers have not been inspected or tested since their installation. The reason this portion of the system has not been tested is because easements and rights of way in which the facilities are located have been built upon, have been over grown with vegetation, or have been completely blocked from access by conventional maintenance equipment. Some of these situations cannot be corrected. A concerted effort is needed to reverse the trend where possible. The rising value of land in this resort community has also stimulated a growing number of cases of encroachment, both inadvertent and deliberate.

INFORMATION MANAGEMENT/COST ACCOUNTING SYSTEM

The District operates on a line oriented budget and cost accounting system. Pressure on the Board of Directors and staff of the District to explain and defend the operation of the Sewer Department has led to the desire for true zero based budgeting system with supporting program-oriented information management/cost accounting systems. The existing accounting practices, software and hardware do not support this style of accounting nor is it efficient to attempt such a system manually. It is difficult to state goals and policies and assess the District's performance without a comprehensive management accounting system.

The State of California has adopted legislation that allows increased dollar limits for work done by the District's forces, the amount allowed for informal bid procedures, and the amount for which formal bidding is required. It is called the Uniform Public Construction Cost Accounting Act. It gives public agencies greater leeway in the execution of public works projects, speeds up the award process, and improves the timeliness of project completion. In order to participate in this program the District must adopt a cost accounting system to track the labor, materials, and equipment charges attributable to those projects.

FACILITIES REPLACEMENT ASSESSMENT AND SCHEDULING

Prior to 1978 public agencies would typically finance replacement of capital facilities through ad valorem taxes (tax based on the value of real property) and connection fees. General Obligation (GO) bonds could be sold and taxes pledged to repay the bonds with a simple majority of the voters. The use of the tax rate, connection fees, and bonds allowed for an orderly and equitable distribution of system replacement costs to the customer. In 1978, with the passage of Proposition 13, a tax cutting and limiting initiative passed by the California voters, the traditional funding sources of capital replacement became all but impossible to use.

The passage of Proposition 13 was followed by a period of transition for most public agencies. Operating budgets for essential public services could not be immediately cut and as a result capital reserve funds were tapped by most agencies to continue operations. A two-thirds voting majority was required to obligate the public to new tax obligations, ensuring that few if any new taxes would be levied.

The taxpayers were unable or unwilling to make up the lost operating revenue through the service rate structure. Again, the capital reserves were used to stabilize the rates. The NTPUD was affected by all these factors. These transfers of funds from the reserves are currently shown as a receivable from the Sewer Operating Fund to the Sewer Reserve Fund. This results in the reserve fund level of the District being made up of about 60% in liquid assets and 40% in receivables. The lowering of interest generating reserves further reduces operating revenue and forces the rates to respond more quickly to inflationary influences.

During the 1970's, regional planning became a significant factor in the Tahoe Basin. In the 1980's, the planning agencies caused the rate of growth to slow and in some years to stop. Connection fee revenue to the District became unpredictable and insignificant in relation to the inflated replacement value of the facilities.

Capital replacement in the foreseeable future will have a greater influence than ever on the rate structure.

CAPITAL COST RECOVERY

A need exists to establish a program to replace facilities that have reached the end of their service life. Both the rate at which facilities are rehabilitated/replaced and the method of assessing those who derive the benefit must be addressed. Sewering of the community was accomplished by the use of federal and state grant funding, state loans, and local assessment districts. The continual operation, maintenance and replacement of the facility falls on the local community.

During a period of federal budgetary deficits and the debate on the continuation of any grant funding for wastewater facilities, it is unlikely that any supplementary funds to the local community will be available at the federal level. Similarly at the state level the emergence of toxic and hazardous waste treatment and disposal as a more important threat to human and economic health is expected to deplete all existing and foreseeable funding. Therefore, this plan assumes no grant funds will be available for facility renovation or replacement.

User charges for sewer service remain the primary means by which the community may continue to maintain and rehabilitate the wastewater conveyance system in the future.

All the above topics, along with related operational requirements of a wastewater agency, are discussed in more detail in the following chapters.

CHAPTER - 6

FLOW GENERATION REFINEMENT

CHAPTER 6

FLOW GENERATION REFINEMENT

PURPOSE

Since there are no per gallon charges to the District for infiltration and inflow (I/I) entering the sewer system and because the District must pump every gallon of sewage at least once, there are significant operational savings to be realized in minimizing I/I. And, while capacity exists within the District's sewage collection/transport system, the Truckee River Interceptor (TRI) which carries the discharge of several districts to the regional treatment facility has at times reached capacity due to high I/I flows. Also, the design of new or replacement facilities can be most economically accomplished utilizing design criteria specific to the NTPUD. For these reasons, the District has commissioned, as a part of the master plan process, an analysis of the sewage flow. In the Preliminary Phase I Investigation, the District's peak day sewage flow was estimated to be 0.82 mgd. This estimate was based upon the number of service connections and an assumption of persons per connection and sewage contribution per person. Further work to refine this estimate was conducted as a part of this Master Plan.

METHOD OF ANALYSIS

Information describing the number of user connections was correlated with pump station flow data for three flow basins in the following areas:

- Old portion of Carnelian Bay (Satellite Pump Station C- 2)
- Moondune Basin of Tahoe Vista (Satellite Pump Station N-1)
- Eastern portion of District, below Brockway (Satellite Pump Stations S-1 and S-2).

Monthly average water consumption and sewage generation rates are summarized in Table 6-1. Sewage flow rates were derived on the basis of satellite pump station running time meter readings and pump curve characteristics. Data describing peak flows for these areas are not presently recorded by the District. In instances when the sewage flow exceeded the metered water consumption, I/I has been assumed. Records indicate that I/I contributions for these areas have not been significant.

The population for area C-2 consists primarily of full-time residents. Area N-1 includes a number of motels and tourist residential units so the population is more transient than the population in area C-2.

For area C-2 (full time resident population), little difference between summer and winter per connection sewage flow rates is indicated. The summer and winter average daily per connection sewage flow rates are approximately 225 and 206 gallons per day per connection (gpd/connection) respectively.

The difference between summer and winter sewage flow rates is more noticeable in area N-1. The corresponding summer average sewage flow rate was 240 gpd/connection; the winter average sewage flow rate was 184 gpd/connection.

If the average per connection sanitary flow is 220 gpd and there are 4,578 connections, the estimated peak day sanitary sewage flow for the District would be approximately 1.0 mgd. If it is assumed that there are 3 persons per connection on the average, the per capita sewage flow would be about 73 gallons per day (gpd). This rate compares closely to the 60 gallons per capita per day used in the Phase I Investigation.

To derive an estimated design peak sanitary flow rate for the purposes of this study, the assumptions described in the Phase I report can be used. Accordingly in areas like Tahoe, it can be assumed that all

water use is in a 12 hour period in the daytime. For small collection areas, the peak instantaneous flow rate can be expected to be 2-1/2 times the average flow rate. Based on the average summer rates for C-2 and N-1, estimated above, peak instantaneous flow/connection will be approximately 1125 gpd for a full time resident connection, and 1200 gpd for a transient residential connection. These instantaneous sanitary flow peak rates can be used to evaluate collection area dry season sewer capacity constraints when adjusted for diversity for tributary area.

As described in the Phase I report, the infiltration into some major collection sewers appears to be limited only by sewer capacity. The District reports that some sewers are surcharged for extended periods during snow-melt. For this reason, no valid estimate can be made of the potential I/I contribution to wastewater flows. Proposed I/I correction in the area identified as having excessive I/I can significantly decrease infiltration and surcharge problems. Drought conditions prevailing since the Phase I report have prevented an actual flow measurement of the effectiveness of District corrective efforts.

Monthly Average Per Connection

Water Usage And Sewer Flow Rates

Satellite P. S.	Number of Water Meters	Monthly Water Consumption (W)/Sewage Flows (S) - Average Rate GPD/Meter																	
		1985 July		1985 Aug.		1985 Sept		1985 Oct.		1985 Nov.		1985 Dec.		1986 Jan.		1986 Feb.		1986 March	
		W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
C-2 (a)	81	303	216	385	238	235	222	189	205	192	212	199	199	242	207	212	325	198	320
N-1 (b)	102	535	268	745	253	316	200	133	145	331	156	246	215	203	181	208	569	225	351
S-1	5	767	207	542	243	437	303	68	183	173	157	159	170	258	390	192	513	286	299
S-2	6	44	244	226	279	111	170	19	34	72	40	103	141	38	492	19	47	89	160

W = Water

S = Sewage

(a) Local occupants, full time

(b) Includes "Timesharing" residences, transients

Table 6-1

ESTIMATION OF FUTURE DISTRICT DRY WEATHER SANITARY FLOW

The current dry weather sanitary flow is approximately 0.89 mgd (1988). Average annual occupancy in the District is presently about 67%. The State Water Resources Control Board "Lake Tahoe Basin Water Quality Plan" projection for year 2003 is approximately 78%. On the basis of these average occupancy rates, an estimated projected District dry weather flow for this study period could be expected to reach approximately 1.04 mgd on the average, with a peak daily flow of about 1.6 mgd.

For the District as a whole, sewage collection facilities will be adequate to accommodate the projected flow increase estimated above.

This projected increase corresponds to a growth rate of approximately 44 connections per year as follows:

$$\frac{150{,}000\ gpd}{225\ gpd/conn.\ x\ 15\ yrs.} = 44\ connections\ per\ year$$

Due to current institutional constraints, growth is not likely to reach the level indicated above.

New connections do not form the basis for developing capital improvements plans addressed later in this report.

CHAPTER - 7

PREVENTIVE MAINTENANCE

Chapter 7

PREVENTIVE MAINTENANCE

SEWER DEPARTMENT POLICIES

This plan establishes policies which support the overall goals of the District. Those policies, identified in Chapter 3, which influence preventive maintenance actions of the Sewer Department include the following:

- Eliminate public exposure to wastewater
- Plan for timely system rehabilitation projects
- Extend the life of existing systems and facilities
- Meet all local, state, and federal regulations
- Provide for an economical wastewater conveyance system into the future.

Preventive maintenance (PM) actions which support these policies include inspecting, cleaning, lubricating, exercising, adjusting, and testing components of the system. In order to carry out the policies, PM actions must be identified and a frequency of action established. PM performed too frequently may not meet the policy of economy. PM not performed frequently enough may expose the public to wastewater, cause the shortened and untimely replacement of system components, and may violate local, state, and federal regulations. Clearly, the establishment of a preventive maintenance program is the cornerstone for meeting the goals of this plan.

PREVENTIVE MAINTENANCE (PM) PROGRAM

A suitable PM program has many elements just as the collection and transport system. A list of typical activities with a desired frequency and an annual quantity for the NTPUD system is as follows:

Activity	Frequency
Lateral Testing	10 years
Structures (paint,HVAC)	10 years
Smoke Test System	7 years
Sewer Main TV Inspection	8 ~~5~~ years
Sewer Main Cleaning	4 ~~3~~ years
Inspect/Clean Easements	4 ~~3~~ years
Root Control	2 years
Seal Admin Building	2 years
Pump Station Tech Inspection	~~annually~~ - ?
Exercise Force Main Valves	annually
Satellite PS Clean Wetwells	semi-annually
Main PS Clean Wetwells	~~quarterly~~ 2 x yr
Operate Stationary Generators	monthly
Pump Station Alarm Testing	monthly
Test/Adjust Pump Operations	monthly

Table 7-1

DISTRICT CAPABILITIES

The District maintenance and operations staff consists of 17 people that perform duties as follows:

for sewer + water

Supervision	1 ~~2~~ People
Clerical	1 Person
Operating Personnel	14 ~~12~~ People
Automotive	1 ~~2~~ People

Presently, the needs of the sewer system are addressed by personnel used in common with the water department. Since 1989 the District has embarked on a course of developing a pool of cross-trained maintenance employees. This allows assembling crews, and implementing maintenance programs and practices that can be modified as needed to respond to changing conditions or emergency situations without duplicating specially trained employees.

Of the twelve operating personnel, their time is split between operations, preventive maintenance, corrective maintenance (repairs) and construction. Approximately 4 people are operating the sewer and water system, 3 people are in construction and 5 people are performing the maintenance, both preventive and corrective. Of the total Sewer Department workforce, operations occupies 18% of the labor hours, construction 8%, and maintaining the system accounts for the remaining 74% of the hours. This distribution assumes the supervisory and clerical staff's time is utilized in the same proportions as the labor force, and automotive labor is treated as a separate department. These numbers are estimates based on staff's knowledge of the type, number, and frequency of departmental activities during the 1989/90 fiscal year. Cost accounting records are not available to allow for more accurate evaluations. 01/02

The available manhours that are represented in the 74% figure identified as maintenance can be identified as a combination of preventive and corrective maintenance. The Sewer Department's labor division between PM and CM along with a goal for optimizing the efforts of labor are as follows:

	Present	Goal
Preventive Maintenance	65%	75%
Corrective Maintenance	35%	25%

There are approximately 15,000 hours of labor in the category of maintenance. To meet the goal of 75% of maintenance time devoted to PM an additional 1,500 hours will have to be shifted from CM, operations or construction labor hours.

Capital replacements can bring about this change. By replacement of those lines that require high corrective maintenance efforts labor can be shifted to preventive maintenance activities. It is not recommended in this plan that additional maintenance personnel be hired. It is recommended that management redirect the manpower saved as a result of capital replacements and improvements toward preventive maintenance.

Equipment needs are very specific and vary greatly between municipalities. The District's equipment inventory was compared to national averages. For informational purposes, a listing of major equipment for various sized agencies, as developed by the American Clean Water Association, Vol. 1, (Ref. 13) is shown on Table C-1 in Appendix C. By comparison, District vehicles and equipment, as shown in Tables F-3 and F-4 in Appendix F, includes a vactor truck, additional portable generator units, and more sedans and pickup trucks. NTPUD's apparent duplication of equipment in comparison to equipment listed for a similar sized municipality is justified to support implementation of stringent emergency contingency action programs, to reduce emergency response times, and to provide support to other departments.

Several references were used for estimating typical staff complements for wastewater collection systems. Estimates are based on several parameters including population size and size of the collection system. Staffing level information based on service area populations between 5,000 and 50,000 is included in Appendix B.

Based on staffing information provided in the American Clean Water Association Guide to Effective Sewer Maintenance, Vol. 1 (Ref. 13) for a facility including collection systems and pump stations serving a population of 10,000 (approximately equal to North Tahoe PUD service area), a staff of 13 to 15 people is recommended. This analysis is included in the appendix. This complement includes general supervision, and provides for construction inspection and equipment maintenance. The District's labor allocated to the sewer system equates to between 10 and 12 people and when supplemented by seasonal labor compares closely with the complement indicated by the analysis.

IMPLEMENTATION

The schedule identified above for a preventive maintenance program must be compared to the available labor. At present a total of 9,800 labor hours are available. The desired frequency of PM identified above requires 13,300 hours of labor, exceeding by 36% the amount of labor available. The operating experience of the District is that corrective maintenance and construction exceed the time budgeted to those catagories, resulting in difficulty maintaining the 9,800 hour level of effort for preventive maintenance activities, including the additional seasonal labor typically hired by the District.

This plan recommends that management allocate to the PM program the amount of labor currently available and adjust the CM and construction activities to prevent the lessening of the PM effort. Maintaining a constant labor allocation to the PM program will provide a basis for program evaluation. Tracking of the use of labor and assessment of progress toward PM goals will be greatly simplified should the District proceed with a Maintenance Information Management System

The frequency of performing the tasks was adjusted taking into account the impact of lowered levels of maintenance. A recommended frequency and annual quantity of work resulting from this adjustment is as follows:

Activity	Frequency	Annual Quantity
Lateral Testing	15 years	413 laterals
Structures (paint,HVAC)	10 years	1 building
Sewer Main TV Inspection	8 years	55,000 feet
Smoke Test System	7 years	62,000 feet
Sewer Main Cleaning	6 years	130,000 feet
Inspect/Clean Easements	3 years	43,000 feet
Seal Admin Building	2 years	
Root Control	2 years	72,000 feet
Pump Station Tech Inspection	annually	18
Exercise Force Main Valves	annually	5
Satellite PS Clean Wetwells	semiannually	28
Main PS Clean Wetwells	quarterly	16
Pump Station Alarm Testing	monthly	216
Operate Stationary Generators	monthly	72
Test/Adjust Pump Operations	monthly	18

TOTAL LABOR HOURS FOR ABOVE = 9,800

Table 7-2

The recommended maintenance schedule should maintain or improve the District's record of sewage spills or backups. Where the schedule lowers the recommended frequency of maintenance it compensates by performing maintenance to a greater portion of the system. By managing the data resulting from the periodic maintenance efforts the frequency of maintenance activities can be further adjusted. Thus the level of effort can be made commensurate with the real maintenance need of each facility and system segment.

CHAPTER - 8

MANAGEMENT INFORMATION CONSIDERATIONS

CHAPTER 8

MANAGEMENT INFORMATION

CONSIDERATIONS

The District does not have an automated computer-driven preventive maintenance (PM) management system. The present IBM 36 computer system on which the District accounting system is run has reached capacity. The District should undertake a study to identify and implement a comprehensive computer scheduling and evaluation PM program. The study should look at the following: upgrading the System 36; conversion to microcomputers; integration of PM programs with accounting programs; cost of the alternatives; and benefits of the finished product. The benefits of computerized PM scheduling, cost tracking, and management reporting are large and these programs should be implemented as soon as practical.

Features to be provided by a maintenance management system should include the following (Reference 18 in Appendix A):

- Provide ready access to maintenance data by various personnel ranging from line workers to the District Manager.
- Provide the capability to automate preventive and corrective maintenance scheduling for mechanical equipment, fleet and the collection system. Track maintenance activities from start to finish and provide readily accessible historical records of all maintenance activities.
- Log location of all "trouble calls", stoppages, grease build-up, odor complaints, root infestation, etc., for improved PM planning.
- Automate the work order system for maintenance record keeping to provide detailed data on maintenance tasks, personnel costs, and material for performing maintenance duties.
- Enable the District to easily access detailed information about equipment, structures, and historical data related to maintenance activities.
- Provide detailed information about residential and commercial parcels, and their relation to the maintenance services provided by the District.
- Track all types of citizen and customer complaints by address and provide management instant access to any complaint or the history of complaints by type and address.
- Aid in keeping track of pending inspections, and what the inspection entails. Track inspection violations, date of second inspection, and log inspections for billing to customers as applicable.
- Provide the ability to track employee activities and work progress, and the time taken to perform certain tasks.

The ability of the District to evaluate its own cost effectiveness versus the use of outside contractors for repairs, various types of maintenance, and some services should offset the investment within the first few years of operation under such a system.

The benefits and cost effectiveness associated with a properly maintained computerized PM management system are well documented and worthy of District consideration in the near future. For budgeting purposes, an estimated cost for implementing a computerized information management system would be approximately $40,000. This project has been included in the short term capital improvement program addressed later in this report.

CHAPTER - 9

I/I REDUCTION

CHAPTER 9

I/I REDUCTION

OVERVIEW OF THE PROBLEM

The North Tahoe Public Utility District is one of five agencies contributing wastewater to the Tahoe-Truckee Sanitation Agency (TTSA) regional plant, and interceptor sewers have been operating at or above design capacity intermittently during several months during very wet years. The potential for overloading the Truckee River Interceptor (TRI) from Tahoe City through Truckee and out to the TTSA treatment plant is of immediate concern. Overflows from the TRI would result in cease and desist orders and building moratoriums within the TTSA area.

Another concern is related to allocation of and preservation of water rights. Future rights allowances for the District may include I/I flows. Earlier I/I studies indicate that the present level of I/I in the District can amount to 120 million gallons annually (Appendix A, Ref. 10). This quantity is equal to approximately 22 percent of the current total water delivery within the District. In this respect, District efforts to reduce I/I are clearly justified.

I/I PROBLEM CHARACTERIZATION

I/I correction programs should be focused in areas where I/I is excessive. Several areas were identified recently by TTSA's intensive flow evaluations in 1984 and 1985. The areas with excessive levels of snowmelt - dependent I/I (SDI/I) and or groundwater infiltration (GWI) were reported as follows:

BASIN INDENTIFICATION	LOCATION	SDI/I & GWI mgd	SDI/I & GWI gpdim
NT-13	Western part of downtown Kings Beach	0.18	3654
NT-03	Cedar Flat area	0.07	2106
NT-09	Tahoe Marina/Tahoe Estates	0.11	2101
NT-14	Eastern portion of Kings Beach and Brockway	0.20	1514
NT-11	Kingswood Estates	0.09	1195

(Appendix A, Ref. 11)

Table 9-1

Approximately 200,000 lineal feet of sewers (42% of total sewer system) exists within these five basins.

For the purposes of the TTSA study, basins with I/I above 1000 gallons per day per inch- diameter mile (gpdim) were considered to have excessive levels of SDI/I and GWI.Current technology indicates that infiltration rates in existing sewers of small diameter can be cost effectively reduced to levels in the range of from 500 to 1000 gpdim with an aggressive and comprehensive rehabilitation program. Sewers in the District are predominantly 6 to 8 inches in diameter.

Snowmelt dependent I/I can be significant. Localized flooding can be particularly serious with warm weather and rainfall occurring during periods of heavy snowpacks. The melting snow ponds over manholes and saturates the ground, maximizing the opportunity for extraneous flows to enter the collection system. Moreover, flooding increases the hydrostatic head on the sewer, thereby increasing the infiltration rates. These conditions can be further aggravated with snow removal activities and pavement heaving which can result in damage to manholes and pipe/manhole connections.

Continuation of an aggressive manhole inspection and rehabilitation program will aid in achieving SDI/I reduction. In addition, storm drainage improvement projects to reduce localized flooding will aid in I/I control. A number of projects are completed and planned by CALTRANS and Placer County.

While inflow and infiltration are often grouped together, their characteristics and correction are quite different. Inflow is characterized by almost immediate flow increase with rainfall or snow melt and rapid decrease at end of rainstorms and snowmelt. Infiltration increases slowly to a peak following rainfall or snowmelt and decreases slowly with a drop in groundwater levels.

When inflow sources are identified, correction is relatively easy and inexpensive. Correction of infiltration, on the other hand, is generally difficult, disruptive, and expensive. It is probable that both occur in the North Tahoe system; however, data is not available to permit qualification. EPA and other studies have indicated that 50 to 75 percent of infiltration can occur in service laterals. The District's service lateral testing program can be very effective in reducing system infiltration.

A problem frequently encountered by other sewerage agencies is the connection of roof leaders and area drains to the sewer, even though prohibited (roof drains are seldom used within the District's boundaries because precipitation occurs in the form of snow).

Another source of inflow that has been found in some agencies is the removal of cleanout plugs to provide drainage from flooded areas on individual parcels. A program of inspection of building premises for inflow sources should be ongoing through smoke testing.

SOURCE DETECTION

Key inspection methods for I/I source detection are:

- Manhole inspection
- Sewer service internal inspection and testing
- Television inspection
- Smoke testing
- Flow measurement

Preventive maintenance programs described earlier in this report have incorporated most of these methods for evaluation of system structural conditions. It is clear that implementation of an aggressive PM program will result in I/I source detection and I/I flow reduction as well.

The District implemented a lateral testing program to complement the house service testing program begun in September 1975. Work is proceeding in the Kings Beach area of the District. Continuation of the program is strongly recommended. The District may consider using an outside contractor to accomplish this work. District staff would then be available to concentrate on other PM activities.

REHABILITATION METHODS

I/I source and rehabilitation alternatives are presented in Table D-1 and Table D-2 in Appendix D.

As shown by Table D-1, extensive root growth can be controlled by chemical sealing or lining. To date, the District has found repair and replacement methods to be more effective and practical. Sliplinings have collapsed under pressure by root regrowth that occurs in the annular space between the lining and the wall of the sewer. Chemical sealing was discontinued in order to avoid exposure to the possible health hazards associated with use of the older, two-component acrylomite compounds. Since other single component, non-toxic compounds are now available, the District should reconsider using chemical sealing methods in the future for rehabilitating deteriorated pipe joints or areas affected by extensive root growth. Recommended criteria for grouting various pipe defects are shown in Table D-3 in Appendix D. Sliplining should also be reconsidered.

Estimated rehabilitation and repair unit costs are presented in Tables D-7 through D-8 in future rehabilitation projects. When possible, rehabilitation costs should be estimated for each project planned using past District experience and records.

Other new technologies such as inversion lining ("Insituforming") may be applicable. These newer methods can be considered for cases where replacement is not feasible such as that of a small diameter line (6 inches), and crossings of Highway 28. These new methods require the use of specially qualified contractors.

Line replacement projects can help in reducing I/I flows. A number of such projects have been identified in the District. These projects are shown in Table 9-2.

Where practical, line replacements should be constructed in conjunction with service lateral repairs/replacements that are identified by the District's ongoing lateral testing program. In this manner, a comprehensive I/I reduction program is accomplished. Flow isolation monitoring should be scheduled before and after the construction of the initial projects in order to evaluate overall I/I reduction cost effectiveness.

Pilot projects involving portions of the flow basin should be attempted initially for evaluation before proceeding with other area by area collection system replacement projects. The District should attempt to complete the construction of the "pilot" projects within three years. Other I/I reduction projects should be completed within the following 5 to 10 year period, or sooner if project funding is available. Costs for these comprehensive I/I reduction projects should be developed as soon as possible following evaluation of the lateral testing results.

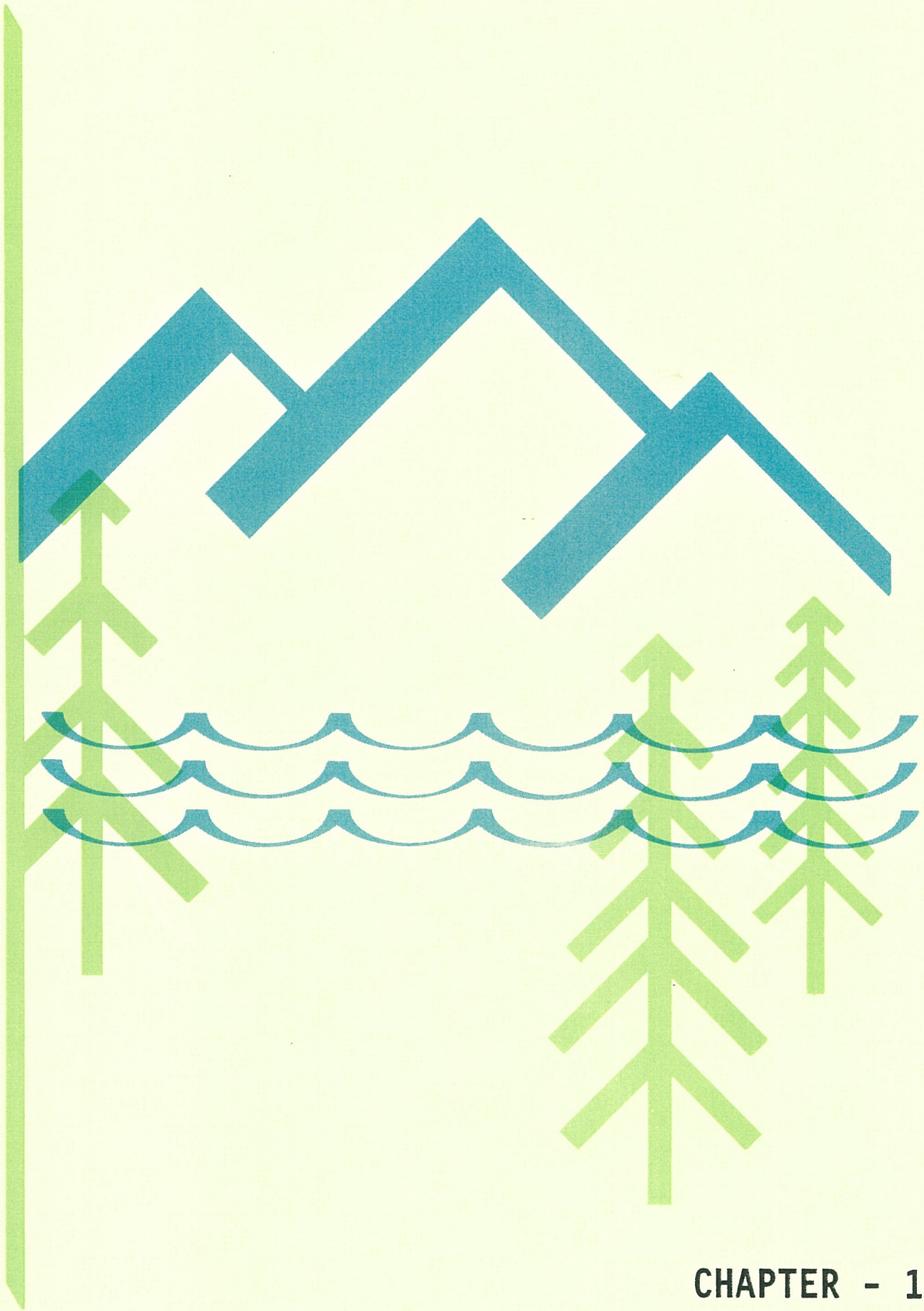
DOWN-SIZING

An avenue of operational and capital savings to the District is the down-sizing of pumps and forcemains. Because of the peak system design, there is significant energy to be saved by careful down-sizing of the pumping facilities. District staff replaced several individual pumps within the system during the 1980's and it has saved considerably in energy and equipment replacement costs.

SEWER LINE REPLACEMENT PROJECTS 1990

Item No.	Lineal Footage	Description	Manhole Numbers	Map Page	Replmt. Cost
1	1430	Esmt. Block BE	#24-26 #13-25	SB-1	$ 310,000
2	525	Tahoe Vista Esmt.	#20-26	SC-1	$ 72,300
3	1991	Trout, Deer & Hwy 28	#79-82 #82-40 #40-43A	SB-1	$ 333.300
4	1035	Coon & Hwy 28	#57-17 #38-39	SB-1	$ 120,000
5	1640	No. Lake Blvd.	#28-37A	SC-1	$ 118,800
6	400	Coon St. Easement	#58-59	SB-1	$ 43,300
7	0	Repl Manhole	#8	SC-1	$ 5,600
8	300	Tiger Street	#42-47	SC-1	$ 52,900
9	420	Beach Street	#50-57	SC-1	$ 54,100
10	1110	Snowflake	#84-88 #80-88	SC-1	$ 176,000
11	135	Bear Street	#69-70	SB-1	$ 30,700
12	200	KBSRA Easement	#27-27A	SB-1	$ 30,100
13	150	Park Lane	#196-196B	SB-1	$ 33,400
14	625	Beaver Street	#184-185	SB-1	$ 69,700
15	280	Chipmunk Street	#36-45	SB-1	$ 66,700
16	460	Loch Leven	#131-132	SB-1	$ 78,300
17	475	Rainbow Street	#95-96	SB-1	$ 61,500
18	300	Loch Leven	#126-127	SB-1	$ 58,300
19	250	T.V. Esmt. & Hwy	#90-92 #92-33	SC-1	$ 141,200
20	214	State Highway	#9-9A	SC-1	$ 33,700
	11,940			**TOTAL**	**$1,889,900**

Table 9-2



CHAPTER - 10

CAPITAL REPLACEMENT AND IMPROVEMENTS PLANNING

CHAPTER 10

CAPITAL REPLACEMENT AND IMPROVEMENTS PLANNING

This section describes capital projects to meet the District's short term and long term goals identified in this Master Sewer Plan. Discussion of alternative methods for estimating capital replacement/capital cost recovery needs is also presented.

FACILITIES SERVICE LIFE AND REPLACEMENT VALUE

A facility's useful life ends when it is more cost effective to replace it than to repair it. Properly maintained and rehabilitated sewers have a useful life of 50 to 100 years; vehicular equipment, 5 to 15 years; pumping equipment, 10 to 15 years; and structures, 20 to 30 years.

For the benefit of the reader of this Master Plan, and to give a more comprehensive look at the total facilities of the NTPUD, a listing of all buildings and their content values, as developed by the District for insurance purposes, is included in Appendix E. This listing does not include Sewer Department equipment, vehicles, wastewater conveyance, or pipelines which are addressed in this chapter.

The inventory value for the Sewer Department's pump stations and base facilities totals $4.3 million. Corresponding building and content values categorized by service life of 10, 15, 20, and 30 years, are shown in the Appendix. The estimated service life for these facilities is approximately 19.3 years.

A listing of Sewer Department major equipment and operating vehicles is shown in Tables E-3 and E-4 in the Appendix. The approximate value of these assets is $1.0 million. The service life averages 10 years.

The estimated replacement value for the District's wastewater operating system is summarized in Table 10-1. As shown, the system replacement value totals $41 million. This total includes replacement costs of the export force main and collection system at $300 per linear foot and $65 per linear foot respectively. The total also includes the facility replacement costs for the pump stations, base facilities, and vehicles and equipment.

The estimated aggregate wastewater operating system service life is approximately 61 years.

The impact of the total replacement value of the District's sewer facilities is significant. If annual capital expenditures are less than $667,000 per year, the components of the system will need to last longer than their estimated service life. While some facilities may last longer than the estimated life, it is not prudent to forestall the necessary improvements.

REPLACEMENT VALUE & ANNUAL CAPITAL REQUIREMENTS

WASTEWATER OPERATING SYSTEM 1990

Facility	Value (a)	Service Life	Annual Capital Replacement
Export FM (25,000 LF @ $300/LF)	$7,500,000	50	$150,000
Collection System (82 miles @ $65/LF)	$28,100,000	100	$281,000
Pump Stations and Base Facility	$4,300,000	30	$143,000
Equipment and Vehicles	$1,018,000	11	$93,000
TOTALS	$40,918,000		$667,000

Table 10-1

CAPITAL REPLACEMENT PROJECTS

A series of sewer line replacement projects have been identified in Chapter 9. Approximate cost estimated by the District in 1989 dollars is $1,890,000 for the identified projects.

Implementation of I/I reduction pilot projects and comprehensive rehabilitation projects were addressed in Chapter 7. These projects have been incorporated into the long term capital improvements plan.

Other facility improvement projects and studies that should be addressed within next ten (10) year period are summarized in Table 10-2. Of particular significance, a number of Dollar Main Sewer Pump Station Improvement Project(s) have been incorporated into this short range planning schedule. These elements are similar to those described in an earlier report to the District entitled "Dollar Hill Forcemain Emergency Facilities Alternative Analysis", July 1985, prepared by Kennedy/Jenks Engineers (Ref. 26).

Emergency response times for handling current power outages are dependent upon District field staffing. Additional projects for constructing satellite pump station standby power facilities should be budgeted to make successful emergency response during a prolonged power outage less labor dependent. Mainline

sewage export pump stations are presently equipped with standby power facilities. The Dollar Main station does not have sufficient capacity to pump at maximum capacity. An additional generator for this station in included in the capital improvements planning.

Sewer Master Plan

Facility Expansion Projects/Studies 1990

Description	Estimated Value	Date To Implement
PM Data Management System	$40,000	1990
N-1 PS Standby Power	$23,800	1990
Kings Beach Base Mapping	$26,100	1991
Dollar Force Main Separation	$50,000	1992
Dollar Program Logic Controller	$20,000	1992
Dollar Variable Frequency Drive	$30,000	1992
Chlorine Storage Study	$5,000	1992
Pump Station Energy Study	$5,000	1992
Kings Beach Base Mapping	$26,500	1992
Install FM Air/Vac Valves	$27,000	1991/93
Fuel Tank Replacement	$100,000	1993
Kings Beach Base Mapping	$18,700	1993
Dollar Surge Control System	$25,000	1994
Kings Beach Base Mapping	$12,300	1994
Dollar Second Generator	$80,000	1997
Dollar New No. 2 Pump	$30,000	1998
Carnelian Force Main Valve	$125,000	1999
New Dollar Force Main	$300,000	2000
TOTAL	$943,800	

Table 10-2

BUDGETING FOR EMERGENCY RESERVES

The District should budget for the accumulation of financial reserves to make emergency repairs/replacements caused by breakdowns or other conditions not under the control of the District. This reserve would be in addition to specific capital line item requests or other equipment and system replacement needs and budget requests. This reserve account would be restricted for the uses presented above, and it would not be used for planned improvements or routine maintenance expenses. A possible source of funding could be the "excess coverage" that must be budgeted annually for repayment of a revenue bond issue.

Methods for computing an annual emergency repair/replacement reserve amount are described below:

Method 1 - Percentage of Replacement Value

Some larger utility districts base reserve funding requirements on an annual replacement rate ranging from 1 to 2 percent of plant and equipment value (Ref. 19). Experience indicates that the corresponding funding amount is usually very significant and most municipalities are unable to accumulate funding at this rate.

The reserve amount computed in this manner would be approximately $410,000 to $820,000.

Method 2 - Percentage of Operating Budget

Many utilities maintain an amount equal to a percentage of the operating budget as a reserve for emergencies. The reserves are not utilized for planned replacements as these costs are provided for by long term debt instruments. Percentages may range from 10% to 25%. The District has established a policy of building and maintaining a 10% operating reserve in the Water Department. For the District's Sewer Department, the reserve amount computed in this manner would be approximately $80,000 in 1990-91. This amount could be carried over from budget year to budget year with charges against the reserve made up in the succeeding year.

Method 3 - Arbitrary Amount

The District could accumulate an amount based on historical operating history not necessarily related to facility replacement rates and values as has been the District practice in the past. Experience indicates (Ref. 19) that $30,000 to $60,000 is a realistic amount.

CAPITAL REPLACEMENT/COST RECOVERY BUDGETING

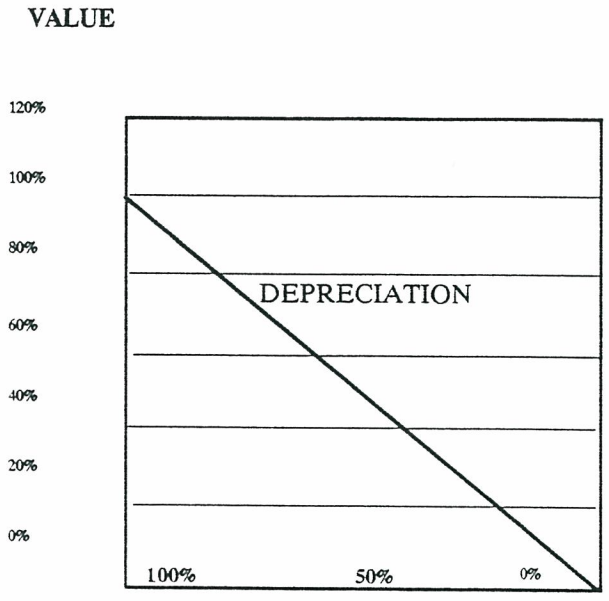
The District should implement policies that provide for scheduled replacement and/or accumulation of reserves that are available for replacement of facilities before each facility reaches the end of its useful life. For the purposes of this investigation, "facility" is defined as any part or element of the wastewater collection system, export system, and equipment and vehicles used in operation and maintenance of the District sewerage system.

Funding can be accumulated in reserves to allow for replacement on a pay-as-you-go basis (reserve cash paid for replacement projects), or replacement costs can be funded on an as-needed basis from other sources of income such as loans, grants, etc. The pay-as-you-go method would cause a very severe rate increase and, therefore, has been excluded from further discussion.

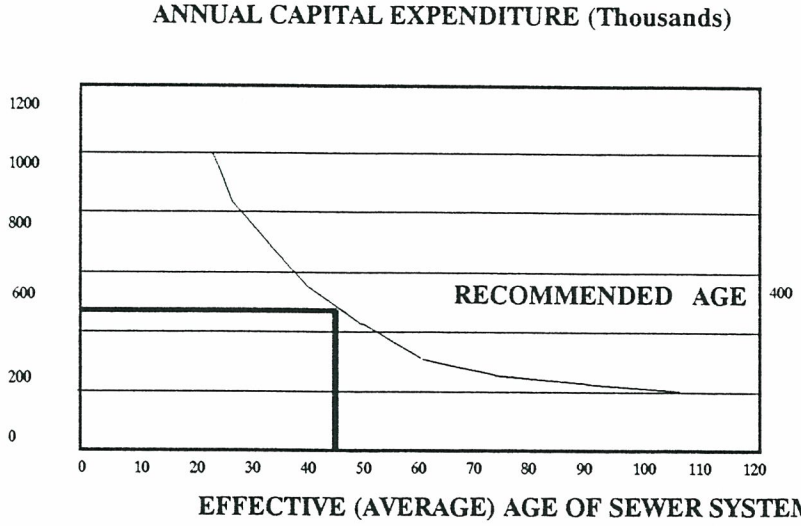
Methods similar to Method 1 above, Percentage of Replacement Value for emergency reserves, can also be used to determine replacement funding needs. Generally, however, only large municipalities are able to implement programs based on this method.

Replacement funding requirements may be based on sustaining the system facilities at a preselected average age. In this context, expenditures would include the amounts actually used for replacement of a part of the facility, and/or amounts derived from operating revenues and placed in reserve.

Relating this concept to the principle of straight-line depreciation, if the facility annual replacement rate is equal to the yearly straight line depreciation rate, it follows that the facility's "effective" age (average of facility elements) will be one-half of the facility's "chronological" age at the end of the facility's estimated useful service life.



For the District facilities listed in Table 10-1 expenditures of amounts based on the straight line depreciation for the facilities aggregate life of 65 years would require an annual accumulation or replacement expenditure of $630,000. After the facilities reach the chronological age of 65 years, the hypothetical effective age will be 32.5 years. To sustain this level of system integrity, an annual amount four times the amount presently budgeted for capital projects would be required. Annual replacement funding of $300,000 would result in a hypothetical effective (average) system age of 68.1 years.



Another method that may be used bases the annual replacement requirement on specific needs as identified by experience, the cost of present maintenance, inspection, and the age of the existing system or facility element. This method allows orderly scheduling of replacement within budgetary constraints usually faced by the District. However, depending on the amounts budgeted, the effective average age of the facility will tend to approach the end of useful life of the facility and yearly maintenance costs may become excessive. Since this does not address the goal of planning for timely system replacement, it is not recommended.

The District should budget capital funding for replacement and reserve accumulation sufficient to maintain the system effective age at 45 years or less, and appropriately replace equipment. To meet this goal, an annual replacement budget of about $450,000 would be required.

Historically, there occur miscellaneous capital purchases beyond the lists of existing assets. The need for these items typically surface during a budget year and frequently involve items with short life spans or relatively small expenditures. Capital funding for such items on an annual basis is appropriate. A sum of $50,000 per year is consistent with recent history. This sum is in addition to that capital necessary to maintain the effective age of the present system and equipment.

FINANCIAL IMPACTS

To meet the guidelines for capital reserve funding described above, additional revenues from property taxes and user charges amounting to approximately $350,000 annually will be needed. In perspective, this amount translates into a sewer use charge increase of approximately 37 percent. To mitigate this fiscal impact, the District may transfer property tax revenue to the Sewer Department. This funding method would require that property taxes going to Recreation and Parks Department be reduced and directed to the Sewer Department.

To meet long term debt issuance requirements, operating income must be greater than operating expenses in an amount 25% greater than the annual debt service.

SUMMARY

The funding of capital projects, emergency replacements, or improvements takes a variety of forms. As presented in this chapter, an annual emergency capital allocation of $30,000 to $60,000 should be budgeted; a total of $450,000 should be expended or "reserved" on an annual basis; and the District should maintain an adequate cash reserve to avoid unnecessary assessments suddenly impacting the systems users. The District presently (1990-91 fiscal year) has a Sewer Reserve Sinking Fund of approximately $520,000. This is considered low in relation to a system replacement value of $41 million, but because of the recommendation to establish an annual capital expenditure level of $450,000, a planned increase in the Sewer Reserve Sinking Fund is not recommended.

CHAPTER - 11

FINANCING OPTIONS

CHAPTER 11

FINANCING OPTIONS

INTRODUCTION

The Sewer Master Plan has identified the elements and capacity required to serve the existing and projected future customer base at an acceptable municipal level of service. The District, however, is not able to finance the proposed capital improvements solely from the application of existing surplus funds or the accumulation of operating revenues at current rates and charges. Similarly, revenues from service charges, without the use of revenue from taxes, will not cover costs of operations (includes salaries plus debt service). If tax revenue is interrupted, drastic reductions must occur in service and personnel. This chapter identifies financing mechanisms which will allow continued funding of the existing system and finance proposed improvements included in the master plan development.

ALTERNATIVE FUNDING MECHANISMS

A number of methods of financing sewerage system improvements may be adopted to meet the needs of the District. These include general obligation bonds, revenue bonds, sale of connection rights (Escondido Plan), Certificates of Participation, reimbursement agreements, special assessment proceedings, (Mello-Roos) community facility district special taxes, the use of accumulated reserves, "pay-as-you-go", or some combination of these mechanisms. Some of these methods will prove more adaptable to the District's needs than others, but all are described.

Bonds

The most common method for a public agency to raise the money required for acquiring and constructing capital improvement programs is through the sale of bonds. The advantages of bonded debtedness are: (1) to facilitate acquisitions needed, (2) to spread the capital cost over the useful life of the project, and (3) to permit present and future "generations" of users to pay their fair share of capital investments. Public agencies enter the bond market in order to borrow money under terms and conditions suited to their particular circumstances.

The most important factors influencing the price at which bonds will be sold at any given time are:

- Federal monetary and fiscal policy;
- Conditions of the world, national and local economies;
- Size of debt and possible future debt;
- Bond terms such as principal payment and call features;
- Security for repayment of the bond;
- Issuer's financial history;
- Total public debt of bond payers.

The weight given to each factor varies according to each public agency. Lack of investor confidence in the ability and the willingness of officials to take timely action in protection of credit can produce higher costs or even prevent a sale

For the District, the choice as to the security to be pledged is legally restricted and predetermined. The principal classes of debt options for the District, based on the specific security pledged are discussed in the following sections.

- **Obligation Bonds**

  General obligation bonds constitute a loan that is secured by the full faith and credit of the issuing agency. The issuer is obligated to levy or cause the levy of ad valorem (property) taxes to pay annual bond interest and principal, if other funds such as service revenues are not sufficient to meet bond service.

  The voter authorized amount of general obligation bonds may be divided into one or more series and each series may be sold separately. Authorized but unissued bonds do not constitute an obligation of the issuer. The District has utilized this borrowing procedure previously by authorizing and issuing General Obligation Sewer Bonds. As of June 30, 1990 there is principle outstanding on Sewer Bonds of $1,025,000. It is predicted that the available balance in the fund for bond repayment will be sufficient to cease collecting taxes for sewer bond repayment as soon as fiscal year 1991/1992. Assumption of new bond indebtedness to replace the retiring debt would provide the most economical means of achieving the capital improvement program identified in this plan. Such assumption of indebtedness means no new or additional cost would accrue to the taxpayer.

  Under present California law, general obligation bonds of a constitutionally created entity must be approved by the affirmative vote of two thirds of those casting a vote on the measure to authorize the bonds.

  The maximum legal interest rate on general obligation bonds under the Government Code of the State of California is 12 percent. Actual interest rates vary widely, depending on the financial status and future economic outlook of the issuer, the condition of the bond market at the time of the sale, and the number of years to the final maturity. Generally speaking, general obligation bonds will provide the best interest rates available to an issuer because property tax is pledged as security for the bond repayment.

- **Bonds**

  Revenue Bonds are loans secured solely by the operating revenues (user fees) of the enterprise. As part of the bond issue, the District must pledge to establish a rate structure sufficient to meet operating and maintenance costs plus revenue bond debt service.

  Sewer Revenue Bonds can be issued under the Revenue Bond Law of 1941 (41 Act), or the Sewer Revenue Bond Act of 1933 (33 Act).

The principal difference between the 41 Act and the 33 Act is that 41 Act Bonds must be submitted to registered voters within the District and over 50 percent must vote in favor of a measure to authorize the issuance of the bonds. The 33 Act Revenue Bonds are only for sewer projects and do not require voter approval unless 15% of the property owners or registered voters petition for an election.

There is no legal limitation of the amount of authorized revenue bonds which may be issued. The maximum legal interest rate on revenue bonds is 12 percent. The actual interest rate will depend on the degree of security provided and the current status of the bond market.

For revenue bonds to be salable the issuer should pledge to maintain net revenues of from 1.15 to 1.25 times annual debt service the so-called "coverage" provided. The marketability of the bonds will be enhanced if it can be shown that the actual coverage provided by the net revenues will exceed the pledged ratio.

All revenues pledged to the payment of bonds, but not needed to meet the bond service, may be used for any lawful purpose. Frequently, these extra revenues are used for replacements and expansion.

The lesser of 10 percent of the principal amount of the bond issue or maximum annual debt service is usually created from the proceeds of the bond sale as a reserve fund. It is maintained to meet principal and interest payment requirements in case operating revenues are not sufficient for that purpose in any year. Reserve funds can be invested during the life of the issue to provide a source of revenue, and are usually used to pay the final year's debt service.

The three principal advantages of revenue bonds are: (1) funds for the payment of the bonds are derived solely from those who use the facility for which the bonds are issued, (2) such bonds are payable solely from the revenues of the project and can never become a lien against real property, and (3) the bonds may be authorized by a simple majority vote or, in the case of sewer enterprises, under the 33 Act only subject to a referendum if requested by the required number of qualified voters.

Present revenue sources, taxes plus service charges, will not enable the District to issue revenue bonds. A change to an enterprise fund accounting system and a rate structure sufficient to meet coverage requirements may allow the District to pursue revenue bonds.

Escondido Plan

The Escondido plan is based upon a program which offers for sale for a limited period (two months) new sewer connection rights to a proposed expanded system capable of serving the "subscribed to" additional connections. This results in a guarantee to the District of immediately available funds to undertake the project. This particular plan probably has little application to the District due to the development limitations in the Tahoe Basin and the need to improve rather than expand the existing sewer facilities.

Certificates of Participation

With a Certificate of Participation (COP), the public entity is not the immediate owner of the facility, but rather becomes the lessee. Another public or private entity is identified to function as the lessor. The District has previously created the North Tahoe Building Corporation for this very purpose. The lessor arranges the financing and construction of the project and then leases it to the District. The District agrees to enter into a contract to lease certain specified property (either real or personal) from lessor. To finance the lease, the lessor may then assign to a third party (trustee) its right to receive the installment payments, and the trustee, in turn, provides the financing. The trustee then carves the lease into smaller interests (represented by the certificates) which are underwritten by investment bankers and sold to investors in $5,000 denominations. The District (lessee) is obligated under the agreement to make lease payments from lawfully available annual appropriations. Neither the full faith and credit nor taxing power of the lessee is pledged; however, the lease agreement provides that the lessee shall take action each year to include rental payment in its annual budget.

The California Special Districts Association (CSDA) launched a Finance Corporation in the Spring of 1988 using Certificates of Participation as a funding source. The purpose of the corporation is to assist member districts, of which North Tahoe Public Utility District is one, in financing costs through pooling resources. Their first COP issue, Series A, was initiated with participation by two districts, including North Tahoe. Under the provisions of this inaugural issue, the cost of issuance, currently 3 percent, and the CSDA fees are waived for the first one million dollars issued. The net construction funds available on an issue of $1,080,000 are $970,386.19. Coupon rate is 8.5 percent. This funding is available upon application by the District. Bond rates subsequent to this issue have carried a lower rate, therefore, the District's option has not been exercised. At the time of seeking funding for capital improvements, the economic conditions can be assessed to determine whether this option should be utilized.

Reimbursement Agreements

Reimbursement agreements are similar to purchase contacts and have been extensively utilized by privately-owned utilities and by public agencies.

The landowner requiring service agrees to advance costs toward and to assist in the construction (to acceptable standards) of projects which are completed, conveyed or dedicated to the operating public entity. The dedicator (developer) is reimbursed through a surcharge on the basic rates levied by the owner/operator of the utility against initial and future customers as they connect to the constructed elements.

Special Assessment Proceedings

The basic premise of the special assessment is that properties should be assessed for the costs of public improvements in proportion to the specific benefit which each property receives from the improvement. These proceedings are utilized for facilities which are clearly of local benefit, not of general benefit to the entire District. As a part of a subdivision project, th "buy-in" costs for sewer service connection can be assessed and financed. The connection fees are transmitted and accumulated by the operating public agency.

Unless the assessments are quite small, provision is usually made in the assessment proceedings for bonds to be issued to represent the assessments. This gives the property owners the opportunity to pay the assessments in installments, rather than in a lump sum, with interest at a tax-exempt rate. Although the agency conducting the assessment proceedings issues the bonds on behalf of the assessed properties, the bonds are not a debt of the issuer.

Accordingly, there are laws both for setting forth procedures for levying assessments and constructing the improvements, and laws providing for the issuance of bonds. Some applicable laws, or procedural acts, are as follows:

- **Municipal Improvement Act of 1913**

  The Municipal Improvement Act of 1913 provides for the formation of an assessment district, the levy of an assessment and the creation of a lien against the benefited private property. The proceedings under the 1913 Act are initiated by a resolution of intention. The resolution calls for the preparation of an engineer's report which contains plans and specifications, a cost estimate, a diagram showing the properties to be assessed, the proposed improvements, and a list of proposed assessments. If the engineer's report is acceptable, the Board of Directors adopts a resolution approving the report and setting the time and place for a public hearing.

  If there is no majority protest or if the protest is overruled, the assessments may be confirmed and recorded. Property owners then have 30 days to pay their assessments, following which bonds may be issued under provisions of either the Improvement Bond Act of 1911 (the "11 Act") or the Improvement Bond Act of 1915 (the "15 Act") to represent the unpaid assessments. By far the most widely used of these bond acts is the 15 Act and, therefore, we will describe the procedures for issuing bonds pursuant to this legislation.

- **Improvement Bond Act of 1915**

  Under the 15 Act, all of the assessments are pooled and an issue of bonds representing all of the assessments is sold. Funds to pay bond interest and principal are derived by adding an amount equal to the pro rata share of annual bond service requirements to the property tax bill for each property against which there is an unpaid assessment.

  The unpaid assessments, together with interest due, are collected in annual installments in the same manner as general real property taxes are collected. Assessments also receive the same treatment as general taxes with regard to the time allotted before payments due become delinquent and penalties are imposed. The properties upon which the assessments were levied are subject to the same provisions for sale and redemption as are properties for nonpayment of general taxes.

A Special Reserve Fund is held by the issuer as a separate trust account and an amount equal to 10 percent of bonds issued is typically deposited into the fund.

In the event of delinquency, the real property subject to the unpaid assessment may be sold at judicial foreclosure sale. Upon such a sale, the right of redemption is limited to one year from the date of sale as distinguished from the five-year redemption period in the event of a tax sale.

The current market has accepted 15 Act bonds payable between 15 to 25 years, although, as in the case of virtually all bond issues, a shorter maturity schedule will result in lower interest rates. The maximum interest is 12 percent; however, there is no limitation on the amount of discount.

- **Mello-Roos Community Facilities District**

The Mello-Roos Community Facilities Act of 1982 (the "Act") enlarges the list of eligible projects that may be financed through special assessment districts and additionally can provide maintenance funds for facilities constructed by the Community Facilities District (the "CFD"). The creation of the CFD to finance facilities, the levy of the special tax and the funding of the maintenance and operation through the special tax, must all be approved by a 2/3 vote of the qualified voters in the CFD. If bonds are to be sold, a separate ballot question must also be approved by a 2/3 vote of the qualified voters.

The Act permits the financing of any facility which the legislative body, creating the CFD, is authorized to construct, own or operate. Therefore, the District could, upon obtaining the necessary voter approval, finance the construction of sewer facilities and even pay some of the costs of maintenance and operation from the authorized special tax.

The procedure required to create the CFD is similar to the creation of a special assessment district. A majority protest to the creation of the CFD would stop the process for at least one year. A majority protest to the furnishing of a specific facility, service or special tax can be addressed by eliminating the specific facility, service or special tax without the need for additional delays.

An election must be conducted following the provisions of the laws regulating elections of the political body creating the CFD, and may be held at either a special or general election.

Use of Accumulated Revenues

The most obvious advantages of the use of accumulated revenues ("pay-as-you-go") is that no interest costs are incurred. However, expenditure of accumulated revenues for capital improvements results in a loss of the interest which could otherwise be earned on the funds and can postpone the construction of needed improvements for extended periods as funds are being accumulated. The most prudent course may be to use a mixture of debt financing and the accumulation of revenues. The District has followed both practices. Review of unaudited fund balances indicates that the sewer enterprise does not have sufficient available unencumbered surplus funds to provide adequate financing of the proposed improvements, nor will it generate significant surpluses under the prevailing sewer rate structure.

FINANCIAL PLANNING CONCERNS

Maintaining existing public services, and selecting and implementing an improvement program, is dependent upon the amount of financing which needs to be secured. A financial plan and project priorities program together constitute an implementation program. The previous sections documented alternative financing mechanisms. The following paragraphs address selected financial planning concerns.

Sewer Revenues

For the year ended June 30, 1989, approximately 48 percent of the Sewer Enterprise revenues were obtained from ad valorem property taxes. The passage of Proposition 13 gave the District the power and obligation to levy property taxes solely for debt service on the outstanding 1967 General Obligation Sewer Bonds. The District's authorization to levy and pledge the tax revenues for the general obligation bonds amounts to an estimated $187,000 annually. It is estimated that based upon an assessed valuation of $582.5 million, the District's 1990-91 levy for debt service is about $0.0322 per $100 A.V. There remains the possibility, however remote, that the State Legislature and/or County who subverts a portion of their annual $1.00 per $100 assessed valuation ad valorem tax levy to the District could be interrupted, reduced or eliminated. This occurrence could have significant negative impact on the financial health of the sewer enterprise. Revenue producing utilities frequently rely entirely on rates and charges to cover operating and maintenance costs. Non- operating revenues (taxes) are frequently utilized to fund non-revenue producing services such as renewal, replacement and capital improvements.

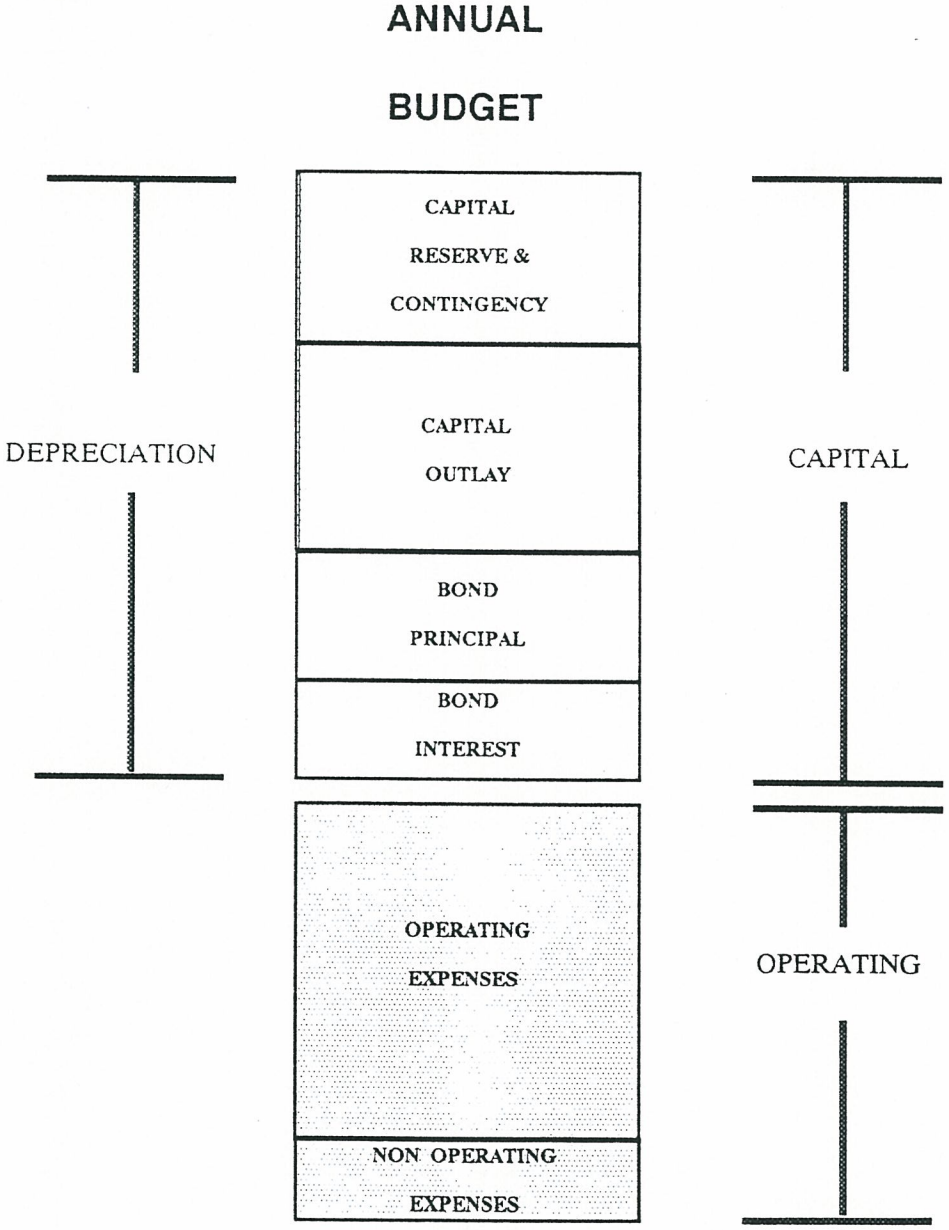
Depreciation

Common usage of the term depreciation is intended to describe: (1) a decrease in book value, (2) a decline in physical condition of a facility, or (3) a cost of operation. Depreciation is all of these.

The principal cause of value reduction is a decrease in future annual returns resulting from the decrease in expectancy of future service life. A decrease in the future annual returns is caused by lowered efficiency, wear, corrosion, obsolescence,lowered output capacity, increased maintenance cost, increased operating costs, intermittent (interrupted) service, and operation at less than normal capacity. No amount of maintenance can accomplish more than a modest postponement of the ultimate date of retirement.

Annual depreciation expense has often been ignored by municipal utilities excepting the cases where bond covenants require its application in determining rates. In the June 30, 1989 audit of the District fixed assets of the Sewer Plant were $19,235,541. Depreciated Plant in Service was valued at $12,788,794 and annual depreciation $448,733. If capital replacements were taking place at this level of expenditure, the system would be expected to last 43 years and have an average age of 21.5 years.

The following Figure 11-1 shows in tabular form the relationship of depreciation to expenditure for bond principal plus capital outlay plus capital reserve. For year ended June 30, 1989, retirement of bonds, notes and contracts was $153,394 (Principal reductions) which would indicate that $295,339 should be spent on renewal, replacement, and accumulated in a reserve fund to maintain the useful life of the sewer enterprise.



Rate Structure Objectives

Numerous influencing parameters must be considered when selecting or modifying a sewer rate structure including, but not limited to:

- Ability to meet all expenditures,
- Simplicity or ability to understand,
- Perceived equity and acceptability,
- Degree of risk or ability to cover fixed costs,
- Degree of change from existing,
- Ability to meet annual "cash flow" requirements,
- Sensitivity of revenues to catastrophe or reduced sewer sales.

The current District charges appropriately reflect the quantity and quality of discharge from various types of discharges. The 1990/91 budgeted rates will generate approximately 62 percent of the revenues to the Sewer Operating Fund under the present fund accounting. Similarly, revenues from service charges will not cover costs of operations (includes salaries plus debt service). If tax revenue is interrupted, drastic reductions must occur in service and personnel.

Grant Eligibility

Historically, in order to obtain federal and state sewer grants, a public agency must adopt and institute sewer service charges in accordance with State Revenue Program Guidelines.

The system of charges must comply with the Federal Water Pollution Control Act 1972 and California Administrative Code, Title 23, Chapter 3, Subchapter 7, to be eligible for grants.

Basically, the requirements state that the District:

- Allocate & recover costs on each user's volume and character of waste,
- Collect revenues that result in self-sufficiency,
- Collect revenues that permit program continuation,
- Repay federal grants,
- Use taxes only if it can be shown that amount collected is proportional to each dischargers volume and quality of flow.

These requirements are not met by the District; therefore, use of grant funds is not included in this plan. Implementation of the recommendations included within this plan may result in these criteria being satisfied. At the first major review of this plan, the District's eligibility for grant funding should be reassessed

Connection Charges

Service charges collected from present users of the system are being utilized, in part, to meet capital expenditures and debt service charges for system capacity which is not being utilized at present but which is required to meet the demands of future users.

A method of assessing such charges involves a system of capital recovery. Under this approach the net asset value per gallon of sewerage discharge is determined and an equivalent amount is collected from each new user on the basis of his estimated demand, in gallons, on the system. The estimated amounts calculated by this method represent the revenues of serving additional connections. The following is the calculation of such charges for the North Tahoe Public Utility District sewage collection and transportation system.

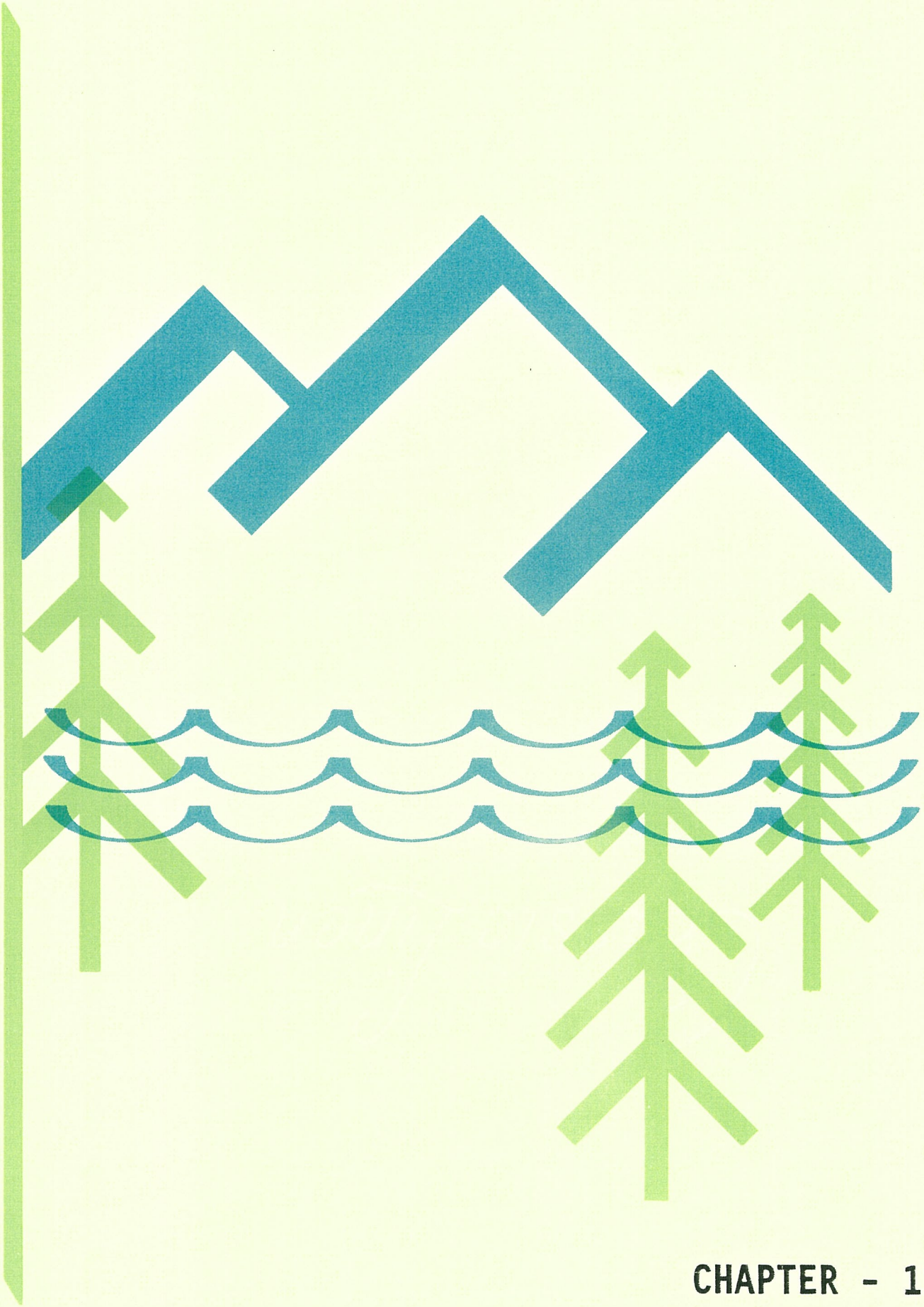
INVESTMENT IN OPERATING SEWER SYSTEM (06/01/89)	$19,235,541.00
CAPACITY USED BY SYSTEM	1 MGD
AVERAGE INVESTMENT PER GALLON	$19.24
APPROXIMATE CONNECTION CHARGE	
SINGLE FAMILY RESIDENCE WITH 180 gal/day flow x $19.24 =	$3,463.00

Even though growth and demand for new connections may be small review of existing level of charges appears appropriate. Connection charges should not be applied toward the costs of operating and maintaining the system, but instead should be used only to meet costs of replacement and renewal of the system and for debt service on bonds issued for such purposes. There are sufficient replacement and renewal projects identified in this plan to justify an increase in the connection fee.

Local Benefit vs. General Benefit

Each element of the Master Plan can be placed in the category of local benefit or general benefit to the entire District. Local benefit facilities costs can be allocated to properties and customers who will receive the benefit. The majority of the elements will fall in the general benefit category.

It has been the past policy of the District to categorize improvements which benefit the District's operational efficiency as being of general benefit. Under this criteria all recommended projects are of general benefit and localized assessment districts are not considered for capital cost recovery.



CHAPTER - 12

CONCLUSIONS AND RECOMMENDATIONS

CHAPTER 12

CONCLUSIONS AND RECOMMENDATIONS

BACKGROUND

The North Tahoe Public Utility District wastewater system is a combination of old and new collection lines, older buildings and pumping equipment, and fleet and equipment that ranges from functional and efficient to worn out and antiquated. Past planning and financial practices have not addressed the natural aging process of the system. Preventive maintenance practices occupy about two-thirds of the maintenance and operation (M&O) efforts, and breakdown maintenance accounts for the remainder. The exception to this is in the category of fleet and equipment where the resource allocation is practically reversed. Because of the highly specialized equipment used for sewer line maintenance and the number of pieces of equipment involved, the category of equipment maintenance has a significant financial impact on wastewater system operating costs.

The wastewater system has relied on Sewer Assessment District (SAD) surplus construction funds, sewer service rates, connection fees, and a portion of District-wide property taxes for operating, capital project, and reserve funding. The surplus SAD construction funds were exhausted in the 1989-90 fiscal year. Connection fees during the last decade have been insufficient to fund even the fleet and equipment capital needs of the wastewater system. Since the future number of connections is so insignificant, financial planning cannot rely on any income from connection fees. At this time, financial assistance by state or federal grant programs is not available and the wastewater system is left with two sources of revenue: service charges and property taxes.

The District has taken steps to establish a General Fund accounting style. The gross tax receipts of the District are received by the General Fund. Presently, the General Fund is used for administrative capital costs of the District, Recreation and Parks debt repayment and special programs. The remaining tax receipts are used as operating and capital income to the District's Sewer and Recreation and Parks departments. The present level of tax income to the Sewer Department is roughly identical to that received in 1984.

Sewer service rates have increased 233% since their establishment at $50 per year in 1978. Many factors play a role in this series of increases, including having established a service rate too low in 1978, a transition from inadequate to adequate levels of maintenance, the loss of supplementary funding sources, the virtual lack of connection fees, and the reallocation of District tax revenues. Therefore, all future maintenance and operations costs, capital spending, and reserve requirements will have to be borne to an even larger degree by the relatively fixed customer base of the District.

Even the customer base is not assured. Public agencies in the 1980's began an aggressive purchasing program of private property at Lake Tahoe. The majority of properties taken off the property tax rolls are undeveloped and have a low assessed valuation. However, some are commercial with higher assessed valuations and valuation of property continues to rise at a greater rate than the acquisitions retire taxable property. Whether this trend will continue is uncertain. For the purpose of this Master Plan, it is assumed to continue for the next ten years resulting in no net loss of tax revenue.

PHASED IMPROVEMENTS

The line replacements together with expansion and planning studies identified in Chapter 9 are beyond the financial and staffing capability of the present organization to achieve in anything less than a long term

phased improvement program. The schedule of capital improvements for the years 1990 through 1996 is as follows:

1990	N-1 Sewer Generator	$23,800	
	Block BE Sewer Replacement	310,000	
	Kings Beach Base Mapping	21,400	
			$355,200
1991	Coon & Hwy 28 Rehhabilitation	$ 120,000	
	N. T. Marina Sewer Line Rplmt.	10,000	
			$130,000
1992	Base Mapping and Energy Study	$ 13,250	
	Trout, Deer, & Highway 28	350,000	
	Dollar Force Main Seperation	50,000	
	Old County Rd. Replacement	32,800	
	Underground Storage Tank Rplmt.	50,000	
	Dollar Controller & VF Drive	50,000	
			$546,050
1993	Base Mapping and Cl_2 Study	$ 17,300	
	Coon Street Easement	48,000	
	Tahoe Vista Easement	42,000	
	North Lake Blvd. Tahoe Vista	119,000	
	Standby Power Generator (C-1)	33,000	
	Underground Storage Tank Rplmt.	60,000	
			$319,300
1994	Tiger Street	$62,000	
	Beach Street	63,000	
	Snowflake	204,000	
	Dollar Surge Control System	27,500	
			$356,500
1995	Bear Street	$38,000	
	KBSRA Easement	37,000	
	Park Lane	41,000	
	Beaver Street	85,000	
	Chipmunk Street	81,000	
	Loch Levon	95,000	
			$377,000
1996	Rainbow Street	$79,000	
	Loch Levon	75,000	
	T. V. Easement & Highway	180,000	
	State Highway	43,000	
			$377,000
1997	Estimated Value of Replacements		$358,000

The preceding figures include engineering, contract administration, and an inflation factor of five percent per annum. The construction cost estimates are based on similar local costs with an *Engineering News Record* Construction Cost Index of 4,750.

The phased improvements listed above replace or rehabilitate an average of 1,700 linear feet of sewer line per year for the next six years. This results in a planned aging of the system from a goal of 45 years to 147 years of average age of the system.

REVENUE PROGRAM - CERTIFICATES OF PARTICIPATION

The identified replacement projects, fleet and equipment costs, expansion and study projects are too great to fund from annual revenues without unacceptably high (42% or greater) annual service charge increases. To mitigate this financial burden, the capital replacement portion of the budget may be borrowed and the debt paid back over time. The recommended financing mechanism is the issuance of Certificates of Participation.

The amount of the issue is dictated by the amount of qualifying work that can be accomplished within three years of the sale of the bonds plus the items that have been previously completed in anticipation of being included in the debt issuance. The first bond should be issued in 1991 to fund the replacement projects of 1990, 1991, 1992, 1993 and 1994. The first issue will be used to fund the elements identified in the first five years of phased improvements as follows:

1990	Capital Reimbursement	$355,200
1991	Capital Improvements & Replacements	$130,000
1992	Capital Improvements & Replacements	$546,050
1993	Capital Improvements & Replacements	$319,300
1994	Capital Improvements & Replacements	$356,500
	Construction Total	$1,707,050
	Bond Reserve	190,000
	Issuance & Capitalized Interest costs	143,000
	TOTAL ISSUE	$2,040,050

When funded in a bond issue with a term of 15 years at an anticipated interest rate of 7%, the annual payment is $224,000. The funding of capital expenditures for fleet and equipment is appropriate as an annual budget item due to the short life of these items. This bond issue will fund work through 1994 when a new issue will be required to fund capital improvements and replacements for the years 1995 through 1997. The projected amount of this issue is $1,297,000 which will raise debt payments by $161,000 to a total of $385,000 annually in 1997. For debt issuance in 1994 and beyond the term of the loan is assumed to be 15 years but the interest rate is assumed to be 9%. This process of periodic debt issuance will continue until the earliest debt is retired. Cost factors for eighteen years are predicted as follows:

Fiscal Year	Total Annual Payment	Issue Amount
1990/91		$2,040,000
1993/94	$224,000	$1,297,000
1996/97	$385,000	$1,284,000*
1999/2000	$535,000	$1,284,000*
2002/03	$685,000	$1,284,000*
2005/06	$835,000	$1,284,000*
2008/09	$795,000	$1,284,000*
2011/12	$798,000	$1,284,000*

*Numbers are approximate and do not reflect specific projects.

This proposal falls short of the minimum level of capital investment in the system to arrest decay (maintain the effective age of the system at a static level). The recommendation is based on the policy of the District to minimize the fiscal impact to the rate payers. It is hoped that experience in the implementation of the plan will produce lower or stable operating costs and allow greater resources to be channeled onto capital replacement in the future.

The sewer service rate adjustments and the projected monthly rate for a residential service are presented in Table 12-2.

PROJECTED SEWER SERVICE RATE ADJUSTMENTS

Year	Change	Rate (Monthly)
1990/91		$13.86
1991/92	3.0%	$14.28
1992/93	4.4%	$14.91
1993/94	10.6%	$16.49
1994/95	10.4%	$18.20
1995/96	9.0%	$21.77
1996/97	8.3%	$23.57
1997/98	7.8%	$25.41
1998/99	7.4%	$27.29
1999/2000	6.9%	$26.13

Table 12-2

A five percent annual inflation rate in both the operating categories and the construction costs are included in the expense categories. This means that exclusive of capital programs or changes in operating expenses, the sewer rate can be expected to increase by almost sixty-three percent solely as a result of inflation over the next ten (10) years.

The increases and rates reflect a systematic maintenance, repair, and replacement program for the sewer lines, fleet and equipment of the North Tahoe Public Utility District Sewer Department. The expense categories that involve labor costs assume that the present level of staffing is maintained. This assumption is consistent with a redirection of effort from corrective maintenance to preventive maintenance as discussed in Chapter 7.

It is a goal of this plan to avoid delaying rate adjustments when such a delay will result in an unacceptably large one time increase in a future year.

REVENUE PROGRAM - GENERAL OBLIGATION BONDS

This alternate assumes the District places a measure before the voters to issue General Obligation (GO) Bonds as the tax rate for the existing bonds is eliminated. This is expected to occur in the 1992/93 fiscal year. Therefore a bond election is predicted in 1992 so that the capital improvements scheduled for 1993 will be financed through the GO bond proceeds. A COP issue is still required to fund the 1990 through 1992 capital improvements.

The COPs should be issued in 1991 to fund the replacement projects of 1990, 1991 and 1992. The first issue will be used to fund the elements identified as follows:

1990	Capital Reimbursement	$355,200
1991	Capital Improvements & Replacements	$130,000
1992	Capital Improvements & Replacements	$546,050
	Construction Total	$1,031,250
	Bond Reserve	103,000
	Issuance costs 3%	85,200
	TOTAL ISSUE	$1,219,250

The annual payment in this alternative is $134,000, a savings achieved by shortening the funded construction period. This bond issue will fund work through 1992 when the GO bond issue will be required to continue capital improvement and replacement projects for the years 1994 through 1998. The projected amount of this issue is $2,000,000. The process of periodic COP debt issuance resumes in 1999 although it is possible that authorization for a greater amount of bonding could be secured to avoid future COP issues..

The advantage to this method of capital funding is that the 25% excess coverage requirements in the service rate structure is not required for GO bonds as it is for COPs. Therefore once the coverage has been satisfied for the first COP no further rate increases are necessary for debt repayment until 1998/99 when a new COP issue is predicted.

The sewer service rate adjustments and the projected monthly rate for a residential service for the general obligation bond funded capital alternative are presented in Table 12-3.

PROJECTED SEWER SERVICE RATE ADJUSTMENTS

Year	Change	Rate (Monthly)
1990/91		$13.86
1991/92	3.0%	$14.28
1992/93	3.9%	$14.84
1993/94	4.7%	$15.53
1994/95	4.8%	$16.28
1995/96	4.8%	$17.06
1996/97	4.8%	$17.88
1997/98	5.0%	$18.77
1998/99	9.7%	$20.60
1999/2000	9.1%	$22.47

Table 12-3

This alternative also includes a five percent annual inflation rate. The advantages to using this method of funding are that 1) the property owner sees no change in the taxes paid to the District, 2) the rates during the years in which capital is funded through the GO bonds need only be adjusted to accommodate inflation and 3) the costs of the improvements are spread to undeveloped properties who will derive benefit by maintaining the availability of a working sewer system.

The alternative of submitting a General Obligation Bond to the voters in 1992 is the recommended alternative of this plan. The effect of this funding alternative is included in a projection of revenues and expenses through the year 2000. These projections are included in Appendix F, Cash Projections. An aggressive public relations campaign should be instituted in 1991 to inform the public of the benefits and alternatives to the bond issue.

RATE DISTRIBUTION

The District charges for sewer service are based on several different physical parameters. Residences, including transient occupancy establishments, are billed on the basis of living units. Businesses are billed on the basis of their revenue generating facilities, i.e., number of seats in a restaurant, chairs in a beauty parlor, or on the basis of the flow capacity of the plumbing fixtures installed within the establishment. The basis for the specific differences are not documented, but the relationship of the charges and the unit measurements bear close relationship to those used by neighboring agencies. From time to time, the District has been asked to review individual categories and, in some cases, has made adjustments in the interests of fairness. There is no focused user protest over inequities in the rate distribution; therefore, it is not recommended that any changes be made as a result of this study. Should serious questions arise or if it becomes necessary to justify the rate structure for the purpose of securing a grant, a focused study could be directed to the rates.

CONNECTION FEES

The District currently charges a connection fee of $1,000 per living unit, $700 per studio, and $835 plus charges for the number of fixtures connected per business. An adjustment to reflect the investment in the facilities utilized by each new connection should be considered. Estimated to be $3,460 per single family residence, this adjustment is subject to computation in accordance with legal requirements and should be reviewed by the District's legal and accounting consultants. Recent reductions in the connection fees by the Tahoe Truckee Sanitation Agency provide an opportunity to make a modest gain on capital funding through the connection fee income with little or no effect on applicants for service. The $1,000 reduction in TTSA fees should be made up by a $1,000 increase in the NTPUD connection fee.

SUMMARY RECOMMENDATIONS

A number of recommendations appear in various locations throughout this plan. This chapter is included to bring together all the recommendations and comments on the final action plan.

Financial

Raise the connection fee to $3,460 – the recommendation is modified to raise the connection fee by $1,000 to a total of $2,000 in order to take advantage of the lowering of the regional treatment plant's connection charge .

Repay reserve funds loaned to operating funds – forgive loan.

Budget 1.25 times bond fund repayment excess in operating revenue – incorporated for the COP portion of debt.

Board of Directors adopt by resolution election to participate in the Uniform Construction Cost Accounting Act procedures – study and implement if appropriate

Sell Certificates of Participation (COP) in an amount sufficient to fund 3 years of identified capital projects – incorporated.

Hold bond election in 1992 to continue the tax rate for capital improvements – incorporated.

Operational

Plan for an increase in preventive maintenance operations – underway.

Complete survey of the condition of the untested portion of the collection system – underway.

Implement management information system – budgeted.

Maintain staffing level at that budgeted for 1990/91 incorporated.

Enforce existing grease control ordinance provisions – incorporated.

Establish right of way control program – incorporated.

Using the unit flow figures established monitor extraneous flows entering the system – delay subject to weather.

Survey the level and use of toxic and hazardous materials – incorporated.

Capital

Budget for replacement of up to 4,300 linear feet of sewer main replacement annually – adjusted to 1,700 linear feet.

Budget for the replacement of vehicles and equipment at the rate of approximately $90,000 annually – sustained at $50,000.

Review annually the results of television inspection and test data for adjustments to the sewer line replacement schedule – planned.

APPENDIX A

REFERENCES

APPENDIX

APPENDIX A

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28. Kennedy/Jenks Engineers, Tahoe Basin Sewer Systems Exfiltration/Overflow study, California Portion, Phase II Report, A Report For South Tahoe PUD, North Tahoe PUD, Tahoe City PUD, May 1983.

APPENDIX B

STAFFING AND ORGANIZATIONS EVALUATION

O & M STAFFING EVALUATIONS

Estimate typical staff complements for wastewater collection systems based on population using "industry-wide" averages - Reference Sources: MOP 7 & Am. CW Associates Guide to Effective Sewer Maintenance, Vol. 1.

Pop = 10,000	1 Superintendent	10	hours/week
	1 Foreman	20	hours/week
	1 Maintenance II	20	
	1 Maintenance I	20	
	1 Const. Equip. Oper.	20	
	1 Labor	20	
	6 Sewer Maintenance	110	
	total = 12 people	220	hours/week
		(or 220 72 x 40 = 46% utilization)	

(Source actually Manpower Requirements for Wastewater Collection Systems in Cities and Towns Up to 150,000 in Population, North Carolina A & T State University, Greensboro, NC, PB-227 039 (June 3, 1973).

Above based on manpower pool sufficient to operation a preventative maintenance mode.

Add, one each Maintenance II and Maintenance I for each 50,000 population for emergency crew.

Above does not provide for auto equipment maintenance, enforcement of sewer use ordinance.

For Pump Station Maintenances

Add Maintenance Mechanic II:

No. of lift stations maintained by 8/3. For District, 17 stations maintained (include all satellites)

= 8/3 x 17 = 45, or 8/3 x 4

= 10.7

Say 40 hours/week

Maintenance Mechanic I:

No. of station visits per week.

Say (4 mains + 17/2 = 8 Sat PS) x 5 days/week

= 60 hours/week

Say one each full time.

Add Construction Inspectors for construction within District

Construction site visits/week x 8/3

Say 2 sites/day x 5/week x 8/3 = 27 hours/week

Say one full time - use for engineer function also.

Construction Supervisor:	0/week
Add Automotive Equipment:	Minimum one staff needed (questionable)

Summarizing:

		Hours/Week
1 Superintendent	1/2 Time	20
1 Foreman	1/2 Time	20
1-1/2 Maintenance II	Full Time	60
1-1/2 Maintenance	I Full Time	60
1 Construction Equipment Operator	1/2 Time	20
1 Laborer	1/2 Time	20
6 Sewer Maintenance, say 1/4 Time 4 Sewer Maintenance	Full Time	160
1 Mechanic II	Full Time	40
1 Mechanic I	Full Time	40
1 Construction Inspector	1/2 Time	20
Auto Mechanic	Full Time	40
15 people in all		500 hours/week, or 12.5 people

Say, 13 person staff is indicated following this course of analysis.

Compare preceding analysis with staff positions provided by present organization; reference to NTPUD Chart - 1986 included herein:

For Water/Sewer Maintenance

4 Supervisors (1-W)

2 Maintenance Technicians II

1 Maintenance Technician I

4 Maintenance Workers II (1-W)

4 Maintenance Workers I (1-W)

1 Maintenance Worker Apprentice (1-W)

1 Equipment Mechanic

1 Inspector (Engineering)

18 Persons plus 1 Superintendent.

Without water deduct 4 persons for total sewer = 14, compared with 13-15 per "analysis/estimate"

Summary Conclusion:

Considering location of the District and inherent environmental constraints and "difficult" climatic conditions to be endured, present staffing numbers looks reasonable.

APPENDIX C

PREVENTIVE MAINTENANCE EVALUATIONS

APPENDIX C
PREVENTIVE MAINTENANCE EVALUATIONS

Staffing Adjustment Considerations Wastewater conveyance system staffing requirements are influenced by a number of factors including size, age, and complexity of the system, work safety requirements, types of equipment used, accessibility of sites, travel distances and topography. Typically, several crews are established to handle distinct functions. For the North Tahoe PUD, crews could be organized as follows:

Crew	Function/Duties
Inspection	I/I source detection, odor source detection, visual inspection
Maintenance & Repair	Routine cleaning, root control, grouting and sealing simple structural repair, pump testing, station cleaning
Emergency	Responding to complaints, flooding, line collapses, rescue operations

Staffing should include maintenance workers, technicians (mechanics and electricians for Pump Station maintenance), and equipment operators. Staff responsibilities would include training in O&M procedures and safety related matters.

Minimum staffing levels should be considered when attempting to reduce operating costs. As a point of reference, the following minimum staff complement has been developed for consideration:

Line Staff without Supervisory Personnel	Function
1 - Equipment Operator	Repairs to sewers
1 - Electrician/Instrument	Pump Station O&M Mechanic
1 - Machinist/Mechanic	Pump Station O&M
3 - Maintenance	Sewer Inspections
3 - Maintenance	Sewer Repairs/Emergencies

The minimum supervision for the line functions noted above could be as low as 1 member, albeit, this is probably unrealistic due to wide range in qualifications required for the job position. Accordingly, 2 supervisors are a more appropriate minimum complement in this scheme.

In total, the staff to handle line functions would thus be 11 people. This complement does not provide for construction/service inspection, equipment maintenance, and general supervision.

Presently, the sewer and station maintenance staff consists of 11 members, and, as such compares closely with the minimum estimated staff described above. Accordingly, the District could consider maintaining the staff at the present level of 11 people while recognizing that it may not be possible to implement preventive maintenance program.

Additional staffing adjustments that can be considered to reduce costs include the following:

- Increase preventive maintenance schedule to expand facility life and lower capital replacements
- Establish a single maintenance worker pool to serve the needs for all departments and maintain 3 supervisors, one each for sewers, water, and technical/mechanical

Administration and general costs were not studied in detail during this investigation.

Preventive Maintenance Requirements:

This appendix addresses a number of specific requirements for this District that should be considered when evaluating present PM schedules or when developing new PM schedules. Suggested programs and schedules addressed later in this Section are not inclusive of all necessary lubrication and other routine maintenance tasks. Additional equipment manufacturer's requirements and recommendations should be included in the formulation of more complete and system specific operation and preventive maintenance programs. Schedules may require more frequent inspections and maintenance work levels than those proposed based on the system peculiarities and actual District operating experience.

Access:

Access to sewer manholes and cleanouts can be difficult in some areas and visual inspection is hindered. Equipment access to manholes in easements may be limited. "Walking" rights-of-way and easements in "off-street" areas requires more lead time and more inspection time. Moreover, utilization and work time is increased.

Manholes should be inspected at least yearly to assure that covers are not buried or paved over. Road paving projects should be monitored to assure that manhole frames are raised as necessary to assure access. Marker posts should be installed at manholes in easements to expedite location.

Cleaning:

Cleaning requirements will vary depending on the type of blockage to be prevented (or removed). Jetting with the vactor is more efficient than flushing as it removes grease buildup from pipe walls. Cleaning frequency should be scheduled initially on the basis of past problems and the grade of the pipeline, with "steeper" lines requiring less cleaning. Frequent cleaning will also help alleviate problems of surcharging and toxic gas formation.

Grease Control:

Grease traps should be required for commercial and institutional laundries, as wells as food handling establishments. District ordinance should require design approval of grease traps, prohibit grease trap modification (baffle removed) without approval, and provide penalty for failure to clean trap and keep it operational. Traps should be designed to plug, if not cleaned, rather than pass grease into sewer system. Indications are that some grease traps are ineffective due to size, design, installation or maintenance.

Grease is best prevented from entering the sewer system, rather than controlled. Grease can be controlled with prudent use of chemicals, bioacids, enzymes, bacterial cultures, caustics, hydroxides, but, mechanical cleaning and enforcement of the sewer ordinance is generally more cost effective.

Root Control:

Root control involving the use of chemical herbicides can inhibit regrowth for up to seven years. The long lasting effects of the chemical in killing roots and inhibiting root regrowth is well documented. With joint sealing when appropriate, additional efficiencies and cost savings can be achieved.

Odor control can be accomplished by a number of methods including the use of chemical and by cleaning to remove H2S producing slimes. Chemicals are expensive and can be hazardous to handle. Recently the District discontinued chlorination in favor of using sulfide precipitating additives. Results to date are inconclusive; further testing is continuing. Other chemical methods using lime (8,000 mg/L for 1 hour to kill slimes) or hydrogen peroxide have been used elsewhere with varying degrees of success. Additional discussion on this subject was included in an earlier report to the District by Kennedy/Jenks Engineers, 1984 (Appendix A, Ref. 27). In addition to chemical dosing, odors can be controlled by aggressive sewer line cleaning that can remove grease, slimes and heavy deposits. Cleaning methods should be used within the collection system where chemical addition is not practical.

Usually odors are generated in sewers when sewage is warm, contains significant sulfates, and has long transit time. None of these conditions exist at North Tahoe where sewage is cold and has low sulfate content. Some forcemains, however, have long detention at night and can generate and release odors at forcemain terminations.

The other two major causes of odor are grease decay and solids build-up. Strict provision and maintenance of grease traps can control odors from this source, as well as reduce sewer cleaning requirements. Roof removal to avoid solids trapping and regular sewer flushing can control odors from these sources.

Records are not available as to the locations and conditions of all reported odors. When these records are available from computer file, causes may be determined and further corrective action initiated.

Export System:

Export system maintenance has required significantly less effort than efforts expended for sewer line and pump station maintenance. Of significance for the District, however, mainline isolation valves installed on the National and Carnelian forcemains require routine visual inspection and periodic exercising. Additional recommended forcemain inspection and testing (PM) was addressed in the 1984 Odor and Corrosion - Phase I Report by Kennedy/Jenks Engineers (Appendix A, Ref.27).

Pump Stations:

Pump station maintenance at the District has been very effective as indicated by the good record of continuous operation. In addition, the District has completed a number of mainline pump replacement projects which were designed to reduce pumping capacity to levels that more closely match prevailing wastewater flows. By doing so, pump wear should be reduced and efficiency of energy utilization should increase.

Continuation of an aggressive PM program is recommended. Experience shows that most pump station failures can be attributed to poor PM. Elements of the program should include:

- Electrical equipment inspection and cleaning (removal of oil, dirt, and moisture), and 6 month running checks and tests of alarm equipment
- Lubrication to preserve expected service life
- Mechanical alignment and vibration inspection and testing to prevent service interruptions and costly equipment repairs
- Safety training to protect against electrical shocks, oxygen deficient atmospheres, toxic, noxious, and flammable gases and vapors
- Running checks of standby power diesel/generator sets, components of the station requiring PM include pump machinery, wet wells, ventilation systems, piping and check valves, automatic sensors and alarms, and standby emergency power generation systems.

APPENDIX D

SANITARY SEWER REHABILITATION

APPENDIX D
SANITARY SEWER REHABILITATION

TABLE D-1

INFILTRATION SOURCES AND REHABILITATION METHODS

	Method of Rehabilitation			
Sources	Replacement	Lining	Sealing	Excavation and Repair
Sewer Mains and Laterals				
Collapsed pipe	0			0
Broken/crushed pipe	0			0
Extensively cracked pipe	0			0
Moderately cracked pipe		0		
Deteriorated pipe joints		0	0	0
Offset pipe joints	0	0		0
Open pipe joints		0	0	0
Extensive root growth		0	0	
Manholes				
Leaking manhole drops	0			0
Leaking manhole stub	0		0	
Deteriotated manhole walls, bases and troughs	0	0	0	

(Appendix A, Ref. 11)

TABLE D-2
INFLOW SOURCES AND REHABILITATION METHOD ALTERNATIVES

	REHABILITATION ALTERNATIVES					
	Disconnect and Plug	Repair Or Replace	Sump Pump Installation	Drain to Landscape or Ditch	Connection to Storm Drain	Storm Drain Installation
Catch Basin	0				0	0
Cross Connection	0					
Downspout	0			0	0	0
Foundation Drain	0		0	0	0	0
Cellar Drain	0		0	0	0	0
Area/Yard Drain	0		0	0	0	0
Driveway Drain	0		0	0	0	0
Drain for Springs and Swampy Areas	0			0	0	0
Low or Perforated Manhole Lid		0				
Open Cleanout		0				
Cooling Water Discharge	0		0	0	0	0

(Appendix A, Ref. 11)

TABLE D-3
RECOMMENDED CRITERIA FOR GROUTING VARIOUS PIPE DEFECTS

Defect Type	Recommended maximum Allowable Tolerance to Allow Grouting.
Offset Joint	6- to 8-inch pipe; 1/2 inch maximum. 10- to 14-inch pipe; 3/4 inch maximum.
Open Joints	1-1/2 inch maximum.
Piece missing	Maximum 1-1/2 inch in greatest dimension.
Spiral or Longitudinal Cracks	Maximum 4 inches in length.
Protruding Tap	Based on a 6-inch pipe: if from the top, 1 inch maximum. If from the side, 1/2 inch maximum. A general rule on this is if the T.V. camera is able to pass by the offset without getting hung up, the grout packer should be able to pass as it is approximately the same size or just slightly larger. Allowable tolerances increase as the pipe diameter increases.
Broken Pipe	Broken pipes are difficult to grout and should be replaced.

(Appendix A, Ref. 11)

TABLE D-4
COLLECTION SYSTEM REHABILITATION
EQUIPMENT, MANPOWER REQUIREMENTS, UNIT COSTS

Method	Crew Size	Production Rate	Unit Cost	Remarks
Chemical	3	500'/shift	6"-$3.92/ft	TV & Sealing Eq.
Slip Lining	Contract			
Inversion Lining	Contract	Variable	Highly Variable High Mobilization Cost	
Replacement	Special	Variable	Variable	Estimate on case-by-case basis
Manhole Rehabilitation				
Frame/Cover				Variable
Grouting				$450/manhole
Coating				$850/manhole
Replacement				$8,000/manhole
Manhole Rehabilitation				Variable

(Appendix A, Ref. 11)

TABLE D-5
REHABILITATION COSTS FOR INFLOW SOURCES (a)

Item	Average Cost ($/ea) (b)
Catch basin disconnection (c)	8,000
Cross connection plugging	700
Downspout disconnection	200
Foundation drain disconnection	1,700
Cellar drain disconnection	500
Area/yard drain disconnection	1,500
Driveway drain disconnection (d)	1,200-5,000
Drain for springs and swampy areas	3,300
Raise or replace low manhole covers	700
Manhole inserts	200
Replace open cleanouts	200

(a) ENR = 5100

(b) Average costs are for disconnection or repair only and do not include modifications to redirect surface runoff.

(c) The cost for catch basin disconnection includes installation of 501f of 12-inch diameter piping to the storm drain.

(d) Disconnection of a driveway drain usually must include installation of a sump and associated piping controls.

(Appendix A, Ref. 12)

TABLE D-6
MANHOLE REHABILITATION (a)

Procedure	Unit Cost Per Manhole
Braize cover (seal cover holes)	$ 75
Seal rim (e.g. Cretex chimney seal)	$400
Grout	$450

(a) ENR = 5100

(Appendix A, Ref. 11)

TABLE D-7
ESTIMATED PIPELINE CHEMICAL SEALING COSTS

Pipe Diameter (a) Inches	Total Unit Costs Dollar/Linear Foot
6	3.92
8	5.23
10	6.53
12	7.84
15	9.80
18	11.76
21	13.72
24	15.68
27	17.64
30	19.60

(a) The pipe diameter refers to sewer mains.

(Appendix A, Ref.11)

TABLE D-8
COST DATA FOR SLIP LINING SEWERS

Existing Sewer Diameter, inches (c)	Total Construction Cost at Various Depths, Dollar/Linear Foot (a,b)		
	0 to 10 Feet	10 To 20 Feet	≥20 Feet
6	27.3	37.7	55.9
8	29.9	40.3	61.0
10	32.6	44.2	62.4
12	36.4	48.1	69.0
15	41.6	50.7	83.3
Lateral Reconnection, (d) Dollar/Lateral	560	780	1,680

(a) ENR +5100

(b) Unit costs include work pit excavation, mobilization, and polyethylene liner. An additional 30 percent was added for engineering, administration, and contingencies.

(c) The pipe diameter refers to the main collection system only.

(d) Cost of excavation and reconnection of house laterals.

(Appendix A,Ref. 11)

APPENDIX E

FACILITY INVENTORY

TABLE E-1

SEWER MASTER PLAN

FACILITY INVENTORY SUMMARY

Facility	Value of Facility - $ Service Life 10 Year	15 Year	20 Year	30 Year
Satellite Pump Stations	$562,900		$653,200	
Dollar Hill Pump Station	408,500		241,000	
Carnelian	122,800		195,150	
Secline	50,100		156,550	
National	122,800		195,150	
Moondune	9,000		105,000	
Administration Buildings/ Base Equipment (a)		$326,300		$1,141,350
SUBTOTALS	$1,276,100	$326,300	$1,546,050	$1,141,350

TOTAL ALL FACILITIES	=	$4,289,800
AVERAGE LIFE	=	18.0

(a) Administration Buildings/Base Equipment are shared and maintained for the benefit of the Water and the Recreation and Parks Departments, as well as the Sewer Department. The completed Master Water Plan and Recreation Master Plan, currently in preparation, do not address their portions of these facilities. Therefore the entire value of these facilities are included within this plan.

TABLE E-2

Sewer Master Plan

VEHICLE INVENTORY REPLACEMENT VALUES 1990

Unit No.	Year	Description	Replacement Value	Expected Life	Annualized Cost
1	1971	Crane Truck	$35,000	10	$5,216
46	1970	IH Diesel Flatbed	25,000	10	3,726
2	1989	JD 410C Backhoe	58,000	15	
5	1980	2WD Datsun PU	13,000	7	2,497
6	1980	Vactor	200,000	9	32,016
47	1970	KW Dump	20,000	15	2,337
24	1962	A-C Loader	35,000	10	5,216
7	1974	TV Truck	70,000	10	10,432
14	1969	IH Flusher	50,000	10	7,451
12	1941	Rodder	30,000	15	3,505
28	1979	4WD Chevy 3/4T	15,000	9	2,401
23	1969	Forklift	20,000	10	2,981
44	1983	4WD Tercel (1/2 swr)	6,500	7	1,248
19	1981	IH 5YD Dump	24,000	10	3,577
3	1981	IH Flatbed	24,000	10	3,577
35	1980	Traffic Lite Trailer	3,500	12	464
15	1987	JD 610 BH	80,000	15	9,346
8	1983	4WD Chevy 1/2T PU	13,000	9	2,081
54	1985	4WD Subaru GL (1/2)	6,500	7	1,248
42	1983	4WD Chevy 3/4T	15,000	9	2,401
43	1983	4WD Chevy 1T Crew	17,500	9	2,801
38	1978	Emulsion Sprayer	5,000	15	584
50	1984	4WD Chevy K-20 3/4T	15,000	9	2,401
40	1978	Air Test Trailer	7,000	15	818
52	1985	4WD F250 PU	17,000	12	2,256
39	1978	3 axle Trailer	4,000	20	407
56	1987	4WD Ford 1T	17,000	12	2,256
55	1987	4WD Ford 1T	17,000	12	2,256
26	1986	Fuel Trailer	2,000	15	234
TOTALS			$845,000		$115,734
		The average life of these vehicles is		10.7	years.

APPENDIX F

CASH PROJECTIONS

NORTH TAHOE PUBLIC UTILITY DISTRICT
MASTER SEWER PLAN
1989-2000 BUDGET CASH PROJECTIONS

	BUDGETED 1989-90	BUDGETED 1990-91	PROJECTED 1991-92	PROJECTED 1992-93	PROJECTED 1993-94	PROJECTED 1994-95	PROJECTED 1995-96	PROJECTED 1996-97	PROJECTED 1997-98	PROJECTED 1998-99	PROJECTED 1999-2000
OPERATING INCOME											
Service Charges	911,000	910,000	954,000	983,000	1,021,000	1,069,000	1,120,000	1,174,000	1,230,000	1,292,000	1,417,000
Transfer of Taxes	0	0	0	0	0	0	0	0	0	0	0
SAD Direct Expense	60,000	0	0	0	0	0	0	0	0	0	0
Rate Adjustment	0	44,000	29,000	38,000	48,000	51,000	54,000	56,000	62,000	125,000	129,000
Transfer from SRSF	0	0	0	0	0	0	0	0	0	0	0
Miscellaneous	12,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000
SUBTOTAL	$983,000	$965,000	$994,000	$1,032,000	$1,080,000	$1,131,000	$1,185,000	$1,241,000	$1,303,000	$1,428,000	$1,557,000
OPERATING EXPENDITURES											
Salaries & Wages	293,000	301,000	316,000	332,000	349,000	366,000	384,000	403,000	423,000	444,000	466,000
Utilities	109,000	107,000	106,000	111,000	117,000	123,000	129,000	135,000	142,000	149,000	156,000
Emply Benefits	112,000	114,000	120,000	126,000	132,000	139,000	146,000	153,000	161,000	169,000	177,000
Fleet & Equipmt.	121,000	104,000	110,000	117,000	124,000	131,000	139,000	147,000	156,000	165,000	175,000
OP/Off Supplies	79,000	91,000	94,000	97,000	100,000	104,000	108,000	112,000	116,000	120,000	124,000
Insurance	0	0	0	0	0	0	0	0	0	0	0
Repairs & Maint.	78,000	72,000	79,000	87,000	96,000	106,000	117,000	129,000	142,000	156,000	172,000
Other Operating	7,000	0	0	0	0	0	0	0	0	0	0
Legal Fees	0	0	0	0	0	0	0	0	0	0	0
Contract Services	6,000	0	0	0	0	0	0	0	0	0	0
Acct & Auditing	0	0	0	0	0	0	0	0	0	0	0
Travel & Meetings	0	0	0	0	0	0	0	0	0	0	0
Educ. & Training	10,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
Outside Programming	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	$815,000	$795,000	$831,000	$876,000	$924,000	$975,000	$1,029,000	$1,085,000	$1,146,000	$1,209,000	$1,276,000
OPERATING TOTAL	$168,000	$170,000	$163,000	$156,000	$156,000	$156,000	$156,000	$156,000	$157,000	$219,000	$281,000

NORTH TAHOE PUBLIC UTILITY DISTRICT
MASTER SEWER PLAN
1989-2000 BUDGET CASH PROJECTIONS

	BUDGETED 1989-90	BUDGETED 1990-91	PROJECTED 1991-92	PROJECTED 1992-93	PROJECTED 1993-94	PROJECTED 1994-95	PROJECTED 1995-96	PROJECTED 1996-97	PROJECTED 1997-98	PROJECTED 1998-99	PROJECTED 1999-2000
NON OPERATING INCOME											
Rents and Leases	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000
Property Taxes	0										
Interest	30,000	30,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000
Miscellaneous	0										
SUBTOTAL	$47,000	$47,000	$32,000	$32,000	$32,000	$32,000	$32,000	$32,000	$32,000	$32,000	$32,000
NON OPERATING EXPENSES											
Transfer to SRSF	69,000	66,000									
Operating Loan Rpymt.		0	0	0	0	0	0	0	0	0	0
Miscellaneous	12,000	17,000									
SUBTOTAL	$81,000	$83,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
NON OPERATING TOTAL	($34,000)	($36,000)	$32,000	$32,000	$32,000	$32,000	$32,000	$32,000	$32,000	$32,000	$32,000
TOTAL OPERATING FUND	$134,000	$134,000	$195,000	$188,000	$188,000	$188,000	$188,000	$188,000	$189,000	$251,000	$313,000

NORTH TAHOE PUBLIC UTILITY DISTRICT
MASTER SEWER PLAN
1989-2000 BUDGET CASH PROJECTIONS

	BUDGETED 1989-90	BUDGETED 1990-91	PROJECTED 1991-92	PROJECTED 1992-93	PROJECTED 1993-94	PROJECTED 1994-95	PROJECTED 1995-96	PROJECTED 1996-97	PROJECTED 1997-98	PROJECTED 1998-99	PROJECTED 1999-2000
SRSF BEGINNING BALANCE	$493,000	$573,000	$715,000	$826,000	$846,000	$880,000	$927,000	$979,000	$1,035,000	$1,097,000	$1,176,000
SRSF SOURCES OF FUNDS											
Transfer to Operating	0	0	0	0	0	0	0	0	0	0	0
Transfer from Operating	134,000	134,000	195,000	188,000	188,000	188,000	188,000	188,000	189,000	251,000	313,000
Transfer to Non Op											
Transfer from Non Op	69,000	66,000	0	0	0	0	0	0	0	0	0
Connection Fees	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000
Interest		46,000	57,000	66,000	68,000	70,000	74,000	78,000	83,000	88,000	94,000
SUBTOTAL	$243,000	$286,000	$292,000	$294,000	$296,000	$298,000	$302,000	$306,000	$312,000	$379,000	$447,000
SRSF USES OF FUNDS											
Capital Long Term Debt	0	46,000	50,000	150,000	150,000	150,000	150,000	150,000	150,000	200,000	250,000
Capital Fac./Contigency	53,000	49,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000
Capital Equipment	91,000	18,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000
Capital Lease/Purchase	19,000	31,000	31,000	24,000	12,000	1,000	0	0	0	0	0
SUBTOTAL	$163,000	$144,000	$181,000	$274,000	$262,000	$251,000	$250,000	$250,000	$250,000	$300,000	$350,000
SRSF TOTAL	$80,000	$142,000	$111,000	$20,000	$34,000	$47,000	$52,000	$56,000	$62,000	$79,000	$97,000
SRSF ENDING BALANCE	$573,000	$715,000	$826,000	$846,000	$880,000	$927,000	$979,000	$1,035,000	$1,097,000	$1,176,000	$1,273,000