

TABLE OF CONTENTS

<u>Section</u>		<u>Page</u>
1	EXECUTIVE SUMMARY.....	1-1
	1-1 Introduction.....	1-1
	1-2 Study Area.....	1-2
	1-3 Criteria.....	1-2
	1-4 Existing Wastewater Collection System.....	1-3
	1-5 Pump Stations.....	1-4
	1-6 Hydraulic Model and Collection System Capacity Analysis.....	1-4
	1-7 Collection System Condition Assessment.....	1-8
	1-8 Operation and Maintenance.....	1-12
	1-9 Capital Improvement Program.....	1-15
2	INTRODUCTION.....	2-1
	2-1 Purpose.....	2-1
	2-2 City History and Background.....	2-1
	2-3 Previous Studies and Work Completed.....	2-1
	2-4 Objectives and Scope of the Work.....	2-2
	2-5 Statewide General Waste Discharge Requirements.....	2-4
	2-6 Future Regulations – Capacity, Management, Operations, and Maintenance.....	2-5
	2-7 Government Accounting Standards Board Statement 34.....	2-8
	2-8 Organization of Wastewater Master Plan Report.....	2-8
	2-9 Acknowledgements.....	2-10
	2-10 Abbreviations.....	2-10
3	STUDY AREA.....	3-1
	3-1 Purpose.....	3-1
	3-2 Location.....	3-1
	3-3 Topographical Description and Geology.....	3-1
	3-4 Climate.....	3-4
	3-5 Land Use.....	3-4
	3-6 Population.....	3-9
4	CRITERIA.....	4-1
	4-1 General.....	4-1
	4-2 Flow Monitoring.....	4-1
	4-3 Unit Flow Factors.....	4-4
	4-4 Peaking Factors.....	4-5
	4-5 Inflow and Infiltration.....	4-7
	4-6 Sewer Design Criteria.....	4-7
	4-7 Pump Station Design Criteria.....	4-8
	4-8 Service Life of Pipe and Pump Station Equipment.....	4-11
	4-9 Criteria for Specific Plans and Development Subareas.....	4-11

5	EXISTING WASTEWATER SYSTEM.....	5-1
5-1	General Description.....	5-1
5-2	Sewersheds.....	5-2
5-3	Manhole Districts.....	5-2
5-4	Regional Facilities and Points of Connection.....	5-3
5-5	Existing and Projected Sewage Generation.....	5-6
6	EXISTING PUMP STATIONS	6-1
6-1	General Description.....	6-1
6-2	Bell Ave Pump Station	6-1
6-3	Palm Avenue Pump Station	6-7
6-4	Pacific Avenue Pump Station	6-11
6-5	Poinsettia Avenue Pump Station.....	6-15
6-6	Meadows Avenue Pump Station	6-19
6-7	Voorhees Avenue Pump Station	6-23
6-8	Civic Center Pump Station	6-26
6-9	Pier Pump Station.....	6-27
7	HYDRAULIC MODEL AND COLLECTION SYSTEM CAPACITY ANALYSIS.....	7-1
7-1	General.....	7-1
7-2	Geometric Model	7-1
7-3	Land Use	7-1
7-4	Split Manholes and Flow Patterns.....	7-2
7-5	Tributary Areas.....	7-2
7-6	Model Loads	7-3
7-7	Pumped Flows.....	7-3
7-8	Hydraulic Analysis Results	7-5
8	CONDITION ASSESSMENT	8-1
8-1	Introduction.....	8-1
8-2	Closed Circuit Television (CCTV) Inspections of Gravity Pipes.....	8-1
8-2.1	Inspection Report Database Summary	8-2
8-2.2	Review of Representative CCTV Recordings	8-2
8-2.3	Condition Grading.....	8-4
8-2.4	Rehabilitation and Replacement Priorities	8-11
8-2.5	Follow-up CCTV Inspection and Condition Assessment	8-19
8-3	Manhole Inspections and Assessments.....	8-19
8-3.1	Rehabilitation Priorities.....	8-20
8-3.2	Manhole Improvements.....	8-22
9	OPERATION AND MAINTENANCE.....	9-1
9-1	CCTV Inspection Data.....	9-1
9-2	'Hot Spots'	9-30
9-3	Sanitary Sewer Overflow (SSO) History	9-33
9-4	Maintenance Program	9-34

10 CAPITAL IMPROVEMENT PROGRAM 10-1
10-1 General Description..... 10-1
10-2 Capital Improvement Project Priorities 10-1
10-3 Capital Improvement Program 10-2

APPENDICES – CD INSERT

APP-1 Flow Monitoring Data
App-2 Survey Data
App-3 Sewer Database
App-4 Hydraulic Model Results
App-5 Gravity Pipe Condition Inspection Summary
App-6 Manhole Condition Inspection Summary

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1-1 Pump Stations	1-6
1-2 Pipes with Model Calculated Capacity Deficiencies Downstream of Pump Discharge Points.....	1-8
1-3 Manhole Elements Condition Summary	1-12
1-4 Collection System Capacity Improvement Projects	1-18
1-5 Gravity Sewer Rehabilitation and Replacement Projects	1-19
1-6 Manhole Rehabilitation and Replacement Projects	1-25
1-7 Pump Station and Force Main Improvement Projects.....	1-26
1-8 Wastewater Capital Improvement Program	1-27
2-1 Abbreviations	2-11
3-1 Existing Land Uses.....	3-5
3-2 Residential Density Requirements by District	3-7
4-1 Flow Monitoring Results	4-3
4-2 Unit Flow Factors.....	4-5
4-3 Minimum Sewer Sizes.....	4-8
4-4 Sewer System Criteria.....	4-10
4-5 Planning Criteria for Facility Useful Life	4-11
5-1 Regional Connection Locations.....	5-3
6-1 Pump Stations	6-2
6-2 Bell Avenue Pump Station Tributary Land Uses	6-5
6-3 Palm Avenue Pump Station Tributary Land Uses.....	6-8
6-4 Pacific Avenue Pump Station Tributary Land Uses	6-13
6-5 Poinsettia Avenue Pump Station Tributary Land Uses	6-15
6-6 Meadows Avenue Pump Station Tributary Land Uses.....	6-19
6-7 Voorhees Avenue Pump Station Tributary Land Uses.....	6-23
7-1 Flow Split Locations.....	7-2
7-2 Pipes with Model Calculate Capacity Deficiencies Downstream of Pump Discharge Points ...	7-5
8-1 Defect Codes and Condition Grades	8-5
8-2 Severe and Major Condition Priorities.....	8-14
8-3 Manhole Elements Condition Summary.....	8-20
8-4 Manhole Rehabilitation and Replacement Recommendations and Cost Estimates.....	8-23
9-1 Operation and Maintenance Issues.....	9-2
9-2 Hot Spot Locations	9-30
9-3 Sanitary Sewer Overflow Summary 2007-2009	9-33
10-1 Capital Improvement Projects	10-4
10-2 Gravity Sewer Rehabilitation and Replacement Projects	10-11
10-4 Pump Station and Forcemain Improvement Projects.....	10-12
10-5 Wastewater Capital Improvement Program	10-13

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1-1 Existing Wastewater System	1-5
1-2 Condition Assessment Priority Summary	1-11
1-3 Capital Improvement Projects	1-17
3-1 Regional Location Map.....	3-2
3-2 Soils Map	3-3
3-3 Seasonal Rainfall 1990-2008	3-4
3-4 Existing Land Use Map.....	3-6
3-5 Residential District Boundary Map	3-8
3-6 City of Manhattan Beach Population History	3-10
4-1 Flow Monitoring Locations.....	4-2
4-2 Measured Flow Data	4-4
4-3 Peaking Formula Coefficient “a”	4-6
5-1 Total Length of Gravity Sewer by Size	5-1
5-2 Totally Length of Gravity Sewer by Year of Construction	5-2
5-3 Existing Wastewater System	5-4
5-4 Manhole Districts	5-5
6-1 Pump Station Tributary Areas	6-3
6-2 Bell Avenue Pump Station Tributary Area.....	6-4
6-3 Palm Avenue Pump Station Tributary Area.....	6-9
6-4 Pacific Avenue Pump Station Tributary Area	6-12
6-5 Poinsettia Avenue Pump Station Tributary Area.....	6-16
6-6 Meadows Avenue Pump Station Tributary Area	6-20
6-7 Voorhees Avenue Pump Station Tributary Area	6-24
7-1 Tributary Area Polygons.....	7-3
7-2 Flow Monitoring of 8” Sewer with Influence from Voorhees Pump Station	7-4
7-3 Model Calculated Capacity Deficiency Locations	7-6
8-1 CCTV Inspection Locations.....	8-3
8-2 Sewer Reaches with Identified Deficiencies	8-6
8-3 Deficiency Grades	8-7
8-4 Broken Pipe	8-8
8-5 Holes in Pipe	8-9
8-6 Large Joint Offsets	8-10
8-7 CCTV Inspection Priorities	8-12
8-8 Condition Assessment Priorities.....	8-13
8-9 Manhole Inspections.....	8-21
9-1 Ball Roots	9-25
9-2 Grease	9-26
9-3 Deposits.....	9-27
9-4 Infiltration	9-28
9-5 Obstacles.....	9-29
9-6 Hot Spot Locations	9-32
10-1 Capital Improvement Projects	10-3

LIST OF PHOTOGRAPHS

<u>Photograph</u>	<u>Page</u>
6-1 Bell Avenue Pump Station Access	6-1
6-2 Bell Avenue Pump Station Wet Well	6-5
6-3 Bell Avenue Pump Station Discharge Header	6-6
6-4 Bell Avenue Pump Station Pumps	6-6
6-5 Bell Avenue Pump Station Control Panel.....	6-7
6-6 Palm Avenue Pump Station Access	6-7
6-7 Palm Avenue Pump Station Wet Well.....	6-8
6-8 Palm Avenue Pump Station Discharge Header	6-10
6-9 Palm Avenue Pump Station Control Panel.....	6-10
6-10 Palm Avenue Pump Station Generator	6-11
6-11 Pacific Avenue Pump Station Access	6-11
6-12 Pacific Avenue Pump Station Wet Well.....	6-13
6-13 Pacific Avenue Pump Station Discharge Header.....	6-14
6-14 Pacific Avenue Pump Station Pumps.....	6-14
6-15 Poinsettia Avenue Pump Station Access	6-15
6-16 Poinsettia Avenue Pump Station Wet Well	6-17
6-17 Poinsettia Avenue Pump Station Pumps.....	6-18
6-18 Poinsettia Avenue Pump Station Control Panel.....	6-18
6-19 Meadows Avenue Pump Station Access	6-19
6-20 Meadows Avenue Pump Station Wet Well.....	6-21
6-21 Meadows Avenue Pump Station Discharge Header	6-21
6-22 Meadows Avenue Pump Station Pumps.....	6-22
6-23 Meadows Avenue Pump Station Control Panel	6-22
6-24 Voorhees Avenue Pump Station Wet Well.....	6-23
6-25 Voorhees Avenue Pump Station Discharge Header	6-25
6-26 Voorhees Avenue Pump Station Pumps.....	6-25
6-27 Civic Center Pump Station Access.....	6-26
6-28 Civic Center Pump Station Wet Well.....	6-27
6-29 Civic Center Pump Station Pumps	6-27
6-30 Pier Pump Station Access.....	6-27
6-31 Pier Pump Station Wet Well	6-27
6-32 Pier Pump Station Force Main	6-28
6-33 Pier Pump Station Force Main Close-up.....	6-28