CITY OF STANTON

SEWER MASTER PLAN

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Submitted to

City of Stanton
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Stanton, California 90680

Submitted by

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June 2009

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Section 1

EXECUTIVE SUMMARY

1-1 INTRODUCTION

Background

The City of Stanton (City) has a population of approximately 39,000. Its boundary covers over 3.1 square miles (1,993 acres) of residential, commercial and industrial areas.

The City's existing wastewater collection system consists of approximately 48.9 miles of pipe and 1,160 manholes and cleanouts. The majority of the gravity sewers are constructed of vitrified clay pipe (VCP). The sizes range from 6-inches to 24-inches in diameter.

Previous Studies

RBF Consulting prepared the City's Sewer Infrastructure Analysis Update, on September 14, 2000. The following ten (10) major trunk sewers were analyzed for this study:

- Western Subtrunk (12-inch to 18-inch)
- Katella Trunk (10-inch to 24-inch)
- Beach Subtrunk (8-inch)
- Rose/Cerritos Subtrunk No. 1 (12-inch to 18-inch)
- Rose/Cerritos Subtrunk No. 2 (10-inch to 12-inch)
- North Santa Rosalia Subtrunk (10-inch to 15-inch)
- Beach/Chapman Subtrunk (10-inch to 15-inch)
- Beach/Lampson Subtrunk (10-inch to 15-inch)
- Sycamore Collector (8-inch)
- South Santa Rosalia Subtrunk (8-inch)

Objective

The objective of this 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.

1-2 STUDY AREA

Location

The City of Stanton is located in the northwestern portion of Orange County, California. The City encompasses 3.1 square miles (1,993 acres) of residential, commercial, and industrial land. Neighboring cities include Anaheim and Buena Park to the north; Garden Grove and Anaheim to the east; Westminster to the south; and Garden Grove and Cypress to the west.

Topography

The study area is very flat, with a general slope of about 0.18 percent. The highest ground elevation is approximately 80 feet above mean sea level (amsl) at Lola Avenue and Magnolia Avenue. The lowest ground

elevation is approximately 50 feet amsl at the southwest corner of Garden Grove Boulevard and Hoover Street.

Climate

The climate in the area is typical of Southern California with generally mild temperatures, virtually no days below freezing, and approximately 340 days of sunshine per year. The average annual rainfall in the City is approximately 12.1 inches, as measured at the Orange County Public Works (OCPW) Watershed Program, Santa Ana Station No. 121. Most of the rainfall occurs between the months of November and March.

Land Use

The land use information utilized in the preparation of the Sewer Master Plan is primarily based upon the City's approved Housing Element (July 2001) and the Draft General Plan (December 2007). The City's existing land use was developed from the 2001 Housing Element's Land Use Map, while the ultimate land use was developed from the 2007 Draft General Plan Land Use Diagram. This information was supplemented by aerial photographs, specific plans, and field reviews.

The City has experienced overcrowding since the 1990s, when an increase of approximate 7,000 persons and the construction of only about 450 additional dwelling units. One reason for the residential overcrowding is the shortage of available land in the City. According to the 2007 Draft General Plan, Stanton has less than 1 percent of vacant developable land. However, plans are underway to redevelop portions of the City which are identified as underutilized land. The 2007 Draft General Plan includes plans to create several mixed use developments. These developments are predominantly proposed along the commercial stretch of Beach Boulevard from Ball Road to Garden Grove Boulevard. Table 1-1 provides a summary of the study area land use categories under existing and ultimate conditions.

Table 1-1
Existing and Ultimate Land Use

General Information			Existing Land Use		Ultimate Land Use	
Property Code	**Zoning Density**	**Property Use Description**	**Net Area (AC)**	**Percentage of Total**	**Net Area (AC)**	**Percentage of Total**
LDR	1-6 du/ac	Low Density Residential	434.2	21.8%	436.2	21.9%
MDR	7-11 du/ac	Medium Density Residential	196.0	9.8%	169.3	8.5%
HDR	12-24 du/ac	High Density Residential	302.7	15.2%	306.1	15.4%
		Subtotal Residential Use	**932.9**	**46.8%**	**911.5**	**45.7%**
GMU	60 du/ac	General Mixed-Use	0.0	0.0%	114.8	5.8%
North	60 du/ac	North Gateway Mixed Use District	0.0	0.0%	22.4	1.1%
South	81 du/ac	South Gateway Mixed-Use District	0.0	0.0%	88.3	4.4%
Town	81 du/ac	Town Center Mixed-Use District	0.0	0.0%	38.7	1.9%
		Subtotal Mixed Use	**0.0**	**0.0%**	**264.2**	**13.3%**
GC		General Commercial	232.4	11.7%	56.1	2.8%
		Subtotal Commercial Use	**232.4**	**11.7%**	**56.1**	**2.8%**
I		Industrial	188.2	9.4%	156.3	7.8%
		Subtotal Industrial Use	**188.2**	**9.4%**	**156.3**	**7.8%**
SCHOOL		School	35.7	1.8%	35.7	1.8%
PI		Public Institutional	3.9	0.2%	52.4	2.6%
		Subtotal Public Use	**39.6**	**2.0%**	**88.0**	**4.4%**
OS		Open Space	126.6	6.4%	114.7	5.8%
VACANT		Vacancy	71.1	3.6%	0.0	0.0%
		Streets and Right of Way	402.0	20.2%	402.0	20.2%
		Subtotal Other Use	**599.8**	**30.1%**	**516.7**	**25.9%**
		Total	**1,993**	**100%**	**1,993**	**100%**

Population

The City's population increased steadily following its reincorporation in 1956. The largest increase took place between 1950 and 1960 when the population grew from 1,762 to 11,163. In January 2009, the California State Department of Finance estimated the total population as 39,480 persons.

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.

Flow Monitoring

A temporary flow monitoring study was conducted by ADS Environmental Services. The flow monitoring was conducted at five (5) locations over a period of fourteen (14) days between March 14, 2009 and March 27, 2009.

Unit Flow Factors

Unit flow factors were developed by using and comparing water use records, population and land use densities, values used by nearby sewer agencies, and flow monitoring results. The existing and ultimate unit flow factors are detailed in Tables 1-2 and 1-3, respectively.

Table 1-2
Existing Unit Flow Factors

Land Use	Abbrev	Density	Existing Flow Factors	Units
Low Density Residential	LDR	1-6	1,440	GPD/AC
Medium Density Residential	MDR	7-11	1,750	GPD/AC
High Density Residential	HDR	12-18	3,800	GPD/AC
General Commercial	GC	N.A.	2,500	GPD/AC
Industrial	I	N.A.	700	GPD/AC
Public/Institutions	PI	N.A.	2,500	GPD/AC
School	SCHOOL	N.A.	15	GPD/student
Open Space Recreation	OS	N.A.	200	GPD/AC

N.A. = Not Applicable

Table 1-3
Ultimate Unit Flow Factors

Land Use	Abbrev	Density DU/acre	Ultimate Flow Factors	Units
Low Density Residential	LDR	1-6	1,440	GPD/AC
Medium Density Residential	MDR	7-11	1,750	GPD/AC
High Density Residential	HDR	12-18	3,800	GPD/AC
General Commercial	GC	N.A.	2,500	GPD/AC
Industrial	I	N.A.	700	GPD/AC
General Mixed Use	GMU	max 45 (60*)	6,600	GPD/AC
North Gateway Mixed Use District	NORTH	max 45 (60*)	6,600	GPD/AC
South Gateway Mixed Use District	SOUTH	max 60 (81*)	8,500	GPD/AC
Town Center Mixed Use District	TOWN	max 60 (81*)	8,500	GPD/AC
Public/Institutions	PI	N.A.	2,500	GPD/AC
School	SCHOOL	N.A.	15	GPD/student
Open Space Recreation	OS	N.A.	200	GPD/AC

* Density Increases up to 35% are allowed if the development provides affordable housing for low/moderate income households.

N.A. = not applicable

Peaking Factor

The adequacy of a sewage collection system is based upon its ability to convey the peak flows. At any individual point in the system, peak dry weather flow (PDWF) is estimated by converting the total average flow upstream of the point in question to peak dry weather flow by an empirical peak-to-average relationship.

The following peaking relationship was selected for this study:

$$PDWF\ (cfs) = 1.9 \times ADWF\ (cfs)^{0.92}$$

where PDWF = Peak Dry Weather Flow

ADWF = Average Dry Weather Flow

Peak Wet Weather Flow (PWWF) = 1.40 x Peak Dry Weather Flow (PDWF)

Sewer Design Criteria

Design criteria are established to ensure that the wastewater collection system can operate effectively under all flow conditions. Each pipe segment must be capable of carrying peak wet weather flows in the hydraulically stable zone of the pipe.

At a minimum, all pipes should be 8-inches or larger in diameter and the velocity of flow in the pipe should be greater than 2 feet per second at average dry weather flow (ADWF). This velocity will prevent deposition of solids in the sewer and help to resuspend any materials that may have already settled in the pipe.

The analysis of the City's existing gravity sewer system was based upon the calculated peak dry weather flows. Any segment of existing sewer pipe with a depth to diameter ratio (d/D) of 0.62 or more was considered to be hydraulically deficient.

For **new construction**, the design and analysis of gravity sewer pipes should be based on the following depth to diameter ratios:

- Pipes **15-inches and smaller** in diameter shall be designed to flow at a maximum **D/d of 0.50** under peak dry weather flows

- Pipes **18-inches and greater** in diameter shall be designed to flow at a maximum **D/d of 0.62** under peak dry weather flows

Service Life of Pipe

Once the service life of a facility is exceeded, it becomes subject to failure and is often expensive to maintain. The values listed in Table 1-4 are generally accepted as prudent planning criteria and are used as benchmarks for replacement recommendations in this study.

Table 1-4
Planning Criteria for Facility Useful Life

Facility	Description	Useful Life (Years)
Gravity Sewers:	Cast Iron Pipe (CIP)	20
	Plastic Pipe	65
	Vitrified Clay Pipe (VCP)	75

Criteria for Specific Plans and Development Subareas

Each party wishing to pursue development of a tract or area within the City's study area shall develop a Sub-Area Master Plan (SAMP). At a minimum, sewage flow calculations shall be based upon the unit flow factors contained in Table 1-3 or higher factors if specific conditions require it.

1-4 EXISTING WASTEWATER SYSTEM

General Description

The City's existing wastewater collection system is made up of a network of gravity sewers. The system consists of approximately 48.9 miles of pipe with 1,160 manholes and cleanouts.

The gravity sewers are predominately constructed of vitrified clay pipe with sizes ranging from 6-inch to 24-inch in diameter. Approximately 80 percent of the pipes are 8-inch in diameter.

Orange County Sanitation District (OCSD) Wastewater Collection System and Tributary Areas

The City of Stanton's sewer service area lies within Orange County Sanitation District's (OCSD's) Service Area 3. The five (5) OCSD facilities located within the City are listed below:

- Knott Interceptor
- Hoover - Western Subtrunk
- Lampson Interceptor
- Katella Interceptor
- Magnolia Subtrunk

The study area was divided into four (4) tributary areas, based on the discharge location to these OCSD facilities. The tributary areas are listed heron:

- Katella Hoover Western Tributary Area
- Knott Tributary Area
- Lampson Hoover Western Tributary Area
- Magnolia Tributary Area.

Flow Splits

Flow spits are manholes that are capable of diverting flow into multiple reaches. There are seventeen (17) flow splits within the City's sewer collection system, which have been analyzed in depth for the capacity analysis of this study.

Siphons

The City's sewer system includes fifteen (15) siphons. These facilities require additional maintenance and are included in the City's hot spot list. Siphons are often required for sewers that must cross existing storm drains. City siphons pass under the following Orange County Flood Control District (OCFCD) facilities:

- Knott Cerritos Storm Drain (OCFCD C02-P03)
- Stanton Storm Channel (OCFCD C02-S01)
- Anaheim Barber City Channel (OCFCD C03)

1-5 HYDRAULIC SEWER MODEL

Hydraulic Model Software

To perform a detailed analysis of the sewer collection system, it is essential to create a mathematical model that is capable of simulating the operating characteristics of the system. The simulations for this study were performed utilizing software designed for the analysis of sewer systems. The software selected for this study is MWHSoft's H2OMap Sewer. It is a GIS based computer program with the ability to perform steady state analyses of the flows in sanitary sewer systems.

Construction of Model Geometry

Information gathered from the City's sewer GIS files, atlas sheets, as-built drawings, survey data, CCTV inspections, and interviews with City staff was used to create the model geometry of the existing system. Only active sewers owned by the City of Stanton were included in the hydraulic model. Private sewers and laterals were not modeled.

Split Manholes and Flow Patterns

From the existing sewer GIS and sewer atlas sheets, 17 split manholes (more than one pipe exiting the manhole) were identified in the collection system. Many of the split manholes appear to be overflow systems, which typically do not convey flow except during the peak hours or wet weather periods. In general, the flows at the split manholes were divided by calculations based on invert elevations, downstream pipes sizes, and downstream slopes at the split manhole.

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 913 polygons were created for the existing and ultimate system analysis.

Model Loads

For each tributary area, the existing land uses and the calibrated unit flow factors (see Table 1-2) were utilized to apply the average loads to the existing model. The ultimate land uses and the ultimate unit flow factors (see Table 1-3) were utilized to apply the average loads to the ultimate model.

Schools

The existing and ultimate flow factor for schools was estimated as 15 gpd per student. These flows were inputted into the model as point source flows for the four (4) schools within the City's boundary: Robert M. Pyles Elementary School, Ester L. Walter Elementary School, Mabel Carver Elementary School, and Saint Polycarp Catholic School.

Anaheim and Garden Grove Flows

The Cities of Anaheim and Garden Grove contribute substantial wastewater flows to the City's sewer system at nineteen (19) locations. The existing flows from the City of Anaheim were estimated using the City of Stanton's unit flow factors. The existing flows from the City of Garden Grove were obtained from the City of *Garden Grove System Evaluation and Capacity Assurance Plan*, dated April 2009.

The ultimate flows from these outside agencies were increased by 5% to account for vacancies and future densification. The existing and ultimate flows were inputted into the model as point source flows at the location that it enters the City's system.

1-6 SYSTEM ANALYSIS

Hydraulic System Analysis

The analysis of the sewer collection system was based upon the calculated existing and ultimate peak dry weather flows. The hydraulic analysis results can be found in Appendix C and D of this report, which is on the CD located at the back of this report. Pipes that exceed the following criteria are considered hydraulically deficient:

Peak Dry Weather d/D > 0.62

The total length of sewer found to be capacity deficient for existing and ultimate conditions are 1,520 feet and 13,518 feet respectively. This is about 0.6 (1,520 / 257,972) percent and 5.2 (13,518 / 257,972) percent of the total system length for existing and ultimate conditions respectively.

Condition Assessment

The City has completed a program to CCTV inspect its entire 257,972 feet (48.9 mile) long collection system. Inspections began on June 2, 2006 and ended on January 16,2009. A total of 253,556 (48.0 miles) of pipe or 98.3 percent of the total system length was ultimately inspected. The City has identified and prioritized its condition deficiencies based on the CCTV recordings, and found approximately 5,801 feet of its sewers to be in need of replacement or repair. This is about 2.2% (5,801 / 257,972) percent of the total system length.

Closed Circuit Television (CCTV) Inspections

Empire Pipe Cleaning and Equipment, Inc. (Empire) performed video inspection work on approximately 253,556 feet of pipe between June 2, 2006 and January 16, 2009. On hundred sixteen (116) DVD's with inspection reports for 1,100 reaches were produced by Empire. 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.

National Association of Sewer Service Companies (NASSCO) Pipeline Assessment and Certification Program (PACP) coding procedures formed the basis of the inspection work and reports prepared by Empire.

Inspection Report Database Summary

Initially, a database summary was developed utilizing the CCTV inspection written reports. This database summary can be found in Appendix E. It contains a tabulation of the deficiencies identified in the written reports.

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, as well as severe operation and maintenance issues.

First, the reaches that listed deficiencies such as deformed pipe, hole in pipe, broken pipe, large offset joint, large obstacles, ball roots and survey abandoned were selected for review. Next, reaches that had numerous or multiple deficiencies such as fractures, cracks, roots, deposits, obstructions, sags, and camera underwater were selected. Finally, several reaches without listed deficiencies were selected in order to develop insight into the overall condition of the CCTV inspected system.

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

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 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.

Sewer Pipeline Operation and Maintenance

The City has currently identified various 'Hot Spots' in its sewer system. These are areas of the system with reoccurring problems that require maintenance and cleaning on a quarterly basis, at minimum. City records detail that the causes of the hot spots are primarily siphons, grease, roots, and debris.

The operation and maintenance conditions were evaluated from the CCTV data, separately from the structural conditions. The operations and maintenance program should be updated based on the results of the CCTV inspection.

Operation and 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.

- 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. The City has prepared its PMP as part of its Operation and Maintenance Program of the Statewide WDR, which is required to be completed by May 2, 2009.

  The City provides the following operation and maintenance activities:

  1. The entire sewer system is cleaned once every year. Sewers on the Hot Spot list require quarterly cleaning.
  2. All of the system manholes are inspected once every year.

- Rehabilitation and Replacement - 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. At minimum, the City plans to review its sewer system in its entirety every ten (10) years. Each spill site must be CCTV inspected to pinpoint the cause of the spill, and implementation of corrective measures for preventing repeat spills.

  The follow-up CCTV program consists of the following:

  1. 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.

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

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

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

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

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

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

  As 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.

- Maintenance Staff Recommendations - The City currently has about 48.9 miles of pipe. In order to comply with the upcoming CMOM requirements, WDR requirements, and the City's preventative maintenance program, the City must quantify the number of employees and equipment necessary to perform the maintenance tasks.

  The City's current staffing for the wastewater collections system includes 5 employees. Three (3) employees have a California Water Environment Association (CWEA) certification through the Technical Certification Program in Collection System Maintenance. Two (2) employees have Grade 1 Certification, and one employee has a Grade II Certification.

  The City has implemented an Illness Prevention Program, which consists of training its staff on the following topics:

a. Traffic Control

b. Driver Safety

c. Personal Protective Equipment

d. Health Precautions for raw sewage exposure

e. Lockout-Tagout Procedures

f. Confined Space Entry

1-7 CAPITAL IMPROVEMENT PROGRAM

General

The primary goal of the Capital Improvement Program (CIP) is to provide the City with a long range-planning tool for implementing its sewer infrastructure improvements in an orderly manner and a basis for financing of these improvements.

The recommended capital improvements were identified through capacity analyses and condition assessment of the system based upon CCTV inspections.

Capital Improvement 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. When segments of sewers with lower priorities are located in the same vicinity as a higher priority project, an exception can be made to include the lower priority sewers in that project to provide a more economically feasible Capital Improvement Program.

While the recommended capital improvement projects are given general prioritizations, the City should review the projects periodically and establish the annual capital improvement program to address any changed conditions based upon the most current information available, and to take advantage of concurrent construction such as street paving projects or adjacent infrastructure work.

It may not be feasible to implement some small projects as one single project. In such cases several projects can be combined into on construction package. Some large projects may be broken down into smaller components to fit the City's budget and other obligations.

Condition Improvements - The condition improvement projects are prioritized solely on the condition of the pipe as viewed from the CCTV recordings. The condition deficiencies with critical structural damage were given the highest priority. Sewers with conditions categorized as "Severe" or "Major" 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 or spot repair 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.

Capacity Improvements - Projects identified by hydraulic evaluations and observed in the field with existing capacity deficiencies are also given a high priority. The projects that show calculated hydraulic deficiencies, but were **not** observed to be deficient in the field are given a lower priority. The discrepancy in calculated and observed flows can be attributed to vacancies, the conservatism included in the unit flow factors, or the fact that field observations may not have been made at the exact peak flow time of the day.

Capital Improvement Program

The Capital Improvement Program is developed based upon the results of the hydraulic analyses and condition assessment. The recommended improvement project locations are illustrated on Figure 1-1. Condition improvement projects are listed in Table 1-5 by priority, along with cost estimates. The existing and ultimate capacity improvement projects are included in Tables 1-6 and 1-7, respectively. These tables include the priority for the capacity improvement projects and cost estimates.

Cost estimates presented are in June 2009 dollars and are based upon recent information for similar projects in the Southern California area. The construction cost is based upon $40 per diameter inch per foot of sewer pipe. Engineering and administration costs are estimated at 35% of the construction cost.

The CIP shown in Table 1-5 includes about $2.2 million dollars in condition improvement projects. Approximately $2.3 million dollars are included in the CIP for existing capacity improvement projects, as detailed in Table 1-6. Capacity improvement projects for the ultimate conditions include an additional $11.0 million dollars, as shown in Table 1-7. These projects are primarily due to the impact of the mixed use redevelopment areas proposed in the City's 2007 General Plan. As currently planned, densities in the mixed use areas range from 60 to 81 dwelling units per acre.

In summary, the system improvement costs are estimated as follows:

Condition Improvement Projects	$2.2	Million
Existing Capacity Improvement Projects	$2.3	Million
Ultimate Capacity Improvement Projects	$11.0	Million
Total Estimated Cost	**$15.5**	**Million**

CITY OF BUENA PARK

CITY OF ANAHEIM

CITY OF CYPRESS

CITY OF GARDEN GROVE

CITY OF WESTMINSTER

Western Ave

Beach Blvd

Dale St

Magnolia St

Knott Ave

Cerritos Ave

Katella Ave

Orangewood Ave

Chapman Ave

Lampson Ave

Garden Grove Blvd

Katella Interceptor

Knott Interceptor

Hoover Western Subtrunk

Magnolia Subtrunk

CI-1 CI-2 CI-3 CI-4 CI-5 CI-6 CI-7 CI-8 CI-9 CI-10 CI-11 CI-12 CI-13

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

Legend

- Sewer Manhole
- Orange County Sanitation District Sewer
- City of Anaheim Sewer
- Garden Grove Sanitary District Sewer
- City Boundary
- CI - # — Capacity Improvement Location No.
- # — Condition Improvement Ranking

Capacity Improvement

- Existing
- & — Ultimate

Condition Improvements

- Severe Conditions
- Major Conditions

N

0 250 500 1,000 1,500 2,000 Feet

1" = 500'

AKM	City of Stanton Sewer Master Plan
Project No.: 1570867.00	Capital Improvement Projects
Date: June 2009	Figure 1-1

Table 1-5
Condition Improvements

General Information																			Cost		
									Manhole			Pipe									
Media Label	Inspection ID	Run Number	Reversal Media Label	Reveral Inspection ID	Reversal Run Number	DVD Watched (Y)	Location Street	CCTV Date	Pipe ID	U/S MH ID	D/S MH ID	Direction of Camera	Size (in)	Material	CCTV Length	Pipe Length	Priority	Condition Ranking	Comments	Recommendation	Unit Cost ($)	Construction Cost ($)	Total Cost ($)
G-011-STAN	3	003					8160 Cardiff Dr	10/13/06	W023-W019	W023	W019	D/S	8	VCP	294	292	Severe	1	221.7' Large HSV. Missing pipe	Replace pipe or spot repair 221' to 223' (HSV)	320	93,440	126,144
A-018-STAN	6	006				Y	10551 Sycamore Ave	8/16/06	J077-J076	J077	J076	U/S	8	VCP	195	200	Severe	2	194.5' MSA (JOL). No Reversal Video. 193.1" JOL (D/SH) & 194.5' JOL (D/SL).	Replace pipe or spot repair at 188' & 200' (JOL)	320	64,000	86,400
G-014-STAN	12	012				Y	12921 Fern St	11/17/06	Z016-Z800	Z016	Z800	D/S	8	VCP	301	294	Severe	3	176' Large HVV. Missing pipe.	Replace pipe or spot repair at 176' (HVV)	320	94,080	127,008
A-051-STAN	6	006				Y	10500 Beach Blvd	11/20/06	J066-J065	J066	J065	U/S	8	VCP	354	350	Severe	4	72' & 303.8' BPVV	Replace pipe or spot repair 69-72' & 300' - 306' BPVV. HSV.	320	112,000	151,200
A-024-STAN	7	007	A-024-STAN	8	008	Y	8356 Central Dr	9/5/06	K008-K007	K008	K007	D/S	8	VCP	263	263	Severe	5	250.5' JOL (D/SL)	Replace or spot repair 245'-255' (JOL)	320	84,160	113,616
A-046-STAN	7	007				Y	10960 Dale Ave	11/10/06	K006-K003	K006	K003	D/S	8	VCP	211	213	Severe	6	208.6' HSV in flow path. End of the sewer line.	Replace pipe or spot repair at 208.6' HSV	320	68,160	92,016
A-019-STAN	4	004				Y	10545 Court St	8/17/06	J050-J049	J050	J049	U/S	8	VCP	127	257	Severe	7	126.1' MSA (JOL D/SH)). No Reversal Video.	Replace pipe or spot repair 126.1' JOL & Inspection must complete	320	82,240	111,024
G-014-STAN	9	009				Y	12920 Sycamore St	11/17/06	Z002-Z001	Z002	Z001	D/S	8	VCP	312	307	Severe	8	39.2' BPV. Broken pipe is located at the tap. Cracks & fractures throughout.	Replace pipe or spot repair at 39.2' & reline	Included in Capacity Improvement Project CI-2 (See Table 8-2)		
R006-STAN	11	011				Y	7731 Eileen St	9/18/06	N071-N036	N071	N036	D/S	8	VCP	350	350	Severe	9	347.8' BPSV in flow path. End of the sewer line	Pipe replace or spot repair at 347.8' HSV	320	112,000	151,200
R311-007	7	007				Y	Beach Blvd	1/13/09	D002-D090	D002	D090	D/S	10	VCP	83.7	83	Severe	10	58.4' BPVV	Replace or spot repair 45.8' -58.4' for Continuous Fracture Multiple & BPVV	400	33,200	44,820
A-032-STAN	8	008				Y	Katella Ave - Easement "Motel 6"	9/20/06	M066A-N092	M066A	N092	D/S	8	VCP	109	84	Severe	11	There is no manhole between pipes M006-M006A and M0066A-N092. This pipe was separated into 2 pipes for modeling purposes. Survey abandoned 109' due to JOL (D/SL). No Reversal Video. Close to Ending MH. Horizontal Alignment Right.	Replace pipe or spot repair at 104'-114' & Alignment Right	320	26,880	36,288
A-032-STAN	8	008				Y	Katella Ave - Easement "Motel 6"	9/20/06	M066-M066A	M066	M066A	D/S	8	VCP	109	29	Severe	12	There is no manhole between pipes M006-M006A and M0066A-N092. This pipe was separated into 2 pipes for modeling purposes. Survey abandoned 109' due to JOL (D/SL).No Reversal Video. Close to Ending MH. Horizontal Alignment Right.	Replace pipe or spot repair at 104'-114' & Alignment Right	320	9,280	12,528
M-010-STAN	8	008				Y	8760 Cerritos Ave	6/15/06	E010-E009	E010	E009	D/S	8	VCP	171	169	Severe	13	159.6' JOL (D/SL).	Replace pipe or spot repair 154'-165' (JOL)	320	54,080	73,008
A-016-STAN	4	004	A-017-STAN	4	004	Y	10552 Royal Oak Way	8/14/06	I063-I062	I063	I062	D/S	8	VCP	117	123	Severe	14	Survey abandoned 114.7' due to JOL (D/SL)	Replace pipe or spot repair 109'-120' (JOL)	320	39,360	53,136
A-046-STAN	5	005				Y	10801 Dale Ave	11/10/06	K007A-K007	K007A	K007	D/S	8	VCP	410	398	Severe	15	363.5' JSL (D/SL)	Replace pipe or spot repair 358-368' (JSL)	320	127,360	171,936
A-012-STAN	2	002				Y	7151 Cerritos Ave	8/8/06	B021-B020	B021	B020	D/S	8	VCP	331	330	Severe	16	200.7' JSL	Replace pipe or spot repair at 195'-205' (JSL)	320	105,600	142,560
A-016-STAN	2	002				Y	10514 Royal Oak Way	8/14/06	I065-I064	I065	I064	D/S	8	VCP	112	112	Severe	17	32.7' JSL	Replace pipe or spot repair at 27'-38' (JSL)	320	35,840	48,384
A-017-STAN	11	011				Y	7791 Sandalwood Way	8/15/06	I053-I052	I053	I052	D/S	8	VCP	153	152	Severe	18	13' JSL	Replace pipe or spot repair at 13' (JSL)	320	48,640	65,664
A-049-STAN	6	006				Y	12791 Fern St	11/16/06	Z019-Z018	Z019	Z018	D/S	8	VCP	362	358	Major	19	4.8' BPVV.	Replace pipe or spot repair at 4.8' (BPVV)	Included in Capacity Improvement		
R311-009	3	003				Y	Dale St	1/15/09	K002-K001	K002	K001	D/S	8	VCP	71.9	70	Major	20	69.5' BPVV	Replace pipe or spot repair 65' to 70' (BPVV)	320	22,400	30,240
M-005-STAN	4	007				Y	10401 Beach Blvd	6/8/06	D011-D001	D011	D001	D/S	10	VCP	295	290	Major	21	241.3' Small BPVV	Replace pipe or spot repair at 241.3' (BPVV)	400	116,000	156,600
G-002-STAN	4	004				Y	10390 Courson Dr	6/16/06	B015-B014	B015	B014	D/S	8	VCP	262	260	Major	22	Cracks & fractures	Replace or reline pipe	320	83,200	112,320
G-002-STAN	5	005				Y	10431 Courson Dr	6/16/06	B014-B004	B014	B004	D/S	8	VCP	271	270	Major	23	Cracks & fractures	Replace or reline pipe	320	86,400	116,640
A-049-STAN	10	010				Y	12850 Sycamore Ave	11/16/06	Z004-Z003	Z004	Z003	D/S	8	VCP	256	247	Major	24	Cracks & fractures	Replace or reline pipe	Included in Capacity Improvement		
M-007-STAN	2	002				Y	8611 Lola Ave	6/12/06	E023-E021	E023	E021	D/S	8	VCP	301	300	Major	25	Cracks & fractures	Replace or reline pipe	320	96,000	129,600
															Total	5,801				Total		1,594,320	2,152,332

Table 1-6
Existing Capacity Improvement Projects

Location Number	Pipe ID	U/S MH ID	D/S MH ID	Street Location	Slope	Length (ft)	Existing Diameter (in)	Minimum Replacement Diameter (in)	Unit Cost ($)	Construction Cost ($)	Engineering and Administration Cost ($)	Total Cost ($)
CI-1	C001-I017	C001	I017	Western Avenue from College Drive to South of Idylwild Drive	0.0035	298	12	15	600	178,896	62,614	241,510
	C012-C001	C012	C001		0.0015	300	12	15	600	180,000	63,000	243,000
	C013-C012	C013	C012		0.0015	214	12	15	600	128,118	44,841	172,959
Subtotal						**812**				**487,014**	**170,455**	**657,469**
CI-2	Z001-Z831	Z001	Z831	Sycamore Street, south of Acacia Avenue to Garden Grove Boulevard	0.0085	71	8	12	480	34,080	11,928	46,008
	Z002-Z001	Z002	Z001		0.0021	307	8	12	480	147,360	51,576	198,936
Subtotal						**378**				**181,440**	**63,504**	**244,944**
CI-3	W006-OC09	W006	OC09	Beach Boulevard from Catherine Avenue to Lampson Avenue	0.0084	339	10	15	600	203,628	71,270	274,898
	W007-W006	W007	W006		0.0047	330	10	15	600	198,000	69,300	267,300
	W008-W007	W008	W007		0.0016	330	10	12	480	158,400	55,440	213,840
	W009-W008	W009	W008		0.0020	84	8	12	480	40,205	14,072	54,276
Subtotal						**1,083**				**600,233**	**210,081**	**810,314**
CI-4	C008-C007	C008	C007	Cerritos Avenue from Beach Boulevard to Rose Street	0.0026	615	15	18	720	443,124	155,093	598,217
	C009-C008	C009	C008		0.0033	12	15	Parallel-15	600	7,200	2,520	9,720
Subtotal						**627**				**450,324**	**157,613**	**607,937**
Grand Total						**2,900**				**1,719,011**	**601,654**	**2,320,665**

Table 1-7
Ultimate Capacity Improvement Projects

Location Number	Pipe ID	U/S MH ID	D/S MH ID	Street Location	Slope	Length (ft)	Existing Diameter (in)	Minimum Replacement Diameter (in)	Unit Cost ($)	Construction Cost ($)	Engineering and Administration Cost ($)	Total Cost ($)
CI-5	Z003-Z002	Z003	Z002	From Stanford Avenue and Fern Street to Sycamore Street, north of Garden Grove Boulevard	0.0020	65	8	12	480	31,200	10,920	42,120
	Z004-Z003	Z004	Z003		0.0020	247	8	12	480	118,560	41,496	160,056
	Z018-Z004	Z018	Z004		0.0020	331	8	12	480	158,842	55,595	214,436
	Z019-Z018	Z019	Z018		0.0023	358	8	12	480	171,840	60,144	231,984
	Z020-Z019	Z020	Z019		0.0022	262	8	12	480	125,818	44,036	169,854
Subtotal						**1,263**				**606,259**	**212,191**	**818,450**
CI-6	C007-I102	C007	I102	Rose Street from Cerritos Avenue to Katella Avenue	0.0015	321	18	21	840	269,262	94,242	363,504
	I102-I103	I102	I103		0.0015	351	18	21	840	294,798	103,179	397,977
	I103-I104	I103	I104		0.0015	325	18	21	840	272,882	95,509	368,391
	I104-I105	I104	I105		0.0020	419	18	21	840	352,120	123,242	475,361
	I105-I106	I105	I106		0.0019	241	18	21	840	202,440	70,854	273,294
	I106-I107	I106	I107		0.0021	324	18	21	840	272,160	95,256	367,416
	I107-I108	I107	I108		0.0020	336	18	21	840	282,240	98,784	381,024
	I108-I010	I108	I010		0.0020	309	18	21	840	259,560	90,846	350,406
Subtotal						**2,626**				**2,205,462**	**771,912**	**2,977,374**
CI-7	I019-I018	I019	I018	Katella Avenue, between Date Street and Western Avenue and between Electric Avenue and Oak Street	0.0016	535	24	27	1080	577,476	202,117	779,593
	I020-I019	I020	I019		0.0016	461	24	27	1080	497,902	174,266	672,167
	I022-I021	I022	I021		0.0020	459	21	24	960	440,496	154,174	594,670
	I023-I022	I023	I022		0.0020	187	21	24	960	179,184	62,714	241,898
	I024-I023	I024	I023		0.0036	408	12	15	600	244,968	85,739	330,707
	J004-J015	J004	J015		0.0080	3	12	15	600	1,500	525	2,025
	J005-J004	J005	J004		0.0041	191	10	15	600	114,486	40,070	154,556
	J006-J005	J006	J005		0.0024	49	10	15	600	29,400	10,290	39,690
	J007-J006	J007	J006		0.0024	350	10	15	600	210,000	73,500	283,500
	J008-J007	J008	J007		0.0024	204	10	15	600	122,280	42,798	165,078
	J013-I024	J013	I024		0.0036	338	12	15	600	202,800	70,980	273,780
	J014-J013	J014	J013		0.0036	244	12	15	600	146,232	51,181	197,413
	J015-J014	J015	J014		0.0035	329	12	15	600	197,568	69,149	266,717
Subtotal						**3,757**				**2,964,292**	**1,037,502**	**4,001,794**

Table 1-7 (Continued)
Ultimate Capacity Improvement Projects

Location Number	Pipe ID	U/S MH ID	D/S MH ID	Street Location	Slope	Length (ft)	Existing Diameter (in)	Minimum Replacement Diameter (in)	Unit Cost ($)	Construction Cost ($)	Engineering and Administration Cost ($)	Total Cost ($)
CI-8	S012-S002	S012	S002	Beach Boulevard from La Monte Road to Chapman Avenue	0.0008	339	10	15	600	203,676	71,287	274,963
	S013-S012	S013	S012		0.0010	329	10	12	480	157,920	55,272	213,192
	S014-S013	S014	S013		0.0014	321	10	12	480	154,080	53,928	208,008
	S015-S014	S015	S014		0.0016	332	10	12	480	159,360	55,776	215,136
	S016-S015	S016	S015		0.0010	328	8	12	480	157,440	55,104	212,544
Subtotal						**1,649**				**832,476**	**291,367**	**1,123,843**
CI-9	O001-O032	O001	O032	Beach Boulevard from Ruthann Avenue to Katella Avenue	0.0024	350	8	12	480	168,000	58,800	226,800
	O002-O001	O002	O001		0.0024	350	8	12	480	168,000	58,800	226,800
	O003-O002	O003	O002		0.0024	350	8	10	400	140,000	49,000	189,000
	O032-J013	O032	J013		0.0033	350	8	12	480	168,000	58,800	226,800
Subtotal						**1,400**				**644,000**	**225,400**	**869,400**
CI-10	I078-I104	I078	I104	Pacific Street from Beach Boulevard to Rose Street	0.0036	193	8	12	480	92,640	32,424	125,064
	I079-I078	I079	I078		0.0036	241	8	12	480	115,699	40,495	156,194
	J042-I079	J042	I079		0.0036	303	8	10	400	121,212	42,424	163,636
Subtotal						**737**				**329,551**	**115,343**	**444,894**
CI-11	Z015-Z835	Z015	Z027	Easement west of Court Street, from north of Garden Grove Boulevard to Garden Grove Boulevard	0.0020	135	8	10	400	53,944	18,880	72,824
	Z024-Z015	Z024	Z015		0.0020	142	8	10	400	56,800	19,880	76,680
	Z027-Z028	Z027	Z028		0.0020	187	8	12	480	89,717	31,401	121,118
Subtotal						**464**				**200,461**	**70,161**	**270,622**
CI-12	D025-D022	D025	D022	Starr Street from east of Beach Boulevard to Beach Boulevard	0.1511	27	8	10	400	10,800	3,780	14,580
	D026-D025	D026	D025		0.0026	348	8	10	400	139,020	48,657	187,677
	D027-D026	D027	D026		0.0022	246	8	10	400	98,400	34,440	132,840
Subtotal						**621**				**248,220**	**86,877**	**335,097**
CI-13	E005-E005A	E005	E005A	Beach Boulevard, from east of Yana Drive to Yana Drive	0.1000	8	8	10	400	3,200	1,120	4,320
	E006-E005	E006	E005		0.0024	288	8	10	400	115,200	40,320	155,520
Subtotal						**296**				**118,400**	**41,440**	**159,840**
Grand Total						**12,812**				**8,149,121**	**2,852,192**	**11,001,313**

Section 2

INTRODUCTION

2-1 PURPOSE

This section provides an overview and outline for the City of Stanton (City) Sewer Master Plan. A brief background description, a description of past studies, objective and scope of work, State and Federal regulations, acknowledgments, and a list of abbreviations used throughout the report are provided.

2-2 HISTORY AND BACKGROUND

In 1906 the Pacific Electric Railroad opened the line from Santa Ana to Watts. The railway served as an important asset to the residents of Stanton, known then as Benedict, by providing the residents a connection to Los Angeles, which was a central district for trade and business. In addition, the railroad brought people in to see and potentially buy the land in the area, which benefited the agents of the Sterns Rancho Corporation.

Prior to the City's incorporation, the City of Anaheim proposed creating a sewage farm on the County land near the residents of Benedict. In 1911, the residents responded to this proposal by deciding to incorporate as the City of Stanton, which inevitably prevented the creation of the sewage farm. The City's incorporation only lasted until 1924 when the residents voted for disincorporation. This action transferred the responsibility of paying hefty road construction costs from the residents to the State of California. In 1956, the City once again voted for the City's incorporation. It now operated under the general law form as mandated by the State of California.

Currently, the City is comprised of approximately 3.1 square miles of commercial, industrial, and residential areas. The California Department of Finance estimated that the City's population in 2009 was 39,480 residents.

2-3 PAST STUDIES

Sewer Infrastructure Analysis

In 2000, RBF Consulting updated the City's 1990 Sewer Infrastructure Analysis, which analyzed the City's ten (10) major trunk sewers. These sewers are listed below:

- Western Subtrunk (12-inch to 18-inch)
- Katella Trunk (10-inch to 24-inch)
- Beach Subtrunk (8-inch)
- Rose/Cerritos Subtrunk No. 1 (12-inch to 18-inch)
- Rose/Cerritos Subtrunk No. 2 (10-inch to 12-inch)
- North Santa Rosalia Subtrunk (10-inch to 15-inch)
- Beach/Chapman Subtrunk (10-inch to 15-inch)

- Beach/Lampson Subtrunk (10-inch to 15-inch)
- Sycamore Collector (8-inch)
- South Santa Rosalia Subtrunk (8-inch)

Unit flow factors were land-use based and consistent with the design criteria from Orange County Sanitation District (OCSD). The ultimate average dry weather flow (ADWF) generated by the City was estimated at 5.69 mgd. The City's peak dry weather flow was estimated as 9.96 mgd by multiplying the average dry weather flow by the factor 1.75. Flow monitoring records were utilized to calculate this peaking coefficient. The Cities of Garden Grove and Anaheim were reported to have agreements with the City to discharge additional flows to the City's system. The ultimate average and peak dry weather flows from these cities totaled 2.19 mgd and 3.84 mgd, respectively.

The depth of flow for this analysis was calculated using the peak dry weather flows and Manning's equation. The general criteria limited the peak dry weather flow to a depth to diameter ratio of 0.50 for pipes 8 to 12-inches in diameter, 0.67 for 15-inch pipes and 0.75 for pipes 18-inches and larger.

Of the City's ten (10) trunk sewers analyzed, Western Trunk, Rose/Cerritos No. 2, Sycamore Collector, and South Santa Rosalia Subtrunk were identified as capacity deficient. The combined length of these deficiencies was approximately 5,810 feet.

2-4 OBJECTIVE AND SCOPE OF WORK

The objective of this 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.

The scope of work for the Sewer Master Plan consists of the following tasks:

1. Provide Project Management, Communication and Meetings

2. Data Collection and Modeling Review

   The primary sources of information used during the course of this study are as follows:

   - GIS Database Information (parcels, land use, zoning, street centerlines, sewers)
   - Sewer Atlas Maps
   - Sewer As-Built Drawings
   - Sanitary Sewer Flow Monitoring
   - 2007 Draft General Plan and Zoning Map
   - Aerial Photographs
   - Water Meter Records
   - Field Visits
   - City Staff Interviews

- Specific Plans
- Closed Circuit Television (CCTV) Inspection Reports and Videos
- Sewer Maintenance Records
- 1990 Sewer Infrastructure Analysis and 2000 Update
- 2008 Survey Reports
- *Combined West Anaheim Area Master Plan of Sanitary Sewers*, July, 2006
- *Garden Grove System Evaluation and Capacity Assurance Plan*, April, 2009

3. Sewer System Computer Hydraulic Model Development

   The sewer GIS, as-built plans, and field survey data was used as the basis of the hydraulic model geometry. The model includes all City sewer pipes, manholes, pump stations, point source flows, and tributary area boundaries. The model was developed utilizing MWH Soft's H2OMap Sewer software.

   Unit flow factors were developed from water use records, population and land use densities, flow monitoring, and values utilized by nearby agencies. The water meter records were also utilized to develop load factors for schools and for areas where the land use could not be isolated by flow meters. The flow monitoring results were used to develop the dry weather peaking relationship and to calibrate the model.

4. Flow Monitoring

   The flow monitoring results were utilized to develop the dry weather peaking relationship and to verify the hydraulic deficiencies identified by the hydraulic model analysis. Five (5) monitors were installed throughout the study area and collected data for fourteen (14) days between March 14, 2009 and March 27, 2009.

5. Sewer Model System Analyses

   The hydraulic model was used to analyze and evaluate the capacity of the sewer system under existing and ultimate conditions. Three (3) model conditions were run as follows:

   1. Calibration Scenario with existing system, current land use and flow conditions, showing and proving areas of adequacy

   2. Ultimate Scenario with existing system, ultimate build-out land use and flow conditions, showing deficiencies and proving areas of adequacy (which included extensive Mixed Use Development Land Use)

   3. Ultimate Recommendation Scenario with fully improved system, ultimate build-out land use and flow conditions (which includes extensive Mixed Use Development Land Use)

6. Condition Assessment and Sewer System Rehabilitation Plan

Closed Circuit Television inspections for the City sewers have been completed as of January 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 prepared for the City. The reports and inspections were analyzed, and the conditions of the City's sewers were prioritized for rehabilitation and replacement.

7. Capital Improvement Program and Sewer Master Plan Report

The capital improvement program was developed based upon the hydraulic model analyses and the condition assessment analysis.

The work effort and results are presented in this report. It includes documentation of the methodology used throughout the project. It includes a study area description, criteria, existing sewer system description, hydraulic sewer model description, system analysis and a recommended capital improvement program for capacity improvements and condition improvements.

2-5 STATEWIDE GENERAL WASTE DISCHARGE REQUIREMENTS

The State Water Resources Control Board (SWRCB) which oversees all wastewater permitting and enforcement, adopted Resolution 2004-80 requiring staff to work with stakeholders in developing a regulatory program that will provide a consistent approach for reducing SSOs. To assist in the development of the regulatory program, a statewide SSO Guidance Committee composed of representatives from the Regional Water Quality Control Boards, County environmental health departments, environmental groups, U.S. EPA, local public collection system owners and other collection system experts was formed. SWRCB staff and the SSO Guidance Committee drafted Statewide General Waste Discharge Requirements (WDR) for Sewage Collection System Agencies.

The SWRCB adopted the Statewide General Waste Discharge Requirements (WDR) for sanitary sewer systems and the associated monitoring and reporting program by issuing Order No. 2006-0003 on May 2, 2006.

The WDR and reporting program addresses Sanitary Sewer Overflow (SSO) reporting and proper collection system management and operation necessary to protect the public health, water quality, the environment, and the public's investment in the sewer system infrastructure.

The proposed completion schedule varies by the population of the service area. For a collection system agency with a population between 10,000 and 100,000, the proposed full compliance schedule is currently set at 39 months after the WDR adoption (August 2, 2009). The Statewide WDR is essentially California's equivalent of the proposed Federal regulation, Capacity, Management, Operation, and Maintenance (CMOM), and includes all elements of CMOM.

The fifth paragraph of the preamble to the Waste Discharge Requirements is:

"To facilitate proper funding and management of sanitary sewer systems, each Enrollee must develop and implement a system-specific Sewer System Management Plan (SSMP). To be effective, SSMPs must include provisions to provide proper and efficient management, operation, and maintenance of sanitary sewer systems, while taking into consideration risk management and cost benefit analysis. Additionally, an SSMP

must contain a spill response plan that establishes standard procedures for immediate response to an SSO in a manner designed to minimize water quality impacts and potential nuisance conditions."

The Sewer System Management Plan must address the following elements:

- Goals
- Organization Structure
- Legal Authority
- Operation and Maintenance Program, including a Preventive Maintenance Program and a Rehabilitation and Replacement Program *(Condition Assessment completed as part of this Master Plan)*
- Design and Performance Provisions
- Overflow Emergency Response Plan
- Fats, Oils, and Grease (FOG) Control Program
- System Evaluation and Capacity Assurance Plan (SECAP) *(Completed as a part of this Master Plan)*
- Monitoring, Measurement, and Program Modifications
- Sewer System Management Plan Program Audits
- Communication Program

The Waste Discharge Requirements define a sanitary sewer system as, "Any system of pipes, pump stations, sewer lines, or other conveyances, upstream of a wastewater treatment plant headworks used to collect and convey wastewater to the publicly owned treatment facility. Temporary storage and conveyance facilities (such as vaults, temporary piping, construction trenches, wet wells, impoundments, tanks, etc.) are considered to be part of the sanitary sewer system, and discharges into these temporary storage facilities are not considered to be SSOs".

The following submittal schedules apply to the City of Stanton (population between 10,000 and 100,000):

▪ Application for Permit Coverage	November 2, 2006
▪ Reporting Program	November 2, 2006
▪ SSMP Development Plan and Schedule	November 2, 2007
▪ Goal	November 2, 2007
▪ Organization	November 2, 2007
▪ Overflow Emergency Response Plan	May 2, 2009
▪ Legal Authority	May 2, 2009
▪ Operation and Maintenance Program	May 2, 2009
▪ Fats, Oils and Grease Control Program	May 2, 2009
▪ Design and Performance	August 2, 2009

- System Evaluation and Capacity Assurance Plan August 2, 2009
- Monitoring and Program Modifications August 2, 2009
- Program Audits August 2, 2009
- Communication Program August 2, 2009
- Final Sewer System Management Plan August 2, 2009

Enrollees are required to certify that the final SSMP and its constituent subparts are in compliance with the Sanitary Sewer Order within the time frame above. Enrollees are also required to obtain their governing board's approval of the SSMP Development Plan and Schedule and final SSMP at a public hearing prior to certification as complete and in compliance. Enrollees do not send their SSMP to the State or Regional Water Boards for review or approval, but need to make them available upon request.

2-6 FUTURE REGULATIONS – CAPACITY, MANAGEMENT, OPERATIONS AND MAINTENANCE (CMOM)

Concerned over the disturbing trend of frequent and large sanitary sewer overflows (SSOs), their environmental and health impacts, and the condition of the infrastructure, President Clinton directed the Environmental Protection Agency (EPA) on May 29, 1999 to develop, within one year, new national regulations to prevent sanitary sewer overflows. Since directed, the EPA worked to develop draft National Pollutant Discharge Elimination System (NPDES) regulations for sanitary sewers and sanitary sewer overflows (SSOs).

The purpose of the proposed regulation is to improve collection systems' capacity, management, operation and maintenance (CMOM) programs, prevent avoidable sewer spills, improve treatment facility performance, and reduce health and environmental risks.

Under the proposed regulations, an NPDES permit is required for all publicly-owned collection systems to develop a written summary of the CMOM program and make it, with audits, available to the public upon request.

It is currently not known how the regulation and permitting process will be implemented. However, compliance with the Statewide WDR is expected to be sufficient to bring the City into compliance with CMOM.

2-7 GOVERNMENT ACCOUNTING STANDARDS BOARD STATEMENT 34 (GASB 34)

Government Accounting Standards Board Statement 34 (GASB 34), issued in June 1999, requires that agencies have an asset management system in place. They must:

- Establish the condition in which they will maintain their assets
- Assess the condition of their infrastructure
- Estimate the useful lives and replacement costs
- Determine the cost to maintain the desired condition of the infrastructure.

Section I, Background, of the proposed CMOM regulations acknowledge GASB 34, and the regulations encompass many of the components of GASB 34. Complying with Statement 34 will provide agencies with the necessary tools for maintaining the integrity of their assets, and will most likely improve their bond rating.

2-8 ORGANIZATION OF SEWER MASTER PLAN REPORT

This Sewer Master Plan report presents the methodology, findings, and recommendations of a comprehensive capacity and condition assessment of the City of Stanton's sewer facilities. A brief outline of the report follows:

- Section 1: Executive Summary provides an overview of the key findings and recommendations of this report
- Section 2: Introduction provides an overview and outline for the Sewer Master Plan
- Section 3: Study Area describes the physical features, land use characteristics and population of the study area.
- Section 4: Criteria discuses the standards and procedures utilized in developing the wastewater flows, assessing the existing system, and selecting the recommended improvements.
- Section 5: Existing Sewer Collection System describes the City's existing system, tributary area, and the regional facilities that receive flows from the study area.
- Section 6: Hydraulic Sewer Model describes the methodology used in the construction of the City's sewer system model. Base data and assumptions are described in detail in this section.
- Section 7: System Analysis describes the hydraulic model analysis and identifies the hydraulically deficient segments of the system. Condition assessment of the sewer collection system, 'hot spots,' and maintenance practices are also discussed.
- Section 8: Capital Improvement Program presents a prioritized capital improvement program for the recommended improvements.
- The Appendices contain background information and are referred to in the text as the location of supplementary facts and figures.

2-9 ACKNOWLEDGMENTS

AKM Consulting Engineers would like to express their sincere appreciation to the following individuals for their valuable assistance and support throughout the preparation of this study:

Sean Crumby – Director of Public Works/City Engineer
Dane Bennett – Public Works Manager
Nick Guilliams – Assistant City Engineer

2-10 ABBREVIATIONS

To conserve space and improve readability, abbreviations have been used in this report. Each term abbreviated has been spelled out in the text the first time it is used. Subsequent usage of the term is usually by its abbreviation. The abbreviations utilized in this report are contained in Table 2-1.

Table 2-1
Abbreviations

Abbreviations	Explanation
AC	Acres
ACP	Asbestos Cement Pipe
ADWF	Average Dry Weather Flow
amsl	Above Mean Sea Level
BMP	Best Management Practices
CCTV	Closed Circuit Television
cfs	Cubic Feet per Second
cip	Cast Iron Pipe
CIP	Capital Improvement Program
City	City of Stanton
County	County of Orange
CMOM	Capacity, Management, Operation and Maintenance
d/D	Depth to Diameter Ratio
DIP	Ductile Iron Pipe
DU	Dwelling Unit
D/S	Downstream
EDU	Equivalent Dwelling Unit
EPA	Environmental Protection Agency
FAR	Floor Area Ratio
ft	Feet
ft/s, fps	Feet per Second
GASB34	Government Accounting Standards Board Statement 34
GIS	Geographic Information System
GPD, gpd	Gallons per Day
gpm	Gallons per Minute
HP	Horsepower
ID	Identification
I/I	Inflow and Infiltration
in	Inches
MGD, mgd	Million Gallons per Day
MH	Manhole
NASSCO	National Association of Sewer Service Companies
NCPI	National Clay Pipe Institute
NFPA	National Fire Prevention Association
NPDES	National Pollutant Discharge Elimination System

Abbreviations	Explanation
O&M	Operations and Maintenance
OCFCD	Orange County Flood Control District
OCSD	Orange County Sanitation District
OMB	Office of Management and Budget
OCPW	Orange County Public Works
OSHA	Occupational Safety & Health Administration
OWM	Office of Wastewater Management
PACP	Pipe Assessment and Certification Program
PDWF	Peak Dry Weather Flow
PVC	Polyvinyl Chloride
PWWF	Peak Wet Weather Flow
RPM	Revolutions per Minute
RWQCB	Regional Water Quality Control Board
SSES	Sanitary Sewer Evaluation Survey
SSMP	Sanitary Sewer Management Plan
SSO	Sanitary Sewer Overflow
TDH	Total Dynamic Head
TSF	Thousand Square Feet
U/S	Upstream
USGS	United States Geological Survey
VCP	Vitrified Clay Pipe
WDR	Waste Discharge Requirements

Section 3

STUDY AREA

3-1 PURPOSE

This section describes the study area, the land uses, and population estimates.

3-2 LOCATION

The City of Stanton (City) is located in the northwestern portion of Orange County, California. The City's regional location is depicted in Figure 3-1. The City encompasses approximately 3.1 square miles of residential, commercial, and industrial land. Neighboring cities include Anaheim and Buena Park to the north; Garden Grove and Anaheim to the east; Westminster to the south; and Garden Grove and Cypress to the west.

The Cities of Garden Grove and Anaheim discharge flows to the City's system. Approximately 645 acres of Anaheim are tributary to City's system from the north, and approximately 565 acres of Garden Grove are tributary to the City's system from the east and west. The southern portion of the City, located south of Stanford Avenue and east of Hoover Street, is tributary to the Garden Grove Sanitary District's system.

The City sewer system resides entirely within its corporate boundaries. Sewer facilities outside City limits are operated by adjacent agencies.

The City is centralized between several Southern California highways, providing access into the City from all directions. The San Diego Freeway (I-405) and Garden Grove Freeway (SR-22) are located to the south. The San Gabriel Freeway (I-605) is located to the west. The Artesia Freeway (SR-91) is located to the north. The major roads within the City include Beach Boulevard, Knott Avenue, Magnolia Avenue, Katella Avenue, Cerritos Avenue, Western Avenue, and Chapman Avenue.

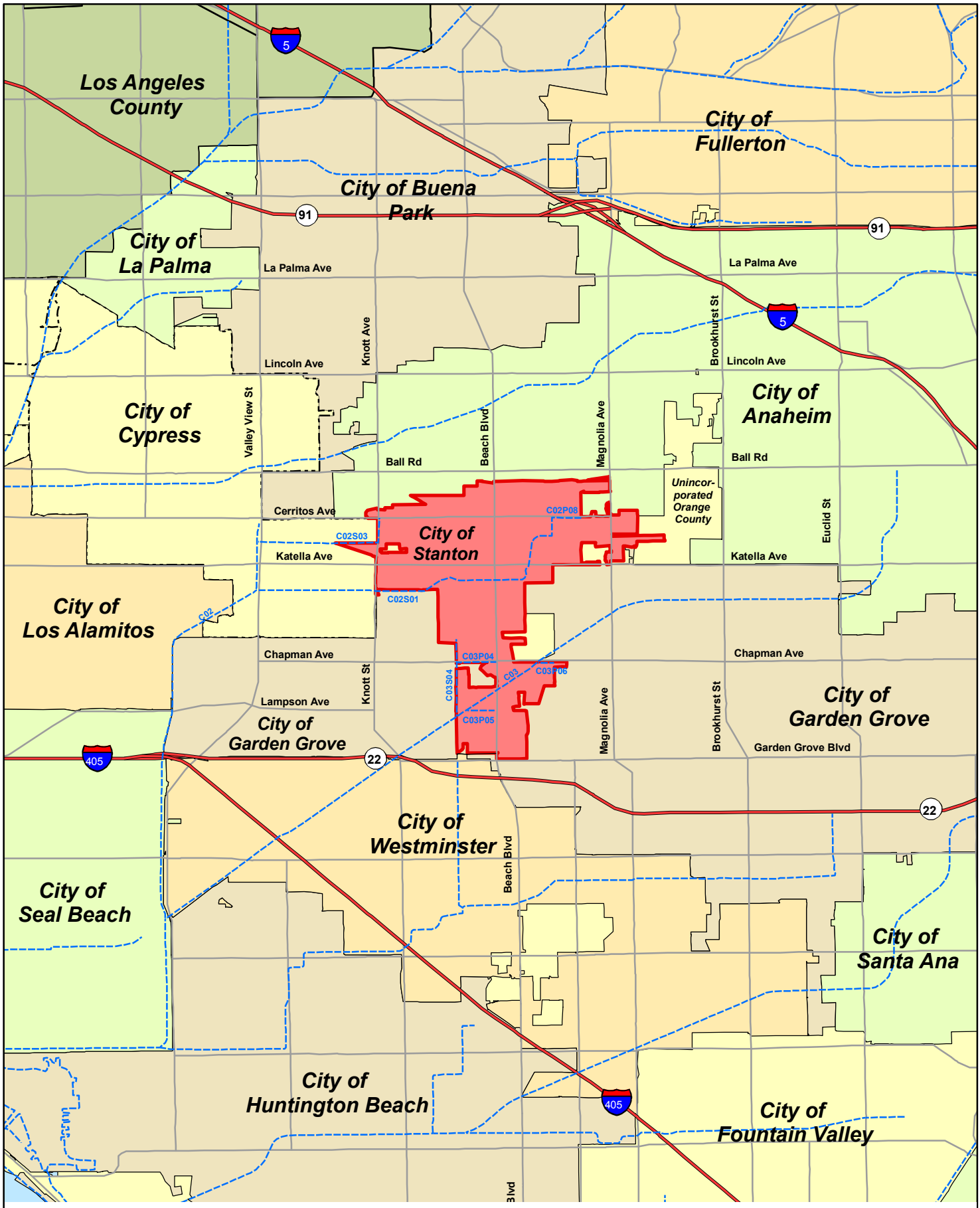
3-3 TOPOGRAPHICAL DESCRIPTION

The study area is very flat, with a general slope of about 0.18 percent. The highest ground elevation is approximately 80 feet above mean sea level (amsl) in the northeast portion of the City, at Lola Avenue and Magnolia Avenue. The lowest ground elevation is approximately 50 feet amsl at the southwest portion of the City at of Garden Grove Boulevard and Hoover Street.

The study area is crossed by several major Orange County Flood Control District (OCFCD) storm channels, which generally drain in a northeast to southwest direction. The general location of these channels can be seen on Figure 3-1.

The Knott-Cerritos Storm Drain (OCFCD Facility No. C02P03) drains from the intersection of Knott Avenue and Cerritos Avenue and extends south along Knott Avenue to the Jonathan Storm Channel (OCFCD Facility No. C02S03) at the Southern Pacific Railroad. A general description of the facility follows:

- Knott Avenue – 81" reinforced concrete pipe (RCP)



CITY OF STANTON
Sewer Master Plan

Location Map

PROJECT NO: 1570867.00

DATE: June 2009

Figure 3-1

The Dale-Cerritos Storm Drain (OCFCD Facility No. C02P08) begins at Cerritos Avenue, 250' west of Sherrill Street. It drains west along Cerritos Avenue and south along Dale Street to the Stanton Storm Channel, south of Sandustrial Street. A general description of the facility follows:

- Cerritos Avenue - single 8' (W) x 4.5' (H) reinforced concrete box (RCB)
- Dale Street - single 9 '(W) x 5' (H) reinforced concrete box (RCB)

The Stanton Storm Channel (OCFCD Facility No. C02S01) conveys the flow from the Dale-Cerritos Storm Drain. It begins at Cerritos Avenue, south of Sandustrial Street and extends southwest through the industrial area at the northeast corner of Katella Avenue and Dale Street. The Stanton Storm Channel parallels Katella Avenue to the south and exits the City limits at Knott Avenue. A general description of the facility follows:

- Monroe Avenue - 5' (W) x 6.5' (H) reinforced concrete trapezoidal channel
- Katella Avenue - 5' (W) x 7' (H) reinforced concrete trapezoidal channel
- Katella Avenue Crossing - 11' (W) x 7' (H) reinforced concrete box (RCB)
- South of Katella Avenue - 8' (W) x 7' (H) reinforced concrete trapezoidal channel
- South of Katella Avenue Crossing - 6' (W) x 7.5' (H) reinforced concrete rectangular channel
- South of Katella Avenue Crossing - 6' (W) x 7.5' (H) reinforced concrete rectangular channel
- Beach Boulevard Crossing - 8' (W) x 7' (H) reinforced concrete box (RCB)
- East of Beach Boulevard - 5' (W) x 7' (H) reinforced concrete trapezoidal channel
- Santa Rosalia Street - 3.5' (W) x 7' (H) reinforced concrete trapezoidal channel
- Pacific Railway - 3.5' (W) x 8.5' (H) reinforced concrete trapezoidal channel
- Western Avenue - 8' (W) x 7' (H) reinforced concrete box (RCB)
- Knott Avenue - 6' (W) x 8' (H) reinforced concrete trapezoidal channel

The Anaheim Barber City Channel (OCFCD Facility No. C03) enters the City at Chapman Avenue and Dale Street and extends southwest to Lampson Avenue and the Pacific Railway where it exits the City boundary. A general description of the facility follows:

- Chapman Avenue - double 12' (W) x 10' (H) reinforced concrete box (RCB)
- Lampson Avenue - double 12' (W) x11' (H) reinforced concrete box (RCB)

The Chapman-Beach Storm Drain (OCFCD Facility No. C03P04) begins at Fillmore Drive and extends west to Beach Boulevard. It then extends south along Beach Boulevard and west on Chapman Avenue, where it exits the City at Santa Paula Street. A general description of the facility follows:

- Fillmore Drive – 48" reinforced concrete pipe (RCP)
- Beach Boulevard – 54" reinforced concrete pipe (RCP)
- Chapman Avenue - single 5' (W) x 4' (H) reinforced concrete box (RCB)

The Lampson Storm Drain (OCFCD Facility No. C03P05) begins at the corner of Beach Boulevard and Lampson Avenue and confluences with the Anaheim Barber City Channel on Lampson Avenue. A general description of the facility follows:

- Lampson Avenue - 12' (W) x 13' (H) reinforced concrete trapezoidal channel

The Chapman-Dale Storm Drain (OCFCD Facility No. C03P06) enters the City in the intersection of Dale Street and Chapman Avenue. It extends west where it confluences with the Anaheim Barber City Channel on Chapman Avenue. A general description of the facility follows:

- Chapman Avenue – 78" reinforced concrete pipe (RCP)

The Rosalia Storm Channel (OCFCD Facility No. C03S04) begins 1,500 ft north of Chapman Avenue. It parallels Santa Rosalia Street to the west and exits the City on Chapman Avenue. A general description of the facility follows:

- Santa Rosalia Street - double 5' (W) x 2.7' (H) reinforced concrete box (RCB)

Numerous storm drains within the City boundaries connect to the eight (8) OCFCD facilities described above. In crossing these channels and tributary storm drains, as well as other major utilities, some sewers have to form inverted siphons. If not designed and constructed properly, inverted siphons become maintenance problems, consuming significant staff effort. The City's inverted siphons are discussed in Section 5 of this Master Plan Report.

3-4 GEOTECHNICAL INFORMATION

Soils

Three soil classifications exist within the corporate boundaries of the City, as seen on the Hydrologic Classification of Soils, Plate A of the Orange County Hydrology Manual and Figure 3-. The descriptions of each soil type are as follows:

Group A soils are well drained sands or gravels with high infiltration and water transmission rates. Group B soils are generally well drained, sandy loam having moderate infiltration and water transmission rates. Group C soils are mostly silty-loam with slow infiltration and water transmission rates.

The soils with higher infiltration rates permit better passage of water through them to the groundwater table. Sewer lines constructed in Group A and B soils would therefore be more susceptible to infiltration through defective pipe joints and manholes than Group C soils.

CITY OF BUENA PARK

CITY OF ANAHEIM

Knott Ave

Western Ave

Beach Blvd

Dale St

Magnolia St

Ball Rd

Gilbert St

Cerritos Ave

Robert M. Pyles Elementary

Esther L. Walter Elementary

Katella Ave

Mabel Carver Elementary

CITY OF CYPRESS

Orangewood Ave

Chapman Ave

Saint Polycarp Elementary

CITY OF GARDEN GROVE

CITY OF GARDEN GROVE

Lampson Ave

Garden Grove Blvd

CITY OF WESTMINSTER

Legend

- City Boundary
- Soil Type A
- Soil Type B
- Soil Type C

N

0 750 1,500 3,000 Feet

1" = 1,500'

CITY OF STANTON
Sewer Master Plan

Soils Map

PROJECT NO: 1570867.00

DATE: June 2009

Figure 3-2

The majority of the soils in the study area are Groups A and B. However, a significant concentration of Group C soil is found on the south side of the City, just north of SR-22 on either side of Beach Boulevard. Group C soil is also found on the corner of Santa Rosalia Street and Lampson Avenue.

Geology

While the City does not lie within any Alquist Priolo Earthquake Fault Zones, several major faults are in close proximity to the City. The Newport-Inglewood Fault and Los Alamitos Fault are located south of the City. The Whittier Fault and Norwalk Fault are located to the north of the City. These faults generally run in the northwest to southeast direction.

3-5 CLIMATE

The climate in the area is typical of Southern California with generally mild temperatures, virtually no days below freezing, and approximately 340 days of sunshine per year. The average annual rainfall for the City of Stanton is estimated to be approximately 12.1 inches, as measured at the Orange County Public Works (OCPW) Watershed Program, Santa Ana Station No. 121. Most of the rainfall occurs between the months of November and March.

3-6 LAND USE

The land use information utilized in the preparation of the Sewer Master Plan is primarily based upon the City's approved Housing Element (July 2001) and the Draft General Plan (December 2007). The City's existing land use was developed from the 2001 Housing Element's Land Use Map, while the ultimate land use was developed from the 2007 Draft General Plan Land Use Diagram. This information was supplemented by aerial photographs, specific plans, and field reviews.

Currently, the City consists of mostly residential, commercial and industrial land. It has experienced overcrowding since the 1990s, when the City experienced an increase of approximate 7,000 persons and the construction of only about 450 additional dwelling units. One reason for the residential overcrowding is the shortage of available land in the City.

According to the 2007 Draft General Plan, Stanton has less than 1% of vacant developable land. However, plans are underway to redevelop portions of the City which are identified as underutilized land. The 2007 Draft General Plan includes plans to create several mixed use developments, which include: North Gateway Mixed Use District, South Gateway Mixed Use District, and Town Center Mixed Use District. These developments are predominantly proposed along the commercial stretch of Beach Boulevard from Ball Road to Garden Grove Boulevard.

Table 3-1 and Table 3-2 provide a summary of the study area land use categories under existing and ultimate conditions. The existing and ultimate land use maps are included on Figure 3-3 and Figure 3-4, respectively.

Table 3-1
Existing Land Use

Property Code	Zoning Density	Property Use Description	Net Area (AC)	Percentage of Total
LDR	1-6 du/ac	Low Density Residential	434.2	21.8%
MDR	7-11 du/ac	Medium Density Residential	196.0	9.8%
HDR	12-24 du/ac	High Density Residential	302.7	15.2%
		Subtotal Residential Use	**932.9**	**46.8%**
GC		General Commercial	232.4	11.7%
		Subtotal Commercial Use	**232.4**	**11.7%**
I		Industrial	188.2	9.4%
		Subtotal Industrial Use	**188.2**	**9.4%**
SCHOOL		School	35.7	1.8%
PI		Public Institutional	3.9	0.2%
		Subtotal Public Use	**39.6**	**2.0%**
OS		Open Space	126.6	6.4%
VACANT		Vacancy	71.1	3.6%
		Streets and Right of Ways	402.0	20.2%
		Subtotal Other Use	**599.8**	**30.1%**
		Total	**1,993**	**100%**

Table 3-2
Ultimate Land Use

Property Code	Zoning Density	Property Use Description	Net Area (AC)	Percentage of Total
LDR	1-6 du/ac	Low Density Residential	436.2	21.9%
MDR	7-11 du/ac	Medium Density Residential	169.3	8.5%
HDR	12-24 du/ac	High Density Residential	306.1	15.4%
		Subtotal Residential Use	**911.5**	**45.7%**
GMU	60 du/ac	General Mixed-Use	114.8	5.8%
North	60 du/ac	North Gateway Mixed Use District	22.4	1.1%
South	81 du/ac	South Gateway Mixed-Use District	88.3	4.4%
Town	81 du/ac	Town Center Mixed-Use District	38.7	1.9%
		Subtotal Mixed Use	**264.2**	**13.3%**
GC		General Commercial	56.1	2.8%
		Subtotal Commercial Use	**56.1**	**2.8%**
I		Industrial	156.3	7.8%
		Subtotal Industrial Use	**156.3**	**7.8%**
SCHOOL		School	35.7	1.8%
PI		Public Institutional	52.4	2.6%
		Subtotal Public Use	**88.0**	**4.4%**
OS		Open Space	114.7	5.8%
		Streets and Right of Way	402.0	20.2%
		Subtotal Other Use	**516.7**	**25.9%**
		Total	**1,993**	**100%**

CITY OF BUENA PARK

CITY OF ANAHEIM

Knott Ave

Western Ave

Beach Blvd

Dale St

Magnolia St

Ball Rd

Gilbert St

Cerritos Ave

Robert M. Pyles Elementary

Esther L. Walter Elementary

Katella Ave

Mabel Carver Elementary

CITY OF CYPRESS

Orangewood Ave

Chapman Ave

Saint Polycarp Elementary

CITY OF GARDEN GROVE

CITY OF GARDEN GROVE

Lampson Ave

Garden Grove Blvd

CITY OF WESTMINSTER

Legend

- City Boundary
- Low Density Residential
- Medium Density Residential
- High Density Residential
- General Commercial
- Industrial
- School
- Public Facilities
- Vacancy
- Open Space

N

0 750 1,500 3,000 Feet

1" = 1,500'

CITY OF STANTON
Sewer Master Plan

Existing Land Use Map

PROJECT NO: 1570867.00

DATE: June 2009

Figure 3-3

CITY OF ANAHEIM

CITY OF BUENA PARK

Knott Ave

Western Ave

Beach Blvd

Dale St

Magnolia St

Ball Rd

Gilbert St

Cerritos Ave

Robert M. Pyles Elementary

Esther L. Walter Elementary

Katella Ave

Mabel Carver Elementary

CITY OF CYPRESS

Orangewood Ave

CITY OF GARDEN GROVE

Chapman Ave

Saint Polycarp Elementary

CITY OF GARDEN GROVE

Garden Grove Blvd

CITY OF WESTMINSTER

Legend

- City Boundary
- Low Density Residential
- Medium Density Residential
- High Density Residential
- General Commercial
- General Mixed Use
- North Gateway Mixed Use District
- South Gateway Mixed Use District
- Town Center Mixed Use District
- Industrial
- School
- Public/Institutional
- Open Space

N

0 750 1,500 3,000 Feet

1" = 1,500'

CITY OF STANTON
Sewer Master Plan

Ultimate Land Use Map

PROJECT NO: 1570867.00

DATE: June 2009

Figure 3-4

Residential Land Use

The City of Stanton is a small community consisting of residential, commercial, and industrial land uses. The primary land use in the City is residential, which is approximately 47 percent of the City's total acreage under existing conditions. Under ultimate conditions, residential land use slightly decreases to 46 percent of the City's total acreage. However, the ultimate conditions provide additional housing through mixed use development. The City's 2006 Housing Element and the 2007 Draft General Plan include three residential land use categories.

Low Density Residential neighborhoods are characterized by single family detached homes with densities up to six (6) dwelling units (DU) per acre.

Medium Density Residential neighborhoods may include cluster housing, duplexes, triplexes, fourplexes, townhomes, condominiums, apartments, and mobile homes, in addition to low density single family homes. The maximum allowed density is eleven (11) DU per acre; however, if a development provides affordable housing for low - moderate income households, the density may be increased by 35 percent to 15 DU per acre.

The High Density Residential designation allows for the development of apartments, condominiums, townhouses and single family homes at a maximum density of eighteen (18) DU per acre. A development may increase its zoning density to twenty four (24) DU per acre by providing affordable housing to low – moderate income households.

In 2009, the California Department of Finance Demographic Research Unit estimated that out of the 11,199 housing units in the City, approximately 2.21 percent were vacant.

General Commercial Land Use

The existing General Commercial Land Use is currently located along Beach Boulevard between Ball Road and Garden Grove Boulevard. There are also patches of commercial land use along Katella Avenue and Cerritos Avenue. General Commercial Land Use encompasses a wide range of businesses which serve the local residential neighborhoods. The General Commercial Land Use designation may include but is not limited to: retail shops, professional offices, restaurants, hotels, theaters, churches, and auto related facilities. FAR (Floor Area Ratio) ranges from 0.25 to 1.5. Approximately 11.7 percent of the City's existing total acreage consists of General Commercial Land Use.

Under ultimate conditions, approximately 2.8 percent of the City's existing total acreage will be General Commercial Land Use. According to the 2007 Draft General Plan, many of the existing General Commercial Land Use areas were ultimately designated as Mixed Land Use.

Mixed-Use

The Mixed Land Use areas allow for both vertical and horizontal mixed use, consisting of residential, commercial, and office uses. The City has defined three specific Mixed Use Districts: North Gateway Mixed Use District, South Gateway Mixed Use District, and Town Center Mixed Use District. Other areas of general mixed use are also located throughout the City.

About 13.3 percent, or 264 acres, of the City is ultimately allocated for mixed use. Mixed-Use areas are defined as areas with 60 percent residential density and a 40 percent commercial density, assuming a FAR of 0.35.

The General Mixed Use areas are mainly located along Beach Boulevard between Katella Avenue and Catherine Avenue, and along Katella Avenue between Beach Boulevard and Dale Street. Buildings are limited to a height of three (3) stories, and the zoning density shall be a maximum of forty-five (45) DU per acre. However, if a development provides affordable housing for low - moderate income households, the density may be increased by 35 percent to sixty (60) DU per acre.

The North Gateway Mixed Use District is located along Starr Street and Beach Boulevard. The buildings may be up to three (3) stories in height, and the zoning density shall be no more than forty-five (45) DU per acre. A development may increase its zoning density to sixty (60) DU per acre by providing affordable housing to low – moderate income households. Commercial uses are encouraged on the ground floor whenever possible, and the upper levels shall consist of office and residential uses.

The South Gateway Mixed Use District is located along Beach Boulevard between Catherine Avenue and Garden Grove Boulevard. Buildings are limited to a height of five (5) stories, and the zoning density shall be a maximum of sixty (60) DU per acre. A development may increase its zoning density to eighty one (81) DU per acre by 35 percent by providing affordable housing to low – moderate income households. Adjacent to the Garden Grove Freeway (SR-22) to the south, the City encourages freeway-oriented commercial and office uses.

The Town Center Mixed Use District is located along Beach Boulevard between Cerritos Avenue and Katella Avenue. The buildings may be up to five (5) stories in height, and the zoning density shall be no more than sixty (60) DU per acre. However, if a development provides affordable housing to low – moderate income households, the density may be increased by 35 percent to eighty one (81) DU per acre. Retail stores are recommended to occupy the ground floors along the street frontages, while offices and residential units are recommended to occupy either the rear of the property or the upper floors.

Industrial Land Use

Industrial areas allow for manufacturing, processing, research and development, assembly, storage, warehousing, distribution and other industrial services. Approximately 9.4 percent of the City's existing total acreage consists of Industrial Land Use. Under the ultimate condition, Industrial land use slightly decreases to 7.8 percent. The industrial developments shall be developed on either large or multiple parcels with common streetscape treatments and design.

Open Space and Recreation

Dedicated to provide recreational needs and provide some open space value, the Open Space and Recreation Land Use is comprised of parks, bicycle paths, golf courses, the off-service Pacific Electric Railroad and Union Pacific Corridor, utility and flood control easements. The City's existing parks consist of: Stanton Park, Hollenbeck Park, Stanton Tennis Courts, Norm Ross Sports Field, Veteran's Memorial Park, Date & Katella Pocket Park, Dotson Park, Zuniga Park and Premier Park.

Public / Institutional

The Public / Institutional category are City offices and yards, libraries, post offices, police and fire stations, hospitals, and medical centers. Less than 1 percent of the City is currently assigned for institutional facilities and other public uses. Under ultimate conditions, Public/Institutional facilities increase to approximately 2.6 percent.

School

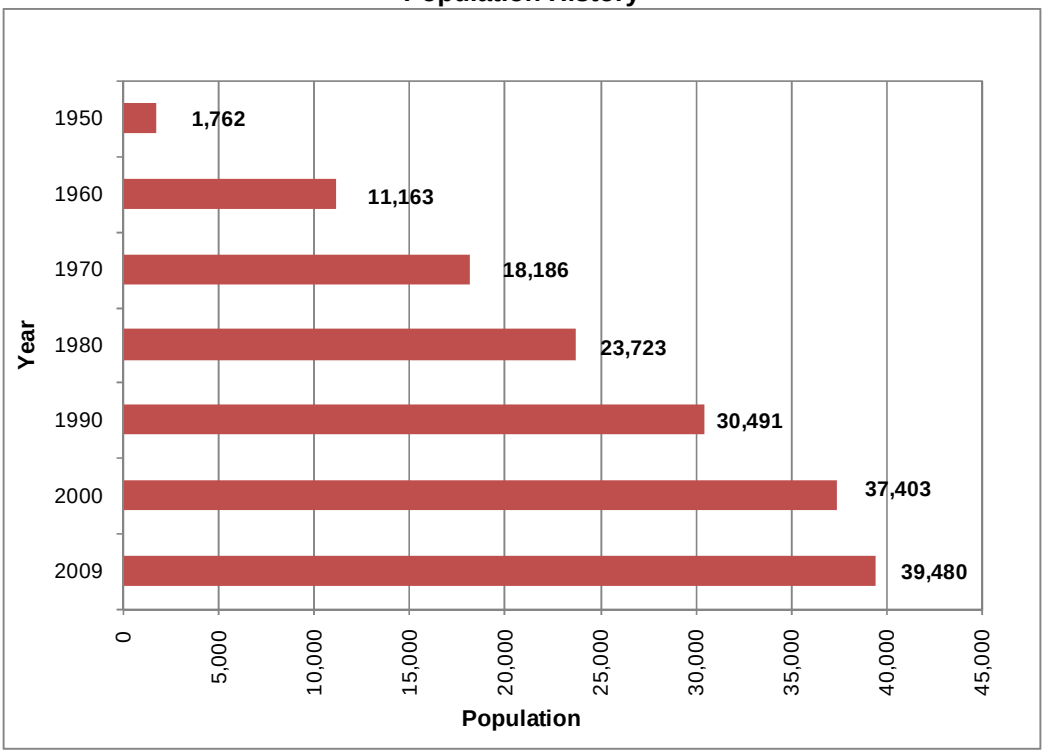
The School category includes City educational facilities. Approximately 2 percent of the City is comprised of the City's three (3) public schools and one (1) private school.

3-7 POPULATION

As illustrated on Figure 3-5, the City's population increased steadily following its reincorporation in 1956. The largest increase took place between 1950 and 1960 when the population grew from 1,762 to 11,163. According to the 2006 Housing element, the City also experienced heavy residential development during this period. Possibly due to the shortage of available land and economic hardships, the increase in population began to slow down in 2000.

In January 2009, the California State Department of Finance estimated the total population was 39,480 persons. The total number of existing housing units was approximately 11,199 units and approximately 10,951 units were occupied. The Department of Finance estimated an average population density of 3.56 persons per dwelling unit and a vacancy rate of approximately 2.21 percent.

Figure 3-5
Population History



**Population data from U.S. Census Bureau and California State Department of Finance*

Section 4

CRITERIA

4-1 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.

Average wastewater flows can be reasonably estimated from land use and their corresponding unit flow factors. The results are then compared to measured flows. Peaking factors are needed for estimating peak dry weather and peak wet weather flows. Peak wet weather flows also include an allowance for inflow and infiltration (I/I).

Collection system design standards include minimum pipe size, minimum flow velocity, and depth of flow to pipe diameter ratio. Finally, facility useful lives are needed for adequately scheduling replacement of the aging infrastructure.

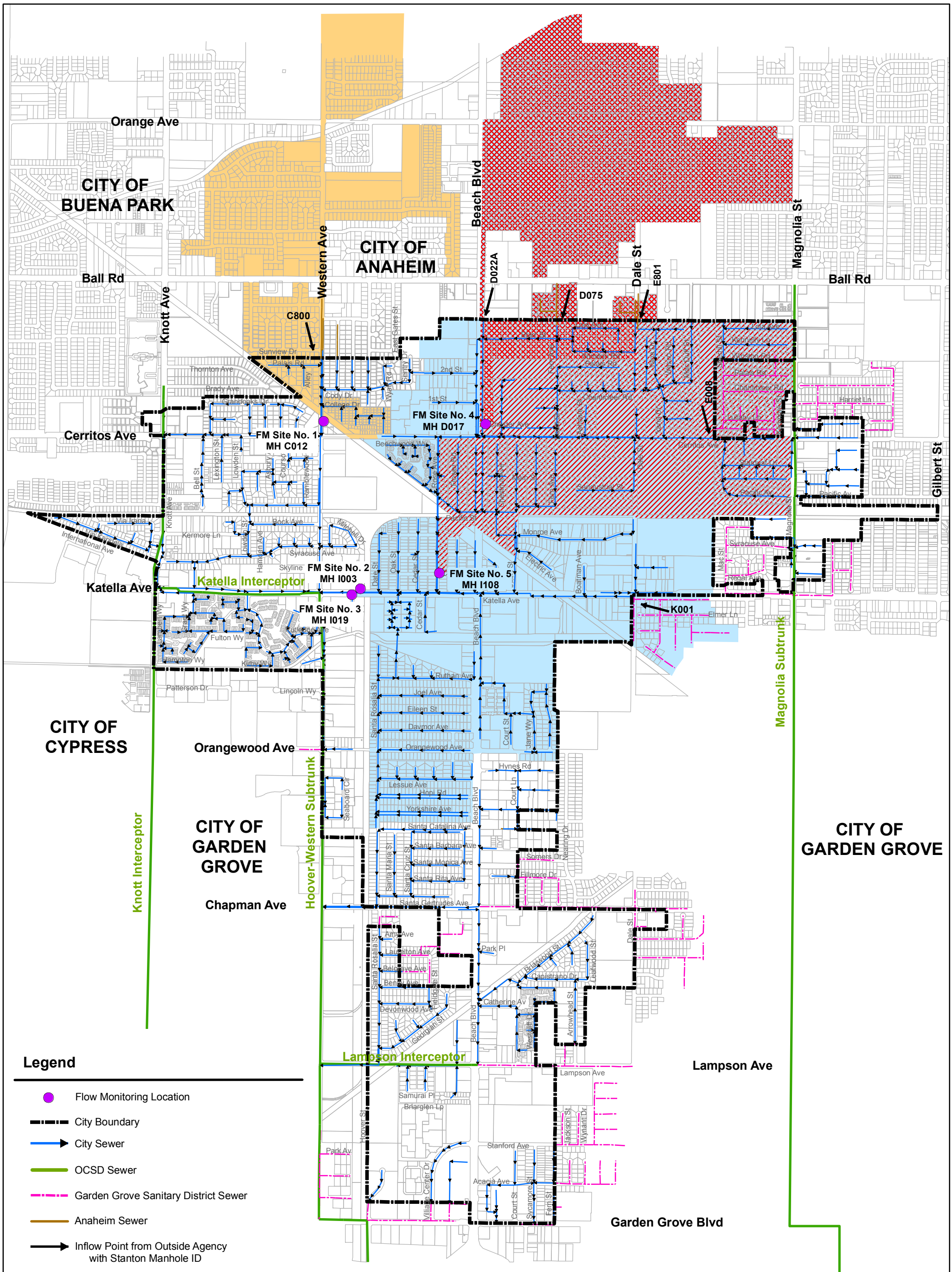
4-2 FLOW MONITORING

Data collection and review is essential in calibrating the system model and verifying unit flow factors, the average and peak flows, and capacity deficiencies identified from the hydraulic analysis.

A temporary flow monitoring study was conducted by ADS Environmental Services. The flow monitoring was conducted at five (5) locations over a period of fourteen (14) days between March 14, 2009 and March 27, 2009. The flow monitoring locations are shown on Figure 4-1 and the results are included in Table 4-1.

Table 4-1
Flow Monitoring Results

Site No.	MH ID	Pipe ID	Pipe Size (in)	Location	Reason	Monitor Location	Flow (mgd)			Velocity (fps)			Depth (in)			
							Min	Ave	Max	Min	Ave	Max	Min	Ave	Max	Max d/D
1	C012	C012-C001	12	Western Avenue, north of Cerritos Avenue	Deficiency Verification	North	0.05	0.23	0.49	0.42	1.00	1.58	3.21	5.43	7.11	0.59
2	I003	I004-I003	12	Katella Avenue, east of Western Avenue	Calibration	East	0.02	0.07	0.14	0.44	0.92	1.31	1.82	2.51	3.46	0.29
3	I019	I020-I019	24	Katella Avenue, east of Western Avenue	Calibration	East	0.44	1.55	2.60	1.14	2.13	2.63	5.33	9.01	12.31	0.51
4	D017	D017-D031	15	Beach Boulevard, north of Cerritos Avenue	Deficiency Verification	North	0.16	0.60	1.05	1.31	2.40	3.30	2.96	5.13	6.75	0.45
5	I108	I108-I010	15	Rose Avenue and Chester Avenue	Deficiency Verification	North	0.24	0.92	1.43	1.51	2.42	3.64	3.52	6.44	8.08	0.54



CITY OF STANTON
Sewer Master Plan

Flow Monitoring Locations

PROJECT NO: 1570867.00

DATE: June 2009

Figure 4-1

Flow monitoring equipment is most accurate when measuring moderate to high depths of flow and low to moderate flow velocities. Flow Monitoring Site No. 2 and 3 were chosen primarily for calibration purposes at locations with large tributary areas.. Flow Monitoring Sites No. 1, 4, and 5 were selected to verify hydraulic deficiencies identified from the City's existing sewer model analysis.

4-3 UNIT FLOW FACTORS

The unit flow factors were developed by using and comparing water use records, population and land use densities, values used by nearby sewer agencies, and flow monitoring results.

Golden State Water Company provided water use information for 2007. The water consumption and acreage were totaled for each land use designation. Unit flow factors were estimated by taking a percentage of the water consumption that accounts for indoor water use only. Outdoor use such as irrigation was excluded.

The land use densities from the City's general plan, the population per dwelling unit estimate from the California Department of Finance, and an average wastewater production value per person (65-70 gpd/person) were also used to estimate unit flow factors.

The unit flow factors selected for this study were based on the estimates described above as well as comparisons with the factors of nearby sewer agencies. The flow monitoring results were also utilized to verify the reasonableness of the developed unit flow factors. The existing unit flow factors are shown in Table 4-2.

Table 4-2
Existing Unit Flow Factors

Land Use	Abbrev	Density	Existing Flow Factors	Units
Low Density Residential	LDR	1-6	1,440	GPD/AC
Medium Density Residential	MDR	7-11	1,750	GPD/AC
High Density Residential	HDR	12-18	3,800	GPD/AC
General Commercial	GC	N.A.	2,500	GPD/AC
Industrial	I	N.A.	700	GPD/AC
Public/Institutions	PI	N.A.	2,500	GPD/AC
School	SCHOOL	N.A.	15	GPD/student
Open Space Recreation	OS	N.A.	200	GPD/AC

N.A. = Not Applicable

The ultimate unit flow factors are shown in Table 4-3. The unit flow factors developed for mixed use areas were based on land use and population densities.

Table 4-3
Ultimate Unit Flow Factors

Land Use	Abbrev	Density DU/acre	Ultimate Flow Factors	Units
Low Density Residential	LDR	1-6	1,440	GPD/AC
Medium Density Residential	MDR	7-11	1,750	GPD/AC
High Density Residential	HDR	12-18	3,800	GPD/AC
General Commercial	GC	N.A.	2,500	GPD/AC
Industrial	I	N.A.	700	GPD/AC
General Mixed Use	GMU	max 45 (60*)	6,600	GPD/AC
North Gateway Mixed Use District	NORTH	max 45 (60*)	6,600	GPD/AC
South Gateway Mixed Use District	SOUTH	max 60 (81*)	8,500	GPD/AC
Town Center Mixed Use District	TOWN	max 60 (81*)	8,500	GPD/AC
Public/Institutions	PI	N.A.	2,500	GPD/AC
School	SCHOOL	N.A.	15	GPD/student
Open Space Recreation	OS	N.A.	200	GPD/AC

* Density Increases up to 35% are allowed if the development provides affordable housing for low/moderate income households.

N.A. = not applicable

4-4 PEAKING FACTORS

Peak Dry Weather

The wastewater unit flow factors discussed in Section 4-3 were used to generate average dry weather flows (ADWF) entering the collection system. However, the adequacy of a sewage collection system is based upon its ability to convey the peak flows. At any individual point in the system, peak dry weather flow (PDWF) is estimated by converting the total average flow upstream of the point in question to peak dry weather flow by an empirical peak-to-average relationship.

The peaking formula commonly used in sewerage studies is of the following form:

$$PDWF = a \times (ADWF)^{b}$$

where Q_{peak} = Peak Dry Weather Flow
Q_{ave} = Average Dry Weather Flow
a, b = Peaking Formula Coefficients

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. Coefficient "b" is typically found to be in the range of 0.91 and 0.92 based on empirical studies. Using a coefficient "b" = 0.92, the resulting coefficient "a" can be calculated by using the measured flow data. The following peaking relationship was selected for this study:

$$PDWF\ (cfs) = 1.9 \times ADWF\ (cfs)^{0.92}$$

This peaking relationship will lead to slightly higher values in comparison to the OCSD peaking formula, which utilizes a factor of 1.84 instead of 1.9. This is acceptable due to the fact that the City's service area is much smaller in comparison to the OCSD service area and will therefore experience higher peaks in flow.

Peak Wet Weather

The peak wet weather flow (PWWF) has two components: peak dry weather flow (PDWF) and rainfall dependent inflow and infiltration (I/I). Therefore, the following equation applies:

$$PWWF = PDWF + I/I$$

Inflow and infiltration is discussed further in Subsection 4-5.

The flow monitoring effort for this study did not cover a wet weather period. Until wet weather flow data can be collected, it is recommended that the peak wet weather flow be estimate as the following:

$$\text{Peak Wet Weather Flow (PWWF)} = 1.40 \times \text{Peak Dry Weather Flow (PDWF)}$$

Although the PWWF/PDWF factor of 1.40 may not cover all situations, it is not reasonable or feasible to design the sewer system to carry the flows that would result from the use of a larger ratio. Instead, it is recommended that the City concentrate on projects such as replacing manhole covers, installing plugs in manhole covers, and replacing or relining cracked pipes to reduce inflow and infiltration.

4-5 INFLOW AND INFILTRATION

Inflow is the surface water that typically gains entry to the sewer system through perforated or unsealed manhole covers during rainfall events. Infiltration is defined as water entering the collection system from the ground through defective pipes, pipe joint connections, or manhole walls. The sewer system design capacity must include allowances for these extraneous flow components, which inevitably become a part of the total flow. The amount of inflow and infiltration (I/I) that enters the system typically depends upon the availability and location of the storm water drainage facilities, age and condition of structures, materials and methods of construction, the location of the groundwater table, and the characteristics of the soil. In absence of flow monitoring data, many regulating agencies utilize commonly accepted practices for estimating I/I. For example, I/I is often estimated based on the diameter and length of pipeline (100 to 400 gpd/ in. dia/mile) or as a percentage of the peak flow or pipeline capacity.

AKM's experience from other master planning studies and review of limited flow monitoring information available during severe rainfall events indicate that the peak wet weather flow can vary from 10 percent of average dry weather flows in steeper areas with adequate drainage facilities, to over 400 percent of average dry weather flows in flat areas that lack significant drainage facilities.

For this study, extraneous flow due to inflow and infiltration is included in the peak wet weather flow formula previous described. If better data becomes available subsequently for specific areas, the analysis should be updated based upon that information.

4-6 SEWER DESIGN CRITERIA

Design criteria are established to ensure that the wastewater collection system can operate effectively under all flow conditions. Each pipe segment must be capable of carrying peak wet weather flows in the hydraulically stable zone of the pipe. Low flows must be conveyed at a velocity that will prevent solids from settling and blocking the system.

The design capacity of a gravity pipeline is the calculated capacity of the pipeline based on the Manning formula:

$$\mathbf{Q = 1.486\ AR^{2/3} S^{1/2} / n}$$

where, **Q** = flow in cubic feet per second
R = hydraulic radius in feet = A / P
A = cross-sectional area of the pipe in square feet
P = wetted perimeter in feet
S = slope of pipe in feet of rise per foot of length
n = Manning's friction factor

Sewer system capacity is established using a Manning's friction factor of 0.013 for vitrified clay pipe.

The analysis of the City's existing gravity sewer system was based upon the calculated peak dry weather flows. Any segment of existing sewer pipe with a depth to diameter ratio (d/D) of 0.62 or more was considered to be hydraulically deficient. This allows for approximately 40 percent capacity above the peak dry weather flow for inflow and infiltration based on the assumption that the maximum capacity of a circular pipe will occur when d/D = 0.82 rather than the theoretical maximum that occurs at d/D = 0.938.

The extra pipeline capacity allows for the possibility that actual wastewater flows may be slightly higher than anticipated, especially during the hours when instantaneous or intermittent peaks may occur. These peaks are generally observed between the hours of 6:00 a.m. and 9:00 a.m. and 7:00 p.m. and 9:00 p.m. during weekdays and somewhat later in the morning hours during weekends. They may also be observed during rainfall events due to inflow and infiltration. Additionally, the area above the water surface helps to keep the sewage aerated, reducing the possibility of septic conditions and odors.

For **new construction**, the design and analysis of gravity sewer pipes should be based on the following depth to diameter ratios:

- Pipes **15-inches and smaller** in diameter shall be designed to flow at a maximum **D/d of 0.50** under peak dry weather flows
- Pipes **18-inches and greater** in diameter shall be designed to flow at a maximum **D/d of 0.62** under peak dry weather flows
- For either group, the depth of flow to diameter ratio shall not exceed 0.82 with peak wet weather flows

At a minimum, all pipes should be 8-inches or larger in diameter and the velocity of flow in the pipe should be greater than 2 feet per second at average dry weather flow (ADWF). This velocity will prevent deposition of solids in the sewer and help to resuspend any materials that may have already settled in the pipe. The minimum corresponding slopes for various pipe sizes are shown in Table 4-4.

Table 4-4
Minimum Sewer Slopes

Sewer Size	2 ft/s Velocity Slope
8"	0.0033
10"	0.0025
12"	0.0019
15"	0.0014
18"	0.0011
21"	0.0008
24"	0.0007
27"	0.0006
30"	0.0005
33"	0.0004
36" & larger	0.0004

It is important to note that the slopes listed above assume the depth of flow in the pipe is 50 or 62 percent full, depending on the design criteria. If there is insufficient flow to create this condition, greater slopes than those shown may be required. The maximum velocity for vitrified clay pipe should be 10 ft/s. For PVC pipe, the maximum velocity should be less than 5 ft/s.

4-7 SERVICE LIFE OF PIPE

In addition to the design criteria discussed in previous sections, the useful lives for which one can expect relatively trouble-free service is also of great importance when assessing an existing or future sewer system. Once the service life of a facility is exceeded, it becomes subject to failure and is often expensive to maintain. The determination of useful life can be difficult and depends on many different considerations including the following:

- Type of materials used and recorded performance of similar installations
- Velocities and flow rates expected in the system
- Chemical and biological conditions of the wastewater
- Construction methods and installation

The values listed in Table 4-5 are generally accepted as prudent planning criteria and are used as benchmarks for replacement recommendations in this study.

Table 4-5
Planning Criteria for Facility Useful Life

Facility	Description	Useful Life (Years)
Gravity Sewers:	Cast Iron Pipe (CIP)	20
	Plastic Pipe	65
	Vitrified Clay Pipe (VCP)	75

4-8 CRITERIA FOR SPECIFIC PLANS AND DEVELOPMENT SUBAREAS

Each party wishing to pursue development of a tract or area within the City's study area shall develop a Sub-Area Master Plan (SAMP). The developer's plans for providing adequate sewer service to all users within the proposed development, how the local sewer system will connect to the backbone and regional system, and the impact of the proposed development to the downstream facilities (to the regional system) shall be fully described in the SAMP. The local sub-area sewers shall meet the sewer design criteria provided in this document and the City Standard Drawings for Sewer Construction. At a minimum, sewage flow calculations shall be based upon the unit flow factors contained in Table 4-3 or higher factors if specific conditions require it. A typical Sub-Area Sewer Master Plan Report shall include, but not be limited to the following:

- Map showing project boundaries and drainage areas
- Detailed land use description and map
- Average dry weather, peak dry weather, and peak wet weather flow calculations
- Exhibit showing all proposed sewer facilities and connections to the downstream regional system
- Phasing of development and wastewater flows
- Hydraulic calculations for phased and fully developed ultimate conditions, from the development to the regional system, meeting all sewer design criteria

Section 5

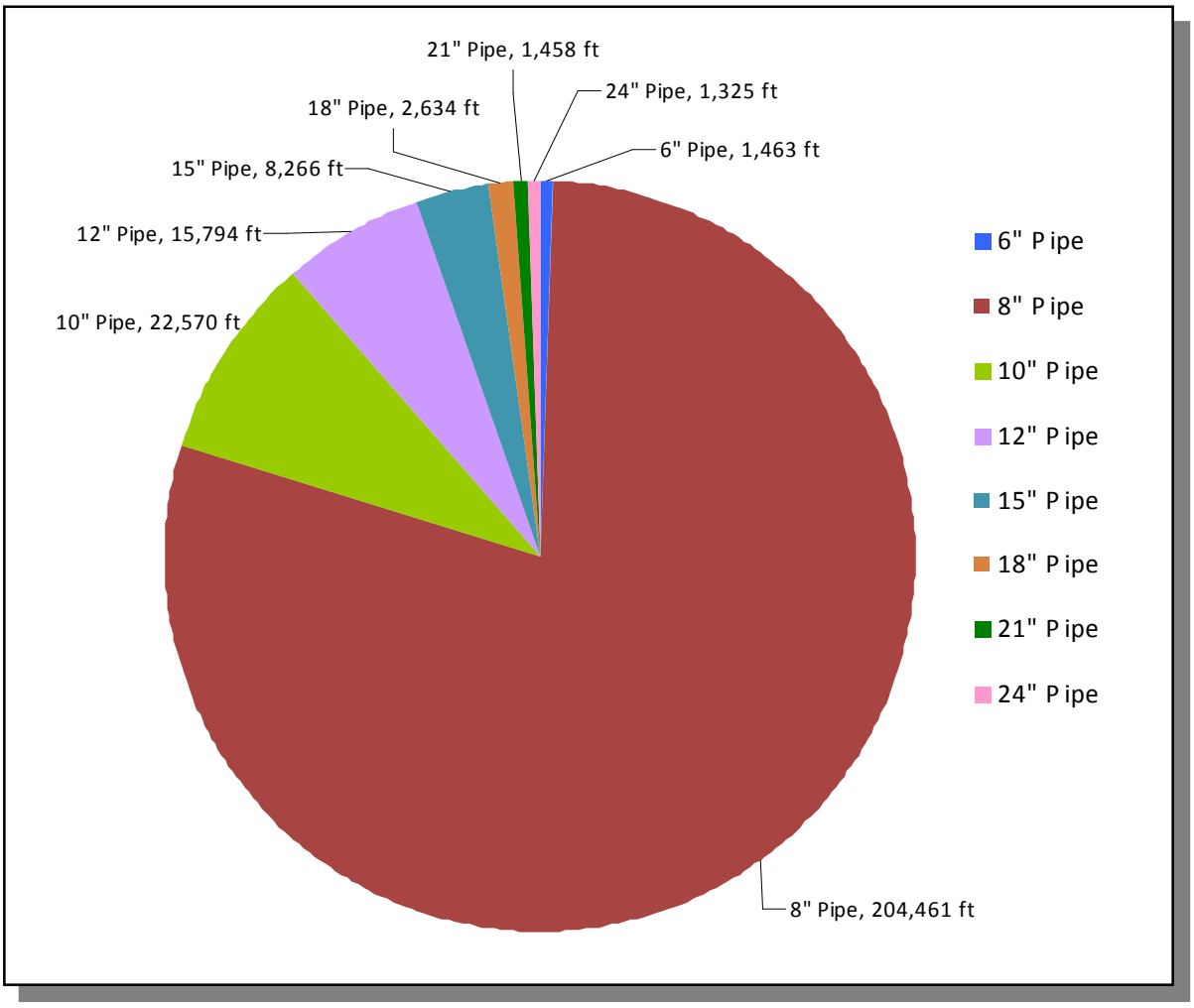
EXISTING WASTEWATER SYSTEM

5-1 GENERAL DESCRIPTION

The City's existing wastewater collection system is made up of a network of gravity sewers. The system consists of approximately 48.9 miles of pipe with 1,160 manholes and cleanouts.

The gravity sewers are predominately constructed of vitrified clay pipe with sizes ranging from 6-inch to 24-inch in diameter. Approximately 80 percent of the pipes are 8-inch in diameter. Figure 5-1 shows the length of gravity sewers in the existing system by pipe size.

Figure 5-1
Total Length of Gravity Sewer by Size



5-2 ORANGE COUNTY SANITATION DISTRICT (OCSD) WASTEWATER COLLECTION SYSTEM AND TRIBUTARY AREAS

The City of Stanton's sewer service area lies within Orange County Sanitation District's (OCSD's) Service Area 3.

The five (5) OCSD facilities located within the City are listed below:

- Knott Interceptor
- Hoover - Western Subtrunk
- Lampson Interceptor
- Katella Interceptor
- Magnolia Subtrunk

The study area was divided into four (4) tributary areas, based on discharge location to these OCSD facilities. The tributary areas are shown on Figure 5-2 and described heron:

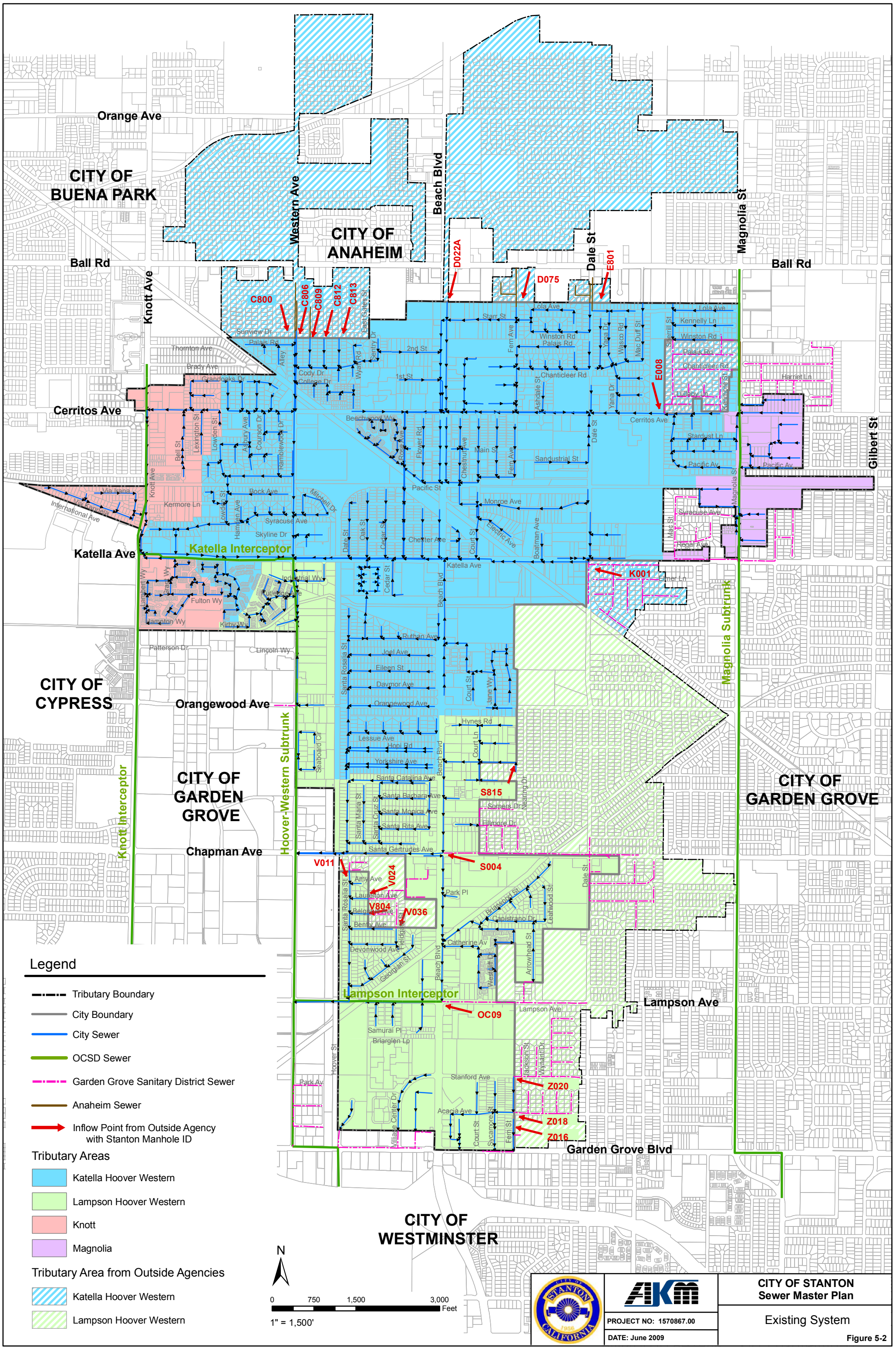
Katella Hoover Western Tributary Area

The Katella Hoover Western Tributary Area consists of approximately 1,180 acres within the City of Stanton. The Cities of Anaheim and Garden Grove contribute wastewater from an additional 645 acres and 35 acres, respectively. The tributary area is bound by Knott Avenue, Litchfield Avenue, Oakhaven Drive, and Danbrook Drive to the west; Del Monte Drive and Ball Road to the north; Magnolia Street and Mac Street to the East; and Orangewood Avenue, Yorkshire Avenue and Hampton Way to the south. Tributary flows from Anaheim enter the City at Western Avenue, Garrett Street, Masterson Road, Courtnight Street, Beach Boulevard, Fern Avenue and Dale Street. Tributary flows from Garden Grove enter the City boundaries at Cerritos Avenue and Katella Avenue.

The Hoover-Western Subtrunk and Katella Interceptor originate at the OCSD manhole (I018) located at Western Avenue and Katella Avenue. The flows are split to the west by the Katella Interceptor and to the south by the Hoover-Western Subtrunk. The Katella Hoover Western Tributary Area includes all areas that are tributary to the split manhole at this location. A brief description of the Katella Interceptor and Hoover-Western Subtrunk follows:

- Katella Interceptor - The Katella Interceptor extends west along Katella Avenue, from Western Avenue to Knott Avenue, where the wastewater is discharged into the Knott Interceptor. The Cities of Stanton, Garden Grove, and Anaheim contribute wastewater to this 24-inch facility at Katella Avenue and Western Avenue. Since the Hoover-Western Subtrunk and Katella Interceptor originate at the same upstream manhole (I018), flows may be diverted to either facility when necessary.

- Hoover-Western Subtrunk - The Hoover-Western Subtrunk collects wastewater from the Cities of Stanton, Anaheim, Garden Grove, and Westminster and conveys the flow to the Knott Interceptor. The Hoover-Western Subtrunk is located along Western Avenue, Garden Grove Boulevard, and Hoover Street, and it is parallel to the Knott Interceptor. Within the City's boundary, this facility is 21-inch and 24-inch in diameter, and extends south along Western Avenue, from Katella Avenue to Simmons Place. Since the Hoover-Western Subtrunk and the Katella Interceptor originate at the same upstream manhole (I018), flows may be diverted to either facility when necessary.


CITY OF BUENA PARK
CITY OF ANAHEIM
CITY OF CYPRESS
CITY OF GARDEN GROVE
CITY OF WESTMINSTER
Orange Ave
Ball Rd
Cerritos Ave
Katella Ave
Orangewood Ave
Chapman Ave
Lampson Ave
Garden Grove Blvd
Western Ave
Beach Blvd
Dale St
Magnolia St
Gilbert St
Knott Ave
Knott Interceptor
Hoover-Western Subtrunk
Magnolia Subtrunk
Katella Interceptor
Lampson Interceptor
C800
C806
C809
C812
C813
D022A
D075
E801
E008
K001
S815
S004
V011
V024
V804
V036
OC09
Z020
Z018
Z016
Legend
Tributary Boundary
City Boundary
City Sewer
OCSD Sewer
Garden Grove Sanitary District Sewer
Anaheim Sewer
Inflow Point from Outside Agency with Stanton Manhole ID
Tributary Areas
Katella Hoover Western
Lampson Hoover Western
Knott
Magnolia
Tributary Area from Outside Agencies
Katella Hoover Western
Lampson Hoover Western
N
0 750 1,500 3,000 Feet
1" = 1,500'
CITY OF STANTON
Sewer Master Plan
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DATE: June 2009
Existing System
Figure 5-2

Knott Tributary Area

The Knott Tributary Area includes all areas that are tributary to the Knott Interceptor via local sewers, and it is comprised of approximately 130 acres within the City of Stanton. The Knott Tributary Area is bound by Via Irana and Knott Avenue to the west; Thornton Avenue to the north; Oakhaven Drive, Litchenfield Avenue, and Hardee Way to the east; and Patterson Drive to the south. A portion of the wastewater from the Katella Hoover Western Tributary Area flows into the Knott Interceptor by means of the Katella Interceptor. A brief description of the Knott Interceptor follows:

- Knott Interceptor - The Knott Interceptor collects wastewater from the Cities of Fullerton, Buena Park, Cypress, Stanton, Westminster, and Seal Beach. Within the City's boundary, the Knott Interceptor is 63-inch and 66-inch in diameter, and it is located along Knott Avenue, south of Brady Way to Hampton Way. The City contributes wastewater to this facility at Syracuse Avenue and at Katella Avenue.

Lampson Hoover Western Tributary Area

The Lampson Hoover Western Tributary Area includes approximately 600 acres within the City of Stanton as well as approximately 530 acres from the City of Garden Grove. The areas that are tributary to the Lampson Interceptor are also included in the Lampson Hoover Western Tributary Area. It is bound by Western Avenue, Hardee Way, and the Union Pacific Corridor to the west; Katella Avenue and Pacific Electric Corridor to the north; Mac Duff Street, Magnolia Street, Josephine Street, and Dale Street to the east, and Garden Grove Boulevard to the south. Tributary flows from the City of Garden Grove enter the City at Crager Lane, Chapman Avenue, Lampson Avenue, Stanford Avenue, Acacia Avenue, Fern Street, Vanguard Circle, Laurelton Avenue, Belgrave Avenue, and Fieldgate Street. Additional wastewater from the Katella Hoover Western Tributary Area flows into the Hoover-Western Subtrunk at Katella Avenue and Western Avenue. A brief description of the OCSD facilities follows:

- Hoover-Western Subtrunk - The Hoover-Western Subtrunk collects wastewater from the Cities of Stanton, Anaheim, Garden Grove, and Westminster and conveys the flow to the Knott Interceptor. The Hoover-Western Subtrunk is located along Western Avenue, Garden Grove Boulevard, and Hoover Street, and it is parallel to the Knott Interceptor. Within the City's boundary, this facility is 21-inch and 24-inch in diameter, and extends south along Western Avenue, from Katella Avenue to Simmons Place. Since the Hoover-Western Subtrunk and the Katella Interceptor originate at the same upstream manhole (I018), flows may be diverted to either facility when necessary.

- Lampson Interceptor - The Lampson Interceptor collects wastewater from the Cities of Stanton and Garden Grove. The facility is 15-inch to 21-inch in diameter and extends west along Lampson Avenue from Beach Boulevard to Western Avenue where the wastewater is discharge to the Hoover-Western Subtrunk. The City contributes wastewater at Beach Boulevard, Rancho 39 MHP, west of the Anaheim Barber Channel, and Santa Rosalia Street.

Magnolia Tributary Area

The Magnolia Tributary Area includes approximately 85 acres on the north-eastern end of the City. It includes the areas that are tributary Magnolia Subtrunk via City sewers. The Magnolia Tributary Area is bound by Christy Street and Annapolis Avenue to the west; Lullaby Lane to the north; Garza Street and Gilbert Street to the east; and Katella Avenue to the south. A brief description of the Magnolia Subtrunk follows:

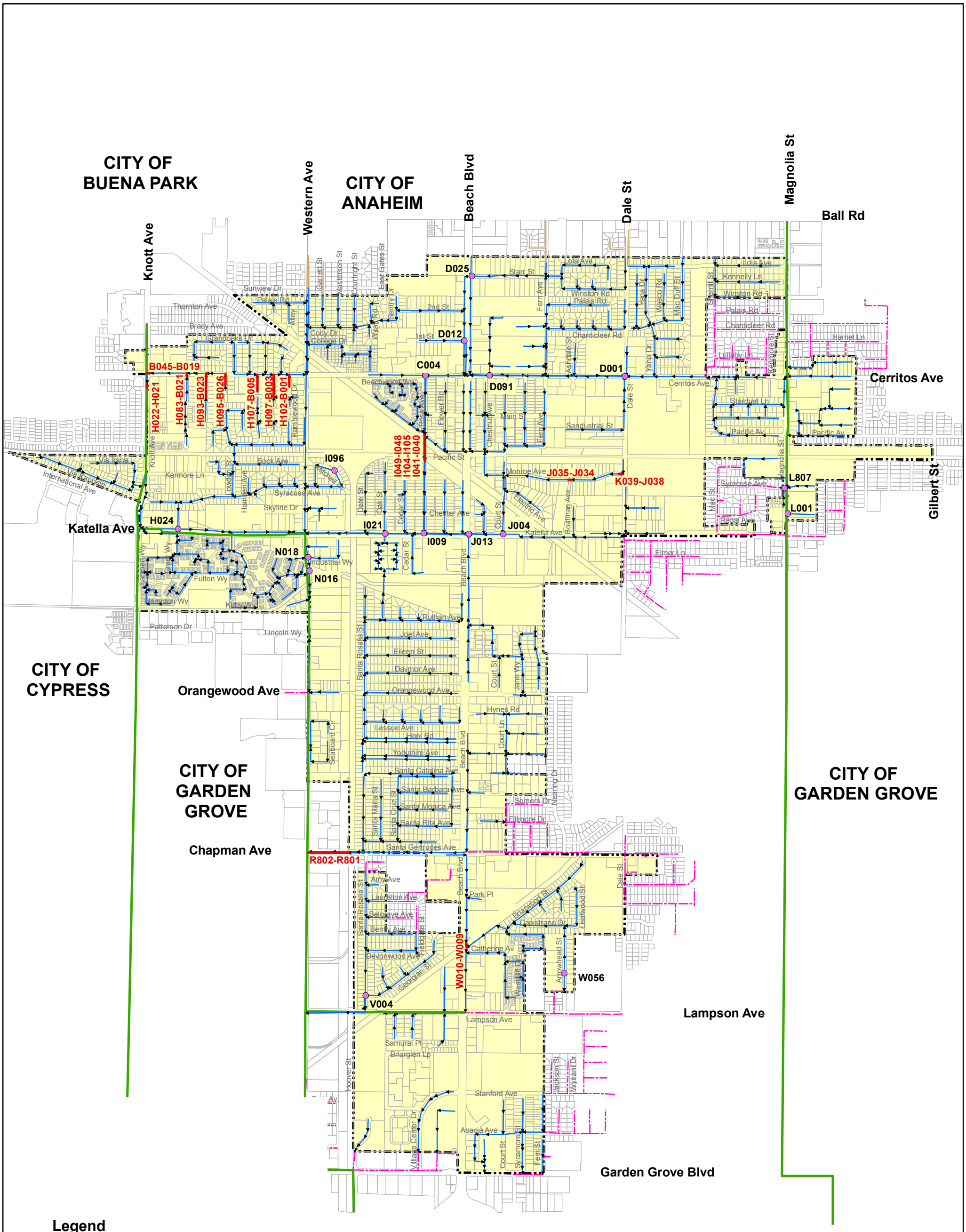
- Magnolia Subtrunk - The Magnolia Subtrunk collects wastewater from the Cities of Anaheim, Stanton, Garden Grove, Westminster, and Fountain Valley. It is located on the east end of the City along Magnolia Street between Lola Avenue and Katella Avenue. The City contributes wastewater to the Magnolia Subtrunk along Magnolia Avenue, at Cerritos Avenue, Pacific Avenue, Stacie Lane, and north of Katella Avenue.

5-3 FLOW SPLITS

Flow spits are manholes that are capable of diverting flow into multiple reaches. There are seventeen (17) flow splits within the City's sewer collection system, which have been analyzed in depth for the capacity analysis of this study. Details of the flow splits and the results of the field investigations are listed in Table 5-1. Flow split locations are shown on Figure 5-3.

Table 5-1
Flow Splits

MH ID	Location	Flow Direction at Split MH	Comments	Plan No.
C004	Cerritos Avenue and Rose Street	South and Southeast	Based on the invert elevations of the discharge pipes, all flow goes south (C004-I004); no flow goes southeast (C004-C058)	D-1485
D012	Beach Boulevard and First Street	South and Southeast	Based on the invert elevations of the discharge pipes, all flow goes southeast (D012-D098); no flow goes south (D012-D011)	CIP 02103
D025	Beach Boulevard and Starr Street	West and Southwest	Based on the invert elevations of the discharge pipes, all flow goes southwest (D025-D022); no flow goes west (D025-D023)	D-1485
D091	Cerritos Avenue, 370' E/O Beach Boulevard	North and West	Survey data show that the west side is blocked. Model forces 100% of flow to the north (D091-D032).	D-1485
E001	Cerritos Avenue and Dale Street	North and West	Based on the invert elevations of the discharge pipes, all flow goes north (E001-E003); no flow goes west (E001-D010)	D-1485
H024	Katella Avenue,660' E/O Knott Avenue	East and West	Flows are split by invert elevations, slopes, and sizes. Pipe H024-H023 to the west, H024-H025 to the east.	D-1485
I009	Katella and Rose Street	South and West	Based on the invert elevations of the discharge pipes, all flow goes south (I009-I023); no flow goes west (I009-I008)	D-1485
I021	Katella Avenue and Oak Street	North and West	Based on the invert elevations of the discharge pipes, all flow goes west (I021-I020); no flow goes north (I021-I006)	D-1485
I096	Mitchell Drive, east of Garrett Street	Northwest and Southeast	Flows are split by invert elevations, slopes, and sizes. Pipe I096-I094 to the east, I096-I095-h025 to the west.	missing
J004	Katella Avenue and Court Street	South and West	Based on the invert elevations of the discharge pipes, all flow goes south (J004-J015); no flow goes west (J004-J003)	D-1485
J013	Katella Avenue and Beach Boulevard	North and West	Based on the invert elevations of the discharge pipes, all flow goes west (J013-I024); no flow goes north (J013-J002)	D-1485
L001	Magnolia @ ~392' N/O Katella	North and South	Flows are split by invert elevations, slopes, and sizes. Pipe l001-l002 to the west, L001-L802 to the south.	D-455 (missing)
L807	Magnolia Avenue and Syracuse Avenue	East and West	Based on the invert elevations of the discharge pipes, all flow goes east (L807-L003A); no flow goes west (L807-K806)	D-451 (missing)
N016	Western Avenue and Industrial Way	West and South	Flows are split by invert elevations, slopes, and sizes. Pipe N016-N093 to the west, N016-N015 to the south.	missing
N018	Western Avenue and Rutledge Avenue	West and South	Flows are split by invert elevations, slopes, and sizes. Pipe N018-N092 to the west, N018-N017 to the south.	missing
V004	Santa Rosalia Streetand Georgian Street	South and Southwest	Based on the invert elevations of the discharge pipes, all flow goes south (V004-V003); no flow goes southwest (V004-V002)	CIP 02103
W056	Arrowhead Street, North of Lampson Avenue	North and South	Flows are split by invert elevations, slopes, and sizes. Pipe W056-W055 to the north, W056-W057 to the south.	missing



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Split Manholes and Siphons

Figure 5-3

5-4 SIPHONS

The City's sewer system includes fifteen (15) siphons. These facilities require additional maintenance and many are included in the City's hot spot list. The primary problem with the siphons is the fact that they often plug up with grease and debris, despite the City's efforts to reduce this through its Fats, Oils and Grease (FOG) Program. Regular cleaning and maintenance, not only of the siphons but also of the rest of the system, are implemented by the City.

Siphons are often required for sewers that must cross existing storm drains. City siphons pass under the following Orange County Flood Control District (OCFCD) facilities:

- Knott Cerritos Storm Drain (OCFCD C02-P03)
- Stanton Storm Channel (OCFCD C02-S01)
- Anaheim Barber City Channel (OCFCD C03)

The existing siphon locations and descriptions are listed in Table 5-2 and shown on Figure 5-3.

Table 5-2
Sewer Siphons

Location No.	Pipe	U/S MH ID	D/S MH ID	Location	Size (in)	Length (ft)	Material	Hot Spot Location	Existing ADWF (mgd)	Existing PDWF (mgd)	Reason for Siphon
1	B045-B019	B045	B019	Knott Avenue & Cerritos Avenue - mid intersection	8	62	VCP	Y	0.0913	0.0913	60" Stanton storm drain crossing
2	H022-H021	H022	H021	Knott Avenue south of Cerritos Avenue	10	70	VCP	Y	0.1014	0.1014	81" OCFCD (C02-P03) storm drain crossing
3	H083-B021	H083	B021	Bell Street, south of Cerritos Avenue	8	55	VCP	Y	0.0501	0.0501	60" Stanton storm drain crossing
4	H093-B023	H093	B023	Lexington Street South of Cerritos Avenue	8	246	VCP	Y	0.0088	0.0088	60" Stanton storm drain crossing
5	H095-B026	H095	B026	Lowden Street South of Cerritos Avenue	8	367	VCP	Y	0.0018	0.0018	
6	H097-B003	H097	B003	Courson Drive, south of Cerritos Avenue	8	371	VCP	Y	0.0067	0.0067	
7	H102-B001	H102	B001	Ramblewood Drive, south of Cerritos Avenue	8	198	VCP	Y	0.0015	0.0015	
8	H107-B005	H107	B005	Alley east of Lowden Street, south of Cerritos Avenue	8	280	VCP	Y	0.0015	0.0015	
9	I041-I040	I041	I040	Rose Street at Pacific Electric Corridor	12	402	VCP		0.1978	0.2339	
10	I049-I048	I049	I048	Rose Street at Pacific Electric Corridor	12	363	VCP		0.0015	0.0016	
11	I104-I105	I104	I106	Rose Street at Pacific Electric Corridor	18	419	VCP		1.2551	1.6982	
12	J035-J034	J035	J034	Monroe Avenue, east of Court Street	8	60	VCP	Y	0.0091	0.0091	5'x6.5' OCFCD (C02-S01) trapezoidal channel crossing
13	K039-J038	K039	J038	Dale Street & Monroe Avenue	8	91	VCP	Y	0.0046	0.0046	
14	R802-R801	R802	R801	Chapman Ave (w/o Beach Blvd)	8	335	VCP	Y	0.0649	0.0806	5'x4' OCFCD (C03) RCB channel crossing
15	W010-W009	W010	W009	Beach Blvd (n/o Catherine Ave)	8	190	VCP	Y	0.0453	0.0952	Double 12'x10' OCFCD (C03) RCB channel crossing

SECTION 6

HYDRAULIC SEWER MODEL

6-1 HYDRAULIC MODEL SOFTWARE

To perform a detailed analysis of the sewer collection system, it is essential to create a mathematical model that is capable of simulating the operating characteristics of the system. The simulations for this study were performed utilizing software designed for the analysis of sewer systems. The software selected for this study is MWHSoft's H2OMap Sewer. It is a GIS based computer program with the ability to perform steady state analyses of the flows in sanitary sewer systems. 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.

The sewer system is modeled by entering data for pipe diameters, lengths, invert elevations, and roughness coefficients as well as unit flow factors and land use classifications. The developed sewer model includes all of the City's manholes and sewer pipes (excluding laterals and private sewers). It is important to include all pipes in the model to comply with the Statewide Waste Discharge Requirements that requires hydraulic analysis of the City's entire collection system. The model identifies points of connection to the Orange County Sanitation District's five (5) facilities within the City boundaries: Knott Interceptor, Katella Interceptor, Hoover-Western Subtrunk, Magnolia Subtrunk, and Lampson Interceptor.

The model uses the average dry weather flows and determines peak flows based upon relationships specified by the user (see Section 4).

At the completion of a modeling run, output data is created for viewing on the screen or for printing. Output data for pipes include average and peak flow rate, velocity, pipe capacity, and ratio of flow depth to diameter (d/D).

6-2 CONSTRUCTION OF MODEL GEOMETRY

Information gathered from the City's sewer GIS files, atlas sheets, as-built drawings, survey data, CCTV inspections, and interviews with City staff was used to create the model geometry of the existing system. Table 6-1 is a list of the information that was initially imported into the model from the City's existing GIS. The existing GIS did not include all of the information needed. Additional information was collected from as-built drawings, field surveys, CCTV inspections, and interviews with City Staff. The base data for the model and the field survey reports, prepared for this study, are included in Appendix A and Appendix B, respectively. Only active sewers owned by the City of Stanton were included in the hydraulic model. Private sewers and laterals were not modeled.

Table 6-1
Data Imported from GIS Files to Hydraulic Model

Node Data	Manhole Shapefile Field Title
Unique ID	NEW_MHNO
Rim Elevation (ft)	RIM_ELEV
Invert Elevation (ft)	UP_INVERT
Pipe Data	**Gravity Mains Shapefile Field Title**
Unique ID	PIPEID
Upstream Node ID	UPMH
Upstream Invert Elevation (ft)	UP_ELEV
Downstream Node ID	DNMH
Downstream Invert Elevation (ft)	DN_ELEV
Pipe Size (in)	DIAMETER
Pipe Length (ft)	LINE_LENGTH

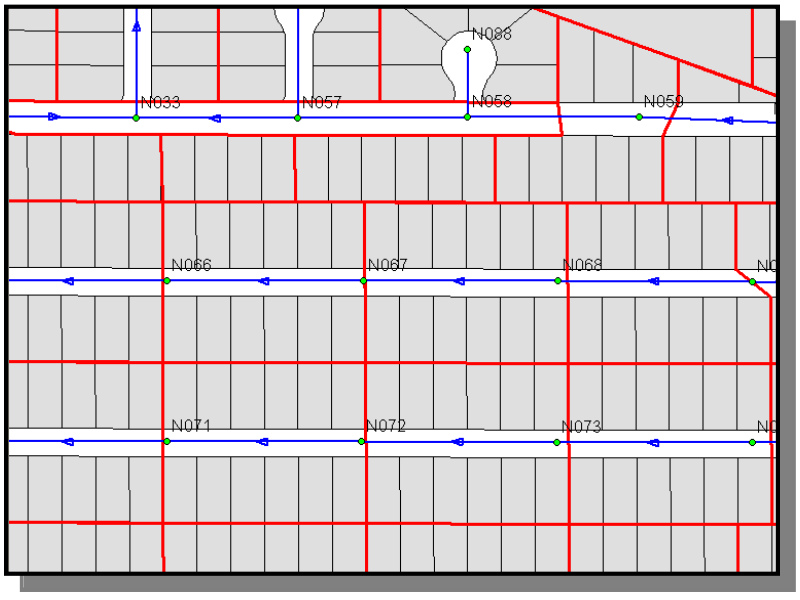
6-3 SPLIT MANHOLES AND FLOW PATTERNS

From the existing sewer GIS and sewer atlas sheets, 17 split manholes (more than one pipe exiting the manhole) were identified in the collection system. Many of the split manholes appear to be overflow systems, which typically do not convey flow except during the peak hours or wet weather periods. In general, the flows at the split manholes were divided by calculations based on invert elevations, downstream pipes sizes, and downstream slopes at the split manhole.

6-4 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 913 polygons were created for the existing and ultimate system analysis. A sample area, displaying the tributary area polygons is shown on Figure 6-1.

Figure 6-1
Tributary Area Polygons



6-5 MODEL LOADS

For each tributary area, the existing land uses (discussed in Subsection 3-5) and the calibrated unit flow factors (see Table 4-2) were utilized to apply the average loads to the existing model. The ultimate land uses (discussed in Subsection 3-5) and the ultimate unit flow factors (see Table 4-3) were utilized to apply the average loads to the ultimate 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:

$$PDWF\ (cfs) = 1.9 \times ADWF(cfs)^{0.92}$$

6-6 SCHOOLS

The City's existing land use map and general plan map were used to designate land uses for the model. Schools were assigned a distinct land use designation. The student population and water use records were reviewed for the four (4) schools within the City's boundary: Robert M. Pyles Elementary School, Ester L. Walter Elementary School, Mabel Carver Elementary School, and Saint Polycarp Catholic School. The existing and ultimate flow factor was estimated as 15 gpd per student. These flows were input into the model as point source flows.

6-7 ANAHEIM AND GARDEN GROVE FLOWS

The Cities of Anaheim and Garden Grove contribute substantial wastewater flows to the City's sewer system at nineteen (19) locations. The City of Anaheim provided the existing and ultimate average dry weather flows from its *Combined West Anaheim Area Master Plan of Sanitary Sewers*, which was completed in July 2006. The results of the temporary flow monitoring that was completed for this study indicates that Anaheim's Master Plan flows are overly conservative. For modeling purposes, the existing average dry weather flows from the City of Anaheim were estimated using the City of Stanton's unit flow factors.

The existing average dry weather flows from the Garden Grove Sanitary District were obtained from the *Garden Grove System Evaluation and Capacity Assurance Plan*, which was completed in April 2009. The Garden Grove Sanitary District's study utilized criteria that were similar to the City of Stanton's criteria for calculating the flows in this area.

The ultimate flows from these outside agencies were increased by 5 percent to account for vacancies and future densification. The existing and ultimate average dry weather flows were input into the City's model as point source flows. Table 6-2 details the inflow from these agencies.

Table 6-2
Anaheim and Garden Grove Inflow Locations

Manhole ID	Location	Contributing Agency	Downstream Pipe Size	Existing (mgd)	Ultimate (mgd)
C800	Western Avenue, north of Ravenswood Drive	Anaheim	12"	0.2751	0.2888
C806	Western Avenue and Sunview Drive	Anaheim	10"	0.0079	0.0083
C809	Garrett Street, between Lanerose Drive and Cody Avenue	Anaheim	8"	0.0079	0.0083
C812	South Masterson Road, between Lanerose Drive and Cody Avenue	Anaheim	8"	0.0079	0.0083
C813	Courtiright Street, south of West Maywood Avenue	Anaheim	8"	0.0222	0.0233
D022A	Beach Boulevard, north of Starr Street	Anaheim	12"	0.3887	0.4081
D075	Fern Avenue, south of Ravenswood Drive	Anaheim	8"	0.0117	0.0123
E008	Cerritos Avenue, west of Sherrill Street	Anaheim	8"	0.0061	0.0064
E801	Dale Street, south of Ravenswood Drive	Anaheim	8"	0.0082	0.0086
K001	Katella Avenue and Dale Street	Garden Grove	10"	0.0740	0.0777
S004	Chapman Avenue and Arthur Drive	Garden Grove	15"	0.6156	0.6464
S815	Crager Lan, west of Jane Way	Garden Grove	8"	0.0072	0.0076
V011	Vanguard Circle and Santa Rosalia Street	Garden Grove	8"	0.0065	0.0069
V024	Laurelton Avenue, between Santa Rosalia Street and Fieldgate Street	Garden Grove	8"	0.0168	0.0176
V036	Bently Avenue and Fieldgate Street	Garden Grove	8"	0.0083	0.0074
V804	Belgrave Avenue, between Santa Rosalia Street and Fieldgate Street	Garden Grove	8"	0.0077	0.0081
Z016	Fern Street and Garden Grove Blvd	Garden Grove	8"	0.0278	0.0292
Z018	Fern Street and Acacia Avenue	Garden Grove	8"	0.0238	0.0250
Z020	Fern Street and Stanford Avenue	Garden Grove	8"	0.0375	0.0394

Section 7

SYSTEM ANALYSIS

7-1 HYDRAULIC SYSTEM ANALYSIS

The analysis of the sewer collection system was based upon the calculated existing and ultimate peak dry weather flows. The hydraulic analysis results can be found in Appendix C and D of this report, which is on the CD located at the back of this report. Pipes that exceed the following criteria are considered hydraulically deficient:

Peak Dry Weather d/D > 0.62

The hydraulic deficiencies, based upon the criteria above under existing and ultimate conditions, are listed in Table 7-1 and Table 7-2, respectively. The locations of these deficiencies are shown on Figure 7-1.

Per the developed criteria, the total length of sewer found to be capacity deficient for existing and ultimate conditions are 1,520 feet and 13,518 feet respectively. This is about 0.6 (1,520 / 257,972) percent and 5.2 (13,518 / 257,972) percent of the total system length for existing and ultimate conditions, respectively.

7-2 CONDITION ASSESSMENT

Per the General Waste Discharge Requirements, discussed in Subsection 2-5, the City's Operation and Maintenance (O&M) Program must be completed and certified by May 2, 2009. One of the elements specified as a part of the O&M Program is as follows:

> "*Develop a rehabilitation and replacement plan to identify and prioritize system deficiencies and implement short-term and long-term rehabilitation actions to address each deficiency. The program should include regular visual and TV inspections of manholes and sewer pipes, and a system for ranking the condition of sewer pipes and scheduling rehabilitation. Rehabilitation and replacement should focus on sewer pipes that are at risk of collapse or prone to more frequent blockages due to pipe defects. Finally, the rehabilitation and replacement plan should include a capital improvement plan that addresses proper management and protection of the infrastructure assets. The plan shall include a time schedule for implementing the short- and long-term plans plus a schedule for developing the funds needed for the capital improvement plan."*

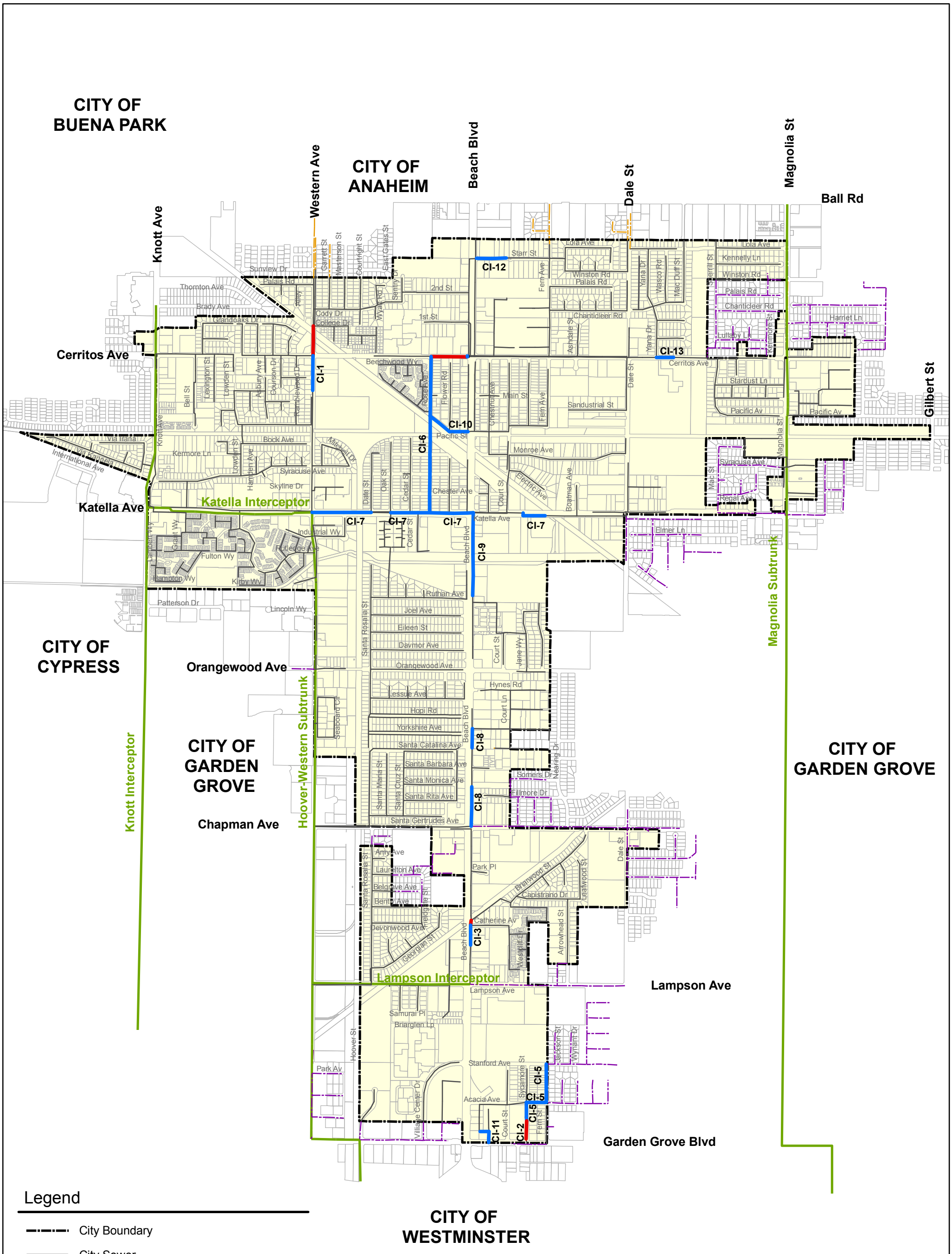
The City has completed a program to CCTV inspect its entire 257,972 feet (48.9 mile) long collection system. Inspections began on June 2, 2006 and ended on January 16, 2009. A total of 253,556 (48.0 miles) of pipe or 98.3 percent of the total system length was ultimately inspected. The City has identified and prioritized its condition deficiencies based on the CCTV recordings, and found approximately 5,801 feet of its sewers to be in need of replacement or repair. This is about 2.2% (5,801 / 257,972) percent of the total system length.

Table 7-1
Hydraulic Deficiencies, Existing Conditions

General Information								Existing Condition					Ultimate Condition					
Pipe ID	Location Number	U/S MH ID	D/S MH ID	Exist Diam (in)	Length (ft)	Slope	Full Flow (mgd)	PDWF (mgd)	ADWF (mgd)	PDWF Vel (ft/s)	PDWF d/D	PDWF Depth (ft)	PDWF (mgd)	ADWF (mgd)	PDWF Vel (ft/s)	PDWF d/D	PDWF Depth (ft)	Minimum Replacement Diameter (in)
C013-C012	CI-1	C013	C012	12	214	0.0015	0.8938	0.6633	0.3186	1.93	0.64	0.64	0.6896	0.3323	1.94	0.66	0.66	15
C012-C001		C012	C001	12	300	0.0015	0.8942	0.6694	0.3218	1.93	0.65	0.65	0.6957	0.3355	1.95	0.66	0.66	15
Z002-Z001	CI-2	Z002	Z001	8	307	0.0021	0.3575	0.2573	0.1138	1.72	0.63	0.42	0.4693	0.2187	2.08	1.00	0.67	12
W009-W008	CI-3	W009	W008	8	84	0.0020	0.3528	0.2503	0.1104	1.70	0.62	0.41	0.3618	0.1648	1.60	1.00	0.67	12
C008-C007	CI-4	C008	C007	15	615	0.0026	2.1411	1.5264	0.7882	2.93	0.62	0.78	1.8911	0.9949	3.05	0.73	0.91	18
Total	**1,520**																	

Table 7-2
Hydraulic Deficiencies, Ultimate Conditions

General Information								Existing Condition					Ultimate Condition					
Pipe ID	Location Number	U/S MH ID	D/S MH ID	Exist Diam (in)	Length (ft)	Slope	Full Flow (mgd)	PDWF (mgd)	ADWF (mgd)	PDWF Vel (ft/s)	PDWF d/D	PDWF Depth (ft)	PDWF (mgd)	ADWF (mgd)	PDWF Vel (ft/s)	PDWF d/D	PDWF Depth (ft)	Minimum Replacement Diameter (in)
C001-I017	CI-1	C001	I017	12	298	0.0035	1.3636	0.9054	0.4468	2.87	0.60	0.60	0.9353	0.4629	2.89	0.61	0.61	15
C012-C001		C012	C001	12	300	0.0015	0.8942	0.6694	0.3218	1.93	0.65	0.65	0.6957	0.3355	1.95	0.66	0.66	15
C013-C012		C013	C012	12	214	0.0015	0.8938	0.6633	0.3186	1.93	0.64	0.64	0.6896	0.3323	1.94	0.66	0.66	15
Z002-Z001	CI-2	Z002	Z001	8	307	0.0021	0.3575	0.2573	0.1138	1.72	0.63	0.42	0.4693	0.2187	2.08	1.00	0.67	12
W008-W007	CI-3	W008	W007	10	330	0.0016	0.5636	0.3411	0.1546	1.67	0.56	0.47	0.4726	0.2204	1.79	0.70	0.58	12
W009-W008		W009	W008	8	84	0.0020	0.3528	0.2503	0.1104	1.70	0.62	0.41	0.3618	0.1648	1.60	1.00	0.67	12
C008-C007	CI-4	C008	C007	15	615	0.0026	2.1411	1.5264	0.7882	2.93	0.62	0.78	1.8911	0.9949	3.05	0.73	0.91	18
C009-C008		C009	C008	15	12	0.0033	2.4169	1.5264	0.7882	3.22	0.58	0.72	1.8911	0.9949	3.37	0.67	0.83	Parallel -15
Z003-Z002	CI-5	Z003	Z002	8	65	0.0020	0.3502	0.2364	0.1038	1.67	0.60	0.40	0.4494	0.2087	1.99	1.00	0.67	12
Z004-Z003		Z004	Z003	8	247	0.0020	0.3523	0.2162	0.0942	1.64	0.57	0.38	0.4304	0.1991	1.91	1.00	0.67	12
Z018-Z004		Z018	Z004	8	331	0.0020	0.3471	0.2048	0.0888	1.60	0.55	0.37	0.4197	0.1937	1.86	1.00	0.67	12
Z019-Z018		Z019	Z018	8	358	0.0023	0.3725	0.1536	0.0650	1.57	0.45	0.30	0.3695	0.1687	1.88	0.81	0.54	12
Z020-Z019		Z020	Z019	8	262	0.0022	0.3671	0.1513	0.0639	1.55	0.45	0.30	0.3673	0.1676	1.63	1.00	0.67	12
C007-I102	CI-6	C007	I102	18	321	0.0015	2.6342	1.5264	0.7882	2.39	0.55	0.82	1.8911	0.9949	2.51	0.63	0.94	21
I102-I103		I102	I103	18	351	0.0015	2.6454	1.5297	0.7901	2.40	0.55	0.82	1.8990	0.9994	2.52	0.63	0.94	21
I103-I104		I103	I104	18	325	0.0015	2.6166	1.5297	0.7901	2.38	0.55	0.82	1.8990	0.9994	2.50	0.63	0.95	21
I104-I105		I104	I105	18	419	0.0020	3.0472	1.6879	0.8793	2.74	0.53	0.80	2.2676	1.2120	2.92	0.64	0.96	21
I105-I106		I105	I106	18	241	0.0019	2.9740	1.6897	0.8803	2.69	0.54	0.81	2.2736	1.2155	2.87	0.65	0.98	21
I106-I107		I106	I107	18	324	0.0021	3.0955	1.6897	0.8803	2.77	0.53	0.79	2.2736	1.2155	2.96	0.64	0.96	21
I107-I108		I107	I108	18	336	0.0020	3.0397	1.6918	0.8815	2.73	0.53	0.80	2.2757	1.2167	2.92	0.65	0.97	21
I108-I010		I108	I010	18	309	0.0020	3.0492	1.6938	0.8826	2.74	0.53	0.80	2.2776	1.2178	2.93	0.64	0.97	21
I019-I018	CI-7	I019	I018	24	535	0.0016	5.8795	2.8920	1.5787	2.88	0.50	0.99	4.2043	2.3710	3.15	0.63	1.25	27
I020-I019		I020	I019	24	461	0.0016	5.7936	2.8920	1.5787	2.85	0.50	1.00	4.2043	2.3710	3.11	0.63	1.26	27
I022-I021		I022	I021	21	459	0.0020	4.6476	2.6302	1.4240	3.08	0.54	0.94	3.8980	2.1839	3.35	0.70	1.23	24
I023-I022		I023	I022	21	187	0.0020	4.5718	2.5906	1.4007	3.03	0.54	0.94	3.8589	2.1601	3.30	0.70	1.23	24
I024-I023		I024	I023	12	408	0.0036	1.3948	0.6065	0.2890	2.65	0.46	0.46	1.1830	0.5975	3.08	0.71	0.71	15
J006-J005		J006	J005	10	49	0.0024	0.7026	0.3499	0.1589	1.99	0.50	0.42	0.6199	0.2960	2.25	0.73	0.61	15
J007-J006		J007	J006	10	350	0.0024	0.6956	0.3475	0.1578	1.97	0.50	0.42	0.5984	0.2848	2.22	0.71	0.60	15
J008-J007		J008	J007	10	204	0.0024	0.6962	0.3475	0.1578	1.97	0.50	0.42	0.5984	0.2848	2.22	0.71	0.60	15
J013-I024		J013	I024	12	338	0.0036	1.3871	0.6065	0.2890	2.64	0.46	0.46	1.1830	0.5975	3.07	0.71	0.71	15
S012-S002	CI-8	S012	S002	10	339	0.0008	0.4004	0.1996	0.0863	1.14	0.50	0.42	0.3371	0.1527	1.27	0.70	0.59	15
S013-S012		S013	S012	10	329	0.0010	0.4497	0.1930	0.0833	1.23	0.46	0.38	0.3206	0.1445	1.39	0.62	0.52	12
S016-S015		S016	S015	8	328	0.0010	0.2521	0.1621	0.0689	1.19	0.58	0.39	0.2490	0.1098	1.27	0.81	0.54	12
O001-O032	CI-9	O001	O032	8	350	0.0024	0.3836	0.2022	0.0876	1.72	0.52	0.34	0.4159	0.1918	1.84	1.00	0.67	12
O002-O001		O002	O001	8	350	0.0024	0.3836	0.1874	0.0806	1.69	0.49	0.33	0.3490	0.1585	1.93	0.75	0.50	12
O003-O002		O003	O002	8	350	0.0024	0.3836	0.1557	0.0659	1.61	0.44	0.30	0.3190	0.1438	1.90	0.70	0.46	10
O032-J013		O032	J013	8	350	0.0033	0.4528	0.2140	0.0932	1.98	0.48	0.32	0.4370	0.2024	2.29	0.79	0.53	12
I078-I104	CI-10	I078	I104	8	193	0.0036	0.4682	0.2034	0.0882	2.00	0.46	0.31	0.4503	0.2091	2.36	0.79	0.52	12
I079-I078		I079	I078	8	241	0.0036	0.4705	0.2034	0.0882	2.01	0.46	0.31	0.4503	0.2091	2.37	0.78	0.52	12
J042-I079		J042	I079	8	303	0.0036	0.4697	0.1726	0.0737	1.92	0.42	0.28	0.3630	0.1654	2.30	0.66	0.44	10
Z015-Z835	CI-11	Z015	Z027	8	135	0.0020	0.3504	0.0902	0.0364	1.30	0.35	0.23	0.3172	0.1429	1.76	0.75	0.50	10
Z024-Z015		Z024	Z015	8	142	0.0020	0.3477	0.0799	0.0319	1.25	0.33	0.22	0.2858	0.1276	1.72	0.69	0.46	10
Z027-Z028		Z027	Z028	8	187	0.0020	0.3484	0.0902	0.0364	1.30	0.35	0.23	0.3172	0.1429	1.75	0.75	0.50	12
D026-D025	CI-12	D026	D025	8	348	0.0026	0.3985	0.1598	0.0678	1.67	0.44	0.29	0.2950	0.1320	1.93	0.64	0.43	10
D027-D026		D027	D026	8	246	0.0022	0.3669	0.1567	0.0664	1.56	0.46	0.30	0.2872	0.1283	1.80	0.67	0.44	10
E006-E005	CI-13	E006	E005	8	288	0.0024	0.3833	0.1685	0.0719	1.64	0.46	0.31	0.2728	0.1213	1.84	0.62	0.42	10



CITY OF STANTON
Sewer Master Plan

PROJECT NO: 1570867.00

DATE: June 2009

Hydraulic Deficiencies

Figure 7-1

Condition assessment of the sewer facilities is presented in this report. The procedure that was utilized to complete the assessment of the gravity sewers is as follows:

a. Conduct CCTV inspections.

b. Review information provided by the CCTV contractor.

c. Prepare a database summarizing the findings of the CCTV reports and recordings, containing the data from approximately 1,132 CCTV inspection reports covering 1,100 reaches.

d. Prioritize the CCTV recordings per the database summary to select a list of reaches with numerous or significant defects of representative types. Consider operation and maintenance issues separately and identify additional hot spots for the City's review.

e. Review the selected CCTV recordings in detail to ensure compliance with CCTV standards and procedures and further prioritize the sewers for replacement and/or repair. Verify the completeness of the inspection reports and update the inspection database.

f. Develop a rating system to identify and prioritize the condition deficiencies, therefore identifying the critical sewer mains in need of rehabilitation and/or repair. Focus on the sewer pipes that are at risk of collapse or prone to more frequent blockages.

7-3 CLOSED CIRCUIT TELEVISION INSPECTIONS

Empire Pipe Cleaning and Equipment, Inc. (Empire) performed video inspection work on approximately 253,556 feet of pipe between June 2, 2006 and January 2, 2009. One hundred sixteen (116) DVD's with inspection reports for 1,100 reaches were produced by Empire. 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.

The CCTV inspected sewer pipes range in size from 6-inches to 24-inches in diameter. The majority of the pipes inspected is 8-inches in diameter and made of vitrified clay pipe (VCP).

National Association of Sewer Service Companies (NASSCO) Pipeline Assessment and Certification Program (PACP) coding procedures formed the basis of the inspection work and reports prepared by Empire.

7-4 INSPECTION REPORT DATABASE SUMMARY

Initially, a database summary was developed utilizing the CCTV inspection written reports. This database summary can be found in Appendix E. It contains a tabulation of the deficiencies identified in the written reports, including the following information:

- DVD Number
- Inspection (Run) Number
- Reversal DVD Number
- Reversal Inspection (Run) Number

- Location (Street Name)
- CCTV Date
- Pipe Identification Number
- Upstream Manhole and Downstream Manhole Identification Numbers
- Direction of Camera
- Pipe Size and Material
- Pipe Length and CCTV Inspected Length of Pipe
- Deficiency Tabulation from Written Reports using PACP codes
- Priority, Ranking, and Recommendations

7-5 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, as well as severe operation and maintenance issues.

First, the reaches that listed deficiencies such as deformed pipe, hole in pipe, broken pipe, large offset joint, large obstacles, ball roots and survey abandoned were selected for review. These deficiencies can be the cause of a sanitary sewer collapse, overflow or exfiltration into the surrounding soil and may need immediate attention. Next, reaches that had numerous or multiple deficiencies such as fractures, cracks, roots, deposits, obstructions, sags, and camera underwater were selected. Finally, several reaches without listed deficiencies were selected in order to develop insight into the overall condition of the CCTV inspected system.

The assessment information of pipes reviewed in detail was incorporated into the Inspection Report Database Summary. This summary database table can be found in Appendix E. Thirty-two (32) reverse inspections were conducted and are included in the summary. The reverse set-ups were conducted to complete runs when the camera was blocked for any reason. The length recorded for some of the reaches where reverse inspections were necessary may be shorter than actual, due to blockages in the pipe, as sometimes the camera was not able to reach the same point in the pipe from two directions.

7-6 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

A truly continuous defect is defined as a defect that extends more than 3 feet. A repeated continuous defect is defined as a defect that occurs in a length of pipe in at least 75 percent of the joints (i.e. 3 out of 4 joints).

The equivalent number (quantity) of "truly" and "repeating" continuous defects is calculated by dividing the length of the continuous defect by 5, normalizing the defects for comparison to other reaches. Each unit in the number of defects represents an occurrence of defect or a joint length of defective pipe. This is a PACP standard.

The grade values for the most common defects are shown in Table 7-3. For defects with variable grade values dependent on the degree of deficiency of the defect, an estimated average value was used.

Figure 7-2 shows the number of reaches where an identified deficiency was found at least once within the reach. It provides a general sense of the magnitude of the problems that were found in the City's collection system. The problems identified most often were grease (330 reaches, 30% of total), vermin (318 reaches, 29% of total) and fine roots (204 reaches, 19% of total).

Figure 7-3 is a plot of the number of reaches versus the highest deficiency grades found in each reach. For example, there were 17 reaches found with at least one structural deficiency grade of 5 and 1 reach found with at least one operation and maintenance deficiency grade of 5.

Figures 7-4 through 7-6 illustrate the locations of the reaches with significant structural defects such as broken pipe, holes in pipe, and large joint offsets.

Table 7-3
Defect Codes and Condition Grades

PACP Code	Structural Defect Coding	Grade
CM	Crack - multiple	3
CL	Crack - longitudinal	2
CS	Crack - spiral	2
CC	Crack - circumferential	1
FM	Fracture - multiple	4
FL	Fracture - longitudinal	3
FS	Fracture - spiral	3
FC	Fracture - circumferential	2
BSV	Broken - soil visible	5
BVV	Broken - void visible	5
HSV	Hole - soil visible	5
HVV	Hole - void visible	5
XP	Collapsed Pipe	5
DP	Deformed Pipe	4
JOL	Joint Offset - large	5[b]
JOM	Joint Offset - medium	3[a]
JSL	Joint Separated - large	2
JSM	Joint Separated - medium	1
JAL	Joint Angular - large	2
JAM	Joint Angular - medium	1
RPP	Point Repair Patched	0
RPPD	Point Repair Patched Damaged	4
RPR	Point Repair Replaced	0
RPRD	Point Repair Replaced Damaged	4
RPZ	Point Repair - other	0
RPZD	Point Repair - other damaged	4
S	Surface Damage	3
MWLS	Miscellaneous - water level, sag.	2

PACP Code	Operational & Maintenance and Construction Features	Grade
DAE	Deposits Attached - encrustation	2
DAGS	Deposits Attached - grease	2
DAR	Deposits Attached - ragging	2
DAZ	Deposits Attached - other	2
DSC	Deposits Settled - hard/compacted	2
DSF	Deposits Settled - fine	2
DSGV	Deposits Settled - gravel	2
DSZ	Deposits Settled - other	2
DNF	Deposits Ingress - fine material (silt & sand)	2
DNGV	Deposits Ingress - gravel	2
DNZ	Deposits Ingress - other	2

PACP Code	Operational & Maintenance and Construction Features	Grade
RBB	Roots Ball - barrel	5
RBL	Roots Ball - lateral	4
RBC	Roots Ball - connection	4
RBJ	Roots Ball - joint	4
RMB	Roots Medium - barrel	4
RML	Roots Medium - lateral	3
RMC	Roots Medium - connection	3
RMJ	Roots Medium - joint	3
RTB	Roots Tap - barrel	3
RTL	Roots Tap - lateral	2
RTC	Roots Tap - connection	2
RTJ	Roots Tap - joint	2
RFB	Roots Fine - barrel	2
RFL	Roots Fine - lateral	1
RFC	Roots Fine - connection	1
RFJ	Roots Fine - joint	1
IG	Infiltration - Gusher	5
IR	Infiltration - Runner	4
ID	Infiltration - Dripper	3
IW	Infiltration - Weeper	2
OBI	Obstacles - protruding through wall	4
OBJ	Obstacles - wedged in joint	4
OBC	Obstacles - through connection	4
OBP	Obstacles -external pipe cable	4
OBS	Obstacles - build into structure	4
OBN	Obstacles - construction debris	4
OBR	Obstacles - rocks	4
OBZ	Obstacles - other	4
VC	Vermin - cockroach	1
VZ	Vermin - other	1
TFD	Tap (Lateral) - factory made defective	2
TBI	Tap (Lateral) - break in intruding	3
TBD	Tap (Lateral) - break in defective	3
TSI	Tap (Lateral) - saddle intruding	2
TSD	Tap (Lateral) - saddle defective	2
ISSRH	Intruding Seal Material - ring hanging	3
ISSRB	Intruding Seal Material - ring broken	3
LL	Line (deviation in sewer line) - left	2
LR	Line (deviation in sewer line) - right	2
LU	Line (deviation in sewer line) - up	2
LD	Line (deviation in sewer line) - down	2
MCU	Miscellaneous - camera underwater	4
MSC	Miscellaneous - shape/size change	0
MMC	Miscellaneous - material change	0
MSA	Miscellaneous - survey abandoned	0

[a] *PACP grade is 1. Grade was increased for this report, because defect is considered to be major.*
[b] *PACP grade is 2. Grade was increased for this report, because defect is considered to be severe*

Figure 7-2
Sewer Reaches with Identified Deficiencies

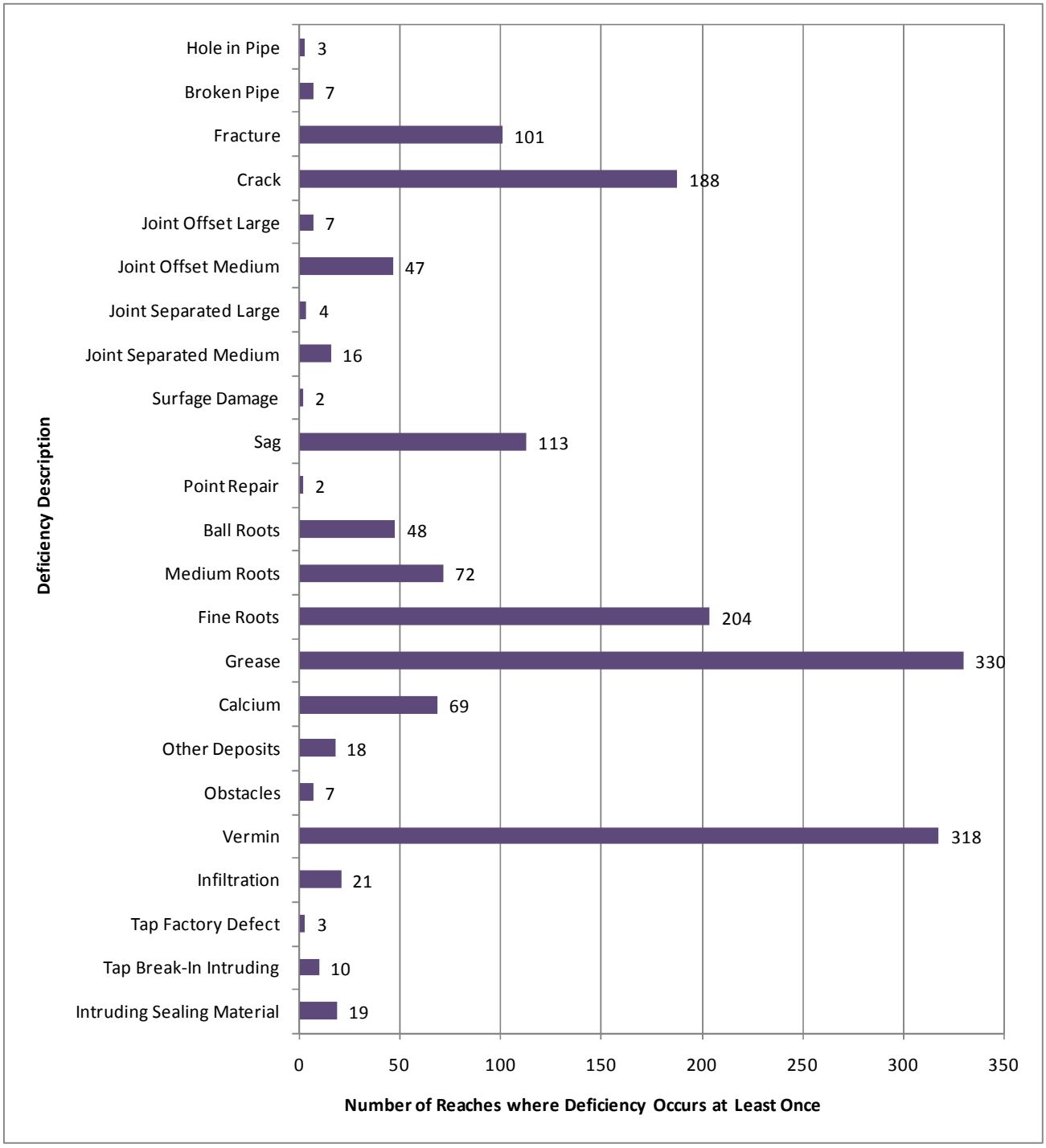
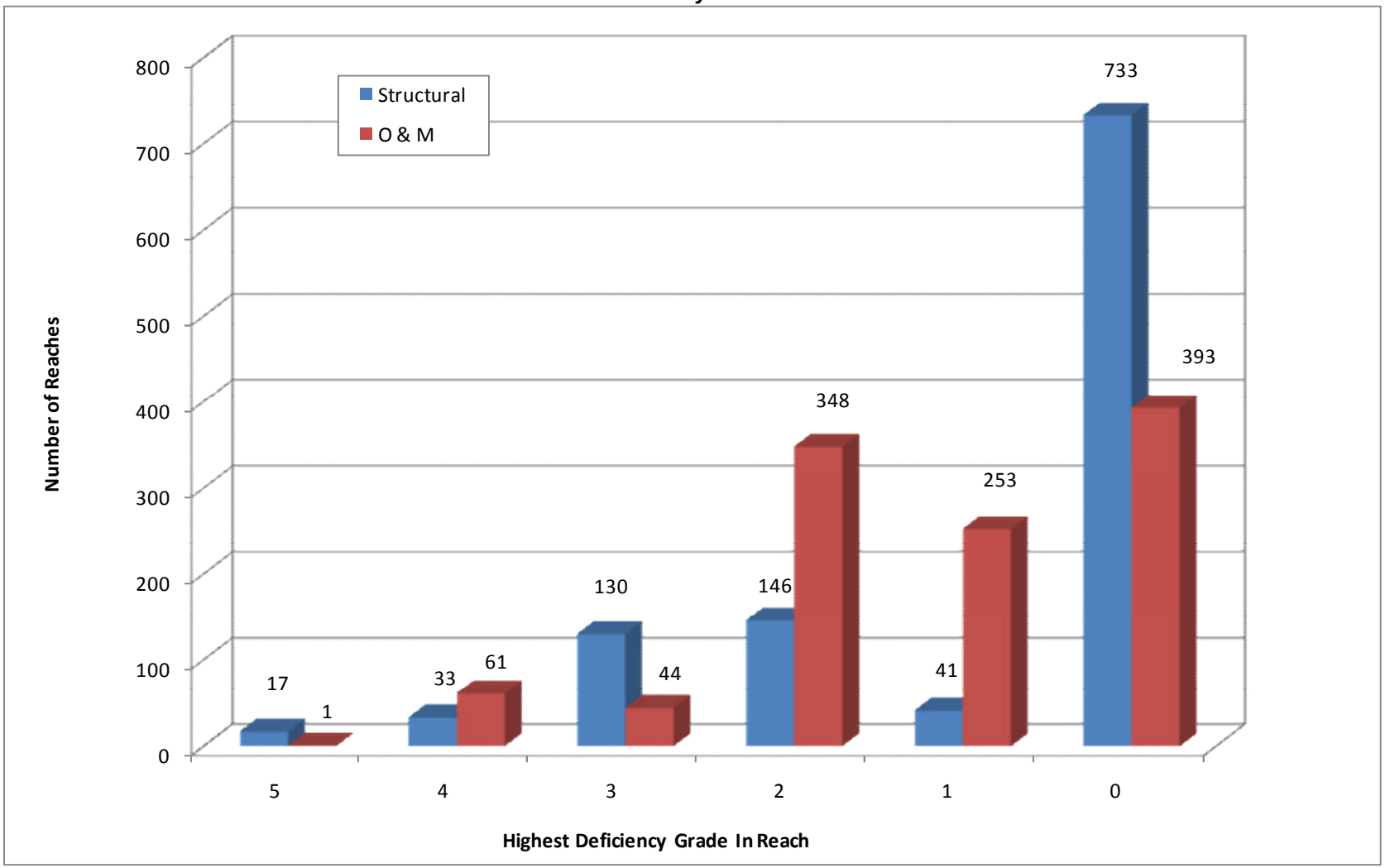


Figure 7-3
Deficiency Grades



CITY OF BUENA PARK

CITY OF ANAHEIM

CITY OF CYPRESS

CITY OF GARDEN GROVE

CITY OF WESTMINSTER

CITY OF GARDEN GROVE

Knott Ave

Western Ave

Beach Blvd

Dale St

Magnolia St

Ball Rd

Gilbert St

Cerritos Ave

Katella Ave

Orangewood Ave

Chapman Ave

Lampson Ave

Garden Grove Blvd

Katella Interceptor

Knott Interceptor

Hoover-Western Subtrunk

Magnolia Subtrunk

Lampson Interceptor

Sunview Dr
Palais Rd
Thornton Ave
Brady Ave
Grandoaks Dr
Garrett St
Masterson St
Courtright St
East Gates St
Sentry Dr
Wyatt Rd
Riley
Cody Dr
College Dr
2nd St
1st St
Starr St
Lola Ave
Fern Ave
Winston Rd
Palais Rd
Yana Dr
Wasco Rd
Mac Duff St
Terrill St
Kennelly Ln
Winston Rd
Palais Rd
Chanticleer Rd
Lullaby Ln
Kenmore St
Harriet Ln
Ashdale St
Chantidleer Rd
Yana Dr
Beechwood Wy
Rose Ave
Flower Rd
Main St
Chestnut Ave
Fern Ave
Sandustrial St
Dale St
Cerritos Ave
Stardust Ln
Pacific Av
Pacific Av
Pacific St
Monroe Ave
Syracuse Ave
Regal Ave
Mac St
Magnolia St
Elmer Ln
Via Iriana
Via Kanuela
International Ave
Knott Ave
Book Ave
Kermore Ln
Lowden St
Hamden Ave
Syracuse Ave
Skyline Dr
Mitchell Dr
Date St
Oak St
Cedar St
Chester Ave
Court St
Electric Ave
Boatman Ave
Bell St
Lexington St
Lowden St
Asbury Ave
Delrson Dr
Ramblewood Dr
Industrial Wy
Cedar St
Beach Blvd
Carden Wy
Galt Wy
Fulton Wy
Rutledge Ave
Hampton Wy
Kirby Wy
Patterson Dr
Lincoln Wy
Ruthan Ave
Joel Ave
Eileen St
Davmor Ave
Orangewood Ave
Santa Rosalia St
Court St
Jane Wy
Hynes Rd
Court Ln
Lessue Ave
Hopi Rd
Yorkshire Ave
Santa Catalina Ave
Santa Barbara Ave
Santa Monica Ave
Santa Rita Ave
Santa Gertrudes Ave
Santa Maria St
Santa Cruz St
Seaboard Cir
Somers Dr
Nearing Dr
Fillmore Dr
Amy Ave
Laurelton Ave
Belgrave Ave
Bentley Ave
Devonwood Ave
Georgian St
Fieldgate St
Park Pl
Briarwood St
Capistrano Dr
Leafwood St
Catherine Av
Arrowhead St
Westpark Ct
Beach Blvd
Lampson Ave
Samurai Pl
Briargien Ln
Hoover St
Park Av
Villiage Center Dr
Stanford Ave
Acacia Ave
Court St
Sycamore St
Fern St
Jackson St
Wyman Dr

Legend

- City Boundary
- City Sewer
- Location Identified with Broken Pipe
- OCSD Sewer
- Garden Grove Sanitary District Sewer
- Anaheim Sewer

N

0 750 1,500 3,000 Feet

1" = 1,500'

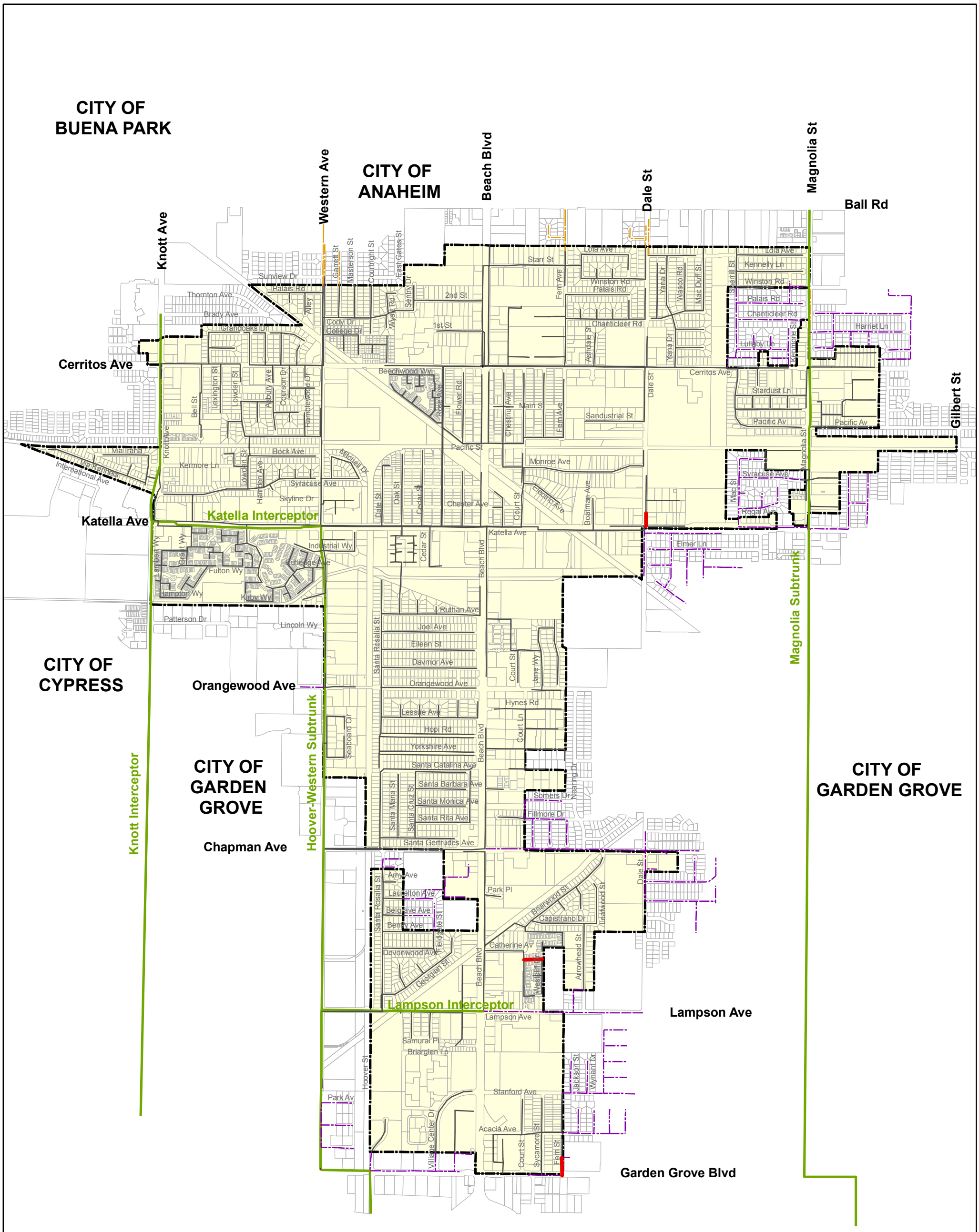
CITY OF STANTON
Sewer Master Plan

Broken Pipe

PROJECT NO: 1570867.00

DATE: June 2009

Figure 7-4



CITY OF STANTON
Sewer Master Plan

Hole in Pipe

PROJECT NO: 1570867.00

DATE: June 2009

Figure 7-5

CITY OF BUENA PARK

CITY OF ANAHEIM

CITY OF CYPRESS

CITY OF GARDEN GROVE

CITY OF GARDEN GROVE

CITY OF WESTMINSTER

Knott Ave

Western Ave

Beach Blvd

Dale St

Magnolia St

Ball Rd

Gilbert St

Cerritos Ave

Katella Ave

Orangewood Ave

Chapman Ave

Lampson Ave

Garden Grove Blvd

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Cody Dr
College Dr
Wyatt Rd
Sentry Dr
2nd St
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Lola Ave
Fern Ave
Winston Rd
Palais Rd
Yana Dr
Wasco Rd
Mac Duff St
Merrill St
Kennelly Ln
Winston Rd
Palais Rd
Chanticleer Rd
Harriet Ln
Lullaby Ln
Ashdale St
Yana Dr
Cerritos Ave
Stardust Ln
Pacific Av
Pacific Av
Bell St
Lexington St
Lowden St
Asbury Ave
Courson Dr
Ramblewood Dr
Beechwood Wy
Flower Rd
Chestnut Ave
Main St
Fern Ave
Sandustrial St
Dale St
Via Irana
Via Kanmela
International Ave
Knott Ave
Bock Ave
Kermore Ln
Lowden St
Hamlen Ave
Syracuse Ave
Skyline Dr
Mitchell Dr
Pacific St
Dale St
Oak St
Cedar St
Chester Ave
Court St
Electric Ave
Boatman Ave
Monroe Ave
Syracuse Ave
Regal Ave
Main St
Magnolia St
Lambert Wy
Industrial Wy
Cornell Wy
Fulton Wy
Rutledge Ave
Hamoton Wy
Kirby Wy
Cedar St
Beach Blvd
Katella Ave
Elmer Ln
Patterson Dr
Lincoln Wy
Ruthan Ave
Joel Ave
Eileen St
Davmor Ave
Orangewood Ave
Santa Rosalia St
Court St
Jane Wy
Hynes Rd
Lessue Ave
Hopi Rd
Yorkshire Ave
Santa Catalina Ave
Seaboard Cir
Court Ln
Beach Blvd
Santa Barbara Ave
Santa Monica Ave
Santa Rita Ave
Santa Gertrudes Ave
Santa Maria St
Santa Cruz St
Somers Dr
Fillmore Dr
Neaning Dr
Dale St
Amy Ave
Lauelton Ave
Belgrave Ave
Benoy Ave
Devonwood Ave
Georgian St
Field Gate St
Park Pl
Briarwood St
Capistrano Dr
Leafwood St
Catherine Av
Arrowhead St
Westfield
Beach Blvd
Lampson Ave
Samurai Pl
Briargten Ln
Hoover St
Park Av
Villa Park Center Dr
Stanford Ave
Acacia Ave
Court St
Sycamore St
Fern St
Jackson St
Wyhant Dr
Magnolia St

Legend

- City Boundary
- City Sewer
- Location Identified with Joint Offset Large
- Location Identified with Joint Offset Medium
- OCSD Sewer
- Garden Grove Sanitary District Sewer
- Anaheim Sewer

N

0 750 1,500 3,000 Feet

1" = 1,500'

CITY OF STANTON
Sewer Master Plan

Joint Offsets

PROJECT NO: 1570867.00

DATE: June 2009

Figure 7-6

7-7 REPLACEMENT AND REHABILITATION PRIORITIES

The structural defect score and O& M defect score is calculated by multiplying the number of occurrences of each defect by its assigned grade and summing them. The structural defect index and the O&M defect index is calculated by dividing the defect score by the number of defects. It is an indicator of the distribution of defect severity.

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.

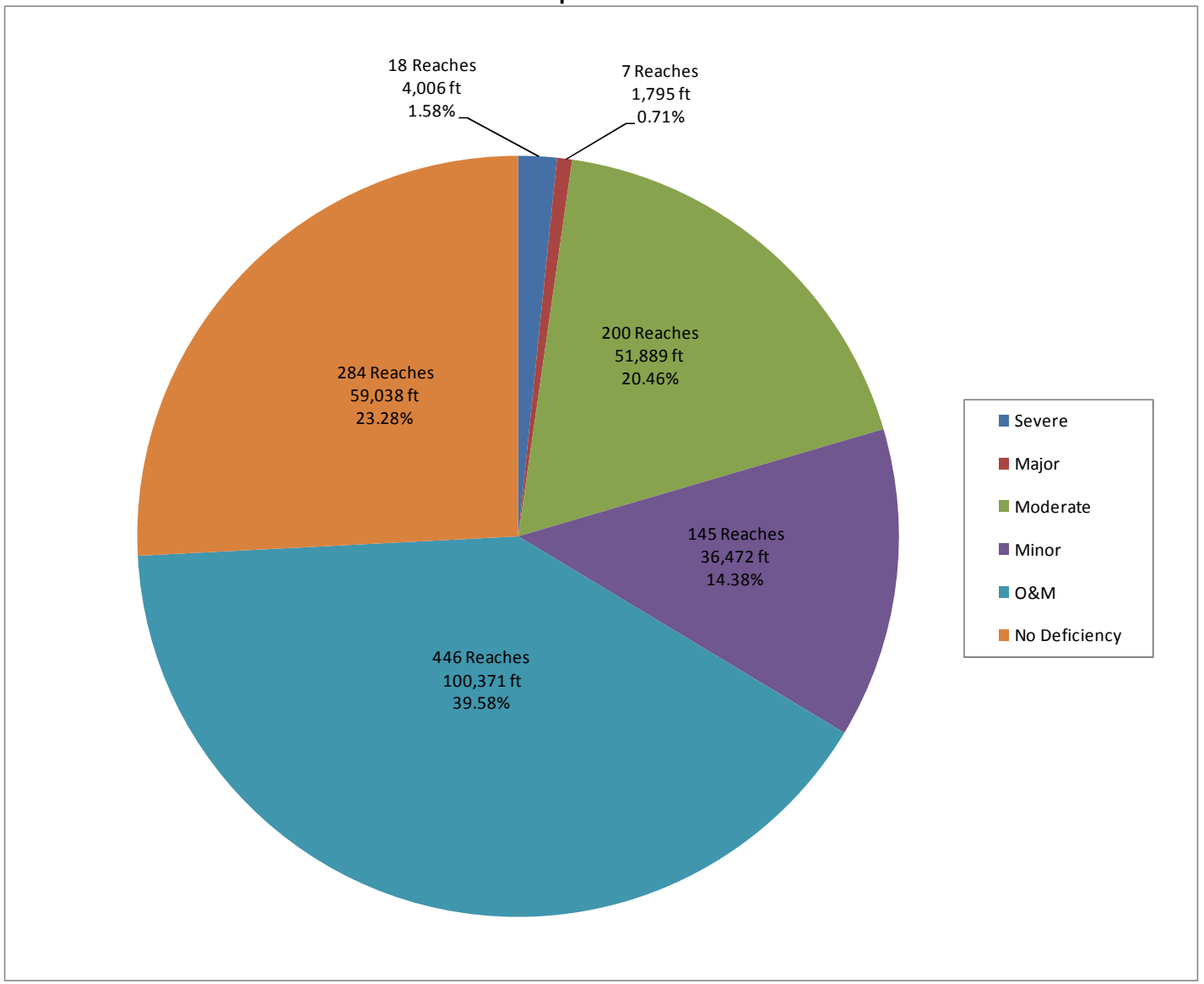
e. O&M – This condition is for operational and maintenance problems and construction feature defects. There are no structural defects.

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

Figure 7-7 shows the distribution of the condition priorities assigned to the pipes with completed inspections. Figure 7-8 shows the CCTV locations, color coded by rehabilitation/replacement priority.

Appendix E lists the CCTV locations with rehabilitation/replacement priorities based on the structural condition of the pipes. The table in Appendix E is sorted by upstream manhole identification number.

Figure 7-7
CCTV Inspection Priorities



CITY OF BUENA PARK

CITY OF ANAHEIM

CITY OF CYPRESS

CITY OF GARDEN GROVE

CITY OF WESTMINSTER

Western Ave

Beach Blvd

Dale St

Magnolia St

Knott Ave

Cerritos Ave

Katella Ave

Orangewood Ave

Chapman Ave

Lampson Ave

Garden Grove Blvd

Knott Interceptor

Hoover Western Subtrunk

Magnolia Subtrunk

Katella Interceptor

Legend

- Sewer Manhole
- Orange County Sanitation District Sewer
- City of Anaheim Sewer
- Garden Grove Sanitary District Sewer
- City Boundary

Condition Priority

- Severe Conditions
- Major Conditions
- Moderate Condition
- Minor Condition
- O & M Condition
- No Defect
- No CCTV

N

0 250 500 1,000 1,500 2,000 Feet

1" = 500'

AKM	City of Stanton Sewer Master Plan
Project No.: 1570867.00	Rehabilitation/Replacement Priorities
Date: June 2009	Figure 7-8

7-8 SEWER PIPELINE OPERATION AND MAINTENANCE

The City has currently identified various 'Hot Spots' in its sewer system. These are areas of the system with reoccurring problems that require maintenance and cleaning on a quarterly basis, at minimum. City records detail that the causes of the hot spots are primarily siphons, grease, roots, and debris. The 'Hot Spot' locations, which includes 75 reaches, as indicated by the City are listed in Table 7-4 and shown on Figure 7-9.

The operation and maintenance conditions were evaluated from the CCTV data, separately from the structural conditions. Figures 7-10 thru 7-15 illustrate the locations of ball roots, grease, sags, deposits, obstacles, and infiltration, respectively. These conditions along with siphons are typically the cause of many of the hot spot locations.

Table 7-5 provides listings of the reaches found with significant amounts of root balls, grease, sags, deposits, and obstacles. It is also noted whether or not these reaches are existing hot spots. 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.

Any loss in cross sectional pipe area is a potential cause of backups and sewer overflows. Therefore those maintenance issues that cause a reduction in cross sectional area shall be given higher priority over others. Accordingly, the highest priority shall be given to those reaches identified with ball roots. Ball roots are defined as roots that have formed a mass and in doing so are severely restricting the flow. The cross sectional area lost is greater than 50 percent.

7-9 OPERATION AND 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. The City has prepared its PMP as part of its Operation and Maintenance Program of the Statewide WDR, which was required to be completed by May 2, 2009.

The City provides the following operation and maintenance activities:

1. The entire sewer system is cleaned once every year. Sewers on the Hot Spot list require quarterly cleaning.

2. All of the system manholes are inspected once every year.

Table 7-4
Hot Spot Locations

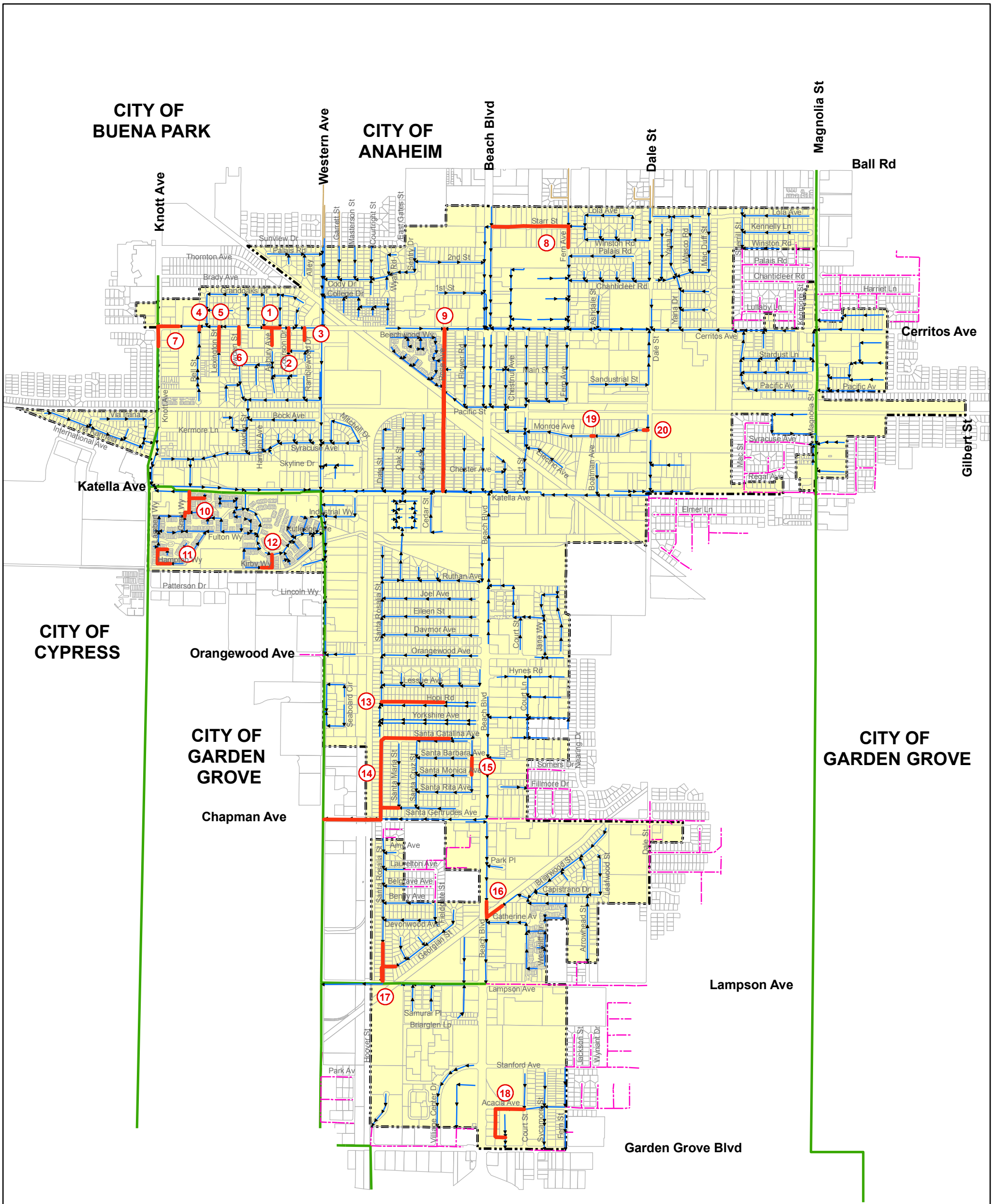
Location No.	Pipe ID	U/S MH	D/S MH	Location	Diameter (in)	Material	Length	Slope	Siphon	Maintenance History*		
										Grease	Roots	Debris
1	B005-B004	B005	B004	Cerritos Ave, west of Courson Dr	10	VCP	136	0.0012		H		L
	B006-B005	B006	B005	Cerritos Ave, east of Westchester	10	VCP	124	0.0012		H		L
	H107-B005	H107	B005	Alley, west of Courson Dr	8	VCP	280	0.0051	Y	H		L
2	H097-B003	H097	B003	Courson Dr, south of Cerritos Ave	8	VCP	371	0.0024	Y	M		L
3	H102-B001	H102	B001	Ramblewood Dr, south of Cerritos Ave	8	VCP	198	0.0061	Y	M		L
4	H083-B021	H083	B021	Bell St, south of Cerritos Ave	8	VCP	55	0.0034	Y	H		L
5	H093-B023	H093	B023	Lexington St, south of Cerritos Ave	8	VCP	246	0.0069	Y	H		L
6	H095-B026	H095	B026	Lowden St, south of Cerritos Ave	8	VCP	367	0.0022	Y	H		L
	H096-H095	H096	H095	Lowden St, south of Cerritos Ave	8	VCP	66	0.0032		H		L
7	B045-B019	B045	B019	Knott Ave, south of Cerritos Ave	8	VCP	62	0.0010	Y			
	B019-H022	B019	H022	Knott Ave, south of Cerritos Ave	10	VCP	317	0.0020		M		L
	B020-B045	B020	B045	Cerritos Ave, east of Knott Ave	8	VCP	333	0.0032		H		
	H021-H020	H021	H020	Knott Ave, south of Cerritos Ave	10	VCP	67	0.0019		L		L
	H022-H021	H022	H021	Knott Ave, south of Cerritos Ave	10	VCP	70	0.0020	Y	M		L
8	D026-D025	D026	D025	Starr St, east of Beach Blvd	8	VCP	348	0.0026		L	L	L
	D027-D026	D027	D026	Starr St, east of Beach Blvd	8	VCP	246	0.0022		L	L	L
	D028-D027	D028	D027	Starr St, east of Beach Blvd	8	VCP	375	0.0024		L		L
	D029-D028	D029	D028	Starr St, east of Beach Blvd	8	VCP	153	0.0018		L		L
	D074-D029	D074	D029	Starr St, east of Beach Blvd	8	VCP	358	0.0025		L		L
	D092-D074	D092	D074	Fern St, south of Starr St	8	VCP	335	0.0024		L		L
9	C004-I044	C004	I044	Rose St, south of Cerritos Ave	12	VCP	342	0.0020				
	C057-I051	C057	I051	Rose St, south of Cerritos Ave	12	VCP	313	0.0023				
	I037-I009	I037	I009	Rose St, north of Katella Ave	12	VCP	320	0.0013				
	I038-I037	I038	I037	Rose St, north of Chester Ave	12	VCP	340	0.0022				
	I039-I038	I039	I038	Rose St, north of Central Ave	12	VCP	320	0.0019				
	I040-I039	I040	I039	Rose St, north of Monroe Ave	12	VCP	257	0.0018				
	I041-I040	I041	I040	Easement, crosses an OCFCD facility	12	VCP	402	0.0018	Y			
	I042-I041	I042	I041	Rose Ave, south of Sandalwood Way	12	VCP	60	0.0024				
	I043-I042	I043	I042	Rose Ave, south of Main St	12	VCP	270	0.0024				
	I044-I043	I044	I043	Rose Ave, north of Main St	12	VCP	320	0.0012				
	I045-I009	I045	I009	Rose St, north of Katella Ave	12	VCP	315	0.0020				
	I046-I045	I046	I045	Rose St, north of Chester Ave	12	VCP	330	0.0020				
	I047-I046	I047	I046	Rose St, north of Central Ave	12	VCP	330	0.0020				
	I048-I047	I048	I047	Rose St, north of Monroe Ave	12	VCP	300	0.0022				
	I049-I048	I049	I048	Easement, crosses an OCFCD facility	12	VCP	363	0.0018	Y			
	I050-I049	I050	I049	Rose St, south of Main St	12	VCP	341	0.0020				
	I051-I050	I051	I050	Rose St, north of Main St	12	VCP	319	0.0020				
	I104-I105	I104	I105	Rose Street at Pacific Electric Corridor	18	VCP	419	0.0020	Y			
10	M004-M003	M004	M003	Easement, between Katella Ave and Marshall Way	8	VCP	105	0.0043		L		L
	M005-M004	M005	M004	Grant Way, south of Marshal Way	8	VCP	226	0.0024		L		L
	M013-M004	M013	M004	Marshall Way, west of Augusta Way	8	VCP	251	0.0304		L		L
	M016-M005	M016	M005	Custer Way, east of Grant Way	8	VCP	64	0.0024		L		L
	M017-M016	M017	M016	Grant Way, south of Custer Way	8	VCP	61	0.0025		L		L
11	M030-M029	M030	M029	Lambert Way, north of Hampton Way	8	VCP	230	0.0024		L		L
	M031-M030	M031	M030	Hampton Way, east of Lambert Way	8	VCP	210	0.0024				L
	M034-M029	M034	M029	Cabot Way, north of Lambert Way	8	VCP	159	0.0040		L		L
12	M092-M077	M092	M077	Hood Way, south of Rutledge Ave	8	VCP	212	0.0024		L		L
	M093-M092	M093	M092	Kirby Way, west of Hood Way	8	VCP	170	0.0180		L		L
13	R061-R083	R061	R083	Hopi Rd, west of Beach Blvd	8	VCP	350	0.0020		L	L	L
	R062-R061	R062	R061	Hopi Rd, west of Beach Blvd	8	VCP	335	0.0020		L		L
	R083-R046	R083	R046	Hopi Rd, east of Santa Rosalia St	8	VCP	320	0.0020		L	L	L

* H = High, M = Medium, L = Low

Table 7-4 *(Continued)*
Hot Spot Locations

Location No.	Pipe ID	U/S MH	D/S MH	Location	Diameter (in)	Material	Length	Slope	Siphon	Maintenance History*		
										Grease	Roots	Debris
14	R802-R801	R802	R801	Chapman Ave, west of Beach Blvd	8	VCP	335	0.002	Y			
14	R001-R802	R001	R802	Chapman Ave, west of Santa Rosalia St	8	VCP	250	0.0024		H		L
	R002-R001	R002	R001	Santa Rosalia St, north of Chapman Ave	8	VCP	198	0.0081		L		L
	R003-R002	R003	R002	Santa Rosalia St, north of Santa Gertrudes Ave	8	VCP	360	0.0021		L	L	L
	R004-R003	R004	R003	Santa Rosalia St, north of Santa Gertrudes Ave	8	VCP	360	0.0024		L	L	L
	R005-R004	R005	R004	Santa Rosalia St, south of Santa Catalina Ave	8	VCP	360	0.0024			L	L
	R006-R005	R006	R005	Corner of Santa Catalina Ave and Santa Rosalia St	8	VCP	68	0.0356			L	L
	R007-R006	R007	R006	Santa Catalina Ave, east of Santa Rosalia St	8	VCP	347	0.0024			L	L
	R008-R085	R008	R085	Santa Catalina Ave, east of Santa Cruz st	8	VCP	350	0.0024			L	L
	R017-R002	R017	R002	Santa Gertrudes Ave, east of Santa Rosalia St	8	VCP	290	0.0024		L	L	
	R085-R007	R085	R007	Santa Catalina Ave, east of Santa Rosalia St	8	VCP	350	0.0024			L	L
15	R036-R035	R036	R035	Santa Paula St, south of Santa Barbara Ave	8	VCP	280	0.0024		H		L
16	W010-W009	W010	W009	Beach Blvd, north of Lampson Ave	8	VCP	190	0.0020	Y	H		
	W011-W010	W011	W010	Beach Blvd, north of Lampson Ave	10	VCP	334	0.0016		H		
	W027-W009	W027	W009	Easement, OCFCD facility	8	VCP	305	0.0023		H		
17	V004-V002	V004	V002	Santa Rosalia St, north of Lampson Ave	8	VCP	241	0.0073				L
	V004-V003	V004	V003	Santa Rosalia St, north of Lampson Ave	8	VCP	229	0.0020			L	L
	V005-V004	V005	V004	Santa Rosalia St, north of Georgian St	8	VCP	375	0.0020			L	L
	V012-V004	V012	V004	Georgian St, east of Santa Rosalia St	8	VCP	203	0.0079			L	L
18	Z007-Z029	Z007	Z029	Acacia Ave, west of Court St	8	PVC	231	0.0020		H		I
	Z021-Z022	Z021	Z022	Easement, east of Beach Blvd	8	VCP	218	0.0020		H		L
	Z022-Z023	Z022	Z023	Easement, east of Beach Blvd	8	VCP	214	0.0020		H		L
	Z023-Z024	Z023	Z024	Easement, east of Beach Blvd	8	VCP	19	0.0021		H		L
	Z024-Z015	Z024	Z015	Easement, east of Beach Blvd	8	VCP	142	0.0020		H		L
	Z029-Z021	Z029	Z021	Acacia Ave, west of Court St	8	PVC	230	0.0020		H		L
19	J035-J034	J035	J034	Monroe St, west of Dale St	8	VCP	60	0.0167	Y	M		L
20	K039-J038	K039	J038	Monroe St, west of Dale St	8	VCP	91	0.0031	Y	H		L

* H = High, M = Medium, L = Low



Legend

- Hot Spot Locations
- City Boundary
- City Sewer
- Anaheim Sewer
- OCSD Sewer
- Garden Grove Sanitary District Sewer

N

0 750 1,500 3,000 Feet

1" = 1,500'

CITY OF STANTON
Sewer Master Plan

PROJECT NO: 1570867.00

DATE: June 2009

Hot Spot Locations

Figure 7-9

CITY OF BUENA PARK

CITY OF ANAHEIM

CITY OF CYPRESS

CITY OF GARDEN GROVE

CITY OF WESTMINSTER

CITY OF GARDEN GROVE

Knott Ave

Western Ave

Beach Blvd

Dale St

Magnolia St

Ball Rd

Gilbert St

Cerritos Ave

Katella Ave

Orangewood Ave

Chapman Ave

Lampson Ave

Garden Grove Blvd

Katella Interceptor

Lampson Interceptor

Knott Interceptor

Hoover-Western Subtrunk

Magnolia Subtrunk

Sunview Dr
Palais Rd
Thornton Ave
Brady Ave
Grandoaks Dr
Alley
Garrett St
Masterson St
Courtright St
East Gates St
Cody Dr
College Dr
Wyar Rd
Sentry Dr
2nd St
1st St
Starr St
Lola Ave
Fern Ave
Winston Rd
Palais Rd
Yana Dr
Wasco Rd
Mac Duff St
Chanticleer Rd
Ashdale St
Serrill St
Kennelly Ln
Winston Rd
Palais Rd
Chanticleer Rd
Lullaby Ln
Kenmore St
Harriet Ln
Stardust Ln
Pacific Av
Beechwood Wy
Rose Ave
Flower Rd
Chestnut Ave
Main St
Fern Ave
Sandustrial St
Dale St
Bell St
Lexington St
Lowden St
Asbury Ave
Courson Dr
Ramblewood Dr
Via Irana
Via Kanela
International Ave
Knott Ave
Bock Ave
Kermore Ln
Lowden St
Hamden Ave
Syracuse Ave
Skyline Dr
Mitchell Dr
Pacific St
Monroe Ave
Electric Ave
Boatman Ave
Court St
Chester Ave
Oak St
Cedar St
Date St
Mac St
Regal Ave
Elmer Ln
Magnolia St
Lambert Wy
Grant Wy
Fulton Wy
Hampton Wy
Kirby Wy
Industrial Wy
Rutledge Ave
Patterson Dr
Lincoln Wy
Cedar St
Beach Blvd
Ruthan Ave
Joel Ave
Eileen St
Davmor Ave
Orangewood Ave
Santa Rosalia St
Court St
Jane Wy
Hynes Rd
Court Ln
Lessue Ave
Hopi Rd
Yorkshire Ave
Santa Catalina Ave
Santa Barbara Ave
Santa Monica Ave
Santa Rita Ave
Santa Gertrudes Ave
Santa Maria St
Santa Cruz St
Seaboard Cir
Beach Blvd
Nearing Dr
Somers Dr
Fillmore Dr
Dale St
Amy Ave
Laurelton Ave
Belgrave Ave
Bentley Ave
Devonwood Ave
Fieldgate St
Georgian St
Beach Blvd
Park Pl
Briarwood St
Capistrano Dr
Leatwood St
Catherine Av
Westcliff Dr
Arrowhead St
Lampson Ave
Samurai Pl
Briarglen Lp
Hoover St
Park Av
Stanford Ave
Acacia Ave
Village Center Dr
Court St
Sycamore St
Fern St
Jackson St
Wynant Dr

Legend

- City Boundary
- City Sewer
- Location Identified with Root Ball Barrell/Root Ball Joint
- Location Identified with Root Ball Lateral
- OCSD Sewer
- Garden Grove Sanitary District Sewer
- Anaheim Sewer

N

0 750 1,500 3,000 Feet

1" = 1,500'

CITY OF STANTON
Sewer Master Plan

Root Balls

PROJECT NO: 1570867.00

DATE: June 2009

Figure 7-10

CITY OF BUENA PARK

CITY OF ANAHEIM

CITY OF CYPRESS

CITY OF GARDEN GROVE

CITY OF WESTMINSTER

CITY OF GARDEN GROVE

Knott Ave

Western Ave

Beach Blvd

Dale St

Magnolia St

Ball Rd

Gilbert St

Cerritos Ave

Katella Ave

Orangewood Ave

Chapman Ave

Lampson Ave

Garden Grove Blvd

Katella Interceptor

Knott Interceptor

Hoover-Western Subtrunk

Lampson Interceptor

Magnolia Subtrunk

Sunview Dr
Palais Rd
Thornton Ave
Brady Ave
Grandoaks Dr
Alley
Garrett St
Masterson St
Courtright St
East Gates St
Sentry Dr
Wyatt Rd
Cody Dr
College Dr
2nd St
1st St
Starr St
Lola Ave
Fern Ave
Winston Rd
Palais Rd
Yana Dr
Wasco Rd
Mac Duff St
Sterrill St
Kennelly Ln
Winston Rd
Palais Rd
Chanticleer Rd
Harriet Ln
Lullaby Ln
Kenmore St
Ashdale St
Chanticleer Rd
Yana Dr
Cerritos Ave
Stardust Ln
Pacific Av
Pacific Av
Bell St
Lexington St
Lowden St
Asbury Ave
Courson Dr
Ramblewood Dr
Beechwood Wy
Rose Ave
Flower Rd
Chestnut Ave
Main St
Fern Ave
Sandustrial St
Dale St
Pacific St
Monroe Ave
Via Irana
Via Kannela
International Ave
Knott Ave
Kermore Ln
Lowden St
Bock Ave
Hamden Ave
Syracuse Ave
Skyline Dr
Mitchell Dr
Dale St
Oak St
Cedar St
Chester Ave
Court St
Electric Ave
Boatman Ave
Mac St
Syracuse Ave
Regal Ave
Elmer Ln
Lambert Wy
Grant Wy
Fulton Wy
Hampton Wy
Kirby Wy
Industrial Wy
Rutledge Ave
Cedar St
Beach Blvd
Patterson Dr
Lincoln Wy
I Ruthan Ave
Joel Ave
Eileen St
Davmor Ave
Orangewood Ave
Santa Rosalia St
Court St
Jane Wy
Hynes Rd
Court Ln
Lessue Ave
Hopi Rd
Yorkshire Ave
Santa Catalina Ave
Santa Barbara Ave
Santa Monica Ave
Santa Rita Ave
Santa Gertrudes Ave
Seaboard Cir
Beach Blvd
Santa Maria St
Santa Cruz St
Nearing Dr
Somers Dr
Fillmore Dr
Amy Ave
Lauralton Ave
Belgrave Ave
Bentley Ave
Fieldgate St
Devonwood Ave
Georgian St
Beach Blvd
Park Pl
Briarwood St
Capistrano Dr
Leafwood St
Dale St
Catherine Av
Arrowhead St
Westcliff Dr
Samurai Pl
Briarglen Lp
Lampson Ave
Hoover St
Park Av
Village Center Dr
Stanford Ave
Acacia Ave
Court St
Sycamore St
Fern St
Jackson St
Wynant Dr

Legend

- City Boundary
- City Sewer
- OCSD Sewer
- Outside Agency Sewers

Locations Identified with Grease

- 1 - 20 Joint Lengths
- 21- 40 Joint Lengths
- 41 - 60 Joint Lengths
- 61 - 80 Joint Lengths
- 81 - 100 Joint Lengths
- 100 - 120 Joint Lengths

N

0 750 1,500 3,000 Feet

1" = 1,500'

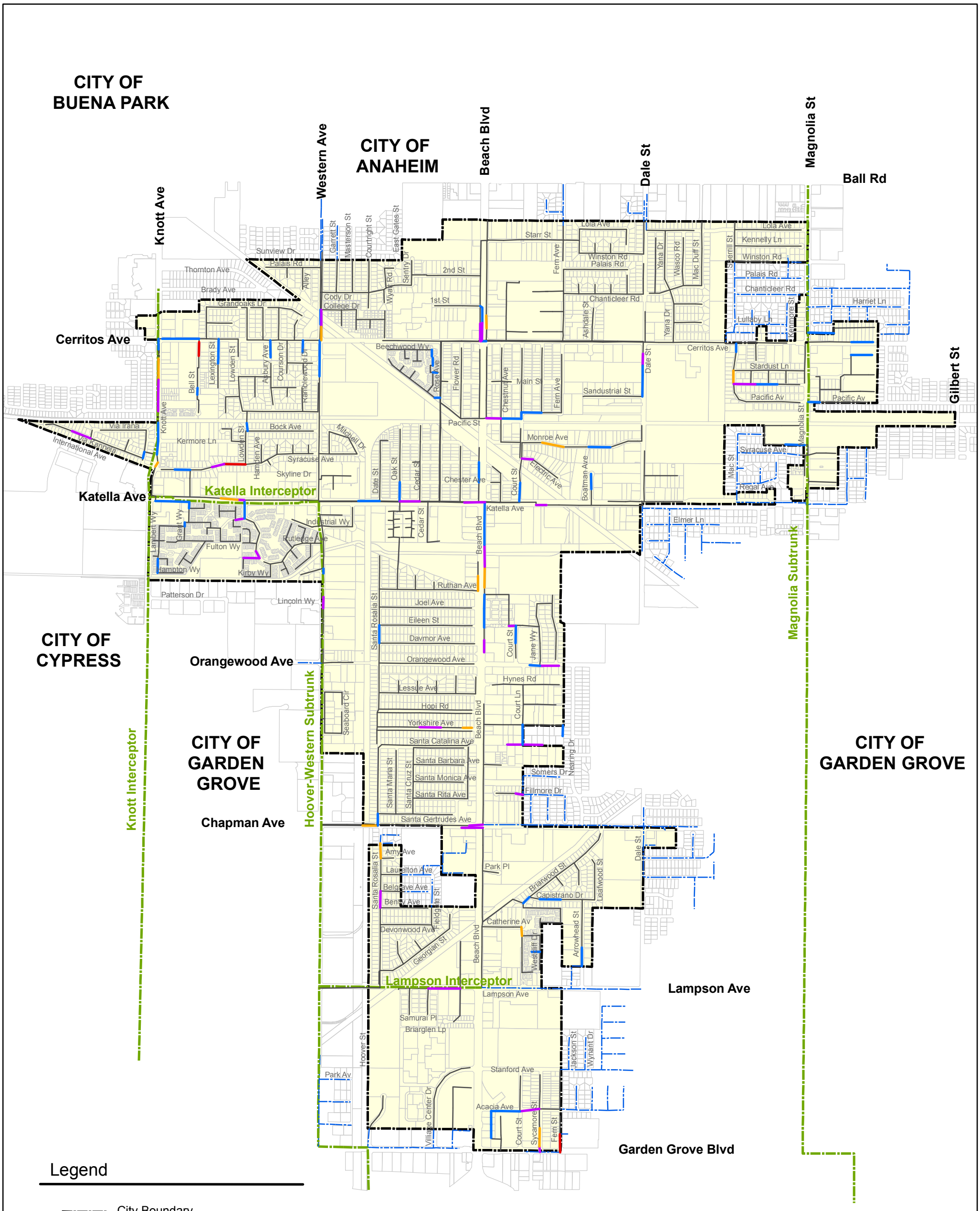
CITY OF STANTON
Sewer Master Plan

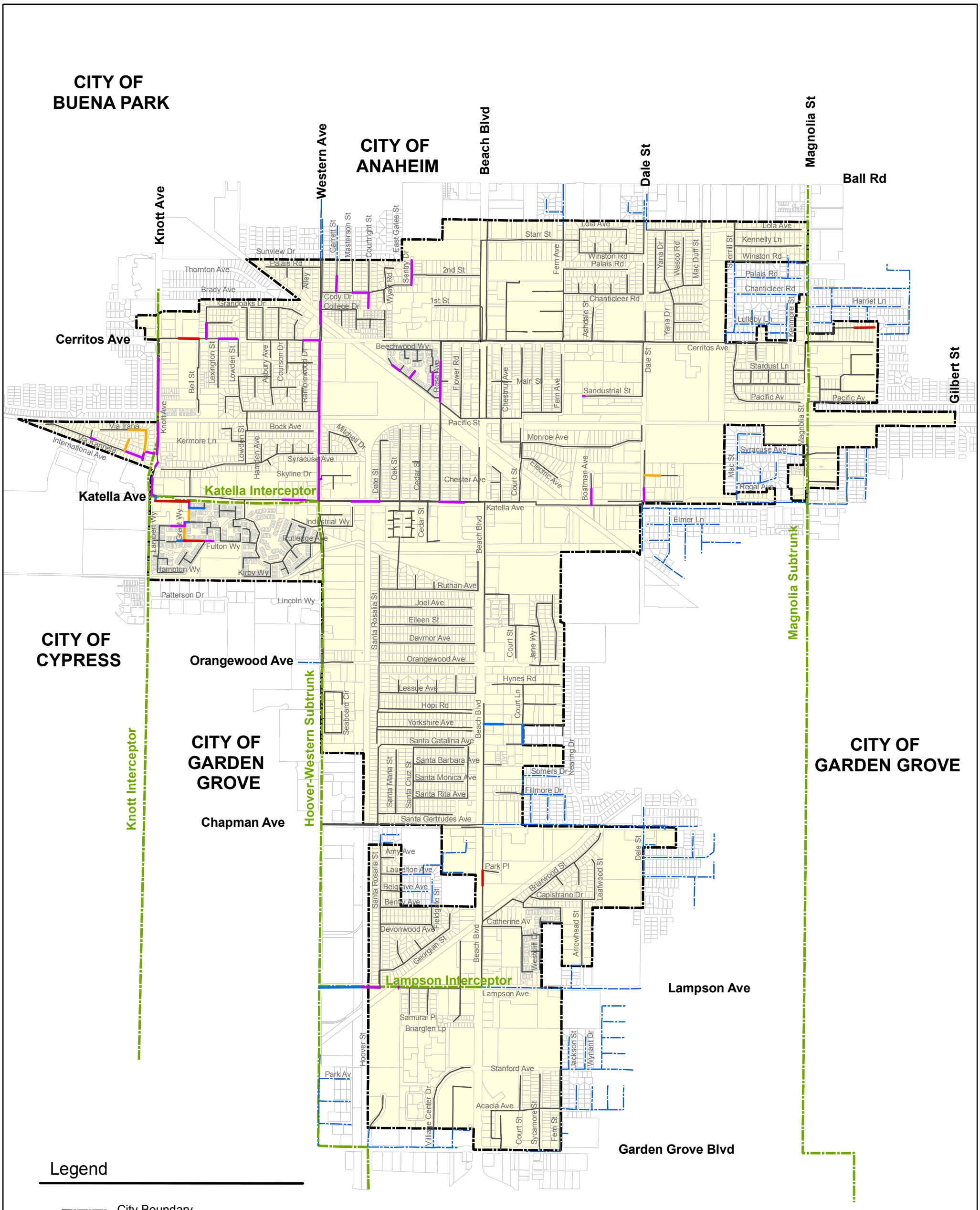
Grease

PROJECT NO: 1570867.00

DATE: June 2009

Figure 7-11


CITY OF BUENA PARK
CITY OF ANAHEIM
CITY OF CYPRESS
CITY OF GARDEN GROVE
CITY OF GARDEN GROVE
CITY OF WESTMINSTER
Knott Ave
Western Ave
Beach Blvd
Dale St
Magnolia St
Gilbert St
Ball Rd
Cerritos Ave
Katella Ave
Orangewood Ave
Chapman Ave
Lampson Ave
Garden Grove Blvd
Katella Interceptor
Knott Interceptor
Hoover-Western Subtrunk
Lampson Interceptor
Magnolia Subtrunk
Sunview Dr
Palais Rd
Thornton Ave
Brady Ave
Grandoaks Dr
Cody Dr
College Dr
Garrett St
Masterson St
Courtright St
East Gates St
Sentry Dr
Wyatt Rd
Alley
2nd St
1st St
Starr St
Lola Ave
Fern Ave
Winston Rd
Palais Rd
Yana Dr
Wasco Rd
Mac Duff St
Sherrill St
Kennelly Ln
Winston Rd
Palais Rd
Chanticleer Rd
Harriet Ln
Lullaby Ln
Kenmore St
Ashdale St
Yana Dr
Beechwood Wy
Rose Ave
Flower Rd
Chestnut Ave
Main St
Fern Ave
Sandustrial St
Stardust Ln
Pacific Av
Pacific St
Monroe Ave
Syracuse Ave
Mac St
Regal Ave
Electric Ave
Boatman Ave
Court St
Chester Ave
Dale St
Oak St
Cedar St
Mitchell Dr
Via Iraha
Via Kanela
International Ave
Kermore Ln
Lowden St
Hamden Ave
Bock Ave
Skyline Dr
Industrial Wy
Rutledge Ave
Lambert Wy
Grant Wy
Fulton Wy
Hampton Wy
Kirby Wy
Elmer Ln
Patterson Dr
Lincoln Wy
Ruthan Ave
Joel Ave
Eileen St
Davmor Ave
Orangewood Ave
Lessile Ave
Hopi Rd
Yorkshire Ave
Santa Catalina Ave
Santa Barbara Ave
Santa Monica Ave
Santa Rita Ave
Santa Gertrudes Ave
Santa Rosalia St
Santa Maria St
Santa Cruz St
Seaboard Cir
Hynes Rd
Court Ln
Jane Wy
Somers Dr
Nearing Dr
Fillmore Dr
Amy Ave
Laurelton Ave
Belgrave Ave
Bentley Ave
Devonwood Ave
Georgian St
Fieldgate St
Park Pl
Briarwood St
Capistrano Dr
Leafwood St
Catherine Av
Arrowhead St
Westcliff Dr
Beach Blvd
Samurai Pl
Briarglen Lp
Hoover St
Park Av
Village Center Dr
Stanford Ave
Acacia Ave
Court St
Sycamore St
Fern St
Jackson St
Wynant Dr
Legend
City Boundary
City Sewer
OCSD Sewer
Outside Agency Sewers
Locations Identified with Sags
1 - 10 Sags
11 - 20 Sags
21 - 40 Sags
41 - 60 Sags
N
0
750
1,500
3,000
Feet
1" = 1,500'
CITY OF STANTON
Sewer Master Plan
PROJECT NO: 1570867.00
DATE: June 2009
Sags
Figure 7-12



Legend

- City Boundary
- City Sewer
- OCSD Sewer
- Outside Agency Sewers

Locations Identified with Deposits

- 1 - 10 Joint Lengths
- 11 - 20 Joint Lengths
- 21 - 40 Joint Lengths
- 41 - 65 Joint Lengths

N

0 750 1,500 3,000 Feet

1" = 1,500'

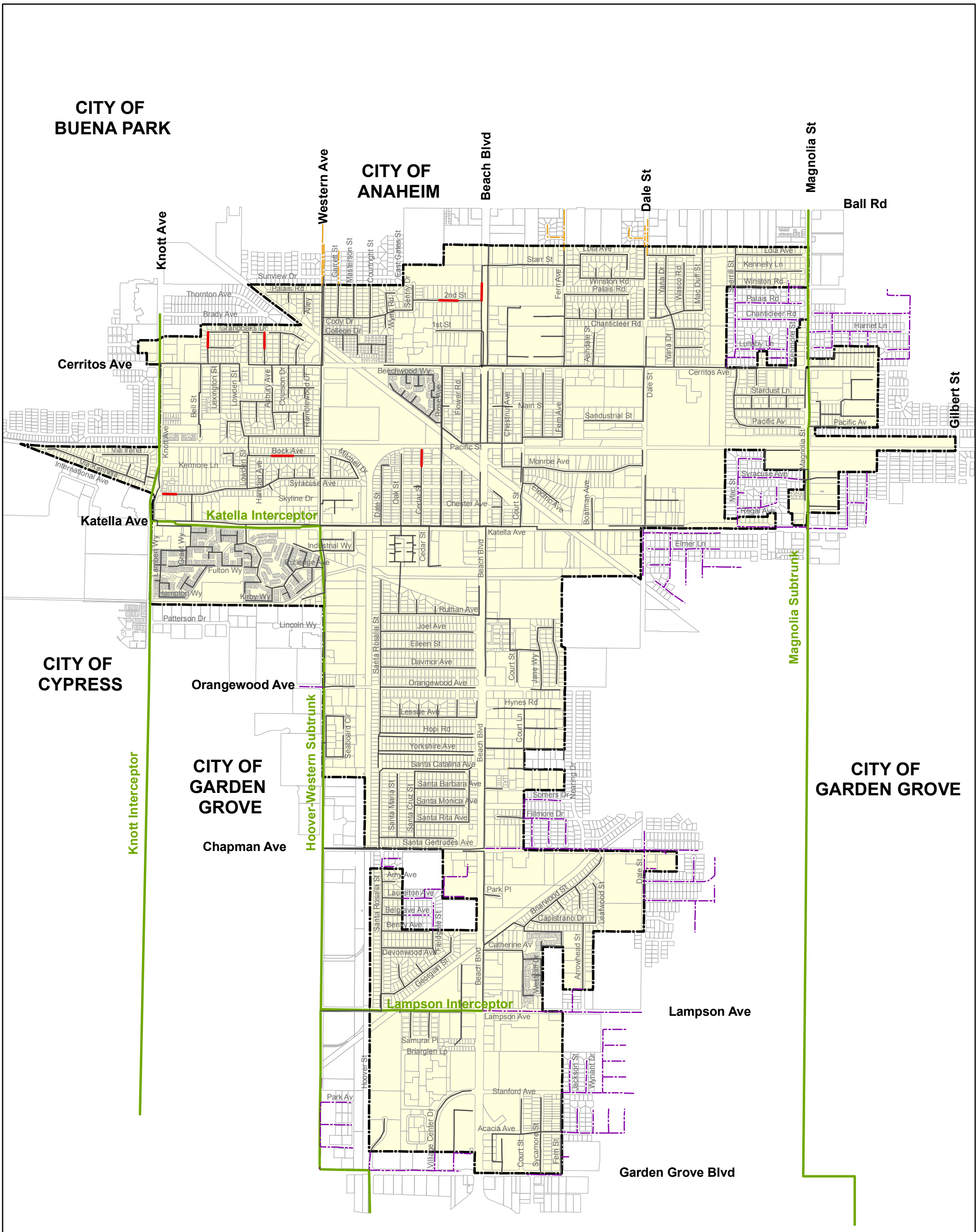
CITY OF STANTON
Sewer Master Plan

PROJECT NO: 1570867.00

DATE: June 2009

Deposits

Figure 7-13


CITY OF BUENA PARK
CITY OF ANAHEIM
CITY OF CYPRESS
CITY OF GARDEN GROVE
CITY OF WESTMINSTER
Knott Ave
Western Ave
Beach Blvd
Dale St
Magnolia St
Ball Rd
Cerritos Ave
Gilbert St
Katella Ave
Orangewood Ave
Chapman Ave
Lampson Ave
Garden Grove Blvd
Katella Interceptor
Knott Interceptor
Hoover-Western Subtrunk
Magnolia Subtrunk
Lampson Interceptor
Legend
City Boundary
City Sewer
Locations Identified with Obstacles
OCSD Sewer
Garden Grove Sanitary District Sewer
Anaheim Sewer
N
0 750 1,500 3,000 Feet
1" = 1,500'
CITY OF STANTON
Sewer Master Plan
PROJECT NO: 1570867.00
DATE: June 2009
Obstacles
Figure 7-14

CITY OF BUENA PARK

CITY OF ANAHEIM

Knott Ave

Western Ave

Beach Blvd

Dale St

Magnolia St

Ball Rd

Gilbert St

Cerritos Ave

Katella Ave

Katella Interceptor

CITY OF CYPRESS

Orangewood Ave

Knott Interceptor

Hoover-Western Subtrunk

Magnolia Subtrunk

CITY OF GARDEN GROVE

Chapman Ave

Lampson Interceptor

Lampson Ave

Garden Grove Blvd

CITY OF WESTMINSTER

Legend

- City Boundary
- City Sewer
- Locations Identified with Infiltration
- OCSD Sewer
- Garden Grove Sanitary District Sewer
- Anaheim Sewer

N

0 750 1,500 3,000 Feet

1" = 1,500'

CITY OF STANTON
Sewer Master Plan

Infilitration

PROJECT NO: 1570867.00

DATE: June 2009

Figure 7-15

Table 7-5
Sewer Pipeline Operation and Maintenance Recommendations

	Location	Pipe Information														Recommendations				
Pipe ID	Street	Size (in)	Material	Length (ft)	Total Roots	Ball Roots	Sags (No. of Joints)	Grease (No. of Joints)	Deposits (No. of Joints)	Obstacles (No. of Incidents)	Highest % of Pipe Blocked	Condition Defect Score	Condition Defect Index	Priority	Siphon	Existing Hot Spot	Root Treat and Cut	Inform Residents of Ball Roots in Lateral	Verify Hotspot Location	Add to Hot Spot List	Clear Obstacle
B002-B001	7361 Cerritos Ave	10	VCP	135				26			5	52	2.00	O & M						✓	
B003-B002	7361 Cerritos Ave	10	VCP	123				30			5	60	2.00	Moderate						✓	
B004-B003	7300 Cerritos Ave	10	VCP	137				27			5	54	2.00	O & M						✓	
B005-B004	1306 Cerritos Ave	10	VCP	136								0	0.00	No Defect		Grease			✓		
B006-B005	1300 Cerritos Ave	10	VCP	124								0	0.00	No Defect		Grease					
B012-B011	7311 Grandoaks Dr	8	VCP	260						1	5	4	0.67	Minor						✓	✓
B014-B004	10431 Courson Dr	8	VCP	270				25	4		5	58	2.00	Major						✓	
B015-B014	10390 Courson Dr	8	VCP	260				10			5	20	2.00	Major						✓	
B016-B015	7391 Grandoaks Dr	8	VCP	211				67			5	134	2.00	Moderate						✓	
B017-B016	7391 Grandoaks Dr	8	VCP	198				61			5	122	2.00	Moderate						✓	
B018-B015	7361 Grandoaks Dr	8	VCP	180				56			5	112	2.00	Moderate						✓	
B019-H022	Knott Ave	10	VCP	176			8	1			5	2	2.00	Moderate		Grease					
B020-B045	7053 Cerritos Ave	8	VCP	333			3	1			5	2	2.00	Moderate		Grease					
B021-B020	7151 Cerritos Ave	8	VCP	330			7	2	58		10	120	2.00	Severe						✓	
B031-B028	10391 Lexington St	8	VCP	260						1	5	4	0.67	O & M						✓	✓
B034-CO17	7431 Palais	8	VCP	292				80			5	160	2.00	Minor						✓	
B040-B039	10431 Ramblewood Dr	8	VCP	100				19			5	38	2.00	O & M						✓	
B045-B019	Knott Avenue & Cerritos Avenue - mid Intersection	8	VCP	62								0	0.00		✓	Siphon					
C005-C004	7765 Cerritos Ave	8	VCP	350				1			10	2	2.00	O & M						✓	
C006-C004	7922 Cerritos Ave	12	VCP	340				1			10	2	2.00	O & M						✓	
C010-D012	7921 1st St	8	VCP	300				17			5	34	2.00	O & M						✓	
C014-C013	Western Ave	12	VCP	150					1		10	2	2.00	O & M						✓	
C019-C013	7560 College Dr	8	VCP	367				67			10	134	2.00	O & M						✓	
C021-C019	7601 College Dr	8	VCP	241				46			5	92	2.00	O & M						✓	
C022-C021	10411 College Dr	8	VCP	152				29			5	58	2.00	O & M						✓	
C023-C022	10440 Scripps Way	8	VCP	164				44			5	88	2.00	O & M						✓	
C024-C022	7640 College Dr	8	VCP	228				63			5	127	1.98	O & M						✓	
C027-C026	7542 Cody Dr	8	VCP	263	2			67			5	137	1.96	Minor						✓	
C028-C027	7598 Cody Dr	8	VCP	260				74			5	148	2.00	Moderate						✓	
C029-C028	10321 Cody Dr	8	VCP	268				74	2		5	152	2.00	Minor						✓	
C030-C029	7691 Cody Dr	8	VCP	253	2			71			5	154	1.97	Moderate						✓	
C032-C031	7720 Cody Dr	8	VCP	146	1			47			5	97	2.02	O & M						✓	
C033-C032	7730 Cody Dr	8	VCP	113				36			5	72	2.00	O & M						✓	
C034-C033	7750 Cody Dr	8	VCP	167				34			5	68	2.00	Moderate						✓	
C035-C034	10281 Sentry Ave	8	VCP	166	9	3		33	1		5	91	2.07	O & M				✓		✓	
C036-C035	10250 Sentry Ave	8	VCP	244	8	2		46	1		5	110	2.00	O & M				✓		✓	
C037-C026	10300 Western St	8	VCP	321				58			5	117	1.98	O & M						✓	
C038-C027	10291 Garrett Rd	8	VCP	265	2			75	1		5	158	1.98	Moderate						✓	
C039-C028	10291 Masterson St	8	VCP	265				75			5	150	2.00	Moderate						✓	
C040-C029	10921 Courtright St	8	VCP	265	1			76			5	155	1.99	Minor						✓	
C041-C031	10261 Wyatt Rd	8	VCP	328	1	1		93			5	193	2.01	Minor						✓	
C042-C041	10260 Wyatt Rd	8	VCP	152				24			5	50	1.92	Minor						✓	
C043-C029	10371 Courtright St	8	VCP	260				39	1		5	84	2.00	Moderate						✓	
C044-C030	10371 Hitchcock Rd	8	VCP	211				59			5	118	2.00	O & M						✓	
C046-C047	7842 2nd St	8	VCP	191	5	1				1	10	14	0.88	O & M						✓	✓
C048-D014	7912 2nd St	8	VCP	350				55			5	110	2.00	O & M						✓	
C051-C011	7865 1st St	8	VCP	141	12	1		45			5	111	1.95	O & M			✓			✓	
C052-C024	10410 College Dr	8	VCP	238	1			47			5	96	1.96	O & M						✓	
C053-C052	10410 Landers Way	8	VCP	300				59			5	119	1.98	O & M						✓	
C054-C052	10410 Landers Way	8	VCP	142				27			5	56	1.93	O & M						✓	
C057-I051	10502 Rose St	12	VCP	313								0	0.00	No Defect		N.A.			✓		
C806-C037	10250 Western St	8	VCP	338				91			5	184	1.98	Minor						✓	
C809-C038	10251 Garrett Rd	8	VCP	267	2			77			5	156	1.97	Moderate						✓	
C812-C039	10251 Masterson Rd	8	VCP	267				76			5	152	2.00	Moderate						✓	
C813-C040	10251 Courtright St	8	VCP	267				75			5	150	2.00	Minor						✓	
D002-D090	Beach Blvd	10	VCP	83			4	20			5	40	2.00	Severe						✓	
D003-D002	8000 Cerritos Ave	10	VCP	254				62			5	124	2.00	O & M						✓	
D004-D091	8100 Cerritos Ave	10	VCP	330				62			5	124	2.00	O & M						✓	
D005-D004	8100 Cerritos Ave	10	VCP	330				78			5	156	2.00	O & M						✓	
D006-D005	8250 Cerritos Ave	10	VCP	338				80			5	160	2.00	O & M						✓	
D007-D006	8351 Cerritos Ave	10	VCP	330				85			10	170	2.00	O & M						✓	
D008-D007	8350 Cerritos Ave	10	VCP	133				31			5	62	2.00	O & M						✓	
D009-D008	8341 Cerritos Ave	10	VCP	189				46			5	92	2.00	O & M						✓	
D010-D009	8440 Cerritos Ave	10	VCP	330				82			5	164	2.00	O & M						✓	
D011-D001	10401 Beach Blvd	10	VCP	290			18	14			5	28	2.00	Major						✓	
D015-D014	10231 Beach Blvd	10	VCP	286				1	1	1	10	8	0.62	O & M						✓	✓
D016-D015	10191 Beach Blvd	10	VCP	292				27			5	54	2.00	O & M						✓	
D020-D018	10330 Beach Blvd	15	VCP	400				79			5	159	1.99	O & M						✓	

Table 7-5 (Continued)
Sewer Pipeline Operation and Maintenance Recommendations

	Location	Pipe Information														Recommendations				
Pipe ID	Street	Size (in)	Material	Length (ft)	Total Roots	Ball Roots	Sags (No. of Joints)	Grease (No. of Joints)	Deposits (No. of Joints)	Obstacles (No. of Incidents)	Highest % of Pipe Blocked	Condition Defect Score	Condition Defect Index	Priority	Siphon	Existing Hot Spot	Root Treat and Cut	Inform Residents of Ball Roots in Lateral	Verify Hotspot Location	Add to Hot Spot List	Clear Obstacle
D021-D020	10250 Beach Blvd	12	VCP	286				81			5	162	2.00	O & M						✓	
D022-D021	10200 Beach Blvd	12	VCP	292				73			5	146	2.00	O & M						✓	
D023-D016	10200 Beach Blvd	10	VCP	87				28			5	56	2.00	Minor						✓	
D026-D025	8062 Starr St	8	VCP	348	37	1		85			5	218	1.79	O & M		Roots	✓	✓			
D027-D026	8081 Starr St	8	VCP	246	60	3		82			5	241	1.70	O & M		Roots	✓	✓			
D028-D027	8151 Starr St	8	VCP	375				73			5	146	2.00	Minor		Grease					
D029-D028	8171 Starr St	8	VCP	153	1			49			5	99	1.98	O & M		Grease					
D038-D032	Continental Garden Apts	8	VCP	148				28			5	58	1.93	Moderate						✓	
D039-D038	Continental Garden Apts.	8	VCP	224				45			5	92	1.96	O & M						✓	
D040-D039	Continental Garden Apts.	8	VCP	218				44			5	90	1.96	O & M						✓	
D041-D040	Continental Garden Apts.	8	VCP	218				44			5	90	1.96	O & M						✓	
D042-D041	Continental Garden Apts.	8	VCP	140				26			5	54	1.93	Minor						✓	
D043-D042	Continental Garden Apts.	8	VCP	209				40			5	82	1.95	O & M						✓	
D044-D043	Continental Garden Apts.	8	VCP	27				4			10	9	1.80	O & M						✓	
D045-D038	Continental Garden Apts.	6	VCP	342				66			5	133	1.99	O & M						✓	
D046-D006	8255 Fern St	8	VCP	100				27			5	54	2.00	O & M						✓	
D047-D046	10450 Fern St	8	VCP	63	1			18			5	37	1.95	O & M						✓	
D048-D047	10402 Fern St	8	VCP	272	7	1		77			5	169	2.01	Moderate						✓	
D049-D048	10392 Fern St	8	VCP	64				10			5	20	2.00	O & M						✓	
D050-D049	10336 Fern St	8	VCP	292				82			5	164	2.00	O & M						✓	
D051-D050	10324 Fern St	8	VCP	38				11			5	22	2.00	O & M						✓	
D052-D051	10314 Fern St	8	VCP	162				46			10	92	2.00	O & M						✓	
D053-D052	10251 Fern St	8	VCP	201				57			10	114	2.00	O & M						✓	
D054-D053	8614 Palais Rd	8	VCP	345	2			99			5	200	1.98	O & M						✓	
D055-D054	8376 Palais Rd	8	VCP	350	3	1		100			5	206	2.00	O & M						✓	
D056-D055	8451 Palais Rd	8	VCP	353	1			5			10	11	1.83	O & M						✓	
D057-D050	8292 Chanticleer Rd	8	VCP	232				70			5	140	2.00	O & M						✓	
D058-D057	8352 Chanticleer Rd	8	VCP	263				75			5	152	1.97	Minor						✓	
D059-D058	8400 Chanticleer Rd	8	VCP	263	7	1		75			5	161	1.94	O & M						✓	
D060-D059	8448 Chanticleer Rd	8	VCP	261	1			6			10	13	1.86	O & M						✓	
D061-D060	10286 Sonnet St	8	VCP	310	1			3			10	7	1.75	O & M						✓	
D062-D047	Continental Garden Apts.	8	VCP	250	2			50			5	104	2.00	O & M						✓	
D063-D062	Continental Garden Apts.	8	VCP	253				29			5	58	2.00	O & M						✓	
D064-D049	Continental Garden Apts.	8	VCP	175				35			5	70	2.00	Moderate						✓	
D065-D064	Continental Garden Apts.	8	VCP	200				37			5	74	2.00	O & M						✓	
D067-D051	Continental Garden Apts.	8	VCP	250	2			49			5	100	1.96	Moderate						✓	
D068-D067	Continental Garden Apts.	8	VCP	250				28			5	56	2.00	O & M						✓	
D069-D070	8448 Winston St	8	VCP	271				50			5	102	1.96	Minor						✓	
D070-D071	8384 Winston St	8	VCP	256				52			5	107	1.95	O & M						✓	
D071-D072	8348 Winston St	8	VCP	258	1			52			5	109	1.98	O & M						✓	
D072-D073	10225 Vantage St	8	VCP	212				42			5	86	1.95	O & M						✓	
D073-D074	10190 Starr St	8	VCP	260	2			62			5	128	1.94	Minor						✓	
D074-D029	8231 Starr St	8	VCP	358	5			119			5	245	1.98	O & M		Grease					
D075-D074	10141 Fern Ave	8	VCP	229	10			65			5	148	1.92	O & M			✓			✓	
D081-D073	10161 Vantage St	8	VCP	184				36			5	74	1.95	O & M						✓	
D082-D081	8350 Lola Ave	8	VCP	258				51			5	103	1.98	O & M						✓	
D083-D082	8388 Lola Ave	8	VCP	256				52			5	105	1.98	O & M						✓	
D084-D083	8441 Lola Ave	8	VCP	258	1			51			5	103	1.98	O & M						✓	
D085-D084	10201 Sonnet St	8	VCP	248	3			47			5	101	2.02	O & M						✓	
D086-D008	10431 Ashdale Ave	8	VCP	244	1			69			10	140	2.00	Moderate						✓	
D087-D086	10370 Ashdale Ave	8	VCP	302	1			80			5	161	1.99	O & M						✓	
D091-D003	8000 Cerritos Ave	10	VCP	69				15			5	30	2.00	O & M						✓	
D092-D074	10231 Fern St	8	VCP	335	4	1		58			5	124	1.97	O & M		Grease		✓			
D093-D059	10309 Banff St	8	VCP	160	1			44			5	89	1.98	O & M						✓	
D094-D058	10309 Ashdale Ave	8	VCP	160				45			5	90	2.00	O & M						✓	
D095-D057	10309 Vantage St	8	VCP	180	2			45			5	95	1.98	O & M						✓	

Table 7-5 (Continued)
Sewer Pipeline Operation and Maintenance Recommendations

	Location	Pipe Information														Recommendations				
Pipe ID	Street	Size (in)	Material	Length (ft)	Total Roots	Ball Roots	Sags (No. of Joints)	Grease (No. of Joints)	Deposits (No. of Joints)	Obstacles (No. of Incidents)	Highest % of Pipe Blocked	Condition Defect Score	Condition Defect Index	Priority	Siphon	Existing Hot Spot	Root Treat and Cut	Inform Residents of Ball Roots in Lateral	Verify Hotspot Location	Add to Hot Spot List	Clear Obstacle
D096-D071	10201 Ashdale St	8	VCP	156				29			5	61	1.91	O & M						✓	
D097-D070	10201 Banff St	8	VCP	156				29			5	60	1.94	O & M						✓	
E006-E005	8641 Cerritos Ave	8	VCP	288				1			10	5	1.25	O & M						✓	
E007-E006	8691 Cerritos Ave	8	VCP	288				1			40	3	1.50	Moderate						✓	
E010-E009	8760 Cerritos Ave	8	VCP	169				55			15	111	1.98	Severe						✓	
E012-E011	2655 Cerritos Ave	8	VCP	320				105			5	211	1.99	O & M						✓	
E013-E012	8882 Cerritos Ave	8	VCP	310				62			5	126	1.97	O & M						✓	
E015-E005	10431 Yana Dr	8	VCP	313				103			5	208	1.98	Moderate						✓	
E016-E015	10371 Yana Dr	8	VCP	297				83			5	168	1.98	Minor						✓	
E017-E016	8551 Yana Dr	8	VCP	242				69			5	140	1.97	Moderate						✓	
E018-E017	10301 Yana Dr	8	VCP	192	1			54			5	110	1.96	Moderate						✓	
E019-E018	10251 Yana Dr	8	VCP	269				78			5	157	1.99	Minor						✓	
E020-E019	10202 Yana Dr	8	VCP	270				77			5	155	1.99	Minor						✓	
E021-E020	8551 Yana Dr	8	VCP	269	1			71			5	144	1.97	Minor						✓	
E022-E021	8501 Lola Ave	8	VCP	310	2			82			5	166	1.98	Moderate						✓	
E023-E021	8611 Lola Ave	8	VCP	300	17			97			5	211	1.85	Major			✓			✓	
E024-E023	8611 Lola Ave	8	VCP	175				50			5	101	1.98	Minor						✓	
E027-E026	10295 Dale Av	8	VCP	255				4			10	8	2.00	Minor						✓	
E028-E027	10251 Dale Av	8	VCP	250				4			10	8	2.00	O & M						✓	
E030-E029	10222 Dale Ave	8	VCP	265	1			76			5	156	1.97	Minor						✓	
E031-E017	8542 Chanticleer Rd	8	VCP	186	1			51			5	105	1.94	Minor						✓	
E032-E031	8532 Chanticleer Rd	8	VCP	68				22			5	46	1.92	O & M						✓	
E033-E032	8532 Chanticleer Rd	8	VCP	95				28			5	58	1.93	O & M						✓	
E034-E032	Alley	8	VCP	350	6			100			5	206	1.94	Moderate						✓	
E035-E034	Alley	8	VCP	350	19			101			5	226	1.87	Moderate			✓			✓	
E036-E035	Alley	8	VCP	200	5			57			5	119	1.92	Minor						✓	
E037-E017	8612 Chanticleer Rd	8	VCP	220	1			62			5	126	1.97	Minor						✓	
E038-E037	8612 MacDuff St	8	VCP	300	1			84			5	170	1.98	Moderate						✓	
E039-E038	10252 MacDuff St	8	VCP	300				86			5	173	1.99	Minor						✓	
E040-E039	10211 MacDuff St	8	VCP	300	1			85			5	171	1.99	Moderate						✓	
E041-E040	10141 MacDuff St	8	VCP	300	4			83			5	172	1.98	Moderate						✓	
E042-E041	10141 MacDuff St	8	VCP	151				41			5	82	2.00	Moderate						✓	
E043-E037	10271 Wasco Rd	8	VCP	230	2			65			5	132	1.97	Moderate						✓	
E044-E043	10211 Wasco Rd	8	VCP	350	2			99			5	201	1.99	Moderate						✓	
E045-E044	10211 Wasco Rd	8	VCP	200	3			56			5	116	1.93	Minor						✓	
E046-E016	8652 Harriet Ln	8	VCP	350				98			5	204	1.92	Moderate						✓	
E047-E046	8652 Harriet Ln	8	VCP	102				30			5	61	1.97	Minor						✓	
E048-E015	8651 Lullaby Ln	8	VCP	350				98			5	197	1.99	Moderate						✓	
E049-E048	8651 Lullaby Ln	8	VCP	107				31			5	63	1.97	O & M						✓	
E050-E002	10410 Dale Ave	8	VCP	294	1			69			5	143	1.99	O & M						✓	
E051-E050	10400 Dale Ave	8	VCP	150				29			5	60	1.94	O & M						✓	
E054-E810	10191 Sherrill St	8	VCP	264				75			5	150	2.00	Moderate						✓	
E057-E056	8972 Kennelly Ln	8	VCP	365	29			102			5	238	1.80	O & M			✓			✓	
E058-E054	10162 Sherrill St	8	VCP	264	1			75			5	153	2.01	O & M						✓	
E059-E058	8841 Lola Ave	8	VCP	360				102			5	204	2.00	Moderate						✓	
E060-E059	8891 Lola Ave	8	VCP	360				102			5	204	2.00	Moderate						✓	
E061-E060	8951 Lola Ave	8	VCP	360	21			101			5	223	1.83	Moderate			✓			✓	
E801-E030	10181 Dale Ave	8	VCP	265				76			5	154	1.97	O & M						✓	
E833-E058	10162 Sherrill St	8	VCP	127				35			5	70	2.00	O & M						✓	
F003-F002	9057 Cerritos Ave	15	VCP	355				2			10	4	2.00	O & M						✓	
F004-F003	9125 Cerritos Ave	15	VCP	355				1			10	2	2.00	O & M						✓	
F009-F008	9195 Cerritos Ave - Easement	8	VCP	320	1				65		5	132	1.97	Moderate						✓	
G001-H014	Easement	8	VCP	214					1		30	2	2.00	O & M						✓	
G002-G001	10781 Via Jacara	8	VCP	191					31		5	66	1.94	O & M						✓	
G003-G002	10740 Via Jacara	8	VCP	161					30		20	63	1.97	Moderate						✓	
G004-G003	6390 Via Irana	8	VCP	285				55	26		5	163	1.99	O & M						✓	
G009-G008	6920 Via Kannela	8	VCP	320					1		60	5	1.67	Moderate						✓	
G012-G011	6830 Via Kannela	8	DIP	90					5		15	11	1.83	O & M						✓	
G013-G012	Via Kannela	8	VCP	328			20		2		25	4	2.00	Moderate						✓	
G015-G009	6920 Via Jardein	8	VCP	187				38	31		5	141	1.99	O & M						✓	
H011-H010	Knott Ave	10	VCP	283					1		25	2	2.00	O & M						✓	
H013-H012	Knott Ave	10	VCP	75			24		4		10	8	2.00	Moderate						✓	
H015-H014	Knott Ave	10	VCP	219			2		8		10	16	2.00	Moderate						✓	
H016-H015	Knott Ave	10	VCP	300					3		20	6	2.00	O & M						✓	
H016-H015	Knott Ave	10	VCP	300			9		1		35	2	2.00	Moderate						✓	
H018-H017	10680 Knott Ave	10	VCP	180			12	10	1		15	25	2.08	Moderate						✓	

Table 7-5 (Continued)
Sewer Pipeline Operation and Maintenance Recommendations

Pipe ID	Location	Pipe Information			Total Roots	Ball Roots	Sags (No. of Joints)	Grease (No. of Joints)	Deposits (No. of Joints)	Obstacles (No. of Incidents)	Highest % of Pipe Blocked	Condition Defect Score	Condition Defect Index	Priority	Siphon	Existing Hot Spot	Recommendations				
	Street	Size (in)	Material	Length (ft)													Root Treat and Cut	Inform Residents of Ball Roots in Lateral	Verify Hotspot Location	Add to Hot Spot List	Clear Obstacle
H019-H018	Knott Ave	10	VCP	350			16	3	10		15	26	2.00	O & M						✓	
H021-H020	10542 Knott Ave	10	VCP	67								0	0.00	No Defect		Grease			✓		
H022-H021	10512 Knott Ave	10	VCP	70								0	0.00	No Defect	✓	Grease					
H024-H025	7129 Katella Ave	10	VCP	369					19		15	40	1.90	O & M						✓	
H037-H105	7061 Syracuse Ave - Easement	10	VCP	139				11			5	22	2.00	O & M						✓	
H039-H038	7030 Syracuse Ave	8	VCP	207	1					1	5	7	0.78	O & M						✓	✓
H040-H037	7140 Syracuse Ave	10	VCP	180	1			5			10	13	2.17	O & M						✓	
H043-H042	7260 Syracuse Ave	10	VCP	349			58	2			10	4	2.00	Moderate						✓	
H045-H044	7310 Syracuse Ave	8	VCP	107				29			5	58	2.00	O & M						✓	
H046-H045	7360 Syracuse Ave	8	VCP	186				51			5	102	2.00	O & M						✓	
H047-H046	7400 Syracuse Ave	8	VCP	256	1			72			5	145	1.99	O & M						✓	
H048-H047	7448 Syracuse Ave	8	VCP	256				72			5	144	2.00	O & M						✓	
H049-H048	7472 Syracuse Ave	8	VCP	77				18			5	36	2.00	O & M						✓	
H050-H043	10820 Lowden St	8	VCP	371				72			5	144	2.00	O & M						✓	
H051-H050	10791 Lowden St	8	VCP	175				35			5	70	2.00	O & M						✓	
H053-H052	7330 Bock Ave	8	VCP	368	2			105			5	214	1.96	O & M						✓	
H054-H053	7400 Bock Ave	8	VCP	352				44		1	10	94	1.65	O & M						✓	✓
H055-H054	7472 Bock Ave	8	VCP	359				101			5	203	1.99	O & M						✓	
H056-H050	10811 Kermore Ln	8	VCP	120				33			5	67	1.97	O & M						✓	
H057-H056	7232 Kermore Ln	8	VCP	112				21			5	42	2.00	O & M						✓	
H058-H057	10800 Keenan Pl	8	VCP	203				39			5	78	2.00	O & M						✓	
H059-H058	10800 Keenan Pl	8	VCP	154				29			5	58	2.00	O & M						✓	
H060-H044	10821 Hamden Ave	8	VCP	295	4			83			5	172	1.98	O & M						✓	
H061-H045	7330 Syracuse Ave	8	VCP	102				16			5	32	2.00	O & M						✓	
H063-H047	10825 Courson Dr	8	VCP	140				37			5	74	2.00	O & M						✓	
H066-H065	7300 Thunderbird Ln	8	VCP	250	3			62			10	129	1.98	O & M						✓	
H067-H066	7360 Thunderbird Ln	8	VCP	350	12	2		81			5	182	1.96	O & M			✓			✓	
H068-H067	7430 Thunderbird Ln	8	VCP	312	5			88			5	184	1.98	O & M						✓	
H069-H068	7425 Ramblewood Dr	8	VCP	389	3			110			5	223	1.97	O & M						✓	
H070-H065	7240 Thunderbird Ln	8	VCP	70				19			10	38	2.00	O & M						✓	
H072-H071	10611 Lowden St	8	VCP	331				93			5	187	1.99	O & M						✓	
H073-H072	7281 Middlesex Dr	8	VCP	271	2			75			5	152	1.97	Minor						✓	
H075-H074	10613 Asbury Ave	8	VCP	173				2			10	4	2.00	O & M						✓	
H076-H075	7361 Lowell St	8	VCP	268				2			10	4	2.00	O & M						✓	
H078-H075	10653 Asbury Ave	8	VCP	272	1			2			10	5	1.67	O & M						✓	
H082-H073	10643 Hamden Dr	8	VCP	331	5			83			5	175	1.94	Moderate						✓	
H083-B021	10568 Bell St	8	VCP	55								0	0.00	No Defect	✓	Grease					
H093-B023	10571 Lexington St	8	VCP	246			3	4			5	8	2.00	Minor	✓	Grease					
H095-B026	10510 Lowden Dr	8	VCP	367				1			5	2	2.00	O & M	✓	Grease					
H096-H095	10551 Lowden Dr	8	VCP	66	2							2	1.00	O & M		Grease					
H097-B003	10580 Courson Dr	8	VCP	371				2			15	4	2.00	Moderate	✓	Grease					
H102-B001	10531 Ramblewood Dr	8	VCP	198	8		4	4			10	16	1.33	Moderate	✓	Grease					
H107-B005	Easement	8	VCP	195			2					0		Moderate	✓	Grease			✓		
I003-I002	7601 Katella Ave	12	VCP	300				2	6		10	20	2.22	O & M						✓	
I004-I003	7701 Katella Ave	12	VCP	351	1		10	5	2		10	15	1.88	Moderate						✓	
I005-I004	7757 Katella Ave	12	VCP	325				3	1		10	8	2.00	O & M						✓	
I007-I006	7700 Katella Ave	12	VCP	330			16	2			10	4	2.00	Moderate						✓	
I009-I008	7850 Katella Ave	12	VCP	191					1		10	6	3.00	Moderate						✓	
I011-I010	7931 Katella Ave	10	VCP	340				2			10	4	2.00	O & M						✓	
I020-I019	Katella Ave	21	VCP	462					1		10	2	2.00	Minor						✓	
I029-I005	10911 Oak St	8	VCP	315			1	2			10	4	2.00	Moderate						✓	
I036-I035	10742 Cedar St	8	VCP	266	13			3		1	5	25	1.14	O & M			✓			✓	✓
I037-I009	10921 Rose St	12	VCP	320				55			5	112	1.96	O & M		N.A.					
I038-I037	10862 Rose St	12	VCP	340								0	0.00	No Defect		N.A.			✓		
I039-I038	10781 Rose St	12	VCP	320	1							3	3.00	O & M		N.A.					
I040-I039	1075 Rose St	12	VCP	257								0	0.00	No Defect		N.A.			✓		
I041-I040	10662 Rose St - Easement	12	VCP	402								0	0.00	No Defect	✓	N.A.			✓		
I042-I041	10662 Rose St	12	VCP	60					3			6	2.00	Minor		N.A.					
I043-I042	10618 Rose St	12	VCP	270				53	3		5	112	2.00	O & M		N.A.					
I044-I043	10750 Rose St	12	VCP	320				58	2		5	123	2.02	Moderate		N.A.					
I045-I009	10901 Rose St	12	VCP	315								0	0.00	No Defect		N.A.			✓		
I046-I045	10862 Rose St	12	VCP	330								0	0.00	No Defect		N.A.			✓		
I047-I046	10819 Rose St	12	VCP	330								0	0.00	No Defect		N.A.			✓		
I048-I047	1075 Rose St	12	VCP	300								0	0.00	O & M		N.A.			✓		
I049-I048	10662 Rose St	12	VCP	363								0	0.00	No Defect	✓	N.A.			✓		

Table 7-5 (Continued)
Sewer Pipeline Operation and Maintenance Recommendations

Pipe ID	Location	Pipe Information			Total Roots	Ball Roots	Sags (No. of Joints)	Grease (No. of Joints)	Deposits (No. of Joints)	Obstacles (No. of Incidents)	Highest % of Pipe Blocked	Condition Defect Score	Condition Defect Index	Priority	Siphon	Existing Hot Spot	Recommendations				
	Street	Size (in)	Material	Length (ft)													Root Treat and Cut	Inform Residents of Ball Roots in Lateral	Verify Hotspot Location	Add to Hot Spot List	Clear Obstacle
I050-I049	10558 Rose St	12	VCP	341								0	0.00	No Defect		N.A.			✓		
I051-I050	10558 Rose St	12	VCP	319								0	0.00	No Defect		N.A.			✓		
I053-I052	7791 Sandalwood Way	8	VCP	152	2	1		29			5	63	2.03	Severe						✓	
I058-I053	10634 Brasewood Way	8	VCP	145				27			5	54	2.00	O & M						✓	
I063-I062	10552 Royal Oak Way	8	VCP	123			10	21			5	42	2.00	Severe						✓	
I080-I079	10670 Flower St	8	VCP	301				2			10	4	2.00	Moderate						✓	
I082-I081	10561 Flower St	8	VCP	350				4			10	8	2.00	Minor						✓	
I086-I085	10822 Flower St	8	VCP	256	7			2			10	11	1.22	Moderate						✓	
I090-I089	145 Katella Ave	8	VCP	294	1			57			5	117	2.02	Moderate						✓	
I091-I089	103 Western Ave	8	VCP	221	1			30			5	61	1.97	Moderate						✓	
I104-I105	10670 Rose St	18	VCP	419								0	0.00	O & M	✓	Siphon					
J001-I011	7931 Katella Ave	10	VCP	306				3			10	7	1.75	O & M						✓	
J035-J034	8322 Monroe Ave	8	VCP	60								0	0.00	No Defect	✓	Grease					
J048-J047	10620 Court St	8	VCP	255	37			16			5	72	1.36	Moderate			✓			✓	
J060-J042	10681 Beach Blvd	8	VCP	300				78			5	157	1.99	O & M						✓	
J066-J065	10500 Beach Blvd	8	VCP	350				77			5	171	1.82	Severe						✓	
J077-J076	10551 Sycamore Ave	8	VCP	200	24	2		15			5	76	1.95	Severe			✓	✓		✓	
J082-J080	8300 Standustrial Ave	8	VCP	29					1		65	2	2.00	Moderate						✓	
K006-K003	10960 Dale Ave	8	VCP	213				39	4		10	91	1.90	Severe						✓	
K007A-K007	10801 Dale Ave	8	VCP	398				17			5	55	1.45	Severe						✓	
K008-K007	8356 Central Dr	8	VCP	263					33		5	72	1.85	Severe						✓	
K022-K021	8970 Tina Way	8	VCP	360	28							31	1.07	O & M			✓			✓	
K024-K025	8877 Stardust Ln	8	VCP	285				70			5	142	1.97	O & M						✓	
K029-E012	10550 Sylvan Ln	8	VCP	280	26	1						32	1.19	O & M			✓			✓	
K039-J038	Dale Street and Monrow Avenue	8	VCP	91											✓	Siphon					
L030-L029	Alley	8	VCP	346			2	3			10	6	2.00	Minor						✓	
M001-H023	Katella Ave	8	VCP	71					14		5	28	2.00	O & M						✓	
M002-M001	7106 Katella Ave	8	VCP	250			4		49		5	100	1.96	Minor						✓	
M003-M002	7117 Katella Ave	8	VCP	297			6		58		5	118	1.97	Minor						✓	
M004-M003	Easement	8	VCP	103			9		5		5	11	1.83	Moderate		Grease					
M005-M004	11060 Grant Way	8	VCP	226					31		5	68	2.00	O & M		Grease					
M013-M004	7140 Marshall Way	8	VCP	250					15		5	32	1.88	O & M		Grease					
M016-M005	7122 Custer Way	8	VCP	64					12		5	26	1.86	O & M		Grease					
M017-M016	11074 Grant Way	8	VCP	61			2		7		5	14	2.00	Minor		Grease					
M018-M017	11108 Grant Way	8	VCP	98					29		5	62	2.07	O & M						✓	
M019-M018	7081 Fulton Way	8	VCP	112					15		5	30	2.00	O & M						✓	
M030-M029	7021 Hamton Way	8	VCP	230			3					0	0.00	Minor		Grease			✓		
M031-M030	7021 Hamton Way	8	VCP	210								0	0.00	No Defect		Debris			✓		
M034-M029	11202 Austin Way	8	VCP	158								0	0.00	No Defect		Grease			✓		
M036-M018	7143 Foulton Way	8	VCP	345					64		5	128	2.00	O & M						✓	
M052-M050	11043 Sherman Way	8	VCP	97					2		25	6	1.50	O & M						✓	
M092-M077	11230 Hood Way	8	VCP	212								0	0.00	No Defect		Grease			✓		
M093-M092	7241 Kirby Way	8	VCP	170								0	0.00	No Defect		Grease			✓		
N002-N001	11500 Western Ave	8	VCP	10				1			10	2	2.00	O & M						✓	
N004-N003	7621 Orangewood Ave	8	VCP	350				3			10	6	2.00	O & M						✓	
N022-N021	7600 Industrial Wy	8	VCP	350	14							14	1.00	O & M			✓			✓	
N035-N034	11311 Santa Rosalia	12	VCP	295	2	2						8	4.00	O & M				✓		✓	
N068-N067	7851 Joel	8	VCP	364	3	2						9	3.00	Minor				✓		✓	
O003-O002	11250 Beach Blvd	8	VCP	350			22	10			5	20	2.00	Moderate						✓	
O005-O004	11362 Beach Blvd	8	VCP	250			10	37			5	74	2.00	Moderate						✓	
R001-R802	Chapman Ave	8	VCP	250			34	2			10	4	2.00	Moderate		Grease					
R002-R001	11951 Santa Rosalia	8	VCP	198			7					0	0.00	Minor		Grease			✓		
R003-R002	11871 Santa Rosalia	8	VCP	360								0	0.00	No Defect		Roots			✓		
R004-R003	11811 Santa Rosalia	8	VCP	360	7	3						20	2.86	Moderate		Roots		✓			
R005-R004	11741 Santa Rosalia	8	VCP	360	7	2						15	2.14	Moderate		Roots		✓			
R006-R005	7681 Santa Catalina	8	VCP	68								0	0.00	No Defect		Roots			✓		
R007-R006	7741 Santa Catalina	8	VCP	347	6	2						14	2.33	O & M		Roots		✓			
R008-R085	7871 Santa Catalina	8	VCP	350	4	1						11	2.75	O & M		Roots		✓			
R009-R008	11731 Santa Paula	8	VCP	350	16	1						21	1.31	O & M			✓			✓	
R017-R002	7722 Santa Gertrudes Ave	8	VCP	290								0	0.00	No Defect		Roots			✓		
R019-R018	7842 Santa Gertrudes Ave	8	VCP	354	42			1			5	50	1.16	O & M			✓			✓	
R023-R022	11751 Santa Maria	8	VCP	340	65	2						82	1.24	O & M			✓	✓		✓	
R027-R026	11751 Santa Cruz St	8	VCP	277	11	1						14	1.27	O & M			✓			✓	
R032-R031	7881 Santa Rita Ave	8	VCP	300	2	2						8	4.00	O & M				✓		✓	

Table 7-5 (Continued)
Sewer Pipeline Operation and Maintenance Recommendations

Location		Pipe Information														Recommendations				
Pipe ID	Street	Size (in)	Material	Length (ft)	Total Roots	Ball Roots	Sags (No. of Joints)	Grease (No. of Joints)	Deposits (No. of Joints)	Obstacles (No. of Incidents)	Highest % of Pipe Blocked	Condition Defect Score	Condition Defect Index	Priority	Siphon	Existing Hot Spot	Root Treat and Cut	Inform Residents of Ball Roots in Lateral	Verify Hotspot Location	Add to Hot Spot List	Clear Obstacle
R036-R035	11790 Santa Paula St	8	VCP	280								0	0.00	No Defect		Grease			✓		
R039-R038	7882 Santa Monica Ave	8	VCP	274	14							15	1.00	O & M			✓			✓	
R059-R053	7832 Lessue	8	VCP	200	4	2						12	3.00	O & M				✓		✓	
R061-R083	7721 Hopi Rd	8	VCP	350	6							8	1.33	O & M		Roots					
R062-R061	7861 Hopi Rd	8	VCP	335	3							3	1.00	O & M		Grease					
R064-R084	7792 Hopi Rd	8	VCP	350	10			2			5	15	1.25	O & M			✓			✓	
R067-R048	7721 Yorkshire Ave	8	VCP	350	53	1		1			5	60	1.11	Moderate			✓			✓	
R068-R067	7791 Yorkshire Ave	8	VCP	350	66							67	1.00	O & M			✓			✓	
R069-R068	7861 Yorkshire Ave	8	VCP	350	11	2	12					23	2.09	Moderate			✓	✓		✓	
R072-R071	7792 Yorkshire Ave	8	VCP	350	61	2		3			20	110	1.72	Minor			✓	✓		✓	
R073-R072	7862 Yorkshire Ave	8	VCP	350	15							19	1.27	Moderate			✓			✓	
R083-R046	7681 Hopi Rd	8	VCP	320	8	1						11	1.38	O & M		Roots		✓			
R085-R007	7801 Santa Catalina	8	VCP	350	12	1						21	1.75	O & M		Roots	✓	✓			
R086-R065	7862 Hopi Rd	8	VCP	335	11							11	1.00	O & M			✓			✓	
R088-R074	7922 Yorkshire Ave	8	VCP	151	10							10	1.00	O & M			✓			✓	
R802-R801	Chapman Ave	8	VCP	335								0	0.00	Minor	✓	Siphon					
S012-S002	11900 Beach Blvd	10	VCP	339				2			15	4	2.00	O & M						✓	
S030-S021	8161 Johnston Rd	8	VCP	254	8	2						14	1.75	O & M				✓		✓	
S811-S016	8072 La Monte Rd	8	VCP	321	1				19		5	39	1.95	O & M						✓	
S813-S812	8192 La Monte	8	VCP	655	26	2						37	1.37	Moderate			✓	✓		✓	
S814-S813	8222 La Monte	8	VCP	306	26	3						39	1.50	O & M			✓	✓		✓	
S817-S812	8101 Crager Ln	8	VCP	324	5		6	1	15		5	37	1.76	Minor						✓	
S818-S817	8061 Crager Ln	8	VCP	275	19		20					27	1.42	Moderate			✓			✓	
S819-S818	8061 Crager Ln	8	VCP	21	2	2						8	4.00	O & M			✓	✓		✓	
V002-OC03	Lampson	8	VCP	36				2			15	4	2.00	O & M						✓	
V004-V002	Sta Rosalia St	8	VCP	241								1	1.00	O & M		Debris			✓		
V004-V003	12431 Santa Rosalia St	8	VCP	229								1	1.00	Moderate		Roots			✓		
V005-V004	12352 Santa Rosalia St	8	VCP	375								0	0.00	Moderate		Roots			✓		
V006-V005	12291 Santa Rosalia St	8	VCP	376				83			5	166	2.00	Moderate						✓	
V012-V004	12442 Georgian St	8	VCP	203								1	1.00	Minor		Roots			✓		
V022-V007	7752 Bently Ave	8	VCP	391	9	2						17	1.89	Minor			✓			✓	
V024-V009	7742 Laurelton Ave	8	VCP	329				2	1		10	6	2.00	Moderate						✓	
V025-V010	7731 Amy Ave	8	VCP	212					10		5	20	2.00	O & M						✓	
V034-V033	7691 Carla St	8	VCP	211	3			25			5	54	1.86	Minor						✓	
V800-Y812	Lampson Ave	21	Vitrified Clay	395					15		5	30	2.00	O & M						✓	
V812-V809	Chapman Ave-Home Depot(Easement)	8	PVC	135				5			15	10	2.00	O & M						✓	
V813-V812	Chapman Ave-Home Depot(Easement)	8	PVC	385				1	2		15	6	2.00	Moderate						✓	
W010-W009	Beach Blvd, n/o Catherine Avenue	8	VCP	190											✓	Siphon					
W011-W010	12232 Beach Blvd	10	VCP	334								0	0.00	No Defect		Grease			✓		
W013A-W013	Park Plaza	8	VCP	338				1			10	2	2.00	O & M						✓	
W013-W012	12100 Beach Blvd	10	VCP	247					59		5	118	2.00	O & M						✓	
W023-W019	8160 Cardiff Dr	8	VCP	292				12	45		5	114	2.00	Severe						✓	
W024-W023	12350 Westcliff Dr	8	VCP	269				3			10	6	2.00	Moderate						✓	
W025-W024	12350 Westcliff Dr	8	VCP	296				3			10	6	2.00	O & M						✓	
W027-W009	Shadow Ln - Easement	8	VCP	305								1	1.00	O & M		Grease					
W038-W037	8151 Briarwood St	8	VCP	275				2			10	4	2.00	O & M						✓	
W041-W040	8310 Briarwood St	8	VCP	246	1			2			10	5	1.67	Moderate						✓	
W045-W040	12120 Brittany Ln	8	VCP	150				1			10	2	2.00	O & M						✓	
W050-W049	8320 Winterwood Ave	8	VCP	200				2			10	4	2.00	Moderate						✓	
W051-W050	12151 Leafwood St	8	VCP	295				2			10	4	2.00	O & M						✓	
W052-W051	12100 Leafwood St	8	VCP	295	1			2			10	5	1.67	O & M						✓	
Y019-V032	Easement Lampson & Beach	8	VCP	467				18			5	36	2.00	Moderate						✓	
Z001-Z831	12900 Sycamore St	8	VCP	71			16	1			15	2	2.00	Moderate						✓	
Z002-Z001	12920 Sycamore St	8	VCP	307			28	102			10	205	1.99	Severe						✓	
Z007-Z029	Acacia Ave	8	PVC	288			4					1	1.00	Minor		Grease			✓		
Z016-Z800	12921 Fern St	8	VCP	294			55	100			5	200	2.00	Severe						✓	
Z021-Z022	Easement	8	PVC	218			2					0	0.00	Minor		Grease			✓		
Z022-Z023	Easement	8	PVC	214			1	3	1		15	8	2.00	Minor		Grease					
Z023-Z024	12880-AA Beach Blvd-Easement	8	PVC	19								0	0.00	No Defect		Grease			✓		
Z029-Z021	8110 Acacia Ave-Easement	8	PVC	230			4		1		5	2	2.00	Minor		Grease					

N.A. = Not Available

Rehabilitation and Replacement

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. At minimum, the City plans to review its sewer system in its entirety every ten (10) years. Each spill site must be CCTV inspected to pinpoint the cause of the spill, and implementation of corrective measures for preventing repeat spills. The follow-up CCTV program consists of the following:

1. 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.
2. Portions of the system rated to be in **Major Structural Deficiency** condition will be CCTV inspected and evaluated once every **three (3) years**
3. Portions of the system rated to be in **Moderate Structural Deficiency** condition will be CCTV inspected and evaluated once every **five (5) years**
4. Portions of the system rated to be in **Minor Structural Deficiency** condition will be CCTV inspected and evaluated once every **ten (10) years**
5. Portions of the system with **no structural deficiencies** will be CCTV inspected and evaluated once every **ten (10) years**
6. Portions of the system with **Operational and Maintenance** deficiencies, except the **Hot Spots**, will be CCTV inspected and evaluated once every **four (4) years.**
7. **Hot Spots**, except siphons, will be CCTV inspected and evaluated before and after each maintenance activity **for one year** to establish the appropriateness of the method, and then **annually**.

As 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.

Maintenance Staff Recommendations

The City currently has about 48.9 miles of pipe. In order to comply with the upcoming CMOM requirements, WDR requirements, and the City's preventative maintenance program, the City must quantify the number of employees and equipment necessary to perform the maintenance tasks.

The City's current staffing for the wastewater collections system includes 5 employees. Three (3) employees have a California Water Environment Association (CWEA) certification through the Technical Certification Program in Collection System Maintenance. Two (2) employees have Grade 1 Certification, and one employee has a Grade II Certification.

The City has implemented an Illness Prevention Program, which consists of training its staff on the following topics:

a. Traffic Control
b. Driver Safety
c. Personal Protective Equipment
d. Health Precautions for raw sewage exposure
e. Lockout-Tagout Procedures
f. Confined Space Entry.

Section 8

CAPITAL IMPROVEMENT PROGRAM

8-1 GENERAL

The primary goal of the Capital Improvement Program (CIP) is to provide the City with a long range-planning tool for implementing its sewer infrastructure improvements in an orderly manner and a basis for financing of these improvements

The recommended capital improvements were identified through capacity analyses and condition assessment of the system based upon CCTV inspections.

8-2 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. When segments of sewers with lower priorities are located in the same vicinity as a higher priority project, an exception can be made to include the lower priority sewers in that project to provide a more economically feasible Capital Improvement Program.

While the recommended capital improvement projects are given general prioritizations, the City should review the projects periodically and establish the annual capital improvement program to address any changed conditions based upon the most current information available, and to take advantage of concurrent construction such as street paving projects or adjacent infrastructure work.

It may not be feasible to implement some small projects as one single project. In such cases several projects can be combined into on construction package. Some large projects may be broken down into smaller components to fit the City's budget and other obligations.

Condition Improvements

The condition improvement projects are prioritized solely on the condition of the pipe as viewed from the CCTV recordings. The condition deficiencies with critical structural damage were given the highest priority. Sewers with conditions categorized as "Severe" or "Major" 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 or spot repair 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.

Capacity Improvements

Projects identified by hydraulic evaluations and observed in the field with existing capacity deficiencies are also given a high priority. The projects that show calculated hydraulic deficiencies, but were **not** observed to be deficient in the field are given a lower priority. The discrepancy in calculated and observed flows can be attributed to vacancies, the conservatism included in the unit flow factors, or the fact that field observations may not have been made at the exact peak flow time of the day.

8-3 CAPITAL IMPROVEMENT PROGRAM

The Capital Improvement Program is developed based upon the results of the hydraulic analyses and condition assessment. The recommended improvement project locations are illustrated on Figure 8-1. Condition improvement projects are listed in Table 8-1 by priority, along with cost estimates. The existing and ultimate capacity improvement projects are included in Tables 8-2 and 8-3, respectively. These tables include the priority for the capacity improvement projects and cost estimates.

Cost estimates presented are in June 2009 dollars and are based upon recent information for similar projects in the Southern California area. The construction cost is based upon $40 per diameter inch per foot of sewer pipe. Engineering and administration costs are estimated at 35% of the construction cost.

The CIP shown in Table 8-1 includes about $2.2 million dollars in condition improvement projects. Approximately $2.3 million dollars are included in the CIP for existing capacity improvement projects, as detailed in Table 8-2. Capacity improvement projects for the ultimate conditions include an additional $11.0 million dollars, as shown in Table 8-3. These projects are primarily due to the impact of the mixed use redevelopment areas proposed in the City's 2007 Draft General Plan. As currently planned, densities in the mixed use areas range from 60 to 81 dwelling units per acre.

In summary, the system improvement costs are estimated as follows:

Condition Improvement Projects	$2.2	Million
Existing Capacity Improvement Projects	$2.3	Million
Ultimate Capacity Improvement Projects	$11.0	Million
Total Estimated Cost	**$15.5**	**Million**

CITY OF BUENA PARK

CITY OF ANAHEIM

CITY OF CYPRESS

CITY OF GARDEN GROVE

CITY OF WESTMINSTER

Western Ave

Beach Blvd

Dale St

Magnolia St

Knott Ave

Cerritos Ave

Katella Ave

Orangewood Ave

Chapman Ave

Lampson Ave

Garden Grove Blvd

Katella Interceptor

Knott Interceptor

Hoover Western Subtrunk

Magnolia Subtrunk

CI-1 CI-2 CI-3 CI-4 CI-5 CI-6 CI-7 CI-8 CI-9 CI-10 CI-11 CI-12 CI-13

Legend

- Sewer Manhole
- Orange County Sanitation District Sewer
- City of Anaheim Sewer
- Garden Grove Sanitary District Sewer
- City Boundary
- CI - # — Capacity Improvement Location No.
- # — Condition Improvement Ranking

Capacity Improvement

- Existing
- & Ultimate

Condition Improvements

- Severe Conditions
- Major Conditions

N

0 250 500 1,000 1,500 2,000 Feet

1" = 500'

AKM	City of Stanton Sewer Master Plan
Project No.: 1570867.00	Capital Improvement Projects
Date: June 2009	Figure 8-1

Table 8-1
Condition Improvements

General Information																		Priority	Condition Ranking	Comments	Recommendation	Cost		
									Manhole			Pipe												
Media Label	Inspection ID	Run Number	Reversal Media Label	Reveral Inspection ID	Reversal Run Number	DVD Watched (Y)	Location Street	CCTV Date	Pipe ID	U/S MH ID	D/S MH ID	Direction of Camera	Size (in)	Material	CCTV Length	Pipe Length						Unit Cost ($)	Construction Cost ($)	Total Cost ($)
G-011-STAN	3	003					8160 Cardiff Dr	10/13/06	W023-W019	W023	W019	D/S	8	VCP	294	292		Severe	1	221.7' Large HSV. Missing pipe	Replace pipe or spot repair 221' to 223' (HSV)	320	93,440	126,144
A-018-STAN	6	006				Y	10551 Sycamore Ave	8/16/06	J077-J076	J077	J076	U/S	8	VCP	195	200		Severe	2	194.5' MSA (JOL). No Reversal Video. 193.1" JOL (D/SH) & 194.5' JOL (D/SL).	Replace pipe or spot repair at 188' & 200' (JOL)	320	64,000	86,400
G-014-STAN	12	012				Y	12921 Fern St	11/17/06	Z016-Z800	Z016	Z800	D/S	8	VCP	301	294		Severe	3	176' Large HVV. Missing pipe.	Replace pipe or spot repair at 176' (HVV)	320	94,080	127,008
A-051-STAN	6	006				Y	10500 Beach Blvd	11/20/06	J066-J065	J066	J065	U/S	8	VCP	354	350		Severe	4	72' & 303.8' BPVV	Replace pipe or spot repair 69-72' & 300' - 306' BPVV. HSV.	320	112,000	151,200
A-024-STAN	7	007	A-024-STAN	8	008	Y	8356 Central Dr	9/5/06	K008-K007	K008	K007	D/S	8	VCP	263	263		Severe	5	250.5' JOL (D/SL)	Replace or spot repair 245'-255' (JOL)	320	84,160	113,616
A-046-STAN	7	007				Y	10960 Dale Ave	11/10/06	K006-K003	K006	K003	D/S	8	VCP	211	213		Severe	6	208.6' HSV in flow path. End of the sewer line.	Replace pipe or spot repair at 208.6' HSV	320	68,160	92,016
A-019-STAN	4	004				Y	10545 Court St	8/17/06	J050-J049	J050	J049	U/S	8	VCP	127	257		Severe	7	126.1' MSA (JOL D/SH)). No Reversal Video.	Replace pipe or spot repair 126.1' JOL & Inspection must complete	320	82,240	111,024
G-014-STAN	9	009				Y	12920 Sycamore St	11/17/06	Z002-Z001	Z002	Z001	D/S	8	VCP	312	307		Severe	8	39.2' BPV. Broken pipe is located at the tap. Cracks & fractures throughout.	Replace pipe or spot repair at 39.2' & reline	Included in Capacity Improvement Project CI-2 (See Table 8-2)		
R006-STAN	11	011				Y	7731 Eileen St	9/18/06	N071-N036	N071	N036	D/S	8	VCP	350	350		Severe	9	347.8' BPSV in flow path. End of the sewer line	Pipe replace or spot repair at 347.8' HSV	320	112,000	151,200
R311-007	7	007				Y	Beach Blvd	1/13/09	D002-D090	D002	D090	D/S	10	VCP	83.7	83		Severe	10	58.4' BPVV	Replace or spot repair 45.8' -58.4' for Continuous Fracture Multiple & BPVV	400	33,200	44,820
A-032-STAN	8	008				Y	Katella Ave - Easement "Motel 6"	9/20/06	M066A-N092	M066A	N092	D/S	8	VCP	109	84		Severe	11	There is no manhole between pipes M006-M006A and M0066A-N092. This pipe was separated into 2 pipes for modeling purposes. Survey abandoned 109' due to JOL (D/SL). No Reversal Video. Close to Ending MH. Horizontal Alignment Right.	Replace pipe or spot repair at 104'-114' & Alignment Right	320	26,880	36,288
A-032-STAN	8	008				Y	Katella Ave - Easement "Motel 6"	9/20/06	M066-M066A	M066	M066A	D/S	8	VCP	109	29		Severe	12	There is no manhole between pipes M006-M006A and M0066A-N092. This pipe was separated into 2 pipes for modeling purposes. Survey abandoned 109' due to JOL (D/SL).No Reversal Video. Close to Ending MH. Horizontal Alignment Right.	Replace pipe or spot repair at 104'-114' & Alignment Right	320	9,280	12,528
M-010-STAN	8	008				Y	8760 Cerritos Ave	6/15/06	E010-E009	E010	E009	D/S	8	VCP	171	169		Severe	13	159.6' JOL (D/SL).	Replace pipe or spot repair 154'-165' (JOL)	320	54,080	73,008
A-016-STAN	4	004	A-017-STAN	4	004	Y	10552 Royal Oak Way	8/14/06	I063-I062	I063	I062	D/S	8	VCP	117	123		Severe	14	Survey abandoned 114.7' due to JOL (D/SL)	Replace pipe or spot repair 109'-120' (JOL)	320	39,360	53,136
A-046-STAN	5	005				Y	10801 Dale Ave	11/10/06	K007A-K007	K007A	K007	D/S	8	VCP	410	398		Severe	15	363.5' JSL (D/SL)	Replace pipe or spot repair 358-368' (JSL)	320	127,360	171,936
A-012-STAN	2	002				Y	7151 Cerritos Ave	8/8/06	B021-B020	B021	B020	D/S	8	VCP	331	330		Severe	16	200.7' JSL	Replace pipe or spot repair at 195'-205' (JSL)	320	105,600	142,560
A-016-STAN	2	002				Y	10514 Royal Oak Way	8/14/06	I065-I064	I065	I064	D/S	8	VCP	112	112		Severe	17	32.7' JSL	Replace pipe or spot repair at 27'-38' (JSL)	320	35,840	48,384
A-017-STAN	11	011				Y	7791 Sandalwood Way	8/15/06	I053-I052	I053	I052	D/S	8	VCP	153	152		Severe	18	13' JSL	Replace pipe or spot repair at 13' (JSL)	320	48,640	65,664
A-049-STAN	6	006				Y	12791 Fern St	11/16/06	Z019-Z018	Z019	Z018	D/S	8	VCP	362	358		Major	19	4.8' BPVV.	Replace pipe or spot repair at 4.8' (BPVV)	Included in Capacity Improvement		
R311-009	3	003				Y	Dale St	1/15/09	K002-K001	K002	K001	D/S	8	VCP	71.9	70		Major	20	69.5' BPVV	Replace pipe or spot repair 65' to 70' (BPVV)	320	22,400	30,240
M-005-STAN	4	007				Y	10401 Beach Blvd	6/8/06	D011-D001	D011	D001	D/S	10	VCP	295	290		Major	21	241.3' Small BPVV	Replace pipe or spot repair at 241.3' (BPVV)	400	116,000	156,600
G-002-STAN	4	004				Y	10390 Courson Dr	6/16/06	B015-B014	B015	B014	D/S	8	VCP	262	260		Major	22	Cracks & fractures	Replace or reline pipe	320	83,200	112,320
G-002-STAN	5	005				Y	10431 Courson Dr	6/16/06	B014-B004	B014	B004	D/S	8	VCP	271	270		Major	23	Cracks & fractures	Replace or reline pipe	320	86,400	116,640
A-049-STAN	10	010				Y	12850 Sycamore Ave	11/16/06	Z004-Z003	Z004	Z003	D/S	8	VCP	256	247		Major	24	Cracks & fractures	Replace or reline pipe	Included in Capacity Improvement		
M-007-STAN	2	002				Y	8611 Lola Ave	6/12/06	E023-E021	E023	E021	D/S	8	VCP	301	300		Major	25	Cracks & fractures	Replace or reline pipe	320	96,000	129,600
																Total	5,801				Total		1,594,320	2,152,332

Table 8-2
Existing Capacity Improvement Projects

Location Number	Pipe ID	U/S MH ID	D/S MH ID	Street Location	Slope	Length (ft)	Existing Diameter (in)	Minimum Replacement Diameter (in)	Unit Cost ($)	Construction Cost ($)	Engineering and Administration Cost ($)	Total Cost ($)
CI-1	C001-I017	C001	I017	Western Avenue from College Drive to South of Idylwild Drive	0.0035	298	12	15	600	178,896	62,614	241,510
	C012-C001	C012	C001		0.0015	300	12	15	600	180,000	63,000	243,000
	C013-C012	C013	C012		0.0015	214	12	15	600	128,118	44,841	172,959
Subtotal						**812**				**487,014**	**170,455**	**657,469**
CI-2	Z001-Z831	Z001	Z831	Sycamore Street, south of Acacia Avenue to Garden Grove Boulevard	0.0085	71	8	12	480	34,080	11,928	46,008
	Z002-Z001	Z002	Z001		0.0021	307	8	12	480	147,360	51,576	198,936
Subtotal						**378**				**181,440**	**63,504**	**244,944**
CI-3	W006-OC09	W006	OC09	Beach Boulevard from Catherine Avenue to Lampson Avenue	0.0084	339	10	15	600	203,628	71,270	274,898
	W007-W006	W007	W006		0.0047	330	10	15	600	198,000	69,300	267,300
	W008-W007	W008	W007		0.0016	330	10	12	480	158,400	55,440	213,840
	W009-W008	W009	W008		0.0020	84	8	12	480	40,205	14,072	54,276
Subtotal						**1,083**				**600,233**	**210,081**	**810,314**
CI-4	C008-C007	C008	C007	Cerritos Avenue from Beach Boulevard to Rose Street	0.0026	615	15	18	720	443,124	155,093	598,217
	C009-C008	C009	C008		0.0033	12	15	Parallel-15	600	7,200	2,520	9,720
Subtotal						**627**				**450,324**	**157,613**	**607,937**
Grand Total						**2,900**				**1,719,011**	**601,654**	**2,320,665**

Table 8-3
Ultimate Capacity Improvement Projects

Location Number	Pipe ID	U/S MH ID	D/S MH ID	Street Location	Slope	Length (ft)	Existing Diameter (in)	Minimum Replacement Diameter (in)	Unit Cost ($)	Construction Cost ($)	Engineering and Administration Cost ($)	Total Cost ($)
CI-5	Z003-Z002	Z003	Z002	From Stanford Avenue and Fern Street to Sycamore Street, north of Garden Grove Boulevard	0.0020	65	8	12	480	31,200	10,920	42,120
	Z004-Z003	Z004	Z003		0.0020	247	8	12	480	118,560	41,496	160,056
	Z018-Z004	Z018	Z004		0.0020	331	8	12	480	158,842	55,595	214,436
	Z019-Z018	Z019	Z018		0.0023	358	8	12	480	171,840	60,144	231,984
	Z020-Z019	Z020	Z019		0.0022	262	8	12	480	125,818	44,036	169,854
Subtotal						**1,263**				**606,259**	**212,191**	**818,450**
CI-6	C007-I102	C007	I102	Rose Street from Cerritos Avenue to Katella Avenue	0.0015	321	18	21	840	269,262	94,242	363,504
	I102-I103	I102	I103		0.0015	351	18	21	840	294,798	103,179	397,977
	I103-I104	I103	I104		0.0015	325	18	21	840	272,882	95,509	368,391
	I104-I105	I104	I105		0.0020	419	18	21	840	352,120	123,242	475,361
	I105-I106	I105	I106		0.0019	241	18	21	840	202,440	70,854	273,294
	I106-I107	I106	I107		0.0021	324	18	21	840	272,160	95,256	367,416
	I107-I108	I107	I108		0.0020	336	18	21	840	282,240	98,784	381,024
	I108-I010	I108	I010		0.0020	309	18	21	840	259,560	90,846	350,406
Subtotal						**2,626**				**2,205,462**	**771,912**	**2,977,374**
CI-7	I019-I018	I019	I018	Katella Avenue, between Date Street and Western Avenue and between Electric Avenue and Oak Street	0.0016	535	24	27	1080	577,476	202,117	779,593
	I020-I019	I020	I019		0.0016	461	24	27	1080	497,902	174,266	672,167
	I022-I021	I022	I021		0.0020	459	21	24	960	440,496	154,174	594,670
	I023-I022	I023	I022		0.0020	187	21	24	960	179,184	62,714	241,898
	I024-I023	I024	I023		0.0036	408	12	15	600	244,968	85,739	330,707
	J004-J015	J004	J015		0.0080	3	12	15	600	1,500	525	2,025
	J005-J004	J005	J004		0.0041	191	10	15	600	114,486	40,070	154,556
	J006-J005	J006	J005		0.0024	49	10	15	600	29,400	10,290	39,690
	J007-J006	J007	J006		0.0024	350	10	15	600	210,000	73,500	283,500
	J008-J007	J008	J007		0.0024	204	10	15	600	122,280	42,798	165,078
	J013-I024	J013	I024		0.0036	338	12	15	600	202,800	70,980	273,780
	J014-J013	J014	J013		0.0036	244	12	15	600	146,232	51,181	197,413
	J015-J014	J015	J014		0.0035	329	12	15	600	197,568	69,149	266,717
Subtotal						**3,757**				**2,964,292**	**1,037,502**	**4,001,794**

Table 8-3 (Continued)
Ultimate Capacity Improvement Projects

Location Number	Pipe ID	U/S MH ID	D/S MH ID	Street Location	Slope	Length (ft)	Existing Diameter (in)	Minimum Replacement Diameter (in)	Unit Cost ($)	Construction Cost ($)	Engineering and Administration Cost ($)	Total Cost ($)
CI-8	S012-S002	S012	S002	Beach Boulevard from La Monte Road to Chapman Avenue	0.0008	339	10	15	600	203,676	71,287	274,963
	S013-S012	S013	S012		0.0010	329	10	12	480	157,920	55,272	213,192
	S014-S013	S014	S013		0.0014	321	10	12	480	154,080	53,928	208,008
	S015-S014	S015	S014		0.0016	332	10	12	480	159,360	55,776	215,136
	S016-S015	S016	S015		0.0010	328	8	12	480	157,440	55,104	212,544
Subtotal						**1,649**				**832,476**	**291,367**	**1,123,843**
CI-9	O001-O032	O001	O032	Beach Boulevard from Ruthann Avenue to Katella Avenue	0.0024	350	8	12	480	168,000	58,800	226,800
	O002-O001	O002	O001		0.0024	350	8	12	480	168,000	58,800	226,800
	O003-O002	O003	O002		0.0024	350	8	10	400	140,000	49,000	189,000
	O032-J013	O032	J013		0.0033	350	8	12	480	168,000	58,800	226,800
Subtotal						**1,400**				**644,000**	**225,400**	**869,400**
CI-10	I078-I104	I078	I104	Pacific Street from Beach Boulevard to Rose Street	0.0036	193	8	12	480	92,640	32,424	125,064
	I079-I078	I079	I078		0.0036	241	8	12	480	115,699	40,495	156,194
	J042-I079	J042	I079		0.0036	303	8	10	400	121,212	42,424	163,636
Subtotal						**737**				**329,551**	**115,343**	**444,894**
CI-11	Z015-Z835	Z015	Z027	Easement west of Court Street, from north of Garden Grove Boulevard to Garden Grove Boulevard	0.0020	135	8	10	400	53,944	18,880	72,824
	Z024-Z015	Z024	Z015		0.0020	142	8	10	400	56,800	19,880	76,680
	Z027-Z028	Z027	Z028		0.0020	187	8	12	480	89,717	31,401	121,118
Subtotal						**464**				**200,461**	**70,161**	**270,622**
CI-12	D025-D022	D025	D022	Starr Street from east of Beach Boulevard to Beach Boulevard	0.1511	27	8	10	400	10,800	3,780	14,580
	D026-D025	D026	D025		0.0026	348	8	10	400	139,020	48,657	187,677
	D027-D026	D027	D026		0.0022	246	8	10	400	98,400	34,440	132,840
Subtotal						**621**				**248,220**	**86,877**	**335,097**
CI-13	E005-E005A	E005	E005A	Beach Boulevard, from east of Yana Drive to Yana Drive	0.1000	8	8	10	400	3,200	1,120	4,320
	E006-E005	E006	E005		0.0024	288	8	10	400	115,200	40,320	155,520
Subtotal						**296**				**118,400**	**41,440**	**159,840**
Grand Total						**12,812**				**8,149,121**	**2,852,192**	**11,001,313**

8-4 CAPITAL IMPROVEMENT PROJECT DESCRIPTIONS

CONDITION DEFICIENCY IMPROVEMENT PROJECTS

- ***Condition Ranking 1, (Cardiff Drive, Westcliff Drive to San Marcos Drive)***

  Pipe W023-W019 has a severe hole with part of the pipe missing and the soil is visible at the defect. There is another deficiency location with a medium offset joint. The 8-inch sewer is 292 feet in length. The minimum recommendation includes a spot repair at the two deficient locations.

  The replacement cost for Pipe W023-W019 is estimated at $126,144.

- ***Condition Ranking 2, (Sycamore Avenue, s/o Cerritos Avenue)***

  Pipe J077-J076 is an 8-inch sewer, with length of 200 feet. The sewer has two (2) large offset joints which accumulate debris that can lead to an overflow. There are also light to medium roots throughout the pipe and root balls in the laterals. The minimum recommendation includes a spot repair at the two (2) large offset joints. The City should also inform the owners to clean and treat their laterals.

  The replacement cost for Pipe J077-J076 is estimated at $86,400.

- ***Condition Ranking 3, (Fern Street, n/o Garden Grove Boulevard)***

  Pipe Z016-Z800 has a severe hole with circumferential cracks and a portion of the pipe is missing. There are also two (2) other locations with medium offset joints. The 8-inch sewer is 294 feet in length. Recommendation includes replacing the pipe due to the multiple deficiencies along the entire pipe length.

  The replacement cost for Pipe Z016-Z800 is estimated at $127,008.

- ***Condition Ranking 4, (Beach Boulevard, n/o Main Street)***

  Pipe J066-J065 is an 8-inch sewer, with length of 350 feet. The sewer has a section of broken pipe where voids are visible from CCTV inspection. Another deficiency location includes a hole where soil is visible. The minimum recommendation includes a spot repair at the two (2) deficiencies.

  The replacement cost for Pipe J066-J065 is estimated at $151,200.

- ***Condition Ranking 5, (Central Avenue, e/o Dale Street)***

  Pipe K008-K007 has a large offset joint which is capable of collecting debris, which can lead to an overflow. This 8-inch sewer is 263 feet in length. The minimum recommendation includes a spot repair at the large offset joint.

  The replacement cost for Pipe K008-K007 is estimated at $113,616.

- ***Condition Ranking 6, (Dale Street, n/o Katella Avenue)***

  Pipe K006-K003 is an 8-inch sewer, with length of 213 feet. The sewer has a hole in the pipe where soil is visible. The minimum recommendation includes a spot repair at the hole.

  The replacement cost for Pipe K006-K003 is estimated at $92,016.

- ***Condition Ranking 7, (Court Street, s/o Cerritos Avenue)***

  Pipe J050-J049 has a large offset joint which is capable of collecting debris that can lead to an overflow. This 8-inch sewer is 257 feet in length. The minimum recommendation includes a spot repair at the large offset joint.

  The replacement cost for Pipe J050-J049 is estimated at $111,024.

- ***Condition Ranking 8, (Dale Street, n/o Katella Avenue)***

  Pipe Z002-Z001 is an 8-inch sewer, with length of 307 feet. The sewer has a section of broken pipe where voids are visible from the CCTV inspection. There are also multiple cracks and fractures along the entire pipe length. This reach shall be included in the Capacity Improvement Project CI-2.

- ***Condition Ranking 9, (Eileen Street, e/o Santa Rosalia Street)***

  Pipe N071-N036 has a section of broken pipe where a void is visible. This 8-inch sewer is 350 feet in length. The minimum recommendation includes a spot repair at the broken section.

  The replacement cost for Pipe N071-N036 is estimated at $151,200.

- ***Condition Ranking 10, (Beach Boulevard and Cerritos Avenue)***

  Pipe D002-D090 is a 10-inch sewer, with length of 83 feet. The sewer has a section of broken pipe where a void is visible. There are also multiple cracks and fractures along the entire pipe length. The minimum recommendation includes a spot repair at the broken pipe with relining of the entire pipe.

  The replacement cost for Pipe D002-D090 is estimated at $44,820.

- ***Condition Ranking 11, (Easement, w/o Western Avenue, s/o Katella Avenue)***

  Pipe M066A-N092 has a severe horizontal alignment to the right which can accumulate debris and lead to an overflow. This 8-inch sewer is 84 feet in length. The minimum recommendation includes a spot repair at the horizontal alignment.

  The replacement cost for Pipe M066A-N092 is estimated at $36,288.

- ***Condition Ranking 12, (Easement, w/o Western Avenue, s/o Katella Avenue)***

  Pipe M066-M066A has a severe horizontal alignment to the right which can accumulate debris and lead to an overflow. This 8-inch sewer is 29 feet in length. The minimum recommendation includes a spot repair at the horizontal alignment.

  The replacement cost for Pipe M066-M066A is estimated at $12,528.

- ***Condition Ranking 13, (Cerritos Avenue, w/o Sherrill Street)***

  Pipe E010-E009 has a large offset joint which can accumulate debris and lead to an overflow. This reach is 8-inch sewer is 169 feet in length. The minimum recommendation includes a spot repair at the large offset joint.

  The replacement cost for Pipe E010-E009 is estimated at $73,008.

- ***Condition Ranking 14, (Royal Oak Way, s/o Cerritos Ave)***

  Pipe I063-I062 is an 8-inch sewer, with length of 123 feet. The sewer has a large offset joint which may accumulate debris that can lead to an overflow. The minimum recommendation includes a spot repair at the large offset joint.

  The replacement cost for Pipe I063-I062 is estimated at $53,136.

- ***Condition Ranking 15, (Dale Street, n/o Central Avenue)***

  Pipe K007A-K007 has a large offset joint which can accumulate debris that can lead to an overflow. This 8-inch sewer is 169 feet in length. The minimum recommendation includes a spot repair at the large offset joint offset.

  The replacement cost for Pipe K007A-K007 is estimated at $171,936.

- ***Condition Ranking 16, (Cerritos Avenue, w/o Bell Street)***

  Pipe B021-B020 is an 8-inch sewer, with length of 330 feet. The sewer has a large separated joint which may accumulate debris that can lead to an overflow. The minimum recommendation includes a spot repair at the large separated joint.

  The replacement cost for Pipe B021-B020 is estimated at $142,560.

- ***Condition Ranking 17, (Royal Oak Way, s/o Cerritos Avenue)***

  Pipe I065-I064 has a large separated joint which can accumulate debris and lead to an overflow. This reach is an 8-inch sewer that is 152 feet in length. The minimum recommendation includes a spot repair at the large separated joint.

  The replacement cost for Pipe I065-I064 is estimated at $48,384.

- ***Condition Ranking 18 (electric Avenue w/o Rose Street)***

  Pipe I053-I052 is an 8-inch sewer, with length of 152 feet. The sewer has a large separated joint which may accumulate debris and lead to an overflow. The minimum recommendation includes a spot repair at the large separated joint.

  The replacement cost for Pipe I053-I052 is estimated at $65,664.

- ***Condition Ranking 19 (Fern Street, n/o Acacia Avenue)***

  Pipe Z019-Z018 has a section of broken pipe where voids are visible. This reach is an 8-inch sewer that is 358 feet in length. This reach shall be included in the Capacity Improvement Project CI-5.

- ***Condition Ranking 20 (Katella Avenue and Dale Street)***

  Pipe K002-K001 is an 8-inch sewer, with length of 70 feet. The sewer has a section of broken pipe, and there are cracks and fractures throughout the pipe length. The minimum recommendation includes a spot repair at the broken section and relining of the entire pipe.

  The replacement cost for Pipe I053-I052 is estimated at $30,240.

- ***Condition Ranking 21, (Beach Boulevard, n/o Cerritos Avenue)***

  Pipe D011-D001 has a small section of broken pipe where there is a void that is visible. This 10-inch sewer is 290 feet in length. The minimum recommendation includes a spot repair at the broken section.

  The replacement cost for Pipe D011-D001 is estimated at $156,600.

- ***Condition Ranking 22 (Courson Drive, s/o Grand Oaks Drive)***

  Pipe B015-B014 is an 8-inch sewer, with length of 260 feet. The sewer has a multiple cracks and fractures throughout its pipe length. The minimum recommendation includes pipe relining.

  The replacement cost for Pipe B015-B014 is estimated at $112,320.

- ***Condition Ranking 23, (Courson Drive, n/o Cerritos Avenue)***

  Pipe B014-B004 has a multiple cracks and fractures along its pipe length. This 8-inch sewer is 270 feet in length. The minimum recommendation includes pipe relining

  The replacement cost for Pipe B014-B004 is estimated at $116,640.

- ***Condition Ranking 24 (Sycamore Street, s/o Acacia Avenue)***

  Pipe Z004-Z003 is an 8-inch sewer, with length of 260 feet. The sewer has a multiple cracks and fractures throughout its pipe length. This reach shall be included in the Capacity Improvement Project CI-5.

- ***Condition Ranking 25 (Lola Avenue, w/o Yana Drive)***

  Pipe E023-E021 has a multiple cracks and fractures along its pipe length. This 8-inch sewer is 300 feet in length. The minimum recommendation includes pipe relining

  The replacement cost for Pipe E023-E021 is estimated at $129,600.

EXISTING CAPACITY IMPROVEMENT PROJECTS

- ***Project CI-1 (Western Avenue, College Drive to s/o Idylwild Drive)***

  Project CI-1 will replace 812 feet of existing 12-inch pipe, extending from Manhole C013 at College Drive to Manhole I017 south of Idylwild Drive. The hydraulic model showed existing peak dry weather flow (PDWF) depth to diameter ratio of more than 0.65. The flow monitoring results measured a maximum depth to diameter ratio of 0.59. While not deficient per the City's criteria, this reach shall be occasionally monitored and analyzed in more detail during any redevelopment projects. It is recommended to replace this sewer with 812 feet of 15-inch pipe, which will be sufficient to convey the existing and ultimate PDWF.

  The estimated cost for Project CI-1 is $657,469.

- ***Project CI-2 (Sycamore Street, s/o Acacia Avenue to Garden Grove Boulevard)***

  Project CI-2 is located on Sycamore Street, stretching from approximately 300 feet south of Acacia Avenue to Garden Grove Boulevard. The existing 8-inch sewer starts at Manhole Z002 and continues south to Manhole Z831. The system hydraulic model for existing conditions showed existing PDWF depth to diameter ratios up to 0.63. The total length of pipe is approximately 378 feet. It is recommended to replace this reach with 12-inch pipe to accommodate not only the existing conditions but the ultimate conditions as well.

  The estimated cost for Project CI-2 is $244,944.

- ***Project CI-3 (Beach Boulevard, Catherine Avenue to Lampson Avenue)***

  Project CI-3 includes 1,083 feet of pipe from Manhole W009 to Manhole OC09, located on Beach Boulevard. The hydraulic model shows existing PDWF depth to diameter ratios of 0.62. The recommendations to improve the existing sewers to convey the ultimate PDWF include the following: Replace 669 feet of the existing 10-inch pipe with 15-inch pipe, replace 330 feet of 10-inch pipe with 12-inch pipe, and the replace 84 feet of 8-inch pipe with 12-inch pipe.

  The estimated cost for Project CI-3 is $810,314.

- ***Project CI-4 (Cerritos Avenue, Beach Boulevard to Rose Street)***

  Project CI-4 encompasses two sections of 627 feet of pipe on Cerritos Avenue, from Rose Street to Beach Boulevard. The hydraulic model calculated an existing and ultimate PDWF depth to diameter ratio of up to 0.62 and 0.73, respectively. The improvements include increasing the capacity from 15-inch to 18-inch for approximately 615 feet of pipe. The remaining 12 feet of improvements will consist of constructing a 15-inch pipe which will be parallel to the existing 15-inch pipe between Manhole C009 and

C008. The recommended improvements will satisfy the city's criteria for the existing and ultimate conditions.

The estimated cost for Project CI-4 is $607,937.

ULTIMATE CAPACITY DEFICIENCY PROJECTS

- ***Project CI-5 (Fern Street, Acacia Avenue, Sycamore Street)***

  Project CI-5 is 1,263 feet of 8-inch sewer located on Fern Street (Manholes Z020 to Z018), Acacia Avenue (Manholes Z018 to Z004) and Sycamore Street (Manholes Z004 to Z002). The hydraulic model shows the PDWF depth to diameter ratios ranging from 0.80 to full under ultimate conditions. The recommended replacement pipe size is 12-inch.

  The estimated cost for Project CI-5 is $818,450.

- ***Project CI-6 (Rose Street, Cerritos Avenue to Katella Avenue)***

  Project CI-6 is one of three parallel lines on Rose Street. It begins at the intersection on Cerritos Avenue (Manhole C007) and continues south to Katella Avenue (Manhole I010). The hydraulic model showed that this 18-inch sewer has PDWF depth to diameter ratios ranging from 0.63 to 0.65 under ultimate conditions. The total length of the project is approximately 2,626 feet. The recommended replacement pipe size is 21-inch.

  The estimated cost for Project CI-6 is $2,977,374.

- ***Project CI-7 (Katella Avenue, Date Street to Western Avenue and Electric Avenue to Oak Street)***

  Project CI-7 includes 996 feet of sewer on Katella Avenue from Date Street to Western Avenue (Manhole I020 to Manhole I018). The hydraulic model showed this 24-inch sewer to be over 0.63 full under ultimate PDWF conditions. The recommended replacement pipe size is 27-inch.

  Project CI-7 also includes 1,761 feet of sewer on Katella Avenue from Electric Avenue to Oak Street (Manhole J008 to Manhole I021) The hydraulic model showed these sewers to have PDWF depth to diameter ratios that were over 0.70 for ultimate conditions. The recommendations include the following: 2,115 feet of 15-inch sewer, 646 feet of 24-inch sewer, and 996 feet of 27-inch sewer.

  The estimated cost for Project CI- 7 is $4,001,794.

- ***Project CI-8 (Beach Boulevard, La Monte Road to Chapman Avenue)***

  Project CI-8 is located on Beach Boulevard from La Monte Road to Chapman Avenue. (Manhole S016 to Manhole S002). The hydraulic model showed these sewers to have PDWF depth to diameter ratios that were over 0.81. The existing sewers consist of 328' of 8-inch and 10-inch sewers. The replacement sewer includes 339 feet of 15-inch pipe and 1,310 feet of 12-inch pipe.

  The estimated cost for Project CI-8 is $1,123,843.

- ***Project CI-9 (Beach Boulevard, Ruthann Avenue to Katella Avenue)***

  Project CI-9 includes 1,400 feet of 8-inch sewer on Beach Boulevard. (Manhole O003 to J013). The hydraulic model showed this reach may surcharge during peak hours under ultimate conditions. The recommended improvements include 1,050 feet of 12-inch pipe and 350 feet of 10-inch pipe.

  The estimated cost for Project CI-9 is $869,400.

- ***Project CI-10 (Pacific Street, Beach Boulevard to Rose Street)***

  Project CI-10 includes 737 feet of sewer on Pacific Street, starting from west of Beach Boulevard and continues northwest to Rose Street (Manhole J042 to Manhole I104). The hydraulic model shows this 8-inch sewer to reach a PDWF depth to diameter ratio of 0.79 under ultimate conditions. The recommended improvements consist of 303 feet of 10-inch pipe and 434 feet of 12-inch pipe.

  The estimated cost for Project CI-10 is $444,894.

- ***Project CI-11 (Easement west of Court Street, north of Beach Boulevard to Beach Boulevard)***

  Project CI-11 is 464 feet of 8-inch sewer located on an easement between Beach Boulevard and Court Street, north of Garden Grove Boulevard (Manhole Z024 to Manhole Z028). The hydraulic model shows that the PDWF depth to diameter ratios range from 0.69 to 0.75 under ultimate conditions. The recommended replacements include 187 feet of 12-inch pipe and 277 feet of 10-inch pipe.

  The estimated cost for Project CI-11 is $270,622.

- ***Project CI-12 (Starr Street, east of Beach Boulevard to Beach Boulevard)***

  Project CI-12 is 621 feet of 8-inch sewer located on Starr Street, east of Beach Boulevard (Manhole D027 to Manhole D022). The existing hydraulic model showed this reach to have a PDWF depth to diameter ratio of up to 0.67. The recommended replacement size is 10 inch.

  The estimated cost for Project CI-12 is $335,097.

- ***Project CI-13 (Cerritos Avenue, east of Yana Drive to Yana Drive)***

  Project CI-13 is located on Cerritos Avenue, east of Yana Drive (Manhole E006 to Manhole E005A). The ultimate hydraulic model showed a depth to diameter ratio of 0.62. The total length of the sewer is about 296 feet and the recommendation include improving the 8-inch pipe to 10-inch.

  The estimated cost for Project CI-13 is $159,840.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