SECTION 1

EXECUTIVE SUMMARY

1-1 INTRODUCTION

Background

The City of Manhattan Beach is a full service City with a population of 36,718. The City provides sewer services to approximately 3.9 square miles of the land located within its corporate boundaries.

The City's existing wastewater collection system is made up of a network of gravity sewers, pump stations, and force mains. The gravity system consists of approximately 81.6 miles (430,784 ft) of pipe and 2,086 manholes and cleanouts. The system also includes eight pump stations and 5,114 feet of associated forcemains.

Previous Studies and Improvements

The City's last Wastewater System Master Plan was prepared in 1994 by Kennedy/Jenks Consultants. It analyzed the wastewater collection and pumping system to provide service through a planning period that extended to the year 2010. The City's year 1990 population was approximately 32,023.

The 1994 Wastewater System Master Plan included hydraulic analysis of all pipes over 8-inches in diameter. Of those analyzed, only two pipes were identified to be hydraulically inadequate. Video inspections were completed in the "Sand" and "Tree" sections of the City and the facilities were found to be in good condition. An ongoing rehabilitation program was recommended at an estimated annual cost of $250,000.

The pumping system was found to require the most immediate attention. It was recommended that pumps and motors be replaced at six of the primary pump stations. Replacement of the natural gas engines with dedicated generator sets; replacement of dry well ventilation; rehabilitation of pump station wiring, main breakers, starters, and disconnect switches; and conversion of analog alarm SCADA system to digital was also recommended for each station. The total pump station improvement costs were estimated at $707,500.

Five wastewater pump stations were rehabilitated in 1998. These included Pacific Avenue Pump Station, Palm Avenue Pump Station, Meadows Avenue Pump Station, Voorhees Avenue Pump Station, and Bell Avenue Pump Station. Pumps and motors were replaced at each station. Diesel fueled generator sets were installed in the dry wells or on site. Ventilation and SCADA systems were also upgraded.

Objectives

The objective of this Wastewater Master Plan is to evaluate the City's sewer collection system to provide a framework for undertaking the construction of new and replacement facilities for the service area in an efficient and cost effective manner. As a planning document, it is general in nature and is predicated upon the best information available at this time. It will aid the City in meeting some of the requirements of the Statewide General Waste Discharge Requirements issued by the California Regional Water Quality Control Board on May 2, 2006.

1-2 STUDY AREA

Service Area

The City of Manhattan Beach (City) is located on the western edge of Los Angeles County, approximately 22 miles southwest of downtown Los Angeles. The City encompasses approximately 3.9 square miles of residential, commercial, and industrial land. It is a coastal community bounded by the approximately 2 miles of beach frontage to the west. Manhattan Beach is bordered by the City of El Segundo to the north, the Cities of Hawthorne and Redondo Beach to the east, and the Cities of Redondo Beach and Hermosa Beach to the south.

Topographical Description and Geology

The characteristic topography of Manhattan Beach is a series of peaks and valleys throughout the City. The City's highest point is located near the intersection of Sepulveda Boulevard and Longfellow Drive and reaches 235 feet above sea level. The lowest ground elevation is at 0.0 ft, along the beach frontage.

The study area can be roughly divided into two sections based on its topography and soil conditions. A sand dune ridge runs diagonally from a point on the northwest City boundary approximately 2,000 feet from the coast to a point on the southern City boundary approximately 1,000 feet east of Sepulveda Boulevard. To the west of this ridge, the soil is fine dune sand and the topography is hilly. To the east of the ridge, the soil is sandy loam and the land is flat to gently sloping.

Climate

The study area has a Mediterranean climate, enjoying plenty of sunshine throughout the year, with an average of 263 sunshine days and only 35 days with measurable precipitation annually. The period of April through November is warm to hot and dry with average high temperatures of 71 - 79°F and lows of 50 - 62°F. The average annual rainfall of about 13.19 inches occurs primarily during the winter months, between November and March.

Land Use

The City is a well planned urban community with a balance of residential, commercial, and industrial land uses. The primary land use is residential (1,422 net acres or 70.5 %). The total study area includes approximately 2,017 net acres.

Population

The City of Manhattan Beach had a population of 36,718 in 2009. With the total number of housing units at approximately 15,580 and a 3.72 percent vacancy rate, the population per household is estimated to be 2.45 (California Department of Finance, Demographic Research Unit).

1-3 CRITERIA

General

Establishing performance standards is an important part of evaluating existing wastewater collection systems, as it forms the basis for system analysis and system improvement recommendations. These standards include methodology for estimating wastewater design flows and minimum design standards for the collection system pipes, pump stations, and forcemains.

Flow Monitoring

A temporary flow monitoring study was conducted by ADS Environmental Services from December 21, 2008 to March 14, 2009 at eight locations. The flow monitoring sites were strategically selected to aid in the development of unit flow factors and calibration of the model. Sites were selected in an attempt to get a good sampling of data across the study area. At the same time, the areas tributary to each site must generate depths of flow large enough to develop accurate wastewater flows.

Unit Flow Factors

Unit flow factors utilized in this study were developed based upon the existing land uses obtained from the City's GIS, and results of the flow monitoring studies. Water use records, aerial photographs and field reviews supplemented this information.

The average daily flow recorded at each flow monitoring site was utilized in determining calibrated existing unit flow factors for each land use. The flow factors were developed in units of gallons per day per acre.

Peaking Factors

The adequacy of a sewage collection system must be based upon its ability to convey the peak flows. The temporary flow monitoring data was reviewed to develop peaking relationships at each site. As expected, these relationships varied from site to site depending upon the makeup and size of the tributary land use. Based upon the information developed, the following peaking relationships were selected for this study:

$$PDWF\ (mgd) = 2.35 \times ADWF\ (mgd)^{0.92}$$

$$PWWF = 1.35 \times PDWF$$

Where, ADWF = Average Dry Weather Flow

PDWF = Peak Dry Weather Flow

PWWF = Peak Wet Weather Flow

Sewer Design Criteria

Design criteria are established to ensure that the collection system can operate effectively under all flow conditions. Each pipe segment must convey peak wet weather flows without surcharging the system. Low flows must be conveyed at a velocity that will prevent solids from settling and blocking the system. Details of the criteria recommended for the collection system and lift stations, and service to Specific Plan and Development sub-areas are included in Section 4 of this report.

1-4 EXISTING WASTEWATER COLLECTION SYSTEM

General Description

The City of Manhattan Beach's existing sewer collection system, shown in Figure 1-1, is made up of a network of gravity sewers, pump stations, and force mains. The gravity system consists of approximately 81.6 miles (430,784 ft) of pipe and 2,086 manholes and cleanouts. The system also includes eight pump stations and 5,114 feet of associated forcemains.

The majority of the local sewers tie into one of the Los Angeles County Sanitation District (LACSD) trunk sewers crossing through the City. The sewage is then transported to LACSD's Joint Water Pollution Control Plant (JWPCP) in the City of Carson.

The sewers are primarily constructed of vitrified clay pipe with sizes ranging from 6-inches to 21-inches in diameter. Approximately 78 percent of the pipes are 8-inches in diameter. The majority of the City's sewer system was constructed between 1920 and 1960.

Los Angeles County Sanitation District (LACSD) Wastewater Collection System

Regional wastewater services are provided to the City and neighboring agencies by the Los Angeles County Sanitation District (LACSD). The City is a part of LACSD's South Bay Cities District. Regional trunk sewers collect the sewage generated in the service area and transport it to LACSD's Joint Water Pollution Control Plant (JWPCP) for treatment. The JWPCP is located in the southwest corner of City of Carson just east of I-110 freeway.

There are two primary LACSD trunk sewers within the City. The first trunk runs northwest to southeast and parallels The Strand along the beachfront. The second trunk runs west to east and is located in 26th Place, Bell Avenue, 25th Street and Marine Avenue. Pacific Avenue Pump Station, Palm Avenue Pump Station, Poinsettia Avenue Pump Station, Meadows Avenue Pump Station and Voorhees Avenue Pump Station are tributary to this trunk sewer.

1-5 PUMP STATIONS

The City of Manhattan Beach owns and operates eight (8) wastewater pump stations. Table 1-1 provides general information on each facility. Detailed description and planning level evaluation of each pump station are included in Section 6.

1-6 HYDRAULIC MODEL AND COLLECTION SYSTEM CAPACITY ANALYSIS

General

To perform a detailed evaluation of the capacity of the sewer collection system, it is convenient to create a mathematical model that is capable of simulating the operating characteristics of the system. The simulations for this study were performed on a Microsoft Windows based computer utilizing software designed for the analysis of sewer systems. The software selected for this study is InfoSewer. It is an ArcGIS-based computer program with the ability to perform steady state analyses of the flows in the sewer system. InfoSewer offers direct ArcGIS integration allowing GIS analysis and hydraulic modeling to exist in a single environment. The program also manages and maintains the database that stores the sewer analysis input and output results. Manning's Equation is used for depth of flow calculations in the gravity sewer pipes.

Geometric Model

As a part of this Master Plan project, the City's Wastewater GIS was developed. As-built plans were georeferenced and the wastewater facilities were then digitized. Data was collected from the as-built plans and input into the GIS. The developed Wastewater GIS served as the basis of the system geometric model. The hydraulic model includes the entire sewer system that is owned and operated by the City, from the uppermost reaches of the system to its confluence with a Los Angeles County Sanitation District (LACSD) trunk sewer or until the flow exits the City into an adjacent agency facility.

City of El Segundo

City of Hawthorne

City of Redondo Beach

Pacific Ocean

City of Hermosa Beach

Palm Ave PS

Bell Ave PS

Pacific Ave PS

LACSD PS

Civic Center PS

Poinsettia Ave PS

Pier PS

Meadows Ave PS

Voorhees Ave PS

N

0 600 1,200 2,400 Feet

1" = 1,200'

Legend

- Sewer Manholes
- Manhattan Beach Sewage Pump Station
- LACSD Sewage Pump Station
- Manhattan Beach Forcemain
- Manhattan Beach Sewer
- LACSD Trunk Sewer
- City Boundary
- Sewershed 1
- Sewershed 2

CITY OF MANHATTAN BEACH
WASTEWATER MASTER PLAN

Existing Wastewater System

Figure 1-1

PROJECT NO: 1640901.10

DATE: September 2009

Table 1-1
Pump Stations

General Pump Station Information											Pump Specifications					Motor Specifications			Estimated Flows		
Pump Station	Location	Date of Cons.	Plan No.	Area Served (Acres)	Force Main Dia (in)	Force Main Length (ft)	Force Main Material	Type	Wet Well Dimensions	Generator Set	Number of Pumps	Pump Mfg	Pump Type	Pump Model	Estimated Flow Capacity (gpm)	RPM	Phase	HP	ADWF (gpm)	PDWF (gpm)	PWWF (gpm)
Bell Avenue	Bell Ave between 31st St and 31st Pl	1938	S-60 S-150 S-230	78	6	900	CIP	Wetwell/ Drywell	12' x 9.5' x ~7'	Diesel Fueled	2	Flygt	submersible, non-clog	CT3102	263	1750	3	5	70	198	278
Palm Avenue	Palm Ave south of Rosecrans Ave	1953	S-149 S-230	39	6	775	CIP	Wetwell/ Drywell	10' x 4' x ~11.5'	Diesel Fueled	2	Flygt	submersible, non-clog	CT3127	174	1740	3	10	38	114	159
Pacific Avenue	Pacific Ave south of 31st St	1953	S-149	103	6	1,225	CIP	Wetwell/ Drywell	10' x 4' x ~11.5'	Diesel Fueled	2	Flygt	submersible, non-clog	CT3127	304	1740	3	10	98	269	376
Poinsettia Avenue	Poinsettia Ave south of Manhattan Beach Blvd	1949	S-227 S-145	25	4	163	CIP	Wetwell/ Drywell	18.6 ft^2 x 6'-10"	Diesel Fueled	2	Flygt	submersible, non-clog	CT3102	136	NA	3	NA	19	60	85
Meadows Avenue	Meadows Ave south of 9th St	1953	S-148 S-230	99	6	730	CIP	Wetwell/ Drywell	10' x 4' x ~11.5'	Diesel Fueled	2	Flygt	submersible, non-clog	CT3127	304	1740	3	10	77	216	303
Voorhees Avenue	Voorhees Ave at Rowell Ave	1953	S-148 S-230	103	6	1,321	CIP	Wetwell/ Drywell	10' x 4' x ~11.5'	Diesel Fueled	2	Flygt	submersible, non-clog	CT3127	227	1740	3	10	90	250	350
Civic Center	Highland Ave south of 15th St	1992	-	Civic Center Bulding	-	-	-	Submersible	-	-	2	-	-	-	-	-	-	-	-	-	-
Pier	End of Manhattan Beach Pier	1992	-	Pier Restaurant	4	-	CIP	Submersible	4' x 4' x 4'	-	2	-	submersible	-	-	-	-	3	-	-	-

Land Use

The parcel layer, which provides the City's 2003 General Plan land use information, was used as the land use base map. Since the City's service area is mostly developed, the hydraulic analyses were conducted assuming fully developed and occupied tributary areas.

Tributary Areas

Polygons were created around individual sewer manholes to define the tributary area to each manhole. Most manholes have a tributary area assigned to it unless there are multiple manholes in the same area. Approximately 1,530 polygons were created for the existing and ultimate system analysis.

Model Loads

For each tributary area, the existing land uses and the developed unit flow factors were utilized to apply the average loads to the hydraulic model.

Peak dry weather flows are calculated in the model by a user defined relationship. The peaking formula used in the City's sewer model is as follows:

$$PDWF\ (cfs) = 2.35 \times ADWF(cfs)^{0.92}$$

Pumped Flows

There are two separate analysis methods that can be used on the City's sewer collection system to evaluate the effect of pumped flows downstream of the existing 8 pump stations. A description of each of the analysis methods is as follows:

Method 1: The average tributary flow to each pump station was transferred to the manholes located at the discharge end of the respective forcemains. The total average flow was peaked and the downstream sewer depth to diameter ratios were evaluated based on the calculated peak dry weather flows or

$$Qpdw = (2.35 \times Qadw^{0.92})\ (in\ mgd)$$

Method 2: The pump capacity of each pump station was transferred to the manholes located at the discharge end of the respective forcemains. The pump capacities were not peaked, but added to the peak dry weather flow at each manhole located downstream of the pump station. The downstream sewer depth to diameter ratios were evaluated based on the calculated peak dry weather flows plus the pump capacities (Qpump) or

$$Qpdw = (2.35 \times Qadwf^{0.92}) + Qpump\ (in\ mgd)$$

Flow monitoring results have shown that pump discharge becomes more and more attenuated the further downstream in the system the monitor is placed. Often times, only the first few reaches located immediately downstream of the discharge point will experience a rush of flow that reflects the pump capacity. In this study, the pump capacity was considered if flow monitoring results showed an influence from the pump station discharge. For the pipes located a far distance from the pump discharge point, the calculated peak dry weather flow based on land use and unit flow factors was utilized for analysis.

Hydraulic Analysis Results

The depth to diameter ratio exceeded the established criteria of 0.64 at the following locations:

1. Bell Avenue at 25th Street (Pipe ID 15084-070L4)
   10" diameter sewer with peak d/D>1.00
   No pump station influence

   As-built plans show a slope of 0.00 and a length of 10 feet. The downstream manhole 070L4 is a LACSD manhole. It is recommended that the slope of this sewer be verified.

2. Pacific Avenue north of 27th Street (Pipe ID 08077-08082)
   8" diameter sewer with peak d/D=0.66 with no pump station influence
   8" diameter sewer with peak d/D>1.00 with pump station influence from Palm Avenue PS (see Table 7-2 and description below)

A few reaches downstream of the Poinsettia Avenue Pump Station, Palm Avenue Pump Station, and Bell Avenue Pump Station discharge locations resulted in d/D ratios greater than 0.64 when the pump capacities were implemented (Method 2). These locations are listed in Table 1-2. It is recommended that flow monitoring be conducted in these areas to verify the d/D ratios prior to implementing any replacement projects.

Table 1-2
Pipes with Model Calculated Capacity Deficiencies Downstream of Pump Discharge Points

Pipe ID	U/S MH ID	D/S MH ID	Dia (in)	Length (ft)	Slope	ADWF (mgd)	Pumped Flow (mgd)	PDWF (mgd)	PDWF Vel (ft/s)	PDWF d/D	PDWF Depth (ft)	Full Flow (mgd)	Comments
06173-06174	06-173	06-174	8	192	0.0040	0.0019	0.7363	0.7437	3.30	1.00	0.67	0.4959	D/S of Poinsettia PS
06174-06175	06-174	06-175	8	254	0.0040	0.0028	0.7363	0.7469	3.31	1.00	0.67	0.4962	D/S of Poinsettia PS
06175-06176	06-175	06-176	8	190	0.0136	0.0033	0.7363	0.7485	4.51	0.69	0.46	0.9125	D/S of Poinsettia PS
08037-08052	08-037	08-052	8	262	0.0040	0.0446	0.4085	0.5430	2.41	1.00	0.67	0.4957	D/S of Palm PS
08052-08055	08-052	08-055	8	281	0.0040	0.0583	0.4085	0.5805	2.57	1.00	0.67	0.4944	D/S of Palm PS
08055-08077	08-055	08-077	8	350	0.0040	0.0637	0.4085	0.5951	2.64	1.00	0.67	0.4953	D/S of Palm PS
08077-08082	08-077	08-082	8	110	0.0040	0.0858	0.4085	0.6538	2.90	1.00	0.67	0.4951	D/S of Palm PS
16019-16022	16-019	16-022	8	68	0.0099	0.0131	0.5728	0.6164	3.84	0.67	0.45	0.7809	D/S of Bell PS
16022-070L3	16-022	07-0L3	10	18	0.0028	0.0135	0.5728	0.6176	2.38	0.69	0.58	0.7504	D/S of Bell PS
		Total		**1,725**									

1-7 COLLECTION SYSTEM CONDITION ASSESSMENT

General

Condition of the collection system depends on many factors, including construction quality, and maintenance practices, surrounding soil and groundwater conditions, flow quantity and velocity, and constituents in sewage. The best available information on the system condition is provided by the closed circuit television (CCTV) inspection reports and recordings and the knowledge of the maintenance staff.

The City of Manhattan Beach (City) established a program to begin CCTV inspections of its approximately 86 mile long sewer collection system. The scope of the Master Plan included inspections of 227,714 feet (43.1 miles) of pipe or 52.9 percent of the total system.

Closed Circuit Television (CCTV) Inspections

Empire Pipe Cleaning and Equipment, Inc. (Empire) performed video inspection work on approximately 222,714 feet of pipe between October 2008 and August 2009. National Association of Sewer Service Companies (NASSCO) Pipeline Assessment and Certification Program (PACP) coding procedures formed the basis of the inspection work and reports. Each inspection report lists the service connections and deficiencies by location in the inspected pipe. Photographs of the identified deficiencies are included in the inspection reports.

All data was compiled into one summary database, which can be found in Appendix 5. The database includes a summary count of the deficiencies identified in the CCTV written reports for the 1,200 reaches were inspected.

Review of Representative CCTV Recordings

The Inspection Report Database Summary was used in selecting the recordings to be reviewed in detail. The pipe reaches selected for detailed review were those that showed the most severe structural problems and multiple deficiencies, such as deformed pipe, hole in pipe, broken pipe, large offset joint, large obstacles, multiple deficiencies such as fractures, cracks, roots, deposits, obstructions, sags, camera underwater, and survey abandoned, and ball roots, as well as severe operation and maintenance issues. Several reaches without listed deficiencies were selected in order to develop insight into the overall condition of the CCTV inspected system. Recordings for 264 reaches and 53,789 feet of pipe (23.9% of total inspected) were selected and reviewed in detail.

Condition Grading

The PACP condition grading system was used to assign a condition rating for structural defects and operation and maintenance defects for each reach of pipe. The rating provides the ability to quantitatively measure the difference in pipe condition between one inspection and subsequent inspections, and to prioritize among different pipe segments. A grade of 1 to 5 is assigned to each defect based on potential for further deterioration or pipe failure. Pipe failure is defined as when it can no longer convey the design capacity. The grades are as follows:

5 – Immediate Attention	Defects requiring immediate attention
4 – Poor	Severe defects that will become Grade 5 defects within the foreseeable future
3 – Fair	Moderate defects that will continue to deteriorate
2 – Good	Defects that have not begun to deteriorate
1 – Excellent	Minor defects

The problems identified most often were fine roots (835 reaches, 22% of total), cracks (563 reaches, 15% of total) and joint offset medium (437 reaches, 12% of total).

Replacement and Rehabilitation Priorities

The purpose of CCTV inspections is to determine the condition of the City's existing gravity sewers, and formulate a rehabilitation plan for the defective sewers. The defect scores and indexes provide a good indication as to which pipes are in poor condition, but cannot be relied upon solely to prioritize improvement projects. The priorities are selected primarily with consideration of the health and safety of the public and protection of the environment by minimizing the possibility of sanitary sewer overflows and leakage. The pipe capacity, location of particular defects, and the tributary areas/wastewater flow rates are other considerations used in formulating the final capital improvement project priorities.

The initial priorities for improvements to the sewers are based on the severity of the pipe defects. The six (6) categories utilized in this report are as follows:

a. Severe Condition – This category primarily includes structural defects of deformed pipe, hole in pipe, broken pipe, and large joint offsets.

b. Major Condition – This category primarily includes structural defects of multiple fractures, medium joint offsets and major sags. Pipes with a large number of cracks are also included.

c. Moderate Condition – Pipes in this category have fractures, cracks, small and medium joint offsets, and sags.

d. Minor Condition – Pipes in this category have slight sags, cracks, and small joint offsets.

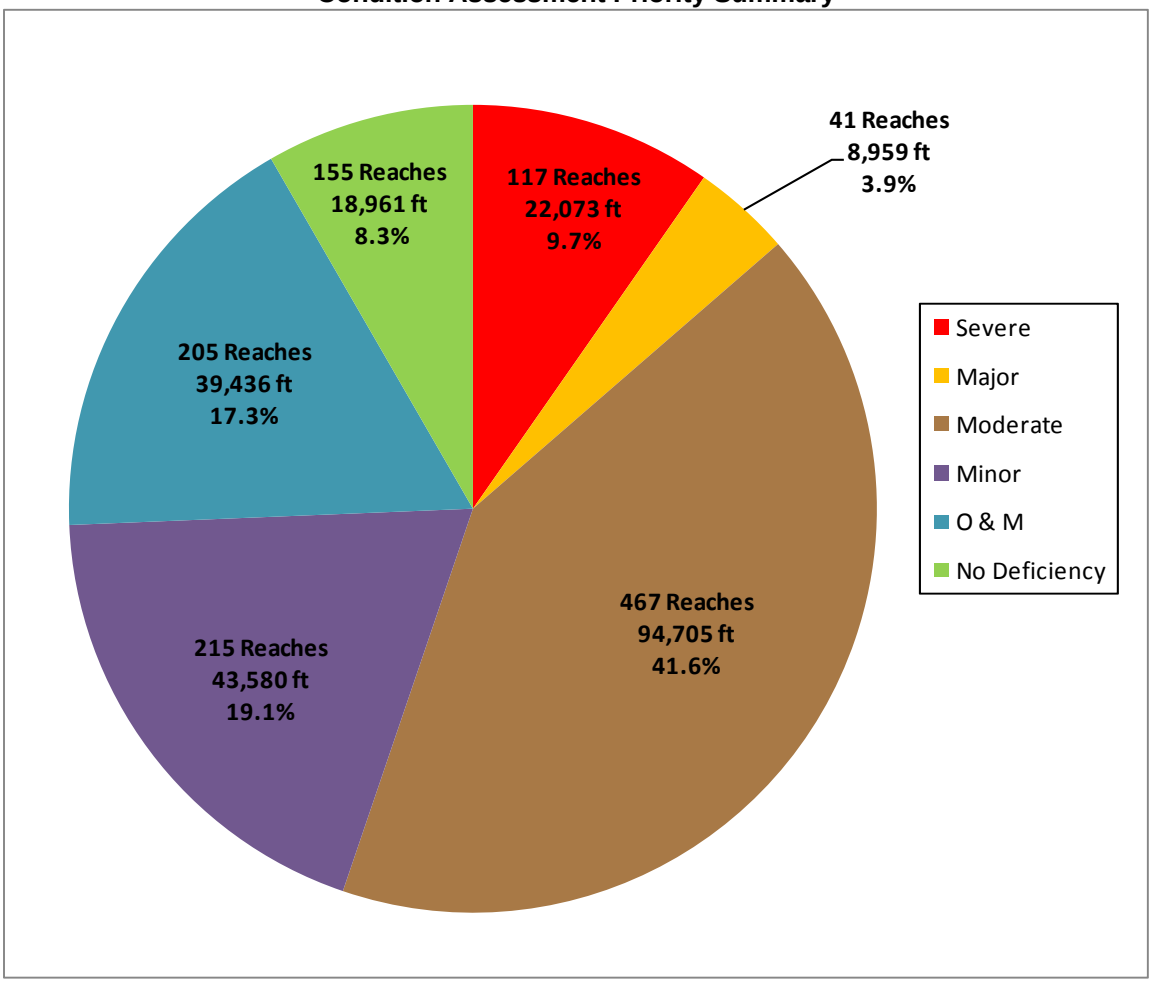
e. O&M – This condition is for operational and maintenance problems and construction feature defects. There are no structural defects.

f. No Defects – This condition is for the pipe with no structural, operation and maintenance or construction feature defects.

Figure 1-2 shows the distribution of the condition priorities assigned the pipes with completed inspections.

The City of Manhattan Beach will address the "Severe" and "Major" collection system deficiencies. The collection system construction estimates are based upon replacement at $45 per diameter inch per foot of pipe. Implementation cost is determined by adding 35 percent of construction cost to cover engineering, inspection, and administration. The total estimated cost of upgrading the sewers with severe or major condition priorities is $15,330,000. This is based on the assessment of 43.1 miles of pipe or 52.9 percent of the total gravity sewer system. Assuming that similar deficiencies will be identified when the remainder of the system is CCTV inspected, the total cost for rehabilitation and replacement of the remaining gravity sewer pipes is estimated at approximately $13,600,000.

Figure 1-2
Condition Assessment Priority Summary



Follow-up CCTV Inspection and Condition Assessment Program

a. Portions of the system rated to be in **Severe Structural Deficiency** condition will be inspected **annually** and evaluated to determine if immediate corrective action is needed.

b. Portions of the system rated to be in **Major Structural Deficiency** condition will be CCTV inspected and evaluated once every **three (3) years**

c. Portions of the system rated to be in **Moderate Structural Deficiency** condition will be CCTV inspected and evaluated once every **five (5) years**

d. Portions of the system rated to be in **Minor Structural Deficiency** condition will be CCTV inspected and evaluated once every **ten (10) years**

e. Portions of the system with **no structural deficiencies** will be CCTV inspected and evaluated once every **ten (10) years**

f. Portions of the system with **Operational and Maintenance** deficiencies, except the **Hot Spots**, will be CCTV inspected and evaluated once every **four (4) years.**

g. **Hot Spots**, except siphons, will be CCTV inspected and evaluated **before and after each maintenance activity and cleaning for one year** to establish the appropriateness of the method, and then **annually**.

As structural deficiency mitigation projects are implemented, their condition will be reclassified, and they will be included in the appropriate category for follow up CCTV inspection and condition assessment work.

Manhole Inspections and Assessments

The condition of the manholes associated with the 52.9 miles of gravity pipes inspected was also assessed. A total of 1,075 manholes were inspected and assessed. Each element was rated as good, fair, poor, or failing. Signs of debris, grease, vermin, and odors were also noted in the inspection reports. The results of the inspections are summarized in Table 1-3.

Table 1-3
Manhole Elements Condition Summary

Condition	Manhole Cover	Frame	Cone	Barrel / Wall	Rungs	Bench	Channel	Debris	Grease	Vermin	Odor
Good	1070	1068	1030	1048	612	1022	960				
Fair		7	37	22	155	38	95				
Poor			7	4	150	15	20				
Failing			1	1	67						
Broken	2										
Cracked	3										
Not Applicable					91						
Yes								15		55	3
No								1060	1075	1020	1072

The total estimated cost of upgrading the manholes with poor conditions is $316,000. This is based on the assessment 1,075 manholes or 53 percent of all the manholes. The total number of manholes in the sewer system is estimated at 2,031. Assuming that similar deficiencies will be identified when the remainder of the system is CCTV inspected, the total remaining cost for rehabilitation and replacement of the manholes in poor condition is estimated at approximately $280,000.

1-8 OPERATION AND MAINTENANCE

CCTV Inspection Data

The operation and maintenance conditions identified through CCTV inspections include ball roots, grease, sags, deposits, obstacles, and infiltration, respectively. These conditions are the cause of many of the

frequent maintenance areas (hot spots). Reduction in cross sectional pipe area is a potential cause for back ups and sewer overflows. Accordingly, the highest priority is given to those reaches identified with ball roots.

The recommendations provided should be used in updating the operation and maintenance of the system, the Hot Spot maintenance program, the cleaning program, as well as the Preventative Maintenance Program.

'Hot Spots'

Hot Spots are areas of the system with reoccurring problems that require maintenance and cleaning on a quarterly basis minimum. Currently, there are 76 reaches with a total length of 10,796 feet that are considered to be Hot Spots in the City's system. Operations staff reports that the causes of the hot spots are grease and roots.

Sanitary Sewer Overflow (SSO) History

There were a total of 19 sanitary sewer overflows responded to by City crews between January 2007 and June 2009. The total number of reported spills that occurred on City property over the past three years is as follows:

7 spills in 2007 (8.6 spills per 100 miles)

3 spills in 2008 (3.7 spills per 100)

1 spill in 2009 (1.2 spills per 100) – *up to September 2009*

A sewer collection system with less than three (3) spills from the publicly owned system (excludes private property spills that do not result from a blockage in the public system) per 100 miles per year is considered an adequate system. For the City's sewer system (81.6 miles), this is an average of about 2.4 (3 x 0.816) spills per year.

Maintenance Program

A comprehensive maintenance program is an important tool in assuring reliable system operation. This not only includes regular inspections and preventative maintenance, but also good record keeping. Accurate records are the backbone of any maintenance operation. They can be used for many purposes including: scheduling regular maintenance activities; allocating manpower; budgeting; pinpointing persistent problems; tracking equipment performance and maintenance history; and the identification of equipment which may be showing signs of failure.

Preventative Maintenance

Preventative maintenance is a crucial element of the maintenance program. The preventative maintenance program (PMP) consists of cleaning, inspection, condition assessment, and rehabilitation tasks.

Sewer inspection includes CCTV inspection and condition assessment of the collection system, visual inspection of manholes and their flow channels, ground surface inspection of rights of way and easements, and odor and corrosion monitoring. Condition assessment includes, review of the inspection data, and formulation of maintenance, rehabilitation, and replacement projects. Following the completion of the initial CCTV inspection program, the City should develop a continuing inspection plan based upon the knowledge

gained from the initial program. Hot Spots, except siphons, should be CCTV inspected and evaluated before and after each maintenance activity and cleaning for one year to establish the appropriateness of the method, and then annually. Each spill site must be CCTV inspected to pinpoint the cause of the spill, and implementation of corrective measures for preventing repeat spills.

Preventative maintenance activities that the City does currently conduct include the following:

- Clean entire gravity system twice per year
- Clean hot spots twice per month
- Inspect and skim wet wells twice per week
- Vacuum out wet wells once per year
- Inspect pump stations once per week by Utilities Electrician and Sewer Maintenance Worker
- Diagnose pump station motor control centers annually for operational efficiency and safety by the Southern California Edison Company
- Catalogue and track tasks by work orders in a maintenance management system
- Perform routine mechanical root removal in areas of known root intrusion
- Start test the emergency power systems at the pump stations weekly
- Service generators bi-annually by Power Plus, Inc.

Maintenance Staff and Training

The City currently has about 81.6 miles of pipe. In order to comply with the WDR requirements and the City's regular preventative maintenance program, the City must quantify the number of employees and equipment necessary to perform these tasks.

The City's current staffing for the wastewater collections system maintenance includes 5 employees, one supervisor and four field staff members. Training of these staff members is as follows:

a. Initial training in proper operation and maintenance of all major wastewater equipment and facilities by the Wastewater Supervisor
b. Critical equipment training is facilitated by outside contractors in areas of fork lift operation, backhoe and bob-cat operation, and crane operation
c. Periodic training in confined space entry, trench shoring, traffic control, heat illness, and hazardous materials management
d. Task proficiency is required for all positions and training records are maintained to monitor completed classes
e. Disaster training exercises are conducted twice per year
f. Staff is also trained in Best Management Practices of the Fats, Oils, and Grease (FOG) Control Ordinance and is instructed to report violations

1-9 CAPITAL IMPROVEMENT PROGRAM

General Description

The primary goal of the Capital Improvement Program (CIP) is to provide the City of Manhattan Beach with a long-range planning tool for implementing its sewer infrastructure improvements in an orderly manner and a basis for financing of these improvements. To accomplish this goal, the program is phased based upon the implementation cost of the facilities, the quantity of work the City can reasonably administer each year, and the funds available for these projects.

Capital Improvement Project Priorities

The capital improvement projects were selected primarily with consideration of the health and safety of the public and protection of the environment by minimizing the possibility of overflows. The projects that will eliminate the capacity deficiencies in the gravity collection system are prioritized based upon the hydraulic analyses conducted during this study. As the City completes CCTV inspection of the system, severe and major defects identified should be incorporated into the CIP and addressed. When the CCTV inspection is completed and a full condition assessment has been conducted, the capital improvement project priorities should be reevaluated.

Collection System Capacity Improvement Projects

The collection system capacity improvement projects include the areas identified with a capacity deficiency in the hydraulic model when pump capacities were implemented. It is recommended that the identified locations be flow monitored to verify the d/D ratios prior to implementing any replacement projects. Operations staff has not indicated that these areas are a problem. Therefore, until the deficiencies are verified in the field, these projects are considered low in priority.

Collection System Condition Improvement Projects

The condition improvement projects are prioritized solely on the condition of the pipe as determined from reviews of the CCTV recordings. The condition deficiencies with critical structural damage and severe obstructions were given the highest priority. Sewer pipes with conditions categorized as “Severe” or “Major” and manholes categorized as in poor condition are included in the recommended improvements.

The planning level recommendations are based upon the ranking and pipe defects from the CCTV inspection reports, and reviews of recordings. It may be possible to reline, repair or perform root treatment on some of the existing gravity pipes, in lieu of replacing them. Actual improvements should be designed based upon further detailed reviews of each recording, taking into consideration other factors such as location, age, capacity of the pipe, existing utilities, and concurrent infrastructure construction projects.

The useful life gained from replacing the deficient facilities will be longer than repairs and relining projects. Root treatment is usually a temporary solution. Unless the source is removed, it is likely that the roots will get thicker as time passes and the root intrusion will continue until the pipe is replaced.

Pump Station Improvements

The recommended pump station capital improvement projects have been based upon condition assessment of each facility, capacity analysis, and conformance with the adopted criteria. The implementation priorities should be based upon the likelihood of a failure that may result in a spill, the volume of spill, and its impact on the public and the environment. The condition assessment and analysis results are described in detail Section 6 for each pump station.

Capital Improvement Program

The Capital Improvement Program is developed based upon the results of the hydraulic analyses and the established priorities. The recommended improvement project locations are illustrated on Figure 1-3.

Gravity collection system projects are listed in Table 1-4 and Table 1-5 by priority, along with cost estimates. The cost estimates presented in Table 1-4 and Table 1-5 reflect replacement of the existing facilities. Replacement costs are generally more conservative and will therefore allow the City more flexibility for each project. The pipeline construction costs are based upon $45 / diameter inch / ft. Preliminary design studies should be conducted utilizing detailed utility information to identify and evaluate project alternatives such as parallel pipes and/or diversions prior to final design. When sewers are replaced, they should be relocated into the walk ways or right-of-ways as much as possible if they are currently in a location that cannot be easily accessed.

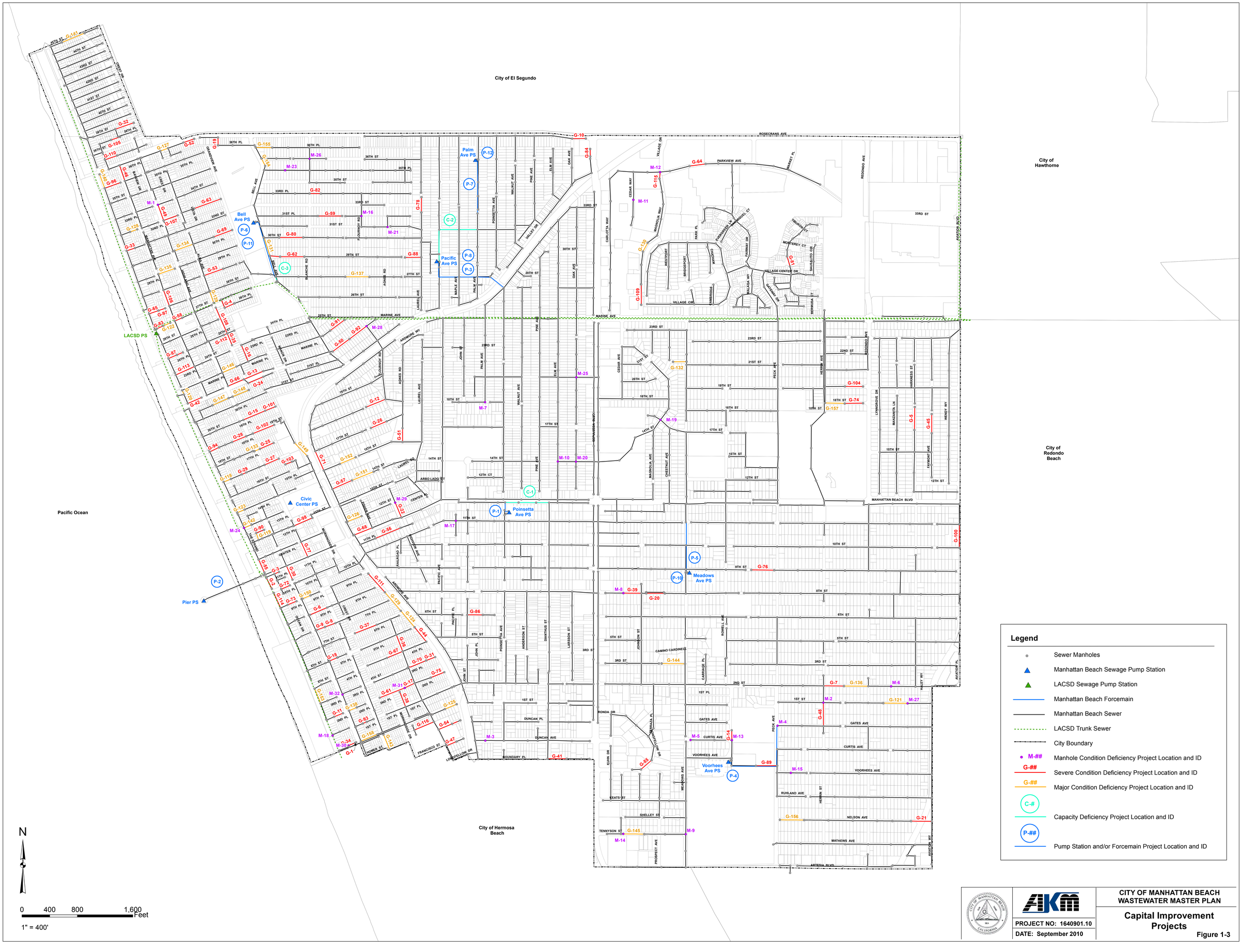
The City of Manhattan Beach is largely occupied and there are many existing utilities to consider. Therefore, the costs of replacing sewer facilities will be generally higher than in an area that is undeveloped. The total costs shown in Table 1-4 and Table 1-5 include engineering, administration and contingency costs, estimated at 35% of the construction cost.

The manhole rehabilitation and replacement projects are listed in Table 1-6. The pump station and forcemain improvement projects are listed in Table 1-7.

The recommended projects have been based upon the best information currently available. It should be updated as new information becomes available from sources such as CCTV inspections and from maintenance crew observations. The project priorities may be revised to correspond to changed conditions, such as impending facility failures, or to take advantage of concurrent construction such as street paving projects or adjacent infrastructure work.

Some of the projects recommended are small and it may not be feasible to implement them as a single project. Therefore, several projects should be combined and bid as a package. Some of the projects may be broken down into smaller components to fit the City's budgetary and other obligations.

The total Wastewater Capital Improvement Program is shown in Table 1-8. The total CIP costs are estimated at $42,042,640.



CITY OF MANHATTAN BEACH
WASTEWATER MASTER PLAN

Capital Improvement Projects

PROJECT NO: 1640901.10

DATE: September 2010

Figure 1-3

Table 1-4
Collection System Capacity Improvement Projects

Project No.	Pipe ID	U/S MH ID	D/S MH ID	Existing Dia (in)	Length (ft)	Slope	ADWF (mgd)	Pumped Flow (mgd)	PDWF (mgd)	Comments	Replacement Size (in)	Unit Cost ($)	Construction Cost ($)	Eng. & Admin. Cost ($)	Project Cost ($)
C-1	06173-06174	06-173	06-174	8	192	0.0040	0.0019	0.7363	0.7437	D/S of Poinsettia PS	15	675	429,300	150,255	579,555
	06174-06175	06-174	06-175	8	254	0.0040	0.0028	0.7363	0.7469						
	06175-06176	06-175	06-176	8	190	0.0136	0.0033	0.7363	0.7485						
C-2	08037-08052	08-037	08-052	8	262	0.0040	0.0446	0.4085	0.5430	D/S of Palm PS	12	540	541,658	189,580	731,238
	08052-08055	08-052	08-055	8	281	0.0040	0.0583	0.4085	0.5805						
	08055-08077	08-055	08-077	8	350	0.0040	0.0637	0.4085	0.5951						
	08077-08082	08-077	08-082	8	110	0.0040	0.0858	0.4085	0.6538						
C-3	16019-16022	16-019	16-022	8	68	0.0099	0.0131	0.5728	0.6164	D/S of Bell PS	12	540	46,591	16,307	62,898
	16022-070L3	16-022	07-0L3	10	18	0.0028	0.0135	0.5728	0.6176						
				Total	**1,725**									**Total**	**1,373,691**

Table 1-5
Gravity Sewer Rehabilitation and Replacement Projects

General Information

Project No.	DVD No.	Inspection No.	Reversal DVD No.	Reversal Inspec. No.	DVD Watched? (Y)	Location: Street Name	CCTV Date	Pipe ID	Manhole: Start	Manhole: End	Direction of Camera	Pipe: Size (in)	Mat	Atlas Length (ft)	CCTV Length (ft)
G-1	G312-011 Ph 2	11	G312-011 Ph 2	6	Y	1ST ST	7/21/09	12025A-12025	12-025A	12-025	D/S	12	VCP	70	80
G-2	G312-003 Ph 2	8			Y	THE STRAND	7/9/09	14070-14071	14-070	14-071	U/S	6	VCP	181	5
G-3	G312-004 Ph 2	2			Y	MANHATTAN BEACH BLVD	7/10/09	14059-14060	14-059	14-060	U/S	6	VCP	70	144
G-4	G312-056	8			Y	26TH PL	1/13/09	20008-20009	20-008	20-009	D/S	8	VCP	152	161
G-5	G312-006	4	G312-006	6	Y	HARKNESS ST	10/27/08	02006-02007	02-006	02-007	U/S	8	VCP	323	326
G-6	G312-033	5	G312-033	6	Y	9TH ST	12/5/08	11093-11094	11-093	11-094	D/S	6	VCP	271	278
G-7	G312-002	7			Y	2ND ST	10/21/08	01082-01083	01-082	01-083	D/S	8	VCP	296	303
G-8	G312-008 Ph 2	1			Y	8TH ST	7/16/09	11099-11100	11-099	11-100	D/S	8	VCP	190	164
G-9	G312-008 Ph 2	2			Y	8TH ST	7/16/09	11100-11101	11-100	11-101	D/S	8	VCP	120	131
G-10	G312-021	3			Y	ROSECRANS AVE	11/17/08	07001-07002	07-001	07-002	U/S	8	VCP	198	185
G-11	G312-035	1			Y	3RD ST	12/9/08	12031-12032	12-031	12-032	U/S	6	VCP	138	16
G-12	G312-036	6			Y	18TH ST	12/10/08	15035-15036	15-035	15-036	D/S	8	VCP	302	307
G-13	G312-060	1			Y	MARINE AVE	1/19/09	21012-21016	21-012	21-016	D/S	6	VCP	303	310
G-14	G312-013	5	G312-013	3	Y	ROWELL AVE	11/5/08	05054-05055	05-054	05-055	D/S	6	VCP	144	151
G-15	G312-072	8	G312-060	2	Y	20TH ST	2/11/09	22030-22031	22-030	22-031	D/S	6	VCP	342	357
G-16	G312-057	10	G312-058	1	Y	VISTA DR	1/14/09	21002-21005	21-002	21-005	U/S	6	VCP	256	247
G-17	G312-017 -1	2			Y	3RD ST	8/3/09	10139-10142	10-139	10-142	D/S	6	VCP	140	166
G-18	G312-017 -1	3			Y	6TH ST	8/3/09	11120A-11122	11-120A	11-122	D/S	6	VCP	120	131
G-19	G312-005 Ph 3	5			Y	EASEMENT	8/14/09	17023-17024	17-023	17-024	U/S	8	VCP	75	112
G-20	G312-012	1			Y	8TH ST	11/4/08	04059-04060	04-059	04-060	D/S	12	VCP	263	278
G-21	G312-003	10	G312-003	11	Y	NELSON AVE	10/22/08	01031-01032	01-031	01-032	D/S	8	VCP	292	307
G-22	G312-031	2	G312-031	3	Y	HIGHVIEW AVE	12/3/08	11040-11041	11-040	11-041	D/S	6	VCP	233	239

Structural Defect Coding

Project No.	Crack C L	Crack C C	Crack C M	Fracture F L	Fracture F C	Fracture F M	Broken B SV	Broken B VV	Hole H SV	Hole H VV	Joint J O M	Joint J O L	Joint J S M	Joint J S L	Deformed D V	Deformed D H	Collapsed Pipe X P	Surface Damage S	Point Repair RP	Lining Failure	Sags	Total Structural Defects	Total Structural Defect Score	Structural Defect Index
PACP Grade	2	1	3	3	2	4	5	5	5	5	3	5	1	2	5	5	5	2	1		2			
G-1							1				1						1					3	13	4.3
G-2								1											1			2	6	3.0
G-3			1			3	1	1			3											9	34	3.8
G-4			2					2			2					1						7	27	3.9
G-5	1					2		3								3						9	40	4.4
G-6			19			3	1				20				1			11				55	161	2.9
G-7	2	2	7	2	1	10		3			3				2						4	36	117	3.3
G-8	2	2	11		2	5		2							1			5				30	88	2.9
G-9			11					2							1	1		6				21	65	3.1
G-10						2										1						3	13	4.3
G-11	1		1		2			1								2		1				8	26	3.3
G-12					1			1			1	1				1						5	20	4.0
G-13		4	9		1	3		1			8	3										29	89	3.1
G-14												3										3	15	5.0
G-15	1	1	13		2	2		2			10	2						41				74	186	2.5
G-16	1		1			1		1			9	2										15	51	3.4
G-17	2	3	5		1	2				2	2	1							2		2	22	59	2.7
G-18	2	2	6			1		1							1			4				17	46	2.7
G-19			1				1					3									13	18	49	2.7
G-20												2									10	12	30	2.5
G-21		1	7		1							2										11	34	3.1
G-22	3		4		1						10	2										20	60	3.0

Operational and Maintenance

Project No.	Deposits D AGS	Deposits D AE	Deposits D Other	Roots Fine (F) B	Fine (F) L	Fine (F) J	Fine (F) C	Tap (T) B	Tap (T) L	Tap (T) J	Tap (T) C	Medium B	Medium L	Medium J	Medium C	Ball (B) B	Ball (B) L	Ball (B) J	Ball (B) C	Infiltration I G	Infiltration I D	Infiltration I R	Infiltration I W	Obstacles OB Other C	Obstacles OB Other Z	Obstacles OB Other %	Vermin V C	Vermin V R	Total O&M Defects	Total O&M Defect Score	O&M Defect Index
PACP Grade	2	2	2	2	1	1	1	3	2	2	2	4	3	3	3	5	4	4	4	5	3	4	2	4	4		1	1			
G-1						7										1													8	12	2
G-2																									1	30			1	4	4.0
G-3	1			1		1																			1	30			4	9	2.3
G-4					1	18	1					2	1	3															26	40	1.5
G-5				1	2	8		1			1		1				1												15	24	1.6
G-6						12					1		1												1	15			15	21	1.4
G-7	100					2																							102	202	2.0
G-8		1			1	8				1			1				2												14	24	1.7
G-9					2	8		1		1																			12	15	1.3
G-10						2																							2	2	1.0
G-11						1							1																2	4	2.0
G-12					2	12	1	1									1												17	22	1.3
G-13						48											2												50	56	1.1
G-14																													0	0	0.0
G-15		1			5	24			4				3	1	1		6												45	78	1.7
G-16					2	13							2	1			5												23	44	1.9
G-17				1	5	15								2															23	28	1.2
G-18						19								3	1		1												24	35	1.5
G-19					1	2																							3	3	1.0
G-20																													0	0	0.0
G-21	4	15				13							2				1												35	61	1.7
G-22						9	1		1				1				1												13	19	1.5

Construction Features, Miscellaneous, Ranking and Recommendations

Project No.	Tap (Lateral) T FD	Tap T BI	Tap T BD	Line L D	Line L L	Line L U	Line L R	Line L RO	Line L LD	Intruding Seal Material IS GT	IS Z	Miscellaneous M SA	M CU	M MC	Priority	Condition Ranking	No Reverse Set-up Completed	Comments	Minimum Recommendations	Project Replacement Cost ($)
G-1												2			Severe	1		64' Collapsed Pipe & 64.8' BPSV. MSA 64.2' (16.2' from D/S MH) BPVV. Inspection complete.	Spot repair	58,466
G-2												1			Severe	2	x	3' BPVV & 5' BPSV. 5' MSA (OBZ=OBI, Another Utility Pipe). Camera blocked by obstacle thru wall. RP=RPP.	Replace pipe	65,975
G-3															Severe	3		55.4' BPSV (Another sewer line or sewer lateral in the main sewer pipe), & 108.4' BPVV. Inspection report shows Repair Patch at 104.8'. But looks like BPVV. OBZ=OBI	Spot repair or Replace pipe	52,634
G-4															Severe	4		144.2' to 146.6' & 157.1' BPVV. 144.2' to 146.7' Deformed Pipe Horizontal.	Spot repair 144' to 148 'BPVV & Deformed Pipe. Also Spot repair 157.1' BPVV. Root Treat and Cut.	78,149
G-5	1											2			Severe	5		306.7' to 316' Deformed Pipe (Also BPVV & Continuous Fracture Multiple). MSA 311.1' (14.8' from U/S MH) BPVV.	Replace 303' to 316' to Deformed Pipe	158,387
G-6												2			Severe	6		55' to 61.5' Deformed Pipe Vertical & BPSV 57.8' from DS MH. MSA 137.8' (140.3' from D/S MH) Obstacle. SAVZ. OBJ	Spot repair 55' to 61' Deformed & Broken Pipe (SV). Clean obstacle @ 137' from U/S MH	101,367
G-7					1										Severe	7		124.5' & 142.8' Deformed Pipe Vertical. 124.5', 142.8' & 150.8' BPVV. 120' to153.9' Continuous Fractures.	Replace 100' to 160' Deformed pipe, BPVV, & fractures.	147,404
G-8	2		2												Severe	8		99' BPVV. 156.3' BPVV & Deformed Horizontal Pipe. S=SAVZ	99' Spot repair & Replace pipe 150' to159'	79,461
G-9															Severe	9		124.9 Deformed Pipe Horizontal & BPVV. 126.8' Deformed Pipe Vertical & BPVV. S=SAVZ	Replace pipe 124.9' to 127'	63,423
G-10			1												Severe	10		148' to 151' Deformed Pipe Horizontal.	Spot repair 148' to 151' to Deformed H. Pipe	90,007
G-11												1			Severe	11	x	15' to 15.8' Deformed Pipe Horizontal & BPVV. 15.8' MSA (BPVV). U/S MH is a possible C/O. SAVZ	Spot repair or Replace pipe 8' to 17'	50,122
G-12															Severe	12		303.7 to 304.6' Broken Pipe & Deformed Pipe Horizontal. 304.6' JOL (D/SH).	Spot repair 301' to 305' Deformed Horizontal & BPVV	149,396
G-13		1													Severe	13		139.1' JOL (D/SL). 140.7' JOL (D/SH) & 150.4 JOL (D/SL). 175.1' BPVV.	Spot repair 139.1' to 150.4' & 175.1'	112,959
G-14												2			Severe	14		120.9' JOL (D/SL). 123' JOL (D/SH) & 148.9' JOL (D/SL). MSA 121.1' (JOL)	Spot repair 120.9', 123' & 148.9' to JOL	55,003
G-15												2	1		Severe	15		6.5' &134.6' BPVV. 48' JOL (D/SL). 171.3' from D/S MH MSA (JOL). Surface Damage= SSSZ	Spot repair. Root Treat & Cut	130,090
G-16												2			Severe	16		205.5' & 208' JOL (D/SH). 208' JOL could be size change, not clear. 101.2' BPVV. MSA 240' (6.5' from U/S MH) RMJ.	Spot repair 101.2' BPVV& & 205.8 to 208' for JOL. Root Treat & Cut	89,849
G-17							1					1			Severe	17	x	165.6' MSA (JOL). 133.3' & 133.8' HVV. 165.1' JOL (D/SH). After 165.1' there is another JOL or Joint Angular. RP=RPR	Spot repair or Replace pipe	60,361
G-18		1													Severe	18		129.2' BPVV & Deformed Pipe Horizontal. S=SSSZ	Replace pipe after 129'	47,859
G-19					1		1								Severe	19		4', 74.1' & 75.9' JOL (D/SH). 4' BPSV.	Spot repair	54,626
G-20															Severe	20		248.6' JOL (D/SL). 250.6' JOL (D/SH).	Spot repair 248' to 251' JOL (D/SL) & JOL (D/SH)	202,370
G-21	1											2			Severe	21		225.9' JOL (D/SL). 238.9' JOL (D/SH). MSA 239.5' (67.2' from D/S MH) JOL.	Spot repair JOL (D/SL) 225.9' & JOL (D/SH) 238.9'	149,056
G-22												2			Severe	22		67' JOL (D/SL) & 68.5' JOL (D/SH). Also lots of JOM. MSA 69.3' (170.1' from D/S MH) JOL.	Spot repair 67' to 68.5 to JOL.	87,261

Table 1-5
Gravity Sewer Rehabilitation and Replacement Projects

General Information

Project No.	DVD No.	Inspection No.	Reversal DVD No.	Reversal Inspec. No.	DVD Watched? (Y)	Location: Street Name	CCTV Date	Pipe ID	Manhole: Start	Manhole: End	Direction of Camera	Pipe: Size (in)	Pipe: Mat	Pipe: Atlas Length (ft)	Pipe: CCTV Length (ft)
G-23	G312-055	6			Y	25TH ST	1/12/09	20053-20054	20-053	20-054	U/S	6	VCP	95	109
G-24	G312-059	7			Y	MARINE AVE	1/16/09	21014-21015	21-014	21-015	U/S	6	VCP	235	260
G-25	G312-063	11			Y	18TH ST	1/27/09	22014-22015	22-014	22-015	U/S	6	VCP	218	66
G-26	G312-052	2			Y	17TH ST	1/7/09	15025-15026	15-025	15-026	D/S	8	VCP	247	250
G-27	G312-071	3			Y	17TH ST	2/10/09	22008-22009	22-008	22-009	U/S	6	VCP	226	194
G-28	A315-015	1			Y	19TH ST	5/29/09	22025-22026	22-025	22-026	D/S	6	VCP	200	227
G-29	A315-019	8	A315-021	2		17TH ST	6/4/09	22011-22012	22-011	22-012	D/S	6	VCP	112	77
G-30	G312-003 Ph 2	1			Y	MANHATTAN AVE	7/9/09	14052-14053	14-052	14-053	D/S	8	VCP	223	224
G-31	G312-006 Ph 2	9			Y	4TH ST	7/14/09	10135-10136	10-135	10-136	U/S	6	VCP	130	3
G-32	G312-071	1			Y	39TH ST	2/10/09	23004-23005	23-004	23-005	D/S	8	VCP	281	287
G-33	G312-053	6	G312-053	11	Y	32ND ST	1/8/09	19031-19053	19-031	19-053	D/S	6	VCP	127	139
G-34	G312-011 Ph 2	7			Y	1ST ST	7/21/09	12025-12026	12-025	12-026	D/S	8	VCP	100	107
G-35	G312-054	3			Y	ALMA AVE	1/9/09	20019-20021	20-019	20-021	U/S	6	VCP	182	195
G-36	G312-042	2			Y	INGLESIDE DR	12/18/08	10129-10132	10-129	10-132	U/S	6	VCP	255	257
G-37	G312-042	4			Y	7TH ST	12/18/08	10121-10122	10-121	10-122	U/S	6	VCP	337	336
G-38	G312-028	4			Y	VISTA DR	11/26/08	10143-10146	10-143	10-146	U/S	6	VCP	233	60
G-39	G312-011	11			Y	8TH ST	11/3/08	04054-04056	04-054	04-056	D/S	8	VCP	252	264
G-40	G312-008 Ph 2	11	G312-012 Ph 2	4	Y	1ST ST	7/16/09	10056-14100	10-056	14-100	D/S	6	VCP	20	8
G-41	G312-027	11			Y	BOUNDARY PL	11/25/08	10013-10014	10-013	10-014	D/S	8	VCP	274	278
G-42	A315-013	3			Y	MARINE AVE	5/27/09	21024-21025	21-024	21-025	U/S	6	VCP	270	3
G-43	G312-012 Ph 2	3			Y	1ST ST	7/22/09	14100-10058	14-100	10-058	D/S	15	VCP	50	35
G-44	G312-007 Ph 2	1	G312-007 Ph 2	2	Y	VALLEY DR	7/15/09	10118-10119	10-118	10-119	D/S	6	VCP	280	192
G-45	G312-005	7			Y	FAYMONT AVE	10/24/08	02001-02002	02-001	02-002	D/S	8	VCP	265	273
G-46	G312-053	2	G312-053	3	Y	MANHATTAN AVE	1/8/09	18039-18040	18-039	18-040	D/S	6	VCP	239	190
G-47	G312-019 -1	1			Y	FRANCISCO ST	8/5/09	10045-10046	10-045	10-046	D/S	8	VCP	164	165
G-48	G312-001	7			Y	HERRIN ST	10/20/08	01076-01080	01-076	01-080	D/S	8	VCP	338	347
G-49	G312-051	2	G312-053	1	Y	HIGHLAND AVE	1/6/09	19015-19017	19-015	19-017	D/S	6	VCP	241	74
G-50	G312-039	5			Y	MARINE AVE	12/15/08	15054-15055	15-054	15-055	D/S	8	VCP	302	307

Structural Defect Coding

Project No.	Crack C: L	Crack C: C	Crack C: M	Fracture F: L	Fracture F: C	Fracture F: M	Broken B: SV	Broken B: VV	Hole H: SV	Hole H: VV	Joint J: O M	Joint J: O L	Joint J: S M	Joint J: S L	Deformed D: V	Deformed D: H	Collapsed Pipe X: P	Surface Damage S	Point Repair RP	Lining Failure	Sags	Total Structural Defects	Total Structural Defect Score	Structural Defect Index
PACP Grade	2	1	3	3	2	4	5	5	5	5	3	5	1	2	5	5	5	2	1		2			
G-23	1	1	1								1	2										6	19	3.2
G-24			1			1					17	2										21	68	3.2
G-25								2			6	2										10	38	3.8
G-26											5	2										7	25	3.6
G-27		1	4				1	1			23	1						6				37	109	2.9
G-28	2	15			2			1				1										21	33	1.6
G-29	1	2	1				1				2	1										8	23	2.9
G-30											1	2	1									4	14	3.5
G-31							1					1										2	10	5.0
G-32	1		1		1			1			1	1										6	20	3.3
G-33		1	5					1			3	1										11	35	3.2
G-34			5		1	4	1					1		1								13	45	3.5
G-35			4			2					9	1										16	52	3.3
G-36			5			1					10	1									9	26	72	2.8
G-37	2		2		1						11	1										17	50	2.9
G-38											7	1										8	26	3.3
G-39											2	1						1				4	13	3.3
G-40						1						1										2	9	4.5
G-41											1	1										2	8	4.0
G-42												1										1	5	5.0
G-43												1										1	5	5.0
G-44			15			1		2				1										19	64	3.4
G-45							1				1	1										3	13	4.3
G-46	1		8		1						3	1										14	42	3.0
G-47	4	4	2			2			1		2	1							1		2	19	47	2.5
G-48	2	3							1		1	1										8	20	2.5
G-49			4					1			2	1										8	28	3.5
G-50	1							1				1										3	12	4.0

Operational and Maintenance

Project No.	Deposits D: AGS	Deposits D: AE	Deposits D: Other	Roots Fine (F): B	Fine: L	Fine: J	Fine: C	Tap (T): B	Tap: L	Tap: J	Tap: C	Medium: B	Medium: L	Medium: J	Medium: C	Ball (B): B	Ball: L	Ball: J	Ball: C	Infiltration I: G	Infiltration: D	Infiltration: R	Infiltration: W	Obstacles OB Other: C	Obstacles: Z	Obstacles: %	Vermin V: C	Vermin: R	Total O&M Defects	Total O&M Defect Score	O&M Defect Index
PACP Grade	2	2	2	2	1	1	1	3	2	2	2	4	3	3	3	5	4	4	4	5	3	4	2	4	4		1	1			
G-23		1	1		2	13	1		1	1			1																21	27	1.3
G-24						19			1																				20	21	1.1
G-25				1		3							2																6	11	1.8
G-26					1	23	1			1	1		3				1												31	42	1.4
G-27					3	6					1		1				3												14	26	1.9
G-28					4	31							5	2	1		1												44	63	1.4
G-29													1																1	3	3.0
G-30		19																											19	38	2.0
G-31				1		1																							2	3	1.5
G-32					1	19		1	1		1	1					1												25	35	1.4
G-33		1				1																							2	3	1.5
G-34					2	10									1														13	15	1.2
G-35	10				3	6	1																						20	30	1.5
G-36						29	1			9							1												40	52	1.3
G-37					3	35	1				1		3				7												50	78	1.6
G-38						10																							10	10	1.0
G-39					1																								1	1	1.0
G-40						1								1															2	4	2.0
G-41	2					7																							9	11	1.2
G-42																													0	0	0.0
G-43	2																												2	4	2.0
G-44					1	31	1																						33	33	1.0
G-45					3	44									1														48	50	1.0
G-46	14			1	1	19	1				1			5			1												43	72	1.7
G-47						11	1			1	2						2												17	26	1.5
G-48	92				1																								93	185	2.0
G-49					1	6											1												8	11	1.4
G-50					1								2																3	7	2.3

Construction Features and Project Summary

Project No.	Tap (Lateral) T: FD	Tap T: BI	Tap T: BD	Line L: D	Line L: L	Line L: U	Line L: R	Line L: RD	Line L: LD	Intruding Seal Material IS: GT	IS: Z	Miscellaneous M: SA	M: CU	M: MC	Priority	Condition Ranking	No Reverse Set-up Completed	Comments	Minimum Recommendations	Project Replacement Cost ($)
G-23															Severe	23		106.1' JOL (D/SH). 108' JOL (D/SL). Both JOL looks like size change. Not clear. DSZ = DNF	Spot repair 106' to 108' to JOL	39,876
G-24														2	Severe	24		142.7' JOL (D/SH). 205.5 JOL (D/SL).	Spot repair 142.7' & 205.5'	94,806
G-25						1						1			Severe	25	x	7' JOL (D/SL). 66.2' JOL (D/SL). 7' & 9.1' BPVV. 66.2' MSA (JOL). U/S MH is a CO.	7' to 9.1' & 64.6' to 66.2' Spot repair	79,282
G-26															Severe	26		123.7'JOL (D/SL). 245.5' JOL (D/SL).	Spot repair 123.7' & 245.5' JOL	121,354
G-27												1			Severe	27	x	1.2' BPVV, 8.5' BPSV , Also 2.4' JOL (D/SH). 194.4' MSA (Camera can't climb). U/S MH is a CO. Surface Damage = SAVZ	Spot repair 1.2' to 8.5'	82,413
G-28												1			Severe	28	x	227 JOL (D/SH) & BPVV. Close to end MH. MSA 227' (JOL)	Spot repair	82,742
G-29												2			Severe	29		74.3' MSA (JOL (D/SH) & BPSV)'. Close to end MH. MSA 74.3' (3' from D/S MH) JOL	Spot repair	40,824
G-30															Severe	30		36.6' (JOL D/SL). 38.4' (JOL D/SH).	Spot repair	108,621
G-31												1			Severe	31	x	3' JOL (D/SH). 3.3' BPSV. MSA (JOL). U/S MH is a C/O	Spot repair	47,385
G-32															Severe	32		284.4' JOL (D/SH) & BPVV. Same M313-002 #7 (deleted).	Spot repair	139,482
G-33							3					2			Severe	33		17.3' Small BPVV & 134.2' JOL (D/SH). 134.8' MSA (JOL).	Spot repair 17.3' BPVV & 134.2' JOL	50,775
G-34			1												Severe	34		98.7' JOL (D/SL). 102.1' JSL. 77.3' BPSV.	Spot repair	51,953
G-35															Severe	35		95.7' JOL (D/SH).	Spot repair	70,932
G-36															Severe	36		125.3' JOL (D/SH).	Spot repair 125.3' JOL	93,786
G-37												1			Severe	37		336.1' JOL (D/SH). Close to end MH	Spot repair	122,508
G-38												1			Severe	38	x	57' JOL (D/SH). 59.5' MSA (JOL). U/S MH is a C/O	57' Spot repair JOL (D/SH)	84,808
G-39															Severe	39		233.6' JOL(D/SH). SAVZ	Spot repair 233.6 JOL (D/SH)	128,498
G-40							1					2			Severe	40		4' MSA (Camera doesn't fit) & 16' (4' From D/S MH) JOL (D/SH). No inspection 4' to 16'. Pipe ID was 10056-10058A.	Spot repair	7,290
G-41															Severe	41		103.9' JOL (D/SH).	Spot repair 103.9' JOL (D/SH)	134,962
G-42												1			Severe	42	x	2.5' JOL (D/SH). MSA (JOL). 336.1' MSA (JOL). U/S MH is a possible C/O.	Spot repair	98,415
G-43					1										Severe	43		32.9' JOL (D/SH). Pipe ID was 10058A-10058.	Spot repair	31,985
G-44												2			Severe	44		187.7' MSA (JOL D/SL). 275.9' (4.1' from U/S MH) BPSV. 168.6' BPVV. No inspection 187.7' to 275.9'	Spot repair	102,060
G-45															Severe	45		244.4' JOL (D/SL). 270.3' BPVV (End of the sewer line).	Spot repair 244.4' JOL (D/SL)	132,484
G-46												2			Severe	46		187.4' MSA (JOL) & 236.04' (Camera does not fit). 186.7' JOL (D/SH). 187.4' MSA (JOL). No inspection 187.4' to 236.04'. Same inspection M311-001 # 11 (deleted).	186.7' Spot repair to JOL (D/SH)	87,130
G-47				1											Severe	47		Same G312-008 Ph 2 # 6 & 7 (deleted). 124.2' HSV & 154.5 JOL (D/SL). RP=RPP. MSA 30.5' (134.1' from D/S MH) RBL.	Replace pipe 122' to 127' & Spot repair 154.5'	80,141
G-48															Severe	48		241.1' JOL (D/SL). 274.4' HSV.	Spot repair 241.1' JOL (D/SL) & 274.4' HSV	168,399
G-49												2			Severe	49		2.5' MSA (Camera does not fit) & 169.48' MSA (71.3 ' from U/S MH) JOL. 70.8' from U/S MH JOL (D/SL) & BPVV. No inspection 2.5' to 169.48'	70.8' from U/S MH Spot repair to JOL & BPVV	87,764
G-50	1														Severe	50		20.3' JOL (D/SL) & 239.6' BPVV.	Spot repair 20.3' to JOL & 239.6' BPVV	149,105

Table 1-5
Gravity Sewer Rehabilitation and Replacement Projects

General Information

Project No.	DVD No.	Inspection No.	Reversal DVD No.	Reversal Inspec. No.	DVD Watched? (Y)	Location – Street Name	CCTV Date	Pipe ID	Manhole Start	Manhole End	Direction of Camera	Pipe Size (in)	Pipe Mat	Atlas Length (ft)	CCTV Length (ft)
G-51	G312-036	2			Y	NO STREET NAME	12/10/08	15023-15024	15-023	15-024	D/S	8	VCP	198	202
G-52	G312-047	6			Y	ROSECRANS AVE	12/29/08	18023-18024	18-023	18-024	U/S	6	VCP	163	181
G-53	G312-056	5			Y	29TH ST	1/13/09	20005-20006	20-005	20-006	D/S	6	VCP	293	292
G-54	G312-008 Ph 2	4			Y	HOMER ST	7/16/09	10048-10049	10-048	10-049	D/S	8	VCP	250	206
G-55	G312-003 Ph 2	6			Y	THE STRAND	7/9/09	14068-14069	14-068	14-069	D/S	8	VCP	207	211
G-56	A315-022	11	A315-022	1	Y	11TH PL	6/29/09	11049-11050	11-049	11-050	D/S	6	VCP	250	105
G-57	G312-001-Ph 2	4			Y	14TH ST	6/10/09	11024-11025	11-024	11-025	D/S	8	VCP	305	307
G-58	A315-011	7	A315-011	9	Y	27TH ST	5/22/09	20048-20049	20-048	20-049	D/S	6	VCP	125	29
G-59	G312-003 Ph 3	1			Y	31ST PL	8/12/09	17071-17072	17-071	17-072	D/S	8	VCP	350	364
G-60	G312-002 Ph 3	7			Y	29TH ST	8/11/09	17012-17013	17-012	17-013	D/S	8	VCP	200	153
G-61	G312-017 -1	1			Y	3RD ST	8/3/09	10138-10139	10-138	10-139	U/S	6	VCP	400	382
G-62	G312-002 Ph 3	6			Y	29TH ST	8/11/09	17011-17012	17-011	17-012	D/S	8	VCP	358	360
G-63	G312-049	1			Y	33RD ST	12/31/08	18001-18002	18-001	18-002	U/S	6	VCP	408	357
G-64	A315-001	13	A315-004	9	Y	PARKVIEW AVE	5/6/09	25027-25028	25-027	25-028	D/S	8	VCP	237	241
G-65	A315-012	13	A315-013	2		28TH ST	5/26/09	19039-19045	19-039	19-045	D/S	6	VCP	130	109
G-66	G312-061	4			Y	MARINE AVE	1/23/09	21016-21017	21-016	21-017	D/S	6	VCP	250	256
G-67	G312-019 -1	3			Y	5TH ST	8/5/09	10131-10132	10-131	10-132	U/S	6	VCP	258	255
G-68	G312-031	6	G312-031	7	Y	MANHATTAN BEACH BLVD	12/3/08	11046-11047	11-046	11-047	D/S	6	VCP	278	305
G-69	R311-002	10	R311-002	11	Y	31ST ST	12/30/08	19001-19002	19-001	19-002	D/S	6	VCP	284	319
G-70	G312-006 Ph 2	8	G312-006 Ph 2	4	Y	4TH ST	7/14/09	10136-10137	10-136	10-137	D/S	8	VCP	250	254
G-71	G312-001-Ph 2	7			Y	ARDMORE AVE	6/10/09	11018-11021	11-018	11-021	D/S	8	VCP	310	306
G-72	G312-003 Ph 2	10				11TH ST	7/9/09	14055-14056	14-055	14-056	U/S	6	VCP	131	97
G-73	G312-035	13			Y	10TH ST	12/9/08	11130-11131	11-130	11-131	U/S	6	VCP	139	143
G-74	G312-004	10			Y	18TH ST	10/23/08	01221-01222	01-221	01-222	U/S	8	VCP	278	282
G-75	G312-006 Ph 2	10			Y	3RD ST	7/14/09	10140-10141	10-140	10-141	U/S	6	VCP	250	111
G-76	G312-004	1			Y	9TH ST	10/23/08	01161-01162	01-161	01-162	D/S	8	VCP	342	346
G-77	G312-002 Ph 2	5			Y	HIGHLAND AVE	7/8/09	14048-14050	14-048	14-050	D/S	12	VCP	245	242
G-78	G312-001 Ph 3	1			Y	LAUREL AVE	8/10/09	08069-08070	08-069	08-070	D/S	8	VCP	230	230
G-79	G312-003 Ph 2	7			Y	THE STRAND	7/9/09	14069-14072	14-069	14-072	D/S	8	VCP	32	31
G-80	G312-045	3			Y	30TH ST	12/23/08	17016-17017	17-016	17-017	U/S	8	VCP	347	359
G-81	G312-066	3			Y	SAUSALITO CIR	2/3/09	24093-24094	24-093	24-094	D/S	8	VCP	135	144

Structural Defect Coding

Project No.	Crack C L	Crack C C	Crack C M	Fracture F L	Fracture F C	Fracture F M	Broken B SV	Broken B VV	Hole H SV	Hole H VV	Joint J O M	Joint J O L	Joint J S M	Joint J S L	Deformed D V	Deformed D H	Collapsed Pipe X P	Surface Damage S	Point Repair RP	Lining Failure	Sags	Total Structural Defects	Total Structural Defect Score	Structural Defect Index
PACP Grade	2	1	3	3	2	4	5	5	5	5	3	5	1	2	5	5	5	2	1		2			
G-51			1	4	3	3		3			2										35	51	124	2.4
G-52		1	1					1				1										4	14	3.5
G-53			17		1	1					10	2						4				35	105	3.0
G-54		1	1		1			1				1										5	16	3.2
G-55	4	2	5						1		2	1										15	41	2.7
G-56		3			1							2										6	15	2.5
G-57			2			1	2				4	1										10	37	3.7
G-58								1				1						1				3	12	4.0
G-59	1		1	1				1			1	1										6	21	3.5
G-60								1			2	1						1			24	29	66	2.3
G-61	1	1	13		1			1			33	1						17				68	187	2.8
G-62	4									1	1	1							3			10	24	2.4
G-63			8		2						29	2						27				68	179	2.6
G-64	2	4	2	1	1		1	2			1										5	19	47	2.5
G-65		2					1					1										4	12	3.0
G-66		6	6		2	4		1			9	1		1								30	83	2.8
G-67		2	3		2	1					9	1						2	2			22	57	2.6
G-68	1		11		2						7	1						13				35	91	2.6
G-69	1	1	9			1					6	1										19	57	3.0
G-70		1	11			1					5	1										19	58	3.1
G-71	1		15	1		2					2	1										22	69	3.1
G-72	4		2			1					8	1										16	47	2.9
G-73	1		3								5	1						8				18	47	2.6
G-74	3	1	7		1						2	1										15	41	2.7
G-75			2		1						4	1										8	25	3.1
G-76		2			1						3	1						1				8	20	2.5
G-77											3	1	1									5	15	3.0
G-78	2	1									1	1										5	13	2.6
G-79	1		4								4	1									4	14	39	2.8
G-80	1				1						2	1										5	15	3.0
G-81											2	1										3	11	3.7

Operational and Maintenance

Project No.	Deposits D AGS	Deposits D AE	Deposits D Other	Roots Fine (F) B	Fine (F) L	Fine (F) J	Fine (F) C	Tap (T) B	Tap (T) L	Tap (T) J	Tap (T) C	Medium B	Medium L	Medium J	Medium C	Ball (B) B	Ball (B) L	Ball (B) J	Ball (B) C	Infiltration I G	Infiltration I D	Infiltration I R	Infiltration I W	Obstacles OB Other C	Obstacles OB Other Z	Obstacles OB Other %	Vermin V C	Vermin V R	Total O&M Defects	Total O&M Defect Score	O&M Defect Index
PACP Grade	2	2	2	2	1	1	1	3	2	2	2	4	3	3	3	5	4	4	4	5	3	4	2	4	4		1	1			
G-51						2																							2	2	1.0
G-52						1																							1	1	1.0
G-53					5	42							2	1															50	56	1.1
G-54						10				1																			11	12	1.1
G-55					2	28	1						1																32	34	1.1
G-56						7											1												8	11	1.4
G-57	6					11	1						1				1												20	31	1.6
G-58																													0	0	0.0
G-59					6	58	2						4	2	3		6		1										82	121	1.5
G-60	1			1	1	13																							16	18	1.1
G-61					3	53							2	1			2												61	73	1.2
G-62				1	2	9							4				2												18	33	1.8
G-63	3				6	18				2	2		3	2			2												38	61	1.6
G-64		17																											17	34	2.0
G-65				1	1	10																							12	13	1.1
G-66						14				4					1														19	25	1.3
G-67					1	15	2						1				3												22	33	1.5
G-68						20				1	1						1												23	28	1.2
G-69					3	42	3								1		6												55	75	1.4
G-70		8			2	26	4										2												42	56	1.3
G-71		5			3	20									1		2												31	44	1.4
G-72																													0	0	0.0
G-73					1	3																							4	4	1.0
G-74		4			4	2																	4						14	22	1.6
G-75					2	11	1						2																16	20	1.3
G-76					5	6			2								1												14	19	1.4
G-77		2																											2	4	2.0
G-78					3	27											2												32	38	1.2
G-79						2																							2	2	1.0
G-80						2	1						4																7	15	2.1
G-81		8																											8	16	2.0

Construction Features

Project No.	Tap (Lateral) T FD	Tap (Lateral) T BI	Tap (Lateral) T BD	Line L D	Line L L	Line L U	Line L R	Line L RD	Line L LD	Intruding Seal Material IS GT	Intruding Seal Material IS Z	Miscellaneous M SA	Miscellaneous M CU	Miscellaneous M MC	Priority	Condition Ranking	No Reverse Set-up Completed	Comments	Minimum Recommendations	Project Replacement Cost ($)
G-51				1									22		Severe	51		71.5', 77' & 106.7' BPVV). Sags. 139.1' to 199.7 MCU. Could not see any defect.	Should Replace all line or Spot repair69' to 84' & 104' to 107' for BPVV & Fractures	98,123
G-52					1		1	1				1			Severe	52	x	180.7' JOL (D/SL) & BPVV. MSA 180.7' (JOL). MH 18-023 is a C/O	Spot repair 178' to 181' to BPVV & JOL	66,084
G-53															Severe	53		37.4'JOL (D/SL) & 100.4' JOL (D/SL). SAVZ	Spot repair 37.4' & 100.4' to JOL	106,361
G-54				1								1			Severe	54	x	151.7' BPVV. 205.8' JOL (D/SL). 206.9' MSA (LD). D/S MH is a Buried MH	Spot repair	121,500
G-55	2	1					1								Severe	55		6.5' HSV. 209.2' JOL (D/SL).	Spot repair for HSV, Spot repair for JOL (D/SL)	102,643
G-56												2			Severe	56		56.3' MSA JOL D/SL & 200.9' (Reversal 46.5') JOL D/SL. No Reversal video between 56.3' to 200.9'.	Spot repair	91,125
G-57															Severe	57		4' Small BPVV. 159.8' JOL (D/SL) & 306.2' BPVV (Channel of D/S MH).	Spot repair 4' Small BPVV, Spot repair Jol & BPVV 306.2'	149,056
G-58				1								2			Severe	58		25.7' JOL (DS/L) & BPVV. MSA 25.7' JOL & 121.5 (Due to angle of the pipe/incline). No inspection 25.7' to 121.5'	Spot repair	45,563
G-59	1												1		Severe	59		144.3' JOL (D/SL) & 322.3' BPVV.	Spot repair. Root Treat & Cut	176,710
G-60															Severe	60		5' BPVV. 83.5' JOL (D/SL). S= SAMZ	Spot repair.	74,115
G-61							1							1	Severe	61		211 JOL (D/SL) & 189' Small BPVV. S=SSSZ	Spot repair	139,385
G-62	1														Severe	62		301.8' JOL (D/SL). 356.7' HVV (End of the Pipe Line). Also three Repair Patch in poor condition (164.2',167.2' & 168.5'). RP=RPP.	Spot repair JOL & HVV. Should Replace pipe 163' to 169' for Repair Patches	174,863
G-63															Severe	63		78.3' & 79.9' JOL (D/SL). SAVZ	Spot repair 78' to 80' to JOL.	148,785
G-64				1								2	5		Severe	64		143.4' to 153.1' BPVV. 201.3' BPSV. 203' MSA (BPVV). 133' to 163.8 continuous cracks, fractures & BPVV.	133' to 164' Reline Pipe & 201.3' Spot repair	117,029
G-65												2			Severe	65		105.9 BPSV (Missing Pipe). 127' JOL (DS/L). MSA 105.9' (BPSV). There is no inspection 105.9' to 127'	Spot repair	47,385
G-66					1										Severe	66		12.8' JOL (D/SL). 161.6' JSL. 235.4' BPVV.	Spot repair for JOL, JSL & BPVV	93,348
G-67															Severe	67		39.3' JOL (D/SL). Same G312-042 #1 (deleted). S=SSSZ. RP=RPR	Spot repair	93,093
G-68												2			Severe	68		272' JOL (D/SL). SAVZ. MSA 272' (33' from D/S MH) JOL	Spot repair 272 to 274' to JOL (D/SL)	111,173
G-69		1										2			Severe	69		8.1' JOL (D/SL). MSA 262.3' (56.8' from D/S MH) TBI	Spot repair 8.1' to JOL	116,312
G-70							2					2			Severe	70		226.3' JOL (D/SL). MSA 237' (17.1' from D/S MH) LR. Inspection complete	Spot repair	123,493
G-71															Severe	71		5' JOL (D/SL).	Spot repair	148,910
G-72												1			Severe	72	x	35.7' JOM (D/SL). U/S MH is a C/O. 96.6' MSA (Camera flips over at JOM)	Spot repair	47,750
G-73															Severe	73		112.2' JOL (D/SL). SAVZ	Spot repair 112.2' to JOL (D/SL)	52,051
G-74															Severe	74		194.7' JOL (D/SH).	Spot repair 194.7' to JOL (D/SL)	136,955
G-75												1			Severe	75	x	111.1' MSA (JOM).29.2' JOL (D/SL). U/S MH is a C/O	Spot repair	91,125
G-76				1											Severe	76		95.3' JOL (D/SL). SAVZ	Spot repair 95.3' JOL (D/SL) & Line Down	168,253
G-77															Severe	77		207.8' JOL (D/SL).	Spot repair	176,637
G-78															Severe	78		83.1' JOL (D/SL).	Spot repair	111,537
G-79					1										Severe	79		16.5' JOL (D/SL).	Spot repair	15,017
G-80															Severe	80		320.3' JOL (D/SL) .	Spot repair 318' to 320.3' to JOL	174,523
G-81															Severe	81		51.2' JOL (D/SL).	Spot repair	70,178

Table 1-5
Gravity Sewer Rehabilitation and Replacement Projects

General Information

Project No.	DVD No.	Inspection No.	Reversal DVD No.	Reversal Inspec. No.	DVD Watched? (Y)	Location: Street Name	CCTV Date	Pipe ID	Manhole Start	Manhole End	Direction of Camera	Pipe Size (in)	Mat	Atlas Length (ft)	CCTV Length (ft)
G-82	G312-070	3			Y	33RD PL	2/9/09	17065-17066	17-065	17-066	D/S	8	VCP	161	167
G-83	A315-012	11			Y	27TH ST	5/26/09	19037-19037A	19-037	19-037A	D/S	6	VCP	120	125
G-84	G312-022	4			Y	SEPULVEDA BLVD	11/18/08	08001-08002	08-001	08-002	D/S	8	VCP	142	112
G-85	G312-010	2			Y	LONGFELLOW DR	10/31/08	04025-04026	04-025	04-026	D/S	8	VCP	210	212
G-86	G312-028	2			Y	6TH ST	11/26/08	10073-10075	10-073	10-075	D/S	8	VCP	225	230
G-87	G312-055	7	G312-055	8	Y	25TH ST	1/12/09	20054-20063	20-054	20-063	D/S	6	VCP	133	67
G-88	G312-024	12			Y	29TH ST	11/20/08	08061-08062	08-061	08-062	D/S	8	VCP	235	241
G-89	G312-013	10			Y	SHORES PARKING LOT	11/5/08	05009-05010	05-009	05-010	D/S	8	VCP	300	316
G-90	A315-021	3			Y	13TH PL	6/9/09	14025-14026	14-025	14-026	U/S	6	VCP	168	79
G-91	A315-013	9	A315-013	10	Y	23RD ST	5/27/09	15071-15072	15-071	15-072	D/S	8	VCP	270	253
G-92	G312-039	4			Y	MARINE AVE	12/15/08	15053-15054	15-053	15-054	D/S	8	VCP	314	316
G-93	G312-033	7			Y	2ND ST	12/5/08	12015-12016	12-015	12-016	U/S	8	VCP	61	94
G-94	A315-016	12			Y	19TH ST	6/1/09	22028-22055	22-028	22-055	D/S	6	VCP	143	4
G-95	G312-009 Ph 2	4			Y	1ST ST	7/17/09	10148-14100	10-148	14-100	D/S	6	VCP	20	8
G-96	A315-024	8			Y	36TH ST	7/15/09	19046-19048	19-046	19-048	U/S	6	VCP	285	140
G-97	A315-012	12			Y	28TH ST	5/26/09	19038-19039	19-038	19-039	U/S	6	VCP	175	3
G-98	A315-018	3			Y	13TH ST	6/3/09	14013-14016	14-013	14-016	D/S	8	VCP	296	300
G-99	G312-056	9			Y	VISTA DR	1/13/09	20009-20012	20-009	20-012	D/S	8	VCP	130	129
G-100	G312-004	7			Y	AVIATION BLVD	10/23/08	01187-01189	01-187	01-189	D/S	8	VCP	340	343
G-101	G312-072	7			Y	20TH ST	2/11/09	22029-22030	22-029	22-030	U/S	6	VCP	161	3
G-102	G312-067	5			Y	19TH ST	2/4/09	22023-22024	22-023	22-024	U/S	6	VCP	330	4
G-103	G312-037	7			Y	16TH PL	12/11/08	14003-14004	14-003	14-004	U/S	6	VCP	105	68
G-104	G312-005	4			Y	19TH ST	10/24/08	01224-01225	01-224	01-225	U/S	8	VCP	278	285
G-105	G312-052	5			Y	38TH PL	1/7/09	18050-18051	18-050	18-051	U/S	6	VCP	140	6
G-106	G312-057	7			Y	MANHATTAN AVE	1/14/09	20044-20046	20-044	20-046	D/S	6	VCP	245	256
G-107	G312-051	3			Y	33RD ST	1/6/09	19016-19017	19-016	19-017	U/S	6	VCP	219	4
G-108	G312-054	1			Y	ALMA AVE	1/9/09	20018-20021	20-018	20-021	U/S	6	VCP	408	407
G-109	A315-001	4			Y	MAGNOLIA WAY	5/6/09	25015-25016	25-015	25-016	U/S	8	VCP	303	303
G-110	A315-005	8	A315-005	9	Y	ROSECRANS PL	5/12/09	18048-18049	18-048	18-049	D/S	6	VCP	200	16
G-111	G312-005 Ph 2	1			Y	VALLEY DR	7/13/09	10115-10116	10-115	10-116	U/S	6	VCP	275	347
G-112	G312-054	4			Y	25TH ST	1/9/09	20021-20022	20-021	20-022	D/S	6	VCP	109	51

Structural Defect Coding

Project No.	Crack C L	Crack C C	Crack C M	Fracture F L	Fracture F C	Fracture F M	Broken B SV	Broken B VV	Hole H SV	Hole H VV	Joint J O M	Joint J O L	Joint J S M	Joint J S L	Deformed D V	Deformed D H	Collapsed Pipe X P	Surface Damage S	Point Repair RP	Lining Failure	Sags	Total Structural Defects	Total Structural Defect Score	Structural Defect Index
PACP Grade	2	1	3	3	2	4	5	5	5	5	3	5	1	2	5	5	5	2	1		2			
G-82											2	1										3	11	3.7
G-83		1	1								1	1										4	12	3.0
G-84					1						1	1										3	10	3.3
G-85											1	1						1				3	10	3.3
G-86	1										1	1										3	10	3.3
G-87			1									1										2	8	4.0
G-88			1									1										2	8	4.0
G-89					1	1						1										3	11	3.7
G-90		2										1										3	7	2.3
G-91												1										1	5	5.0
G-92												1										1	5	5.0
G-93												1										1	5	5.0
G-94												1										1	5	5.0
G-95												1										1	5	5.0
G-96	2	6	1		1				1		1											12	23	1.9
G-97							1															1	5	5.0
G-98		1	62		1						2											66	195	3.0
G-99		1	2		2	1	2	1														9	30	3.3
G-100		1				2	2				1								1			7	23	3.3
G-101								1										1				2	7	3.5
G-102							1															1	5	5.0
G-103			6	2	2	1			1		4											16	49	3.1
G-104	1	2	3		2	4		2														14	43	3.1
G-105								2														2	10	5.0
G-106		2	10			4					4				1							21	65	3.1
G-107						2		2														4	18	4.5
G-108	1		6			4		2	1		13											27	90	3.3
G-109									1													1	5	5.0
G-110			1				1															2	8	4.0
G-111	1	1	8						1		6											17	50	2.9
G-112			4			1		1														6	21	3.5

Operational and Maintenance

Project No.	Deposits D AGS	Deposits D AE	Deposits D Other	Roots Fine (F) B	Fine L	Fine J	Fine C	Tap (T) B	Tap L	Tap J	Tap C	Medium B	Medium L	Medium J	Medium C	Ball (B) B	Ball L	Ball J	Ball C	Infiltration I G	I D	I R	I W	Obstacles OB Other C	OB Z	OB %	Vermin V C	Vermin V R	Total O&M Defects	Total O&M Defect Score	O&M Defect Index
PACP Grade	2	2	2	2	1	1	1	3	2	2	2	4	3	3	3	5	4	4	4	5	3	4	2	4	4		1	1			
G-82						5				1			1				1												8	14	1.8
G-83						9																							9	9	1.0
G-84	8				1	1																							10	18	1.8
G-85					2	23																							25	25	1.0
G-86					1	1																					4		6	6	1.0
G-87						16																							16	16	1.0
G-88						4											1												5	8	1.6
G-89						56	1																						57	57	1.0
G-90						2											1												3	6	2.0
G-91					3	46							2				5												56	75	1.3
G-92					1	1	2																						4	4	1.0
G-93					1																								1	1	1.0
G-94																													0	0	0.0
G-95																													0	0	0.0
G-96		7																											7	14	2.0
G-97																													0	0	0.0
G-98				2		43								2			1	1											49	61	1.2
G-99	3					6				1																			10	14	1.4
G-100																													0	0	0.0
G-101																													0	0	0.0
G-102												1													2	15			3	12	4.0
G-103						4							4																8	16	2.0
G-104				1	2	2											1												6	10	1.7
G-105																													0	0	0.0
G-106					1	3																							4	4	1.0
G-107																													0	0	0.0
G-108		1			4	62				2				3			2												74	89	1.2
G-109		26																				1							27	56	2.1
G-110						1																							1	1	1.0
G-111		8			2	28	2																						40	48	1.2
G-112						7								2															9	13	1.4

Construction Features, Miscellaneous and Recommendations

Project No.	Tap (Lateral) T FD	T BI	T BD	Line L D	L L	L U	L R	L RD	L LD	Intruding Seal Material IS GT	IS Z	Miscellaneous M SA	M CU	M MC	Priority	Condition Ranking	No Reverse Set-up Completed	Comments	Minimum Recommendations	Project Replacement Cost ($)
G-82															Severe	82		164.9' JOL (D/SL).	Spot repair	81,113
G-83				1								1			Severe	83	x	124.7' JOL(D/SL). MSA 124.' (JOL).	Spot repair	45,453
G-84															Severe	84		7' JOL (D/SL). Pipe ID was 08001-08001A.	Spot repair 7' JOL (D/SL)	54,626
G-85															Severe	85		121.5' JOL (D/SL). SAVZ	Spot repair 121.5' to JOL (D/SL)	103,032
G-86															Severe	86		34.1' JOL (D/SL).	Spot repair34' to 36' to JOL	111,537
G-87												2			Severe	87		64.1' JOL (D/SL). 64.5' MSA (JOL). 130.85' (2' from U/S MH) MSA (Camera does not fit). No inspection 64.5' to 130.85'	Spot repair	48,424
G-88				1			1	1							Severe	88		238.2' JOL (D/SL). Close to End MH.	Spot repair 238.2' JOL (D/SL)	117,223
G-89															Severe	89		5' JOL (D/SL).	Spot repair 5' JOL (D/SL)	153,673
G-90												1			Severe	90	x	78.8' MSA (JOL D/SL). U/S MH is a possible C/O	Spot repair	61,236
G-91												2			Severe	91		167.5' (JOL D/SL). 167.5' (85.8' from D/S MH) JOL.	Spot repair	131,220
G-92	1														Severe	92		60.7' JOL (D/SL).	Spot repair 60.7' to JOL	153,333
G-93							1	1							Severe	93		17' JOL (D/SL).	Spot repair 17' JOL (D/SL)	45,490
G-94												1			Severe	94	x	3.5' MSA (JOL).	Spot repair	52,124
G-95				1								1			Severe	95	x	2' JOL (D/SL). 7.5' MSA (LD). Pipe ID was 10148-10058B.	Spot repair	7,290
G-96												1			Severe	96	x	140.1' MSA (BPSV). Following two pipes segments seem to have a JOL. MH 19-046 is possible CO	After 140.1' , Replace or Spot repair 2 or 3 pipes	103,883
G-97												1			Severe	97	x	2.5' BPSV (Missing Pipe). 2.5' MSA (BP SV). U/S MH is a CO	Spot repair	63,788
G-98															Severe	98		Continuous Cracks (Multiple). 278' to 284' possible abandoned MH (MH14-035). Bottom part is in poor condition.	Reline or Replace pipe 278' to 284'	145,606
G-99															Severe	99		2' BPVV. 121.5' & 122.5' BPSV.	Spot repair 2' to 4' BPVV & 119' to 128' BPSV and Fractures	62,840
G-100		1													Severe	100		223.8' & 226.8 ' (two sides) BPSV. Pipe ID was 01187-01089.	220' to 229' Fractures Multiple & Broken Pipes. Spot repair 220' to 229'	166,601
G-101													1		Severe	101	x	2.5' BPSV (Missing Pipe). 2.5' MSA (BPSV). U/S MH is a CO. Surface Damage = SAMZ	Replace pipe or Spot repair	58,612
G-102												1			Severe	102	x	4.2' BPSV. 4.2' MSA (OBM). OBM & OBN. U/S MH is a CO.	Spot repair 2 to 4.2'	120,278
G-103		1										1			Severe	103	x	26.9' HSV. Large Fractures. 68' MSA (Roots). U/S MH Possible C/O.	Spot repair 21' to 27' for HSV & fractures	38,269
G-104	3														Severe	104		17.4' & 144.1' BPVV with continuous fractures.	Spot repair or Replace pipe 13' to 19' & 140' to 146'	138,413
G-105												1			Severe	105	x	6' MSA (BPVV). 4' to 6' BPVV (Missing Pipe). U/S MH is a possible C/O	Spot repair 2' to 6' to BPVV	51,132
G-106															Severe	106		157.9' Vertical Deformed Pipe.	Spot repair 157.9' to vertical deformed pipe	93,421
G-107												1			Severe	107	x	4' MSA (BPVV). U/S MH is Poinsettia Pump Station.	Spot repair 0' to 6' BPVV	79,785
G-108											1				Severe	108		97' & 110.1' BPVV. 186.1' HSV. U/S MH is a possible C/O.	Spot repair 97' & 110.1' to BPVV , 186.1' HSV	148,169
G-109															Severe	109		103.1' HSV & Infiltration Runner at the same point.. ISZ=ISSRH	Spot repair	147,258
G-110												2			Severe	110	x	15.8' BPSV (Missing Pipe). 15.8' MSA (BPSV). There is no inspection 15.8' to 200' (Due to angle of mouth of the pipe).	Spot repair	72,900
G-111														1	Severe	111		103.7' HSV (Missing Pipe).	Spot repair	126,627
G-112															Severe	112		34.7 BPVV (Missing Pipe).	Spot repair 34' to 38' for BPVV & Fracture	18,480

Table 1-5
Gravity Sewer Rehabilitation and Replacement Projects

Project No.	DVD No.	Inspection No.	Reversal DVD No.	Reversal Inspec. No.	DVD Watched? (Y)	Location: Street Name	CCTV Date	Pipe ID	Manhole: Start	Manhole: End	Direction of Camera	Pipe: Size (in)	Pipe: Mat	Pipe: Atlas Length (ft)	Pipe: CCTV Length (ft)	Crack C: L	Crack C: C	Crack C: M	Fracture F: L	Fracture F: C	Fracture F: M	Broken B: SV	Broken B: VV	Hole H: SV	Hole H: VV	Joint J: O M	Joint J: O L	Joint J: S M	Joint J: S L	Deformed D: V	Deformed D: H	Collapsed Pipe X: P	Surface Damage S	Point Repair RP	Lining Failure	Sags	Total Structural Defects	Total Structural Defect Sco	Structural Defect Index	Deposits D: AGS	Deposits D: AE	Deposits D: Other	Roots (R) Fine (F): B	Fine (F): L	Fine (F): J	Fine (F): C	Tap (T): B	Tap (T): L	Tap (T): J	Tap (T): C	Medium: B	Medium: L	Medium: J	Medium: C	Ball (B): B	Ball (B): L	Ball (B): J	Ball (B): C	Infiltration I: G	Infiltration I: D	Infiltration I: R	Infiltration I: W	Obstacles OB Other: C	Obstacles OB Other: Z	Obstacles OB Other: %	Vermin V: C	Vermin V: R	Total O&M Defects	Total O&M Defect Score	O&M Defect Index	Tap (Lateral) T: FD	Tap (Lateral) T: BI	Tap (Lateral) T: BD	Line L: D	Line L: L	Line L: U	Line L: R	Line L: RD	Line L: LD	Intruding Seal Material IS: GT	Intruding Seal Material IS: Z	Miscellaneous M: SA	Miscellaneous M: CU	Miscellaneous M: MC	Priority	Condition Ranking	No Reverse Set-up Completed	Comments	Minimum Recommendations	Project Replacement Cost ($)
															PACP Grade	2	1	3	3	2	4	5	5	5	5	3	5	1	2	5	5	5	2	1		2				2	2	2	2	1	1	1	3	2	2	2	4	3	3	3	5	4	4	4	5	3	4	2	4	4		1	1																							
G-113	G312-055	5			Y	24TH ST	1/12/09	20059-20061	20-059	20-061	D/S	6	VCP	297	301		4	23		2	3		2			13											47	138	2.9						12								4	1														17	27	1.6															Severe	113		70.1' & 76.6' BPVV.	Spot repair 70' to 78' for BPVV & Fractures	109,642
G-114	G312-040	8			Y	THE STRAND	12/16/08	11132-11133	11-132	11-133	D/S	8	VCP	251	256					2	1		1			1			1								6	18	3.0	4	1				1																							6	11	1.8	1										1				Severe	114		74.8' Small BPVV. 253.7' Joint Separated Large. ISSR	Spot repair 74.8' BPVV & 253.7' JSL	124,319
G-115	A315-001	10			Y	MAGNOLIA WAY	5/6/09	25024-25025	25-024	25-025	D/S	8	VCP	97	95		1			1		1														2	5	12	2.4		12																									2		14	26	1.9															Severe	115		39' BPSV. ISZ=ISSRH	Spot repair	46,170
G-116	G312-010 Ph 2	4	G312-010 Ph 2	5	Y	EASEMENT	7/20/09	10052-10053	10-052	10-053	D/S	6	VCP	350	19							1							1								2	7	3.5						2																							2	2	1.0												2			Severe	116		5' MSA (Camera doesn't fit due to channel at U/S MH). 336' JSL & BPSV. No Inspection 5' to 336'	Spot repair	127,575
G-117	Various 2 (G312-015)	9			Y	27TH ST	7/30/09	19037A-19044	19-037A	19-044	U/S	6	VCP	20	15						1					1	1										3	12	4.0						1																							1	1	1.0					1		1					1			Severe	117		13.6' JOL (D/SL). Severe De	Spot Repair	5,285
G-118	A315-019	9			Y	17TH ST	6/4/09	22013-22050	22-013	22-050	D/S	6	VCP	146	114					1			1														2	7	3.5					1	7								1															9	11	1.2															Major	118		4' BPVV.	Spot repair	41,553
G-119	A315-021	4			Y	OCEAN DR	6/9/09	14026-14027	14-026	14-027	D/S	8	VCP	149	107	2	6	2						1													11	21	1.9						1																							1	1	1.0															Major	119		17.9' HSV.	Spot repair	51,856
G-120	G312-061	6			Y	THE STRAND	1/23/09	21023-21026	21-023	21-026	D/S	6	VCP	66	66								1			1											2	8	4.0																													0	0	0.0				1											Major	120		63.2' BPVV.	Spot repair	24,130
G-121	G312-002	3			Y	1ST ST	10/21/08	01060-01061	01-060	01-061	D/S	8	VCP	346	353					1			1			2											4	13	3.3					3								1																4	6	1.5	1														Major	121		348.9' BPSV & FC.	Replace pipe 347' to 350' BPVV	171,461
G-122	A315-012	10			Y	27TH ST	5/26/09	19036-19037	19-036	19-037	U/S	6	VCP	175	42			1	1						1	1											4	14	3.5						2								1															3	5	1.7												1			Major	122	x	7' Small HVV. 42.4' MSA (RMJ). U/S MH is a possible C/O	Spot repair	63,788
G-123	A315-016	6			Y	15TH ST	6/1/09	14034-14062	14-034	14-062	D/S	6	VCP	132	116		3	2		2	1		1														9	22	2.4					2	4																							6	6	1.0															Major	123		3' BPVV.	Spot repair	42,391
G-124	G312-005 Ph 2	3			Y	VALLEY DR	7/13/09	10117-10118	10-117	10-118	D/S	6	VCP	350	318		1	7		2	1		1														12	35	2.9					1	34	1							1															37	39	1.1															Major	124		171.8' BPVV.	Spot repair 169.6' to 173.7'	115,911
G-125	G312-008 Ph 2	9			Y	1ST ST	7/16/09	10054-10055	10-054	10-055	D/S	6	VCP	200	192			6		2		1				3											12	36	3.0					1	24							3																28	34	1.2				1											Major	125		27' BPSV.	Spot repair	70,020
G-126	A315-024	11			Y	12TH ST	7/15/09	11033-11034	11-033	11-034	U/S	6	VCP	247	222	1	2	1						1													5	12	2.4	3			1	1	7						1	2																15	26	1.7															Major	126		153.1' HSV.	Spot repair	81,065
G-127	A315-005	16	A315-005	17	Y	ROSECRANS	5/12/09	18025-18027	18-025	18-027	U/S	6	VCP	150	122	1	1	3	1			1											1				8	22	2.8				1		1																							2	3	1.5												2			Major	127		6.5' BPSV . MSA 6.5' ' (BPSV). Close to End MH	Spot repair	54,675
G-128	A315-007	5			Y	33RD ST	5/18/09	19032-19033	19-032	19-033	U/S	6	VCP	110	3		1						1														2	6	3.0																													0	0	0.0												1			Major	128	x	2.5' BPVV. MSA 2.5' (BPVV). U/S MH is a possible C/O	Spot repair	40,095
G-129	G312-005 Ph 2	2			Y	VALLEY DR	7/13/09	10116-10117	10-116	10-117	D/S	6	VCP	345	368	2	6	16		1	1			1													27	69	2.6					1	32							3																36	42	1.2		1													Major	129		305.1' HSV.	Spot repair	133,954
G-130	A315-001	3			Y	MAGNOLIA WAY	5/6/09	25018-25019	25-018	25-019	D/S	8	VCP	155	157	1	1					1	1													2	6	17	2.8		29				1																							30	59	2.0				1	1		1	1		1					Major	130		65.4' BPSV. 106.8' BPVV.	Spot repair	76,108
G-131	G312-004 Ph 3	2			Y	BELL AVE	8/13/09	17013-17018	17-013	17-018	D/S	10	VCP	300	276	1		11		2			1			2											17	50	2.9					1	32								2															35	39	1.1															Major	131		264.3' BPVV.	Spot repair 264' to 267'	167,792
G-132	G312-008	12	G312-008	13	Y	21ST ST	10/29/08	03059-03060	03-059	03-060	D/S	8	VCP	188	198			4					1														5	17	3.4					1	9							2																12	16	1.3		1										2			Major	132		111.7' to 113.4' BPVV. MSA 113.4' (84.9' from D/S MH) BPVV.	Spot repair 110' to 113' to BPVV	96,374
G-133	G312-071	4			Y	18TH ST	2/10/09	22015-22016	22-015	22-016	U/S	6	VCP	84	135	1		2			2		1			10											16	51	3.2					1	16		1							1		1												20	27	1.4															Major	133		103.2' BPVV.	Spot repair 100' to 103.2'	49,135
G-134	G312-050	5			Y	31ST ST	1/5/09	19005-19007	19-005	19-007	D/S	6	VCP	284	291	5	3	16		1	2		1			5							11				44	113	2.6						6	1						1	3															11	19	1.7		1													Major	134		215.6' BPVV. SAVZ	215.6' Spot repair to BP VV	106,179
G-135	G312-057	4			Y	30TH ST	1/14/09	20041-20042	20-041	20-042	U/S	6	VCP	252	51			3					1			3											7	23	3.3						10				1							2												13	20	1.5												1			Major	135	x	3.5' BPVV. 51.1' MSA (RTJ). U/S MH is CO.	Spot repair 3.5' to BP VV	91,807
G-136	G312-002	8			Y	2ND ST	10/21/08	01083-01085	01-083	01-085	D/S	8	VCP	350	355	2	9	13	1	3	4		3			4							1			7	47	120	2.6	115	30																											145	290	2.0													2		Major	136		90' & 92.8' Continuous BPVV. 199.9' Small BPVV. SAVZ	90' to 93' Replace pipe for BPVV.199.9' Spot repair for Small BPVV	172,287
G-137	G312-040	3			Y	27TH ST	12/16/08	16015-16016	16-015	16-016	D/S	8	VCP	350	359	1				1		1				2											5	15	3.0					6	38							4																48	56	1.2															Major	137		23.3' BPVV.	Spot repair 23.3' to BPSV	174,474
G-138	G312-031	11	G312-031	12	Y	3RD ST	12/3/08	12012-12013	12-012	12-013	U/S	6	VCP	122	122	1		5					1			4							9				20	52	2.6	3					4																							7	10	1.4												2			Major	138		3' BPVV. SAVZ. MSA 97.5' (24" from U/S MH) JOM.	Spot repair 2' to 3' for BPVV	44,287
G-139	G312-057	3	G312-057	2	Y	ALMA AVE	1/14/09	20013-20016	20-013	20-016	U/S	6	VCP	177	182	1	3	5	1	1			2			7							1				21	58	2.8						5																							5	5	1.0		1										2			Major	139		8.3' & 90' Small BPVV. 179.5' MSA (Camera does not fit). SCP (lateral)	Spot repair 8.9' & 90' to BP VV	66,339
G-140	A315-007	8			Y	THE STRAND	5/18/09	19047-19048	19-047	19-048	U/S	8	VCP	200	206	3	1				1	1															6	16	2.7					1	12	2						2				1												18	25	1.4															Major	140		2' BPSV.	Spot repair	100,067
G-141	A315-002	2			Y	HOMER ST	5/7/09	23027-23028	23-027	23-028	D/S	8	VCP	350	357					1			1														2	7	3.5					1	2							1		1														5	9	1.8															Major	141		352.9' BPVV .	Spot repair	173,453
G-142	G312-037	10			Y	14TH ST	12/11/08	14041-14064	14-041	14-064	D/S	6	VCP	116	116			4		1			1		1	3											10	33	3.3						9																							9	9	1.0															Major	142		102.1' HVV. 103.4' BPVV.	Spot repair 103' to 106' for HVV & BPVV	42,100
G-143	G312-030	2			Y	HIGHLAND AVE	12/2/08	12007-12008	12-007	12-008	D/S	8	VCP	236	268			15		2	1		1			9										5	33	95	2.9	10					39									1		2		1										53	74	1.4															Major	143		261.6' BPVV. MH12-009 corrected to MH12-008	Spot repair 261' to 264' BPVV. Root Treat & Cut	130,345
G-144	G312-010	13			Y	3RD ST	10/31/08	04008-04011	04-008	04-011	D/S	8	VCP	332	350	2	2	1				1		1		2										3	12	31	2.6					2	40							1	1			4												48	64	1.3															Major	144		89.2' BPVV, 348.1' HVV, (End of the sewer line).	Spot repair 89.2' BPVV & Spot repair 348.1' HVV	169,906
G-145	G312-012	6			Y	TENNYSON ST	11/4/08	05020-05021	05-020	05-021	D/S	8	VCP	300	306								1										2			32	35	73	2.1	47																												47	94	2.0															Major	145		196.8' BPVV. Also invert of the Start & End MH has severe Surface Damage. SAMZ	Spot repair 196.8' BPVV, Spot repair to Surface Damage	148,619
G-146	G312-058	6			Y	23RD ST	1/15/09	21008-21018	21-008	21-018	D/S	6	VCP	222	230	2		10		1	2		1			1											17	52	3.1					2	13									1		1												17	22	1.3		1													Major	146		160.5' BPVV.	Spot repair 160' to 162'	83,944
G-147	G312-059	3	G312-059	4	Y	21ST PL	1/16/09	22042-22043	22-042	22-043	D/S	6	VCP	253	261		2	6			1		1			5											15	44	2.9	2					7									1														10	14	1.4		1										2			Major	147		2' BPVV. 243.2' MSA (Large Lateral)	Spot repair	95,244
G-148	G312-059	1			Y	21ST PL	1/16/09	22040-22041	22-040	22-041	U/S	6	VCP	253	257	1	2	8							1	8											20	57	2.9	1				1	5								1			1												9	15	1.7		1										1			Major	148	x	48.8' HVV. 257.1 MSA (JOM). U/S MH is a possible C/O.	Spot repair	93,713
G-149	G312-004 Ph 2	5			Y	19TH ST	7/10/09	14001-14002	14-001	14-002	D/S	8	VCP	250	237	2		6			1		1														10	31	3.1																													0	0	0.0															Major	149		236.8' BPVV .	Spot repair	115,085
G-150	G312-010 Ph 2	1			Y	10TH ST	7/20/09	11083-11084	11-083	11-084	D/S	6	VCP	100	128		2	5			3		1			1											12	37	3.1						14								1															15	17	1.1				1											Major	150		62.7' BPVV.	Spot repair	46,729

Table 1-5
Gravity Sewer Rehabilitation and Replacement Projects

General Information

Project No.	DVD No.	Inspection No.	Reversal DVD No.	Reversal Inspec. No.	DVD Watched? (Y)	Location: Street Name	CCTV Date	Pipe ID	Manhole: Start	Manhole: End	Direction of Camera	Pipe: Size (in)	Pipe: Mat	Pipe: Atlas Length (ft)	Pipe: CCTV Length (ft)
														PACP Grade	
G-151	G312-001-Ph 2	3			Y	14TH ST	6/10/09	11023-11024	11-023	11-024	D/S	8	VCP	330	336
G-152	G312-001-Ph 2	1			Y	15TH ST	6/10/09	11019-11020	11-019	11-020	D/S	8	VCP	255	260
G-153	Various 1 (G312-015)	7	Various 1 (G312-015)	6	Y	THE STRAND	7/30/09	12037-12038	12-037	12-038	D/S	8	VCP	235	259
G-154	G312-007 Ph 3	4			Y	BELL AVE	8/18/09	17032-80133	17-032	17-033	D/S	8	VCP	150	95
G-155	G312-005 Ph 3	2			Y	36TH PL	8/14/09	17028-17029	17-028	17-029	D/S	8	VCP	235	243
G-156	G312-003	1			Y	NELSON AVE	10/22/08	01025-01026	01-025	01-026	D/S	8	VCP	350	357
G-157	G312-005	3			Y	18TH ST	10/24/08	01222-01223	01-222	01-223	D/S	8	VCP	278	284
G-158	G312-030	5			Y	1ST ST	12/2/08	12010-12023	12-010	12-023	D/S	6	VCP	259	263
														Total ft	31,032
														Total miles	5.9

Structural Defect Coding

Project No.	Crack C L	Crack C C	Crack C M	Fracture F L	Fracture F C	Fracture F M	Broken B SV	Broken B VV	Hole H SV	Hole H VV	Joint J O M	Joint J O L	Joint J S M	Joint J S L	Deformed D V	Deformed D H	Collapsed Pipe X P	Surface Damage S	Point Repair RP	Lining Failure	Sags	Total Structural Defects	Total Structural Defect Sco	Structural Defect Index
PACP Grade	2	1	3	3	2	4	5	5	5	5	3	5	1	2	5	5	5	2	1		2			
G-151		1	2					1			3											7	21	3.0
G-152	1						1				3											5	16	3.2
G-153	2	3	11		1	1	1														2	21	55	2.6
G-154								1			1											2	8	4.0
G-155			1					1														2	8	4.0
G-156									1	1	3											5	19	3.8
G-157			48		2						3							1				54	159	2.9
G-158	2		57			1					2							33				95	251	2.6

Operational and Maintenance

Project No.	Deposits D AGS	Deposits D AE	Deposits D Other	Roots Fine (F) B	Fine L	Fine J	Fine C	Tap (T) B	Tap L	Tap J	Tap C	Medium B	Medium L	Medium J	Medium C	Ball (B) B	Ball L	Ball J	Ball C	Infiltration I G	Infiltration D	Infiltration R	Infiltration W	Obstacles OB Other C	Obstacles Other Z	Obstacles Other %	Vermin V C	Vermin V R	Total O&M Defects	Total O&M Defect Score	O&M Defect Index
PACP Grade	2	2	2	2	1	1	1	3	2	2	2	4	3	3	3	5	4	4	4	5	3	4	2	4	4		1	1			
G-151					1	16	3										1												21	24	1.1
G-152					2	3	2							1	1		2												11	21	1.9
G-153			2																										2	4	2.0
G-154						3																							3	3	1.0
G-155					3	4								1			2												10	18	1.8
G-156					5	4							5																14	24	1.7
G-157	25	52											1										51						129	259	2.0
G-158	2				1	15			1				1				1												21	29	1.4

Construction Features

Project No.	Tap (Lateral) T FD	Tap T BI	Tap T BD	Line L D	Line L L	Line L U	Line L R	Line L RD	Line L LD	Intruding Seal Material IS GT	Intruding Seal Material IS Z	Miscellaneous M SA	Miscellaneous M CU	Miscellaneous M MC	Priority	Condition Ranking	No Reverse Set-up Completed	Comments	Minimum Recommendations	Project Replacement Cost ($)
G-151															Major	151		335.6' BPVV (Channel of D/S MH).	Spot repair 335.6'	163,247
G-152															Major	152		257.7' BPSV.	Spot repair 257.7'	126,263
G-153		1	1									2			Major	153		63.1' BPSV. Major Defect. D/	Spot Repair	125,631
G-154															Major	154		0' BPVV (Beginning of the sewer line).	Spot repair	46,170
G-155															Major	155		243.2' BPVV (End of the sewer line)	Spot repair	118,292
G-156		1													Major	156		248.6' HSV & 354.1' HVV (End of the sewer line).	Spot repair 248.6' HSV & 354.1' HVV	173,308
G-157															Major	157		Most joints have DAE, IW & CM. SAVZ.	Reline	137,975
G-158											1				Major	158		Continuous Crack Multiple & Surface Damage. SAVZ. ISSRH	Reline	95,718
																			Total	15,329,403

Table 1-6
Manhole Rehabilitation and Replacement Projects

Project No.	Inspection Phase	Session ID	Street	Manhole	Inspection Date	Surface Condition	Manhole Cover	Frame	Cone	Barrel / Wall	Rungs	Bench	Channel	Debris	Grease	Vermin	Odor	Priority Score	Condition Ranking	Comment	Recommendation	Project Cost ($)
M-1	1	25	HIghland Ave	19-015	1/12/09	Pavement - Concrete Collar	Good	Good	Failing	Failing	Good	Good	Good	No	No	No	No	24	1	Fractures in cone and barrel. Fracture seen in street pavement surrounding manhole cover.	Replace	30,000
M-2	1	28	1st St	01-080	11/21/08	Pavement - Concrete Collar	Good	Good	Poor	Poor	Failing	Poor	Poor	No	No	0	No	22	2	Missing mortar. Corrosion at bench and channel.	Line manhole	10,000
M-3	1	74	Duncan Ave	10-039	12/19/08	Pavement - Concrete Collar	Good	Good	Good	Good	Failing	Poor	Poor	No	No	No	No	18	3	Corrosion at bench and channel.	Line manhole	10,000
M-4	1	90	Gates Ave	01-072	11/20/08	Pavement - Concrete Collar	Good	Good	Poor	Fair	Poor	Poor	Poor	No	Yes	0	Yes	15	4	Corrosion at bench and channel.	Line manhole	10,000
M-5	1	51	Curtis Ave	05-052	12/2/08	Pavement - Concrete Collar	Broken	Good	Good	Good	Poor	Poor	Poor	No	No	No	No	14	5	Broken manhole cover. Corrosion at bench and channel.	Replace manhole cover and line	13,500
M-6	1	36	2nd St	01-086	11/24/08	Pavement - Concrete Collar	Good	Good	Good	Good	Poor	Poor	Poor	Yes	No	0	No	11	6	Corrosion at bench and channel.	Line manhole	10,000
M-7	1	109	18th St	06-244	12/5/08	Pavement - Concrete Collar	Good	Good	Good	Good	Poor	Poor	Poor	No	No	No	No	10	7	Corrosion at bench and channel.	Line manhole	10,000
M-8	1	23	8th St	04-054	12/1/08	Pavement - Concrete Collar	Good	Good	Good	Good	Poor	Poor	Poor	No	No	No	No	10	8	Corrosion at bench and channel.	Line manhole	10,000
M-9	1	50	Meadows Ave	05-023	12/2/08	Pavement - Concrete Collar	Good	Good	Good	Good	Poor	Poor	Poor	No	No	No	No	10	9	Corrosion at bench and channel. Not a smooth transition.	Line manhole	10,000
M-10	1	130	14th St	06-191	12/8/08	Pavement - Concrete Collar	Good	Good	Good	Good	Poor	Poor	Poor	No	No	No	No	10	10	Corrosion at bench and channel.	Line manhole	10,000
M-11	1	291	Cedar Way	25-012	1/22/09	Pavement - Concrete Collar	Good	Good	Poor	Poor	Poor	Good	Good	No	No	No	No	10	11	Corrosion and cracking in cone and wall	Line manhole	10,000
M-12	1	293	Village Dr	25-025	1/22/09	Pavement - Concrete Collar	Good	Good	Poor	Poor	Poor	Good	Good	No	No	No	No	10	12	Corrosion in cone and barrel.	Line manhole	10,000
M-13	1	53	Rowell Ave	05-055	12/2/08	Pavement - Concrete Collar	Broken	Good	Good	Good	Fair	Good	Good	No	No	No	No	9	13	Broken manhole cover.	Replace manhole cover	3,500
M-14	1	47	Tennyson St	05-020	12/2/08	Pavement - Concrete Collar	Good	Good	Good	Good	Poor	Fair	Poor	No	No	No	No	9	14	Corrosion at channel.	Line manhole	10,000
M-15	1	60	Voorhees Ave	05-005	12/2/08	Pavement - Concrete Collar	Good	Good	Good	Good	Poor	Fair	Poor	No	No	No	No	9	15	Corrosion at channel.	Line manhole	10,000
M-16	1	181	Flournoy Rd	17-057	1/8/09	Pavement - Concrete Collar	Good	Good	Good	Good	Fair	Poor	Poor	No	No	No	No	9	16	Corrosion at bench and channel.	Line manhole	10,000
M-17	1	46	11th St	09-028	12/18/08	Pavement - Concrete Collar	Good	Good	Good	Good	Good	Poor	Poor	No	No	Yes	No	9	17	Corrosion at bench and channel.	Line manhole	10,000
M-18	2	235	The Strand	12-030A	7/20/09	Pavement - Concrete Collar	Good	Good	Good	Poor	Poor	Good	Fair	No	No	No	No	9	18	Missing mortar.	Repair mortar	6,000
M-19	1	80	14th St	06-050	12/4/08	Pavement - Concrete Collar	Good	Good	Good	Good	Good	Poor	Poor	No	No	No	No	8	19	Corrosion at bench and channel.	Line manhole	10,000
M-20	1	131	14th St	06-077	12/8/08	Pavement - Concrete Collar	Good	Good	Good	Good	Good	Poor	Poor	No	No	No	No	8	20	Corrosion at bench and channel.	Line manhole	10,000
M-21	1	178	31st St	17-053	1/8/09	Pavement - Concrete Collar	Good	Good	Good	Good	Good	Poor	Poor	No	No	No	No	8	21	Corrosion at channel.	Line manhole	10,000
M-22	1	99	Manhattan Ave	11-116A	12/22/08	Pavement - Concrete Collar	Good	Good	Poor	Good	Poor	Good	Good	No	No	No	No	8	22	Cracks in cone.	Line manhole	10,000
M-23	3	25	35th Pl	17-049	8/11/09	Pavement - Concrete Collar	Good	Good	Good	Good	Fair	Fair	Poor	No	No	0	No	8	23	Corrosion at bench and channel.	Line manhole	10,000
M-24	1	284	The Strand	14-064	1/21/09	Pavement - Concrete Collar	Cracked	Good	Good	Good	N/A	Good	Good	No	No	No	No	7	24	Cracked manhole cover.	Replace manhole cover	3,500
M-25	1	119	19th St	06-030	12/5/08	Pavement - Concrete Collar	Good	Good	Good	Good	Good	Fair	Poor	No	No	No	No	7	25	Corrosion at channel.	Line manhole	10,000
M-26	1	205	Blanche Rd	17-040	1/9/09	Pavement - Concrete Collar	Good	Good	Good	Good	Fair	Good	Poor	No	No	No	No	7	26	Corrosion at channel.	Line manhole	10,000
M-27	1	26	1st St	01-061	11/21/08	Pavement - Concrete Collar	Good	Good	Good	Good	Fair	Good	Poor	No	No	0	No	7	27	Corrosion at channel.	Line manhole	10,000
M-28	1	143	Marine Ave	15-053	1/7/09	Pavement - Concrete Collar	Good	Good	Poor	Good	Fair	Good	Good	No	No	No	No	7	28	Missing mortar and possibly bricks.	Repair mortar	6,000
M-29	1	87	Highview Ave	11-040	12/22/08	Pavement - Concrete Collar	Good	Good	Good	Good	Poor	Good	Good	Yes	No	No	No	7	29	Cracks in cone.	Line manhole	10,000
M-30	2	191	1st St	12-026	7/16/09	Pavement - Concrete Collar	Good	Good	Good	Good	Good	Poor	Fair	No	No	No	No	7	30	Corrosion at bench and channel.	Line manhole	10,000
M-31	2	278	3rd St	10-139	7/22/09	Pavement - Concrete Collar	Cracked	Good	Good	Good	Good	Good	Good	No	No	No	No	7	31	Cracked manhole cover.	Replace manhole cover	3,500
M-32	1	100	Manhattan Ave	11-117	12/22/08	Pavement - Concrete Collar	Good	Good	Poor	Good	Good	Good	Good	No	No	No	No	6	32	Cracks in cone.	Line manhole	10,000
																					Total	**316,000**

Table 1-7
Pump Station and Force Main Improvement Projects

Project No.	Project Description	Date of Construction for Existing Facility	Justification	Recommended Facilities				Unit Cost ($)	Construction Cost ($)	Eng. & Admin. Cost ($)	Total Project Cost ($)
				Firm Capacity (gpm)	Volume (gal)	Pipe Size (in)	Pipe Length (ft)				
P-1	Replace Poinsettia PS	1949	Condition / Criteria	150					2,000,000	700,000	2,700,000
	Replace Poinsettia PS Forcemain	1949	Age / Condition			4	163	300	49,000	18,000	67,000
P-2	Replace Pier PS Forcemain	1935	Age / Condition			4	900	400	360,000	126,000	486,000
P-3	Upgrade Pacific PS	1953	Criteria	400					400,000	140,000	540,000
	Replace Pacific PS Forcemain	1953	Age / Condition			6	1,225	240	294,000	102,900	396,900
P-4	Upgrade Voorhees PS	1953	Criteria	350					400,000	140,000	540,000
	Replace Voorhees PS Forcemain	1953	Age / Condition			6	930	240	223,200	78,120	301,320
P-5	Upgrade Meadows PS	1953	Criteria	310					400,000	140,000	540,000
	Replace Meadows PS Forcemain	1953	Age / Condition			6	730	240	175,200	61,320	236,520
P-6	Upgrade Bell Pump Station	1938	Criteria	300					400,000	140,000	540,000
	Replace Bell PS Forcemain	1938	Age / Condition			6	900	240	216,000	75,600	291,600
P-7	Replace Palm PS Forcemain		Age / Condition			4	775	240	186,000	65,100	251,100
P-8	Construct Emergency Storage for Pacific PS	-	Criteria		12,000			70	840,000	294,000	1,134,000
P-9	Construct Emergency Storage for Voorhees PS	-	Criteria		10,500			70	735,000	257,250	992,250
P-10	Construct Emergency Storage for Meadows PS	-	Criteria		9,300			70	651,000	227,850	878,850
P-11	Construct Emergency Storage for Bell PS	-	Criteria		8,400			70	588,000	205,800	793,800
P-12	Construct Emergency Storage for Palm PS	-	Criteria		4,800			70	336,000	117,600	453,600
								Total	**8,253,400**	**2,889,540**	**11,142,940**

Table 1-8
Wastewater Capital Improvement Program

CIP No.	Project Description	Date of Construction for Existing Facility	Justification	Recommended Facilities				Unit Cost ($)	Construction Cost ($)	Eng. & Admin. Cost ($)	Total Project Cost ($)
				Firm Capacity (gpm)	Volume (gal)	Pipe Size (in)	Pipe Length (ft)				
1	Replace Poinsettia PS	1949	Condition / Criteria	150					2,000,000	700,000	2,700,000
	Replace Poinsettia PS Forcemain	1949	Age / Condition			4	163	300	49,000	18,000	67,000
2	Replace Pier PS Forcemain	1935	Age / Condition			4	900	400	360,000	126,000	486,000
3	Upgrade Pacific PS	1953	Criteria	400					400,000	140,000	540,000
	Replace Pacific PS Forcemain	1953	Age / Condition			6	1,225	240	294,000	102,900	396,900
4	Upgrade Voorhees PS	1953	Criteria	350					400,000	140,000	540,000
	Replace Voorhees PS Forcemain	1953	Age / Condition			6	930	240	223,200	78,120	301,320
5	Upgrade Meadows PS	1953	Criteria	310					400,000	140,000	540,000
	Replace Meadows PS Forcemain	1953	Age / Condition			6	730	240	175,200	61,320	236,520
6	Upgrade Bell Pump Station	1938	Criteria	300					400,000	140,000	540,000
	Replace Bell PS Forcemain	1938	Age / Condition			6	900	240	216,000	75,600	291,600
7	Replace Palm PS Forcemain		Age / Condition			4	775	240	186,000	65,100	251,100
8	Construct Emergency Storage for Pacific PS	-	Criteria		12,000			70	840,000	294,000	1,134,000
9	Construct Emergency Storage for Voorhees PS	-	Criteria		10,500			70	735,000	257,250	992,250
10	Construct Emergency Storage for Meadows PS	-	Criteria		9,300			70	651,000	227,850	878,850
11	Construct Emergency Storage for Bell PS	-	Criteria		8,400			70	588,000	205,800	793,800
12	Construct Emergency Storage for Palm PS	-	Criteria		4,800			70	336,000	117,600	453,600
*13	Gravity Sewer Rehabilitation and Replacement	Varies	Condition								28,930,000
*14	Manhole Rehabilitation and Replacement	Varies	Condition								596,000
**15	Collection System Capacity Deficiencies	Varies	Criteria			12 & 15	1,725				1,373,700
								Total	**8,253,400**	**2,889,540**	**42,042,640**

*Notes: * Total project cost includes a projection for the remainder of the system to be CCTV inspected*
*** Flow monitoring and verification of d/D ratios is recommended prior to project implementation*