

## TABLE OF CONTENTS

<u>Section</u>		<u>Page</u>
<b>1</b>	<b>EXECUTIVE SUMMARY</b>	
1-1	Introduction .....	1-1
1-2	Study Area .....	1-2
1-3	Existing Drainage System.....	1-3
1-4	Criteria.....	1-4
1-5	Hydrology Study.....	1-6
1-6	Hydraulic Analysis .....	1-6
1-7	Pump Stations .....	1-6
1-8	Recommendations .....	1-7
1-9	Capital Improvement Program (CIP) .....	1-9
1-10	Capital Improvement Project Priorities .....	1-9
<b>2</b>	<b>INTRODUCTION</b>	
2-1	Background .....	2-1
2-2	Past Studies .....	2-3
2-3	Objectives and Scope of Work.....	2-7
2-4	Organization of the Storm Drain Master Plan Report .....	2-8
2-5	Acknowledgments .....	2-9
<b>3</b>	<b>STUDY AREA</b>	
3-1	Purpose.....	3-1
3-2	Location.....	3-1
3-3	Topographical Description .....	3-1
3-4	Soils .....	3-1
3-5	Climate .....	3-3
3-6	Land Use .....	3-3
3-7	Population .....	3-6
<b>4</b>	<b>EXISTING DRAINAGE SYSTEM</b>	
4-1	Los Angeles County Flood Control District Facilities .....	4-1
4-2	Orange County Flood Control District Facilities.....	4-1
4-3	City Drainage Areas and Facilities.....	4-6
4-4	Other Drainage Areas .....	4-23
<b>5</b>	<b>CRITERIA</b>	
5-1	Hydrology .....	5-1
5-2	Levels of Flood Protection .....	5-1
5-3	Hydraulic Analysis Criteria .....	5-1
5-4	Street Capacity Criteria.....	5-3
5-5	Proposed Storm Drain System Criteria.....	5-3
5-6	Downstream Water Surface/HGL Control Criteria .....	5-4

<b>6</b>	<b>HYDROLOGY</b>	
6-1	Methodology.....	6-1
6-2	Drainage Area Delineation.....	6-2
6-3	Sub-Area Parameters (Rational Method) .....	6-3
6-4	Sub-Area Parameters (Unit Hydrograph Method) .....	6-6
6-5	Hydrology Calculation Results .....	6-7
<b>7</b>	<b>HYDRAULIC ANALYSIS</b>	
7-1	Hydraulic Model .....	7-1
7-2	Hydraulic Analysis Results.....	7-1
7-3	Future Storm Drain Facilities .....	7-1
<b>8</b>	<b>PUMP STATION</b>	
8-1	Introduction .....	8-1
8-2	West End Pump Station.....	8-1
8-3	Seal Beach Pump Station .....	8-4
<b>9</b>	<b>RECOMMENDATIONS</b>	
9-1	Southwest Region Drainage Areas.....	9-1
9-2	Northeast Region Drainage Areas.....	9-15
9-3	Northwest Region Drainage Areas .....	9-25
9-4	Communities Outside the Study Area .....	9-26
9-5	Inundation History and Recommendation.....	9-27
9-6	Ad Hoc Street and Storm Drain Committee Assessment Report .....	9-27
<b>10</b>	<b>CAPITAL IMPROVEMENT PROGRAM</b>	
10-1	General .....	10-1
10-2	Capital Improvement Project Priorities.....	10-1
10-3	Capital Improvement Program .....	10-2

**APPENDICES**  
**(Volume 2)**

Appendix A .....	FEMA Maps
Appendix B .....	10-Year Storm
Appendix C .....	25-Year Storm
Appendix D .....	Hydraulic Analysis

## LIST OF FIGURES

<u>Figure</u>		<u>Page</u>
1-1	Recommended Improvements Map.....	1-8
1-2	Southwest Region Capital Improvement Projects .....	1-10
1-3	Northeast Region Capital Improvement Projects – (Alternative No.1) .....	1-11
1-4	Northeast Region Capital Improvement Projects – (Alternative No. 2) .....	1-12
1-5	Northwest Region Capital Improvement Projects .....	1-13
2-1	Planning Communities .....	2-2
3-1	Location Map.....	3-2
3-2	Earthquake Fault Map.....	3-4
3-3	Land Use Map.....	3-5
3-4	City of Seal Beach Population History .....	3-6
4-1	Drainage Study .....	4-7
4-2	Southwest Region Drainage Systems .....	4-8
4-3	Northeast Region Drainage Systems.....	4-9
4-4	Northwest Region Drainage Systems .....	4-10
4-5	North Region Drainage Systems .....	4-11
5-1	Flood Protection Goals.....	5-2
6-1	Hydrological Soil Groups.....	6-5
6-2	Southwest Region Hydrology.....	6-8
6-3	Northeast Region Hydrology.....	6-9
6-4	Northwest Region Hydrology .....	6-10
8-1	Pump Station Tributary Area.....	8-2
9-1	Southwest Region Recommendations.....	9-2
9-2	Northeast Region Recommendations, Alternative No.1 .....	9-3
9-3	Northeast Region Recommendations, Alternative No. 2 .....	9-4
9-4	Northwest Region Recommendations .....	9-5
9-5	Inundation Areas .....	9-28
10-1	Southwest Region Capital Improvement Projects .....	10-3
10-2	Northeast Region Capital Improvement Projects (Alternative No.1) .....	10-4
10-3	Northeast Region Capital Improvement Projects (Alternative No. 2) .....	10-5
10-4	Northwest Region Capital Improvement Projects .....	10-6

## LIST OF TABLES

<u>Table</u>		<u>Page</u>
3-1	Service Area Land Uses .....	3-3
4-1	Original Electric Avenue Drainage System .....	4-13
4-2	Electric Avenue Drainage System .....	4-14
4-3	Seal Beach Boulevard Connector Pipe Drainage System.....	4-15
4-4	Marina Hill Drainage System .....	4-16
4-5	West End Pump Station Main Drainage System .....	4-17
4-6	San Gabriel River Drainage System .....	4-18
4-7	Anaheim Bay Drainage System .....	4-19
4-8	Bolsa Chica Channel Drainage System.....	4-20
4-9	College Park East Drainage System.....	4-21
4-10	College Park West Drainage System (CPW1-CPW3) .....	4-22
4-11	Los Alamitos Drainage System .....	4-23
4-12	Pacific Gateway Business Center Drainage System .....	4-25
6-1	Standard Impervious Factors .....	6-3
9-1	Recommended Improvements Seal Beach Pump Station South Drainage Area Electric Avenue Storm Drains (SB1, SB2, and SB4) .....	9-6
9-2	Recommended Improvements Seal Beach Pump Station Drainage Area North Seal Beach Storm Drain C00P02 .....	9-8
9-3	Recommended Improvements Seal Beach Pump Station Drainage Area North Pacific Coast Highway Storm Drains (SB3-1).....	9-8
9-4	Recommended Improvements Seal Beach Pump Station Drainage Area North Bolsa Avenue, Bay Side Drive, and Harbor Way Storm Drains (SB5) .....	9-9
9-5	Recommended Improvements Seal Beach Pump Station Drainage Area North Marlin Avenue Storm Drains (SB6) .....	9-9
9-6	Recommended Improvements West End Pump Station Drainage Area Electric Avenue Storm Drains (WE1).....	9-11
9-7	Recommended Improvements West End Pump Station Drainage Area Fifth Street and Coastline Drive Storm Drains (WE6) .....	9-12
9-8	Recommended Improvements West End Pump Station Drainage Area Electric Avenue- Main Street Storm Drains (WE4) .....	9-13
9-9	Recommended Improvements West End Pump Station Drainage Area Marina Drive and Pacific Coast Highway Storm Drains (WE5) .....	9-13
9-10	Recommended Improvements San Gabriel River Drainage Area Marina Drive and Central Avenue Storm Drains (SG2) .....	9-14
9-11	Recommended Improvements Anaheim Bay Drainage Area Seal Beach Blvd. Storm Drains (AB1) .....	9-15
9-12	Recommended Improvements Bolsa Chica Channel Drainage Area Almond Avenue Storm Drains (BC1) .....	9-16
9-13	Recommended Improvements Bolsa Chica Channel Drainage Area Fir Avenue Storm Drains (BC2) .....	9-16
9-14	Recommended Improvements College Park East Drainage Area Alternative 1 Guava Avenue, Hazelwood Avenue, and Fir Avenue Storm Drains (CPE1) .....	9-18
9-15	Recommended Improvements College Park East Drainage Area Alternative 1 Elder Avenue Storm Drain (CPE2) .....	9-19

9-16	Recommended Improvements College Park East Drainage Area Alternative 1 Candleberry Avenue Storm Drains (CPE3) .....	9-20
9-17	Recommended Improvements College Park East Drainage Area Alternative 1 Basswood Avenue Storm Drains (CPE4) .....	9-21
9-18	Recommended Improvements College Park East Drainage Area Alternative 2 Aster Street, Candleberry Avenue, and Ironwood Avenue Storm Drains (CPE6).....	9-22
9-19	Recommended Improvements College Park East Drainage Area Alternative 2 Guava Avenue, Hazelwood Avenue, and Fir Avenue Storm Drains (CPE1).....	9-22
9-20	Recommended Improvements College Park East Drainage Area Alternative 2 Elder Avenue Storm Drain (CPE2) .....	9-23
9-21	Recommended Improvements College Park East Drainage Area Alternative 2 Candleberry Avenue Storm Drains (CPE3) .....	9-23
9-22	Recommended Improvements College Park East Drainage Area Alternative 2 Basswood Avenue Storm Drain (CPE4) .....	9-24
9-23	Recommended Improvements College Park East Drainage Area Lampson Avenue Storm Drains (CPE5) .....	9-24
9-24	Recommended Improvements College Park West Drainage Area Harvard Lane, Stanford Lane, College Park Drive and Yale Lane Storm Drains (CPW1-CPW2)	9-25
9-25	Recommended Improvements Los Alamitos Drainage Area Seal Beach Boulevard Storm Drain (LA1) .....	9-26
9-26	Improvements to Current Inundation Areas.....	9-27
9-27	Ad Hoc Street and Storm Drain Committee Improvement Priorities.....	9-29
10-1	Storm Drain Capital Improvement Program, Alternative 1.....	10-7
10-2	Storm Drain Capital Improvement Program, Alternative 2.....	10-11