COUNTY OF SAN MATEO

Harbor Industrial-Scenic Heights
Oak Knoll-Kensington-Square

SEWER MASTER PLAN

Prepared by:
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July 2000

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EXECUTIVE SUMMARY

In December 1996, the County of San Mateo engaged Brown and Caldwell to prepare a sewer system master plan for the Harbor Industrial Sewer Maintenance District (HISMD), Kensington Square Sewer Maintenance District (KSSMD), Oak Knoll Sewer Maintenance District (OKSMD), and Scenic Heights County Sanitation District (SHCSD). This executive summary presents the findings, conclusions, and recommendations regarding this system. It also proposes a capital improvement plan (CIP) and summarizes recommended rates and a revenue plan to finance proposed improvements.

Background

The overall master planning process used for the sewer system master plan consisted of identifying capacity limitations along with structural deficiencies of the sewer system and developing an ongoing improvement program to correct the limitations. Part of the overall improvement program is the consideration for changing current maintenance activities to more appropriately match the needs of the sewer system. The improvement plan's goal is to develop a balance between capital projects and system maintenance to achieve a highly reliable collection system for the lowest overall cost.

A series of field inspections were performed to collect information on the collection system. Limited source detection methods (including manhole inspections, maintenance calls, and television inspection) were used to identify collection system structural deficiencies. Hydraulic modeling was performed to develop a listing of hydraulic deficiencies. Projects were developed and prioritized based on the deficiencies and capital costs that were prepared. Methods for financing the recommended improvements are also included in the study.

Findings

Review of known problem areas and interviews with County maintenance crews was used to prioritize field inspections in the HISMD, KSSMD, OKSMD, and SHCSD. Hydraulic modeling was also performed to evaluate the amount of remaining capacity in the wastewater collection system. This section presents the results of the field inspection and capacity analysis.

A manhole inspection program was performed in the winter and spring of 1997. Field crews documented the condition of 22 manholes in the HISMD, 17 manholes in the OKSMD and 7 manholes in the SHCSD. No serious defects were noted during the inspection. Results of the inspections were used to prioritize the television inspection program.

The television inspection program was conducted during the winter of 1999. A total of 600 feet of the collection system was inspected in the HISMD. Over 16 structural defects were documented during the inspection. A total of 1,300 feet of the collection system was inspected in the KSSMD. Over 104 structural defects were documented during the inspection. A total of 700 feet of the collection system was inspected in the OKSMD. Over five structural defects were documented during the inspection. A total of 400 feet of the collection system was inspected in the SHCSD.

Over six structural defects were documented during the inspection. Results of the television inspection program were used to develop the CIP.

Recommendations

A CIP was developed based on the results of the field work and capacity analysis. A total of five capital improvement projects were developed for the HISMD, KSSMD, OKSMD and SHCSD. All five of the projects are recommended to repair structural deficiencies. Estimated total construction costs for the projects range between $26,400 to $136,600 depending on the selected alternative improvement. The locations of the improvement projects are listed below:

Harbor Industrial Sewer Maintenance District
1. Elmer Street

Kensington Square Sewer Maintenance District
1. Upton Street

Oak Knoll Sewer Maintenance District
1. Don Court
2. Moloney Court

Scenic Heights County Sanitation District
1. Scenic Drive

SECTION 1

INTRODUCTION

This chapter introduces the sewer master planning process for the Harbor Industrial Sewer Maintenance District (HISMD), Kensington Square Sewer Maintenance District (KSSMD), Oak Knoll Sewer Maintenance District (OKSMD) and Scenic Heights County Sanitation District (SHCSD) of San Mateo County (County), including background, authorization, scope of work and report organization.

Background and Purpose of Work

The overall master planning process used for the sewer system master plan consisted of identifying capacity limitations along with structural deficiencies of the sewer system and developing an ongoing improvement program to correct the limitations. Part of the overall improvement program is the consideration for changing current maintenance activities to more appropriately match the needs of the sewer system. The improvement plan's goal is to develop a balance between capital projects and system maintenance to achieve a highly reliable collection system for the lowest overall cost.

A series of field inspections were performed to collect information on the collection system. Limited source detection methods (including manhole inspections and television inspection) were used to identify collection system structural deficiencies. Hydraulic modeling was performed to develop a listing of hydraulic deficiencies. Projects were developed and prioritized based on the deficiencies and capital costs that were prepared. Methods for financing the recommended improvements are also included in the study.

The County maintains and operates nine noncontiguous sewer districts containing approximately 130 miles of sewer mains. The sewer districts are:

1. Burlingame Hills Sewer Maintenance District
2. Crystal Springs County Sanitation District
3. Devonshire County Sanitation District
4. Emerald Lake Heights Sewer Maintenance District
5. Fair Oaks Sewer Maintenance District
6. Harbor Industrial Sewer Maintenance District
7. Kensington Square Sewer Maintenance District
8. Oak Knoll Sewer Maintenance District
9. Scenic Heights County Sanitation District

The HISMD, KSSMD, OKSMD and SHCSD are all much smaller than the remaining County Districts. For this reason, the master plans for these Districts have been combined into one report. Each of the smaller Districts are located on the San Francisco peninsula.

The HISMD is located in the area bounded by Harbor Boulevard in the south, S.P.R.R. Co. in the west, O'Neill Avenue in the north and the Bayshore Freeway in the east.

The KSSMD is located in the area bounded by Jefferson Avenue in the south, Alameda De Las Pulgas in the west, Harding Avenue in the north and Topaz Street in the east.

The OKSMD is located in two non-adjacent areas. The first area is bounded by Don Court in the south, Edgewood Road in the west, Alameda De Las Pulgas in the north and Acacia Lane in the east. The second area is bounded by Upland Road in the south, Hillcrest Road in the west, Stanley Street in the north and Upland Road and Hillcrest Drive in the east.

The SHCSD is located in the area bounded by Belle Roche Avenue in the south, Clifford Avenue in the west, Lemoore Drive in the north and Edgewood Road in the east.

Though the County has maintained and upgraded these collection systems in the past, this work has been done without the benefit of master planning. This report provides a prioritized capital improvement program along with recommended follow-up field investigations and potential funding mechanisms.

Authorization

The County authorized this work through an agreement with Brown and Caldwell dated December 17, 1996.

Scope of Work

The scope of work includes the following activities:

Assessment of Existing Sewer Systems. To develop a meaningful capital improvement program, it was necessary to determine the structural and hydraulic condition of each District's collection system. Methods used to complete the evaluation included reviewing existing maps and records drawings, interviewing County maintenance workers and checking maintenance records, manhole inspections and television inspection.

Development of Sewer System Capital Improvement Plans. A listing of sewer system deficiencies were developed based on the sewer system assessment task. Capital projects were developed to correct each identified system deficiency. Capital projects were prioritized and estimated capital costs for each project were determined. Project priorities were reviewed with County staff and an annual schedule of required capital improvements were developed. A financial plan was developed to support the recommend projects. The financial plan includes financial alternatives and recommended sewer charges and revised connection fees, if any.

Data Management. Data generated during the study was entered into a series of Access databases for future use by the County. The databases will be submitted under separate cover to the County with the Master Plans.

Master Plan Report. Prepare a sewer system master plan report for each of the Districts. The master plan report is supported by a series of technical memoranda prepared as part of the previous

tasks. The master plan provides completed documentation of the recommended capital improvement projects as well as financing alternatives.

Report Format

This Master Plan report has been organized as a reference report, to the extent possible. Each section in the report consists of one to two pages of descriptive text followed by a data table, graphical figure, or both. This report has 15 sections roughly divided as follows:

- Sections 1 through 3 describe the current County system and operating procedures.
- Sections 4 through 7 describe the field work programs.
- Sections 8 and 9 summarize the hydraulic modeling work.
- Sections 10 through 12 describe the capital improvement program and funding mechanisms.

Technical memoranda and backup material are also provided in the appendices following the main body of the report as identified in the Table of Contents.

SECTION 2

EXISTING SEWERS

The general physical characteristics of the Harbor Industrial Sewer Maintenance District (HISMD), Kensington Square Sewer Maintenance District (KSSMD), Oak Knoll Sewer Maintenance District (OKSMD) and Scenic Heights County Sanitation District (SHCSD) sewer collection systems are described in this section. These characteristics provide the basis for physical evaluation of the collection system and determine the system's ability to convey current and projected wastewater flows.

Description of Existing Facilities

The HISMD, KSSMD, OKSMD and SHCSD's sewer collection systems are characterized as gravity systems. Sewage pumping stations are not required due to the topography in the service area. The HISMD collection system consists of approximately 2 miles of 6-inch vitrified clay and 27-inch-diameter pipe. The KSSMD collection system consists of approximately 0.5 mile of 6-inch vitrified clay pipe. The OKSMD collection system consists of approximately 1.5 miles of 6-inch vitrified clay and polyvinyl chloride pipe. The SHCSD collection system consists of approximately 0.5 mile of 8-inch vitrified clay pipe. Most of the collection systems have been constructed between the post World War II period and the present.

The main trunk sewer in the HISMD is a 27-inch-diameter sewer maintained by the City of San Carlos and located on Industrial Way. The sewer is roughly located in the center of the HISMD drainage area. The trunk sewer discharges to the City of San Carlos. The main trunk sewer in the KSSMD is a 6-inch-diameter sewer located on Upton Street. The main trunk sewer in the OKSMD is a 6-inch-diameter sewer located on Oak Knoll Drive. The trunk sewer discharges to Redwood City. The main trunk sewer in the SHCSD is an 8-inch-diameter sewer located on Brecon Court. The trunk sewer discharges to the City of San Carlos.

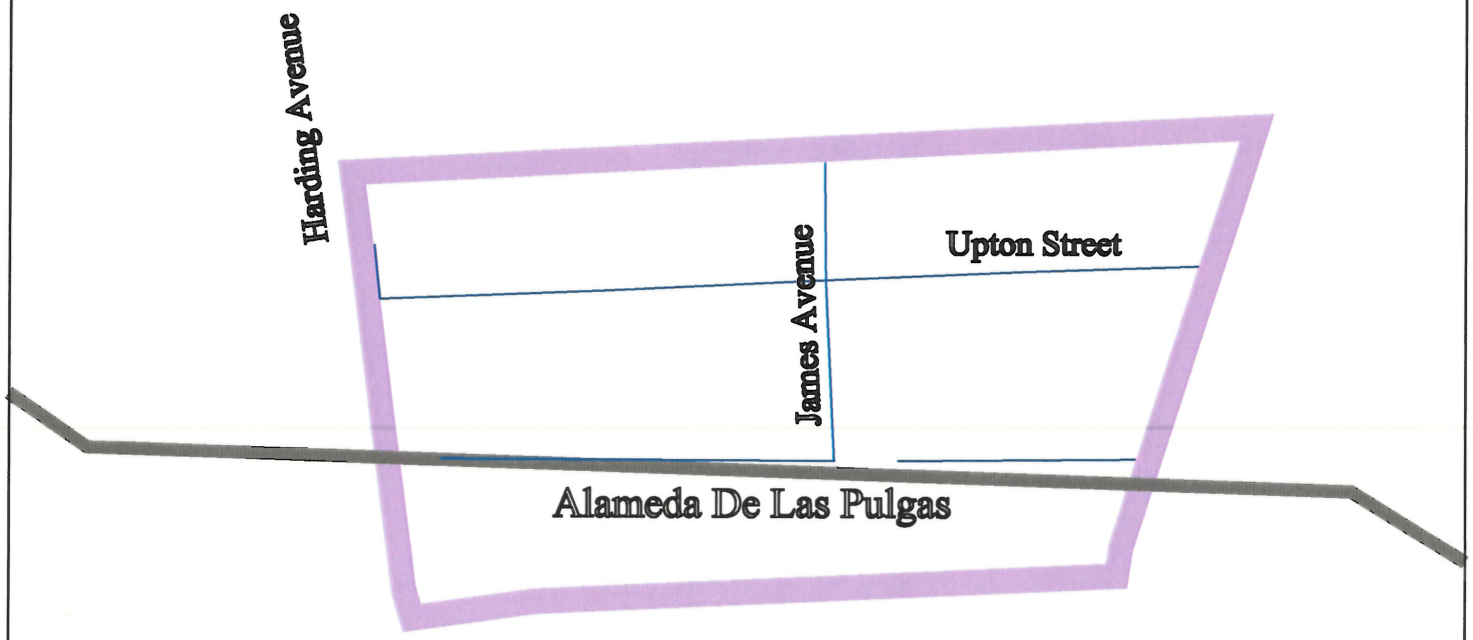
The District boundaries are shown on Figures 2-1a, 2-1b, 2-1c, and 2-1d, respectively.

Manhole Number System

A manhole numbering scheme was developed to aid in data management. The manhole numbering system consists of an eight-digit alphanumeric code. The first letter identifies the District within the County (O for OKSMD). The next four numbers identify the manhole within the OKSMD. A single letter code follows and is used for manholes with duplicate numbers (typically infill manholes constructed by the County). The last two numbers in the code describe the County map number.

Harbor Industrial Sewer Maintenance District
Existing Sewers
Figure 2-1a

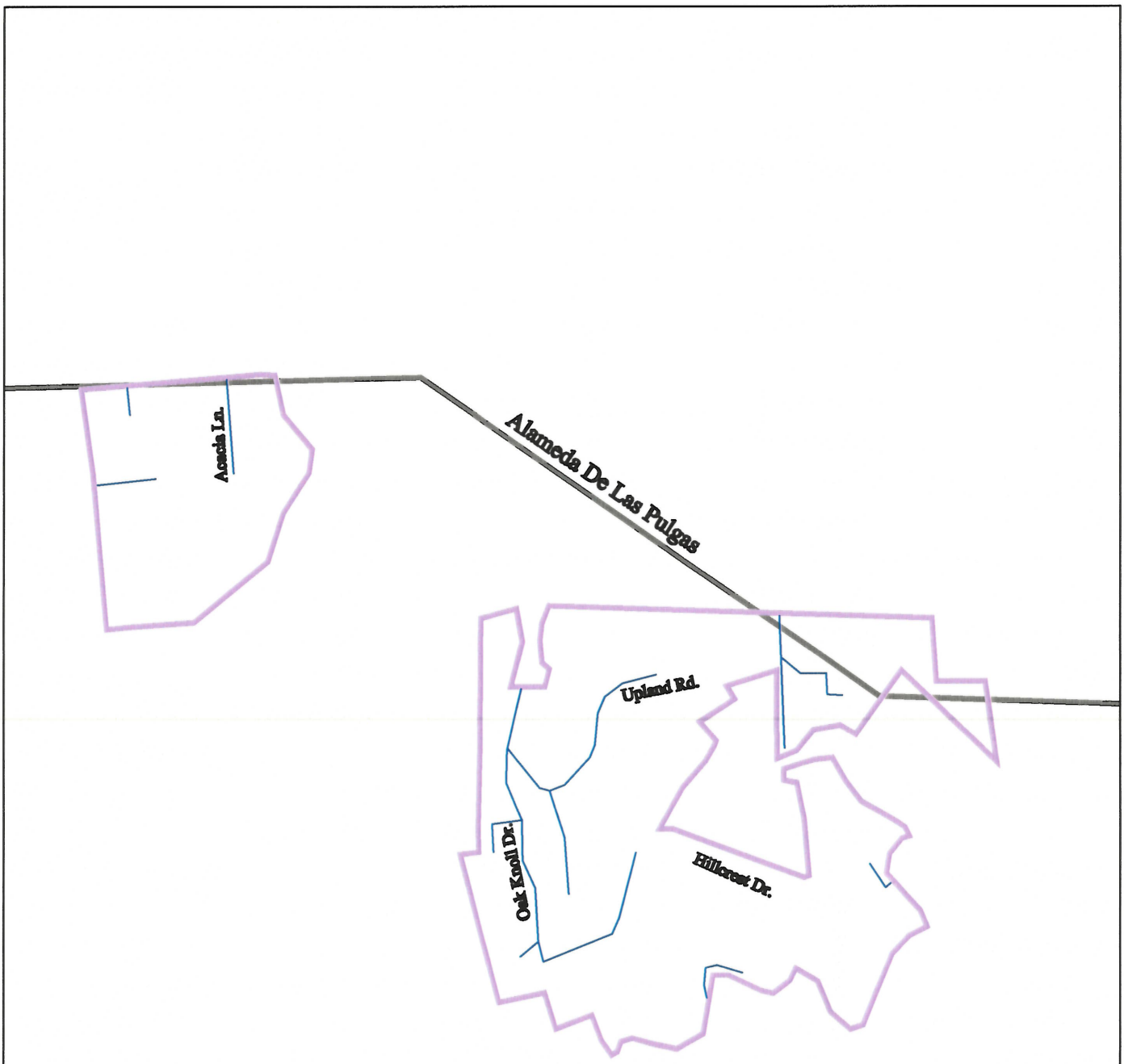
Note: All sewers are 6" in diameter unless otherwise noted.



Kensington Square Sewer Maintenance District
Existing Sewers
Figure 2-1b

Legend
Existing Sewers
Freeway/Major Road
District Boundary
N
GRAPHIC SCALE
350 0 175 350 700

Note: All sewers are 6" in diameter unless otherwise noted.



Legend

Existing Sewers

Freeway/Major Road

District Boundary

N

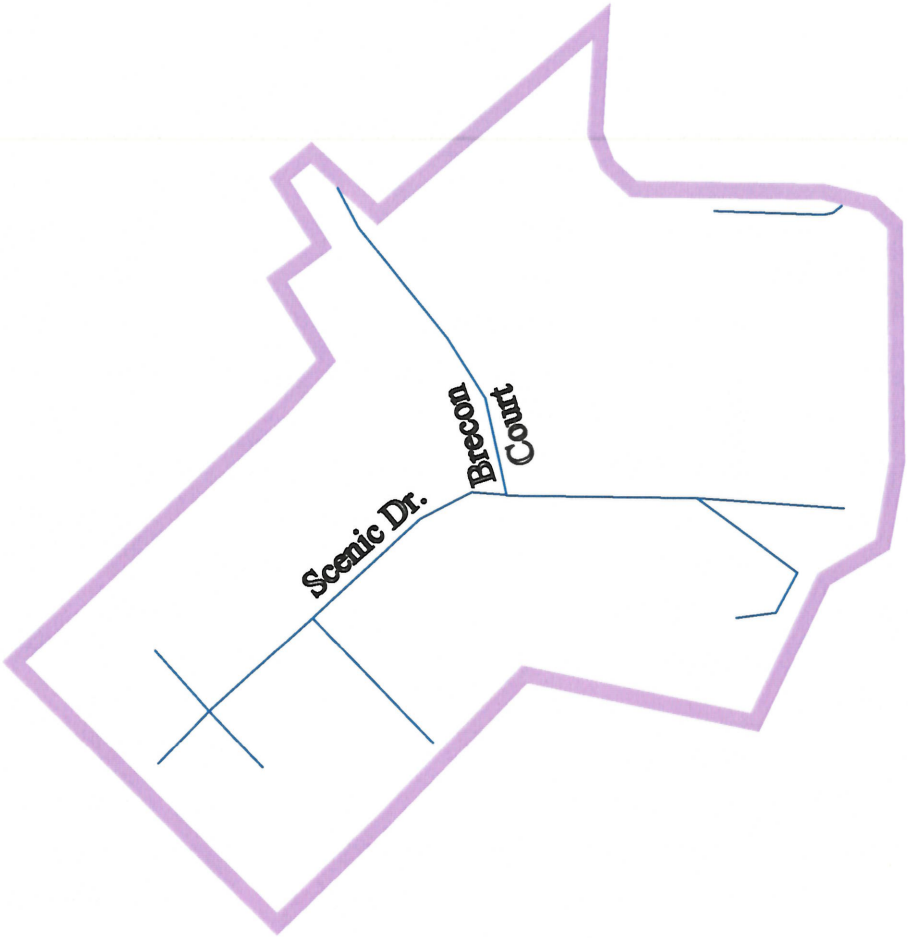
GRAPHIC SCALE

370 0 185 370 740

Oak Knoll Sewer Maintenance District
Existing Sewers
Figure 2-1c

Note: All modeled sewers are 6" in diameter unless otherwise indicated.

Alameda De Las Pulgas



Legend

Existing Sewers

Freeway/Major Road

District Boundary

N

GRAPHIC SCALE

100 0 50 100 200

Scenic Heights County Sanitation District
Existing Sewers
Figure 2-1d

Note: All modeled sewers are 8" in diameter unless otherwise indicated.

SECTION 3

SEWER OPERATION AND MAINTENANCE

Prior to beginning the physical inspection of the Harbor Industrial Sewer Maintenance District (HISMD), Kensington Square Sewer Maintenance District (KSSMD), Oak Knoll Sewer Maintenance District (OKSMD) and Scenic Heights County Sanitation District (SHCSD), the current operation and maintenance procedures were reviewed. This section documents the results of that review.

Known Problem Areas

Areas of known problems within the sewer collection system were identified through discussions with County personnel and review of the District's maintenance records. Problem areas were identified by line blockages from roots and grease accumulations or sewer sags. The collection systems are on a cleaning frequency of once per year minimum and can range up to four times per year based on collection system call outs. Problems associated with flat sewers are not found in the KSSMD, OKSMD and SHCSD due to the relatively steep topography in the service area. There are no known manholes or pipelines with hydrogen sulfide corrosion problems.

Several approaches are available for addressing sewer maintenance problems. Grease problems are addressed by controlling grease discharges from commercial establishments by requiring grease traps and having an enforcement program to ensure that they function properly. Grease can accumulate at sags, areas with flat slopes, roots, and offset joints in sewers. Grease problems in residential areas are addressed by increased maintenance (hydroflushing of the sewer to flush the grease accumulation downstream).

Root problems are typically addressed by using an undersized root cutter, typically a 4-inch-diameter cutter for a 6-inch sewer. The County maintenance crews prefer to use an undersized cutter to prevent damage to the pipeline. Roots can also be addressed by chemical foam application to kill the roots. Application and reapplication is typically required on a 1- to 3-year cycle. The County has recently started using chemical root treatment in the Burlingame Hills Sewer Maintenance District. Results of that program should be evaluated to determine if the method would be appropriate for the remaining Sewer Maintenance Districts in the County.

Accumulations of rocks and gravel in the sewer line can be an indicator of broken pipe in the system. Television inspection should be performed in these areas to look for pipes in bad condition. A listing of the maintenance "hot-spots" for sewer laterals in the system requiring callouts more than twice a year is provided in Table 3-1. Sewer mains requiring two or more callouts per year are summarized in Table 3-2. A description of the problem is also provided. This listing was used to develop the collection system physical inspection programs described in the following sections.

Table 3-1. Callout Summary for Sewer Laterals

Street number	Street name	Year	Reason for callout				
			Roots	Grease	Paper	Inspection	Comment
Harbor Industrial							
1303	Elmer St	1977				x	Permit 0078
120	Harbor Blvd	1980				x	Lateral OK
300	Harbor Blvd	1986				x	Lateral OK (Bldgs A & B)
425	Harbor Blvd	1979				xx	
604	Harbor Blvd	1988				xx	Needs box
405	Industrial Wy	1978				x	Permit 0144
1530	Industrial Wy	1994					No cleanout
1621	Old County Rd	1986				xx	Tie-in to main
1775	Old County Rd	1978				xx	
361	Quarry Rd	1995	x				No cleanout
641	Quarry Rd	1995					Permit 2475 & 2591
551	Taylor Wy	1987					No cleanout
585	Taylor Wy	1980				x	Permit 0261
Kensington Square							
417	Alameda de las Pulgas	1990	x				Lateral & main OK
431	Alameda de las Pulgas	1978	x				Lateral OK
509	Alameda de las Pulgas	1977	xx				
511	Alameda de las Pulgas	1991	x		x		
511	Alameda de las Pulgas	1992	x		x		
515	Alameda de las Pulgas	1987			x		Cleanout OK
403	Upton St	1993					No cleanout
504	Upton St	1977	xx				
506	Upton St	1979	x	x			
Oak Knoll							
407	Upland Rd	1987					No cleanout
858	Upland Rd	1984				x	Permit 0490
934	Hillcrest Dr	1987					Permit 1434
2110	Hillcrest Rd	1986				x	Permit 1223
Scenic Heights							
132	Brecon Ct	1988	xx				
275	Clifford Ave	1993			x		Permit 2393

Table 3-2. Callout Summary for Sewer Mains

Street number	Street name	Year	Reason for callout				
			Roots	Grease	Paper	Inspection	Comment
Harbor Industrial							
1500	Industrial Wy	1986				xx	Repair of sag & separation of wye
Kensington Square							
415	Alameda de las Pulgas	1975	x				
500	Upton St	1980	x				
Oak Knoll							
477	Upland Rd	1987					Main OK
846	Upland Rd	1985				x	
854	Upland Rd	1984					Main OK
3070	Oak Knoll Dr	1992	x				
3079	Oak Knoll Dr	1987					Main OK
	Don Ct	1996	x				
	Oak Knoll Dr	1990		x			Int. Hillcrest Dr
Scenic Heights							
1354	Edgewood Rd	1980					Main OK (2)

SECTION 4

MANHOLE INSPECTION

The manhole inspection program was conducted during the winter and spring of 1997. Field crews documented the condition of 22 manholes in the Harbor Industrial Sewer Maintenance District (HISMD), 17 manholes in the Oak Knoll Sewer Maintenance District (OKSMD), and 7 manholes in the Scenic Heights County Sanitation District (SHCSD). This section presents the results of the manhole inspection program.

Purpose and Objective

Manhole inspection was performed to evaluate manholes as potential infiltration/inflow (I/I) sources and document their physical condition. Additionally, the manhole inspection results were used to prioritize the smoke testing and television inspection programs. The manhole inspection program did not include all the manholes in the HISMD, KSSMD, OKSMD and SHCSD. Manholes were selected for inspection to provide a representative sample of the manholes in the HISMD, OKSMD and SHCSD.

During the inspection, the general condition of the manhole and incoming/outgoing pipelines was determined. Photographs of the incoming/outgoing pipelines were taken to determine their condition. The following conditions were documented during the inspection:

- Manhole bench/channel condition
- Roots in the manhole or pipeline
- Grease in the manhole or pipeline
- Manhole frame/cover condition
- Presence of I/I in the manhole or pipeline
- Major debris in the manhole or pipeline
- General physical condition of the pipeline.

Findings

The major manhole defects noted during the manhole inspection program are listed in Table 4-1. The major pipeline defects observed from the photographs are listed in Table 4-2. A technical memorandum, dated October 12, 1998, describing the manhole inspection in more detail is provided in Appendix A. Attachments A, B and C for the technical memorandum were provided in the original submittal. Manhole inspection forms and photographs are provided under separate cover in a series of three-ring binders.

Table 4-1. Manhole Defects

Defect type	District		
	Harbor Industrial	Oak Knoll	Scenic Heights
Bench/channel defects	9	4	1
Roots	1	1	0
Grease	14	10	6
Frame and cover problems	1	2	0
Active or signs of infiltration/inflow	5	0	0
Major debris in channel	6	3	7
Manholes inspected	22	17	7

Table 4-2. Pipeline Defects Noted from Manhole Inspection Program

Type of defect	District		
	Harbor Industrial	Oak Knoll	Scenic Heights
Pipes with separated joints greater than moderate and deflections greater than 1 inch	0	0	0
Pipes with greater than minor corrosion	0	0	0
Pipes with infiltration/inflow	2	0	0
Pipes with greater than light grease	6	0	0
Pipes with greater than light roots	1	5	0
Pipes with roots and grease	0	0	0
Pipes with cracks and fractures	0	2	0
Pipes with plugs and obstructions	6	1	1

SECTION 5

TELEVISION INSPECTION PROGRAM

The television inspection program was conducted during the winter of 1999. Field crews inspected approximately 600 linear feet of sewer lines in the Harbor Industrial Sewer Maintenance District (HISMD), 1,300 linear feet of sewer lines in the Kensington Square Sewer Maintenance District (KSSMD), 700 linear feet of sewer lines in the Oak Knoll Sewer Maintenance District (OKSMD), and 400 linear feet of sewer lines in the Scenic Heights County Sanitation District (SHCSD). This section presents the results of the television inspection program.

Purpose and Objective

The purpose of the television inspection program of mainline sewers was to observe and document the internal condition of the pipeline in reference to infiltration/inflow (I/I) and structural deterioration. Results of the television inspection were then used to develop capital improvement programs described in Section 11. The following conditions were observed and documented:

1. Structural Integrity— the number, type and extent of cracks and/or broken, crushed, shattered or collapsed pipe.

2. Root Intrusion— the amount and severity of the roots were documented.

3. I/I— the location of I/I sources were documented.

4. Protruding Laterals— a lateral's protrusion into the pipeline was estimated to judge if it will interfere with rehabilitation or routine maintenance.

5. Defective Lateral Connections— defective lateral connections such as broken pipe at the connections, broken saddles, cracks at the connections, pieces missing from the connection, and structural defects in the lateral were documented.

6. Offset or Open Joints— offset or open joints were visually estimated from the inspection to determine if they would require spot repairs prior to rehabilitation.

7. Pipe Sags— the extent of sags or misalignment was judged to help determine the structural integrity of the pipeline and their suitability for rehabilitation.

8. Corrosion— hydrogen sulfide corrosion of concrete sewers was identified and documented.

Television Inspection Results

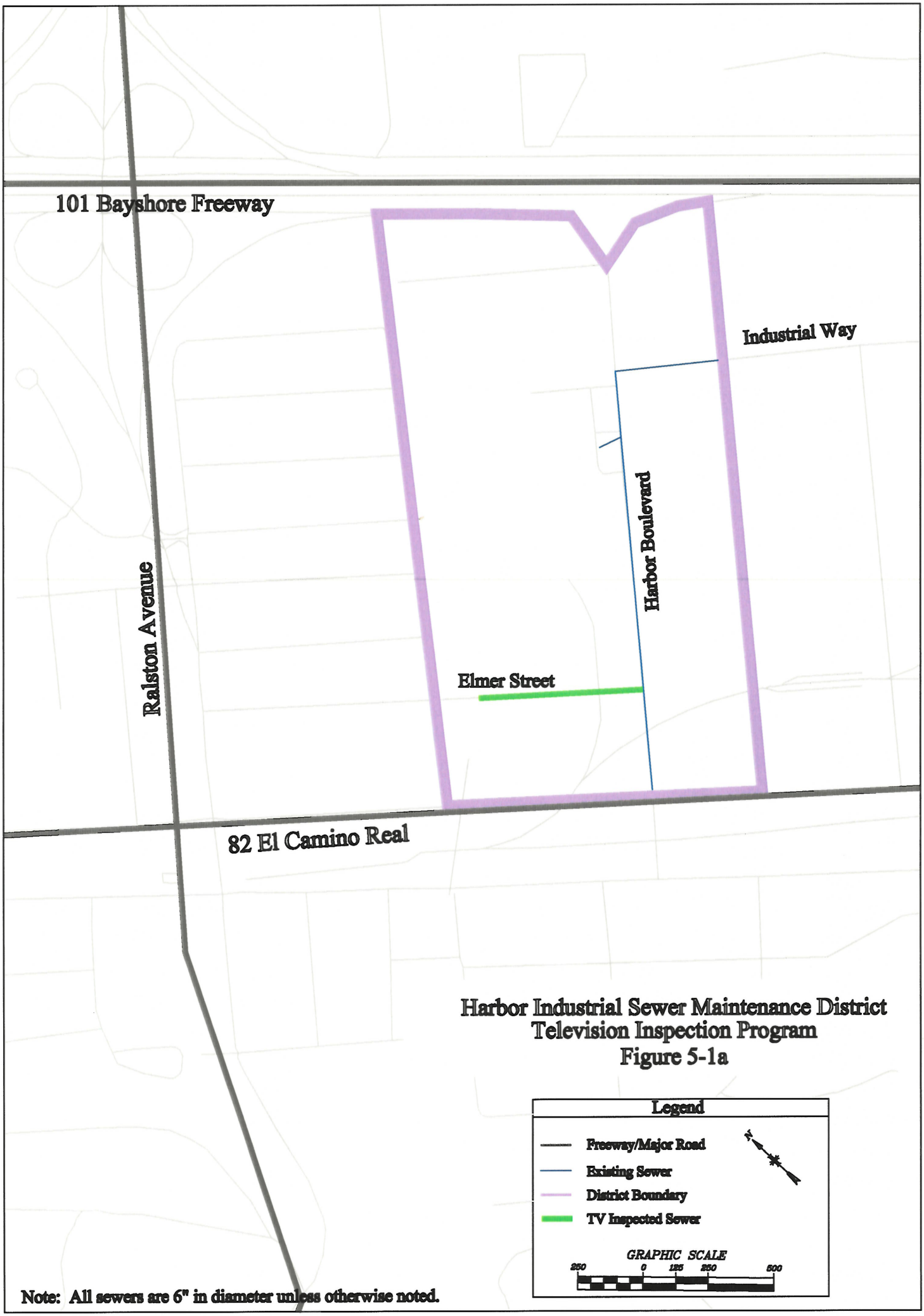
The areas scheduled for television inspection in the HISMD, KSSMD, OKSMD and SHCSD are shown on Figures 5-1a, 5-1b, 5-1c, and 5-1d, respectively. Sewers were selected for television inspection if they met one of the following four criteria:

- Excessive maintenance callouts
- Manhole inspection program noted a pipeline defect
- Special request from the County maintenance personnel
- A mainline defect was noted during the smoke testing program.

Sewers scheduled for television inspection were cleaned or flushed prior to inspection to allow for a better structural inspection. When a severe defect was encountered, the camera setup was reversed to attempt an inspection of the sewer whenever possible. Results of the television inspection program are summarized in Table 5-1. Complete results of the program are provided in Appendix B.

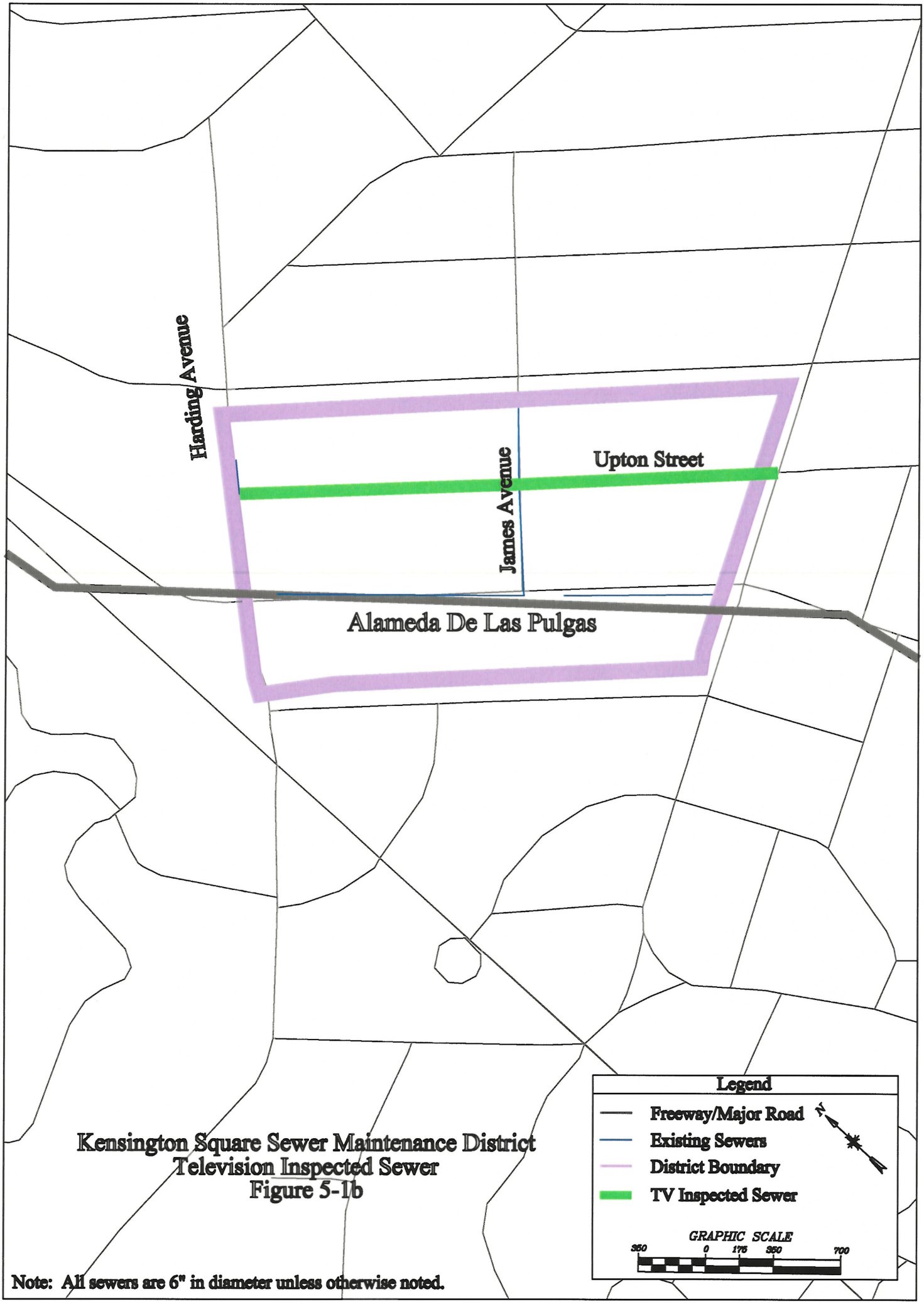
Table 5-1. Television Inspection Summary

Description	District			
	Harbor Industrial	Kensington Square	Oak Knoll	Scenic Heights
	Total	Total	Total	Total
Footage Attempted	636	1349	747	389
Footage Completed	636	1349	747	389
Cracks				
Radial	3	39	1	0
Longitudinal	0	0	0	0
Joints				
Minor Offset Joint	0	1	0	0
Major Offset Joint	0	0	0	0
Laterals				
Protruding Lateral	0	0	0	0
Defect at Connection	0	0	0	0
Dead Connection	4	41	0	1
Roots				
Roots at Joint	3	6	3	3
Roots at Lateral	0	4	0	2
Infiltration/Inflow				
At Joint	0	0	0	0
At Crack	0	0	0	0
At Roots	0	0	0	0
At Inside Lateral	0	0	0	0
At Lateral Connection	0	0	0	0
At Inside Lateral and at Connection	0	0	0	0
Alignment				
Sag in Line	5	8	0	0
Pipe Out of Round	0	0	0	0
Structural				
Piece Missing	1	5	0	0
Shattered/Broken	0	0	0	0
Crushed or Collapsed	0	0	1	0
Mineral Stains				
At Joint	0	0	0	0
At Cracks	0	0	0	0
Sulfide Corrosion				
Minor	0	0	0	0
Severe	0	0	0	0
Tap Connection	15	90	9	9



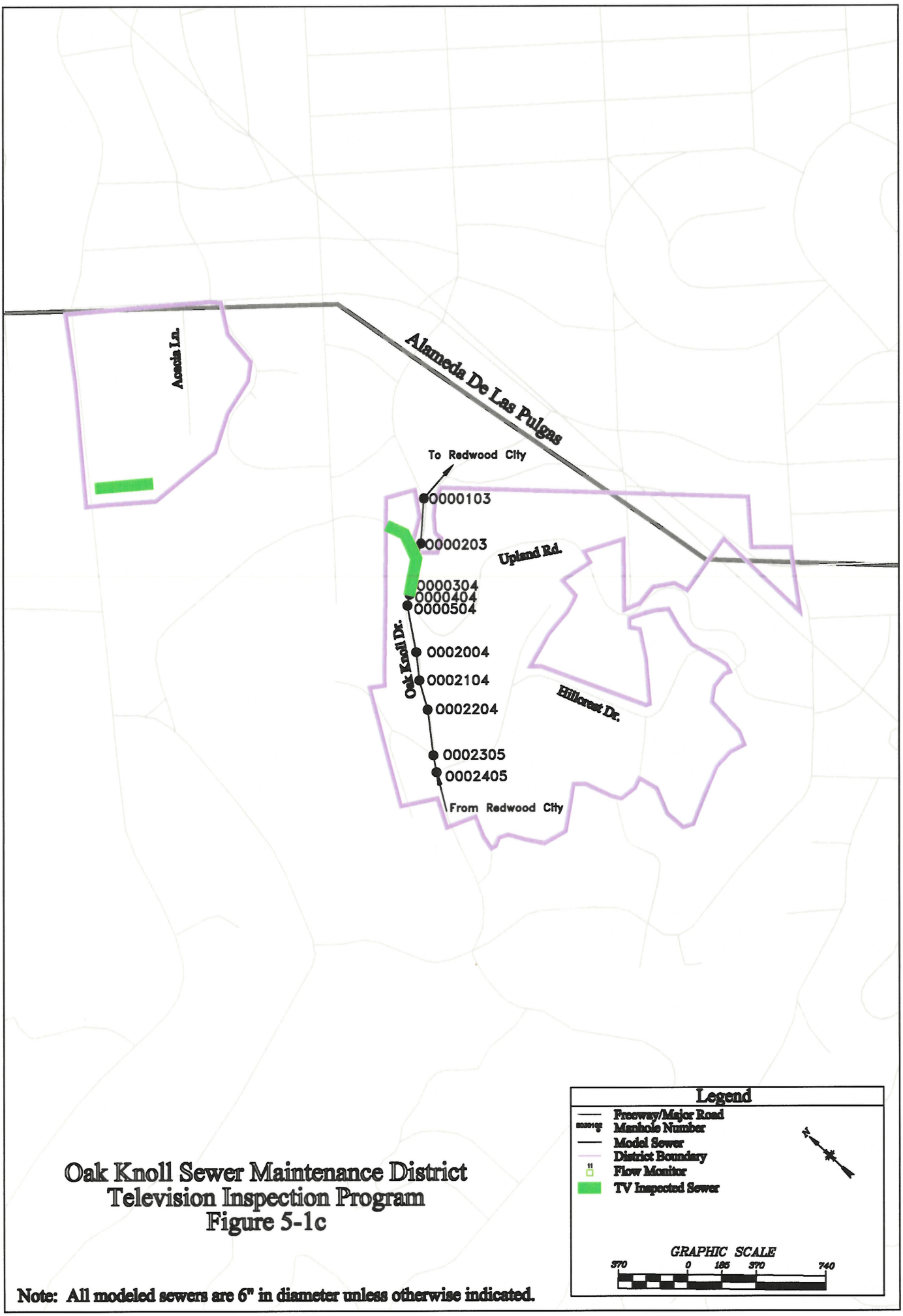
Harbor Industrial Sewer Maintenance District
Television Inspection Program
Figure 5-1a

Note: All sewers are 6" in diameter unless otherwise noted.



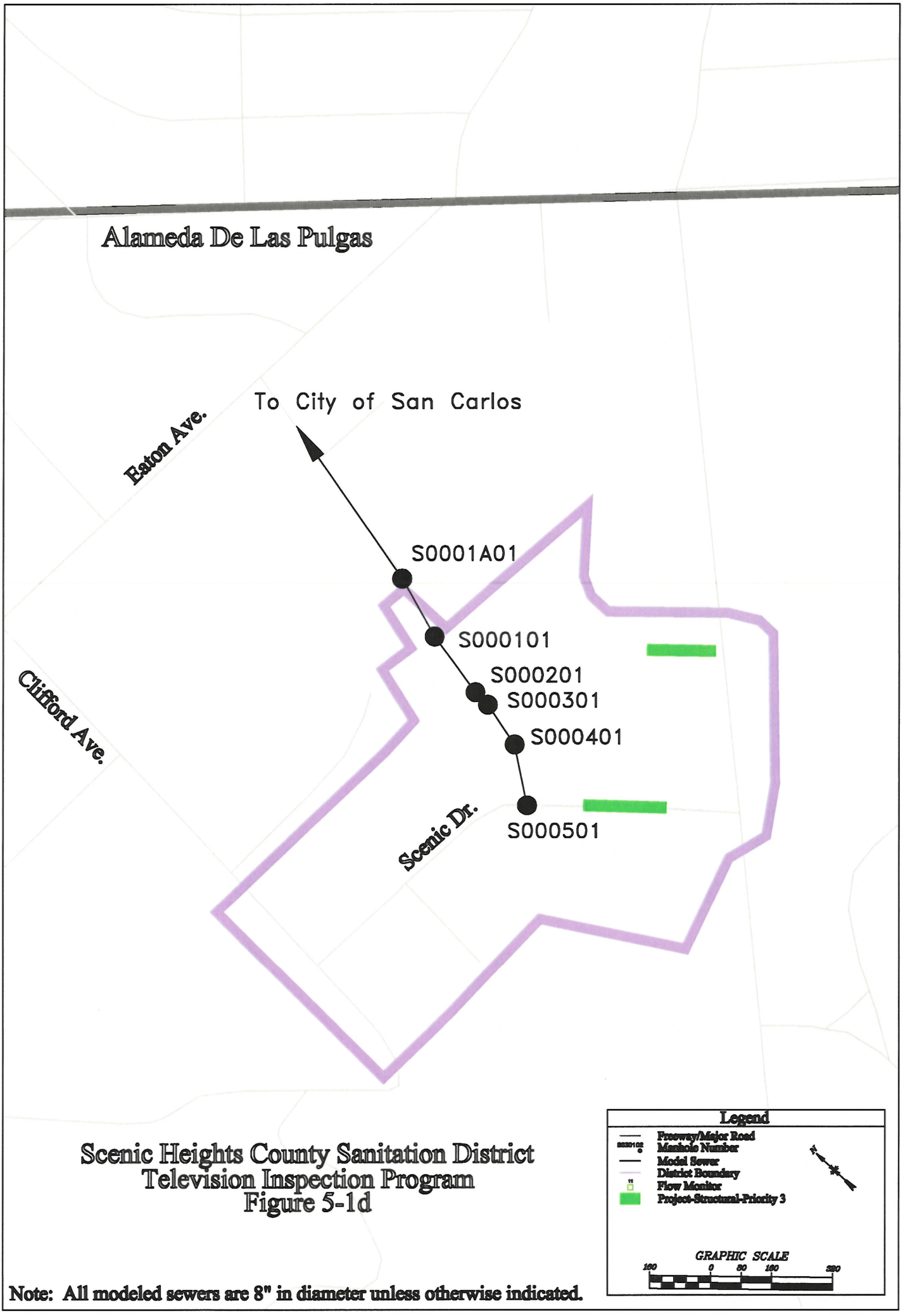
Kensington Square Sewer Maintenance District
Television Inspected Sewer
Figure 5-1b

Note: All sewers are 6" in diameter unless otherwise noted.



Oak Knoll Sewer Maintenance District
Television Inspection Program
Figure 5-1c

Note: All modeled sewers are 6" in diameter unless otherwise indicated.



Scenic Heights County Sanitation District
Television Inspection Program
Figure 5-1d

Note: All modeled sewers are 8" in diameter unless otherwise indicated.

SECTION 6

BASE SANITARY FLOWS

Base sanitary flow rates are used with wet weather flow rates and the hydraulic model to determine the amount of available capacity in the collection system. Wet weather flow rates and the hydraulic modeling are discussed in subsequent sections of the report. This section describes the methodology used to develop base sanitary flow rates for the Harbor Industrial Sewer Maintenance District (HISMD), Kensington Square Sewer Maintenance District (KSSMD), Oak Knoll Sewer Maintenance District (OKSMD) and Scenic Heights County Sanitation District (SHCSD).

Dry Weather Flow

BSF is wastewater contributed by residential, commercial, industrial and public users. Base flow is directly related to land use and varies throughout the day and between weekdays and weekends. BSF from residential areas has a typical diurnal pattern with peak flows occurring in the morning after 7:00 a.m. and a second smaller peak occurring in the evening.

BSF flow contributions to the hydraulic model are based on the number of parcels in the District and a unit flow rate of 220 gallons per day per parcel. A peaking factor of 3.5 was used to develop the design flow for each District. The technical memorandum describing the flow projections and hydraulic modeling in more detail is provided in Appendix C.

Groundwater infiltration (GWI) occurs when groundwater levels are above the sewer pipes and the pipes have defects that allow infiltration. Some groundwater infiltration is undoubtedly included in the BSF rates. However, extensive review of accurate water use data in each District would be needed to determine the amount of groundwater infiltration in each area. Based on our review of the flow monitoring, GWI is not a significant factor in the total wastewater flow in San Mateo County.

BSF projections were not prepared for future land use conditions. Land use planners for the County and affected City agencies indicated that growth or significant infilling were not expected in the future.

SECTION 7

INFLOW/INFILTRATION RATES

Inflow/infiltration (I/I) rates are used in conjunction with base sanitary flow (BSF) rates (established in Section 6) and the hydraulic model to determine the amount of available capacity in the collection system. This section describes the methodology used to develop I/I rates for the Harbor Industrial Sewer Maintenance District (HISMD), Kensington Square Sewer Maintenance District (KSSMD), Oak Knoll Sewer Maintenance District (OKSMD), and Scenic Heights County Sanitation District (SHCSD).

Wet Weather Flow

I/I consists of direct inflow of storm water runoff and rainfall-induced infiltration of stormwater percolating through the soil into the collection system. Inflow occurs when stormwater enters the collection system through illegally connected catch basins, area drains or home roof gutter downspouts, or through manhole covers of cleanout lids. Inflow can become severe if surface flooding occurs and manholes and cleanouts are submerged or used to drain low-lying areas.

I/I accounts for the large increase in peak flows that occur during rainfall events. In areas with older sewers, I/I is typically the largest component of the total wastewater flow. Due to the lack of flow monitoring data, a conservative I/I rate of 2,400 gallons per acre per day was used in the modeling. This rate is used by the Central Contra Costa Sanitation District and is the most conservative rate in use in the Bay Area.

SECTION 8

HYDRAULIC MODEL DESCRIPTION

Hydraulic models were prepared of the Harbor Industrial Sewer Maintenance District (HISMD), Kensington Square Sewer Maintenance District (KSSMD), Oak Knoll Sewer Maintenance District (OKSMD), and Scenic Heights County Sanitation District (SHCSD) wastewater collection system trunk sewers. The models were used to evaluate the capacity of the pipelines to carry existing peak wet weather flows. This section presents a description of the model and the model development.

Computer Model

Major trunk sewers in each of the sewer Districts were modeled to determine where capacity deficiencies exist. The HYDRA model developed by PIZER, Inc., was used to simulate wastewater flows in the each of the OKSMD and SHCSD collection systems. HYDRA routes flow hydrographs (developed in Section 7) through the collection system and accounts for the time delays of peak flow from various tributary areas as the flows move downstream. A spreadsheet model was used to evaluate the capacity of the smaller HISMD and KSSMD collection systems.

For the OKSMD, the Oak Knoll Drive trunk sewer was modeled using HYDRA. This trunk sewer is composed of 6-inch-diameter gravity sewers. For the SHCSD, the Brecon Court trunk sewer was modeled using HYDRA. This trunk sewer is composed of 8-inch-diameter gravity sewers.

Most of the pipeline data used in the model was taken from the existing County collection system maps. Pipeline data required by the model includes upstream and downstream inverts and pipeline length and diameter. Surveying was completed to fill in gaps in the data or questionable data.

Modeled flow is compared to the theoretical capacity of each pipe segment. The capacity of each pipeline is a function of the pipeline slope and diameter. If capacity deficiencies were detected, then the program was used to size the appropriate relief and/or replacement sewer size. The technical memorandum describing the flow development and modeling is provided in Appendix C.

SECTION 9

MODEL RESULTS

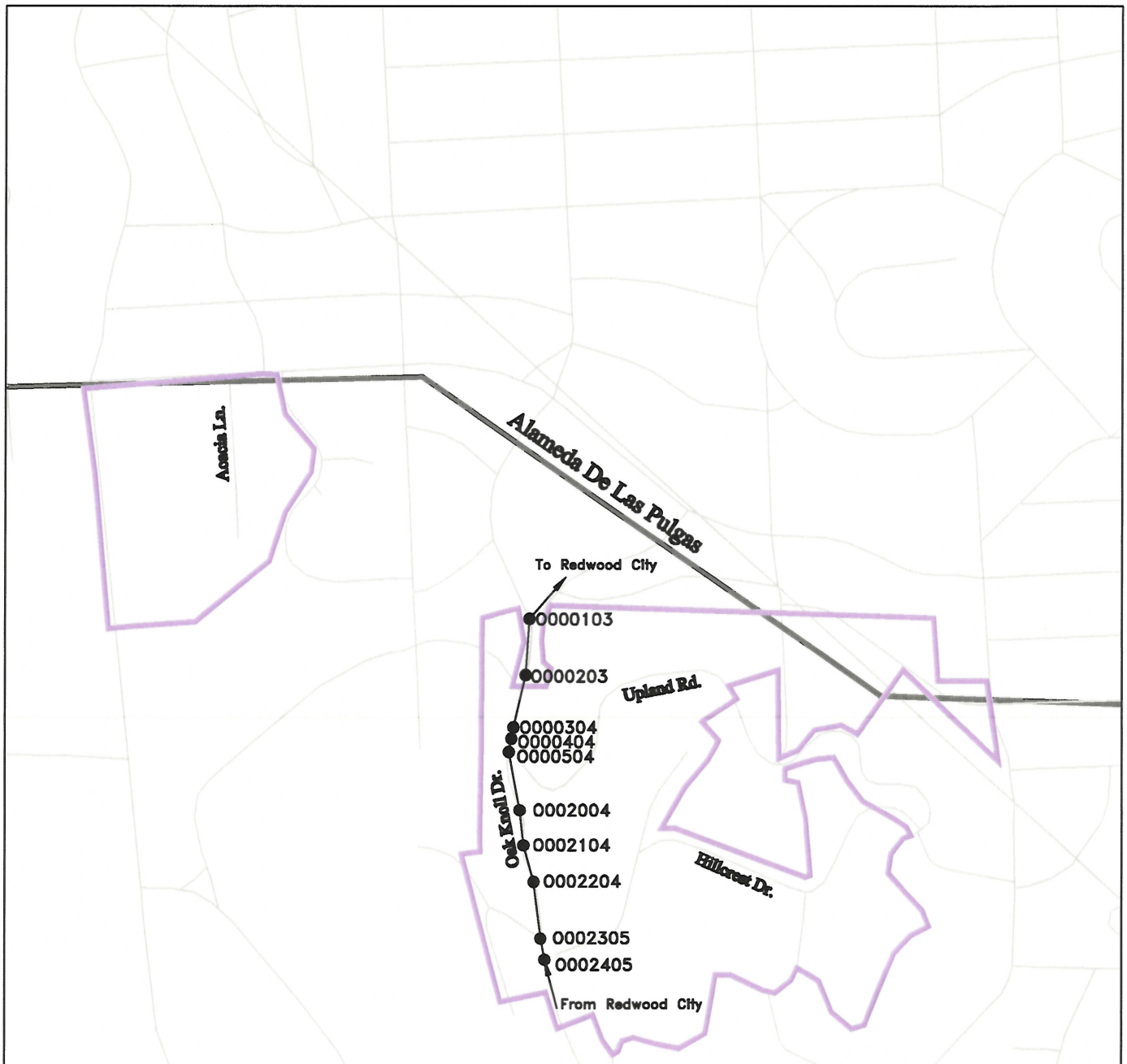
An evaluation of the pipeline capacities was performed using the flows developed in Sections 6 and 7 and the hydraulic model described in Section 8. This section describes the results of the capacity evaluation developed for the Harbor Industrial Sewer Maintenance District (HISMD), Kensington Square Sewer Maintenance District (KSSMD), Oak Knoll Sewer Maintenance District (OKSMD), and Scenic Heights County Sanitation District (SHCSD).

Capacity Analysis

The capacity of the existing system was evaluated using peak wet weather flows. This flow condition is generated by existing development in the service area (Section 6) under design storm conditions (Section 7).

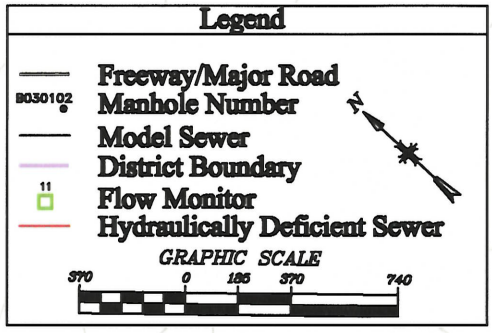
The model routes the flow through the pipe network, calculates the capacities of the pipes, and compares the routed flows to the pipe capacities to identify inadequate pipes. The pipe capacity calculations are based on a Manning's roughness coefficient of 0.013. Pipes were defined to be hydraulically inadequate if the depth of flow is 100 percent or greater of the pipe diameter. The model sized relief and replacement sewer sizes for all inadequate sewers.

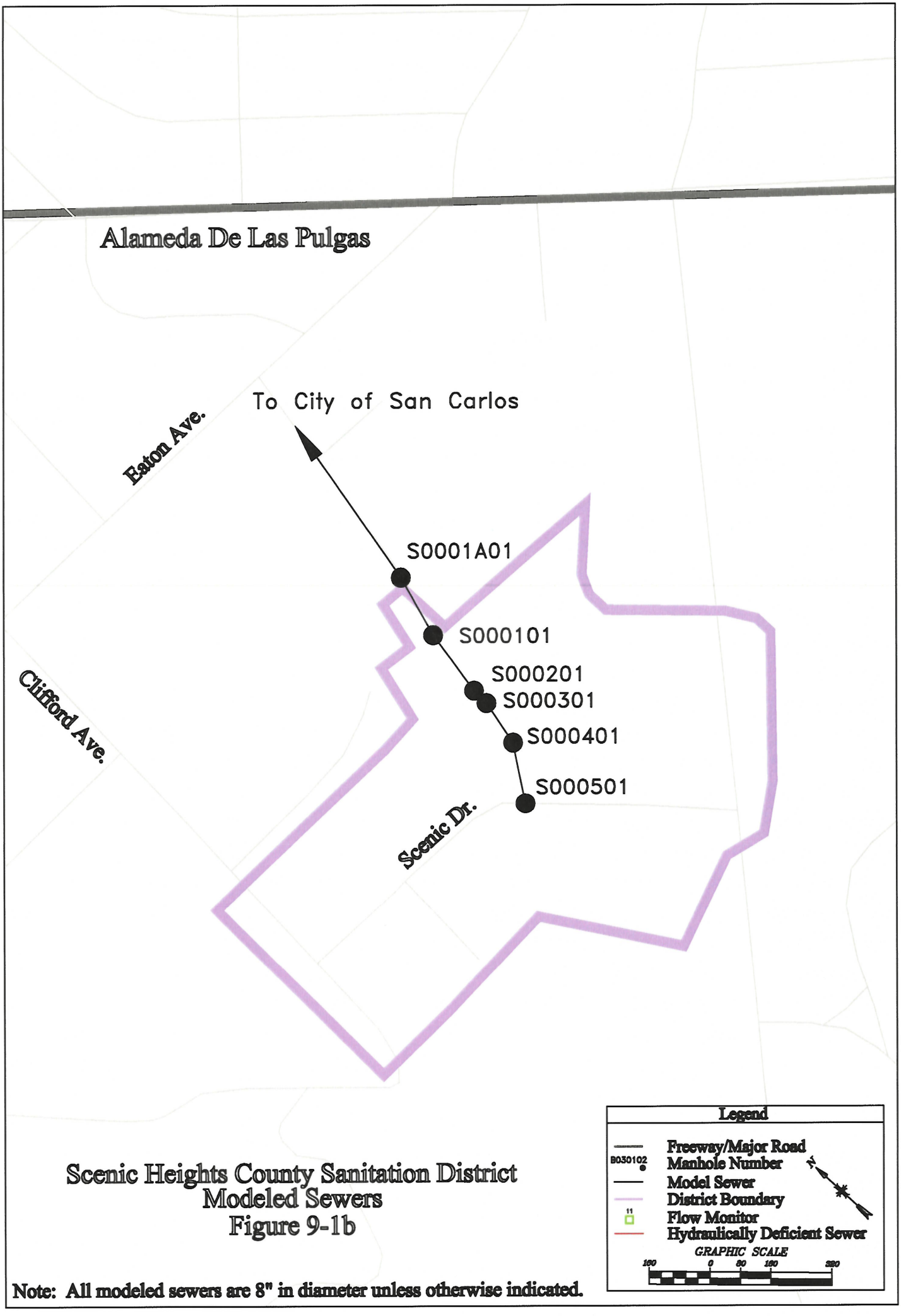
The results of the model indicate sufficient capacity to convey peak wet weather flow without surcharging. The modeled sewers in OKSMD are shown on Figure 9-1a. Modeled sewers in SHCSD are shown on Figure 9-1b. The technical memorandum describing the flow development and modeling is provided in Appendix C. Additionally, the complete HYDRA modeling results are provided in Appendix C.



Oak Knoll Sewer Maintenance District
Modeled Sewers
Figure 9-1a

Note: All modeled sewers are 6" in diameter unless otherwise indicated.





Scenic Heights County Sanitation District
Modeled Sewers
Figure 9-1b

Note: All modeled sewers are 8" in diameter unless otherwise indicated.

SECTION 10

UNIT COSTS

This section presents the basis for the estimated unit costs that were developed for estimating the construction costs and the capital costs of recommended capital improvements. The cost index and the development of the capital costs of gravity sewer pipeline construction and rehabilitation are presented.

Capital Costs

The total capital investment necessary to complete a project consists of expenditures for construction, engineering services, contingencies, and such overhead items as legal and administrative services and financing. The various components of capital costs are described below. Unit construction costs were developed for the following construction and rehabilitation methods:

- Remove and Replace— recommended for pipelines with serious structural or hydraulic capacity deficiencies where trenchless construction is typically more expensive or not practical.
- Sliplining— recommended for pipelines with minor structural deficiencies or root intrusion and minimal sags.
- Pipe Bursting— recommended method for increasing capacity of structurally deficient 6-inch-diameter lines to 8-inch-diameter lines and provides minimal disruption to the community.
- Chemical Root Treatment— recommended for lines with root intrusion.
- Do Nothing— no capital project is recommended for lines with minor structural deficiencies and light root intrusion. For this option, television re-inspection in a maximum of 10 years is recommended.
- Increase O & M— recommended for lines with minor root intrusion and grease buildup.
- Spot Repair— recommended for lines with severe defects that create maintenance problems or where required prior to implementing other rehabilitation methods.

Cost Index. A good indicator of changes over time in construction costs is the Engineering News Record (ENR) 20-city Construction Cost Index (CCI), which is computed from prices of construction materials and labor, and based on a value of 100 in 1913. Cost data in this report are based on an ENR CCI of 6000, representing costs in March 1999.

Construction Costs. Construction costs presented in the master plan represent preliminary cost estimates of the materials, labor and services necessary to build the proposed projects. The cost estimates are prepared to be indicative of the cost of construction in the study area. In considering cost estimates, it is important to realize that changes during final design, as well as future changes in

the cost of material, labor and equipment, will cause comparable changes in the estimated costs. Unit costs used in this study were obtained from a review of pertinent sources of reliable construction cost information. Construction cost data given in this report are not intended to represent the lowest prices that can be achieved for each type of work, but rather are intended to represent planning-level estimates for budgeting purposes. The following assumptions were made in the development of the unit costs:

- Remove and Replace— Costs include excavation, backfill, compaction, haul off and asphalt repair. Material costs for 8-inch- to 21-inch-diameter sewers are for PVC or VCP. Material costs for 24-inch-diameter or larger sewers are for RCP. Replacement costs for 6-inch-diameter lines include cost for 8-inch-diameter replacement materials. The costs have been developed based on average trench depth not exceeding 15 feet.
- Sliplining— Costs include the use of HDPE as the liner material, construction of access pits and an average service lateral reconnection fee. Sewage bypass pumping is only needed on a localized basis and, therefore, is not included in the costs.
- Pipe Bursting— Costs include the use of HDPE as the liner material, construction of access pits and an average service lateral reconnection fee. Costs include the bypassing of sewage.
- Chemical Root Treatment— Costs include application and removal with hydroflush equipment. Costs also include reapplication every 2 years.
- Do nothing— Costs for this option are for television re-inspection in 10 years at a rate of $1.50/foot for the data collection and data review.
- Spot Repair— A cost of $800 has been included in the estimates for each spot repair occurrence.

Table 10-1 presents the unit construction costs for construction and rehabilitation of gravity sewer pipelines.

Contingencies, Engineering, and Overhead

Construction contingencies, engineering and overhead are assumed to be 40 percent of the construction cost. It is appropriate to allow for the uncertainties unavoidably associated with planning-level layout of projects. Such factors as unexpected geotechnical conditions, extraordinary utility relocation and alignment changes are a few of the items that can increase project cost for which it is wise to make allowance in preliminary estimates.

Engineering services associated with projects include preliminary investigations and reports, site and route surveys, geotechnical explorations, preparation of drawings and specifications, construction services, surveying and staking, and sampling and testing of materials. Overhead charges cover such items as legal fees, financing expenses, administrative costs, and interest during construction.

Table 10-1. Gravity Sewer Pipe Unit Construction Costs

Pipe diameter, inches	Relief and replacement sewer cost, $/foot	Sliplining, $/foot	Root treatment, $/foot	Pipe bursting, l.f.
6	85	n/a	3	90
8	85	55	3	90
10	100	70	4	115
12	110	90	5	145
15	120	110	6	175
18	140	N/A	N/A	N/A
21	180	N/A	N/A	N/A
24	195	N/A	N/A	N/A
27	220	N/A	N/A	N/A
30	230	N/A	N/A	N/A
33	255	N/A	N/A	N/A
36	285	N/A	N/A	N/A
42	305	N/A	N/A	N/A
48	355	N/A	N/A	N/A

Other Costs:

$800/spot repair

Reinspect in 10 years = $1.50/foot

SECTION 11

CAPITAL IMPROVEMENT PROGRAM

Capital improvement program (CIP) projects in the Harbor Industrial Sewer Maintenance District (HISMD), Kensington Square Sewer Maintenance District (KSSMD), Oak Knoll Sewer Maintenance District (OKSMD), and Scenic Heights County Sanitation District (SHCSD) are necessary to correct identified hydraulic and structural deficiencies. This section presents the recommended improvement for correcting the structural problems identified in Section 5.

Capital Projects

A total of five capital improvement projects were developed for the HISMD, KSSMD, OKSMD and SHCSD. All five of the projects are required to correct structural deficiencies that create increased maintenance costs or where the sewer is deteriorated to the point where failure may occur in the near future. Alternatives have been developed for the following projects in the Districts:

Harbor Industrial Sewer Maintenance District
1. Elmer Street

Kensington Square Sewer Maintenance District
1. Upton Street

Oak Knoll Sewer Maintenance District
1. Don Court
2. Moloney Court

Scenic Heights County Sanitation District
1. Scenic Drive

A priority ranking of 1 to 3 was applied to each of the projects to aid in the scheduling of the recommended CIP projects. The ranking was done according to the following:

- Priority 1—Required to correct hydraulic deficiencies. The only mitigation alternative available for this option is construction of relief or replacement sewers.
- Priority 2—Sewer lines with excessive maintenance requirements. Improvements to Priority 2 lines are required to prevent dry weather overflows that may be associated with blockages created by roots or other structural problems.
- Priority 3—Sewer lines with minor to major structural deficiencies. Corrective action may or may not be required on these lines depending on the severity of defects.

Table 11-1 presents the recommended projects, priority rating and minimum and maximum mitigation construction costs. The recommended projects for HISMD are shown on Figure 11-1a, recommended projects for KSSMD are shown on Figure 11-1b, recommended projects for

OKSMD are shown on Figure 11-1c, and recommended projects for SHCSD are shown on Figure 11-1d. A project summary sheet is provided for each project in Appendix D. The summary sheet describes the project location, description of the deficiency, the three corrective alternatives, estimated construction costs for each alternative and any specific project concerns (i.e., easement work, coordination with neighboring cities, etc.).

Table 11-1. Recommend Capital Improvement Program

Project description	Priority	Minimum construction cost, dollars	Maximum construction cost, dollars
Harbor Industrial Project Summary			
Elmer Street	3	49,300	55,400
Totals		49,300	55,400
Kensington Square Project Summary			
Upton Street	3	114,900	136,600
Totals		114,900	136,600
Oak Knoll Project Summary			
Don Court	3	35,900	43,000
Moloney Court	3	26,400	29,800
Totals		62,300	72,800
Scenic Heights Project Summary			
Scenic Drive	3	28,400	33,700
Totals		28,400	33,700

Estimated construction costs for the projects range from $26,400 to $136,600 depending on the selected alternative.

Operation and Maintenance Program

A crucial part of the successful ongoing performance of the collection system is the operation and maintenance (O&M) program used by the agency. Current maintenance guidelines for the collection system are to clean all sewers in easements annually, and all sewers in roadways every 6 months. In addition, some sewers are cleaned more frequently where they have been identified as being prone to blockages. The purpose of this section is to provide an overview of an O&M approach for the District. It is beyond the scope of work for this project to develop a reach-by-reach O&M program for the District.

County staff provided a long-term history of emergency call outs to respond to potential spills and blockages. Analysis of these data confirmed that some portions of the system require more frequent cleaning than other segments, which is typical of all collection systems. Also, typical cleaning practice is to clean enough material from the pipe to keep the flow moving, rather than completely clean the pipe. An example of this practice is the use of a 4-inch root cutter head to open the flow

on the 6-inch-diameter sewer. This cleaning method provides only 44 percent of the available pipe cross-sectional area to convey sewer flows. Cleaning to the full diameter of the sewer (use of a 6-inch root cutter in a 6-inch sewer, etc.) and removing the debris from the immediate downstream manhole, while more time-consuming, will provide the maximum available sewer system capacity without pipe replacement. The priority of the field crew should be placed on providing a clean sewer rather than the more typical production rate performance criteria.

Overall collection system maintenance should be on a regular schedule that balances the need to provide maximum available sewer capacity with the cost of maintenance. Typical cleaning frequencies in other agencies in the Bay Area range from once every 6 to 10 years, with segments of sewer cleaned more frequently (up to monthly) where needed. Adopting a program with a fixed cleaning frequency should be instituted for the District. The County has maintenance management software that is capable of establishing schedules for the maintenance crews. Initial cleaning frequencies should be extended to once every 2 years (except for known trouble spots) and then to longer return periods as the condition of the collection system relative to debris, grease, and roots build up is determined throughout the collection system. Known trouble spots that require more frequent maintenance should be placed on a 2-month cleaning schedule or more frequent if warranted and tracked to determine whether the cleaning frequency can be increased.

Establishing a cleaning program that relies on continuous schedule/frequency refinement will provide the District with an optimum cleaning program that provides a high level of service and reliability to the community. An added benefit to a responsive cleaning program is the ability of the maintenance crews to shift their focus to accommodate changes in the collection system as changes occur.

When the cleaning of the collection system is performed by a maintenance crew that has other assigned duties in addition to O&M on the collection system, it becomes very important to prioritize, with justification, the time requirements of the maintenance crews. Other collection system activities, such as spot repairs, main line rehabilitation, manhole rehabilitation/ reconstruction, and lateral rehabilitation could all be added to the duties of the maintenance crew. The impact of this type of increased workload would likely require the maintenance crews to become completely assigned to collection system O&M. This approach would allow the County to maintain the structural integrity of the collection system with a minimum amount of outside construction contracting. Larger projects where several sewers are rehabilitated at the same time should be constructed with a contractor that specializes in the rehabilitation method being used for that portion of the collection system.

The upcoming EPA regulations on sanitary sewer overflows (SSO) will likely require that each district within the County apply for and secure a National Pollutant Discharge Elimination System (NPDES) permit for the operation of the collection system. One of the key aspects proposed for the SSO regulations is the tracking and elimination of dry weather overflows. The SSO regulations will likely allow for limited overflows to occur that are related to acts of nature (severe wet weather events) and for acts of vandalism (illegal dumping of debris into a manhole). It will not allow for repeat overflow locations and will require a database/geographic information system to track the O&M and the performance of the collection system.

The mission of proactive collection system maintenance is to provide the longest possible life to the sewers without having to replace them with costly construction projects. The primary goal of providing the maximum capacity of the existing collection system network is what the maintenance program should achieve. Unfortunately, an aggressive O&M program will not have any effect on the amount of I/I that enters the collection system as the repairs that are completed by the maintenance crews are selective, structurally oriented, and spread over the entire collection system, rather than a comprehensive focused rehabilitation program.

Other Collection System Options

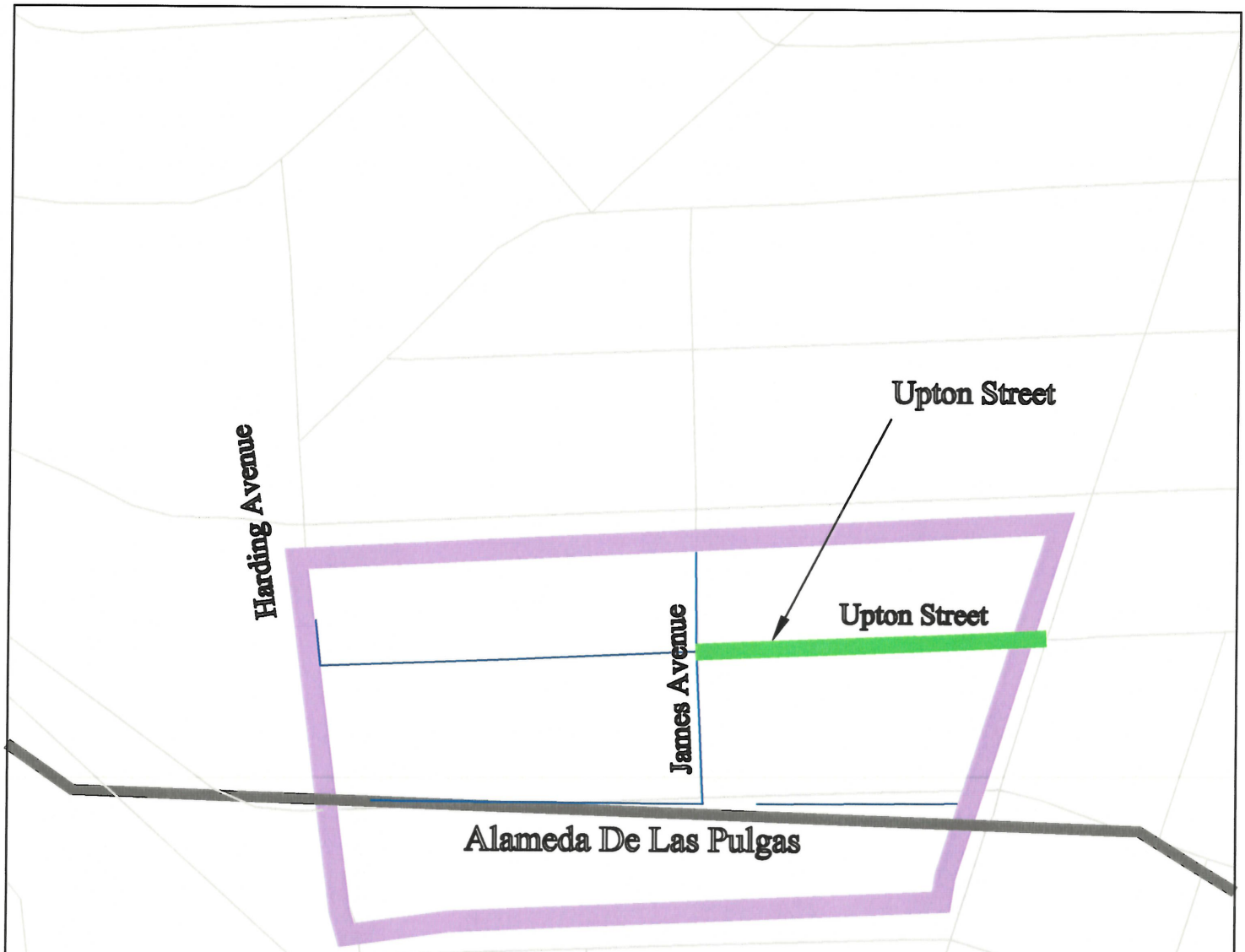
The County could consider the impacts/benefits of other collection system options, in addition to construction and modifications of the O&M program recommendations made from this study. Two main options are presented below:

1. Require lateral inspection testing and repair as a condition of ownership transfer of a sewered parcel. The benefit is that the new property owner will acquire the property with a sound sewer lateral and the County will, over a long time period, have the sewer lateral located on the private property rehabilitated at no direct cost to the County. Statistically, home ownership changes an average of every 7 to 10 years. A downside to this approach is that many properties do not change ownership in this time frame and consequently the County will end up with a mix of tested and untested laterals within a neighborhood, thereby limiting the effectiveness of the rehabilitation for reducing the I/I contribution to PWWF. This type of inspection has been implemented in several communities in California and in all cases meet with considerable political resistance for impacted jurisdictions and the local real estate organizations. Where implemented, the program is now considered a minor cost of doing business within the community.

2. Begin a long-term sewer replacement program of the collection system. At this time, the cost of a cyclic replacement program based on the design life of the collection system is both impractical and cost prohibitive. The cost comparison of providing system capacity versus total system rehabilitation (see Section 10) to reduce I/I contribution demonstrates the economic burden on the rate payer. A key benefit of a scheduled cyclic replacement program would be establishing a reasonable expected cap to I/I related flows by establishing a schedule of replacement combined with ongoing O&M to effectively limit the amount of I/I entering the collection system.

Harbor Industrial Sewer Maintenance District
Recommended Projects
Figure 11-1a

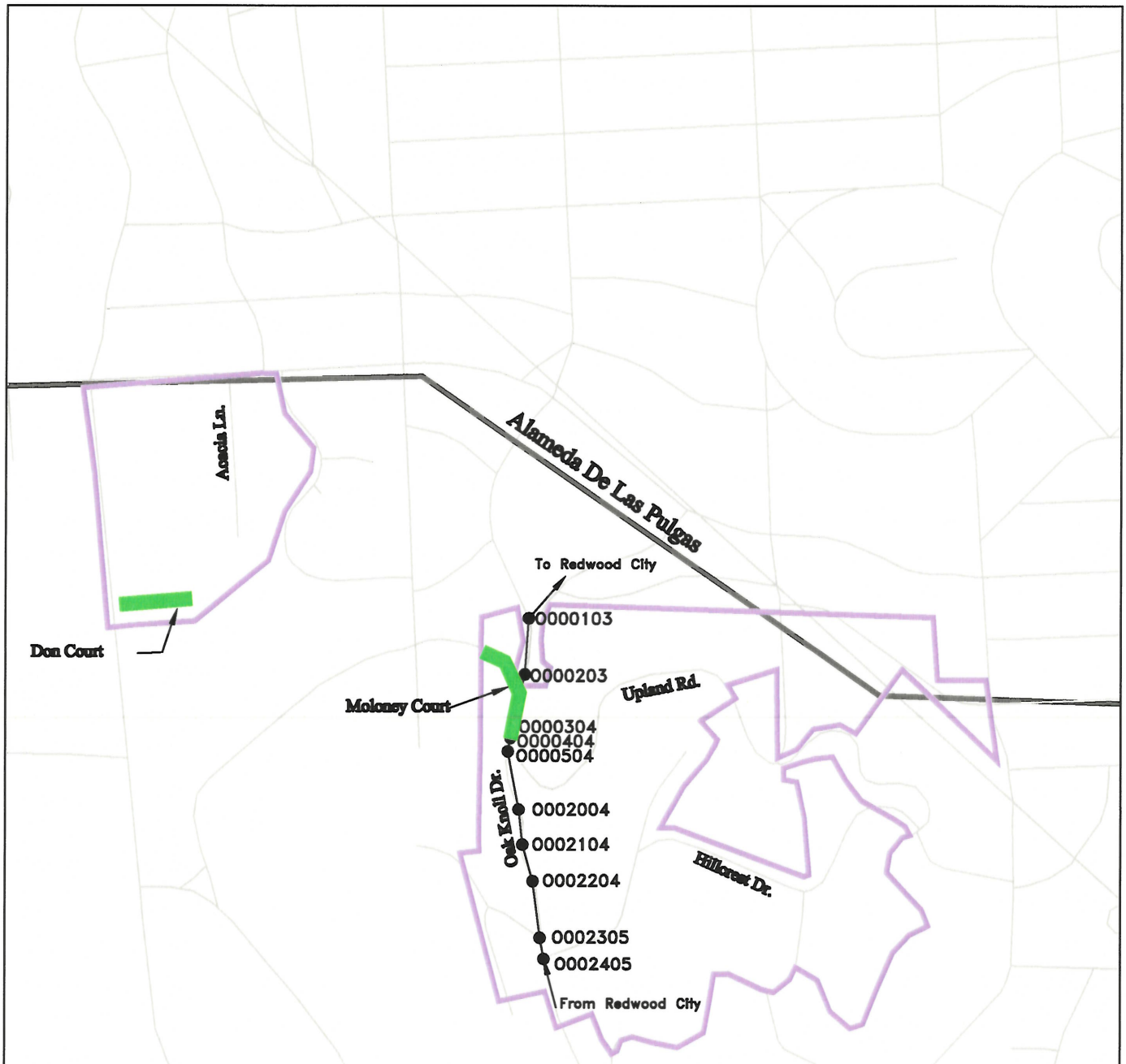
Note: All sewers are 6" in diameter unless otherwise noted.



Kensington Square Sewer Maintenance District
Recommended Projects
Figure 11-1b

Legend
Freeway/Major Road
Existing Sewers
District Boundary
Project-Hydraulic Deficiency-Priority 1
Project-O&M-Priority 2
Project-Structural-Priority 3
GRAPHIC SCALE
350 0 175 350 700

Note: All sewers are 6" in diameter unless otherwise noted.



Legend

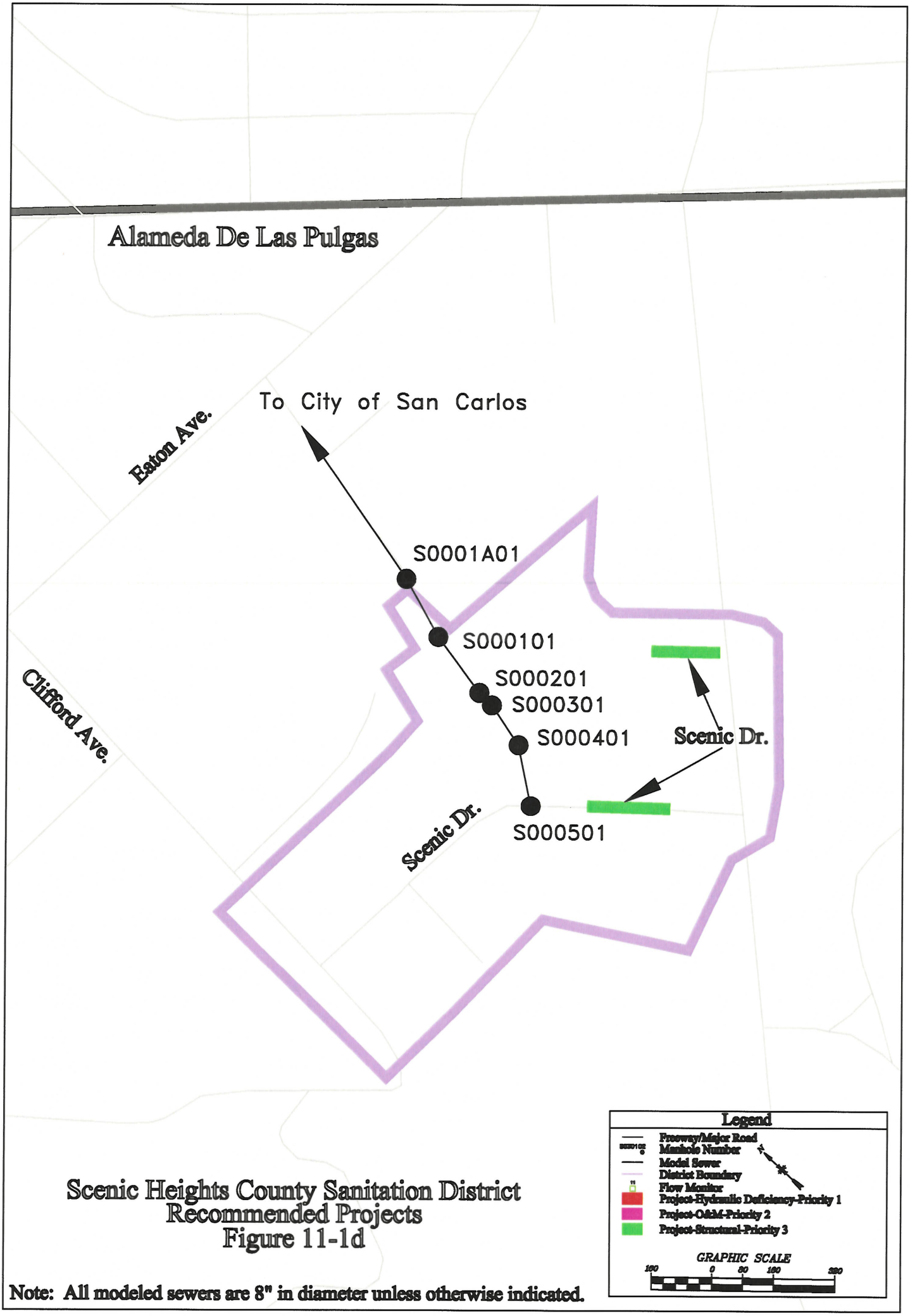
- Freeway/Major Road
- Manhole Number
- Model Sewer
- District Boundary
- Flow Monitor
- Project-Hydraulic Deficiency-Priority 1
- Project-O&M-Priority 2
- Project-Structural-Priority 3

GRAPHIC SCALE

370 0 185 370 740

Oak Knoll Sewer Maintenance District
Recommended Projects
Figure 11-1c

Note: All modeled sewers are 6" in diameter unless otherwise indicated.



Scenic Heights County Sanitation District
Recommended Projects
Figure 11-1d

Note: All modeled sewers are 8" in diameter unless otherwise indicated.

SECTION 12

SANITARY SEWER RATES

The implementation of the capital improvement programs (CIP) developed for Harbor Industrial Sewer Maintenance District (HISMD), Kensington Square Sewer Maintenance District (KSSMD), Oak Knoll Sewer Maintenance District (OKSMD), and Scenic Heights County Sanitation District (SHCSD) in Section 10 will require that the District invest considerably in its sanitary sewer collection system. As a consequence, the District will need to charge higher rates to its customers. The impact of the various alternative levels of CIP expenditures on District finances and a projection of this impact on the equivalent single-family residences (SFR) rate is presented in this section. SFRs currently make up approximately 29, 100, 93 and 100 percent of residential unit equivalents in the Districts, respectively. The impact of various levels of CIP expenditures on the rates assessed SFRs was determined by (1) determining the various alternative levels of the CIP expenditure considered over a 5-year period, adjusted for inflation, and (2) determining current revenue requirements.

The sanitary sewer rates necessary to pay for the recommended improvements, at each alternative level considered for the 5-year study period fiscal years (FYs) 1999/00 through 2003/04 were estimated. This section presents the methodology used to determine the likely impacts.

The rates derived assume no use of reserves to lower revenue requirements necessary to be recovered from rates. As such, this section contains guidelines for the County's use in determining an appropriate reserve level for the Districts. All supporting documentation of the development of revenue requirements and rates is contained in Appendix E.

RATE IMPACTS

Determining the impact of the CIP on the sanitary sewer rates requires that the cost of the CIP be combined with existing annual revenue requirements to estimate the increase in the rates required to meet the new level of revenue requirements. Essentially, revenue requirements are developed based on historical expenditures, offsetting revenues and alternative levels of CIP-related expenditures for each fiscal year in the study period. This total net revenue requirement is divided by the total number of equivalent residential connections (ERC) in the District to obtain the rate per ERC.

Development of CIP

The three priority levels of capital improvements currently under consideration are discussed in detail in Section 11. The recommended financing alternative for the District for the CIP developed is pay-as-you-go financing. Although debt (e.g., Certificates of Participation [COPs] or revenue bonds) could possibly be issued by combining projects from several Districts to create a larger single issue, pay-as-you-go financing is the recommended alternative at this time.

Development of Annual Revenue Requirements

Revenue requirements for the HISMD, KSSMD, OKSMD, and SHCSD systems were estimated from accounting information provided by County staff. For each alternative, historical and projected revenue requirements were developed. Projected expenses were developed by inflating the FY 1997/98 expenses by 3 percent per year. The capital projects expenditures (CIP) in any given year is the level of CIP divided by 5 years (assuming the projects will be paid evenly over the 5-year period) and inflated by 3 percent in each subsequent year. Offsetting revenue in the form of secure property taxes was also inflated by 3 percent per year. Other projected offsetting revenues were based on historical levels of receipts and were not inflated. It was assumed that the District does not plan to either add to or subtract from their existing reserve fund balance. This assumption may change if the County conducts a reserve study, the results of which may indicate that the reserve balance can either be used or added to. Tables 12-1, 12-2 and 12-3 contain a summary of the revenue requirements and rate development.

Impact of Revised Revenue Requirements

Harbor Industrial. Current rates are $179/residential unit equivalent. The Alternative 1 CIP necessitates a maximum rate increase of 670 percent to $1,379/residential unit equivalent in FY 2003/04. Alternative 2 sees a maximum rate increase of 670 percent to $1,379/residential unit equivalent in FY 2003/04. Alternative 3 sees a maximum rate increase of 669 percent to $1,377/residential unit equivalent in FY 2003/04. This analysis assumes that the increased costs, both as a result of the CIP and increases in general expenses, are absorbed equally by all customers. The tables provided in Appendix E summarize the revenue requirements including CIP levels for each alternative along with the calculated rates. As no significant growth is expected in HISMD, the number of equivalent residential units used to calculate the rates is 282. The full development of the rates for the three alternatives and the average of the three alternatives is contained in Appendix E. Tables 12-1, 12-2 and 12-3 also contain a summary of the rate development.

Kensington Square. Current rates are $247/residential unit equivalent. The Alternative 1 CIP necessitates a maximum rate increase of 154 percent to $627/residential unit equivalent in FY 2003/04. Alternative 2 sees a maximum rate increase of 135 percent to $581/residential unit equivalent in FY 2003/04. Alternative 3 sees a maximum rate increase of 127 percent to $561/residential unit equivalent in FY 2003/04. This analysis assumes that the increased costs, both as a result of the CIP and increases in general expenses, are absorbed equally by all customers. The tables provided in Appendix E summarize the revenue requirements including CIP levels for each alternative along with the calculated rates. As no significant growth is expected in KSSMD, the number of equivalent residential units used to calculate the rates is 74. The full development of the rates for the three alternatives and the average of the three alternatives is contained in Appendix E. Tables 12-1, 12-2 and 12-3 also contain a summary of the rate development.

Oak Knoll. Current rates are $275/residential unit equivalent. The Alternative 1 CIP necessitates a maximum rate increase of 43 percent to $395/residential unit equivalent in FY 2003/04. Alternative 2 sees a maximum rate increase of 52 percent to $419/residential unit equivalent in FY 2003/04. Alternative 3 sees a maximum rate increase of 49 percent to $410/residential unit equivalent in FY 2003/04. This analysis assumes that the increased costs, both as a result of the CIP and increases in general expenses, are absorbed equally by all customers. The tables provided in Appendix E summarize the revenue requirements including CIP levels for each alternative along with the calculated rates. As no significant growth is expected in OKSMD, the number of equivalent residential units used to calculate the rates is 96. The full development of the rates for the three alternatives and the average of the three alternatives is contained in Appendix E. Tables 12-1, 12-2 and 12-3 also contain a summary of the rate development.

Scenic Heights. Current rates are $247/residential unit equivalent. The Alternative 1 CIP necessitates a maximum rate increase of 109 percent to $515/residential unit equivalent in FY 2003/04. Alternative 2 sees a maximum rate increase of 104 percent to $505/residential unit equivalent in FY 2003/04. Alternative 3 sees a maximum rate increase of 114 percent to $529/residential unit equivalent in FY 2003/04. This analysis assumes that the increased costs, both as a result of the CIP and increases in general expenses, are absorbed equally by all customers. The tables provided in Appendix E summarize the revenue requirements including CIP levels for each alternative along with the calculated rates. As no significant growth is expected in SHCSD, the number of equivalent residential units used to calculate the rates is 50. The full development of the rates for the three alternatives and the average of the three alternatives is contained in Appendix E. Tables 12-1, 12-2 and 12-3 also contain a summary of the rate development.

RESERVE RECOMMENDATION

The following list of general recommendations are for the County's use in determining the appropriate amount of reserve funds to maintain for the Districts.

1. **Working Capital Reserve**— This generally constitutes 1/6 to 1/12 (as appropriate for a utility's billing cycle) of annual operations and maintenance expenses. This is intended to cover the gap created by the need to pay for expenses incurred prior to the receipt of fees for services rendered.

2. **Emergency Repair Reserve**— Between 1 percent and 3 percent of the current replacement value of a system's assets can be held in reserve for use in the case of main breaks or other necessary emergency repairs.

3. **Self Insurance Reserve**— Between 1 percent and 3 percent of the current replacement value of a system's assets can be held in reserve as self insurance in the case of damages a system might sustain from natural or other disaster.

4. **Debt Service Reserve**— Generally, debt holders require that a utility maintain a minimum reserve equal to 1 year's debt service payments.

It is recommended that, at a minimum, the County maintain 10 percent of annual O&M costs as working capital reserves or about $35,000 in the case of Harbor Industrial, $5,000 for Kensington Square, $4,000 for Oak Knoll, and $2,500 for Scenic Heights. Based on lengths of 12,000 feet, 2,000 feet, 7,500 feet (assuming 1,500 feet modeled length represents 20 percent of the system), and 3,500 feet (assuming 700 feet modeled length represents 20 percent of the system), respectively, and using a replacement cost of $85/foot yields total replacement costs of $1,000,000, $170,000, $640,000, and $300,000, respectively. Thus, the recommended emergency repair reserves would be between $10,000 and $30,000 for Harbor Industrial, between $2,000 and $6,000 for Kensington Square, between $6,500 and $19,500 for Oak Knoll, and between $3,000 and $9,000 for Scenic Heights. Thus, the total minimum recommended reserves would be between $45,000 and $65,000 for Harbor Industrial, between $6,000 and $10,000 for Kensington Square, between $10,000 and $23,000 for Oak Knoll, and between $5,500 and $11,500 for Scenic Heights. It should be noted that these minimum levels of reserves are based on the District's current O&M expenses, the above guidelines, and a rough estimate of the value of the District's assets and should be updated if better information becomes available. Current and projected fund balance levels are shown in the tables in Appendix E.

Table 12-1. Alternative 1 Summary Rate Development

Item	Projected, dollars				
	1999/00	2000/01	2001/02	2002/03	2003/04
Harbor Industrial					
Gross expenses	376,658	387,957	399,596	411,584	423,932
Total offsetting revenue	35,028	35,346	35,674	36,011	36,359
Use of fund balance	-	-	-	-	-
Net revenue requirements	341,630	352,611	363,922	375,573	387,572
Annual rate assuming 282 connections	1,211	1,250	1,291	1,332	1,374
Kensington Square					
Gross expenses	49,748	51,241	52,778	54,362	55,992
Total offsetting revenue	9,177	9,286	9,397	9,512	9,630
Use of fund balance	-	-	-	-	-
Net revenue requirements	40,573	41,955	43,381	44,850	46,362
Annual rate assuming 74 connections	548	567	586	606	627
Oak Knoll					
Gross expenses	43,656	44,965	46,314	47,704	49,135
Total offsetting revenue	11,12411,124	11,155	11,187	11,220	11,253
Use of fund balance	-	-	-	-	-
Net revenue requirements	32,532	33,811	35,128	36,484	37,882
Annual rate assuming 96 connections	339	352	366	380	395
Scenic Heights					
Gross expenses	23,713	24,424	25,157	25,912	26,689
Total offsetting revenue	904	918	932	947	962
Use of fund balance	-	-	-	-	-
Net revenue requirements	22,809	23,507	24,225	24,965	23,727
Annual rate assuming 50 connections	456	470	485	499	515

Table 12-2. Alternative 2 Summary Rate Development

Item	Projected, dollars				
	1999/00	2000/01	2001/02	2002/03	2003/04
Harbor Industrial					
Gross expenses	337,258	388,575	400,233	412,240	424,607
Total offsetting revenue	35,028	35,346	35,674	36,011	36,359
Use of fund balance	-	-	-	-	-
Net revenue requirements	342,230	353,299	364,559	376,228	388,248
Annual rate assuming 282 connections	1,214	1,253	1,293	1,334	1,377
Kensington Square					
Gross expenses	46,768	48,172	49,617	51,105	52,638
Total offsetting revenue	9,177	9,286	9,397	9,512	9,630
Use of fund balance	-	-	-	-	-
Net revenue requirements	37,591	38,886	40,220	41,593	43,008
Annual rate assuming 74 connections	508	525	544	562	581
Oak Knoll					
Gross expenses	45,756	47,128	48,542	49,999	51,499
Total offsetting revenue	11,124	11,144	11,187	11,220	11,253
Use of fund balance	-	-	-	-	-
Net revenue requirements	34,632	35,974	37,356	38,779	40,245
Annual rate assuming 96 connections	361	375	389	404	419
Scenic Heights					
Gross expenses	23,293	23,992	24,712	25,453	26,216
Total offsetting revenue	904	918	932	947	962
Use of fund balance	-	-	-	-	-
Net revenue requirements	22,389	23,074	23,780	24,506	25,255
Annual rate assuming 50 connections	448	461	476	490	505

Table 12-3. Alternative 3 Summary Rate Development

Item	Projected, dollars				
	1999/00	2000/01	2001/02	2002/03	2003/04
Harbor Industrial					
Gross expenses	377,258	388,575	400,233	412,240	424,607
Total offsetting revenue	35,028	35,346	35,674	36,011	36,359
Use of fund balance	-	-	-	-	-
Net revenue requirements	342,230	353,229	364,559	376,228	388,248
Annual rate assuming 282 connections	1,214	1,253	1,293	1,334	1,377
Kensington Square					
Gross expenses	49,748	51,241	52,778	54,362	55,992
Total offsetting revenue	9,177	9,286	9,397	9,512	9,630
Use of fund balance	-	-	-	-	-
Net revenue requirements	40,571	41,955	43,381	44,850	46,362
Annual rate assuming 74 connections	548	567	586	606	627
Oak Knoll					
Gross expenses	44,936	46,284	47,672	49,103	50,576
Total offsetting revenue	11,124	11,144	11,187	11,220	11,253
Use of fund balance	-	-	-	-	-
Net revenue requirements	33,812	35,129	36,486	37,883	39,322
Annual rate assuming 96 connections	352	366	380	395	410
Scenic Heights					
Gross expenses	24,353	25,084	25,836	26,611	27,410
Total offsetting revenue	904	918	932	947	962
Use of fund balance	-	-	-	-	-
Net revenue requirements	23,449	24,166	24,904	25,665	26,448
Annual rate assuming 50 connections	469	483	498	513	529

APPENDIX A

MANHOLE INSPECTION TECHNICAL MEMORANDUM

MEMORANDUM

To: Mark Welsh
County of San Mateo, DPW

From: Charlie Joyce
Brown & Caldwell

Date: October 12, 1998 File- 4692.01/10

Subject: Sanitary Sewer and Water System Evaluation Study
Manhole Inspection Memorandum of Field Work

INTRODUCTION

This memorandum presents a summary of the field investigations conducted during the winter and spring of 1997 on inspection of manholes in the nine sewer districts maintained by the San Mateo County Department of Public Works. A total of 873 manholes in the nine districts were inspected with the following in each district:

Table 1
Number of Manholes Inspected By District

District	Manholes Inspected
Burlingame Hills Sewer Maintenance District	90
Crystal Springs County Sanitation District	257
Devonshire County Sanitation District	37
Emerald Lake Heights Sewer Maintenance District	233
Fair Oaks Sewer Maintenance District	204
Harbor Industrial Sewer Maintenance District	22
Kensington Square Sewer Maintenance District	6
Oak Knoll Sewer Maintenance District	17
Scenic Heights County Sanitation District	7

The purpose of this memorandum is to provide the background of how the manholes inspections were conducted, manhole numbering, interpretation of the manhole data, how the data will be used for other parts of the sanitary sewer collection system evaluation, and a summary of critical locations in the districts where repair work should take place. The memorandum also includes descriptions on how to locate photographs related to an inspected manhole in the 12 three ring binders provided at the completion of this project.

This memorandum does not provide the condition assessment of the sanitary collection system. That work effort will be completed as part of a later task in the project when the other parts of the field data, namely flow monitoring, television inspection, and smoke testing, are completed.

MANHOLE INSPECTION OVERVIEW

A key part of the data collection consisted of documenting the findings of the inspections for analysis. Two methods of documenting the manhole inspection were used for this project. The first was a field form set up to allow the field crew to collect data in an efficient manner on the condition of the manhole. The second method of documenting the manhole condition was to photograph defects found during the visual inspections. The manhole inspections were top side inspections where the condition of the manhole was observed from the surface.

In order to collect additional data on each manhole location a "Camera on a Stick" (Figure 1) was lowered into the manhole and a photograph of each pipe entering and leaving the manhole was taken. Where infiltration/inflow or other manholes conditions warranted a photograph was also taken from the "Camera on a Stick".

The view in the pipeline using the "Camera on a Stick" is dependent on the flow, debris, and channel benching in the manhole. Where the camera can be placed in the channel with a clear view of the pipeline the photograph typically shows approximately 20 feet of the sewer away from the manhole for an 8-inch diameter sewer. Larger sewer diameters typically show a longer distance and smaller sewer diameters show a shorter distance.

Figure 1

Pipes were photographed in a clockwise direction to avoid confusion and to allow for cataloging the photographs. Pipe A was always the first pipe in the clockwise direction from the primary outlet pipe(s). Drop manholes would have a photograph taken of both the top and bottom of the drop manhole and were noted as such in the comment field of that pipe. Each pipe in the drop manhole pipe was given a separate pipe identifier.

A copy of a blank field form used to document manhole conditions is included as Attachment A. Also in that attachment is a blank form for the pipe condition assessment that was completed for each pipe when the photographs were reviewed.

Manhole numbering modifications to the existing manholes numbering system for each basin were performed so that each manhole in the nine districts has a discrete unique label. The manhole number is an eight character alpha/numeric with the following definition:

B0001A04

B	Burlingame Hills, see Table 2.
0001	Manhole Number with zeros shown for place holders.
A	Several manholes were placed after initial numbering using a letter - A, B, etc. When not needed this part of field is left blank.
04	District Map Number as supplied by County.

Table 2
District Designators

District	Designator
Burlingame Hills Sewer Maintenance District	B
Crystal Springs County Sanitation District	C
Devonshire County Sanitation District	D
Emerald Lake Heights Sewer Maintenance District	E
Fair Oaks Sewer Maintenance District	F
Harbor Industrial Sewer Maintenance District	H
Kensington Square Sewer Maintenance District	K
Oak Knoll Sewer Maintenance District	O
Scenic Heights County Sanitation District	S

The manholes were numbered as the inspections were completed. Each completed form was then entered into a Microsoft Access v2.0 database that was programmed for manhole inspection analysis. Each item on the inspection form was input to the data base. The checks and boxes on the inspection form translate to a yes/no or numerical value in the database for future use in the condition assessment analysis. Data related to the pipe photographs were entered directly into the database after the photographs were developed and reviewed.

Manholes were selected for inspection to provide a representative random sample of the manholes in each of the nine districts. Manholes were identified for inspection from the collection system maps. The manholes selected normally met one of the following criteria:

- Connection of more than two sewers entering the manhole
- One of the sewers entered into or exited from an easement
- The sewer segment appeared typical to the area served
- A special flow connection or cross-connection was shown on the maps
- A manhole with many laterals entering, such as a cul-de-sac.

Manholes located in easements were also inspected, although access to many of these manholes was not possible due to obstructions, locked gates, or the occasional fence built over the manhole. Traffic control measures were used to route vehicles around the field crew and the crew followed safety precautions as outlined in the Field Health and Safety Plan required on all

Brown and Caldwell field related projects.

MANHOLE INSPECTION BINDERS

A series of three-ring binders containing the print outs from the database with the accompanying photographs for each inspected manhole were assembled. The binders are numbered by an alpha/numeric format where the first letter corresponds to the district and the number corresponds to the binder number for that district. This format allows for future manhole inspections to be placed in successive binders. A field was added to the database so that the binder number could be attached to the manhole number.

A summary report is contained at the front of each binder to facilitate the location of a manhole. The summary report is provided in two orientations: 1) by film roll number, and 2) by manhole number. The contents of the binders area are arranged by film roll number for each District, rather than by manhole number.

The photographs for each manhole are arranged so the first photo (normally upper left) is the manhole number followed by the manhole cover, channel, or other defect photographs. The pipe photographs follow using the same convention as identified in the field inspection, beginning with Pipe A and proceeding through to Pipe X.

Locating a manhole in the binders is most easily accomplished by using the database query "BINDER/ROLL/MHID" to identify the binder number and the roll number of the associated photographs and then looking up the database print out and photographs in the appropriate binder.

Of the 873 manholes inspected a total of 2,480 pipes were photographed. The following tables provide summary information related to the manholes and pipes inspected. The tables are arranged by manhole number. Specific database reports for manholes and pipes, Attachments B and C, respectively, follow this memorandum.

Manholes
Manholes with Bench/Channel Defects Worse Than Moderate
Manholes with Roots
Manholes with Grease
Manholes with Frame and Cover Problems
Manholes with Infiltration/Inflow and Flow Caps
Manholes with Major Debris in Channel

Pipes
Pipes with Separated Joints Greater than Moderate and Deflections Greater than One Inch

Pipes with Greater than Minor Corrosion
Pipes with Infiltration/Inflow
Pipes with Greater than Light Grease
Pipes with Greater than Light Roots
Pipes with Roots and Grease
Pipes with Cracks and Fractures
Pipes with Plugs and Obstructions

APPENDIX B

TELEVISION INSPECTION RESULTS

County of San Mateo - Wastewater Master Plan
Mainline Sewer Internal Inspection
District: Harbor Industrial

RUN No.	STREET OR PARCEL No.	UPSTREAM MANHOLE No.	DOWNSTREAM MANHOLE No.	DEPTH	LENGTH BETWEEN MANHOLES, ft	COMPLETE FOOTAGE TAPED, ft	PIPE MATERIAL TYPE	DATE OF INSPECTION	VIDEO TAPE No.	MAINLINE SEWER DEFECTS																						T	EST. I/I FLOW RATE, gpm	TOTAL No. of DEFECTS TO REHABILITATE	Total Score	COMMENTS
										CRACK		JTS		LATERALS			ROOTS		I/I						ALIGN		STRUC.			M.S.		S.C.					
										CP1	CP2	OJ1	OJ2	PT1	PT2	PT3	RJ	RT	I1	I2	I3	I4	I5	I6	A1	A2	S1	S2	S3	M1	M2	C1	C2					
1, 2	1300 Elmer St.	can't locate #	can't locate #		310	327	VCP	12/9/98	2-4	1						2	3								4		1							6		11	13	Good grade of line. Line is clean. Camera rolled over. Reverse set up needed to go 120' to overlap.
3	601 Elmer St.			6.1	309	309	VCP	12/10/98	2-6	2						2									1									9		5	5	Fair grade of line. Line is clean.
TOTAL					619	636				3						4	3								5		1							15		16		

County of San Mateo - Wastewater Master Plan
Mainline Sewer Internal Inspection
District: Kensingston Square

RUN No.	STREET OR PARCEL No.	UPSTREAM MANHOLE No.	DOWNSTREAM MANHOLE No.	DEPTH	LENGTH BETWEEN MANHOLES, ft	COMPLETE FOOTAGE TAPED, ft	PIPE SIZE, in	PIPE MATERIAL TYPE	DATE OF INSPECTION	VIDEO TAPE No.	MAINLINE SEWER DEFECTS																						T	EST. I/I FLOW RATE, gpm	TOTAL No. of DEFECTS TO REHABILITATE	Total Score	COMMENTS
											CRACK		JTS		LATERALS			ROOTS		I/I						ALIGN		STRUC.			M.S.		S.C.					
											CP1	CP2	OJ1	OJ2	PT1	PT2	PT3	RJ	RT	I1	I2	I3	I4	I5	I6	A1	A2	S1	S2	S3	M1	M2	C1	C2					
2	412 Uptown Street	7	2		407	407	6	VCP	12/10/98	3-1	16		1				12									3		3						28		35	38	Poor grade of line.
4	3121 Jefferson	10	13		450	446	6	VCP	12/22/98	3-3	13						14	5	3							3		1						29		39	23	
1	2018 Harding Ave.	8	7	6	343	349	6	VCP	12/10/98	2-7	10						10									2		1						24		23	23	
3	453 Uptown Street	2	3		152	147	6	VCP	12/10/98	3-2							5	1	1															9		7	7	
TOTAL					1352	1349					39		1				41	6	4							8		5						90		104		

County of San Mateo - Wastewater Master Plan
Mainline Sewer Internal Inspection
District: Oak Knoll

RUN No.	STREET OR PARCEL No.	UPSTREAM MANHOLE No.	DOWNSTREAM MANHOLE No.	DEPTH	LENGTH BETWEEN MANHOLES, ft	COMPLETE FOOTAGE TAPED, ft	PIPE SIZE, in	PIPE MATERIAL TYPE	DATE OF INSPECTION	VIDEO TAPE No.	MAINLINE SEWER DEFECTS																						T	EST. I/I FLOW RATE, gpm	TOTAL No. of DEFECTS TO REHABILITATE	Total Score	COMMENTS
											CRACK		JTS		LATERALS			ROOTS		I/I						ALIGN		STRUC.			M.S.		S.C.					
											CP1	CP2	OJ1	OJ2	PT1	PT2	PT3	RJ	RT	I1	I2	I3	I4	I5	I6	A1	A2	S1	S2	S3	M1	M2	C1	C2					
3	3039 Oak Knoll	6	5		70	24	6	VCP	12/23/98	4-2								1											1							2	421	Poor grade of line. Line is collapsed or abandoned. Unable to get by. MH #6 is buried.
5	10 Moloney	4	3		37	36	6	VCP	12/23/98	4-4	1							1																		2	11	
7	10 Moloney	30	29		57	51	6	PVC	12/23/98	4-6																								1			2	
2	19 Don Court	51	50		344	328	6	VCP	12/22/98	4-1								1																5		1	2	
6	20 Moloney	31	30		113	129	6	PVC	12/23/98	4-5																								1			1	
1	19 Don Court	51	52		134	123	6	VCP	12/22/98	3-4																								2				No defects
4	3039 Oak Knoll	5	4		28	30	6	VCP	12/23/98	4-3																												No defects
8, 9	10 Moloney	29	3		26	26	6	PVC	12/23/98	4-7																												No defects
TOTAL					809	747					1							3											1					9		5		

County of San Mateo - Wastewater Master Plan
Mainline Sewer Internal Inspection
District: Scenic Heights

RUN No.	STREET OR PARCEL No.	UPSTREAM MANHOLE No.	DOWNSTREAM MANHOLE No.	DEPTH	LENGTH BETWEEN MANHOLES, ft	COMPLETE FOOTAGE TAPED, ft	PIPE SIZE, in	PIPE MATERIAL TYPE	DATE OF INSPECTION	VIDEO TAPE No.	MAINLINE SEWER DEFECTS																					T	EST. I/I FLOW RATE, gpm	TOTAL No. of DEFECTS TO REHABILITATE	Total Score	COMMENTS
											CRACK		JTS		LATERALS			ROOTS		I/I						ALIGN		STRUC.		M.S.		S.C.					
											CP1	CP2	OJ1	OJ2	PT1	PT2	PT3	RJ	RT	I1	I2	I3	I4	I5	I6	A1	A2	S1	S2	S3	M1	M2	C1	C2				
1	108 Scenic Hts.	7	6		231	232	8	VCP	12/9/98	2-1								2	2															5		4	4	
2	1364 Edgewood Rd.	22	c/o	9.5		114	6	VCP	12/9/98	2-2							1																	4		1	4	
3	1364 Edgewood Rd.	22	20	9.5		43	6	VCP	12/9/98	2-3								1																			1	2	Reverse setup. Unable to get camera by due to heavy grease and roots. Poor grade of line. Line is not clean.
TOTAL					231	389											1	3	2														9		6		

APPENDIX C

HYDRAULIC MODELING TECHNICAL MEMORANDUM

MEMORANDUM 14692-006

December 22, 1998

TO: MARK WELSH
COUNTY OF SAN MATEO, DPW

FROM: CHARLIE JOYCE
BROWN AND CALDWELL

SUBJECT: WASTEWATER MASTER PLAN
FLOW PROJECTIONS AND HYDRAULIC MODELING

This technical memorandum presents the results of the hydraulic modeling performed to determine the amount of available capacity in the County of San Mateo (County) trunk sewers. Modeling was performed on the major trunk sewers in Burlingame Hills (BH), Crystal Springs (CS), Devonshire (DS), Emerald Lake (EL), and Fair Oaks (FO), Oak Knoll (OK) and Scenic Heights (SH) sewer districts.

Design Flow Projections

Wastewater flows were divided into base sanitary flow (BSF) and wet weather infiltration/inflow (I/I) components for this study. Base sanitary flow factors are based on dry weather flow monitoring performed during the winter of 1997. Due to limited rainfall during the winter of 1997, additional wet weather flow monitoring was performed during the following season. El Nino effects resulted in extensive rainfall during the January and February of 1998. Wet weather flow projections are based on flow monitoring results from second flow monitoring program.

BSF. BSF is wastewater contributed by residential, commercial, industrial, and public users. Base flow is directly related to land use and varies throughout the day and between weekdays and weekends. BSF from residential areas has a typical diurnal pattern with peak flows occurring in the morning after 7:00 a.m. and a second smaller peak occurring in the evening.

BSF flow contributions to the hydraulic model are based on the flow monitoring data collected during dry weather periods. Actual dry weather hydrographs were extracted from the flow monitoring data and used in the model. Dry weather periods were used to minimize the amount of groundwater infiltration included in the calculation. Groundwater infiltration occurs when groundwater levels are above the sewer pipes and the pipes have defects that allow infiltration. Some groundwater infiltration is undoubtedly included in the BSF rates, however, extensive review of accurate water use date in each District would be needed to determine the amount of groundwater infiltration in each area.

Dry weather flow projections were prepared for current land use conditions only. Land use planners for the County and affected City agencies indicated that growth or significant in-filling was not expected in the future.

Flow monitoring was not performed in the OK and SH Districts. BSF calculations for these Districts are based on the number of parcels in the District and a per parcel water use rate of 220 gallons per day. A conservative sanitary peaking factor of 3.5 was used to determine the peak dry weather flow.

Wet Weather I/I Flow

I/I consists of direct inflow of storm water runoff and rainfall-induced infiltration of storm water percolating into the collection system. Inflow occurs when storm water enters the collection system through illegally connected catch basins, area drains, or home roof gutter downspouts, or through manhole covers of cleanout lids. Inflow can become severe if surface flooding occurs and manholes and cleanouts are submerged or used to drain low-lying areas.

I/I accounts for the large increase in peak flows that occur during rainfall events. In areas with older sewers, I/I is typically the largest component of the total wastewater flow. I/I was evaluated by calculating the "R" factor for each of the monitored basins for each storm. An "R" factor is the percentage of rainfall that enters the collection system as I/I. The composite minimum and maximum "R" factor for each District is listed in Table 1.

Table 1, R Factors

District	Minimum R factor	Maximum R factor
Burlingame Hills	0.026	0.113
Crystal Springs	0.027	0.102
Devonshire	0.018	0.040
Emerald Lake	0.024	0.105
Fair Oaks	0.012	0.111

To determine the effects of I/I on the capacity of the wastewater conveyance system a wet weather design storm was developed. The January 18, 1998 rainfall event was very similar to a 5-year design storm in terms of intensity, duration, and volume. Therefore, this storm was selected as the design event. Minor adjustments were made to the rainfall hydrograph to account for differences in the volume between the actual storm and the 5-year design rainfall.

To develop wet weather hydrographs for use in the model, unit hydrographs were developed for each basin. Unit hydrographs are based on the "R" factor and the individual runoff characteristics for each basin. Synthetic hydrographs were added to the base flow hydrographs and the total hydrograph was input to the model.

Due to the lack of flow monitoring data for the OK and SH areas, a conservative I/I rate of 2,400 gallons per acre per day was used. This rate is used by the Central Contra Costa Sanitary District and is the most conservative rate in use in the Bay Area.

Capacity Analysis

Major trunk sewers in each of the sewer Districts were modeled to determine if any capacity deficiencies exist. The HYDRA model developed by PIZER, Inc. was used to simulate wastewater flows in the each of the Districts collection systems. HYDRA routes flow hydrographs through the collection system and accounts for the time delays of peak flow from various tributary areas as the flows move downstream. A standard Manning's friction coeffcient of 0.0135 was used for the analysis.

Modeled flow is compared to the theoretical capacity of each pipe segment. The capacity of each pipeline is a function of the pipeline slope and diameter. Surveying was required in various areas to verify the pipeline slope. If capacity deficiencies were detected, the program was used to size the appropriate relief and/or replacement sewer size.

Hydraulic models of the Harbor Industrial and Kensington Square districts were not prepared due to their small size. Both districts are much less than 50 acres in size. An 8-inch diameter sewer with a slope of 0.1 percent has enough capacity to serve a tributary area greater than 50 acres in size using conservative flow factors for BSF and I/I. Therefore, it was assumed that trunk sewers in the Harbor Industrial and Kensington Square districts have adequate capacity.

Hydrographs produced by the model were compared to the actual wet weather hydrographs from the flow monitoring to verify model calibration. An example of a model calibration hydrograph for the Burlingame Hills District is shown in Figure 1.

The modeled sewers for each District and the results of the modeling are shown on Figure 2 through Figure 8. Relief sewer sizes for each District are summarized in Tables 2 through Table 5. Hydraulic capacity deficiencies were not found in the DS, OK or SH Districts. Complete model results are given in Attachment A.

Table 2, Hydraulic Modeling Results, Burlingame Hills

Upstream Manhole	Downstream Manhole	Existing Diameter, inches	Length, ft	Recommended Relief Sewer Sizes, inches
B004603	B000204	6-8	2,610	8
B000204	B000104	8	216	12
Total			2,826	

Table 3, Hydraulic Modeling Results, Crystal Springs

Upstream Manhole	Downstream Manhole	Existing Diameter, inches	Length, ft	Recommended Relief Sewer Sizes, inches
C019105	C014405	10	1,714	8
C014405	C000301	10	3,280	12
Total			4,994	

Table 4, Hydraulic Modeling Results, Emerald Lake

Upstream Manhole	Downstream Manhole	Existing Diameter, inches	Length, ft	Recommended Relief Sewer Sizes, inches
E115601	E115201	6	455	8
E102322	E101634	8	1,163	8
E101634	E101134	8	342	12
Total			1,960	

Table 5, Hydraulic Modeling Results, Fair Oaks

Upstream Manhole	Downstream Manhole	Existing Diameter, inches	Length, ft	Recommended Relief Sewer Sizes, inches
F198636	F198227	10	1,170	8
F197727	F193228	10	1,327	10
F193228	F191828	8-10	1,743	15
F190528	F183828	15	1,253	15
F183828	F170419	18	2,911	30
F170419	F169919	15-18	870	27
F169919	F168014	15	1,642	15
F157414	F156914	10	1,049	10
F156914	F156714	10	176	15
F120311	F117211	8-10	921	18
F117211	F116211	10-12	1,883	12
F116211	F115610	12-18	1,489	24
F156614	F145009	15-21	2,979	24
F143709	F115510	10-21	3,251	15
F115510	F114904	30	2,857	45
TOTAL			25,521	

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OAK KNOLL SEWER DISTRICT WET WEATHER

*** OAK KNOLL TRUNK Analysis of Existing Pipes

Link	Long	Slope / Diam	Invert Up/Dn	San Inf	Sto Mis	Qdes / Vel / d/D	Qmax / %Cap / QRem	GrUp / HGLUp / DiffUp	GrDn / HGLDn / DiffDn	SrCh/Dlt / Parallel / Replace
1	243	0.0412	198.00	0.0	0.0	0.02	0.64	212.00	194.00	
		6	188.00	0.0	0.0	2.18	2.83	198.07	188.07	
O002405						0.13		13.93	5.93	
2	200	0.0980	188.00	0.0	0.0	0.02	0.99	194.00	175.00	
		6	168.40	0.0	0.0	2.96	1.84	188.05	168.45	
O002304						0.11		5.95	6.55	
3	185	0.0724	168.40	0.0	0.0	0.02	0.85	175.00	160.00	
		6	155.00	0.0	0.0	2.65	2.14	168.46	155.06	
O002204						0.12		6.54	4.94	
4	213	0.0892	155.00	0.0	0.0	0.02	0.94	160.00	143.00	
		6	136.00	0.0	0.0	2.86	1.93	155.06	136.06	
O002104						0.11		4.94	6.94	
5	100	0.0700	136.00	0.0	0.0	0.02	0.83	143.00	136.00	
		6	129.00	0.0	0.0	2.62	2.17	136.06	129.06	
O002004						0.12		6.94	6.94	
6	28	0.0071	129.00	0.0	0.1	0.15	0.27	136.00	134.00	
		6	128.80	0.0	0.0	2.06	56.62	129.28	129.08	
O000504						0.56		6.72	4.92	
7	37	0.1459	128.80	0.0	0.1	0.15	1.20	134.00	130.00	
		6	123.40	0.0	0.0	6.05	12.53	128.93	123.53	
O000404						0.26		5.07	6.47	
8	356	0.0669	123.40	0.0	0.1	0.15	0.81	130.00	108.00	
		6	99.60	0.0	0.0	4.48	18.51	123.55	99.75	
O000304						0.30		6.45	8.25	
9	184	0.0978	99.60	0.0	0.1	0.17	0.98	108.00	90.00	
		6	81.60	0.0	0.0	5.31	17.14	99.75	81.75	
O000203						0.29		8.25	8.25	

Lateral length= 1546 Upstream length= 1546

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MGD

SCENIC HEIGHTS SEWER DISTRICT WET WEATHER

*** BEACON-FRANCES Analysis of Existing Pipes

Link	Long	Slope Diam	Invert Up/Dn	San Inf	Sto Mis	Qdes Vel d/D	Qmax %Cap QRem	GrUp HGLUp DiffUp	GrDn HGLDn DiffDn	SrCh/Dlt Parallel Replace
1	161	0.0200	90.36	0.0	0.0	0.08	0.96	109.00	94.00	
		8	87.14	0.0	0.0	2.42	7.98	90.50	87.28	
S000501						0.21		18.50	6.72	
2	90	0.0204	87.14	0.0	0.0	0.08	0.97	94.00	92.50	
		8	85.30	0.0	0.0	2.44	7.90	87.28	85.44	
S000401						0.21		6.72	7.06	
3	126	0.0197	85.30	0.0	0.0	0.08	0.95	92.50	90.00	
		8	82.82	0.0	0.0	2.41	8.05	85.44	82.96	
S000301						0.21		7.06	7.04	
4	142	0.0050	80.44	0.0	0.0	0.08	0.48	90.00	88.00	
		8	79.73	0.0	0.0	1.43	15.97	80.63	79.92	
S000201						0.29		9.37	8.08	
5	145	0.0016	79.73	0.0	0.1	0.10	0.27	88.00	93.00	
		8	79.50	0.0	0.0	1.02	35.29	80.02	79.79	
S000101						0.43		7.98	13.21	

Lateral length= 664 Upstream length= 664

APPENDIX D

CAPITAL IMPROVEMENT PROJECTS

District: Harbor Industrial Priority: 3

Project: Elmer Streeet

Project Purpose: Structural

Project Location: Elmer Street from Harbor Boulevard to northern end of line
Could not read manhole numbers from maps, approximately from
601 Elmer Street to 1300 Elmer Street

Existing Conditions:

Pipeline: 615 feet of 6-inch diameter
Television Inspection: 1 piece missing
5 sags
roots and cracks
Operation & Maintenance 3 callouts/year: Y / [N]
Manhole Inspection: Roots / Pipe / Grease
Hydraulics: No

Alternative 1: Increase Operations & Maintenance (rc)
Spot Repair (4)

Alternative 1 Cost: $49,300

Alternative 2: Pipe Bursting

Alternative 2 Cost: $55,400

Alternative 3: Remove and Replace

Alternative 3 Cost: $52,275

Project Concerns:

Recommended Alternative:

District: Kensington Square Priority: 3

Project: Upton Street

Project Purpose: Structural

Project Location: Upton Street from Harding Avenue to Jefferson Avenue
MH 8-10

Existing Conditions:

Pipeline: 1352 feet of 6-inch diameter
Television Inspection: 1 minor offset joint
8 sags
5 pieces missing
roots and cracks
Operation & Maintenance 3 callouts/year: Y / [N]
Manhole Inspection: Roots / Pipe / Grease
Hydraulics: No

Alternative 1: Increase Operations & Maintenance (rc)
Spot Repair (44)

Alternative 1 Cost: $136,600

Alternative 2: Pipe Bursting

Alternative 2 Cost: $121,700

Alternative 3: Remove and Replace

Alternative 3 Cost: $114,900

Project Concerns:

Recommended Alternative:

District: Oak Knoll Priority: 3

Project: Don Court

Project Purpose: Structural

Project Location: Don Court near Edgewood Rd.
MH 50-52

Existing Conditions:

Pipeline: 478 feet 6-inch diameter
Television Inspection: roots
Operation & Maintenance 3 callouts/year: Y / [N]
Manhole Inspection: [Roots] / [Pipe] / Grease
Hydraulics: No

Alternative 1: Increase Operations & Maintenance (rc)

Alternative 1 Cost: $35,900

Alternative 2: Pipe Bursting

Alternative 2 Cost: $43,000

Alternative 3: Remove and Replace

Alternative 3 Cost: $40,600

Project Concerns:

Recommended Alternative:

District: Oak Knoll Priority: 3

Project: Moloney Court

Project Purpose: Structural

Project Location: Moloney Court near Oak Knoll Drive
MH 6-3, MH 3-31

Existing Conditions:

Pipeline: 331 feet 6-inch diameter
Television Inspection: 1 severe structural problem (collapsed pipe)
roots and cracks
Operation & Maintenance 3 callouts/year: Y / [N]
Manhole Inspection: [Roots] / Pipe / Grease
Hydraulics: No

Alternative 1: Increase Operations & Maintenance (rc)
Spot Repair (2)

Alternative 1 Cost: $26,400

Alternative 2: Pipe Bursting

Alternative 2 Cost: $29,800

Alternative 3: Remove and Replace

Alternative 3 Cost: $28,100

Project Concerns:

Recommended Alternative:

District: Scenic Heights Priority: 3

Project: Scenic Drive

Project Purpose: Structural

Project Location: Scenic Drive near Edgewood Road
MH 6-7, MH 20-23

Existing Conditions:

Pipeline: 165 feet of 6-inch diameter
231 feet of 8-inch diameter

Television Inspection: sev roots

Operation & Maintenance 3 callouts/year: Y / [N]

Manhole Inspection: Roots / Pipe / Grease

Hydraulics: No

Alternative 1: Increase Operations & Maintenance (rc)
Spot Repair (1)

Alternative 1 Cost: $30,500

Alternative 2: Pipe Bursting for 6-inch diameter
Sliplining for 8-inch diameter
Spot Repair (1)

Alternative 2 Cost: $28,400

Alternative 3: Remove and Replace

Alternative 3 Cost: $33,700

Project Concerns:

Recommended Alternative:

APPENDIX E

SANITARY SEWER RATE MODELS

Inflator 3%

Harbor Industrial Alternative 1 CIP Summary

Project	Priority	Alternative 1	Alt 1 Description
Elmer Street	3	$ 49,300	Increase O & M, 4 Spot Repair
Total		**$ 49,300**	

Harbor Industrial Alternative 1 Revenue Requirements

Item	1994/95	1995/96	1996/97	1997/98	1998/99 Budget	1999/00	2000/01	Projected 2001/02	2002/03	2003/04
Expenses										
Admin/Eng	$ 120,849	$ 10,277	$ 9,660	$ 8,935	$ 9,203	$ 9,479	$ 9,764	$ 10,056	$ 10,358	$ 10,669
Capital Projects*	$ -	$ -	$ -	$ -	$ -	$ 9,860	$ 10,156	$ 10,460	$ 10,774	$ 11,098
Debt Service	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
O&M	$ 84,148	$ 5,248	$ 1,863	$ 2,278	$ 2,346	$ 2,417	$ 2,489	$ 2,564	$ 2,641	$ 2,720
Other	$ 208,281		$ 7,079	$ 198,262	$ 204,210	$ 210,336	$ 216,646	$ 223,146	$ 229,840	$ 236,735
Sewage Treatment	$ 461,570		$ 160,921	$ 91,000	$ 93,730	$ 96,542	$ 99,438	$ 102,421	$ 105,494	$ 108,659
Source Control	$ 214,509	$ 51,060	$ 65,249	$ 45,267	$ 46,625	$ 48,024	$ 49,464	$ 50,948	$ 52,477	$ 54,051
Gross Expenses	**$ 1,089,357**	**$ 66,585**	**$ 244,772**	**$ 345,742**	**$ 356,114**	**$ 376,658**	**$ 387,957**	**$ 399,596**	**$ 411,584**	**$ 423,932**
Offsetting Income										
Secure Property Taxes**	$ 10,257	$ 10,471	$ 3,425	$ 10,322	$ 10,300	$ 10,609	$ 10,927	$ 11,255	$ 11,593	$ 11,941
Unsecured Property Taxes	$ 1,407	$ 1,383	$ 435	$ 1,226	$ 1,300	$ 1,300	$ 1,300	$ 1,300	$ 1,300	$ 1,300
Interest Earned***	$ 12,427	$ 22,469	$ 4,911	$ 21,655	$ 22,569	$ 22,569	$ 22,569	$ 22,569	$ 22,569	$ 22,569
HOPTR	$ 214	$ 206	$ 66	$ 188	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100
Annexation Charges	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Connection Charges	$ 2,292	$ 352	$ -	$ 323	$ 300	$ 300	$ 300	$ 300	$ 300	$ 300
Miscellaneous Revenue	$ 176	$ 172	$ 71	$ 299	$ 150	$ 150	$ 150	$ 150	$ 150	$ 150
Total Offsetting Income	**$ 26,773**	**$ 35,053**	**$ 8,908**	**$ 34,013**	**$ 34,719**	**$ 35,028**	**$ 35,346**	**$ 35,674**	**$ 36,011**	**$ 36,359**
Use of Fund Balance	**$ -**	**$ -**	**$ (46,103)**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Net Revenue Requirements	**$ 1,062,584**	**$ 31,532**	**$ 189,761**	**$ 311,729**	**$ 321,396**	**$ 341,630**	**$ 352,611**	**$ 363,922**	**$ 375,573**	**$ 387,572**
Annual Rate Assuming 282 Connections****					**1,140**	**1,211**	**1,250**	**1,291**	**1,332**	**1,374**

Note:

*Projected CIP is paid for over 5 years.

**Secure Property Tax revenue is assumed to increase at 3% per year

***Interest Earned in projected years is calculated as 5% of Beginning Fund Balance

****Current Rate is $179.

Harbor Industrial Alternative 1 Fund Balance

Item	1994/95	1995/96	1996/97	1997/98	Projected 1998/99 Budget	1999/00	2000/01	Projected 2001/02	2002/03	2003/04
Beginning Fund Balance	$ 285,951	$ 366,384	$ 497,476	$ 451,373	$ 451,373	$ 451,373	$ 451,373	$ 451,373	$ 451,373	$ 451,373
Additions to/(Use of) Balance	$ 80,433	$ 131,092	$ (46,103)	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ending Fund Balance	$ 366,384	$ 497,476	$ 451,373	$ 451,373	$ 451,373	$ 451,373	$ 451,373	$ 451,373	$ 451,373	$ 451,373

Harbor Industrial Alternative 2 CIP Summary

Project	Priority	Alternative 2	Alt 2 Description
Elmer Street	3	$ 55,400	Pipe Bursting
Total		**$ 55,400**	

Harbor Industrial Alternative 2 Revenue Requirements

Item	1994/95	1995/96	1996/97	1997/98	1998/99 Budget	1999/00	2000/01	Projected 2001/02	2002/03	2003/04
Expenses										
Admin/Eng	$ 120,849	$ 10,277	$ 9,660	$ 8,935	$ 9,203	$ 9,479	$ 9,764	$ 10,056	$ 10,358	$ 10,669
Capital Projects*	$ -	$ -	$ -	$ -	$ -	$ 11,080	$ 11,412	$ 11,755	$ 12,107	$ 12,471
Debt Service	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
O&M	$ 84,148	$ 5,248	$ 1,863	$ 2,278	$ 2,346	$ 2,417	$ 2,489	$ 2,564	$ 2,641	$ 2,720
Other	$ 208,281		$ 7,079	$ 198,262	$ 204,210	$ 210,336	$ 216,646	$ 223,146	$ 229,840	$ 236,735
Sewage Treatment	$ 461,570		$ 160,921	$ 91,000	$ 93,730	$ 96,542	$ 99,438	$ 102,421	$ 105,494	$ 108,659
Source Control	$ 214,509	$ 51,060	$ 65,249	$ 45,267	$ 46,625	$ 48,024	$ 49,464	$ 50,948	$ 52,477	$ 54,051
Gross Expenses	**$ 1,089,357**	**$ 66,585**	**$ 244,772**	**$ 345,742**	**$ 356,114**	**$ 377,878**	**$ 389,214**	**$ 400,890**	**$ 412,917**	**$ 425,305**
Offsetting Income										
Secure Property Taxes**	$ 10,257	$ 10,471	$ 3,425	$ 10,322	$ 10,300	$ 10,609	$ 10,927	$ 11,255	$ 11,593	$ 11,941
Unsecured Property Taxes	$ 1,407	$ 1,383	$ 435	$ 1,226	$ 1,300	$ 1,300	$ 1,300	$ 1,300	$ 1,300	$ 1,300
Interest Earned***	$ 12,427	$ 22,469	$ 4,911	$ 21,655	$ 22,569	$ 22,569	$ 22,569	$ 22,569	$ 22,569	$ 22,569
HOPTR	$ 214	$ 206	$ 66	$ 188	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100
Annexation Charges	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Connection Charges	$ 2,292	$ 352	$ -	$ 323	$ 300	$ 300	$ 300	$ 300	$ 300	$ 300
Miscellaneous Revenue	$ 176	$ 172	$ 71	$ 299	$ 150	$ 150	$ 150	$ 150	$ 150	$ 150
Total Offsetting Income	**$ 26,773**	**$ 35,053**	**$ 8,908**	**$ 34,013**	**$ 34,719**	**$ 35,028**	**$ 35,346**	**$ 35,674**	**$ 36,011**	**$ 36,359**
Use of Fund Balance	**$ -**	**$ -**	**$ (46,103)**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Net Revenue Requirements	**$ 1,062,584**	**$ 31,532**	**$ 189,761**	**$ 311,729**	**$ 321,396**	**$ 342,850**	**$ 353,868**	**$ 365,217**	**$ 376,906**	**$ 388,945**
Annual Rate Assuming 282 Connections****					**1,140**	**1,216**	**1,255**	**1,295**	**1,337**	**1,379**

Note:

*Projected CIP is paid for over 5 years.

**Secure Property Tax revenue is assumed to increase at 3% per year

***Interest Earned in projected years is calculated as 5% of Beginning Fund Balance

****Current Rate is $179.

Harbor Industrial Alternative 2 Fund Balance

Item	1994/95	1995/96	1996/97	1997/98	Projected 1998/99 Budget	1999/00	2000/01	Projected 2001/02	2002/03	2003/04
Beginning Fund Balance	$ 285,951	$ 366,384	$ 497,476	$ 451,373	$ 451,373	$ 451,373	$ 451,373	$ 451,373	$ 451,373	$ 451,373
Additions to/(Use of) Balance	$ 80,433	$ 131,092	$ (46,103)	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ending Fund Balance	$ 366,384	$ 497,476	$ 451,373	$ 451,373	$ 451,373	$ 451,373	$ 451,373	$ 451,373	$ 451,373	$ 451,373

Harbor Industrial Alternative 3 CIP Summary

Project	Priority	Alternative 3	Alt 3 Description
Elmer Street	3	$ 52,300	Remove and Replace
Total		**$ 52,300**	

Harbor Industrial Alternative 3 Revenue Requirements

Item	1994/95	1995/96	1996/97	1997/98	1998/99 Budget	1999/00	2000/01	Projected 2001/02	2002/03	2003/04
Expenses										
Admin/Eng	$ 120,849	$ 10,277	$ 9,660	$ 8,935	$ 9,203	$ 9,479	$ 9,764	$ 10,056	$ 10,358	$ 10,669
Capital Projects*	$ -	$ -	$ -	$ -	$ -	$ 10,460	$ 10,774	$ 11,097	$ 11,430	$ 11,773
Debt Service	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
O&M	$ 84,148	$ 5,248	$ 1,863	$ 2,278	$ 2,346	$ 2,417	$ 2,489	$ 2,564	$ 2,641	$ 2,720
Other	$ 208,281		$ 7,079	$ 198,262	$ 204,210	$ 210,336	$ 216,646	$ 223,146	$ 229,840	$ 236,735
Sewage Treatment	$ 461,570		$ 160,921	$ 91,000	$ 93,730	$ 96,542	$ 99,438	$ 102,421	$ 105,494	$ 108,659
Source Control	$ 214,509	$ 51,060	$ 65,249	$ 45,267	$ 46,625	$ 48,024	$ 49,464	$ 50,948	$ 52,477	$ 54,051
Gross Expenses	**$ 1,089,357**	**$ 66,585**	**$ 244,772**	**$ 345,742**	**$ 356,114**	**$ 377,258**	**$ 388,575**	**$ 400,233**	**$ 412,240**	**$ 424,607**
Offsetting Income										
Secure Property Taxes**	$ 10,257	$ 10,471	$ 3,425	$ 10,322	$ 10,300	$ 10,609	$ 10,927	$ 11,255	$ 11,593	$ 11,941
Unsecured Property Taxes	$ 1,407	$ 1,383	$ 435	$ 1,226	$ 1,300	$ 1,300	$ 1,300	$ 1,300	$ 1,300	$ 1,300
Interest Earned***	$ 12,427	$ 22,469	$ 4,911	$ 21,655	$ 22,569	$ 22,569	$ 22,569	$ 22,569	$ 22,569	$ 22,569
HOPTR	$ 214	$ 206	$ 66	$ 188	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100
Annexation Charges	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Connection Charges	$ 2,292	$ 352	$ -	$ 323	$ 300	$ 300	$ 300	$ 300	$ 300	$ 300
Miscellaneous Revenue	$ 176	$ 172	$ 71	$ 299	$ 150	$ 150	$ 150	$ 150	$ 150	$ 150
Total Offsetting Income	**$ 26,773**	**$ 35,053**	**$ 8,908**	**$ 34,013**	**$ 34,719**	**$ 35,027.65**	**$ 35,345.92**	**$ 35,673.74**	**$ 36,011.39**	**$ 36,359.17**
Use of Fund Balance	**$ -**	**$ -**	**$ (46,103)**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Net Revenue Requirements	**$ 1,062,584**	**$ 31,532**	**$ 189,761**	**$ 311,729**	**$ 321,396**	**$ 342,230**	**$ 353,229**	**$ 364,559**	**$ 376,228**	**$ 388,248**
Annual Rate Assuming 282 Connections****					**1,140**	**1,214**	**1,253**	**1,293**	**1,334**	**1,377**

Note:

*Projected CIP is paid for over 5 years.

**Secure Property Tax revenue is assumed to increase at 3% per year

***Interest Earned in projected years is calculated as 5% of Beginning Fund Balance

****Current Rate is $179.

Harbor Industrial Alternative 3 Fund Balance

Item	1994/95	1995/96	1996/97	1997/98	Projected 1998/99 Budget	1999/00	2000/01	Projected 2001/02	2002/03	2003/04
Beginning Fund Balance	$ 285,951	$ 366,384	$ 497,476	$ 451,373	$ 451,373	$ 451,373	$ 451,373	$ 451,373	$ 451,373	$ 451,373
Additions to/(Use of) Balance	$ 80,433	$ 131,092	$ (46,103)	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ending Fund Balance	$ 366,384	$ 497,476	$ 451,373	$ 451,373	$ 451,373	$ 451,373	$ 451,373	$ 451,373	$ 451,373	$ 451,373

Harbor Industrial Average Alternative CIP Summary

Project	Priority	Minimum Cost	Maximum Cost	Average
Elmer Street	3	$49,300	$55,400	$52,350
Total		**$49,300**	**$55,400**	**$52,350**

Harbor Industrial Average Alternative Revenue Requirements

Item	1994/95	1995/96	1996/97	1997/98	1998/99 Budget	1999/00	2000/01	Projected 2001/02	2002/03	2003/04
Expenses										
Admin/Eng	$ 120,849	$ 10,277	$ 9,660	$ 8,935	$ 9,203	$ 9,479	$ 9,764	$ 10,056	$ 10,358	$ 10,669
Capital Projects*	$ -	$ -	$ -	$ -	$ -	$ 10,470	$ 10,784	$ 11,108	$ 11,441	$ 11,784
Debt Service	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
O&M	$ 84,148	$ 5,248	$ 1,863	$ 2,278	$ 2,346	$ 2,417	$ 2,489	$ 2,564	$ 2,641	$ 2,720
Other	$ 208,281		$ 7,079	$ 198,262	$ 204,210	$ 210,336	$ 216,646	$ 223,146	$ 229,840	$ 236,735
Sewage Treatment	$ 461,570		$ 160,921	$ 91,000	$ 93,730	$ 96,542	$ 99,438	$ 102,421	$ 105,494	$ 108,659
Source Control	$ 214,509	$ 51,060	$ 65,249	$ 45,267	$ 46,625	$ 48,024	$ 49,464	$ 50,948	$ 52,477	$ 54,051
Gross Expenses	**$ 1,089,357**	**$ 66,585**	**$ 244,772**	**$ 345,742**	**$ 356,114**	**$ 377,268**	**$ 388,586**	**$ 400,243**	**$ 412,251**	**$ 424,618**
Offsetting Income										
Secure Property Taxes**	$ 10,257	$ 10,471	$ 3,425	$ 10,322	$ 10,300	$ 10,609	$ 10,927	$ 11,255	$ 11,593	$ 11,941
Unsecured Property Taxes	$ 1,407	$ 1,383	$ 435	$ 1,226	$ 1,300	$ 1,300	$ 1,300	$ 1,300	$ 1,300	$ 1,300
Interest Earned***	$ 12,427	$ 22,469	$ 4,911	$ 21,655	$ 22,569	$ 22,569	$ 22,569	$ 22,569	$ 22,569	$ 22,569
HOPTR	$ 214	$ 206	$ 66	$ 188	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100
Annexation Charges	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Connection Charges	$ 2,292	$ 352	$ -	$ 323	$ 300	$ 300	$ 300	$ 300	$ 300	$ 300
Miscellaneous Revenue	$ 176	$ 172	$ 71	$ 299	$ 150	$ 150	$ 150	$ 150	$ 150	$ 150
Total Offsetting Income	**$ 26,773**	**$ 35,053**	**$ 8,908**	**$ 34,013**	**$ 34,719**	**$ 35,027.65**	**$ 35,345.92**	**$ 35,673.74**	**$ 36,011.39**	**$ 36,359.17**
Use of Fund Balance	**$ -**	**$ -**	**$ (46,103)**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Net Revenue Requirements	**$ 1,062,584**	**$ 31,532**	**$ 189,761**	**$ 311,729**	**$ 321,396**	**$ 342,240**	**$ 353,240**	**$ 364,570**	**$ 376,239**	**$ 388,259**
Annual Rate Assuming 282 Connections****					**1,140**	**1,214**	**1,253**	**1,293**	**1,334**	**1,377**

Note:
*Projected CIP is paid for over 5 years.
**Secure Property Tax revenue is assumed to increase at 3% per year
***Interest Earned in projected years is calculated as 5% of Beginning Fund Balance
****Current Rate is $179.

Harbor Industrial Average Alternative Fund Balance

Item	1994/95	1995/96	1996/97	1997/98	Projected 1998/99 Budget	1999/00	2000/01	Projected 2001/02	2002/03	2003/04
Beginning Fund Balance	$ 285,951	$ 366,384	$ 497,476	$ 451,373	$ 451,373	$ 451,373	$ 451,373	$ 451,373	$ 451,373	$ 451,373
Additions to/(Use of) Balance	$ 80,433	$ 131,092	$ (46,103)	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ending Fund Balance	$ 366,384	$ 497,476	$ 451,373	$ 451,373	$ 451,373	$ 451,373	$ 451,373	$ 451,373	$ 451,373	$ 451,373

Inflator 3%

Kensington Square Alternative 1 CIP Summary

Project	Priority	Alternative 1	Alt 1 Description
Upton Street	3	$ 136,600	Increase O & M, 44 Spot Repair
Total		**$ 136,600**	

Kennisington Square Alternative 1 Revenue Requirements

Item	1994/95	1995/96	1996/97	1997/98	Projected 1998/99 Budget	Projected 1999/00	2000/01	2001/02	2002/03	2003/04
Expenses										
Admin/Eng	$ 2,411	$ 930	$ 774	$ 3,704	$ 3,815	$ 3,930	$ 4,047	$ 4,169	$ 4,294	$ 4,423
Capital Projects*	$ -	$ -	$ -	$ -	$ -	$ 27,320	$ 28,140	$ 28,984	$ 29,853	$ 30,749
Debt Service	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
O&M	$ 1,777	$ 5,122	$ 5,492	$ 2,412	$ 2,484	$ 2,559	$ 2,636	$ 2,715	$ 2,796	$ 2,880
Other	$ -	$ -	$ 1,843		$ -	$ -	$ -	$ -	$ -	$ -
Sewage Treatment	$ 14,564	$ 15,025	$ 15,025	$ 15,025	$ 15,476	$ 15,940	$ 16,418	$ 16,911	$ 17,418	$ 17,941
Source Control	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Gross Expenses	**$ 18,752**	**$ 21,077**	**$ 23,134**	**$ 21,141**	**$ 21,775**	**$ 49,748**	**$ 51,241**	**$ 52,778**	**$ 54,362**	**$ 55,992**
Offsetting Revenue										
Secure Property Taxes**	$ 2,865	$ 3,234	$ 3,425	$ 3,630	$ 3,500	$ 3,605	$ 3,713	$ 3,825	$ 3,939	$ 4,057
Unsecured Property Taxes	$ 391	$ 430	$ 435	$ 432	$ 450	$ 450	$ 450	$ 450	$ 450	$ 450
Interest Earned***	$ 2,156	$ 3,559	$ 4,911	$ 6,339	$ 4,962	$ 4,962	$ 4,962	$ 4,962	$ 4,962	$ 4,962
HOPTR	$ 59	$ 63	$ 66	$ 66	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60
Annexation Charges	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Connection Charges	$ 3,990	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous Revenue	$ 49	$ 51	$ 71	$ 104	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100
Total Offsetting Revenue	**$ 9,510**	**$ 7,337**	**$ 8,908**	**$ 10,571**	**$ 9,072**	**$ 9,177**	**$ 9,286**	**$ 9,397**	**$ 9,512**	**$ 9,630**
Use of Fund Balance	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Net Revenue Requirements	**$ 9,242**	**$ 13,740**	**$ 14,226**	**$ 10,570**	**$ 12,703**	**$ 40,571**	**$ 41,955**	**$ 43,381**	**$ 44,850**	**$ 46,362**
Annual Rate Assuming 74 Connections****					**172**	**548**	**567**	**586**	**606**	**627**

Note:
*Projected CIP is paid over 5 years.
**Secure Property Tax revenue is assumed to increase at 3% per year
***Interest Earned in projected years is calculated as 5% of Beginning Fund Balance
****Current Rate is $247.

Kennsington Square Alternative 1 Fund Balance

Item	1994/95	1995/96	1996/97	1997/98	Projected 1998/99 Budget	Projected 1999/00	2000/01	2001/02	2002/03	2003/04
Beginning Fund Balance	$ 52,420	$ 60,845	$ 79,945	$ 99,249	$ 99,249	$ 99,249	$ 99,249	$ 99,249	$ 99,249	$ 99,249
Additions to/(Use of) Balance	$ 8,425	$ 19,100	$ 19,304	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ending Fund Balance	$ 60,845	$ 79,945	$ 99,249	$ 99,249	$ 99,249	$ 99,249	$ 99,249	$ 99,249	$ 99,249	$ 99,249

Kensington Square Alternative 2 CIP Summary

Project	Priority	Alternative 2	Alt 2 Description
Upton Street	3	$ 121,700	Pipe Bursting
Total		**$ 121,700**	

Kennisington Square Alternative 2 Revenue Requirements

Item	1994/95	1995/96	1996/97	1997/98	Projected 1998/99 Budget	1999/00	2000/01	Projected 2001/02	2002/03	2003/04
Expenses										
Admin/Eng	$ 2,411	$ 930	$ 774	$ 3,704	$ 3,815	$ 3,930	$ 4,047	$ 4,169	$ 4,294	$ 4,423
Capital Projects*	$ -	$ -	$ -	$ -	$ -	$ 24,340	$ 25,070	$ 25,822	$ 26,597	$ 27,395
Debt Service	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
O&M	$ 1,777	$ 5,122	$ 5,492	$ 2,412	$ 2,484	$ 2,559	$ 2,636	$ 2,715	$ 2,796	$ 2,880
Other	$ -	$ -	$ 1,843		$ -	$ -	$ -	$ -	$ -	$ -
Sewage Treatment	$ 14,564	$ 15,025	$ 15,025	$ 15,025	$ 15,476	$ 15,940	$ 16,418	$ 16,911	$ 17,418	$ 17,941
Source Control	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Gross Expenses	**$ 18,752**	**$ 21,077**	**$ 23,134**	**$ 21,141**	**$ 21,775**	**$ 46,768**	**$ 48,172**	**$ 49,617**	**$ 51,105**	**$ 52,638**
Offsetting Revenue										
Secure Property Taxes**	$ 2,865	$ 3,234	$ 3,425	$ 3,630	$ 3,500	$ 3,605	$ 3,713	$ 3,825	$ 3,939	$ 4,057
Unsecured Property Taxes	$ 391	$ 430	$ 435	$ 432	$ 450	$ 450	$ 450	$ 450	$ 450	$ 450
Interest Earned***	$ 2,156	$ 3,559	$ 4,911	$ 6,339	$ 4,962	$ 4,962	$ 4,962	$ 4,962	$ 4,962	$ 4,962
HOPTR	$ 59	$ 63	$ 66	$ 66	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60
Annexation Charges	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Connection Charges	$ 3,990	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous Revenue	$ 49	$ 51	$ 71	$ 104	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100
Total Offsetting Revenue	**$ 9,510**	**$ 7,337**	**$ 8,908**	**$ 10,571**	**$ 9,072**	**$ 9,177**	**$ 9,286**	**$ 9,397**	**$ 9,512**	**$ 9,630**
Use of Fund Balance	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Net Revenue Requirements	**$ 9,242**	**$ 13,740**	**$ 14,226**	**$ 10,570**	**$ 12,703**	**$ 37,591**	**$ 38,886**	**$ 40,220**	**$ 41,593**	**$ 43,008**
Annual Rate Assuming 74 Connections****					172	508	525	544	562	581

Note:

*Projected CIP is paid over 5 years.

**Secure Property Tax revenue is assumed to increase at 3% per year

***Interest Earned in projected years is calculated as 5% of Beginning Fund Balance

****Current Rate is $247.

Kennsington Square Alternative 2 Fund Balance

Item	1994/95	1995/96	1996/97	1997/98	Projected 1998/99 Budget	1999/00	2000/01	Projected 2001/02	2002/03	2003/04
Beginning Fund Balance	$ 52,420	$ 60,845	$ 79,945	$ 99,249	$ 99,249	$ 99,249	$ 99,249	$ 99,249	$ 99,249	$ 99,249
Additions to/(Use of) Balance	$ 8,425	$ 19,100	$ 19,304	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ending Fund Balance	$ 60,845	$ 79,945	$ 99,249	$ 99,249	$ 99,249	$ 99,249	$ 99,249	$ 99,249	$ 99,249	$ 99,249

Kensington Square Alternative 3 CIP Summary

Project	Priority	Alternative 3	Alt 3 Description
Upton Street	3	$ 114,900	Remove and Replace
Total		**$ 114,900**	

Kennisington Square Alternative 3 Revenue Requirements

Item	1994/95	1995/96	1996/97	1997/98	Projected 1998/99 Budget	1999/00	2000/01	Projected 2001/02	2002/03	2003/04
Expenses										
Admin/Eng	$ 2,411	$ 930	$ 774	$ 3,704	$ 3,815	$ 3,930	$ 4,047	$ 4,169	$ 4,294	$ 4,423
Capital Projects*	$ -	$ -	$ -	$ -	$ -	$ 22,980	$ 23,669	$ 24,379	$ 25,111	$ 25,864
Debt Service	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
O&M	$ 1,777	$ 5,122	$ 5,492	$ 2,412	$ 2,484	$ 2,559	$ 2,636	$ 2,715	$ 2,796	$ 2,880
Other	$ -	$ -	$ 1,843		$ -	$ -	$ -	$ -	$ -	$ -
Sewage Treatment	$ 14,564	$ 15,025	$ 15,025	$ 15,025	$ 15,476	$ 15,940	$ 16,418	$ 16,911	$ 17,418	$ 17,941
Source Control	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Gross Expenses	**$ 18,752**	**$ 21,077**	**$ 23,134**	**$ 21,141**	**$ 21,775**	**$ 45,408**	**$ 46,771**	**$ 48,174**	**$ 49,619**	**$ 51,108**
Offsetting Revenue										
Secure Property Taxes**	$ 2,865	$ 3,234	$ 3,425	$ 3,630	$ 3,500	$ 3,605	$ 3,713	$ 3,825	$ 3,939	$ 4,057
Unsecured Property Taxes	$ 391	$ 430	$ 435	$ 432	$ 450	$ 450	$ 450	$ 450	$ 450	$ 450
Interest Earned***	$ 2,156	$ 3,559	$ 4,911	$ 6,339	$ 4,962	$ 4,962	$ 4,962	$ 4,962	$ 4,962	$ 4,962
HOPTR	$ 59	$ 63	$ 66	$ 66	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60
Annexation Charges	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Connection Charges	$ 3,990	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous Revenue	$ 49	$ 51	$ 71	$ 104	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100
Total Offsetting Revenue	**$ 9,510**	**$ 7,337**	**$ 8,908**	**$ 10,571**	**$ 9,072**	**$ 9,177.45**	**$ 9,285.60**	**$ 9,396.99**	**$ 9,511.73**	**$ 9,629.91**
Use of Fund Balance	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Net Revenue Requirements	**$ 9,242**	**$ 13,740**	**$ 14,226**	**$ 10,570**	**$ 12,703**	**$ 36,231**	**$ 37,485**	**$ 38,777**	**$ 40,107**	**$ 41,478**
Annual Rate Assuming 74 Connections****					**172**	**490**	**507**	**524**	**542**	**561**

Note:

*Projected CIP is paid over 5 years.

**Secure Property Tax revenue is assumed to increase at 3% per year

***Interest Earned in projected years is calculated as 5% of Beginning Fund Balance

****Current Rate is $247.

Kennsington Square Alternative 3 Fund Balance

Item	1994/95	1995/96	1996/97	1997/98	Projected 1998/99 Budget	1999/00	2000/01	Projected 2001/02	2002/03	2003/04
Beginning Fund Balance	$ 52,420	$ 60,845	$ 79,945	$ 99,249	$ 99,249	$ 99,249	$ 99,249	$ 99,249	$ 99,249	$ 99,249
Additions to/(Use of) Balance	$ 8,425	$ 19,100	$ 19,304	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ending Fund Balance	$ 60,845	$ 79,945	$ 99,249	$ 99,249	$ 99,249	$ 99,249	$ 99,249	$ 99,249	$ 99,249	$ 99,249

Kensington Square Average Alternative CIP Summary

Project	Priority	Minimum Cost	Maximum Cost	Average
Upton Street	3	$114,900	$136,600	$125,750
Total		**$114,900**	**$136,600**	**$125,750**

Kennisington Square Average Alternative Revenue Requirements

Item	1994/95	1995/96	1996/97	1997/98	Projected 1998/99 Budget	1999/00	2000/01	Projected 2001/02	2002/03	2003/04
Expenses										
Admin/Eng	$ 2,411	$ 930	$ 774	$ 3,704	$ 3,815	$ 3,930	$ 4,047	$ 4,169	$ 4,294	$ 4,423
Capital Projects*	$ -	$ -	$ -	$ -	$ -	$ 25,150	$ 25,905	$ 26,682	$ 27,482	$ 28,307
Debt Service	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
O&M	$ 1,777	$ 5,122	$ 5,492	$ 2,412	$ 2,484	$ 2,559	$ 2,636	$ 2,715	$ 2,796	$ 2,880
Other	$ -	$ -	$ 1,843		$ -	$ -	$ -	$ -	$ -	$ -
Sewage Treatment	$ 14,564	$ 15,025	$ 15,025	$ 15,025	$ 15,476	$ 15,940	$ 16,418	$ 16,911	$ 17,418	$ 17,941
Source Control	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Gross Expenses	**$ 18,752**	**$ 21,077**	**$ 23,134**	**$ 21,141**	**$ 21,775**	**$ 47,578**	**$ 49,006**	**$ 50,476**	**$ 51,990**	**$ 53,550**
Offsetting Revenue										
Secure Property Taxes**	$ 2,865	$ 3,234	$ 3,425	$ 3,630	$ 3,500	$ 3,605	$ 3,713	$ 3,825	$ 3,939	$ 4,057
Unsecured Property Taxes	$ 391	$ 430	$ 435	$ 432	$ 450	$ 450	$ 450	$ 450	$ 450	$ 450
Interest Earned***	$ 2,156	$ 3,559	$ 4,911	$ 6,339	$ 4,962	$ 4,962	$ 4,962	$ 4,962	$ 4,962	$ 4,962
HOPTR	$ 59	$ 63	$ 66	$ 66	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60
Annexation Charges	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Connection Charges	$ 3,990	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous Revenue	$ 49	$ 51	$ 71	$ 104	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100
Total Offsetting Revenue	**$ 9,510**	**$ 7,337**	**$ 8,908**	**$ 10,571**	**$ 9,072**	**$ 9,177.45**	**$ 9,285.60**	**$ 9,396.99**	**$ 9,511.73**	**$ 9,629.91**
Use of Fund Balance	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Net Revenue Requirements	**$ 9,242**	**$ 13,740**	**$ 14,226**	**$ 10,570**	**$ 12,703**	**$ 38,401**	**$ 39,720**	**$ 41,079**	**$ 42,479**	**$ 43,920**
Annual Rate Assuming 74 Connections****					**172**	**519**	**537**	**555**	**574**	**594**

Note:

*Projected CIP is paid over 5 years.

**Secure Property Tax revenue is assumed to increase at 3% per year

***Interest Earned in projected years is calculated as 5% of Beginning Fund Balance

****Current Rate is $247.

Kennsington Square Average Alternative Fund Balance

Item	1994/95	1995/96	1996/97	1997/98	Projected 1998/99 Budget	1999/00	2000/01	Projected 2001/02	2002/03	2003/04
Beginning Fund Balance	$ 52,420	$ 60,845	$ 79,945	$ 99,249	$ 99,249	$ 99,249	$ 99,249	$ 99,249	$ 99,249	$ 99,249
Additions to/(Use of) Balance	$ 8,425	$ 19,100	$ 19,304	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ending Fund Balance	$ 60,845	$ 79,945	$ 99,249	$ 99,249	$ 99,249	$ 99,249	$ 99,249	$ 99,249	$ 99,249	$ 99,249

Inflator 3%

Oak Knoll Alternative 1 CIP Summary

Project	Priority	Alternative 1	Alt 1 Description
Moloney Court	3	$ 26,400	Increase O & M, 2 Spot Repair
Don Court	3	$ 35,900	Increase O & M
Total		**$ 62,300**	

Oak Knoll Alternative 1 Revenue Requirements

Item	1994/95	1995/96	1996/97	1997/98	Projected 1998/99 Budget	1999/00	2000/01	Projected 2001/02	2002/03	2003/04
Expenses										
Admin/Eng	$ 17,053	$ 9,354	$ 2,465	$ 5,783	$ 5,956	$ 6,135	$ 6,319	$ 6,509	$ 6,704	$ 6,905
Capital Projects*	$ -	$ -	$ -	$ -	$ -	$ 12,460	$ 12,834	$ 13,219	$ 13,615	$ 14,024
Debt Service	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
O&M	$ 6,784	$ 8,301	$ 5,244	$ 1,694	$ 1,745	$ 1,797	$ 1,851	$ 1,907	$ 1,964	$ 2,023
Other	$ -	$ -	$ 8,536	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Sewage Treatment	$ 19,821	$ 21,319	$ 21,522	$ 21,928	$ 22,586	$ 23,263	$ 23,961	$ 24,680	$ 25,421	$ 26,183
Source Control	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Gross Expenses	**$ 43,658**	**$ 38,974**	**$ 37,767**	**$ 29,405**	**$ 30,287**	**$ 43,656**	**$ 44,965**	**$ 46,314**	**$ 47,704**	**$ 49,135**
Offsetting Revenue										
Secure Property Taxes**	$ 900	$ 921	$ 966	$ 1,006	$ 1,000	$ 1,030	$ 1,061	$ 1,093	$ 1,126	$ 1,159
Unsecured Property Taxes	$ 124	$ 123	$ 123	$ 120	$ 120	$ 120	$ 120	$ 120	$ 120	$ 120
Interest Earned***	$ 2,134	$ 3,331	$ 4,448	$ 6,291	$ 4,539	$ 4,539	$ 4,539	$ 4,539	$ 4,539	$ 4,539
HOPTR	$ 19	$ 18	$ 19	$ 18	$ 20	$ 20	$ 20	$ 20	$ 20	$ 20
Annexation Charges	$ 800	$ 400		$ 800	$ 400	$ 400	$ 400	$ 400	$ 400	$ 400
Connection Charges	$ 7,018	$ 6,098	$ 20	$ 11,319	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000
Miscellaneous Revenue	$ 16	$ 15		$ 384	$ 15	$ 15	$ 15	$ 15	$ 15	$ 15
Total Offsetting Revenue	**$ 11,011**	**$ 10,906**	**$ 5,576**	**$ 19,938**	**$ 11,094**	**$ 11,124**	**$ 11,155**	**$ 11,187**	**$ 11,220**	**$ 11,253**
Use of Fund Balance	**$ (6,098)**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Net Revenue Requirements	**$ 26,549**	**$ 28,068**	**$ 32,191**	**$ 9,467**	**$ 19,193**	**$ 32,532**	**$ 33,811**	**$ 35,128**	**$ 36,484**	**$ 37,882**
Annual Rate Assuming 96 Connections****					**200**	**339**	**352**	**366**	**380**	**395**

Note:

*Projected CIP is paid over 5 years and each years payment is inflated by 3%.

**Secure Property Tax revenue is assumed to increase at 3% per year

**Interest Earned in projected years is calculated as 5% of Beginning Fund Balance

****Current Rate is $275.

Oak Knoll Alternative 1 Fund Balance

Item	1994/95	1995/96	1996/97	1997/98	Projected 1998/99 Budget	1999/00	2000/01	Projected 2001/02	2002/03	2003/04
Beginning Fund Balance	$ 57,296	$ 51,198	$ 72,490	$ 90,780	$ 90,780	$ 90,780	$ 90,780	$ 90,780	$ 90,780	$ 90,780
Additions to/(Use of) Balance	$ (6,098)	$ 21,292	$ 18,290	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ending Fund Balance	$ 51,198	$ 72,490	$ 90,780	$ 90,780	$ 90,780	$ 90,780	$ 90,780	$ 90,780	$ 90,780	$ 90,780

Oak Knoll Alternative 2 CIP Summary

Project	Priority	Alternative 2	Alt 2 Description
Moloney Court	3	$ 29,800	Pipe Bursting
Don Court	3	$ 43,000	Pipe Bursting
Total		**$ 72,800**	

Oak Knoll Alternative 2 Revenue Requirements

Item	1994/95	1995/96	1996/97	1997/98	Projected 1998/99 Budget	1999/00	2000/01	Projected 2001/02	2002/03	2003/04
Expenses										
Admin/Eng	$ 17,053	$ 9,354	$ 2,465	$ 5,783	$ 5,956	$ 6,135	$ 6,319	$ 6,509	$ 6,704	$ 6,905
Capital Projects*	$ -	$ -	$ -	$ -	$ -	$ 14,560	$ 14,997	$ 15,447	$ 15,910	$ 16,387
Debt Service	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
O&M	$ 6,784	$ 8,301	$ 5,244	$ 1,694	$ 1,745	$ 1,797	$ 1,851	$ 1,907	$ 1,964	$ 2,023
Other	$ -	$ -	$ 8,536	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Sewage Treatment	$ 19,821	$ 21,319	$ 21,522	$ 21,928	$ 22,586	$ 23,263	$ 23,961	$ 24,680	$ 25,421	$ 26,183
Source Control	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Gross Expenses	**$ 43,658**	**$ 38,974**	**$ 37,767**	**$ 29,405**	**$ 30,287**	**$ 45,756**	**$ 47,128**	**$ 48,542**	**$ 49,999**	**$ 51,499**
Offsetting Revenue										
Secure Property Taxes**	$ 900	$ 921	$ 966	$ 1,006	$ 1,000	$ 1,030	$ 1,061	$ 1,093	$ 1,126	$ 1,159
Unsecured Property Taxes	$ 124	$ 123	$ 123	$ 120	$ 120	$ 120	$ 120	$ 120	$ 120	$ 120
Interest Earned***	$ 2,134	$ 3,331	$ 4,448	$ 6,291	$ 4,539	$ 4,539	$ 4,539	$ 4,539	$ 4,539	$ 4,539
HOPTR	$ 19	$ 18	$ 19	$ 18	$ 20	$ 20	$ 20	$ 20	$ 20	$ 20
Annexation Charges	$ 800	$ 400		$ 800	$ 400	$ 400	$ 400	$ 400	$ 400	$ 400
Connection Charges	$ 7,018	$ 6,098	$ 20	$ 11,319	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000
Miscellaneous Revenue	$ 16	$ 15		$ 384	$ 15	$ 15	$ 15	$ 15	$ 15	$ 15
Total Offsetting Revenue	**$ 11,011**	**$ 10,906**	**$ 5,576**	**$ 19,938**	**$ 11,094**	**$ 11,124**	**$ 11,155**	**$ 11,187**	**$ 11,220**	**$ 11,253**
Use of Fund Balance	**$ (6,098)**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Net Revenue Requirements	**$ 26,549**	**$ 28,068**	**$ 32,191**	**$ 9,467**	**$ 19,193**	**$ 34,632**	**$ 35,974**	**$ 37,356**	**$ 38,779**	**$ 40,245**
Annual Rate Assuming 96 Connections****					**200**	**361**	**375**	**389**	**404**	**419**

Note:
*Projected CIP is paid over 5 years and each years payment is inflated by 3%.
**Secure Property Tax revenue is assumed to increase at 3% per year
**Interest Earned in projected years is calculated as 5% of Beginning Fund Balance
****Current Rate is $275.

Oak Knoll Alternative 2 Fund Balance

Item	1994/95	1995/96	1996/97	1997/98	Projected 1998/99 Budget	1999/00	2000/01	Projected 2001/02	2002/03	2003/04
Beginning Fund Balance	$ 57,296	$ 51,198	$ 72,490	$ 90,780	$ 90,780	$ 90,780	$ 90,780	$ 90,780	$ 90,780	$ 90,780
Additions to/(Use of) Balance	$ (6,098)	$ 21,292	$ 18,290	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ending Fund Balance	$ 51,198	$ 72,490	$ 90,780	$ 90,780	$ 90,780	$ 90,780	$ 90,780	$ 90,780	$ 90,780	$ 90,780

Oak Knoll Alternative 3 CIP Summary

Project	Priority	Alternative 3	Alt 3 Description
Moloney Court	3	$ 28,100	Remove and Replace
Don Court	3	$ 40,600	Remove and Replace
Total		**$ 68,700**	

Oak Knoll Alternative 3 Revenue Requirements

Item	1994/95	1995/96	1996/97	1997/98	Projected 1998/99 Budget	1999/00	2000/01	Projected 2001/02	2002/03	2003/04
Expenses										
Admin/Eng	$ 17,053	$ 9,354	$ 2,465	$ 5,783	$ 5,956	$ 6,135	$ 6,319	$ 6,509	$ 6,704	$ 6,905
Capital Projects*	$ -	$ -	$ -	$ -	$ -	$ 13,740	$ 14,152	$ 14,577	$ 15,014	$ 15,464
Debt Service	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
O&M	$ 6,784	$ 8,301	$ 5,244	$ 1,694	$ 1,745	$ 1,797	$ 1,851	$ 1,907	$ 1,964	$ 2,023
Other	$ -	$ -	$ 8,536	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Sewage Treatment	$ 19,821	$ 21,319	$ 21,522	$ 21,928	$ 22,586	$ 23,263	$ 23,961	$ 24,680	$ 25,421	$ 26,183
Source Control	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Gross Expenses	**$ 43,658**	**$ 38,974**	**$ 37,767**	**$ 29,405**	**$ 30,287**	**$ 44,936**	**$ 46,284**	**$ 47,672**	**$ 49,103**	**$ 50,576**
Offsetting Revenue										
Secure Property Taxes**	$ 900	$ 921	$ 966	$ 1,006	$ 1,000	$ 1,030	$ 1,061	$ 1,093	$ 1,126	$ 1,159
Unsecured Property Taxes	$ 124	$ 123	$ 123	$ 120	$ 120	$ 120	$ 120	$ 120	$ 120	$ 120
Interest Earned***	$ 2,134	$ 3,331	$ 4,448	$ 6,291	$ 4,539	$ 4,539	$ 4,539	$ 4,539	$ 4,539	$ 4,539
HOPTR	$ 19	$ 18	$ 19	$ 18	$ 20	$ 20	$ 20	$ 20	$ 20	$ 20
Annexation Charges	$ 800	$ 400		$ 800	$ 400	$ 400	$ 400	$ 400	$ 400	$ 400
Connection Charges	$ 7,018	$ 6,098	$ 20	$ 11,319	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000
Miscellaneous Revenue	$ 16	$ 15		$ 384	$ 15	$ 15	$ 15	$ 15	$ 15	$ 15
Total Offsetting Revenue	**$ 11,011**	**$ 10,906**	**$ 5,576**	**$ 19,938**	**$ 11,094**	**$ 11,124.00**	**$ 11,154.90**	**$ 11,186.73**	**$ 11,219.51**	**$ 11,253.27**
Use of Fund Balance	**$ (6,098)**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Net Revenue Requirements	**$ 26,549**	**$ 28,068**	**$ 32,191**	**$ 9,467**	**$ 19,193**	**$ 33,812**	**$ 35,129**	**$ 36,486**	**$ 37,883**	**$ 39,322**
Annual Rate Assuming 96 Connections****					200	352	366	380	395	410

Note:

*Projected CIP is paid over 5 years and each years payment is inflated by 3%.

**Secure Property Tax revenue is assumed to increase at 3% per year

**Interest Earned in projected years is calculated as 5% of Beginning Fund Balance

****Current Rate is $275.

Oak Knoll Alternative 3 Fund Balance

Item	1994/95	1995/96	1996/97	1997/98	Projected 1998/99 Budget	1999/00	2000/01	Projected 2001/02	2002/03	2003/04
Beginning Fund Balance	$ 57,296	$ 51,198	$ 72,490	$ 90,780	$ 90,780	$ 90,780	$ 90,780	$ 90,780	$ 90,780	$ 90,780
Additions to/(Use of) Balance	$ (6,098)	$ 21,292	$ 18,290	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ending Fund Balance	$ 51,198	$ 72,490	$ 90,780	$ 90,780	$ 90,780	$ 90,780	$ 90,780	$ 90,780	$ 90,780	$ 90,780

Oak Knoll Average Alternative CIP Summary

Project	Priority	Minimum Cost	Maximum Cost	Average
Moloney Court	3	$26,400	$29,800	$28,100
Don Court	3	$35,900	$43,000	$39,450
Total		**$62,300**	**$72,800**	**$67,550**

Oak Knoll Average Alternative Revenue Requirements

Item	1994/95	1995/96	1996/97	1997/98	Projected 1998/99 Budget	1999/00	2000/01	Projected 2001/02	2002/03	2003/04
Expenses										
Admin/Eng	$ 17,053	$ 9,354	$ 2,465	$ 5,783	$ 5,956	$ 6,135	$ 6,319	$ 6,509	$ 6,704	$ 6,905
Capital Projects*	$ -	$ -	$ -	$ -	$ -	$ 13,510	$ 13,915	$ 14,333	$ 14,763	$ 15,206
Debt Service	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
O&M	$ 6,784	$ 8,301	$ 5,244	$ 1,694	$ 1,745	$ 1,797	$ 1,851	$ 1,907	$ 1,964	$ 2,023
Other	$ -	$ -	$ 8,536	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Sewage Treatment	$ 19,821	$ 21,319	$ 21,522	$ 21,928	$ 22,586	$ 23,263	$ 23,961	$ 24,680	$ 25,421	$ 26,183
Source Control	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Gross Expenses	**$ 43,658**	**$ 38,974**	**$ 37,767**	**$ 29,405**	**$ 30,287**	**$ 44,706**	**$ 46,047**	**$ 47,428**	**$ 48,851**	**$ 50,317**
Offsetting Revenue										
Secure Property Taxes**	$ 900	$ 921	$ 966	$ 1,006	$ 1,000	$ 1,030	$ 1,061	$ 1,093	$ 1,126	$ 1,159
Unsecured Property Taxes	$ 124	$ 123	$ 123	$ 120	$ 120	$ 120	$ 120	$ 120	$ 120	$ 120
Interest Earned***	$ 2,134	$ 3,331	$ 4,448	$ 6,291	$ 4,539	$ 4,539	$ 4,539	$ 4,539	$ 4,539	$ 4,539
HOPTR	$ 19	$ 18	$ 19	$ 18	$ 20	$ 20	$ 20	$ 20	$ 20	$ 20
Annexation Charges	$ 800	$ 400		$ 800	$ 400	$ 400	$ 400	$ 400	$ 400	$ 400
Connection Charges	$ 7,018	$ 6,098	$ 20	$ 11,319	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000
Miscellaneous Revenue	$ 16	$ 15		$ 384	$ 15	$ 15	$ 15	$ 15	$ 15	$ 15
Total Offsetting Revenue	**$ 11,011**	**$ 10,906**	**$ 5,576**	**$ 19,938**	**$ 11,094**	**$ 11,124.00**	**$ 11,154.90**	**$ 11,186.73**	**$ 11,219.51**	**$ 11,253.27**
Use of Fund Balance	**$ (6,098)**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Net Revenue Requirements	**$ 26,549**	**$ 28,068**	**$ 32,191**	**$ 9,467**	**$ 19,193**	**$ 33,582**	**$ 34,892**	**$ 36,242**	**$ 37,632**	**$ 39,063**
Annual Rate Assuming 96 Connections****					**200**	**350**	**363**	**378**	**392**	**407**

Note:

*Projected CIP is paid over 5 years and each years payment is inflated by 3%.

**Secure Property Tax revenue is assumed to increase at 3% per year

**Interest Earned in projected years is calculated as 5% of Beginning Fund Balance

****Current Rate is $275.

Oak Knoll Average Alternative Fund Balance

Item	1994/95	1995/96	1996/97	1997/98	Projected 1998/99 Budget	1999/00	2000/01	Projected 2001/02	2002/03	2003/04
Beginning Fund Balance	$ 57,296	$ 51,198	$ 72,490	$ 90,780	$ 90,780	$ 90,780	$ 90,780	$ 90,780	$ 90,780	$ 90,780
Additions to/(Use of) Balance	$ (6,098)	$ 21,292	$ 18,290	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ending Fund Balance	$ 51,198	$ 72,490	$ 90,780	$ 90,780	$ 90,780	$ 90,780	$ 90,780	$ 90,780	$ 90,780	$ 90,780

Inflator 3%

Scenic Heights Alternative 1 CIP Summary

Project	Priority	Alternative 1	Alt 1 Description
Scenic Drive	3	$ 30,500	Increase O & M, 1 Spot Repair
Total		**$ 30,500**	

Scenic Heights Alternative 1 Revenue Requirements

Item	1994/95	1995/96	1996/97	1997/98	Projected 1998/99 Budget	Projected 1999/00	2000/01	2001/02	2002/03	2003/04
Expenses										
Admin/Eng	$ 1,714	$ 497	$ 390	$ 2,265	$ 2,300	$ 2,369	$ 2,440	$ 2,513	$ 2,589	$ 2,666
Capital Projects*	$ -	$ -	$ -	$ -	$ -	$ 6,100	$ 6,283	$ 6,471	$ 6,666	$ 6,866
Debt Service	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
O&M	$ 4,214	$ 3,318	$ 1,921	$ 1,744	$ 1,800	$ 1,854	$ 1,910	$ 1,967	$ 2,026	$ 2,087
Other	$ -		$ 1,843	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Sewage Treatment	$ 10,300	$ 22,281	$ 12,628	$ 12,759	$ 13,000	$ 13,390	$ 13,792	$ 14,205	$ 14,632	$ 15,071
Source Control	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Gross Expenses	**$ 16,228**	**$ 26,096**	**$ 16,782**	**$ 16,768**	**$ 17,100**	**$ 23,713**	**$ 24,424**	**$ 25,157**	**$ 25,912**	**$ 26,689**
Offsetting Revenue										
Secure Property Taxes**	$ 405	$ 419	$ 451	$ 478	$ 450	$ 464	$ 477	$ 492	$ 506	$ 522
Unsecured Property Taxes	$ 55	$ 56	$ 57	$ 57	$ 50	$ 50	$ 50	$ 50	$ 50	$ 50
Interest Earned***	$ 830	$ 1,240	$ 661	$ 379	$ 370	$ 370	$ 370	$ 370	$ 370	$ 370
HOPTR	$ 8	$ 8	$ 9	$ 9	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10
Annexation Charges	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Connection Charges	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous Revenue	$ 7	$ 7	$ 9		$ 10	$ 10	$ 10	$ 10	$ 10	$ 10
Total Offsetting Revenue	**$ 1,305**	**$ 1,730**	**$ 1,187**	**$ 923**	**$ 890**	**$ 904**	**$ 918**	**$ 932**	**$ 947**	**$ 962**
Use of Fund Balance	**$ (2,647)**	**$ (12,094)**	**$ (3,011)**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Net Revenue Requirements	**$ 12,276**	**$ 12,272**	**$ 12,584**	**$ 15,845**	**$ 16,210**	**$ 22,809**	**$ 23,507**	**$ 24,225**	**$ 24,965**	**$ 25,727**
Annual Rate Assuming 50 Connections****					**324**	**456**	**470**	**485**	**499**	**515**

Note:

*Projected CIP is paid over 5 years and each years payment is inflated by 3%.

**Secure Property Tax revenue is assumed to increase at 3% per year

***Interest Earned in projected years is calculated as 5% of Beginning Fund Balance

****Current Rate is $247.

Scenic Heights Alternative 1 Fund Balance

Item	1994/95	1995/96	1996/97	1997/98	Projected 1998/99 Budget	Projected 1999/00	2000/01	2001/02	2002/03	2003/04
Beginning Fund Balance	$ 25,155	$ 22,508	$ 10,414	$ 7,403	$ 7,403	$ 7,403	$ 7,403	$ 7,403	$ 7,403	$ 7,403
Additions to/(Use of) Balance	$ (2,647)	$ (12,094)	$ (3,011)	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ending Fund Balance	$ 22,508	$ 10,414	$ 7,403	$ 7,403	$ 7,403	$ 7,403	$ 7,403	$ 7,403	$ 7,403	$ 7,403

Scenic Heights Alternative 2 CIP Summary

Project	Priority	Alternative 2	Alt 2 Description
Scenic Drive	3	$ 28,400	Pipe Bursting, Sliplining, 1 Spot Repair
Total		**$ 28,400**	

Scenic Heights Alternative 2 Revenue Requirements

Item	1994/95	1995/96	1996/97	1997/98	Projected 1998/99 Budget	Projected 1999/00	2000/01	2001/02	2002/03	2003/04
Expenses										
Admin/Eng	$ 1,714	$ 497	$ 390	$ 2,265	$ 2,300	$ 2,369	$ 2,440	$ 2,513	$ 2,589	$ 2,666
Capital Projects*	$ -	$ -	$ -	$ -	$ -	$ 5,680	$ 5,850	$ 6,026	$ 6,207	$ 6,393
Debt Service	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
O&M	$ 4,214	$ 3,318	$ 1,921	$ 1,744	$ 1,800	$ 1,854	$ 1,910	$ 1,967	$ 2,026	$ 2,087
Other	$ -		$ 1,843	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Sewage Treatment	$ 10,300	$ 22,281	$ 12,628	$ 12,759	$ 13,000	$ 13,390	$ 13,792	$ 14,205	$ 14,632	$ 15,071
Source Control	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Gross Expenses	**$ 16,228**	**$ 26,096**	**$ 16,782**	**$ 16,768**	**$ 17,100**	**$ 23,293**	**$ 23,992**	**$ 24,712**	**$ 25,453**	**$ 26,216**
Offsetting Revenue										
Secure Property Taxes**	$ 405	$ 419	$ 451	$ 478	$ 450	$ 464	$ 477	$ 492	$ 506	$ 522
Unsecured Property Taxes	$ 55	$ 56	$ 57	$ 57	$ 50	$ 50	$ 50	$ 50	$ 50	$ 50
Interest Earned***	$ 830	$ 1,240	$ 661	$ 379	$ 370	$ 370	$ 370	$ 370	$ 370	$ 370
HOPTR	$ 8	$ 8	$ 9	$ 9	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10
Annexation Charges	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Connection Charges	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous Revenue	$ 7	$ 7	$ 9		$ 10	$ 10	$ 10	$ 10	$ 10	$ 10
Total Offsetting Revenue	**$ 1,305**	**$ 1,730**	**$ 1,187**	**$ 923**	**$ 890**	**$ 904**	**$ 918**	**$ 932**	**$ 947**	**$ 962**
Use of Fund Balance	**$ (2,647)**	**$ (12,094)**	**$ (3,011)**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Net Revenue Requirements	**$ 12,276**	**$ 12,272**	**$ 12,584**	**$ 15,845**	**$ 16,210**	**$ 22,389**	**$ 23,074**	**$ 23,780**	**$ 24,506**	**$ 25,255**
Annual Rate Assuming 50 Connections****					**324**	**448**	**461**	**476**	**490**	**505**

Note:

*Projected CIP is paid over 5 years and each years payment is inflated by 3%.

**Secure Property Tax revenue is assumed to increase at 3% per year

***Interest Earned in projected years is calculated as 5% of Beginning Fund Balance

****Current Rate is $247.

Scenic Heights Alternative 2 Fund Balance

Item	1994/95	1995/96	1996/97	1997/98	Projected 1998/99 Budget	Projected 1999/00	2000/01	2001/02	2002/03	2003/04
Beginning Fund Balance	$ 25,155	$ 22,508	$ 10,414	$ 7,403	$ 7,403	$ 7,403	$ 7,403	$ 7,403	$ 7,403	$ 7,403
Additions to/(Use of) Balance	$ (2,647)	$ (12,094)	$ (3,011)	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ending Fund Balance	$ 22,508	$ 10,414	$ 7,403	$ 7,403	$ 7,403	$ 7,403	$ 7,403	$ 7,403	$ 7,403	$ 7,403

Scenic Heights Alternative 3 CIP Summary

Project	Priority	Alternative 3	Alt 3 Description
Scenic Drive	3	$ 33,700	Remove and Replace
Total		**$ 33,700**	

Scenic Heights Alternative 3 Revenue Requirements

Item	1994/95	1995/96	1996/97	1997/98	Projected 1998/99 Budget	1999/00	2000/01	Projected 2001/02	2002/03	2003/04
Expenses										
Admin/Eng	$ 1,714	$ 497	$ 390	$ 2,265	$ 2,300	$ 2,369	$ 2,440	$ 2,513	$ 2,589	$ 2,666
Capital Projects*	$ -	$ -	$ -	$ -	$ -	$ 6,740	$ 6,942	$ 7,150	$ 7,365	$ 7,586
Debt Service	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
O&M	$ 4,214	$ 3,318	$ 1,921	$ 1,744	$ 1,800	$ 1,854	$ 1,910	$ 1,967	$ 2,026	$ 2,087
Other	$ -		$ 1,843	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Sewage Treatment	$ 10,300	$ 22,281	$ 12,628	$ 12,759	$ 13,000	$ 13,390	$ 13,792	$ 14,205	$ 14,632	$ 15,071
Source Control	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Gross Expenses	**$ 16,228**	**$ 26,096**	**$ 16,782**	**$ 16,768**	**$ 17,100**	**$ 24,353**	**$ 25,084**	**$ 25,836**	**$ 26,611**	**$ 27,410**
Offsetting Revenue										
Secure Property Taxes**	$ 405	$ 419	$ 451	$ 478	$ 450	$ 464	$ 477	$ 492	$ 506	$ 522
Unsecured Property Taxes	$ 55	$ 56	$ 57	$ 57	$ 50	$ 50	$ 50	$ 50	$ 50	$ 50
Interest Earned***	$ 830	$ 1,240	$ 661	$ 379	$ 370	$ 370	$ 370	$ 370	$ 370	$ 370
HOPTR	$ 8	$ 8	$ 9	$ 9	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10
Annexation Charges	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Connection Charges	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous Revenue	$ 7	$ 7	$ 9		$ 10	$ 10	$ 10	$ 10	$ 10	$ 10
Total Offsetting Revenue	**$ 1,305**	**$ 1,730**	**$ 1,187**	**$ 923**	**$ 890**	**$ 903.65**	**$ 917.56**	**$ 931.88**	**$ 946.63**	**$ 961.82**
Use of Fund Balance	**$ (2,647)**	**$ (12,094)**	**$ (3,011)**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Net Revenue Requirements	**$ 12,276**	**$ 12,272**	**$ 12,584**	**$ 15,845**	**$ 16,210**	**$ 23,449**	**$ 24,166**	**$ 24,904**	**$ 25,665**	**$ 26,448**
Annual Rate Assuming 50 Connections****					**324**	**469**	**483**	**498**	**513**	**529**

Note:

*Projected CIP is paid over 5 years and each years payment is inflated by 3%.

**Secure Property Tax revenue is assumed to increase at 3% per year

***Interest Earned in projected years is calculated as 5% of Beginning Fund Balance

****Current Rate is $247.

Scenic Heights Alternative 3 Fund Balance

Item	1994/95	1995/96	1996/97	1997/98	Projected 1998/99 Budget	1999/00	2000/01	Projected 2001/02	2002/03	2003/04
Beginning Fund Balance	$ 25,155	$ 22,508	$ 10,414	$ 7,403	$ 7,403	$ 7,403	$ 7,403	$ 7,403	$ 7,403	$ 7,403
Additions to/(Use of) Balance	$ (2,647)	$ (12,094)	$ (3,011)	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ending Fund Balance	$ 22,508	$ 10,414	$ 7,403	$ 7,403	$ 7,403	$ 7,403	$ 7,403	$ 7,403	$ 7,403	$ 7,403

Scenic Heights Average Alternative CIP Summary

Project	Priority	Minimum Cost	Maximum Cost	Average
Scenic Drive	3	$28,400	$33,700	$31,050
Total		**$28,400**	**$33,700**	**$31,050**

Scenic Heights Average Alternative Revenue Requirements

Item	1994/95	1995/96	1996/97	1997/98	Projected 1998/99 Budget	1999/00	2000/01	Projected 2001/02	2002/03	2003/04
Expenses										
Admin/Eng	$ 1,714	$ 497	$ 390	$ 2,265	$ 2,300	$ 2,369	$ 2,440	$ 2,513	$ 2,589	$ 2,666
Capital Projects*	$ -	$ -	$ -	$ -	$ -	$ 6,210	$ 6,396	$ 6,588	$ 6,786	$ 6,989
Debt Service	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
O&M	$ 4,214	$ 3,318	$ 1,921	$ 1,744	$ 1,800	$ 1,854	$ 1,910	$ 1,967	$ 2,026	$ 2,087
Other	$ -		$ 1,843	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Sewage Treatment	$ 10,300	$ 22,281	$ 12,628	$ 12,759	$ 13,000	$ 13,390	$ 13,792	$ 14,205	$ 14,632	$ 15,071
Source Control	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Gross Expenses	**$ 16,228**	**$ 26,096**	**$ 16,782**	**$ 16,768**	**$ 17,100**	**$ 23,823**	**$ 24,538**	**$ 25,274**	**$ 26,032**	**$ 26,813**
Offsetting Revenue										
Secure Property Taxes**	$ 405	$ 419	$ 451	$ 478	$ 450	$ 464	$ 477	$ 492	$ 506	$ 522
Unsecured Property Taxes	$ 55	$ 56	$ 57	$ 57	$ 50	$ 50	$ 50	$ 50	$ 50	$ 50
Interest Earned***	$ 830	$ 1,240	$ 661	$ 379	$ 370	$ 370	$ 370	$ 370	$ 370	$ 370
HOPTR	$ 8	$ 8	$ 9	$ 9	$ 10	$ 10	$ 10	$ 10	$ 10	$ 10
Annexation Charges	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Connection Charges	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Miscellaneous Revenue	$ 7	$ 7	$ 9		$ 10	$ 10	$ 10	$ 10	$ 10	$ 10
Total Offsetting Revenue	**$ 1,305**	**$ 1,730**	**$ 1,187**	**$ 923**	**$ 890**	**$ 903.65**	**$ 917.56**	**$ 931.88**	**$ 946.63**	**$ 961.82**
Use of Fund Balance	**$ (2,647)**	**$ (12,094)**	**$ (3,011)**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Net Revenue Requirements	**$ 12,276**	**$ 12,272**	**$ 12,584**	**$ 15,845**	**$ 16,210**	**$ 22,919**	**$ 23,620**	**$ 24,342**	**$ 25,085**	**$ 25,851**
Annual Rate Assuming 50 Connections****					**324**	**458**	**472**	**487**	**502**	**517**

Note:

*Projected CIP is paid over 5 years and each years payment is inflated by 3%.

**Secure Property Tax revenue is assumed to increase at 3% per year

***Interest Earned in projected years is calculated as 5% of Beginning Fund Balance

****Current Rate is $247.

Scenic Heights Average Alternative Fund Balance

Item	1994/95	1995/96	1996/97	1997/98	Projected 1998/99 Budget	1999/00	2000/01	Projected 2001/02	2002/03	2003/04
Beginning Fund Balance	$ 25,155	$ 22,508	$ 10,414	$ 7,403	$ 7,403	$ 7,403	$ 7,403	$ 7,403	$ 7,403	$ 7,403
Additions to/(Use of) Balance	$ (2,647)	$ (12,094)	$ (3,011)	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Ending Fund Balance	$ 22,508	$ 10,414	$ 7,403	$ 7,403	$ 7,403	$ 7,403	$ 7,403	$ 7,403	$ 7,403	$ 7,403