CITY OF SEAL BEACH
SEWER SYSTEM
MASTER PLAN UPDATE

Submitted to

CITY OF SEAL BEACH

Prepared by

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EXECUTIVE SUMMARY

1-1 Background

The City of Seal Beach (City) was incorporated in 1915 and has been in operation under its own charter since 1964. It covers an area of 11.6 square miles in southwest Orange County. The City's total population in 2005 was 24,537. It is expected to reach 27,471 persons at ultimate buildout, sometime after the year 2030.

The City provides sewer service approximately 5000 customers in the northeast and southwest sections of Seal Beach and the Sunset Aquatic Park. Within the current limits but not served by the City's system are the communities of Leisure World, College Park West, Surfside, and Rossmoor Shopping Center. Estimated population in the sewer service area is 15,751 which is expected to grow to 15,962 by the year 2030.

For over 50 years, Seal Beach was served by its own wastewater treatment plant located at the southwestern edge of the City. In 1972 this plant was demolished, and the system was rerouted to pump to the Orange County Sanitation District (OCSD) system for treatment and disposal. The City continues to operate its sewer system in this manner.

1-2 Land Use

Seal Beach encompasses an area of 7134.5 acres of which 6458 are served by its sewer system. The largest land owner is the U.S. Naval Weapons Station which occupies 5256 acres on the east side of the City. Seal Beach accepts sewage generated on the Base but does not maintain its collection system. Land use in the remaining sectors of the City is predominantly residential (47%). Strip commercial is found along Pacific Coast Highway and Main Street and accounts for 6 percent of the City's land use. Industrial land use is only found at the Boeing facility. The remaining acreage is made up of recreational, institutional and oil extraction land uses.

1-3 Criteria

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

Average dry weather wastewater flows can be reasonably estimated from land use and unit flow factors, with the results then compared to measured flows. The components used to estimate design wastewater flows include unit flow factors, peaking factors, and infiltration/inflow allowances.

Collection system design standards include minimum pipe size, minimum flow velocity, and depth of flow to pipe diameter ratio. Pump station criteria includes sizing requirements for pumps, wet wells and forcemains. It also includes provisions for redundancy, emergency storage, emergency power, and remote monitoring and control.

The unit flow factors utilized in this study were developed from flow monitoring conducted at four locations, as well as water use records.

Peak dry weather flows used in analyzing the system are estimated from average dry weather flows and infiltration as follows:

$Q_{pdw} = 1.85 \times Q_{adw}^{0.92}$ + dry weather infiltration

Design peak dry weather flows will be determined as follows:

$Q_{pdw} = 2.1 \times Q_{adw}^{0.92}$+dry weather infiltration

Peak wet weather flow will be determined as follows:

$Q_{pww}=1.35\ Q_{pdw}$

For new pipes, the depth at peak dry weather flow to pipe diameter ratio will nor exceed 0.5 for pipes 15-inches in diameter and smaller. This ratio shall not exceed 0.64 for larger pipes.

Depth at peak wet weather flow to pipe diameter ratio will not exceed 0.80.

1-4 Inflow and Infiltration

Inflow and infiltration (I/I) is external water which gains entry into the sewer system from the surface or the ground. It can cause surcharging of pipes and increase pumping and treatment costs.

Inflow is the surface water that gains entry into the sewer system through manhole covers or other unsealed openings in the sewer system. The majority of the terrain in the City is very flat. Ponding of water is common in many areas of the City during storm events. Additionally the majority of sewer manholes in the Old Town area are located in the center of back alleys in the direct path of stormwater runoff. Examination of the sewer system flows during storm events showed increases in flow equivalent to 250,000 gallons per day per inch of rainfall in the Old Town area. It is estimated that approximately 2.5 million gallons per year of rainwater is collected, and conveyed through the City's Old Town sewer system.

Infiltration is the water which enters the collection system from the ground, through defective pipe, pipe joint connections or manhole walls. Groundwater levels throughout the City are high, and much of the City's system is located below the water table. Because much of the sewer system is over 40 years old and does not have rubber gasketed joints, infiltration is prevalent. A review of the system indicated that approximately 375 gallons per day per acre (gpd/ac) enters the City's collection system by infiltration in College Park East, and 850 gpd/ac enters the system in the Old Town and Bridgeport areas.

1-5 Existing Collection System Capacity Analysis

The existing wastewater collection system maintained by the City is made up of gravity sewers, pump stations, and sewer force mains. The gravity system consists of approximately 169,000 feet of pipe and 730 manholes. The majority of the gravity sewers are constructed of vitrified clay pipe (VCP) with sizes ranging from 6 inches to 24 inches in diameter. The City maintains seven sewer pump stations and associated force mains.

There are seven major wastewater drainage areas within the City's service area. They include the Pump Station No.35 Sewershed (Bridgeport, Marina Hill South, Marina Hill North, Old Town, and US Naval Weapons Station), Adolfo Lopez Pump Station Sewershed, Boeing Pump Station Sewershed, College Park East/Lampson Sewershed, Old Ranch Towne Center Sewershed, and the Centex Homes Sewershed.

The City is part of the Orange County Sanitation District's Revenue Area 3. All of the sewage generated within the City is ultimately conveyed to one of two OCSD pump stations, where it is then pumped to the OCSD interceptor system for conveyance to Plant No.2 in Huntington Beach for treatment and disposal.

1-6 Existing Collection System Deficiencies and Recommended Improvements

The hydraulic capacity of the entire wastewater collection system was evaluated with the use of a computer hydraulic model. The Model showed that the system did not meet the City's criteria at several locations. These include 5863 feet of pipe in College Park East/Lampson, 3220 feet in Old Town, and 1718 feet in Seal Beach Boulevard.

1-7 Pump Stations

The City of Seal Beach currently owns and operates seven (7) wastewater pump stations

The First Street, Pier and Eighth Street Pump Stations service small areas and discharge into the collection system in Old Town, that eventually drains into the City's Pump Station No.35, located at the intersection of Electric Avenue and Seal Beach Boulevard. Pump Station No.35 collects wastewater generated by the Naval Weapons Station, Bridgeport, Marina Hill, and Old Town. It pumps the wastewater through a 16-inch diameter force main into a 24-inch Seal Beach Boulevard Trunk Sewer just south of Catalina Avenue. The 24-inch diameter gravity sewer extends north in Seal Beach Boulevard, and terminates at the Orange County Sanitation District's Seal Beach Pump Station located north easterly of the intersection of Seal Beach Boulevard and Westminster Avenue.

The Boeing and Adolfo Lopez Pump Stations discharge directly into the Seal Beach Boulevard Trunk Sewer. Aquatic Park Pump Station No.1 serves the Sunset Aquatic Park. Its tributary wastewater was diverted to the City of Huntington Beach system in 2003.

The Boeing Pump Station and Adolfo Lopez Pump Station were recently reconstructed. They meet all current criteria. Pump Station No.35 is planned to be improved in two phases. The Pier Pump Station is very difficult to maintain. The 1st Street and 8th Street Pump Stations are reaching the end of their useful lives and will need to be replaced.

1-8 Collection System Condition Assessment

Thorough knowledge of the system's condition is essential in maximizing the useful life of this very important and significant asset in a cost effective manner.

Additionally, condition assessment of the system and development of a Sewer System Rehabilitation Plan is a requirement of the Waste Discharge Requirements issued by the Regional Water Quality Control Board, Santa Ana Region.

To this end, most of the City's collection system was inspected with the use of closed circuit television recordings in two phases in 2002 and 2004. All the inspection reports and a significant portion of the recordings were reviewed to assess the system's condition. Planning level system rehabilitation and replacement projects were formulated for approximately 28,630 feet of pipe.

1-9 Capital Improvement Program

The ultimate goal of a capital improvement program is to provide the City with a short and long-range planning tool to implement the construction of needed infrastructure improvements in an orderly manner, and to keep pace with the City's growth. To accomplish this goal, it is necessary to determine the estimated cost of the projects included in the capital improvement program and prioritize them in a manner which will result in reliable service in a fiscally responsible manner. Funding mechanisms to finance the improvements can then be identified to implement the program.

The needed capital improvement projects were identified as a result of the analyses conducted and described in Sections 5, 6, and 7 of this report.

Table 1-1 lists the recommended 10-year Capital Improvement program. Figures 1-1 and 1-2 illustrates these projects.

The capital improvement projects recommended by this Master Plan are based upon the best information available at this time. Detailed studies will be necessary to determine the precise scope of each project. The Capital Improvement Program and its priorities should be updated as additional and better information becomes available. The project priorities may be revised to correspond to changed conditions, such as impending facility failures and requirements of new regulations.

1-10 Financial Analysis

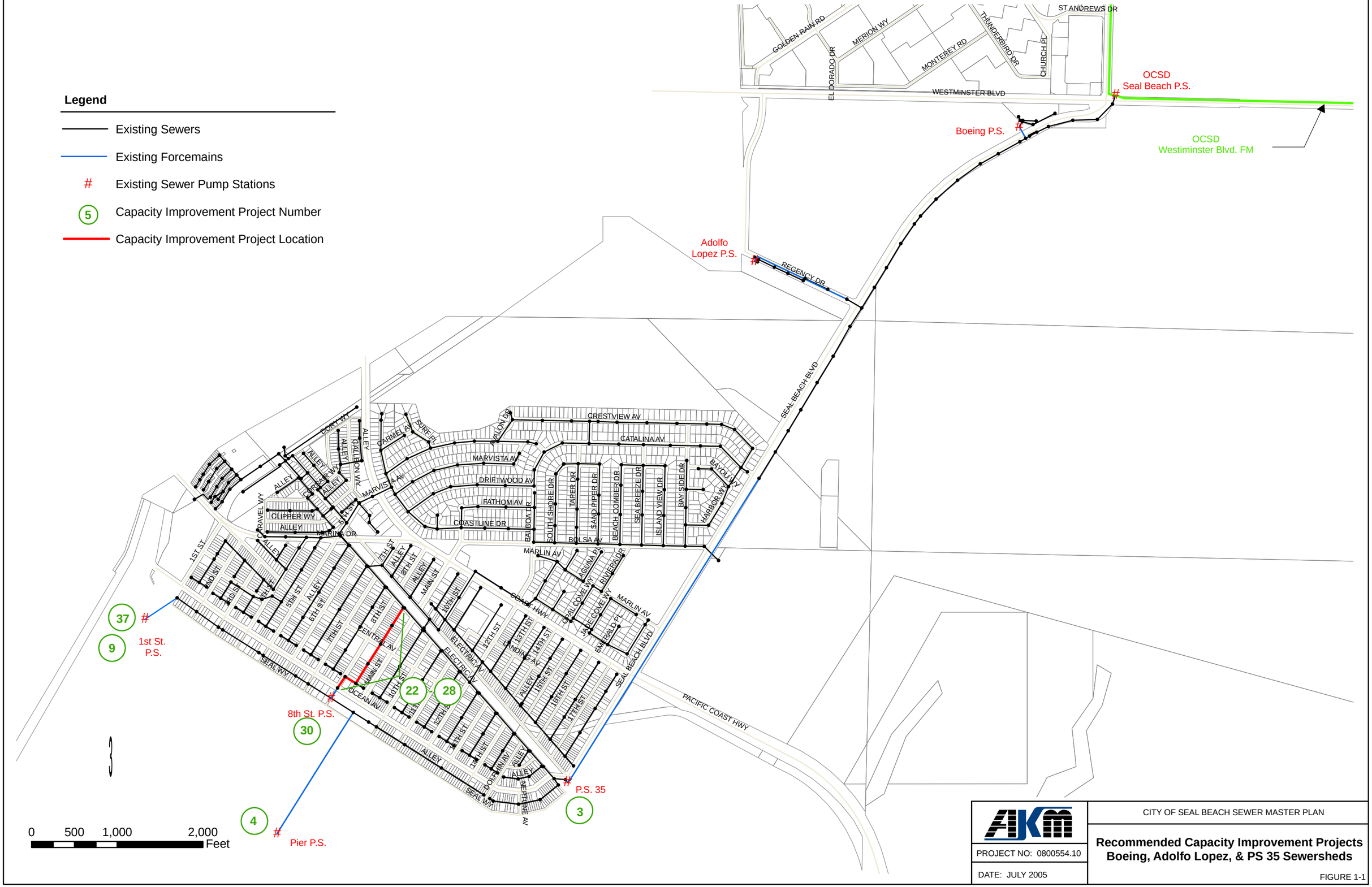
A financial analysis was conducted to evaluate the adequacy of the existing rate structure and alternative funding methods for proper operation and maintenance of the system, and constructing the capital improvements recommended by the Master Plan Update.

Table 1-1
Recommended 10-Year Capital Improvement Program

CIP Program Year	Project No.	Location	Existing Size	Proposed Size	Quantity	Project Cost ($)	Annual CIP Cost ($)
1	1	Seal Beach Blvd, east of Lampson Ave. to Los Alamitos Sub-trunk		18	190	240,000	
	2	Sewer System Rehabilitation Projects			1200	1,000,000	1,240,000
2	3	Pump Station No.35 Improvements-Phase 2		-	1	800,000	
	4	Pier Pump Station Improvements		-	1	515,000	
	5	Lampson Ave. south of Basswood St.	15	18	244	222,000	
	6	Basswood St. east of Lampson Ave.	12	18	270	245,000	
	7	Basswood St. west of Aster St.	12	18	191	176,000	
	8	Sewer System Rehabilitation Projects		-	Various	100,000	
	9	Sewer System Rehabilitation Project-1st Street Pump Station		-	1	181,000	2,239,000
3	10	Candleberry Ave. east of Ironwood Ave.	10	15	222	175,000	
	11	Ironwood Ave. west of Dogwood Ave.	10	15	268	210,000	
	12	Ironwood Ave. west of Elder Ave.	10	15	254	199,000	
	13	Elder Ave. east of Ironwood Ave.	8	12	265	168,000	
	14	Elder Ave. east of Ironwood Ave.	8	12	230	147,000	
	15	Elder Ave. east of Ironwood Ave.	8	12	237	151,000	
	16	Elder Ave. east of Ironwood Ave.	8	12	272	172,000	
	17	Elder Ave. west of Heather St.	8	12	225	144,000	
	18	Elder Ave. west of Heather St.	8	12	220	141,000	
	19	Elder Ave. west of Heather St.	8	12	290	183,000	
	20	Elder Ave. west of Heather St.	8	12	256	162,000	
	21	Sewer System Rehabilitation Projects		-	Various	248,000	2,100,000
4	22	Eighth St. Alley south of Electric Ave.	8	15	9	15,000	
	23	Eighth St. Alley south of Electric Ave.	8	15	244	198,000	
	24	Eighth St. Alley north of Central Ave.	8	15	255	206,000	
	25	Eighth St. Alley south of Central Ave.	8	15	274	221,000	
	26	Eighth St. Alley north of Ocean Ave. Alley	8	15	269	217,000	
	27	Ocean Ave. Alley east of Eighth St.	8	15	145	121,000	
	28	Eighth St. north of Ocean Ave.	8	15	160	133,000	
	29	Sewer System Rehabilitation Projects		-	Various	239,000	1,350,000
5	30	8th Street Pump Station		2x500 gpm	1	1,519,000	1,519,000
6	31	Aster St. north of Basswood St.	12	15	138	123,000	
	32	Aster St. west of Candleberry Ave	12	15	233	201,000	
	33	Aster St. west of Candleberry Ave	12	15	230	198,000	
	34	Aster St. west of Birchwood Ave.	12	15	255	219,000	
	35	Aster St. west of Candleberry Ave	12	15	253	217,000	
	36	Sewer System Rehabilitation Projects		-	Various	292,000	1,250,000
7	37	1st Street Pump Station Replacement		2x125 gpm	1	597,000	
	38	Sewer System Rehabilitation Projects		-	Various	691,000	1,288,000
8	39	Sewer System Rehabilitation Projects		-	Various	1,326,000	1,326,000
9	40	Sewer System Rehabilitation Projects		-	Various	1,366,000	1,366,000
10	41	Sewer System Rehabilitation Projects		-	Various	1,407,000	1,407,000
		Total					15,085,000

Legend

- Existing Sewers
- Existing Forcemains
- # Existing Sewer Pump Stations
- (5) Capacity Improvement Project Number
- Capacity Improvement Project Location



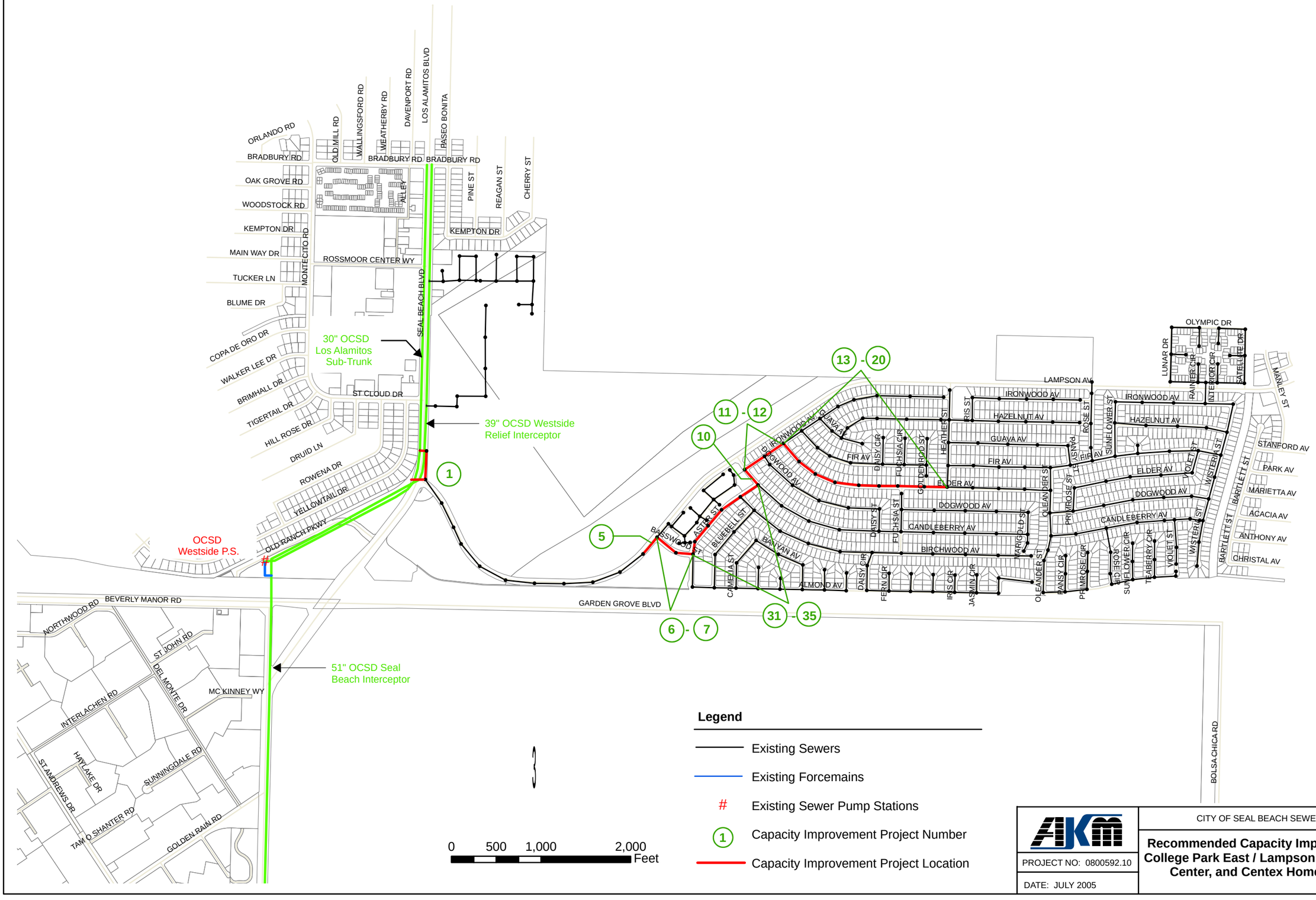
CITY OF SEAL BEACH SEWER MASTER PLAN

Recommended Capacity Improvement Projects
Boeing, Adolfo Lopez, & PS 35 Sewersheds

PROJECT NO: 0800554.10

DATE: JULY 2005

FIGURE 1-1



CITY OF SEAL BEACH SEWER MASTER PLAN

Recommended Capacity Improvement Projects College Park East / Lampson, Old Ranch Towne Center, and Centex Homes Sewersheds

PROJECT NO: 0800592.10

DATE: JULY 2005

FIGURE 1-2

The City's Sewer Enterprise has two charges. One is the Sewer Service Charge, which is 22 percent of the water bill for all customers connected to the sewer system. The second charge, which was first established in 2001, is the Capital Fund Charge. It varies by customer class and water meter size. The existing Sewer Service Charges generate sufficient revenues for operation and maintenance of the system. However, the Capital Fund Charges cannot support the recommended Capital Improvement Plan.

This study evaluated a pay-as-you-go alternative, (Alternative 1) and a combination pay-as-you-go/pay-as-you-use alternative (Alternative 2). Because of the more gradual increases in the Capital Fund Charges, Alternative 2 is recommended. It includes the issuance of $7,000,000 debt, which will cover the issuance costs, and the debt service reserve. Approximately $6,000,000 will be available for the Capital Improvement Plan.

Figure 1-3 shows the comparison of the Capital Fund Charges with the two alternatives evaluated. Table 1-2 shows the increases in the Capital Fund Charges through Fiscal Year 2016-2017 with Alternative 2.

Table 1-3 and Figure 1-4 illustrate the average monthly sewer bills for a single family residential Seal Beach customer with a ¾-inch water meter for the next four years in comparison to the monthly bills for several Orange County Agencies.

The City of Seal Beach has only 5000 customers to fund the requirements of this old system that had no replacement or rehabilitation until 2001. Additionally, the City's system includes seven pump stations which require frequent replacement of mechanical and electrical equipment. Villa Park, with a much newer system and only one pump station will have monthly sewer bills higher than Seal Beach. Fullerton has a very large customer base but the proposed monthly bills are higher than the first three years of Seal Beach bills.

Figure 1-3
Monthly Capital Fund Charges for the Two Alternatives

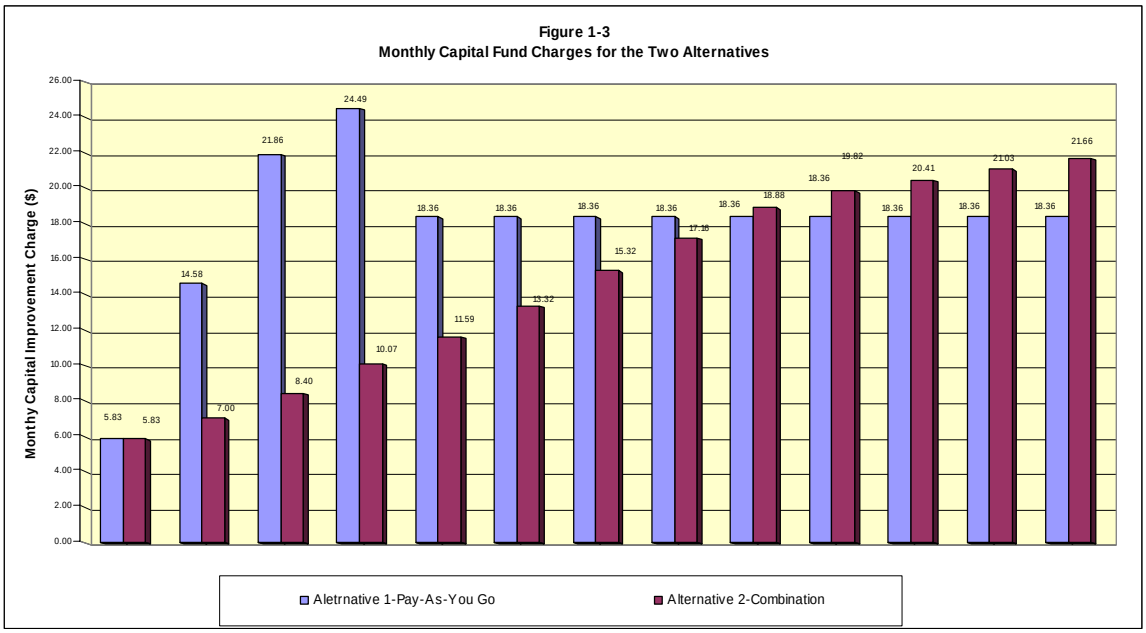
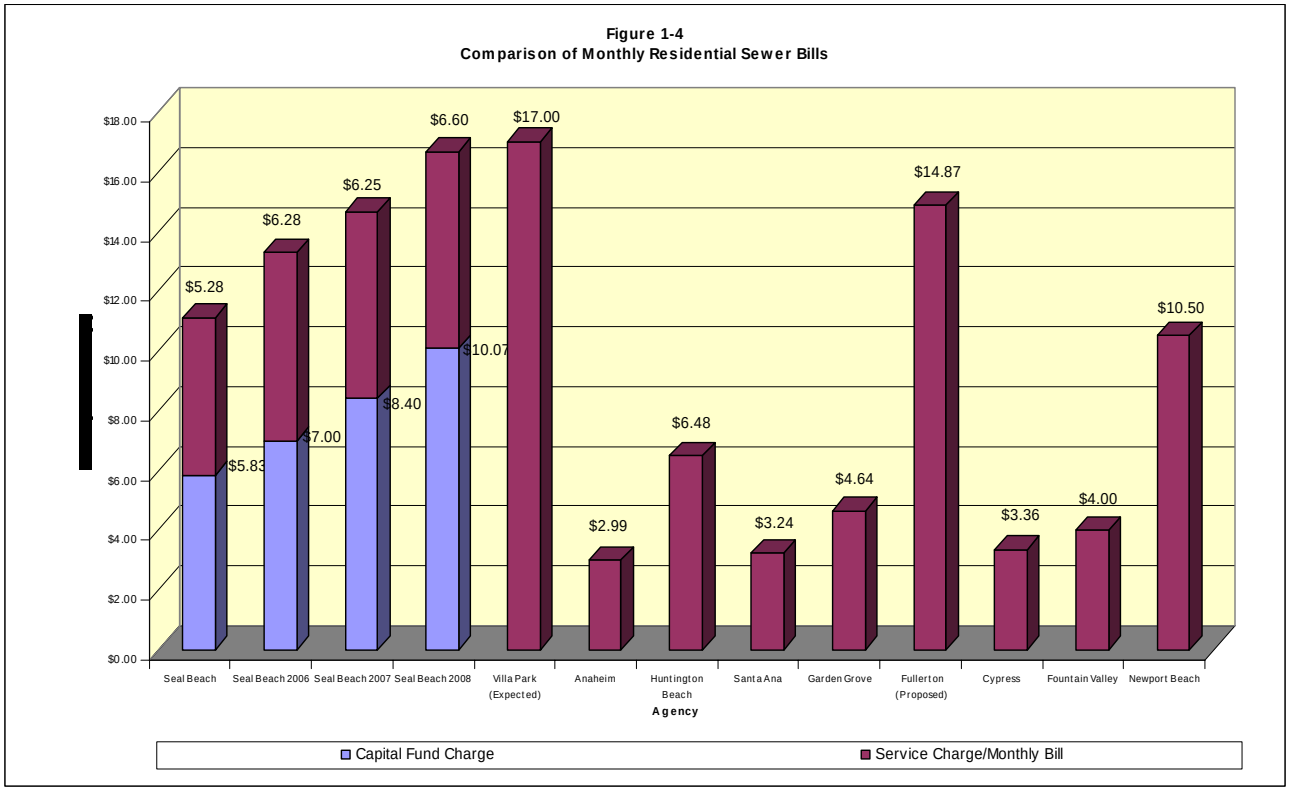


Table 1-2
Capital Improvement Charges with $ 7M Bond Alternative

Meter Size	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17
Residential													
1	8.06	9.67	11.61	13.93	16.02	18.42	21.18	23.72	26.10	27.40	28.22	29.07	29.94
2	23.32	27.98	33.58	40.30	46.34	53.29	61.29	68.64	75.51	79.28	81.66	84.11	86.63
3	165.36	198.43	238.12	285.74	328.60	377.89	434.58	486.73	535.40	562.17	579.04	596.41	614.30
4	276.66	331.99	398.39	478.07	549.78	632.25	727.08	814.33	895.77	940.55	968.77	997.83	1,027.77
1.5	14.84	17.81	21.37	25.64	29.49	33.91	39.00	43.68	48.05	50.45	51.96	53.52	55.13
3/4	5.83	7.00	8.40	10.07	11.59	13.32	15.32	17.16	18.88	19.82	20.41	21.03	21.66
5/8	5.83	7.00	8.40	10.07	11.59	13.32	15.32	17.16	18.88	19.82	20.41	21.03	21.66
% increase	0%	20%	20%	20%	15%	15%	15%	12%	10%	5%	3%	3%	3%
Meter Size	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17
Commercial/Government													
1	13.78	16.54	19.84	23.81	27.38	31.49	36.21	40.56	44.62	46.85	48.25	49.70	51.19
2	72.08	86.50	103.80	124.55	143.24	164.72	189.43	212.16	233.38	245.05	252.40	259.97	267.77
3	199.28	239.14	286.96	344.36	396.01	455.41	523.72	586.57	645.23	677.49	697.81	718.75	740.31
4	359.34	431.21	517.45	620.94	714.08	821.19	944.37	1,057.70	1,163.47	1,221.64	1,258.29	1,296.04	1,334.92
6	507.74	609.29	731.15	877.37	1,008.98	1,160.33	1,334.38	1,494.50	1,643.95	1,726.15	1,777.93	1,831.27	1,886.21
8	1060.00	1,272.00	1,526.40	1,831.68	2,106.43	2,422.40	2,785.76	3,120.05	3,432.05	3,603.65	3,711.76	3,823.12	3,937.81
10	1060.00	1,272.00	1,526.40	1,831.68	2,106.43	2,422.40	2,785.76	3,120.05	3,432.05	3,603.65	3,711.76	3,823.12	3,937.81
1.5	18.02	21.62	25.95	31.14	35.81	41.18	47.36	53.04	58.34	61.26	63.10	64.99	66.94
3/4	6.36	7.63	9.16	10.99	12.64	14.53	16.71	18.72	20.59	21.62	22.27	22.94	23.63
5/8	6.36	7.63	9.16	10.99	12.64	14.53	16.71	18.72	20.59	21.62	22.27	22.94	23.63

Table 1-3
Comparison of Monthly Sewer Bills

Capital Fund Charge	Service Charge/Monthly Bill
$5.83	$5.28
$7.00	$6.28
$8.40	$6.25
$10.07	$6.60
$0.00	$17.00
$0.00	$2.99
$0.00	$6.48
$0.00	$3.24
$0.00	$4.64
$0.00	$14.87
$0.00	$3.36
$0.00	$4.00
$0.00	$10.50



Section 2

INTRODUCTION AND REQUIREMENT

2-1 Background

The City of Seal Beach was incorporated in 1915 and has been in operation under its own charter since 1964. It covers an area of 11.51 square miles in the northwest corner of Orange County. The City's total population was 24,157 in 2000 (Census information) and the current population is 25,058. The expected ultimate population is 27,401.

Originally called Bay City, Seal Beach was developed in the early 1900's as a resort destination for residents of the Los Angeles area. Its early growth was accelerated by the construction of the Pacific Electric Railway Trolley, which reached the City in 1906. The railway allowed visitors to reach the City more easily and in greater numbers to enjoy the many hotels, bathhouses and dance halls which were constructed for their recreation. In 1926, oil was discovered in the City, and the oil boom that followed resulted in the development of Seal Beach into the residential community it is today.

The City is divided into several distinct communities. Old Town, which is the area south of Electric Avenue and Marina Drive, between 1st Street and Seal Beach Boulevard, was developed in the 1920's and is the oldest area within the City's corporate limits. High density residential and commercial land uses are prevalent in this area. Large single-family residential lots located directly on the beach are found in the Gold Coast District. The City's mile long beach in Old Town is used for surfing and swimming. The Seal Beach Pier, located at the end of Main Street, provides fishing facilities and a restaurant.

Bridgeport is the area located west of Pacific Coast Highway and north of Marina Drive. It was primarily developed in the 1960's and consists of medium density and high density residential land uses (Oakwood Apartments and Seal Beach Mobile Home Park).

Marina Hill was developed in the 1950's and consists of single-family homes. This area is located north of Pacific Coast Highway, adjacent to the southerly edge of the Hellman Ranch property.

Surfside, a colony which was incorporated in the 1930's, became a part of Seal Beach in 1969. The area consists of single-family homes located on the south spit of Anaheim Bay. Although a gated community, pedestrian and bicycle access to the beach is available and it is a popular location for surfing and swimming.

College Park East and West were both developed in the late 1960's. They are single-family residential communities located north of the San Diego Freeway.

The Leisure World Retirement Community is located between Westminster Boulevard and the San Diego Freeway west of Seal Beach Boulevard. It was built in 1961 and is a gated community of 1200 acres. Leisure World includes 6482 cooperative apartments and 126 condominiums housing an approximate population of 9000. Leisure World provides a secure, serene environment for seniors 55 and older. Medical, religious, commercial and recreational facilities are all provided within the compound limits.

Boeing Integrated Defense Systems occupies 107 acres southwest of Seal Beach Boulevard and Westminster Avenue. The plant manufactures satellites, and has laboratory and testing facilities to support Boeing's space program. Engineering

and design operations are also conducted from this facility. The remaining land will be developed as a business park combined with hotel, commercial, and light industrial uses.

Hellman Ranch occupies 231-acre parcel of land located west of Seal Beach Boulevard, just north of the Marina Hill Community. Development plans 70 single-family residences, the Gum Grove Nature Park, public access, oil extraction, saltwater marsh wetlands, and freshwater wetlands.

Anaheim Bay, once part of an extensive system of coastal marshes, consists of an outer harbor formed by jetties, an inner harbor dredged to accommodate oceangoing ships, and a wetland system of salt marshes and tidal channels. In 1944, the U.S. Navy acquired 5,256 acres (including the Wildlife Refuge) of the Bay and adjoining property for construction of the Naval Weapons Station. This is the largest land use within the City's limits.

The Seal Beach National Wildlife Refuge was established in 1972 and preserves 920 acres of salt marsh and upland area in Anaheim Bay. The refuge is located within the boundaries of the U.S. Naval Weapons Station and there is no public access.

Sunset Aquatic Park was acquired by the County in 1962 from the U.S. Navy. It encompasses 67 acres of Anaheim Bay and is the site of a public marina and park.

2.2 Wastewater Service

The Seal Beach Public Works Division provides wastewater collection service to approximately 5,000 customers in the northeast and southwest portions of the City and the Sunset Aquatic Park. The northeast region covers the College Park East area, Old Ranch Golf Course, Old Ranch Towne Center and Centex Homes. It is bounded by the San Diego Freeway to the south, Bolsa Chica Channel to the east, the Armed Forces Reserve Center to the north, and Seal Beach Boulevard to the west. The predominant land use in College Park East and Centex Homes is residential low density (RLD) housing. Old Ranch Towne Center is a commercial area.

The southwest region is the area of the City located south of Westminster Avenue and mostly west of Seal Beach Boulevard. This includes the Boeing Integrated Defense Systems, Adolfo Lopez Drive, Hellman Ranch, and the areas of Bridgeport, Marina Hill, and Old Town. The City does not maintain the sewers serving the Naval Weapons Station, but accepts flows from the Base at its main pump station (Pump Station No.35).

The remainder of the City is serviced by either the Orange County Sanitation District (OCSD), the Rossmoor/Los Alamitos Area Sewer District, or the Sunset Beach Sanitary District (SBSD).

Until 1972, Seal Beach treated and disposed of sewage generated in the City through a local wastewater treatment plant located on the southwestern edge of the City. The main trunk line carried flows west in Electric Avenue to the treatment plant. In 1972, the City demolished the sewage treatment plant and rerouted the system so that the wastewater would ultimately be treated and disposed of by the Orange County Sanitation District. The main trunk line was replaced with a 21-inch/24-inch vitrified clay pipe (vcp) interceptor sewer that carried flows east in Electric Avenue to the newly constructed Pump Station No.35. At the same time, a 16-inch ductile steel force main and 24-inch vcp gravity line were constructed in Seal Beach Boulevard from Pump Station No.35 to the OCSD Seal Beach Pump Station at the corner of Seal Beach Boulevard and Westminster Avenue. The Seal Beach Pump Station lifts the sewage into the OCSD system where it is conveyed by gravity

to Plant Number 2 in Huntington Beach for treatment and disposal.

The existing wastewater system consists of 169,000 feet of gravity sewers, 730 manholes, seven sewer pump stations and their force mains.

2-3 Previous Studies

The City of Seal Beach's first comprehensive Sewer System Master Plan was completed in 1999. It developed service criteria, evaluated the capacity of the then existing system, identified future capacity deficiencies, and recommended a capital improvement program to relieve the existing and future capacity deficiencies. Additionally, the 1999 Master Plan evaluated the condition and capacity of the nine sewer pump stations that existed at the time. It recommended the elimination of two pump stations, and improvements to the remaining seven to ascertain that these critical facilities provide proper service.

The City of Seal Beach updated its sewer rate structure in 2001. The new structure included a Capital Fund Fee to provide dedicated revenues for constructing the facilities recommended by the Master Plan.

Since 1999, the City implemented several of the recommended improvements, including:

- Replacement of a portion of the Pump Station No.35 force main with a gravity sewer in Seal Beach Boulevard
- Elimination of the Marina Community Center Pump Station
- Replacement of old 6-inch sewers in several alleys of Old Town
- Diversion of Sunset Aquatic Park wastewater flows to the City of Huntington Beach system and elimination of Aquatic Park Pump Station No.2
- Replacement of Boeing Pump Station
- Replacement of Adolfo Lopez Pump Station

The California Regional Water Quality Control Board, Santa Ana Region issued Order No. R8-2002-0014, General Waste Discharge Requirements (WDR) for Sewage Collection Agencies in Orange County within the Santa Ana Region. The Order prohibits the discharge of untreated sewage to any surface water stream, natural or manmade, or to any drainage system intended to convey storm water runoff to surface water streams. It contains thirteen provisions, which include:

Provision 7: The discharger shall properly fund, manage, operate and maintain, with adequately trained staff and/or contractors possessing adequate knowledge skills, and abilities as demonstrated through a validated program at all times, all parts of the sewage collection system owned and operated by the discharger.

Provision 8:

The discharger shall provide adequate capacity to convey base flows and peak flows, including wet weather related events to the minimum design criteria as defined in the discharger's System Evaluation and Capacity Assurance Plan, for all parts of the collection system owned and operated by the discharger.

Provision 9:

The discharger shall take all feasible steps to stop, and mitigate the impact of, sanitary sewer overflows in portions of the collection system owned and operated by the discharger.

Provision 11:

The discharger shall develop and implement a written plan, a Sewer System Management Plan (SSMP), for compliance with these waste discharge requirements and make it available to any member of the public upon request in writing.

In addition to the System Evaluation and Capacity Assurance Plan, the SSMP requires the preparation of an

- Overflow Emergency Response Plan
- Preventative Maintenance Plan
- Fats, Oils, and Grease Control Program
- Sewer System Rehabilitation Plan

The City completed and submitted all the requirements of the Order, excepting the Sewer System Rehabilitation Plan, which is due on or before September 30, 2005.

The City of Seal Beach is in the process of completing a financial study reviewing the revenues needed to meet all the requirements of the Order. Upon adoption by the City Council, the sewer rates will be adjusted to comply with Provision 7.

2-4 Objective

The purpose of this study is to provide the City of Seal Beach with a comprehensive Sewer System Master Plan Update that evaluates the condition and capacity of the entire collection system and the pump stations, and develops a capital improvement program with current cost estimates for eliminating the deficiencies identified. The products of the study will be used for meeting the requirements of Order No. R8-2002-0014. The recommended capital improvement program and the operational needs of the system will be utilized in conducting financial studies and developing a funding mechanism for a sustainable Sewer Enterprise.

2-5 Abbreviations

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

Table 2-1
Abbreviations

Abbreviations	Explanation
ac	Acres
acp	Asbestos Cement Pipe
amsl	Above Mean Sea Level
cfs	Cubic Feet per Second
cip	Cast Iron Pipe
CIP	Capital Improvement Program
City	City of Seal Beach
d/D	Depth to Diameter Ratio
du	Dwelling Unit
dip	Ductile Iron Pipe
fps	Feet per Second
GIS	Geographic Information System
gpcd	Gallons per Capita per Day
gpd	Gallons per Day
gpm	Gallons per Minute
HGL	Hydraulic Grade Line
hp	Horsepower
hwy	Highway
I/I	Inflow and Infiltration
KTSS	Knott Trunk Sewer System
LADWP	Los Angeles Department of Water and Power
LF	Length Feet
mg	Million Gallons
mgd	Million Gallons per Day
NEC	National Electric Code
NFPA	National Fire Prevention Association
OCSD	Orange County Sanitation District
O&M	Operations and Maintenance
OSHA	Occupational Safety & Health Administration
PCH	Pacific Coast Highway
PHD	Peak Hour Demand
pvc	Polyvinyl Chloride
RLD	Residential Low Density
RMD	Residential Medium Density
RHD	Residential High Density
SBSD	Sunset Beach Sanitary District
tsf	Thousand Square Feet
USGS	United States Geological Survey
vcp	Vitrified Clay Pipe
VFD	Variable Frequency Drive

Section 3

STUDY AREA

3-1 Purpose

This section describes the study area of the Sewer Master Plan, existing and future land uses within the study area, and population estimates for present day and ultimate build-out. This information is utilized in the subsequent sections for determining the design flows.

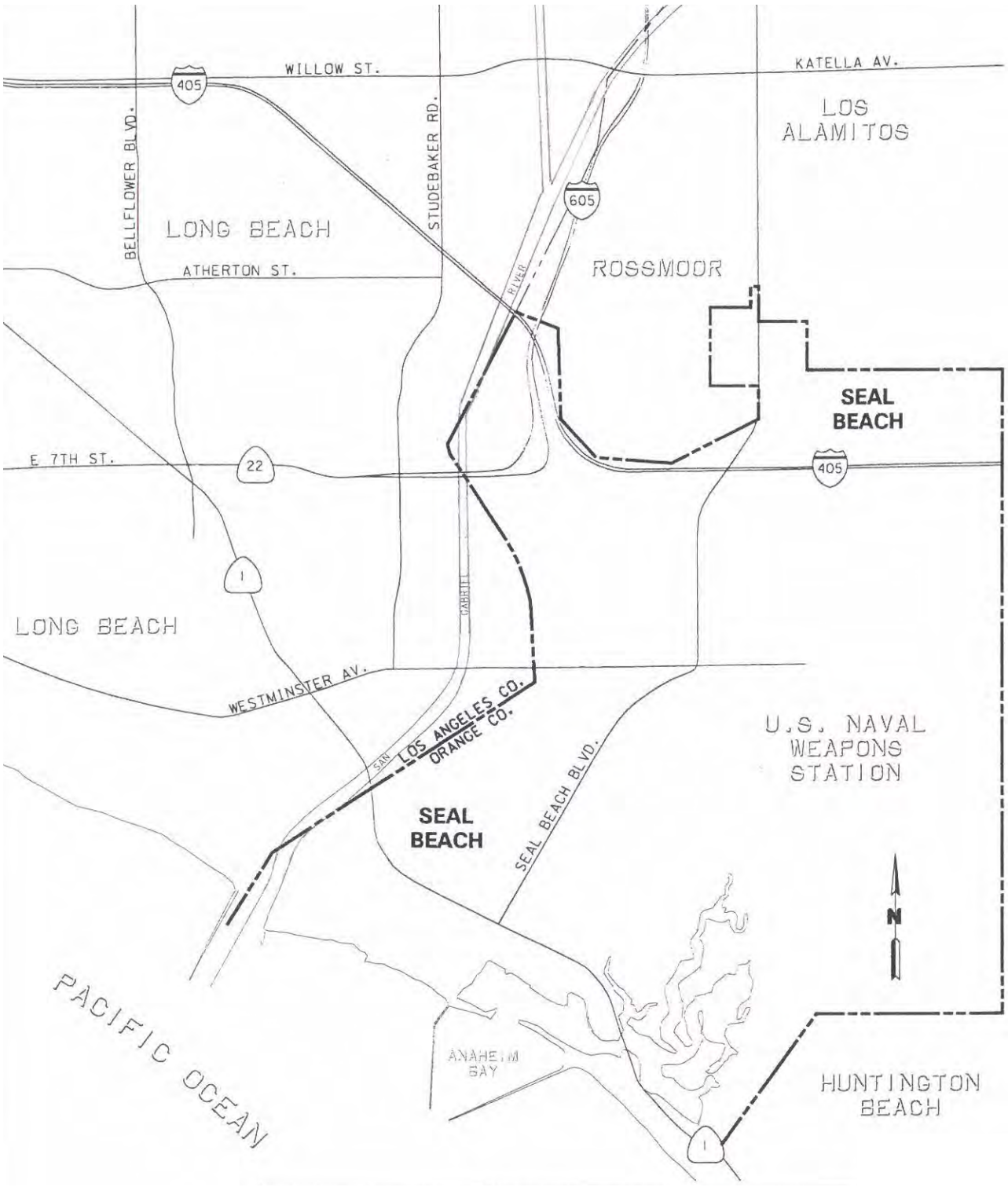
3-2 Location

The City of Seal Beach is located along the California coastline in northwestern Orange County. It is bordered to the north by the City of Los Alamitos, and the unincorporated Rossmoor community; to the east by the Cities of Garden Grove, Westminster, and Huntington Beach; to the south by the Pacific Ocean and City of Huntington Beach; and to the west by the City of Long Beach (Los Angeles County). Figure 3-1 shows the location of the City of Seal Beach and the neighboring communities.

The study area includes those territories receiving wastewater service from the City of Seal Beach. It covers approximately 6458 acres of the City's 7135 acre area. The U.S. Naval Weapons Station accounts for 5256 acres of this total. The City's wastewater collection system consists of several separate sewersheds:

- Bridgeport, Old Town, Marina Hill North, Marina Hill South and US Naval Weapons Station drain to Pump Station No.35, located east of Seal Beach Boulevard and north of Electric Avenue
- Hellman Ranch, properties along Adolfo Lopez Drive, and the southerly portion of Boeing Integrated Defense Systems drain to the Adolfo Lopez Pump Station located in the City's Maintenance Yard south of Adolfo Lopez Drive
- The northerly portion of Boeing Integrated Defense Systems and the commercial area located south of Westminster Avenue and west of Seal Beach Boulevard drain to the Boeing Pump Station located west of Seal Beach Boulevard and south of Westminster Avenue
- College Park East, Old Ranch Golf Course, and the commercial properties south of Lampson Avenue and east of Seal Beach Boulevard drain to Orange County Sanitation District's Los Alamitos Sub-trunk Sewer (Contract 3-8) at the intersection of Lampson Avenue and Seal Beach Boulevard.
- Sunset Aquatic Park drains to the Aquatic Park Pump Station, which pumps the wastewater to the City of Huntington Beach system.
- Old Ranch Towne Center, located east of Seal Beach Boulevard and north of Lampson Avenue drains to Orange County Sanitation District's West Side Relief Interceptor (Contract 3-21-1) in Seal Beach Boulevard.
- Centex Homes, located north of Old Ranch Towne Center drains to OCSD's West Side Relief Interceptor at Seal Beach Boulevard and Plymouth Drive

Figure 3-2 shows the Wastewater Collection System Service Areas. Each of these service areas lie entirely within the corporate boundaries of Seal Beach, with the exception of College Park East/Lampson.



AKM	CITY OF SEAL BEACH SEWER MASTER PLAN
PROJECT NO.: 0800592.10	**Location Map**
DATE: JULY 2005	FIGURE 3-1

CITY OF SEAL BEACH SEWER MASTER PLAN

Wastewater Collection System Service Areas

PROJECT NO.: 0800592.10

DATE: JULY 2005

FIGURE 3-2

A small residential housing tract located north of Lampson Avenue and west of Bolsa Chica Channel, which is in the City of Los Alamitos, drains into the College Park East/Lampson system at Tulip Street and Lampson Avenue.

The Leisure World Retirement Community is served directly by the Orange County Sanitation District (OCSD). Southerly portion of the community drains into Orange County Sanitation District's Seal Beach Interceptor in Seal Beach Boulevard, which terminates at the Seal Beach Pump Station. The remainder drains northerly across 405 Freeway into Los Alamitos Sub-trunk.

The Bixby Ranch and Rossmoor Center commercial areas, located north of the San Diego Freeway and west of Seal Beach Boulevard, are also served by Rossmoor/Los Alamitos Area Sewer District.

The Rossmoor-Los Alamitos Area Sewer District serves most of the College Park West community with the exception of the sewers in Loyola Plaza and College Park Drive, between Loyola Plaza and Harvard Lane which are maintained by the City (not included in this study).

Surfside, a coastal residential community, south of Pacific Coast Highway and east of Seal Beach Boulevard, is served by the Sunset Beach Sanitary District (SBSD).

3-3 Topographical Description

The majority of the City is located within an alluvial plain that extends southward from the convergence of Coyote Creek and the San Gabriel River. The two channels drain from the northeast and north respectively and the combined flow reaches the ocean at the Alamitos Gap. Landing Hill, located within Seal Beach, Alamitos Heights in Long Beach, and Bolsa Chica Mesa in Huntington Beach, consist of uplifted blocks within the Newport-Inglewoood fault zone, and are the major topographic features within and near the City.

Ground surface elevations in the study area vary between sea level at the Pacific Ocean and 54 feet above mean sea level (amsl) at Landing Hill (Marina Hill North).

The highest elevations in the Old Town area south of Pacific Coast Highway are found along Ocean Avenue between Second Street and Main Street (26 feet amsl). This area slopes down north towards Electric Avenue and south towards the Pacific Ocean. The remaining portions of Old Town, Bridgeport, and Marina Hill South are very flat, which seems to have resulted in the construction of facilities with minimal slopes.

Hellman Ranch, The Adolfo Lopez and westerly portion of Boeing Integrated Defense Systems (also known as Pacific Gateway Business Center) slope towards the west end of Adolfo Lopez Drive. Elevations vary from 40 feet amsl in Hellman Ranch to 6 feet amsl between the City's Maintenance Yard and the Animal Shelter.

The easterly portion of Boeing Integrated Defense Systems slopes east towards Seal Beach Boulevard. The elevations in this area vary from 27 feet to 9 feet amsl.

The College Park East area slopes southwesterly from 23 feet amsl at Lampson Avenue and Bolsa Chica Channel to 16 feet at Lampson Avenue and Basswood Street.

The Old Ranch Towne Center and Centex Homes generally slope from east to west towards Seal Beach Boulevard. Elevations vary from 15 feet to 12 feet amsl.

Table 3-1
Soil Classifications within Service Area

Service Area Region	Soil Classification Hydrologic Group
Bridgeport	B
College Park East - East Residential Area	C
College Park East - West Residential Area	B
College Park East – Golf Course	C
Marina Hill	D
Old Town	B
U.S. Naval Weapons Station	C
Future Hellman Ranch Site & Boeing Facility	C & D

3-4 Geotechnical Information

The predominant soil classifications found within each of the major regions of the City's service area are shown in Table 3-1.

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. Group D soils consist primarily of clays which have very slow infiltration rates when thoroughly wetted.

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

High groundwater is prevalent throughout the City. Groundwater levels in the Old Town, and Bridgeport areas are at approximately elevation +3.0 feet amsl. Sewers in these low-lying areas are therefore continually under the influence of groundwater. Sewers in the community of Marina Hill North are mostly at elevations above the groundwater table and should not be affected by significant rates of infiltration.

Groundwater levels in College Park East are also known to be high (10-15 feet amsl). Some of the sewers in this area are also located within the groundwater zone and subject to high levels of infiltration.

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 in the City is about 11 inches. 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 System Master Plan was obtained from the following sources:

a. City land use map

b. Land Use Element and resolutions of City General Plan last updated December 2003

c. Housing Element and Resolutions of City General Plan

d. Various specific plans and resolutions of City General Plan

Excluding the open space lying within the boundary of the Naval Weapons Station, the City is approximately 98 percent developed, or proposed for development, with a mix of residential, commercial, industrial and public land uses. Land use designations for the City are depicted on Figure 3-3.

The study area covers approximately 6458 acres of the City's 7134.5 acre total area. The largest land holder within the study area is the U.S. Naval Weapons Station, which occupies a total of 5256 acres on the east side of the City. Other large land holdings within the study area include:

- The Old Ranch Country Club which is located on approximately 208 acres northeast of the San Diego Freeway adjacent to College Park East;
- The Boeing Integrated Defense Systems which lies on a 106 acre lot on the southwest corner of Westminster Avenue and Seal Beach Boulevard.

Land use throughout the remainder of the study area is predominantly residential. Low density residential zoning is found in the areas known as Hellman Ranch (Heron Point), College Park East, the Gold Coast area of Old Town, and Marina Hill. Medium and high density residential uses are located in Bridgeport and Old Town. A breakdown of existing land use areas by community is listed in Table 5-3.

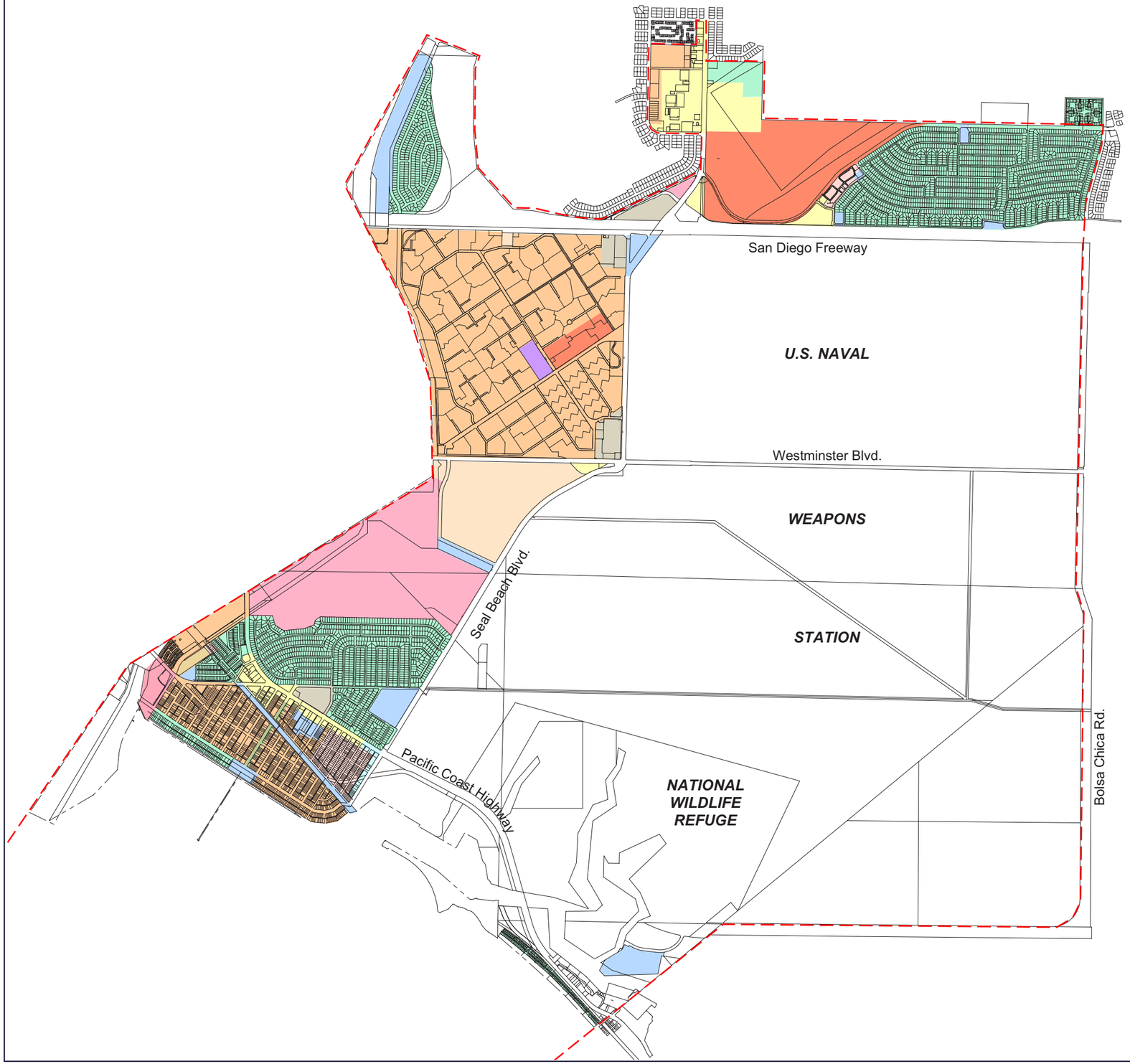
3-7 Population

Population estimates for the service area were based upon information from the Center for Demographic Research at California State University, Fullerton. These population projections take into consideration national, state, and local trends, as well as land use and immigration policies.

Since its incorporation in 1915, the City of Seal Beach has grown from a population of 250 to one of over 25,000. The Center for Demographic Research estimates that the total City population will increase to 27,471 by the year 2030. City population projections are listed in Table 3-2.

The sewer service area population estimates shown in Table 3-3 are based upon data collected from census tract numbers 995.02, 995.04, 995.05, and 1100.12. It excludes the Leisure World Retirement Community, the College Park West Area and Surfside. It includes a small tract of homes located in the northeast corner of College Park East, which is part of the City of Los Alamitos. The 2030 sewer service area population is estimated at 15,962 persons.

The modest increase in population seen in Table 3-4 is due to the future residential development planned for the Hellman Ranch and old Department of Water and Power property southwesterly of Marina Drive and First Street, and the increase in net allowable densities in the existing developed areas at ultimate build-out. Table 3-4 shows the actual versus net allowable density for each of the residential areas within the study area. Table 3-5 illustrates the ultimate land use by sewershed.



Explanation

RLD	Residential Low Density
RMD	Residential Medium Density
RHD	Residential High Density
L-C	Light Commercial
C-O	Professional Office
MSSP	Main Street Specific Plan (Commercial)
C-1	Service Commercial
C-2	General Commercial
O-E	Oil Extraction
M-1	Light Manufacturing
PLU/R	Public Land Use/Recreation
R-G	Recreation - Grass
SPR	Specific Plan Regulatory Zone (Currently vacant, see section 7 for land use explanation)

N

0 2500 5000 FEET

AKM

CITY OF SEAL BEACH SEWER MASTER PLAN

PROJECT NO.: 0800554.10

DATE: JULY 2005

City Land Use

FIGURE 3-3

Table 3-2
City of Seal Beach Population Estimates

Year	Population	% Growth
2000	24,157	---
2005	25,058	3.7
2010	26,335	5.1
2015	26,922	2.2
2020	27,245	1.2
2030	27,471	0.8

Table 3-3
Service Area Population Estimates

Year	Population	% Growth
2000	15,634	---
2005	15,634	-0.7
2005	15,744	0.7
2010	15,861	0.7
2015	15,947	0.5
2020	15,962	0.1

Table 3-4
Sewer Service Area
Residential Land Use Densities

		Existing Conditions		Ultimate Conditions	
Land Use Category	Total Net Area (acre)	Current or Planned Density (du/acre)	Existing No. of Dwelling Units (du)	Net Allowable Density (du/acre)	Potential No. of Dwelling Units (du)
Low Density Residential					
Marina Hill North	121	8	968	9	969
Marina Hill South	26	8	208	9	208
Old Town	8.4	8	67	9	129
Hellman Ranch	27.5	2.5		2.5	70
College Park East	206	8	1,648	9	1,648
Centex Homes	18	4.3	77	4.3	77
Medium Density Residential					
Bridgeport	12.9	13.6	176	17	225
College Park East	7.2	8.3	60	17	125
Old Town	27.8	17.4	484	17	484
High Density Residential					
Old Town	186	20	3,720	20	3,720
Bridgeport (River Beach)	22.7	20.5	465	32.2	733
Total	**663.5**	**---**	**7873**	**---**	**8388**

Table 3-5
Ultimate Land Use Areas by Sewershed

	Sewershed	Land Use Area (Acres)									Total Area
		RLD	RMD	RHD	PLU/R	C	R-G	M-1	I-OE	M	SPR	
1	**Pump Station No. 35**											
	Bridgeport		12.9	22.7	3.2	8.1			6.3		2.7	55.9
	Marina Hill North	121.0										121.0
	Marina Hill South	26.0			14.1	9.7						49.8
	Old Town	8.4	27.8	186.0	19.2	37.8					12.6	291.8
	US Naval Weapons Station									5256.0		5256.0
2	**Adolfo Lopez Pump Station**											
	Hellman Ranch	27.5										27.5
	Adolfo Lopez Drive				6.5			5.2				11.7
	Boeing Integrated Defense Systems					6.2	22.1					28.3
3	**Boeing Pump Station**											
	Boeing Integrated Defense Systems					16.6		60.2				76.8
	Westminster Ave. Comm.					3.1						3.1
4	**Aquatic Park**				67.0							67.0
5	**College Park East/Lampson**	206.0	7.2		5.9	13.7	191.3					424.1
6	**Old Ranch Town Center**					27.0						27.0
7	**Centex Homes**	18.0										18.0
	Total	406.9	47.9	208.7	115.9	122.2	213.4	65.4	6.3	5256.0	15.3	6458.0

RLD	Residential Low Density	**R-G**	Recreation/Grass
RMD	Residential Medium Density	**M-1**	Light Manufacturing
RHD	Residential High Density	**I-OE**	Oil Extraction
PLU/R	Public Use/Recreation	**M**	Military
C	Commercial	**SPR**	Specific Plan Regulatory Zone-currently vacant

Section 4

CRITERIA

4-1 General

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

Average dry weather wastewater flows can be reasonably estimated from land use and unit flow factors, with the results then compared to measured flows. The components used to estimate design wastewater flows include unit flow factors, peaking factors, and infiltration/inflow allowances.

Collection system design standards include minimum pipe size, minimum flow velocity, and depth of flow to pipe diameter ratio. Pump station criteria includes sizing requirements for pumps, wet wells and forcemains. It also includes provisions for redundancy, emergency storage, emergency power, and remote monitoring and control.

4-2 Flow Monitoring

Data collection and review is essential in developing unit flow factors, calibrating the system model, and estimating the ultimate average day and peak flows.

The 1999 Master Plan reviewed flow measurement data at Pump Station No.35 for the 1996 and 1997 calendar years, and determined that the average monthly flow was approximately 35 million gallons (mg), excluding the flows from the US Naval Weapons Station. The corresponding average daily flow was approximately 1.16 million gallons per day (mgd). Daily flow records obtained for various months from 1996 to 1998 confirmed these values. Additionally, flow monitoring was conducted at three locations to develop unit flow factors for single family developments in the City.

For the current study, four flow monitoring locations were selected for verifying and refining the information developed in 1998. Flow monitoring was conducted from March 5 through March 18, 2005 at the following sites:

Site 1 4265 Elder Avenue (east of Ironwood Avenue), Manhole B08-A27-8" VCP

Site 2 Fifth Street south of Pacific Coast Highway, Manhole C12-096, 12" VCP

Site 3 Electric Avenue at Fifth Street Alley, Manhole F18-014, 21" VCP

Site 4 Seal Beach Boulevard south of Adolfo Lopez Drive-Manhole S01-114, 24" VCP

Site 1 is located in College Park East. All the tributary flow is generated by single family residential land uses in College Park East and the small City of Los Alamitos territory north of Lampson Avenue. The tributary area includes 958 dwelling units on 118.6 acres. The average dry weather flow measured during the monitoring period was 260,000 gallons per day. The resulting unit flow factor would be 2192 gallons per acre per day, or 272 gallons per dwelling unit per day assuming no vacancy. The average water use for this portion of the City is 315 gallons per dwelling unit per day. The ratio of wastewater to water use would then be 0.86, which is unreasonable for low density single family residential land uses. With a population density of 3 persons per unit, the wastewater generation can be estimated at 225

gallons per dwelling unit per day. It is then reasonable to expect that the remaining wastewater flow is due to infiltration from the relatively high groundwater in this area. Based upon this analysis, groundwater infiltration is estimated at 375 gallons per acre per day in the College Park East/Lampson Sewershed. The resulting low density residential unit flow factor would be 1825 gallons per acre per day. An infiltration allowance of 375 gallons per acre per day would be added to this amount to determine the average dry weather flow. The peak dry weather flow measured was about 410,000 gallons per day and the maximum depth was 7.4 inches in the 8-inch diameter pipe.

Site 2 measured the wastewater flows from 811 single family residential units on 122.5 acres in Marina Hill North, and a 0.9 acre commercial area in Marina Hill South. The average dry weather flow measured was 172,000 gallons per day. The average water use for the Marina Hill North area is 319 gallons per dwelling unit per day. Based upon a population density of 3 persons per dwelling unit, the wastewater generation can be estimated at 225 gallons per dwelling unit per day. The resulting average dry weather wastewater generated by this area would then be 182,475 gallons. Adding the estimated flow from the small commercial area, the total average dry weather flow would be 184,775 gallons per day. This is 6 percent greater than the measured flow, which is reasonable. This also indicates that there is minimal, if any infiltration into the collection system in the Marina Hill North area. The resulting low density residential unit flow factor for this area is 1490 gallons per acre per day, which is essentially the same as that used by Orange County Sanitation District. In the model, a low density residential unit flow factor of 1550 gallons per acre per day was used for this area. The peak dry weather flow measured was about 300,000 gallons per day, which occurred on Wednesday, March 15 at 7:15 am.

Site 3 measured wastewater flows from Bridgeport, Marina Hill North, portions of Marina Hill South, and Old Town. The tributary area covers 991 low density residential units on 136 acres, 21 acres of high density residential including Oakwood Apartments and Seal Beach Mobile Home Park, 6.2 acres of medium density residential, and 8 acres of commercial land uses. The average dry weather flow measured was 433,000 gallons per day. Based upon the previously estimated unit flow factors for the low density residential land use, and reasonable factors for the other land uses, the calculated average dry weather flow would be approximately 378,000 gallons per day. The difference is through groundwater infiltration, estimated at 850 gallons per acre per day. The peak dry weather flow measured was 778,000 gallons per day.

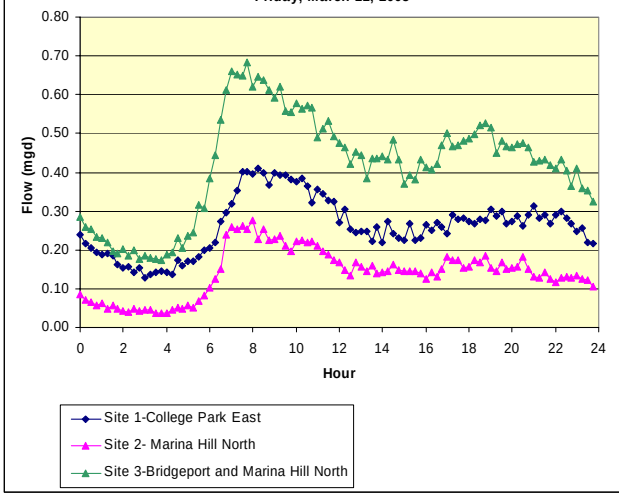
Site 4 measured the flow tributary to Pump Station No.35. Because this site is on the discharge side of the pump station, peaking relationships cannot be established from the results of this site. The flow monitoring results show an average dry weather flow of 1,290,000 gallons per day. The model calculated average dry weather flow was 1,300,000 gallons.

Summary of the flow monitoring results is provided in Table 4-1. The hourly flow variations at Sites 1, 2, and 3 for a representative day (Friday, March 11, 2005) are shown graphically on Figure 4-1. The basic trend in flows remains the same at each location. Peak flows generally occur between 7:00 a.m. and 8:00 a.m. each week day, with a second peak occurring around 7:00 p.m. to 9:00 p.m. The peak flows occur later on weekend days reflects the mostly residential makeup of the service area.

Table 4-1
Flow Monitoring Results
March 5, 2005 though March 18, 2005

Site	Minimum Daily		Average Daily Flow		Maximum Daily	
	MGD	CFS	MGD	CFS	MGD	CFS
1	0.105	0.162	0.26	0.402	0.424	0.656
2	0.032	0.050	0.172	0.266	0.326	0.504
3	0.156	0.241	0.433	0.670	0.778	1.204
4	0.01	0.015	1.29	1.996	2.27	3.512

Figure 4-1
Diurnal Flows at Sites 1,2, and 3
Friday, March 11, 2005



4-3 Unit Flow Factors

Unit flow factors for the various land uses within the City were developed from the flow monitoring data, flow records at Pump Station No.35, water meter records, and the census data provided in the City General Plan.

The average daily flow recorded at Site 1 (College Park East) and Site 2 (Marina Hill North), along with water meter records for these areas were utilized in determining unit flow factors for residential low density land uses in these areas. The residential medium density unit flow factor was estimated based upon a housing density of 17 units per acre and 2.3 persons per unit. Commercial unit flow factor was estimated based upon a floor area ratio of 0.35 and 165 gallons per 1000 square feet per day. These unit flow factors were verified by the average daily flows at flow monitoring Sites 3 and 4. The Orange County Sanitation District (OCSD) recommended wastewater flow generation factors were used for manufacturing and public recreation land uses.

The unit flow factors developed for this study are shown in Table 4-2.

Table 4-2
Unit Flow Factors

Land Use Category		Unit Flow Factor	
Use	Description	GPD/Acre	GPD/DU
RHD	Residential High Density	4000	160
RMD	Residential Medium Density	3230	190
RLD-CPE, OT	Residential Low Density-College Park East, Old Town	1825	225
RLD-MH	Residential Low Density-Marina Hill	1550	225
RLD-HR	Residential Low Density-Hellman Ranch	765	300
C	Commercial	2500	
R-G	Recreation/Grass	200	
PLU/R	Public Land Use/Recreation	200	
O-E	Oil Extraction	0	
MSSP	Main Street Specific Plan	2500	
M-1	Light Manufacturing	3167	

4-4 Peaking Factors

The wastewater unit flow factors developed in Section 4.3 are used to generate average flows entering the collection system. However, the adequacy of a sewage collection system is based upon its ability to convey peak flows. At any individual point in the system, peak dry weather flow is estimated by converting the total average dry weather flow upstream of the point in question to peak dry weather flow by an empirical relationship. The peaking formula commonly used to estimate peak dry weather flows is of the following form:

$$Q_{pdw} = \text{Peaking factor} \times Q_{adw}^{0.92}$$

Where Q_{pdw} = Peak dry weather flow in cfs

Q_{adw} = Average dry weather flow in cfs

From this equation and the flow monitoring data, a peaking factor for the City was developed. The calculated peaking factors at flow monitoring sites 1, 2, and 3 ranged from 1.61 to 1.80. For a more conservative estimate for this study, the following relationship between peak dry weather and average dry weather flow was used for the system hydraulic analysis:

$Q_{pdw} = 1.85 \times Q_{adw}^{0.92}$+dry weather infiltration

For studies of smaller sewersheds, a peaking factor of 2.1 should be used, as required by the City's Design Criteria for Sewer Facilities, unless flow monitoring indicates that a higher value should be used.

4-5 Inflow and Infiltration

Inflow

Inflow is the surface water that typically gains entry to the sewer system through perforated or unsealed manhole covers during rainfall events. Tests have indicated that leakage through manhole covers can range from 20 to 70 gpm with a depth of 1 inch over the cover (Clay Pipe Engineering Manual, National Clay Pipe Institute, 1990). This could lead to a significant volume of water entering the sewer system, resulting in surcharging and increased pumping and treatment costs.

Hydrologic data and sewage flows at Pump Station No.35 during both dry and wet weather were examined during the preparation of the 1999 Master Plan to quantify the amount of inflow entering the City's sewage collection system. The Orange County Resources and Development Management Department provided daily records for rainfall from Station No. 170 (Los Alamitos), located within Seal Beach in the vicinity of Westminster Avenue and the western city boundary. The City provided total daily sewage flow records as well as the daily navy flow records at Pump Station No.35.

The wastewater flow produced by the City was determined by subtracting the US Naval Weapons Station flow from the total flow. An average flow was then calculated for the month under examination. On days in which a rainfall event occurred, inflow was determined by calculating the difference between the measured wastewater flow for that day and the average flow. The inflow was determined for several different rainfall events and plotted versus inches of rainfall per day. The results are displayed in Figure 4-3.

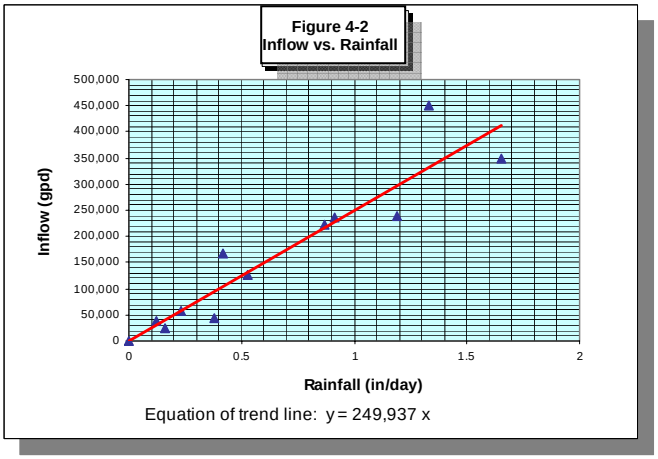


Figure 4-3 shows a trend between the inflow into the collection system and the amount of precipitation that occurs during a rainfall event. Generally, the relationship can be defined as linear and the amount of inflow expected (gpd) is about 250,000 times the amount of rainfall (in/day). This relationship was based upon sewage flows entering and leaving Pump Station No.35 only. It is assumed that the College Park East drainage area will have similar characteristics and follow the same trend as displayed above.

It is seen that inflow contributes a significant amount of excess water into the system during rainfall events. According to hydrologic data taken at rainfall station No. 170, the City of Seal Beach has an average annual rainfall of 10.14 inches per year. This would amount to approximately 2.5 million gallons of inflow into the sewage collection system tributary to Pump Station No.35 each year. For an average rainfall of 0.5 inches, an increase in the sewer average dry weather flows of 20 percent can be expected for the Pump Station No.35 service area and 33 percent for the College Park East area. Identifying reaches where manholes are most likely to be inundated with storm water and then taking steps to either relocate or seal these manholes can reduce the volume of inflow. This would include manholes located in the vicinity of gutters and other flow paths of storm water, and sump areas that experience ponding.

The City of Seal Beach is relatively flat, especially in the areas of Old Town and College Park East where there have been problems with water ponding in streets and alleys. The City has reported flooding in Old Town at the following locations:

- First Street between Marina Drive and PCH, including Seal Beach Mobile Home Park
- 7th Street and Marina Drive
- 2nd Street and Marina Drive
- Corsair Way east of Caravel Way
- Clipper Way east of Caravel Way
- 15th, 16th, and 17th Streets between Electric Avenue and Landing Avenue
- The north side of Electric Avenue from 12th Street to Seal Beach Boulevard
- Seal Beach Boulevard south of Pacific Coast Highway
- Near the beach between 8th Street and 11th Street, especially the beach parking lot located at 10th Street

The majority of sewer manholes in Old Town are located in the center of back alleys lying directly in the path of stormwater runoff.

College Park East is extremely flat, causing water to pond nearly throughout the area.

To reduce inflow into the wastewater collection system, the City could install new manhole covers which have one vent hole and one pick hole, or cover some of the manhole openings with plugs. A more appropriate solution is to improve the storm drain system so as to eliminate ponding water throughout the City and its potential to enter the wastewater collection system. The City of Seal Beach is developing a plan to improve the drainage system and reduce flooding, which will reduce inflow into the wastewater collection system.

Infiltration

Infiltration is defined as water entering the wastewater collection system from the ground through defective pipes, pipe joints, connections, or manhole walls. Much of the sewer system is subject to infiltration due to the high groundwater level throughout the City, and the age of the facilities, most of which are over 40 years old.

The City reports that infiltration into manholes is clearly visible in College Park East. The CCTV inspections conducted between 2002 and 2004 showed infiltration in a number of reaches in this area. Comparison of flow monitoring results and water meter records also indicates the presence of infiltration in College Park East, at about 375 gallons per acre per day.

Infiltration is not expected in Marina Hill North during dry weather due to the higher ground elevations and greater depth to groundwater.

Based upon review of flow monitoring and water meter records, infiltration in Bridgeport is estimated at 850 gallons per acre per day. This amount of infiltration is also expected in portions of Old Town with the deeper sewers.

4-6 Sewer Design Criteria

Design criteria are established to ensure that the wastewater collection system can operate effectively under all but extreme wet weather periods. Each pipe segment must be capable of carrying design peak wet weather flows without surcharging the system. Low flows must be conveyed at a velocity that will prevent solids from settling and blocking the system.

Design Flows

Average wastewater flows are determined from the land use areas and unit flow factor factors plus dry weather infiltration. Contribution from high wastewater generators should be considered separately in order to accurately determine the average dry weather flows.

The peak dry weather flows will be determined as follows:

$Q_{pdw}=2.1\ Q_{adw}^{0.92}$+dry weather infiltration

Determination of peak dry weather flow will also consider pumped flows.

Peak wet weather flow will be determined as follows:

$Q_{pww}=1.35\ Q_{pdw}$

Pipe Sizes and Velocities

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 flow. This velocity will prevent deposition of solids in the sewer. A minimum velocity of 3.0 ft/sec is required at peak flow, to resuspend any materials which may have already settled in the pipe. The minimum corresponding slope for various pipe sizes is presented in Table 4-3.

It is important to note that the slopes listed in Table 4-3 assume the depth of flow to pipe diameter ratio to be 0.50 or 0.64. If there is insufficient flow to create this condition, greater slopes than those shown may be required.

Table 4-3
Minimum Sewer Slopes

Pipe Size (in)	Minimum Slope
8*	0.0075
10*	0.0056
12*	0.0044
15*	0.0032
18**	0.0021
21**	0.0017
24**	0.0014

** 0.50 Full with peak dry weather flow*
*** 0.64 full with peak dry weather flow*

Flow Depth to Pipe Diameter Ratios

The design and analysis of collection system pipes is typically based upon the depth of flow to diameter ratio (d/D).

All new pipe should be designed with peak dry weather depth of flow to pipe diameter ratio less than or equal to 0.5 for 15-inch and smaller pipes, and 0.64 for 18-inch and larger pipes. The extra pipeline capacity is reserved for wet weather related infiltration and inflow into the system. Additionally, the area above the water surface

helps to keep the sewage aerated, preventing septic conditions and resulting odors. The peak wet weather flow depth to pipe diameter ratio should not exceed 0.8.

Sewer system design criteria are summarized in Table 4-4. Additional design criteria details are included in the "City of Seal Beach Design Criteria for Sewer Facilities"

Table 4-4
Sewer System Criteria

Collection System	
Minimum Pipe Size	8-inch
Minimum Velocity	2.0 Ft/Sec at average flow or; 3.0 Ft/Sec at peak flow
Flow Depth to Pipe Diameter Ratio with Peak Dry Weather Flow	
15-inch and under	0.5
18-inch and over	0.64
Pump Station	
Pumps	▪ Minimum 2 each sized at peak flow ▪ Minimum solids handling capacity 3"
Wet Wells	▪ Sized to limit pump cycling to less than 6 times/hr for motor HP up to 20; 4 times/hr up to 50 HP; 3 times/hr up to 75 HP; 2 times/hr 100 HP and above ▪ Provide 30 minutes of storage at peak flow to allow response to a failure ▪ Equipment to be maintained must be accessible without entering the structure
Ventilation	▪ 12-air changes/hour minimum in dry well and as required by NFPA 820
Controls	Redundant system. Float operated back-up controls
Emergency Power	Stationary source in locations which cannot provide 30-minute response time without overflowing. Provisions for connection of a portable power source at all other locations
Telemetry	Dialer system at all pump stations to alert personnel in the event of a station failure
Force Mains	▪ Minimum velocity 3.0 ft/sec ▪ Minimum size 4" ▪ Air/Vacs installed in vaults

4-7 Pump Station Design Criteria

The performance of a wastewater pump station is of particular importance since a failure could have far reaching ramifications. It must therefore be reliable, sized with sufficient capacity, contain redundant equipment or backup, and be able to notify the appropriate staff in the event of a failure.

The primary components of a pump station are the wet well, pumps, dry well, forcemain and electrical controls.

The wet well stores the incoming wastewater until a pump is activated to discharge it. It should be designed with sufficient capacity to prevent short cycles whereby the pumps continually start and stop, yet small enough that it will be regularly evacuated to prevent the wastewater from becoming septic. The desired number of pump cycles should be limited to no more that 6 per hour for motors up to 20 HP, and less for larger motors.

The pumps should be sized to efficiently handle the peak flows. A minimum of two pumps sized at the peak flow to the station should be provided so that sufficient standby capacity is available when one pump is removed for repairs. The pumps should be able to pass a minimum solid size of 3 inches without clogging. The shafts, seals and impellers should be constructed of wear resistant material to provide long life. Tungsten Carbide seals, Ni-Hard impellers, and 316 stainless steel pump shafts are recommended. For services where aggressive agents may be found in the sewage, such as at golf courses, complete stainless steel construction is recommended. This includes the pump bowl, shaft, impeller, and motor housing.

The dry well houses the valves, pumps, motors and electrical controls. It must be well ventilated and provide unobstructed access to all equipment. A minimum 3-foot clearance from all obstructions

should be provided. Greater clearances may be required for equipment with special maintenance needs. Facilities for equipment removal, including hatches, large door openings, and hoists, should also be provided.

The force mains should be selected to operate within a 3.0 feet per second to 5 feet per second velocity range, but should not be smaller than 4-inches in diameter.

While submersible pump stations may be utilized for the small flows, the larger pump stations should be the wet well/dry type. They should be designed with easy access to all equipment. Wet wells of wastewater pumping stations are classified by the National Electric Code as Class I, Group D, Division 1 facilities if ventilated at less than 12 air changes per hour and Division 2 if continuously ventilated at 12 or more air changes per hour. Dry wells, which are physically separated from wet wells, if ventilated at less than 12 air changes per hour, are classified as Class I, Group D, Division 2 locations. Wet wells and under certain circumstances dry wells, should be considered confined spaces and should be entered in accordance with the corresponding requirements of Occupational Safety and Health Administration (OSHA).

All pump stations should incorporate redundant control systems for operation of the pumps. A float system should be used as a backup for a primary control system that utilizes an ultrasonic device or a bubbler.

Telemetry equipment (dialer) must be provided at all pump stations. The dialer notifies personnel when an alarm or failed condition occurs. The dialer must be capable of calling several pre-programmed numbers until the alarm is acknowledged by an operator. The dialer can also be used to remotely check the status of the station if desired.

While pump stations may be necessary to serve portions of the City's service area because of topographic requirements, all feasible efforts should be made to eliminate their use. In evaluating the feasibility of constructing a pump station, a detailed comparison with a gravity alternative should be made. The service lives of the two facilities, the cost of operation and maintenance, as well as the many problems associated with the development of flows during the first several years should be carefully considered.

Service criteria for sewer pump stations are summarized in Table 4-4.

4-8 Service Life of Pipe and Pump Station Equipment

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

However, 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 (Yrs.)
Gravity Sewers:	Cast Iron Pipe (cip)	20
	Plastic Pipe	70
	Vitrified Clay Pipe (vcp)	70
Force Mains:	Asbestos-Cement Pipe (acp)	40
	Ductile Iron Pipe (dip)	40
	Plastic Pipe	30
Pump Stations:	Structure	60
	Piping	30
	Valving	20
	Mechanical	15
	Electrical	15

Section 5

COLLECTION SYSTEM CAPACITY ANALYSIS

5-1 General Description

The City's existing wastewater collection system is made up of a network of gravity sewers, pump stations, and sewer force mains. The gravity system consists of approximately 169,000 feet of pipe and 730 manholes serving about 5000 customers. The majority of the gravity sewers are constructed of vitrified clay pipe with sizes ranging from 6 inches to 24 inches in diameter. There are seven pump stations and associated force mains maintained by the City. Figure 5-1 depicts the existing City pump stations and force mains as well as two OCSD pump stations located within the City limits. The details of the seven City pump stations and force mains are discussed in Section 6 of this report.

Originally, the City maintained a sewer in Electric Avenue that conveyed wastewater flows to a local wastewater treatment plant at the western border of the City. In 1973, the treatment plant was demolished and Pump Station No.35 was constructed at the east end of Electric Avenue. A new 21-inch to 24-inch diameter interceptor, also in Electric Avenue, was constructed to convey wastewater in the opposite direction towards Pump Station No.35.

The gravity trunk sewer in Electric Avenue collects wastewater from the areas of Bridgeport, Marina Hill, and Old Town, and transports it southeast to Pump Station No.35. Wastewater from the U.S. Naval Weapons Station flows directly into Pump Station No.35.

From Pump Station No.35, wastewater is pumped north in Seal Beach Boulevard through a 16-inch force main to the 24-inch Seal Beach Boulevard Trunk Sewer, which terminates at OCSD's Seal Beach Pump Station, located on the northeast corner of Westminster Avenue and Seal Beach Boulevard. Flows from the Adolfo Lopez Pump Station and Boeing Pump Station are also pumped into the 24-inch Seal Beach Boulevard Trunk Sewer.

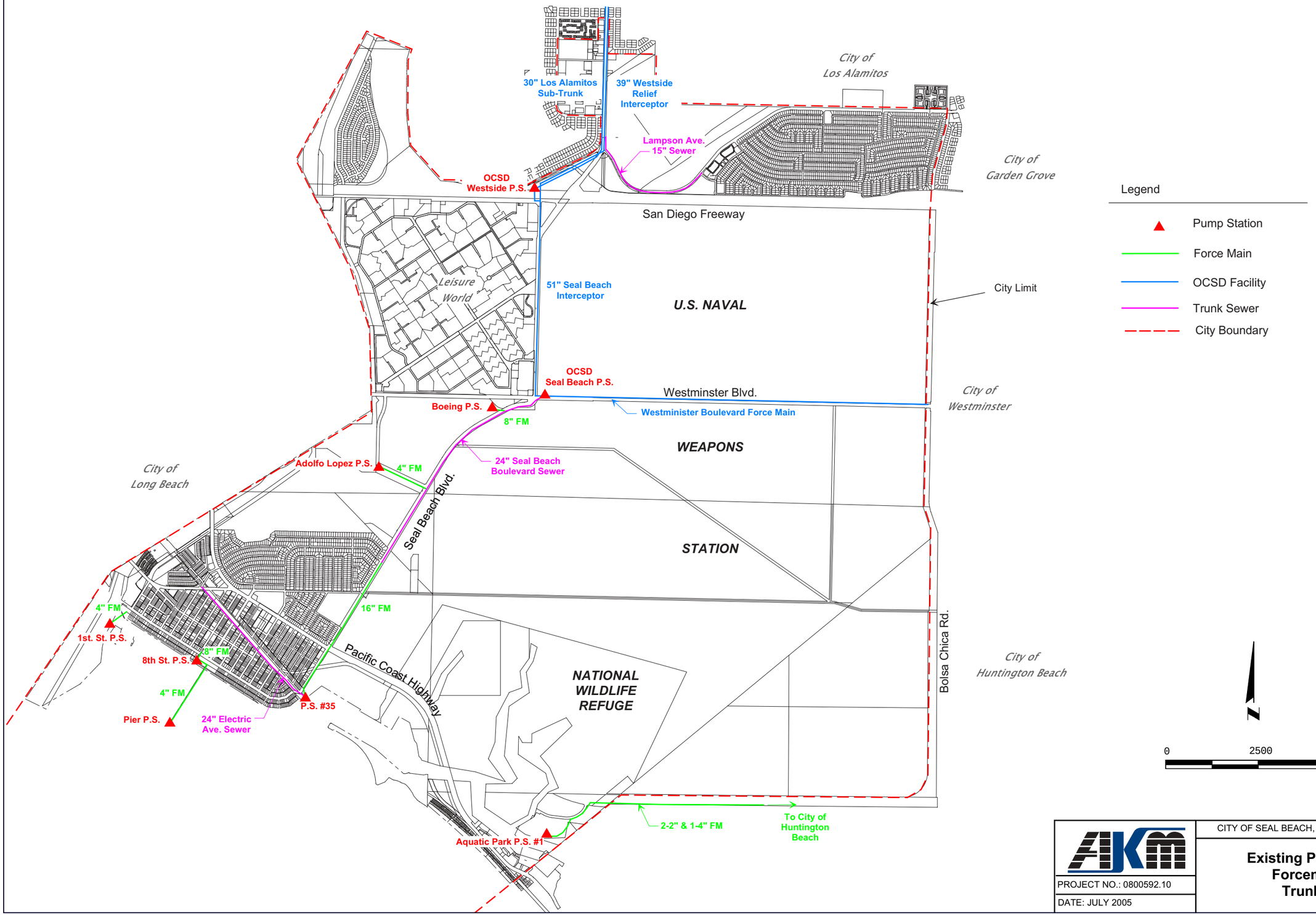
The system of sewers in College Park East conveys the wastewater to the 15-inch VCP Lampson Avenue Trunk Sewer, which extends from Basswood Street to Seal Beach Boulevard. This sewer reduces to 12-inch diameter at Seal Beach Boulevard before entering OCSD's 30-inch diameter VCP Los Alamitos Sub-trunk Sewer located on the west side of Seal Beach Boulevard. The Los Alamitos Sub-trunk sewer terminates at OCSD's Westside Pump Station located between Yellowtail Drive and Bixby Storm Channel.

5-2 Drainage Regions (Sewersheds)

Seven wastewater drainage regions (sewersheds) were delineated from review of the City's sewer atlas maps and record drawings. The names of the sewersheds are listed in Table 5-1 and the areas are shown in relation to the City boundary on Figure 5-2.

Table 5-1
Major Sewersheds

1	Pump Station No. 35
	Bridgeport
	Marina Hill North
	Marina Hill South
	Old Town
	US Naval Weapons Station
2	Adolfo Lopez Pump Station
3	Boeing Pump Station
4	Aquatic Park
5	College Park East/Lampson
6	Old Ranch Town Center
7	Centex Homes



CITY OF SEAL BEACH, SEWER SYSTEM MASTER PLAN

Existing Pump Stations, Forcemains, and Trunk Sewers

FIGURE 5-1

PROJECT NO.: 0800592.10

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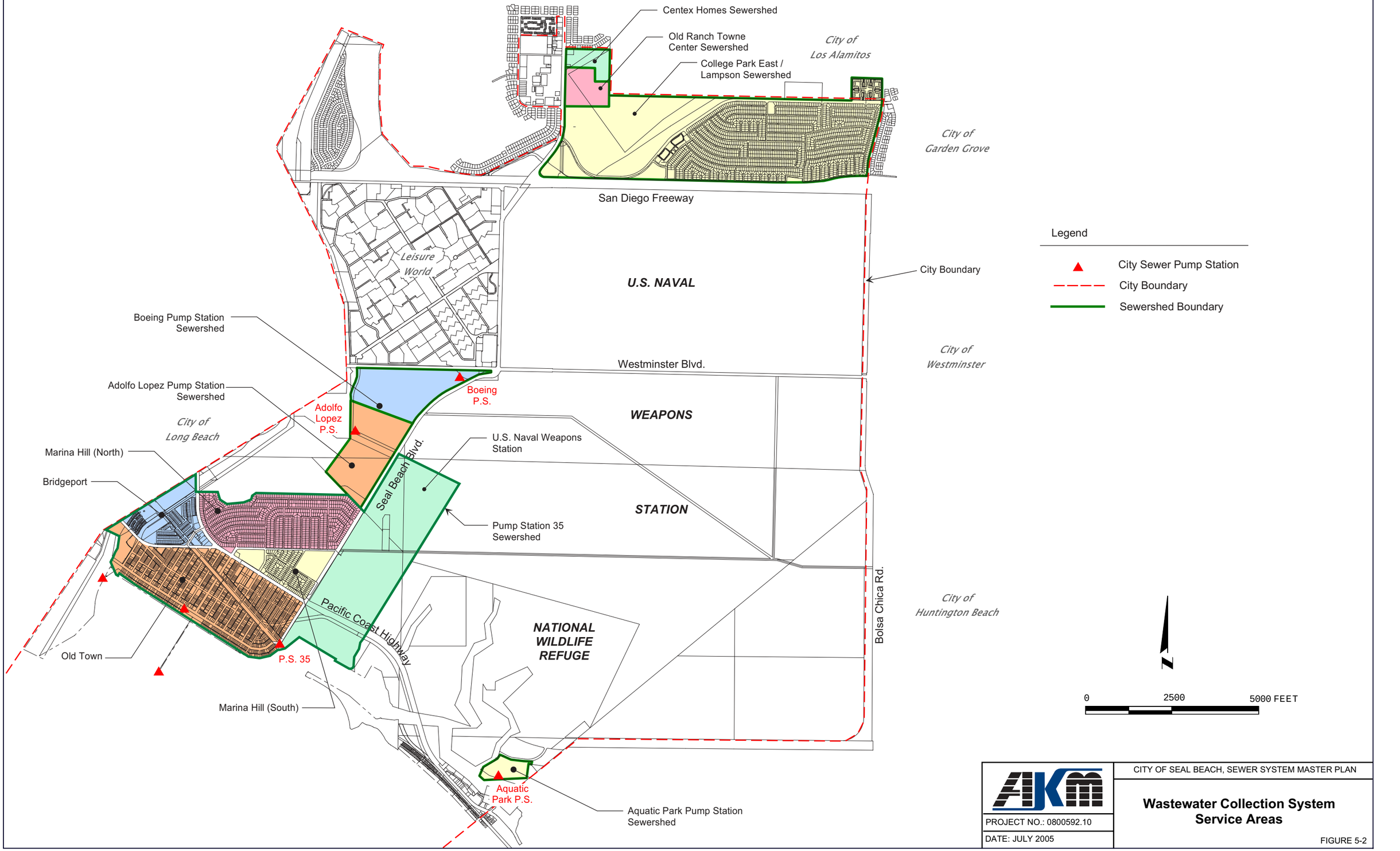

CITY OF SEAL BEACH, SEWER SYSTEM MASTER PLAN

Wastewater Collection System Service Areas

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FIGURE 5-2

Table 5-2 lists the characteristics of each of the seven (7) sewersheds, including total acreage, land uses, boundaries, general flow direction, and construction date.

Table 5-3 provides a breakdown of each sewershed into its various land uses.

Figures 5-3 and 5-4 show the wastewater collection systems maintained by the City of Seal Beach.

5-3 Orange County Sanitation District (OCSD) Wastewater Collection System

The City of Seal Beach is a part of OCSD's Revenue Area No. 3. The City's wastewater collection system ultimately conveys sewage to one of two OCSD pump stations. Sewage collected at Pump Station No.35 is conveyed north in Seal Beach Boulevard via a 16-inch diameter force main and a 24-inch diameter gravity sewer to OCSD's Seal Beach Pump Station, located on the northeast corner of Seal Beach Boulevard and Westminster Avenue. The wastewater collected at the City's Boeing and Adolfo Lopez Pump Stations are pumped to the 24-inch diameter trunk sewer in Seal Beach Boulevard, terminating at the Seal Beach Pump Station. Flows from College Park East, Old Ranch Golf Course, and commercial area east of Seal Beach Boulevard and south of Lampson Avenue discharge into OCSD's 30-inch diameter Los Alamitos Sub-trunk sewer in Seal Beach Boulevard. This facility carries the wastewater to OCSD's Westside Pump Station, located at 3112 Yellowtail Drive just north of the San Diego Freeway.

The Westside Pump Station has a 20-inch diameter force main that discharges to the Seal Beach Interceptor. This is a 51-inch reinforced concrete pipe in Seal Beach Boulevard that transports flows south to the Seal Beach Pump Station. The Seal Beach Pump Station then takes the flows it receives from the Seal Beach Interceptor and Pump Station No.35, and lifts it into the Westminster Avenue Interceptor.

The Westminster Avenue Interceptor conveys the flow east from the Seal Beach Pump Station to a connection with OCSD's Knott Trunk Sewer System (KTSS) at the intersection of Westminster Avenue and Golden West Street. The KTSS is one of four major sewer trunk lines serving the western portion of Orange County. The KTSS begins in Fullerton at the intersection of Knott Avenue and Artesia Street and terminates at OCSD's Treatment Plant No. 2, located in the City of Huntington Beach next to the Santa Ana River and east of Pacific Coast Highway. The unit operations at Treatment Plant No. 2 include: screening, grit removal, primary clarification, aeration, secondary clarification, and disinfection. Treated effluent is disposed of through an ocean outfall system. Figure 5-5 shows the locations of OCSD's trunk lines, pump stations, and treatment plants.

5-4 Collection System Hydraulic Modeling

To perform a detailed analysis of the wastewater collection system, it is convenient to create a mathematical model that is capable of simulating the operating characteristics of the system. The simulations for this study were performed utilizing H2ONet Sewer software by MWHSoft. The Manning's Equation is used for all gravity flow calculations in pipes.

As a municipal planning tool, H2ONet Sewer may be used to simulate zoning changes and their effects on the wastewater system.

The collection system is modeled by entering data for pipe diameters, lengths, manhole invert elevations, and roughness coefficients as well as zoning classifications.

Table 5-2
Sewershed Characteristics

Sewershed	Area (Ac)	Land Uses	Boundaries	General Flow Direction	Date of Construction	Comments
Pump Station No.35	5519			North		Flows are pumped north in a 16-inch diameter force main, outletting to a 24-inch gravity sewer in Seal Beach Blvd, which terminates at OCSD's Seal Beach Pump Station
Bridgeport	56	C,O-E, PLU/R, RMD,RHD	San Gabriel River to the Northwest; PCH to the northeast; Marina Drive to the south	Southeast	1960's	Flow enters Electric Ave. Sewer at Marina Drive and 5th Street, is then conveyed southeasterly to Pump Station No.35
Marina Hill North	121	RLD	Gum Grove Park to the north; Seal Beach Blvd to the east; Bolsa Ave. to the South; PCH to the west	West	1950's to 1960's	Flow enters Electric Ave. Sewer at Marina Drive and 5th Street, is then conveyed southeasterly to Pump Station No.35
Marina Hill South	50	C,PLU/R, RLD	Bolsa Ave. to the north; PCH to the southwest; Seal Beach Blvd to the southeast	Southwest	1950's to 1960's	Flow enters Electric Ave. Sewer at 10th Street and 12th Street, then conveyed southeast to Pump Station No.35
Old Town	292	C,MSSP,PLU/R, RLD, RMD, RHD	Marina Drive and PCH to the north; Seal Beach Blvd. to the east; Pacific Ocean to the South; San Gabriel River to the west	Southeast	1920's	Flows are transported to Electric Ave. Sewer, and then southeast to Pump Station No.35
Naval Weapons Station	5000	PLU/R	San Diego Freeway to the north; City of Westminster to the east; City of Huntington Beach and PCH to the South; Seal Beach Blvd to the west	South	1944	Flows are transported south directly to Pump Station No.35
Adolfo Lopez Pump Station	267			East		Wastewater is pumped east in a 4-inch force main in Adolfo Lopez Drive to a manhole west of Seal Beach Blvd, then flows east by gravity to the 24-inch sewer in Seal Beach Blvd.
Hellman Ranch	230	RLD	Marina Hill North to the south; Los Alamitos Retarding Basin to the west; Adolfo Lopez Drive to the north; Seal Beach Blvd. to the east	Northwest	2005	Flows are transported west, then north, and then east to the 8-inch gravity sewer in Adolfo Lopez Drive, which terminates at the Adolfo Lopez Pump Station
Adolfo Lopez Drive	11	PLU/R	Adolfo Lopez Drive	West	1976	Flows are transported west and south in an 8-inch sewer to the Adolfo Lopez Pump Station
Boeing Property (southerly portion)	27	M-1, C-2	Adolfo Lopez Drive to the south, Los Alamitos Retarding Basin to the west; Apollo Drive (future) to the east	South	Future	Flows will be transported south to the 8-inch gravity sewer in Adolfo Lopez Drive, which terminates at the Adolfo Lopez Pump Station
Boeing Pump Station	75	M-1, C-2	Los Alamitos Channel to the west; Westminster Avenue to the north; Seal Beach Blvd. to the east	East	1966	Wastewater is pumped east in a 8-inch and 12-inch force main to the 24-inch gravity sewer in Seal Beach Blvd., which terminates at OCSD's Seal Beach Pump Station
Aquatic Park Pump Station	67	PLU/R	Anaheim Bay National Wildlife Refuge to the north; Huntington Harbor to the South	East	1968	Flows are pumped east along Edinger Avenue to the City of Huntington Beach system at Edinger Avenue and
College Park East/Lampson	440	C, PLU/R, R-G, RLD, RMD	City of Los Alamitos to the north; Bolsa Chica Channel to the east; San Diego Freeway to the south; Seal Beach Blvd to the west	West	Mid to Late 1960's	Flows are conveyed west to Lampson Avenue Sewer, then to OCSD's 30-inch Los Alamitos Sub-trunk Sewer in Seal Beach Blvd., which terminates at OCSD's Westside Pump Station
Old Ranch Towne Center	27	C	Centex Homes to the north; Old Ranch Golf Course and Centex Homes to the east; Old Ranch Golf Course to the south; Seal Beach Blvd to the west	West	2002	Flows are transported west to OCSD's 39-inch Westside Relief Interceptor in Seal Beach Boulevard, which terminates at OCSD's Seal Beach Pump Station
Centex Homes	18	RLD	City of Los Alamitos to the north; Los Alamitos Joint Forces Training Base to the east; Old Ranch Golf Course and Towne Center to the south; Seal Beach Blvd to the west	West	2002	Flows are transported west to OCSD's 39-inch Westside Relief Interceptor in Seal Beach Boulevard, which terminates at OCSD's Seal Beach Pump Station

Table 5-3
Ultimate Land Use Areas by Sewershed

	Sewershed	Land Use Area (Acres)										Total Area (Acres)
		RLD	RMD	RHD	PLU/R	C	R-G	M-1	I-OE	M	SPR	
1	**Pump Station No. 35**											
	Bridgeport		12.9	22.7	3.2	8.1			6.3		2.7	55.9
	Marina Hill North	121.0										121.0
	Marina Hill South	26.0			14.1	9.7						49.8
	Old Town	8.4	27.8	186.0	19.2	37.8					12.6	291.8
	US Naval Weapons Station									5256.0		5256.0
2	**Adolfo Lopez Pump Station**											
	Hellman Ranch	27.5										27.5
	Adolfo Lopez Drive				6.5			5.2				11.7
	Boeing Integrated Defense Systems					6.2	22.1					28.3
3	**Boeing Pump Station**											
	Boeing Integrated Defense Systems					16.6		60.2				76.8
	Westminster Ave. Comm.					3.1						3.1
4	**Aquatic Park**				67.0							67.0
5	**College Park East/Lampson**	206.0	7.2		5.9	13.7	191.3					424.1
6	**Old Ranch Town Center**					27.0						27.0
7	**Centex Homes**	18.0										18.0
	Total	406.9	47.9	208.7	115.9	122.2	213.4	65.4	6.3	5256.0	15.3	6458.0

RLD Residential Low Density
RMD Residential Medium Density
RHD Residential High Density
PLU/R Public Use/Recreation
C Commercial
R-G Recreation/Grass
M-1 Light Manufacturing
I-OE Oil Extraction
M Military
SPR Specific Plan Regulatory Zone-currently vacant

Legend

- 4" Forcemain
- 6" Sewer
- 8" Sewer
- 8" Forcemain
- 10" Sewer
- 12" Sewer
- 15" Sewer
- 16" Forcemain
- 18" Sewer
- 21" Sewer
- 24" Sewer
- OCSD Trunk Sewer
- # Pump Station

GOLDEN RAIN RD
MERION WY
EL DORADO DR
MONTEREY RD
THUNDERBIRD DR
CHURCH PL
WESTMINSTER BLVD
OCSD Seal Beach P.S.
Boeing P.S.
Adolfo Lopez P.S.
REGENCY DR
SEAL BEACH BLVD
CRESTVIEW AV
CATALINA AV
MARVISTA AV
DRIFTWOOD AV
FATHOM AV
COASTLINE DR
AVALON DR
CARMEL AV
SURF PL
DORY WY
GALLEON WY
ALLEY
CLIPPER WY
CARAVEL WY
MARINA DR
1ST ST
2ND ST
3RD ST
4TH ST
5TH ST
6TH ST
7TH ST
8TH ST
MAIN ST
CENTRAL AV
OCEAN AV
SEAL WY
1st St. P.S.
8th St. P.S.
Pier P.S.
BALBOA DR
SOUTH SHORE DR
TAPER DR
SAND PIPER DR
BEACH COMBER DR
SEA BREEZE DR
ISLAND VIEW DR
BAY SIDE DR
HARBOR WY
BAYOU ST
BOLSA AV
MARLIN AV
LAGUNA DR
RIVIERA DR
CORAL COVE WY
JADE COVE WY
EMERALD PL
COAST HWY
10TH ST
11TH ST
12TH ST
13TH ST
14TH ST
15TH ST
16TH ST
17TH ST
18TH ST
ELECTRIC AV
LANDING AV
DONAX AV
REDONDO AV
PACIFIC COAST HWY
P.S. 35

0 600 1,200 2,400 Feet

AKM

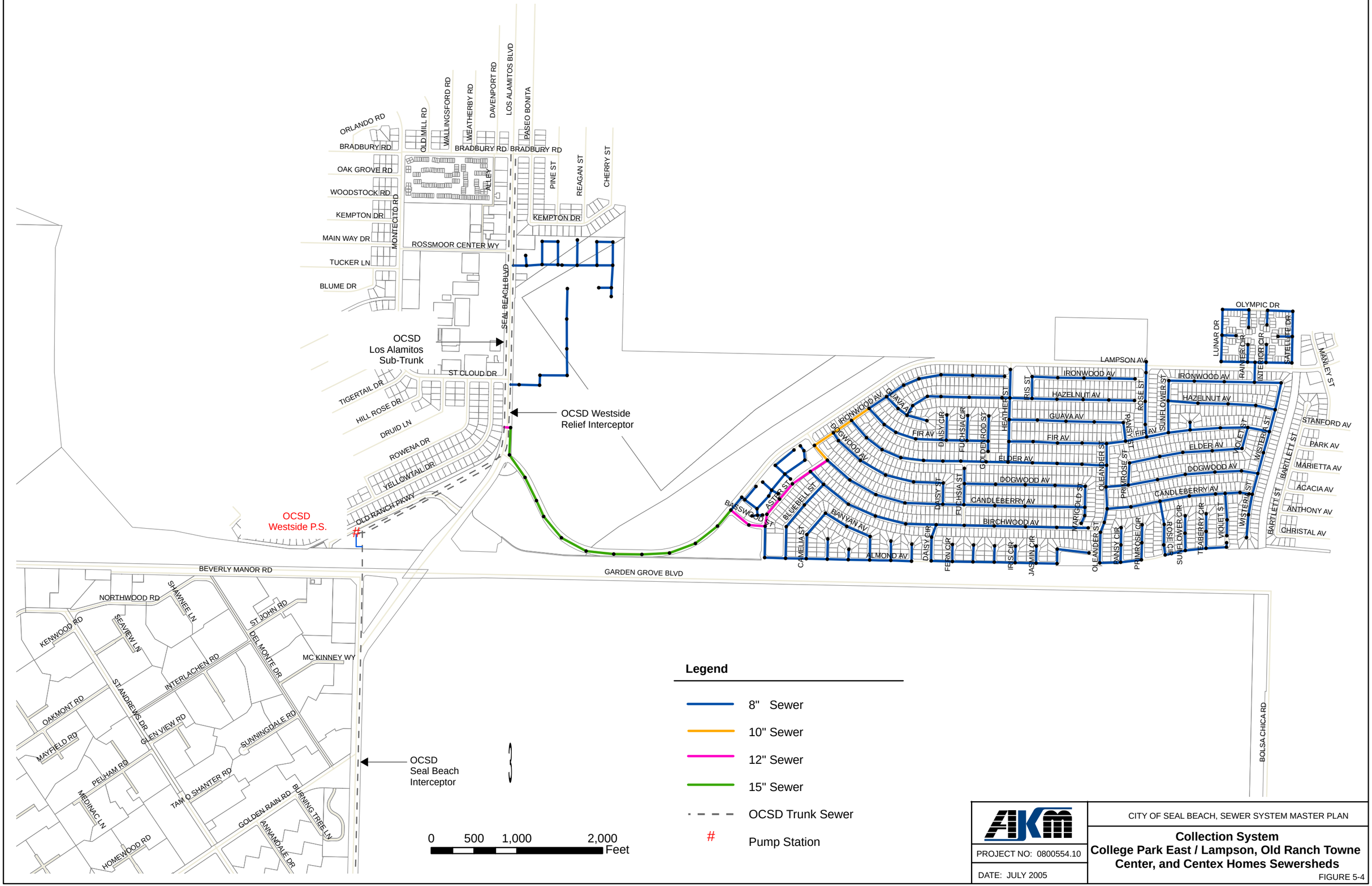
CITY OF SEAL BEACH, SEWER SYSTEM MASTER PLAN

PROJECT NO: 0800554.10

DATE: JULY 2005

Collection System
Boeing, Adolfo Lopez, & PS 35 Sewersheds

FIGURE 5-3



CITY OF SEAL BEACH, SEWER SYSTEM MASTER PLAN

Collection System
College Park East / Lampson, Old Ranch Towne Center, and Centex Homes Sewersheds

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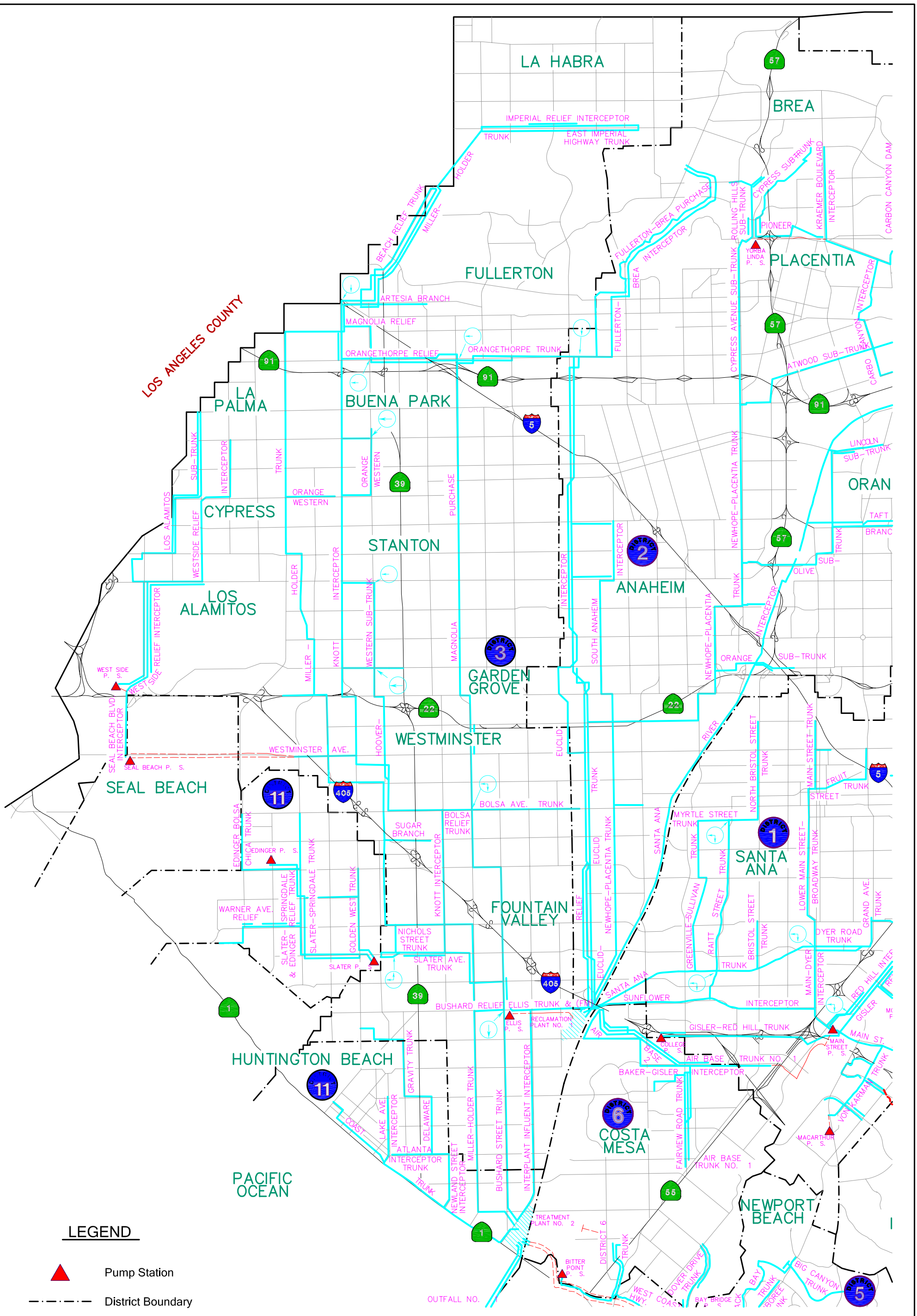
FIGURE 5-4


LA HABRA
BREA
FULLERTON
PLACENTIA
BUENA PARK
CYPRESS
STANTON
LOS ALAMITOS
ANAHEIM
GARDEN GROVE
WESTMINSTER
SEAL BEACH
FOUNTAIN VALLEY
HUNTINGTON BEACH
COSTA MESA
NEWPORT BEACH
SANTA ANA
ORAN
LA PALMA
LOS ANGELES COUNTY
PACIFIC OCEAN
IMPERIAL RELIEF INTERCEPTOR
EAST IMPERIAL HIGHWAY TRUNK
BEACH RELIEF TRUNK
HOLDER
MILLER-
ARTESIA BRANCH
MAGNOLIA RELIEF
ORANGETHORPE RELIEF
ORANGETHORPE TRUNK
FULLERTON-BREA PURCHASE
BREA INTERCEPTOR
FULLERTON-
ROLLING HILLS SUB-TRUNK
CYPRESS SUB-TRUNK
KRAEMER BOULEVARD INTERCEPTOR
CARBON CANYON DAM
PIONEER
YORBA LINDA P. S.
CYPRESS AVENUE SUB-TRUNK
ATWOOD SUB-TRUNK
CARBO CANYON INTERCEPTOR
LINCOLN SUB-TRUNK
TAFT BRANC
NEWHOPE-PLACENTIA TRUNK
OLIVE SUB-TRUNK
ORANGE SUB-TRUNK
LOS ALAMITOS SUB-TRUNK
WESTSIDE RELIEF
WEST SIDE RELIEF INTERCEPTOR
WEST SIDE P. S.
SEAL BEACH BLVD INTERCEPTOR
SEAL BEACH P. S.
WESTMINSTER AVE.
EDINGER BOLSA CHICA TRUNK
EDINGER P. S.
ORANGE WESTERN TRUNK
WESTERN SUB-TRUNK
KNOTT INTERCEPTOR
HOOVER-
MAGNOLIA PURCHASE
SOUTH ANAHEIM INTERCEPTOR
EUCLID TRUNK
BOLSA AVE. TRUNK
BOLSA RELIEF TRUNK
SUGAR BRANCH
SPRINGDALE RELIEF TRUNK
SLATER-SPRINGDALE TRUNK
GOLDEN WEST TRUNK
WARNER AVE. RELIEF
SLATER & EDINGER
SLATER P. S.
SLATER AVE. TRUNK
NICHOLS STREET TRUNK
BUSHARD RELIEF
ELLIS TRUNK & (FM)
ELLIS P. S.
RECLAMATION PLANT NO. 1
SUNFLOWER INTERCEPTOR
GISLER-RED HILL TRUNK
COLLEGE P. S.
AIR BASE TRUNK NO. 1
BAKER-GISLER INTERCEPTOR
MAIN STREET P. S.
MAIN ST. TRUNK
VON KARMAN
MACARTHUR P. S.
RIVER
NORTH BRISTOL STREET TRUNK
MAIN-STREET TRUNK
FRUIT STREET TRUNK
MYRTLE STREET TRUNK
SANTA ANA RIVER TRUNK
GREENVILLE-SULLIVAN
RAITT STREET TRUNK
BRISTOL STREET TRUNK
MAIN-DYER INTERCEPTOR
DYER ROAD TRUNK
LOWER MAIN STREET-BROADWAY TRUNK
GRAND AVE. TRUNK
RED HILL INTERCEPTOR
GISLER
NEWHOPE-PLACENTIA INTERCEPTOR
FAIRVIEW ROAD TRUNK
AIR BASE TRUNK NO. 1
DISTRICT 6 TRUNK
TREATMENT PLANT NO. 2
BITTER POINT P. S.
OUTFALL NO. 1
DOVER DRIVE TRUNK
BIG CANYON TRUNK
BAY BRIDGE
WEST COAST HWY.
ATLANTA INTERCEPTOR TRUNK
LAKE AVE. INTERCEPTOR
DELAWARE GRAVITY TRUNK
NEWLAND STREET INTERCEPTOR
MILLER-HOLDER TRUNK
BUSHARD STREET TRUNK
INTERPLANT INFLUENT INTERCEPTOR
COAST
LEGEND
Pump Station
District Boundary
Forcemain
OCSD Trunk Facility
Flow Diversion
CITY OF SEAL BEACH, SEWER MASTER PLAN
Orange County Sanitation District
Existing Facilities
PROJECT No.
DATE: JULY 2005
FIGURE 5-5

The pipe size, length, and manhole invert elevation data was developed from the sewer atlas sheets and as built plans of the collection system. The pipe slope is then calculated by the model using the manhole invert elevations and pipe lengths. The model uses the average dry weather flows for peaking as specified by the user. Pumped flows and measured flows can be entered at any manhole as a fixed flow.

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, ratio of flow depth to pipe diameter.

5-5 Existing System Analysis

The wastewater flow rates utilized in determining the capacity of the existing system were calculated with the following equations:

Average Dry Weather Flow with Infiltration

Q_{adw}= Sum (Area*UFF)+ Infiltration+ Pumped Flow

Peak Dry Weather Flow with Exponential Formulae

$Q_{pdw} = CPKF * (Sum (Area*UFF))^{e} +$ Infiltration + Pumped Flow

Where,

Q_{adw}=average dry weather flow in cfs

Q_{pdw} = peak dry weather flow in cfs

UFF = Unit flow factor in gallons per acre per day

CPKF = user-specified constant peaking factor (1.85 for Seal Beach)

e = Exponent (0.92 for Seal Beach)

The peak wet weather flow is estimated at 1.35 times the peak dry weather flow, and pump station firm capacities are based on the larger of three times the average dry weather flow and 1.35 times the peak dry weather flow.

The capacity analysis was conducted with the estimated peak dry weather flows, except peak wet weather flows were used for the 24-inch Seal Beach Boulevard Trunk Sewer. For this pipe, the design flows were calculated as the sum of the firm capacities of Pump Station No.35, Adolfo Lopez Pump Station, and Boeing Pump Station, as applicable.

Where the model indicated a depth to diameter ratio greater than 0.64 with peak dry weather flows, the pipe was initially considered not meeting the design criterion. Some of these pipes were then reviewed in the field during the peak flow period to verify the deficiency. If the field observed depth to diameter ratio was found to be less than 0.64, the pipe is not scheduled for replacement for capacity, but is recognized as a potential capacity deficient pipe. Future development in the tributary areas of such pipes needs to be monitored, and capacity improvements need to be made as needed.

The 24-inch pipe in Seal Beach Boulevard was initially considered capacity deficient if the depth to diameter ratio exceeded 0.8, since the analysis was conducted with peak wet weather flows. The flow monitoring data was consulted to verify the flow conditions in this pipe.

If a pipe is recommended for replacement due to a capacity deficiency, it is sized such that the depth to diameter ratio will not exceed 0.5 with peak dry weather flow for pipes 15-inch and smaller. Otherwise, the depth to diameter ratio will not exceed 0.64 with peak dry weather flows.

Table 5-4 lists, and Figures **5-6** and **5-7** illustrate the pipes where the model calculated depth to diameter ratios exceed 0.64 or 0.80, as applicable. Table 5-4 also shows the field observed depth to diameter ratios during the peak flow period of the day for selected pipes, as well as the general condition rating based upon the detailed condition assessment of the system conducted in 2003 and 2004.

Table 5-4
Collection System Pipes with Model Calculated Capacity Deficiencies

ID	From ID	To ID	Diameter (in)	Length (ft)	Slope	Peak Flow (cfs)	Velocity (ft/s)	d/D	Full Flow (cfs)	Field Observed d/D	Condition	Location
College Park East/Lampson Sewershed												
B01-A02	B01-A02	B01-A01	12	100	0.0010	1.8231	2.32	1.00	1.1296		Very Poor	Seal Beach Blvd at Lampson Ave
B01-A03	B01-A03	B01-A02	15	312	0.0013	1.8020	2.09	0.66	2.3191		Poor	Lampson Ave. east of Seal Beach Blvd.
B03-A14	B03-A14	B01-A13	15	244	0.0006	1.5695	1.28	1.00	1.5515		Good	Lampson Ave. south of Basswood St.
B03-A15	B03-A15	B03-A14	12	270	0.0016	1.5039	1.91	1.00	1.4256		Good	Basswood St. east of Lampson Ave.
B03-A16	B03-A16	B03-A15	12	191	0.0015	1.4992	1.91	1.00	1.3677		Good	Basswood St. west of Aster St.
B03-A17	B03-A17	B03-A16	12	138	0.0016	1.4007	2.07	0.80	1.4263		Very Poor	Aster St. north of Basswood St.
B03-A18	B03-A18	B03-A17	12	233	0.0016	1.3959	2.07	0.80	1.4235		Good	Aster St. west of Candleberry Ave
B03-A19	B03-A19	B03-A18	12	230	0.0016	1.3911	2.08	0.79	1.4328		Poor	Aster St. west of Candleberry Ave
B06-A21	B06-A21	B05-A20	12	253	0.0012	1.2203	1.81	0.80	1.2504		Good	Aster St. west of Candleberry Ave
B06-A22	B06-A22	B06-A21	10	222	0.0018	1.0788	1.98	1.00	0.9325		Fair	Candleberry Ave. east of Ironwood Ave.
B07-A23	B07-A23	B06-A22	10	268	0.0019	1.0716	1.96	1.00	0.9677		Fair	Ironwood Ave. west of Dogwood Ave.
B08-A24	B08-A24	B07-A23	10	254	0.0018	1.0310	1.89	1.00	0.9349		Fair	Ironwood Ave. west of Elder Ave.
B08-A25	B08-A25	B08-A24	8	265	0.0018	0.7523	2.16	1.00	0.5157		Good	Elder Ave. east of Ironwood Ave.
B08-A26	B08-A26	B08-A25	8	230	0.0018	0.7451	2.13	1.00	0.5116		Good	Elder Ave. east of Ironwood Ave.
B08-A27	B08-A27	B08-A26	8	237	0.0019	0.7379	2.11	1.00	0.5279		Fair	Elder Ave. east of Ironwood Ave.
B08-A28	B08-A28	B08-A27	8	272	0.0020	0.7307	2.09	1.00	0.5348		Good	Elder Ave. east of Ironwood Ave.
B08-A29	B08-A29	B08-A28	8	225	0.0019	0.7235	2.07	1.00	0.5235		Fair	Elder Ave. west of Heather St.
B08-A30	B08-A30	B08-A29	8	220	0.0018	0.7163	2.05	1.00	0.5166		Fair	Elder Ave. west of Heather St.
B08-A31	B08-A31	B08-A30	8	290	0.0018	0.7091	2.03	1.00	0.5131		Very Poor	Elder Ave. west of Heather St.
B12-A32	B12-A32	B08-A31	8	256	0.0018	0.7019	2.01	1.00	0.5136		Fair	Elder Ave. west of Heather St.
B12-A33	B12-A33	B12-A32	8	288	0.0018	0.5685	1.62855	1.00	0.5148		Fair	Elder Ave.east of Heather St.
B12-A34	B12-A34	B12-A33	8	288	0.0018	0.5607	1.60639	1.00	0.5148		Good	Elder Ave. east of Heather St.
B12-A35	B12-A35	B12-A34	8	288	0.0018	0.5530	1.5842	1.00	0.5148		Good	Elder Ave. west of Oleander St.
B12-A36	B12-A36	B12-A35	8	289	0.0018	0.5452	1.56198	1.00	0.5139		Fair	Elder Ave. west of Oleander St.
Total Length				5,863								
Pump Station No.35 Sewershed												
F02-275	F02-275	F02-274	6	125	0.0010	0.1729	1.05	0.78	0.1814	0.33	Very Poor	4th St. at Central Way
F02-276	F02-276	F02-275	6	106	0.0010	0.1551	1.04	0.71	0.1812		Good	Central Way west of 4th St.
F03-266A	F03-266A	F03-266	6	315	0.0010	0.1560	1.01	0.73	0.1765	0.33	Fair	5th St. Alley south of Electric Ave.
F04-306	F04-306	F04-305	6	599	0.0010	0.1660	1.03	0.76	0.1781	0.33	Very Poor	6th St. Alley south of Electric Ave.
F05-310A	F05-310A	F05-310	6	279	0.0010	0.1446	1.01	0.68	0.1782		Fair	7th St. Alley south of Electric Ave.
F06-315	F06-315	F18-011	8	9	0.0094	1.2094	3.46	1.00	1.1754		Fair	8th St. Alley south of Electric Ave.
F06-315A	F06-315A	F06-315	8	244	0.0010	1.1969	3.43	1.00	0.3800		Fair	8th St. Alley south of Electric Ave.
F06-316	F06-316	F06-315A	8	255	0.0010	1.1842	3.39	1.00	0.3794		Very Poor	8th St. Alley north of Central Ave.
F06-316A	F06-316A	F06-316	8	274	0.0010	1.1712	3.36	1.00	0.3803		Poor	8th St. Alley south of Central Ave.
F06-317	F06-317	F06-316A	8	269	0.0010	1.1580	3.32	1.00	0.3839		Poor	8th St. Alley north of Ocean Ave. Alley
F06-C319	F06-C319	F06-317	8	145	0.0010	1.1304	3.24	1.00	0.3765		Good	Ocean Ave. Alley east of 8th St.
F15-320	F15-320	F06-C319	8	160	0.0010	1.1147	3.19	1.00	0.3831		Very Poor	8th St. north of Ocean Ave.
F15-367	F15-367	F15-900	8	292	0.0010	0.4748	1.36	1.00	0.3818		N/A	Pier Parking east of 8th St. Pump Station
F19-391	F19-391	F19-390A	8	148	0.0020	0.4178	1.72	0.66	0.5455	0.59	Poor	Electric Ave. Alley east of 12th St.
Total Length				3,220								
Seal Beach Boulevard												
S01-101	S01-101	S01-121	18	119	0.0000	4.2332	2.40	1.00	4.2332		N/A	Seal Beach Blvd. east of Boeing PS
S01-101A	S01-101	S01-121	18	119	0.0000	4.2332	2.40	1.00	4.2332		N/A	Seal Beach Blvd. east of Boeing PS
S01-102	S01-102	S01-101	24	92	0.0009	8.4664	2.69	1.00	6.6855		N/A	Seal Beach Blvd. east of Boeing PS
S01-104	S01-104	S01-103	24	282	0.0008	7.2856	2.32	1.00	6.3669		N/A	Seal Beach Blvd south of Boeing PS
S01-105	S01-105	S01-104	24	271	0.0008	7.2856	2.32	1.00	6.4094		N/A	Seal Beach Blvd south of Boeing PS
S01-106	S01-106	S01-105	24	341	0.0008	7.2856	2.32	1.00	6.3854		N/A	Seal Beach Blvd. south of Boeing PS
S01-121	S01-121	S01-122	24	209	0.0014	8.4664	2.69	1.00	8.4493		N/A	Seal Beach Blvd. east of Boeing PS
S01-122	S01-122	S01-123	24	286	0.0011	8.4664	2.69	1.00	7.4678		N/A	Seal Beach Blvd. east of Boeing PS
Total Length				1,718								

Legend

- Capacity Deficient Sewers (PDWF d/D > 0.64)
- Existing Sewers
- Existing Forcemains
- # Existing Sewer Pump Stations

OCSD Seal Beach P.S.

OCSD Westiminster Blvd. FM

Boeing P.S.

Adolfo Lopez P.S.

1st St. P.S.

8th St. P.S.

P.S. 35

Pier P.S.

0 500 1,000 2,000 Feet

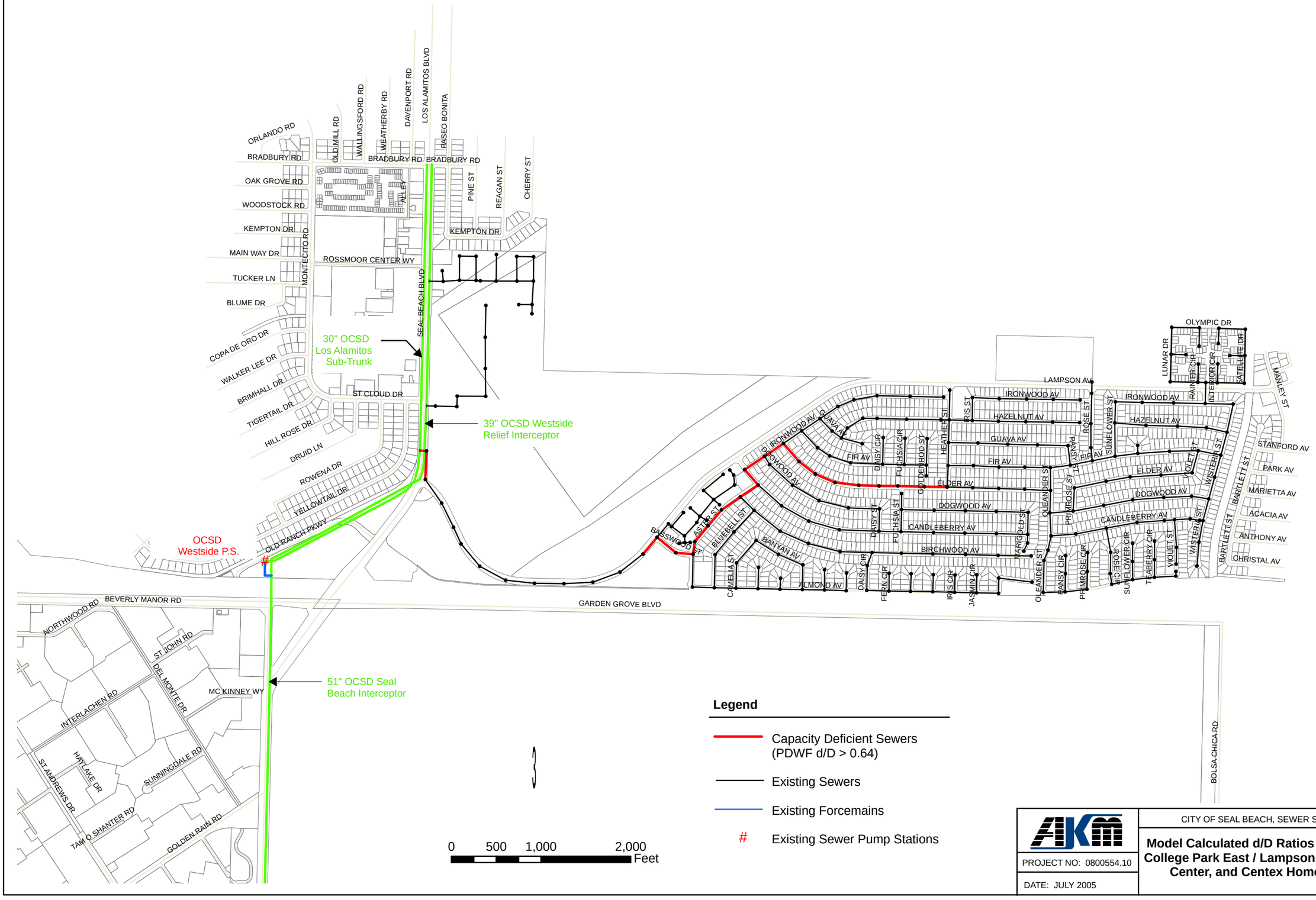
CITY OF SEAL BEACH, SEWER SYSTEM MASTER PLAN

Model Calculated d/D Ratios Exceeding Criteria Boeing, Adolfo Lopez, & PS 35 Sewersheds

PROJECT NO: 0800554.10

DATE: JULY 2005

FIGURE 5-6



CITY OF SEAL BEACH, SEWER SYSTEM MASTER PLAN

Model Calculated d/D Ratios Exceeding Criteria College Park East / Lampson, Old Ranch Towne Center, and Centex Homes Sewersheds

PROJECT NO: 0800554.10

DATE: JULY 2005

FIGURE 5-7

5-6 Existing Collection System Deficiencies and Recommended Improvements

5-6.1 Velocities

The topography of the City is generally flat and the majority of the gravity sewer lines have been designed and built with less than desirable slopes that attempt to follow the grade of the ground surface. This has resulted in a system that is velocity deficient in many areas where velocities are under 2.0 feet per second with average dry weather
flows, and under 3.0 feet per second with peak dry weather flows.

It is not cost-effective or practical to correct these deficiencies until the sewer is scheduled for replacement due to a condition deficiency. In some instances, such as in College Park East, it may not be possible to correct the problem without constructing a costly pump station. This deficiency should, therefore, be noted with the understanding that the collection system will inevitably require continual maintenance and cleaning in order to flush out materials that periodically settle in the sewer lines.

The City of Seal Beach cleans the entire collection system once every year. Additionally, portions of the system with frequent settlement problem are included in the "Hot Spot" list, which are cleaned monthly. The Hot Spots are included in the City's Preventative Maintenance Program. It is updated as new problem areas are identified through the CCTV inspection program.

5-6.2 Capacity

The following subsections describe the capacity deficiencies calculated by the hydraulic model, and provide recommendations for either additional studies, or for projects that will mitigate the deficiencies.

PUMP STATION No. 35 SEWERSHED

Bridgeport

No capacity deficiencies were found in the Bridgeport sewershed.

Marina Hill North

No capacity deficiencies were found in the Marina Hill North sewershed.

Marina Hill South

The Marina Hill South system has no capacity deficiencies. The portion identified to be deficient by the 1999 Master Plan has been relieved by the diversion of Aquatic Park flows to the City of Huntington Beach system.

Old Town

The hydraulic model calculated 2928 feet of sewers that did not meet the City's capacity criterion.

1. **Central Way, Fourth Street, Fifth Street Alley, Sixth Street Alley, and Seventh Street Alley**

   Five reaches of sewers with a total length of 1424 feet between Third Street and Eighth Street, south of Electric Avenue are of old 6-inch diameter VCP, all with design slopes of 0.0001, had model calculated depth to diameter ratios between 0.68 to 0.78. Because these sewers are also quite shallow, reducing the possibility of extensive dry weather infiltration, they were observed by City staff during the peak flow period between 6:50 to 8:00 am on June 17, 2005. The maximum depth to diameter ratios did not exceed 0.33. Therefore, these sewers are not considered capacity deficient.

2. Electric Avenue Alley East of 12th Street

This 148 foot reach of 8-inch sewer was determined by the model to have a peak dry weather flow depth to pipe diameter ratio of 0.66. Wastewater flow in the pipe was observed during the peak flow period on June 17, 2005. The maximum depth to diameter ratio was measured at 0.59. This reach was rated poor by the condition assessment work completed in 2003 due to a sag and mineral deposits blocking the passage of the camera. Although it is not currently capacity deficient, it will be replaced with a larger pipe as part of the sewer system rehabilitation plan. If additional development is proposed in the tributary area, it may have to be replaced earlier than planned.

3. Eighth Street, Ocean Avenue Alley East of Eighth Street, and Eighth Street Alley

The model shows the seven reaches (1356 feet) of 8-inch sewers between the Eighth Street Pump Station force Main and Electric Avenue to be deficient because of the high flow from the pump station. The 8-inch diameter pipes will need to be replaced with 15-inch diameter pipes. Because the Electric Avenue sewer is deeper than the existing connection, these pipes can be constructed with steeper slopes, which will reduce the pipe size and increase the velocities. As an alternate, the force main from the pump station can be extended to Electric Avenue when the pump station is replaced. This will bypass the existing capacity deficient pipes and significantly reduce their design flows.

4. Pier Parking East of Eighth Street Pump Station

This 292 foot section of pipe is calculated to be deficient due to the pumped flows from the Pier Pump Station. It will be flow monitored to verify the deficiency due to the short duration of the pumped flows. If the deficiency is verified, this section of pipe will be replaced when the 8th Street Pump Station is replaced.

US Naval Weapons Station

The collection system within the US Naval Weapons Station is the responsibility of the US Navy, and was not evaluated as part of this study.

Pump Station No.35 Disposal System (Seal Beach Boulevard Trunk Sewer)

This section of the system was analyzed with the pump station firm capacities added. The reaches between Adolfo Lopez Pump Station and Boeing Pump Station were analyzed with a total flow of 3270 gpm (7.29 cfs), which is the sum of the proposed Pump Station No.35 firm capacity of 3000 gpm, and the measured firm capacity of the new Adolfo Lopez Pump Station. The reaches between Boeing Pump Station and connection to OCSD system, were analyzed with a design flow of 3800 gpm (8.47 cfs) which is the sum of the ultimate firm capacities of Pump Station No.35, Adolfo Lopez Pump Station, and Boeing Pump Station).

Three reaches of 24-inch diameter sewer (Manhole S01-106 to S01-103) totaling 893 feet had slopes of 0.0008 and model calculated depth to diameter ratios exceeding 0.80 between Adolfo Lopez Pump Station and Boeing Pump Station. The slopes of these reaches were constrained by the downstream pipe elevations, an inverted siphon necessitated by a storm drain crossing, and the ground profile. The pipe is quite shallow and is encased in reinforced concrete for structural protection.

Downstream of the Boeing Pump Station connection, 119 feet of two parallel 18-inch pipes, and three reaches (587 feet) of 24-inch diameter sewer exceeded the depth to diameter ratio of 0.8.

The two 18-inch pipes were constructed in 1998 and 1999 when the 16-inch diameter force main failed. Similarly, the pipes are very shallow, and slopes are mild.

The City staff indicated that there was no spill from any of these reaches when all three pumps were operated at Pump Station No.35 (3500 gpm) during the 2004-2005 wet weather period. Significant portion of the tributary area of Boeing Pump Station is not yet developed. It is recommended that these reaches be flow monitored with the firm pump capacities of the three pump stations when new pumps are installed at Pump Station No.35. If the depth to diameter ratios exceed 0.80, a 15-inch diameter relief line can be constructed. When the section of the system downstream of Boeing Pump Station is replaced due to condition, it may be possible to increase the slopes of several reaches, by relocating interfering utilities.

ADOLFO LOPEZ PUMP STATION

The model did not show any capacity deficiencies in the public collection system tributary to the Adolfo Lopez Pump Station.

BOEING PUMP STATION

The model did not show any capacity deficiencies in the public collection system tributary to the Boeing Pump Station.

AQUATIC PARK

The collection system in Aquatic Park is the responsibility of the County of Orange. It was therefore not evaluated as part of this study.

COLLEGE PARK EAST/LAMPSON SEWERSHED

The hydraulic model indicated that 5863 feet of pipe did not meet the City's criteria for capacity. Flow monitoring conducted in the reach between manhole B08-A28 and B08-A27 showed a maximum depth to diameter ratio of 0.93, where the model calculated full depth. Two other flow monitoring results conducted in May and June 2002, one at Manhole B08-A20 (intersection of Aster Street and Birchwood Avenue), and one at Manhole B05-A22 (intersection of Ironwood Avenue and Candleberry Avenue) indicated maximum depth to diameter ratios of 0.67. The model calculated maximum depth to diameter ratios of 1.00 and 0.8, respectively at these locations, with similar peak dry weather flows. Therefore, the model results are deemed to be reasonable, particularly in view of the fact that the flow monitoring results are based upon less than full occupancy. Calculated deficiencies and proposed mitigation projects are as follows:

1. **Seal Beach Boulevard Crossing North of Lampson Avenue**

   This is a 12-inch diameter pipe downstream of the 15-inch diameter sewer in Lampson Avenue. It crosses Seal Beach Boulevard from east to west, and terminates at OCSD's 30-inch diameter Los Alamitos Sub-trunk Sewer. Profile of Westside Relief Interceptor (Sheet 3 of 19, Contract 3-21-1) indicates that this pipe confluences with the Los Alamitos Sub-trunk Sewer with its soffit well below the soffit of the Sub-trunk.

   The condition assessment work conducted in 2003 rated this pipe very poor. It had high flow, a sag, infiltration, and mineral deposits blocking the top 25 percent of the pipe. Closed circuit television (CCTV) inspection report does not show any laterals connecting to this reach of pipe. It should be eliminated following the construction of a new 190 feet of 18-inch sewer from Manhole B01-A03 to the Los Alamitos Sub-trunk manhole located west of Seal Beach Boulevard and south of Bixby Channel.

2. Seal Beach Boulevard North of Lampson Avenue

This is a 312 foot reach where the model indicates a maximum depth to diameter ratio of 0.66. This is slightly over the City's criterion of 0.64. This reach will be flow monitored to verify the model result. If the deficiency is verified, it will be scheduled to be replaced with an 18-inch diameter pipe.

This reach of pipe was rated poor by the condition assessment work conducted in 2003. The pipe has a circumferential crack, minor joint offsets, sag, roots, infiltration, and mineral deposits.

The CCTV inspection report does not show any laterals in this reach. Therefore, it can be eliminated by constructing the 190 feet of 18-inch sewer recommended for the above described deficiency.

3. Lampson Avenue South of Basswood Street

This is a 244 foot reach of 15-inch pipe with a design slope of 0.0006. The model shows it to be flowing full with peak dry weather flows. It will be replaced with an 18-inch diameter pipe.

4. Basswood Street between Aster Street and Lampson Avenue

These two reaches consist of 461 feet of 12-inch pipe. The model indicates that they are full with peak dry weather flows. They will be replaced with 18-inch pipe. The depth to diameter ratio in the replacement pipe will be limited to 0.43.

5. Aster Street between Candleberry Avenue and Basswood Street

These four reaches cover 856 feet of 12-inch pipe. The model shows depth to diameter ratios of 0.79 to 0.80, except one reach south of Birchwood Avenue, where it is 0.63 because of its steeper design slope. All four reaches will be replaced with 15-inch pipe. The peak dry weather flow depth to diameter ratios will not exceed 0.52. Although this is slightly greater than 0.50, a larger diameter is not recommended because of the already low velocities.

6. Candleberry Avenue and Ironwood Avenue between Elder Avenue and Aster Street

These three reaches of sewer cover 788 feet of 10-inch pipe. The model indicates that all three reaches flow full with peak dry weather flows. The flow monitoring conducted in 2002 showed a depth to diameter ratio of 0.67 for the reach between Dogwood Avenue and Candleberry Avenue, which still exceeds the City's capacity criterion. These three reaches will be replaced with 15-inch diameter pipe.

7. Elder Avenue Between Heather Street and Ironwood Avenue

This portion of the system consists of eight reaches of 8-inch diameter sewer with a total length of 1995 feet. The model shows these reaches to be full with peak dry weather flows. Flow monitoring conducted upstream of Manhole B08-A27 showed a maximum depth to diameter ratio of 0.93. These eight reaches will be replaced with 12-inch pipe.

8. Elder Avenue between Oleander Street and Heather Street

The four reaches of 8-inch diameter sewer are shown to be full with peak dry weather flows. However, this deficiency can be mitigated by diverting the flow at the intersection of Fir Avenue and Oleander Street to the west. If the entire flow is diverted, the sewers in Fir Avenue will have depth to diameter ratios of 0.54 to 0.57 with peak dry weather flows, and

the reach in Heather Street between Fir Avenue and Elder Avenue will have a depth to diameter ratio of 0.61. The City should make this diversion, with an overflow to the south, and avoid the replacement of 1153 feet of 8-inch pipe with 12-inch pipe in Elder Avenue.

OLD RANCH TOWNE CENTER

The model did not show any capacity deficiencies in this system

CENTEX HOMES

The model did not show any capacity deficiencies in this system.

The recommended capacity improvement projects are listed in Table 5-5 and illustrated on Figures 5-8 and 9.

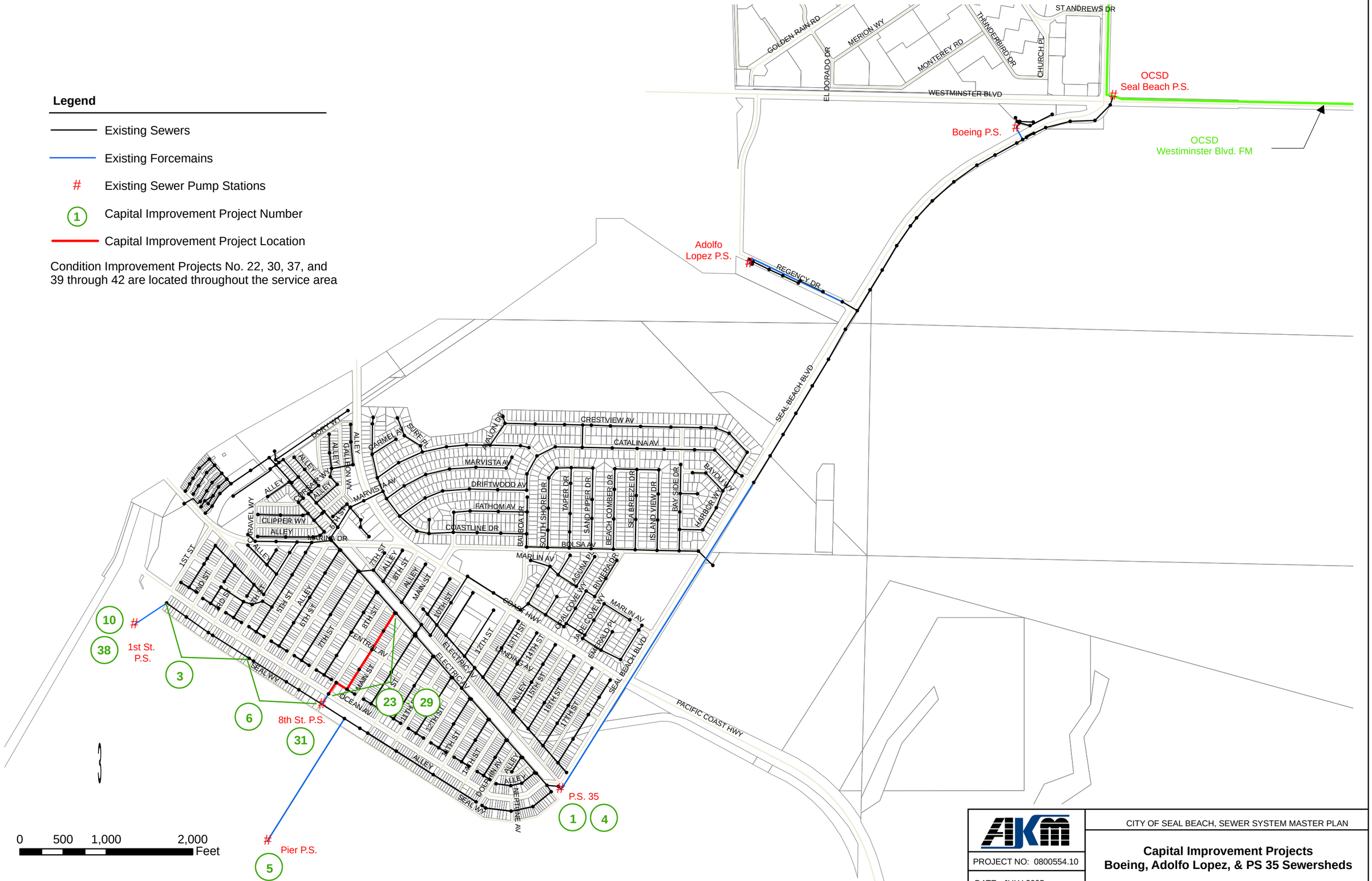
Table 5-5
Recommended Capacity Improvement Projects-Collection System
College Park East/Lampson Sewershed

No.	Pipe ID	From Manhole	To Manhole	Existing Size (in)	Proposed Size (in)	Length (ft)	Peak Flow (cfs)	Existing Condition	Location
1		B01-A03	Los Al ST		18	190	1.8231	Very Poor	SB Blvd, from east of Lampson Ave. to Los Alamitos Sub-trunk
2	B03-A14	B03-A14	B01-A13	15	18	244	1.5695	Good	Lampson Ave. south of Basswood St.
3	B03-A15	B03-A15	B03-A14	12	18	270	1.5039	Good	Basswood St. east of Lampson Ave.
4	B03-A16	B03-A16	B03-A15	12	18	191	1.4992	Good	Basswood St. west of Aster St.
5	B03-A17	B03-A17	B03-A16	12	15	138	1.4007	Very Poor	Aster St. north of Basswood St.
6	B03-A18	B03-A18	B03-A17	12	15	233	1.3959	Good	Aster St. west of Candleberry Ave
7	B03-A19	B03-A19	B03-A18	12	15	230	1.3911	Poor	Aster St. west of Candleberry Ave
8	B05-A20	B05-A20	B03-A19	12	15	255	1.3863	Good	Aster St. west of Birchwood Ave.
9	B06-A21	B06-A21	B05-A20	12	15	253	1.2203	Fair	Aster St. west of Candleberry Ave
10	B06-A22	B06-A22	B06-A21	10	15	222	1.0788	Fair	Candleberry Ave. east of Ironwood Ave.
11	B07-A23	B07-A23	B06-A22	10	15	268	1.0716	Fair	Ironwood Ave. west of Dogwood Ave.
12	B08-A24	B08-A24	B07-A23	10	15	254	1.0310	Fair	Ironwood Ave. west of Elder Ave.
13	B08-A25	B08-A25	B08-A24	8	12	265	0.7523	Good	Elder Ave. east of Ironwood Ave.
14	B08-A26	B08-A26	B08-A25	8	12	230	0.7451	Good	Elder Ave. east of Ironwood Ave.
15	B08-A27	B08-A27	B08-A26	8	12	237	0.7379	Fair	Elder Ave. east of Ironwood Ave.
16	B08-A28	B08-A28	B08-A27	8	12	272	0.7307	Good	Elder Ave. east of Ironwood Ave.
17	B08-A29	B08-A29	B08-A28	8	12	225	0.7235	Fair	Elder Ave. west of Heather St.
18	B08-A30	B08-A30	B08-A29	8	12	220	0.7163	Fair	Elder Ave. west of Heather St.
19	B08-A31	B08-A31	B08-A30	8	12	290	0.7091	Very Poor	Elder Ave. west of Heather St.
20	B12-A32	B12-A32	B08-A31	8	12	256	0.7019	Fair	Elder Ave. west of Heather St.
	Total Length					4,743			
					Pump Station No.35 Sewershed				
21	F06-315	F06-315	F18-011	8	15	9	1.2094	Fair	8th St. Alley south of Electric Ave.
22	F06-315A	F06-315A	F06-315	8	15	244	1.1969	Fair	8th St. Alley south of Electric Ave.
23	F06-316	F06-316	F06-315A	8	15	255	1.1842	Very Poor	8th St. Alley north of Central Ave.
24	F06-316A	F06-316A	F06-316	8	15	274	1.1712	Poor	8th St. Alley south of Central Ave.
25	F06-317	F06-317	F06-316A	8	15	269	1.1580	Poor	8th St. Alley north of Ocean Ave. Alley
26	F06-C319	F06-C319	F06-317	8	15	145	1.1304	Good	Ocean Ave. Alley east of 8th St.
27	F15-320	F15-320	F06-C319	8	15	160	1.1147	Very Poor	8th St. north of Ocean Ave.
	Total Length					1,356			

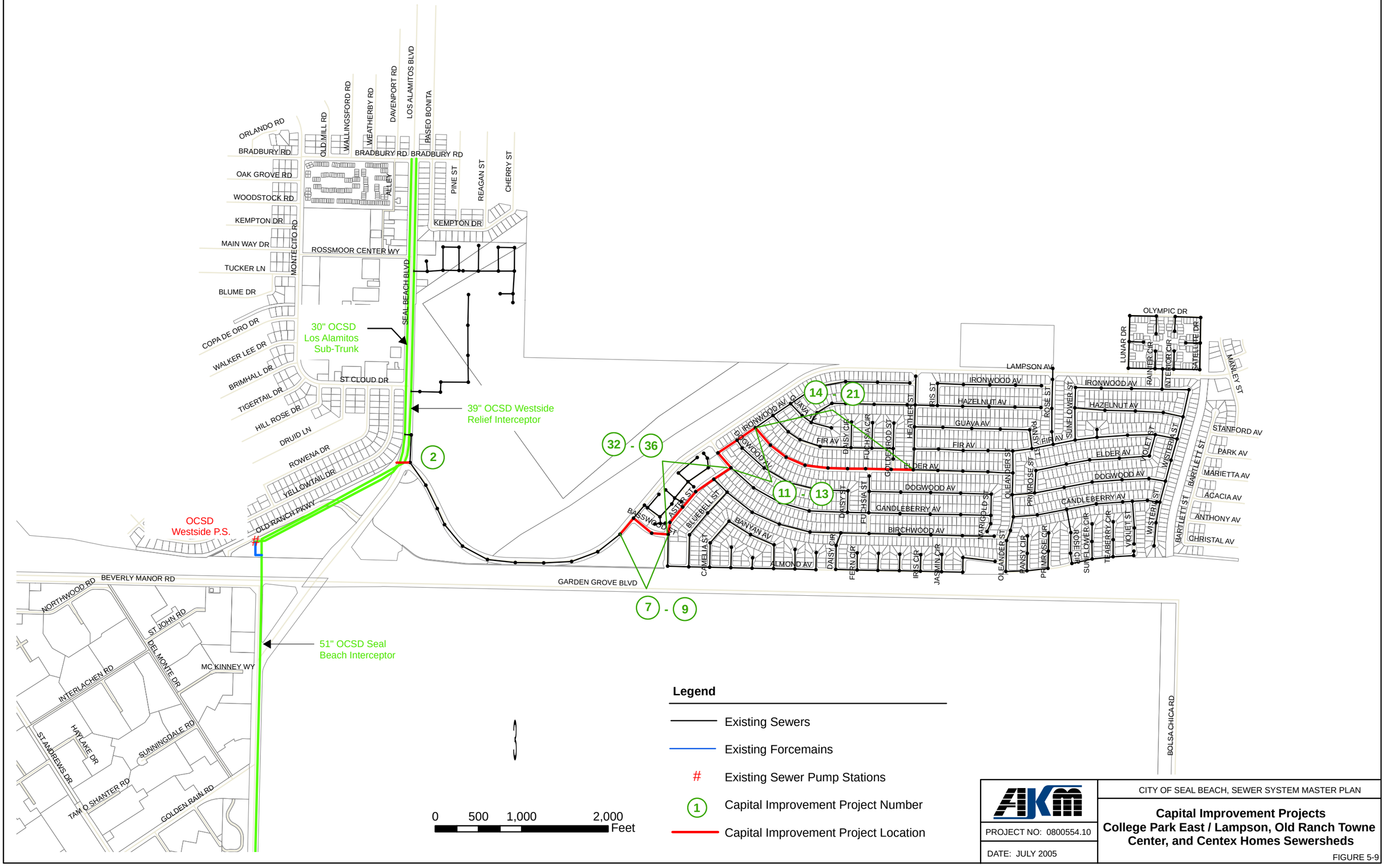
Legend

- Existing Sewers
- Existing Forcemains
- # Existing Sewer Pump Stations
- (1) Capital Improvement Project Number
- Capital Improvement Project Location

Condition Improvement Projects No. 22, 30, 37, and 39 through 42 are located throughout the service area



AKM	CITY OF SEAL BEACH, SEWER SYSTEM MASTER PLAN
PROJECT NO: 0800554.10	**Capital Improvement Projects Boeing, Adolfo Lopez, & PS 35 Sewersheds**
DATE: JULY 2005	FIGURE 5-8



CITY OF SEAL BEACH, SEWER SYSTEM MASTER PLAN

Capital Improvement Projects
College Park East / Lampson, Old Ranch Towne Center, and Centex Homes Sewersheds

PROJECT NO: 0800554.10

DATE: JULY 2005

FIGURE 5-9

Section 6

PUMP STATIONS

6-1 General

The City of Seal Beach currently owns and operates seven (7) sewer pump stations located throughout the City as shown on Figure 6-1.

Marina Community Center Pump Station was eliminated by constructing a gravity sewer in 2002. Aquatic Park Pump Station No.2 was removed from service when the Aquatic Park Pump Station No.1 tributary wastewater was diverted to the City of Huntington Beach system in 2003.

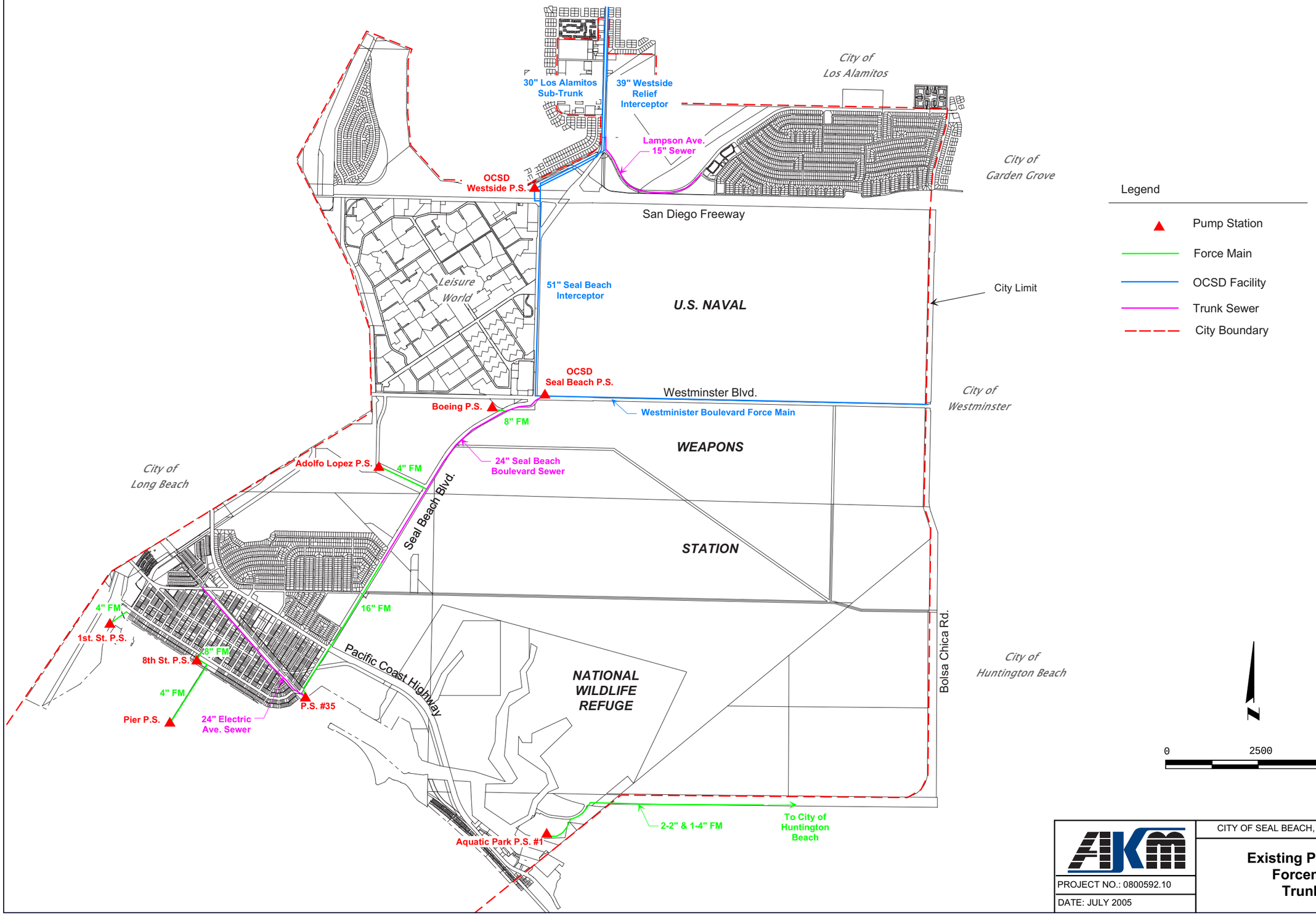
The First Street, Pier and Eighth Street Pump Stations service small areas and discharge into the collection system in Old Town that eventually drains into the City's Pump Station No.35, located at the intersection of Electric Avenue and Seal Beach Boulevard. Pump Station No.35 collects wastewater generated by the Naval Weapons Station, Bridgeport, Marina Hill, and Old Town. It pumps the wastewater through a 16-inch diameter force main into the 24-inch Seal Beach Boulevard Trunk Sewer just south of Catalina Avenue. The 24-inch diameter trunk sewer extends north in Seal Beach Boulevard, and terminates at the Orange County Sanitation District's Seal Beach Pump Station located north easterly of the intersection of Seal Beach Boulevard and Westminster Avenue. The Boeing and Adolfo Lopez Pump Stations discharge directly into the Seal Beach Boulevard Trunk Sewer. Table 6-1 provides a summary of the City's sewer pump stations.

Boeing and Adolfo Lopez Pump Stations were replaced with new facilities in 2003 and 2005, respectively. These pump stations comply with all current codes and regulations. Pump Station No. 35 is planned to be improved in two phases over the next three years. The remaining pump stations were constructed between the 1920's and early 1970's. They have been retrofitted with new pumps and control systems in the mid 1980's. They are similar in that they share many of the same deficiencies which may be expected from facilities designed and constructed over 35 years ago. Some deficiencies are the result of poor design, while others are the result of the facility's age. Some of the more significant deficiencies include:

- Lack of standby emergency power provisions to operate the stations during loss of commercial power
- Poor access to pumps and valving. Most are located in OSHA classified confined spaces
- Severely corroded piping, valves, and other metallic appurtenances
- Inadequate or total lack of ventilation equipment
- Non-compliance with the National Electric Code (NEC, NFPA 70) and National Fire Prevention Association (NFPA) Standard 820
- Spalled or crumbling concrete in the wet wells

The following subsections provide a detailed discussion of each pump station identifying deficiencies and developing recommendations for improvements. It should be noted that these recommendations are general in nature and should not be considered as detailed design recommendations. Prior to undertaking the design of upgrades at any of the City's pump stations, detailed design reports should be prepared to expand upon the approaches contained herein. The design reports should verify the data and assumptions, and provide a detailed framework for proceeding into design.

Table 6-2 is an evaluation matrix which summarizes the existing deficiencies and provides recommendations for improvements.



CITY OF SEAL BEACH, SEWER SYSTEM MASTER PLAN

Existing Pump Stations, Forcemains, and Trunk Sewers

PROJECT NO.: 0800592.10

DATE: JULY 2005

FIGURE 6-1

Table 6-1
City of Seal Beach
Wastewater Pump Stations

Name	Type	Number of Pumps, Manufacturer, Type	Rated Conditions	Motor HP	Existing Flow (GPM)		Ultimate Flow (GPM)		Force Main			Year Constructed
					Average	Peak WW	Average	Peak WW	Size (in)	Material	Length (FT)	
Adolfo Lopez	Submersible	(2) WEMCO 4x11S Vortex	215 GPM @ 89 FT TDH 1750 RPM	30	25	75	72	215	4	PVC	1100	2005 Used Existing Force Main
Aquatic Park	Submersible	(2) ABS PIRANHA M35-2 Grinder	30 GPM @ 103 FT TDH 3450 RPM	4.7	3	17	3	17	2-2" 1-4"	Sch. 80 PVC, AWWA C-900 PVC	3x3902	1968 Pump and Force MainReplaced in 2003
Pier	Submersible	(2) ESSCO 493 Vortex	125 GPM @25 FT TDH 1750 RPM	3	2	12	2.5	15	4	PVC	1658	1984
Boeing	Submersible	(2) WEMCO 6x11M Vortex	510 GPM @ 21 FT TDH 1170 RPM	10	32	96	167	500	8/12	PVC	147/100	2004
1st Street	Submersible	(2) ESSCO	85 GPM @ 25 FT TDH	3.5	2	12	13	65	4	CIP	450	1968 Pumps and Control Planel Repaired
8th Street	Wet Well/ Dry Well	(2) ESSCO 4x12 TF Vortex	500 GPM @25 FT TDH 1170 RPM	7.5	50	155	65	208	6	CIP	150	1920's Pumps and Control Panel Replaced
Pump Station 35	Wet Well/ Dry Well	(3) WEMCO Model EV Torque Flow	2600 GPM @71.3 FT TDH 1170 RPM	100	920	2852	958	2970	16	DIP/PVC	4000/200	1973 Pumps Repaired

Table 6-2
Pump Station Deficiency Matrix

Pump Station	Deficiencies: Age	Pumps	Access	Wet Well	Ventilation	Controls	Emergency Power	Telemetry	Force Main	Recommended Improvements	Grade	Comments
Adolfo Lopez										Replace force main when useful life is reached	A	Construction of new facility was completed in 2005. Meets all established criteria.
Aquatic Park #1	•	•	•	•	•		•	•		1) Replace control panel 2)Remove existing metal wet well, convert concrete manhole into wet well	D+	Operational. Wet well is inadequate. Groundwater infiltrates vault. Exceeded useful life.
Pier			•	•			•	•		As a minimum improvement, retrofit with access hatches, install grease trap/interceptor, and Install telemetry equipment. If space can be made available, replace with a new station	D+	Very difficult to maintain station. No access provided. Has a grease problem.
Boeing										None	A	Construction of new facility was completed in 2004. Meets all established criteria.
First Street	•	•	•	•			•	•		May be possible to remove from service, otherwise replace with new 125 gpm duplex submersible pump station.	D	Appears to be operationally adequate. Poor design. Pump removal is difficult. Has exceeded useful life.
8th Street	•		•				•	•	•	Replace with new 400 gpm duplex submersible pump station with dedicated emergency generator. Replace force main	D+	Station is operational. Oldest facility in the system.
Pump Station #35		•						•	•	1) Replace the motor control center, install new motors and variable frequency drives 2) Replace the pumps and piping, reline the wet well	C	Station in fair condition. Better pump selection required. Electrical equipment is becoming old. Wet well should be relined to extend useful life.

Explanation of Grading System

A Excellent condition. Long Term use to be expected
B Good condition. Few deficiencies. Moderate Longevity
C Fair condition. Some significant deficiencies. Approaching end of useful life
D Poor condition. Significant deficiencies. At end of useful life.
F Totally inadequate. Failure imminent.

6-2 Existing Pump Station Descriptions and Deficiencies

6-2.1 Adolfo Lopez Pump Station

General

The Adolfo Lopez Pump Station is a small submersible facility located at the City's Maintenance Yard near the west end of Adolfo Lopez Drive. Currently, it services Accurate Metals Manufacturing, the Animal Shelter, Police Station, and City Maintenance Yard located on Adolfo Lopez Drive. Ultimately, it will serve the Hellman Ranch (Heron Pointe) Development, and the westerly portion of the Boeing Integrated Defense Systems property.

The pump station service area is shown on Figure 6-2.

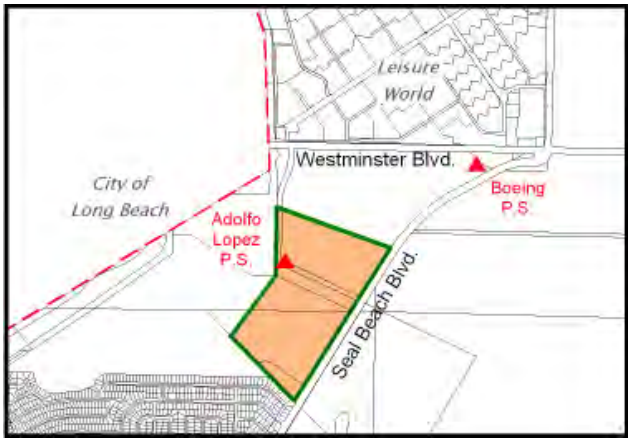


Figure 6-2
Adolfo Lopez Pump Station Service Area

Construction of the existing pump station was completed in 2005. It incorporates all elements of the City's criteria, including emergency storage and standby power. It has an 8-foot diameter PVC lined reinforced concrete wet well with two 30 HP submersible WEMCO 4x11S vortex pumps (one standby). The isolation and check valves are located above ground. There have been no prolonged power outages at the station, nor sewage spills reported.

Flows

The existing wastewater flows into the pump station are limited to sewage generated at the Animal Shelter, Police Station, Accurate Metals and City Maintenance Yard. Based upon logs of pump running hours from the old pump station, and the rated capacity of 100 gpm, total flow through the station is calculated as 5.42 MGD per year. This is equivalent to an average flow of 10.3 gpm.

The wastewater flows to the station will increase with the development of Hellman Ranch, and westerly portion of Boeing Integrated Defense Systems. Hellman Ranch will have 70 single family residential units, and the Boeing property will incorporate 17.72 acres of industrial and 4.96 acres of commercial development. The estimated ultimate average dry weather flow to Adolfo Lopez Pump Stations is 72 gpm. The corresponding peak wet weather flow is estimated at 215 gpm. The pump station's firm capacity of 270 gpm is greater than the ultimate peak wet weather flow.

Collection System

The collection system tributary to the Adolfo Lopez Pump Station consists of 8-inch sewers from west and east in Adolfo Lopez Drive. The gravity sewer from the west is 8-inch PVC, conveying wastewater from Hellman Ranch and the Animal Shelter.

The beginning 300 feet of the sewer from the east is 8-inch VCP. It continues west as an 8-inch SDR-26 PVC. It currently conveys wastewater from Accurate Metals, the Seal Beach Police Department facility, and the Seal Beach Maintenance Yard. It has an 8-inch lateral to the north for the future flows from the Boeing property.

The two gravity sewers confluence in Adolfo Lopez Drive, and extend southerly and westerly into the pump station wet well.

Disposal System

The pump station lifts wastewater through 1100 feet of 4-inch PVC force main in Adolfo Lopez Drive, terminating at a manhole just west of Seal Beach Boulevard. An 8-inch diameter VCP sewer extends east from this manhole and terminates at the 24-inch diameter Seal Beach Boulevard Trunk Sewer. The 24-inch trunk sewer conveys flows to OCSD's Seal Beach Pump Station located at the corner of Seal Beach Boulevard and Westminster Avenue. The sewage is ultimately conveyed to OCSD's Plant No. 2 in Huntington Beach for treatment and disposal. Pump station information is shown in Table 6-3.

Table 6-3
Adolfo Lopez Pump Station

Pump Station Name	Adolfo Lopez Pump Station	
Location	8' diameter manhole at City of Seal Beach Maintenance Yard south of Adolfo Lopez Drive.	
Plan Identification	Plans for the Construction of Adolfo Lopez Sewage Pump Station-21 Sheets	
Construction Date	2005	
Pump Information		
Pump No.	1	2
Type of Pump	4" submersible torque flow Model 4x11S	4" submersible torque flow Model 4x11S
Capacity (gpm)	270	270
Head (ft.)	89	89
HP	30	30
RPM	1750	1750
Voltage	480V	480 V
Number of Phases	3	3
Existing Hrs of Operation	N/A	N/A
Impeller Diameter (in)	10.25	10.25

Table 6-3
Adolfo Lopez Pump Station *(Continued*

Force Main Information	
Start Point	Adolfo Lopez Pump Station
Wet Well Invert	-17.0
End Point	48" diameter manhole west of Seal Beach Blvd. (63' west of centerline) Elevation 31.75
Size (in)	4
Material	PVC
Length (ft)	1100

Deficiencies

The construction of Adolfo Lopez Pump Station was completed in 2005. The new pump station incorporates all current criteria, including on-site standby power (100 kW natural gas generator), 20 minutes of peak hour storage, standby pump, flow meter, PVC lined wet well, and telemetry. The slide rail system allows removal of the pumps without entering the wet well.

With proper maintenance, it should provide many years of reliable service. Most of the original force main, constructed in 1978, was left in service. It is expected to provide adequate service for another fifteen years.

6-2.2 Aquatic Park Pump Station

General

Located in Anaheim Bay, within the corporate boundaries of Seal Beach, but segregated from the Old Town area by the Wildlife Refuge and Naval Weapons Station, is the Sunset Aquatic Park. The 63-acre park was acquired by the County in 1963 from the Navy and provides boat slips, boat ramps and picnic areas to the public.

Sewer service to the Park is provided through a small collection system owned by the County, and a submersible pump station owned and operated by the City. Park facilities being served by the sewer system consist of five restroom buildings,

the Harbor Patrol building, a dockside café, the marina management offices, and the Sunset Aquatic Shipyard.

The Aquatic Park Pump Station was constructed in 1968 and is located within the greenbelt area of the park's parking lot. It is a small package type submersible station installed within a concrete vault. The station originally contained two submersible pumps mounted in a small steel wet well with shafting to a dry well motor mounted above. In 2003, the pump and motor arrangement was replaced with two submersible grinder pumps. The electrical control panel was replaced in 1984.

Up to 2003, all wastewater collected at the facility was pumped under a channel through a 4-inch force main to a second pump station located on a peninsula in Anaheim Bay. The second pump station then lifted the flow into the City's Old Town collection system.

Due to two failures of the force main under the channel (1985 and 2003), the flow was diverted to the City of Huntington Beach's collection system at Edinger Avenue and Trinidad Lane. At that time, the second pump station located on the Anaheim Bay Peninsula was demolished by City forces.

The diversion forcemain consists of two parallel 2-inch diameter PVC pipes, as well as a 4-inch diameter PVC pipe. The wastewater is currently pumped through one of the two 2-inch diameter force mains because of capacity limitations in the City of Huntington Beach system. The second 2-inch force main is a standby facility. When the receiving City of Huntington Beach system is improved, the 4-inch diameter force main can be used to convey the Aquatic Park Pump Station flows. The Aquatic Park System is shown on Figure 6-3.

Detailed information on Aquatic Park Pump Station is shown in Table 6-4.

Table 6-4
Aquatic Park Pump Station

Pump Station Name	Aquatic Park Pump Station	
Location	Sunset Aquatic Park 2901 Edinger Avenue	
Plan Identification	Aquatic Park Pump Station and 2-Inch Forcemain 2003 (15 Sheets)	
Construction Date	1968 (Pump Station)/2003	
<u>Pump Information</u>		
Pump No.	1	2
Type of Pump	ABS Piranha Model 35-2 Submersible Grinder	ABS Piranha Model 35-2 Submersible Grinder
Capacity (gpm)	30	30
Head (ft.)	103	103
HP	5	5
RPM	3450	3450
Voltage	480V	480V
No. of Phases	3	3
Hrs of Operation	209	209
Impeller Dia (in)	6 ¼	6 ¼
<u>Force Main Information</u>		
Start Point	Aquatic Park Pump Station No. 1	
Wet Well Invert	0.00	
End Point	48" Manhole at Edinger Ave and Trinidad Lane	
Size (in)	2-2", 1-4" (outlet elevation 2.0')	
Material	Sch. 80 PVC, AWWA C900 Class 200 PVC, 316 Stainless Steel at Bolsa Chica Channel Bridge	
Length (ft)	3902	

Figure 6-3
Aquatic Park Pump Station Service Area

Flows

Flows are limited to those generated at the five restroom buildings, Harbor Patrol building, dockside café, marina management offices, and the Sunset Aquatic Shipyard. The City does not maintain flow records for the station.

A study of sewage flow to the pump station was conducted on September 23, 2002 over a 12 hour period. This study showed an average flow of 2.7 gpm, and a peak flow of 10.8 gpm, with a peaking factor of 3.8. Utilizing this information, and the small size of the tributary area, the peak flow to the pump station is estimated at 17 gpm. The existing pump station firm capacity of 30 gpm is greater than the estimated peak wet weather flow.

Any additional development in the tributary area will increase the average and peak flows. Such development should only be approved if additional capacity is provided at the pump station, and in the City of Huntington Beach system.

Collection System

The collection system consists of 6-inch and 8-inch VCP sewers owned and maintained by the County of Orange.

Disposal System

The Pump Station lifts sewage through 3902 feet of 2-inch Schedule 80 PVC and stainless steel force main to the City of Huntington Beach system at Edinger Avenue and Trinidad Lane. The pump station has a complete standby parallel 2-inch diameter force main. Additionally, a parallel 4-inch diameter AWWA C-900 Class 200 PVC force main was installed, except at the Bolsa Chica Channel Bridge. This 4-inch forcemain, along with larger pumps can be placed into service when the capacities of the downstream City of Huntington Beach facilities are improved.

The force mains extend east and northeast through the Park's parking area to Sunset Way, then northeast to Edinger Avenue and across

Bolsa Chica Channel. At the Bolsa Chica Channel crossing, the 2-inch force mains are 316 stainless steel, inside 4-inch diameter galvanized steel casing pipes. They are supported by braces attached to the bridge stringers.

From the channel crossing to the north of Trinidad Lane, the pipes are located in the north shoulder of Edinger Avenue. They terminate at a PVC lined City of Seal Beach manhole 21 feet north of the centerline of Edinger Avenue. The wastewater is then conveyed in 26 feet of 10-inch VCP gravity sewer to a City of Huntington Beach manhole to the east.

Pump Station Equipment

The existing pumping equipment for the station is listed in Table 6-4. All equipment is located in the concrete vault which encloses the wet well and pumps.

Deficiencies

The pump station deficiencies are primarily due to age and limited access to equipment. The specific facility deficiencies are described below.

1. Mechanical Equipment

   The mechanical equipment is located in the vault surrounding the wet well and cannot be accessed without exposure to a hazardous atmosphere. Pumps cannot be removed without physically entering the wet well and unbolting them from the discharge piping.

2. Concrete Vault

   The concrete vault surrounding the mechanical equipment is unlined and is subject to corrosive attack from sewer gases. The vault is not water-tight and allows infiltration of groundwater. The hatch on the vault is also in poor condition and is in need of replacement.

3. Telemetry System

   There is an automatic dialer at the station, which alerts staff of high wet well level and commercial power failure. There are no provisions for connection to the City's planned SCADA system at this time.

4. Washdown Water

   Washdown water is not available at the site for maintenance purposes.

5. Equipment Access

   All equipment is located in an OSHA-defined confined space. Special precautions must be taken to inspect or remove equipment at the station. This is both dangerous and time-consuming.

6. Emergency Power

   The station has a portable generator connection and a manual transfer switch. Therefore, commercial power failures can only be mitigated by dispatching staff to the site to connect a portable generator, and manually transfer the power source.

7. Wet Well Capacity

   The depth of the wet well does not allow proper submergence of the pump and pump motors. Adequate submergence is required to eliminate air from entering the pumps through vortexing and to keep the motors cool. Normally, a minimum water surface level 18-inches above the pump volute is required.

Improvements Currently Being Undertaken by the City

The City is in the process of performing upgrades to the Aquatic Park Pump Station. These improvements include:

- Removal of abandoned equipment in the wet well
- Conversion of the concrete vault to a wet well, providing more operational volume and required pump submergence
- Replacement of the wet well access hatch
- Sealing of the existing wet well from groundwater infiltration
- Installation of new valving and flow meters in new precast concrete vaults in the parking lot island adjacent to the existing concrete vault
- Installation of new pump station controls

Recommended Additional Improvements

While the improvements currently underway will significantly improve the reliability and serviceability of the pump station, some additional upgrades to the facility are recommended. These include:

- Installation of a slide rail removal system for each pump
- Epoxy/polyurethane lining of the existing wet well
- Installation of an RTU at the site to connect the pump station to the City's planned SCADA system

The pump station should be upgraded with 4-inch 120 gpm vortex submersible pumps when the City of Huntington Beach increases capacity in its receiving sewer facilities. The 4-inch PVC forcemain should also be made continuous at that time. The larger pumps are recommended for their solids handling capacity (4-inch). The 120 gpm pumping rate is recommended to maintain a 3 ft/sec self-cleansing velocity in the 4-inch forcemain

It will be important for the City of Seal Beach to coordinate with the City of Huntington Beach to assure that the City of Huntington Beach's sewer improvements will accommodate the proposed 120 gpm proposed pumping rate.

6-2.3 Pier Pump Station

General

The Pier Pump Station is a small submersible facility located at the end of the Municipal Pier under the pier deck. It contains two submersible pumps installed in a 4' x 5' x 4' fiberglass reinforced plastic (FRP) tank which serves as a wet well. Its purpose is to service the needs of the restaurant at the end of the pier. The pump station is currently inaccessible. The wet well is mounted under a doorway landing to the restaurant. There is a removable piece in the floor of the landing to be used for access to the station but it is too small to remove a pump. Additionally, because the pumps are hard piped to the force main, they cannot be removed without unbolting a flange in the wet well. There is no way to safely remove the pumps as currently designed.

The wet well accumulates a considerable amount of grease. The restaurant does not maintain a grease removal device and the pump station is acting in this capacity. The City must regularly remove the grease from the wet well.

Flows

Flows into the pump station are limited to wastewater generated by the Pier restaurant. Water meter records from April 2000 through April 2005 indicate an average flow of 0.86 gpm. The average daily flow during the billing period with the maximum flows was 1.86 gpm. With a peaking factor of 6, the maximum flow to the pump station is approximately 12 gpm. The pump station firm capacity of 125 gpm is significantly greater than the ultimate peak flow.

Disposal System

Flows collected at the pump station are conveyed through 1658 LF of 4-inch PVC forcemain,

mounted to the underside of the pier deck, to an 8-inch gravity sewer which parallels Ocean Avenue. This sewer eventually terminates at the 8th Street Pump Station, which pumps into the Old Town gravity system at 8th Street and Ocean Avenue. The sewage then flows by gravity to Pump Station No.35.

Pump Station Equipment

The existing pumping equipment is listed in Table 6-5. Pumps are located in the FRP wet well. Isolation valves and check valves are located just outside the tank.

Table 6-5
Pier Pump Station

Pump Station Name	Pier Pump Station	
Location	Ocean End of Municipal Pier	
Plan Identification		
Construction Date	1984	
Pump Information		
Pump No.	1	2
Type of Pump	Essco Model 493 Submersible pump	Essco Model 493 Submersible pump
Capacity(gpm)	125	125
Head (ft.)	25	25
HP	3	3
RPM	1750	1750
Voltage	480 V	480 V
No. of Phases	3	3
Hours of Operation	198	198
Impeller Diameter (in)	6	6
Force Main Information		
Start Point	Pier Pump Station	
Wet Well Invert		
End Point	Joins existing 8" VCP sewer at land side of pier (Main St. & Ocean Ave.)	
End Point Elevation (ft)		
Size (in)	4	
Material	PVC	
Length (ft)	~1658	

Deficiencies and Recommendations

Access is the primary concern at the station. There is currently no means for removing the pumps from the fiberglass holding tank, or for accessing the valves connected to the force main.

To improve access, several measures are recommended. These are as follows:

1. The ramp and door landing to Ruby's Restaurant is located directly over the pump station. Placing a hatch or providing a removable floor section in the landing will not address the problem as a person could still not lean through the opening and access the pumps. Therefore, the entire ramp and landing must be reconstructed so that it may be unbolted and easily moved away, clear from the work area.

2. Install a 4' x 5' double door hatch through the pier deck, directly over the fiberglass holding tank. This will allow complete access to the pumps and piping below the pier.

3. Modify the top of the fiberglass holding tank so that the entire top may be easily removed. As designed, personnel cannot access the pump discharge piping in the holding tank to unbolt the pump for removal.

4. Install a double door access hatch through the pier deck over the check valves and isolation valves. (The proposed hatch over the holding tank may be made larger to achieve the same result if found to be more appropriate, eliminating this second hatch).

There is no good solution for the grease problem. A potential solution is to re-plumb the restaurant drains to an interceptor located above-deck in the storage room adjacent to the restaurant. The restaurant is higher than the pier deck and it appears that such re-plumbing is possible. The grease tank could then be connected to the sewage pump station. The sewer from the restroom would not be routed through this tank. The City would still need to maintain the grease trap, but it would be easier to access.

6-2.4 Boeing Pump Station

General

The Boeing Pump Station is situated on the north east corner of the Boeing Integrated Defense Systems property located at 2600 Westminster Avenue. It services the existing development on Boeing facility as well as the commercial lots located at the southwest corner of Seal Beach Boulevard and Westminster Avenue. Currently, only a small portion of the property along Seal Beach Boulevard is developed. Ultimately, a total of 76.8 acres of commercial and industrial development, including a 120 room hotel will drain to the pump station.

The original pump station, which was constructed in 1966, was replaced with a new pump station in 2003. The City reported that wet well levels in excess of 100-inches in the original pump station (elevation -2.66 feet) would cause sewage overflows in the Boeing "Clean Room".

The new pump station incorporates nearly all the up to date design criteria, including a standby pump, on site standby power (100 KW natural gas generator), PVC lined 8-foot diameter wet well, slide rail system, and telemetry. The wet well provides approximately 7 minutes of storage with the estimated peak wet weather flows, excluding the capacity available in the collection system. The total storage capacity available provides approximately 20 minutes of storage with the peak wet weather flows. The wet well is significantly deeper than the old wet well, minimizing the possibility of overflows in the "Clean Room."

Flows

The existing wastewater flows into the station are generated from the Boeing facilities and a few commercial lots on the southwest corner of Seal Beach Boulevard and Westminster Avenue. Although the station and influent sewer have firm pumping capacity of 530 gpm, current flows estimated from pump running hours are only 27 gpm on average. Unquestionably, the occupancy and use of the Boeing facility has changed substantially from when the pump station was originally constructed.

At its ultimate development, the Boeing property tributary to the pump station will have 60.2 acres of light manufacturing and 16.6 acres of commercial development, including a 120 room hotel. The projected average dry weather and peak wet weather flows are 167 gpm and 500 gpm. The existing pump station firm capacity of 530 gpm is greater than the projected peak wet weather flow.

Collection System

The influent sewer to the pump station is an 18-inch VCP line which is approximately 19-feet deep. The depth is required to serve some of the below-grade areas at the Boeing Plant. This line also can also provide storage for the pump station in extreme events.

Disposal System

Sewage collected at the Boeing Pump Station is pumped through an 8-inch to 12-inch diameter PVC force main across Seal Beach Boulevard to a manhole on the 24-inch gravity sewer, which flows to the OCSD Seal Beach Pump Station. This facility then pumps the sewage into the OCSD gravity system where it is conveyed to Plant No. 2 for treatment and disposal.

Figure 6-4 shows the service area of the Boeing Pump Station.

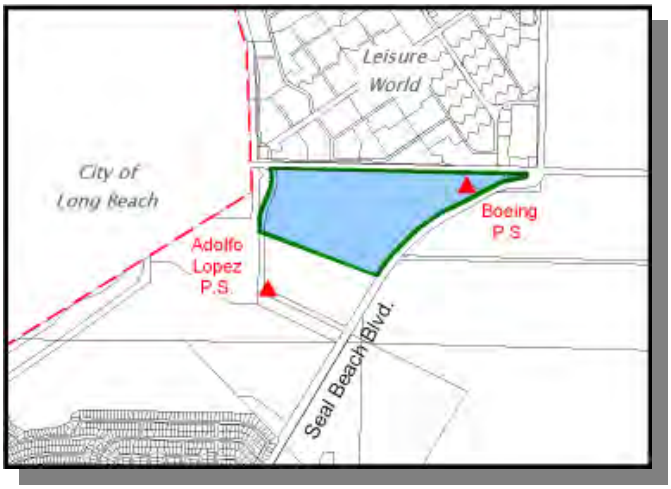


Figure 6-4
Boeing Pump Station Service Area

Pump Station Equipment

The existing pumping equipment is listed in Table 6-6. The pumps are located in the PVC lined 8-foot diameter wet well. The check valves, isolation valves, and bypass pumping connection are located in a below ground reinforced concrete vault.

Table 6-6
Boeing Pump Station

Pump Station Name	Boeing Pump Station	
Location	Seal Beach Blvd. & Westminster Ave. (south of train tracks)	
Plan Identification	Boeing Sewage Pump Station Replacement, 2/12/03	
Construction Date	2003	
Pump Information		
Pump No.	1	2
Type of Pump	Wemco 6x6 ES Vortex	Wemco 6x6 ES Vortex
Capacity (gpm)	530	530
Head (ft.)	21	21
HP	10	10
RPM	1170	1170
Voltage	480	480
No. of Phases	3	3
Hours of Operation	219 (5/05-5/05)	220 (5/04-5/05)
Impeller Diameter (in)	9.37	9.37

Table 6-6
Boeing Pump Station *(Continued)*

Force Main Information	
Start Point	Boeing Pump Station
Wet Well Invert	-19.50
End Point	Manhole located just north connected to 24" VCP leading into OCSD Seal Beach Pump Station
End Point Elevation (ft)	2.56
Size (in)	8"/12"
Material	PVC
Length (ft)	360'

Deficiencies

The pump station was constructed in 2003, and there are no current deficiencies.

6-2.5 8th Street Pump Station

The 8th Street Pump Station is a wet well/dry well facility located in the beach parking lot at the end of 8th Street. The station serves the entire strip of residential homes south of Ocean Avenue, and the pier.

The 8th Street is the oldest pump station in the City, constructed in the 1920's. It was improved in the late 1990's with new pumps and a control panel, and enclosed with a chain link fence. With the exception of the electric service and controls, the entire facility is underground. Pumps in the dry well are submersible type and are difficult to remove because there is not a hatch over the top of them. The concrete structure is believed by the City to be in good condition, and holds out groundwater well, but accumulates sand in the wet well. The 6-inch cast iron force main from the station is the original pipe installed in the 1920's.

Flows

Flows to the pump station are generated from the strip of residential homes south of Ocean Avenue, the restaurant on the pier, and the small area at the end of First Street, which includes a beach

side restroom and café, and the City's maintenance shop.

The City does not maintain flow records for the pump station. Average day flows calculated from pump running hours (795 hours from May 2004 to May 2005) and rated capacity yield an average day flow of 45 gpm. Peak flow to the station is determined by adding the pump capacity of the First Street and Pier Pump Stations to the peak flows for the residential land uses directly tributary to the station. The peak flow to the station is thereby calculated as 360 gpm. At ultimate buildout, the average dry weather flows to the station are expected to increase to 60 gpm, primarily from the development of the vacant Department of Water parcel. The expected ultimate peak wet weather flow is 400 gpm. The existing firm capacity of 500 gpm is more than adequate for the ultimate design flows.

Collection System

The 8th Street Pump Station collection system consists of an 8-inch VCP gravity sewer located in the alley south of Ocean Avenue. This system serves the high and low density residential units north and south of the alley. Flows collected at the Pier and First Street Pump Station are also pumped into this system. Figure 6-5 shows the 8th Street Pump Station collection system service area.

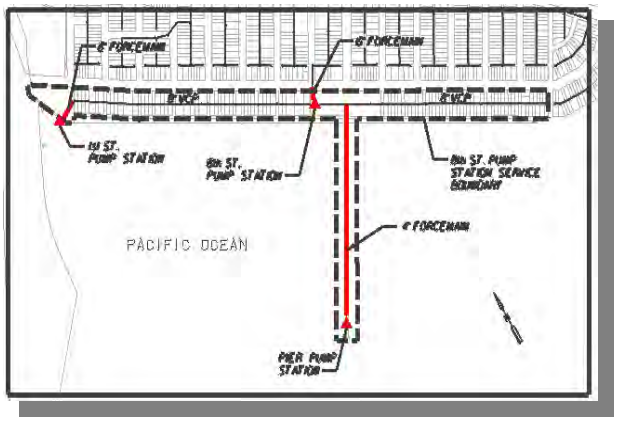


Figure 6-5
8th Street Pump Station Service Area

Disposal System

Sewage collected at the 8th Street Pump Station is lifted through a 6-inch cast iron force main, which was built in the 1920's, to a manhole in Ocean Avenue and 8th Street. From this point, the sewage flows in several gravity sewers to Pump Station No.35 where it is pumped to OCSD's Seal Beach Pump Station.

Pump Station Equipment

The existing pump station equipment is listed in Table 6-7. All equipment is located in the pump station dry well.

Table 6-7
8th Street Pump Station

Pump Station Name	8th Street Pump Station	
Location	8th Street (south of Ocean Ave in beach parking lot)	
Pump Information		
Pump No.	1	2
Type of Pump	Essco 4x12 TF	Essco 4x12 TF
Capacity (gpm)	500	500
Head (ft.)	25	25
RPM	1170	1170
Voltage	480 V	480 V
No. of Phases	3	3
Hours of Operation	1116.1	901.5
Impeller Diameter (in)	9.5	9.5

Deficiencies

The deficiencies at the station are attributable to its age and poor equipment access. The specific facility deficiencies are described below.

1. Pump Station Structure

   The pump station structure is old and is at the end of its useful life. It should be replaced before it begins significant deterioration.

2. Equipment Access

   Equipment cannot be directly removed from the hatches above. Entry into the dry well is difficult, especially with tools.

3. Telemetry System

   The station has a dialer system which can notify personnel in the event of a failure, however, complete SCADA system has not yet been implemented.

4. Emergency Power

   The station has an emergency generator connection and a manual transfer switch, but not standby power. City staff has to transport a portable generator to the site in case of commercial power outages.

5. Force Main

   The force main is over 70 years old and has outlived its useful life. It should be scheduled for replacement.

Recommendations

The age of the facility, over 70 years, precludes rehabilitation as a viable option. A new submersible station is recommended. Because this is one of the City's larger facilities, a dedicated standby emergency generator housed in an aboveground structure should be provided. The structure can help protect the generator and control panel from vandalism, and soften the visual affect of the station. The new pumps can be sized at about 400 gpm each. The disposition of the First Street Pump Station and Pier Pump Station should be studied prior to pump station capacity determination. A new 6-inch or 8-inch forcemain, replacing the existing 70-year-old pipe, is also recommended.

As part of this study, the possibility of constructing a gravity sewer from the 1st Street Pump Station to the 8th Street Pump Station along the south side of the Goldcoast properties was evaluated. If feasible, the 1st Street Pump Station could be removed from service. However, because of the required slopes, such a facility would be very deep as it approached the 8th Street Pump Station. The estimated cost of the gravity sewer was nearly twice as high as replacing the 1st street Pump Station. Therefore, the 8th Street Pump Station will need to be sized to accommodate the flows pumped from the 1st Street Pump Station.

6-2.6 1st Street Pump Station

General

The First Street Pump Station is a small submersible facility located directly adjacent to a beach parking lot at the end of First Street. Currently, the station services a restroom facility and snack building located on the beach, and the City's maintenance shop located adjacent to the San Gabriel River.

The pump station was originally constructed in 1968. It consists of a 5-foot diameter unlined manhole which serves as the wet well. Pumps, piping and valves are all located in the wet well. The original pumps and control panel were replaced in the mid 1980's with ESSCO equipment which is currently in place.

The City reports that the pump station is reliable but does have a minor sanding problem. There have been no sewage spills documented at the pump station.

Flows

Flows to the station are limited to domestic sewage generated at the beach side café and restroom, and the City's maintenance shop located adjacent to the San Gabriel River. No flow records are available for the facility. However an estimate may be made from pump running hours. In 2004, the City recorded 146 hours of pump operation. For pumps with 85 gpm capacity, flow

through the station is estimated as 1.42 gpm. Peak flows are estimated at 10 gpm.

As the wastewater flows from the DWP property will need to be routed through the First Street Pump Station, the average dry weather flow will increase to 16 gpm, with an estimated peak wet weather flow of 55 gpm. The existing firm capacity is adequate for the increased flows. However, the gravity sewer depth from the DWP property, and emergency storage will require a deeper pump station.

Collection System

The pump station's collection system is limited to small service laterals to the existing buildings being served.

Figure 6-6 shows the 1st Street Pump Station service area.

Figure 6-6
1st Street Pump Station Service Area

Disposal System

The existing pump station lifts sewage through a short length of 4-inch CIP force main to an 8-inch gravity system in the alley south of Ocean Avenue. The sewage then flows to the 8th Street Pump Station from where it is pumped into the collection system tributary to Pump Station No. 35.

Pump Station Equipment

The existing pump station equipment is listed in Table 6-8. All equipment is located in the pump station wet well.

Table 6-8
1ST Street Pump Station

Pump Station Name	1st Street Pump Station	
Location	10 Ocean Ave (Ocean & 1st St)	
Plan Identification		
Construction Date		
Pump Information		
Pump No.	1	2
Type of Pump	Essco	Essco
Capacity (gpm)	85	85
Head (ft.)	25	25
RPM		
Voltage		

Deficiencies

The deficiencies at the station are primarily attributed to poor equipment access; age of the pumps, valves and pipe in the wet well; and lack of a telemetry system. The specific deficiencies are described below:

1. Mechanical Equipment

   The mechanical equipment is located in the wet well and cannot be accessed without exposure to an atmosphere which is hazardous. Check valves, isolation valves and piping in the wet well are corroded and require replacement. Pumps cannot be removed without physically entering the wet well and unbolting them from the discharge piping.

2. Wet Well Structure

   The wet well structure is unlined and subject to corrosive attack from sewer gases.

3. Telemetry System

   There is a dialer that notifies staff of a power failure but not a telemetry system.

4. Washdown Water

   There is not a convenient source of washdown water available at the site for maintenance purposes.

5. Equipment Access

   All equipment is located in an OSHA-defined confined space. Special precautions must be taken to inspect or remove equipment at the station which is dangerous and time-consuming.

6. Emergency Power

   The station has no standby emergency power system. There are provisions for connecting a portable generator at the site.

7. Pump Capacity

   Although adequate for the tributary peak flows, the existing pumps are of insufficient capacity to maintain an effective cleansing velocity in the force main. A minimum velocity of 3.0 feet per second is required to resuspend material. For a 4-inch pipe, a 120 gpm pumping rate is required.

Recommended Improvements

The relocation of the Gold Coast Sewer to the beach would eliminate the need for the pump station. However, this would be an expensive project for which adequate funding will not be available for many years.

Until the DWP property is developed, the wet well can be lined, and the pumps, piping, and valves can be replaced, with the valves placed in a separate vault. When the DWP property is developed, the pump station should be replaced with a new facility. A submersible station is recommended. The pumps should be sized for 120 gpm.

The force main from the pump station should be replaced with a new 4-inch force main.

6-2.7 Pump Station No. 35

General

Pump Station No.35 is located in the south east corner of the Old Town area at Electric Avenue and Seal Beach Boulevard. It is a large wet well/dry well station which receives all of the flows generated in the Old Town, Aquatic Park, Marina Hill, and Bridgeport communities, as well as the US Naval Weapons Station, and pumps them into the OCSD system for treatment and disposal. The station was constructed in 1973 as part of a comprehensive program that eliminated the City's treatment facility. The project redirected flows from the southwest quadrant of the City, where the treatment plant was located, to the southeast quadrant of the City where the pump station was constructed.

The facility incorporates three dry well pumps, two rated at 1600 gpm and one rated at 1750 gpm. Two of the pumps have the ability to be operated by an electric motor or a natural gas engine. The third pump is only connected to an electric motor. The dry well has stairway access from the building above, which houses the electric motors, diesel engines, and electrical switchgear. There is an overhead crane in the building which can be positioned over a hatch in the floor to remove the pumps below. The maintenance staff has noted that the crane and ceiling height are too low to remove the motors and drives.

The station's dry well is a 19' x 20' x 21' deep structure which houses the pumps, valving, discharge piping and ventilation equipment. The pumps are connected by long shafting to the motors and drives above. The City has reported problems maintaining these shafts. Bearings are located 15 feet from the floor and are difficult to replace while on a ladder.

Sewage enters the wet well through a screening structure with a main channel and a bypass channel.

The wet well is 6-foot wide and extends the length of the dry well. It is hoppered to prevent solids from settling in the corners.

The City has indicated that there are no noise or odor problems at the station. The station has flooded with sewage once, immediately after it was placed into service. A victaulic coupling on the discharge line had failed. This problem was corrected. A leak from the discharge pipe just west of the pump station was detected in 2002. The cracked section of pipe was replaced, and no other incidents have been reported.

Flows

Pump Station No.35 collects and pumps wastewater generated from the Bridgeport, Marina Hill North, Marina Hill South, Old Town areas, and the US Naval Weapons Station. On average, the station pumps 1.3 million gallons per day, including dry weather infiltration. The ultimate peak wet weather flow is estimated at 3000 gpm.

Collection System

The area tributary to Pump Station No.35 is large and includes three (3) pump stations. Flows are generally collected in the 24-inch Electric Avenue trunk sewer and conveyed to the station by gravity. The 12-inch gravity line from the Naval Weapons Station is also routed directly to the station. Flows from the Navy are measured in a manhole outside the pump station.

Figure 6-7 shows the pump station's tributary area.

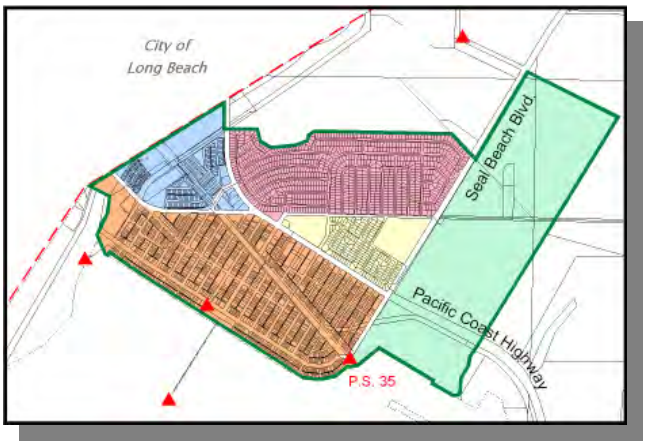


Figure 6-7
Pump Station No. 35 Tributary Area

Disposal System

Sewage collected at Pump Station No.35 is pumped through 4150 feet of 16-inch force main in Seal Beach Boulevard to the 24-inch VCP Seal Beach Boulevard Trunk Sewer, just south of Catalina Avenue. The 24-inch trunk sewer extends north in Seal Beach Boulevard to OCSD's Seal Beach Pump Station for further conveyance to the OCSD system.

Pumping Equipment

The existing pumping equipment is listed in Table 6-9. All equipment is located in the dry well and superstructure above.

Table 6-9
Pump Station No. 35

Pump Station Name	Pump Station No. 35		
Location	Seal Beach Blvd. & Electric Ave		
Plan Identification	Interceptor Sewers and Pumping Station S-0073-A thru S-0109-A		
Construction Date	1973		
Pump Information			
Pump No.	1	2	3
Type of Pump	Wemco torque flow 8x6x17L, Model EV	Wemco torque flow, 8x6x17L Model EV	Wemco torque flow, 8x6x17L Model EV
Capacity (gpm)	1750	1600	1600
Head (ft.)	56	56	56
HP	100 (I.S. Motor)	100 (I.S. Motor)	100 (I.S. Motor)
RPM	1170	1170	1170
Voltage	480	480	480
No. of Phases	3	3	3
Hours of Operation			
Impeller Diameter (in)	14.0	13.75	13.75
Force Main Information			
Start Point	Pump Station No. 35		
Wet Well Invert	-13.00		
End Point	Manhole connecting to 24" VCP gravity sewer in Seal Beach Boulevard south of Catalina Avenue		
End Point Elevation (ft)	41.1		
Size (in)	16		
Material	DIP		
Length (ft)	4150		

Deficiencies

The overall condition of the station appears to be good. However, there are some concerns which must be addressed. A listing of deficiencies is provided below.

1. Pumping Equipment

   Pumping equipment was oversized originally. Subsequent pump replacements seem to have improved the condition. While this has worked to some extent, pump impellers and bowls still wear out faster than desirable.

   Maintenance of the long shafting connecting the pumps to the motors is difficult and it expends horsepower. A close coupled pump would be easier to maintain but would require the natural gas engines to be replaced with a generator.

2. Wet Well

   The wet well has insufficient capacity to limit pump cycle time to less than 6 per hour without surcharging the influent sewer system.

   A review of the construction plans showed that the pump station was designed to operate at a low water level of –11.00. Lowering the water surface in the wet well to this level could cause air binding of the pumps. This will reduce pumping output and produce premature wear.

3. Dry Well Piping

   The dry well piping blocks access to pumping equipment. Pumps cannot be accessed without climbing over or under piping.

4. Overhead Crane

   The overhead crane is too low to remove the existing motors and drives.

Recommendations

Pump Station No.35 is the most important facility in the City's sewer system. As such, it must be kept in top condition. The following recommendations focus on the improvements which are of the utmost importance. Issues such

as repairing the bridge crane are secondary and can be dealt with as funds become available.

1. Pump Replacement and Electrical Improvements

   The existing pumps should be replaced with Hydrostal pumps, which have a successful history of operation within the desired operating range. They are efficient, and the design virtually eliminates clogging of the passages. Two duty pumps should have a combined capacity of 3000 gpm, which is the estimated ultimate peak wet weather flow tributary to the pump station. A third pump should be provided as the standby. The pumps should be operated through variable frequency drives to minimize pump cycling and surcharging of the influent sewer.

   With the variable frequency drives, the switchgear, motor control center, and pump station controls should be replaced. The existing motors will have to be replaced with inverter duty motors.

2. Telemetry System

   A radio controlled SCADA system should be installed to monitor and control the pump station. The existing automatic dialer should be maintained as the backup facility.

3. Wet Well

   There is very little that can be done with the wet well volume short of replacing the pump station. Pump cycling can be reduced by installing variable frequency drives, and automatically alternating pumps after each time they are called to run. The surcharging of the influent line is relatively minor and should not result in a significant maintenance problem.

   Aggregate exposure has been observed in the wet well. In order to significantly extend the useful life of this critical facility, the wet well should be lined when the suction and discharge piping are replaced.

4. Replacement of Suction and Discharge Piping

   The existing piping arrangement makes it very difficult to access the equipment for maintenance. It should be replaced when the pumps are replaced.

6-3 Pump Station Design

The two alternatives generally contemplated when confronted with upgrading a pump station are rehabilitation and new construction.

Rehabilitation can be an inexpensive way to extend the service life of a pumping facility. To do so requires two things: a) there is something in the existing station that is worth salvaging and; b) the design of the existing facility is substantially adequate and major modifications are not required to bring it up to current standards. The pump stations operated by the City do not meet either criterion, except for Pump Station No.35, which appears to be in good order. Most have equipment which is inaccessible except by entering the wet well. Some have inadequately sized or failing structural components which render the entire facility useless for rehabilitation. New construction is therefore recommended for upgrade of many of the Seal Beach sewer pump stations.

There are many pump station types which are employed. Most common and currently utilized in the City are submersible and wet well/dry well types.

Submersible stations cost less, and are generally used with lower tributary flows or where there is limited space available. They incorporate a wet well where the pumps are located and a vault to provide access to valves and instrumentation.

Pumps are installed on guide rails and raised or lowered into the wet well by use of a crane. A special elbow permanently mounted on the wet well floor is equipped with a self-locking coupling that allows the pump nozzle to be connected and removed from the discharge piping without personnel entering the wet well. Unless required for electrical equipment, there is usually not a building provided. However, where vandalism is a problem, or visual impacts are of concern, a building may be constructed to house the electrical panels.

The primary disadvantage of a submersible facility is that the pumps cannot be visually inspected without removing them from the wet well. Another problem which occurs is that the seal between the pump and discharge elbow may leak if the pump is improperly seated or the O-ring gasket fails. A leaking elbow connection is difficult to detect and often requires personnel to enter the wet well to make the necessary repairs. However, in general, a submersible station is very reliable and most appropriate when the design flow is less than 500 gpm because of the significantly lower costs.

Therefore, new submersible facilities are recommended at 1st Street and 8th Street. It is also recommended that the 8th Street Pump Station have a dedicated standby generator at the site because of its size. The other stations should have sufficient storage and provisions for the connection of a portable power source.

For facilities with higher flows, a wet well/dry well arrangement may be more appropriate. A wet well/dry well station has a separate structure which houses the pumps, valves and appurtenances. Due to the additional construction of a dry well, this type of station is significantly more expensive to build than a submersible facility. Supplementary equipment associated with the larger facility also increases the maintenance and capital costs.

A preliminary design report investigating all pertinent conditions and feasible alternatives should be prepared prior to the final design of each pump station.

The final design should be in accordance with all applicable codes and the latest version of the City of Seal Beach's Design Criteria for Sewer Facilities.

Section 7

COLLECTION SYSTEM CONDITION ASSESSMENT

7.1 Purpose

The City of Seal Beach's wastewater collection system dates back to the 1920's. Until recently, the condition of the system was not comprehensively evaluated. Limited closed circuit television inspection of the system was available when the 1999 Master Plan was completed. Presence of significant infiltration in parts of the system was verified at that time, and an asset replacement program was recommended. The City of Seal Beach replaced aging collection system pipes in portions of Old Town between 2000 and 2004. Thorough knowledge of the system's condition is essential in maximizing the useful life of this very important and significant asset in a cost effective manner.

The California Regional Water Quality Control Board, Santa Ana Region's Order No. R8-2002-0014, issued on April 26, 2002 requires proper maintenance of the system, including the preparation of a Sewer System Rehabilitation Plan. Provision 12.(iv) (F) of the Order states "Identify and prioritize structural deficiencies and implement short-term and long term rehabilitation actions to address each deficiency. This shall include a rehabilitation plan including schedules for the entire system. As with the preventive maintenance program, sewer rehabilitation and replacement is crucial for prevention of spills. Among the provisions that should be specified in this section is the need to direct rehabilitation and replacement at sewer pipes at risk of collapse or prone to blockages due to pipe defects. The program should also include regular visual and TV inspection of sewer pipes and a system for assessing and ranking the condition of sewer pipes. Finally, the rehabilitation and replacement plan should include a financial plan that properly manages and protects the infrastructure assets."

The State Water Quality Control Board is in the process of developing Waste Discharge Requirements for all the Regional Boards in California. These requirements are very similar to the requirements of Order No. R8-2002-0014.

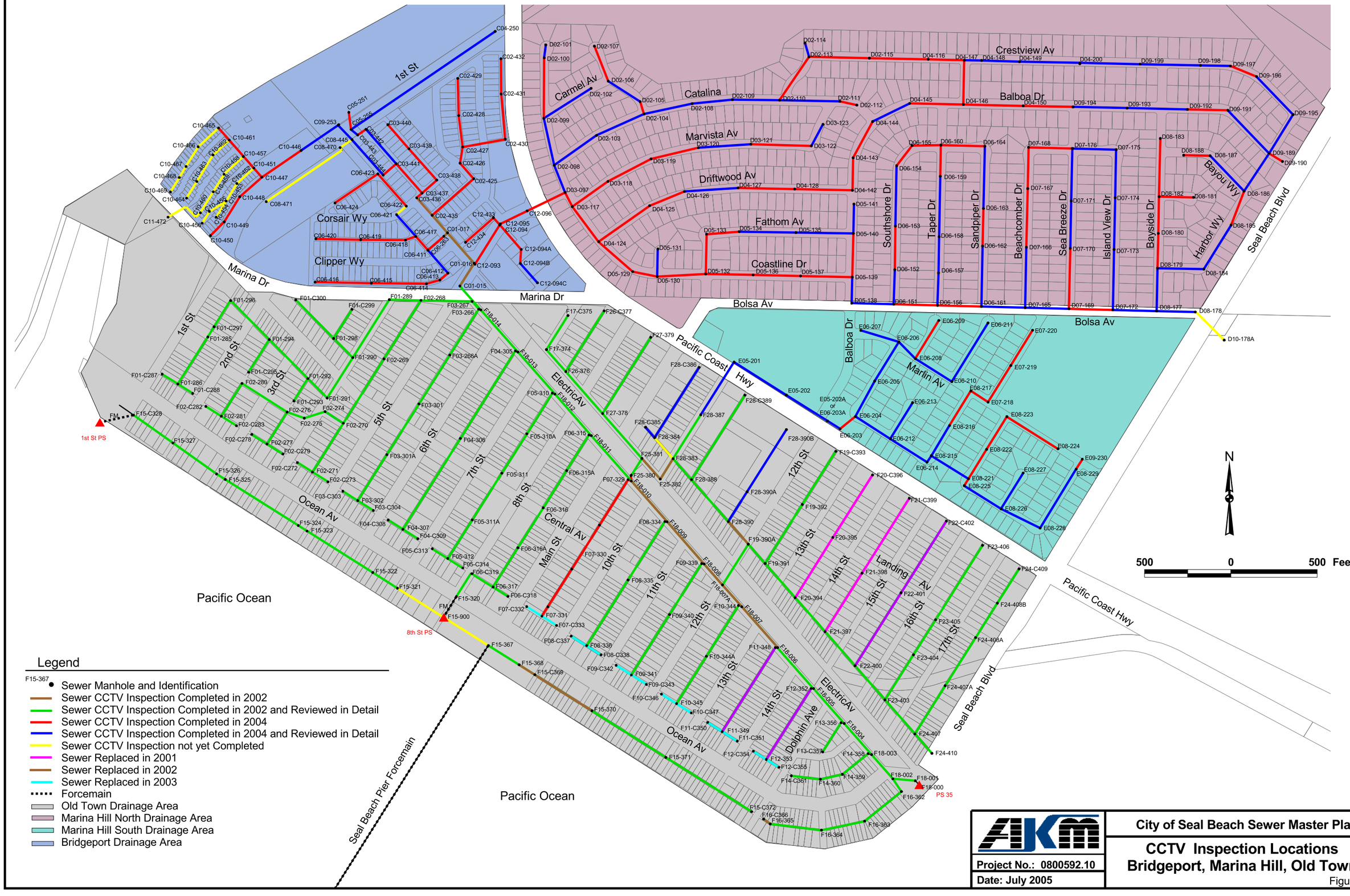
In order to protect its assets and comply with the requirements of the Order, the City of Seal Beach conducted CCTV inspection and condition assessment of nearly the entire system between 2002 and 2004. A very small portion of the pipes could not be accessed due to lack of manholes at the upstream end. These studies were documented in two separate reports in February 2003 and December 2004. This section summarizes the two studies, and develops a Sewer System Rehabilitation Capital Improvement Program.

7.2 Closed Circuit Television Inspections and Condition Assessment

The inspections were conducted in two phases in 2002 and 2004. Figures 7-1 and 7-2 show the inspection locations, as well as the reaches that were reviewed in detail.

Phase 1 Inspection and Assessment

The City of Seal Beach conducted the CCTV inspection work in two phases. The Phase 1 work was completed between February 13, 2002 and June 13, 2002. It covered 92,443 feet of the gravity system. This work was performed prior to the adoption of National Association of Sewer Service Companies (NASSCO) Pipeline Assessment and Certification Program (PACP) as the standard by the OCSD.



Legend

- Sewer Manhole and Identification
- Sewer CCTV Inspection Completed in 2002
- Sewer CCTV Inspection Completed in 2002 and Reviewed in Detail
- Sewer CCTV Inspection Completed in 2004
- Sewer CCTV Inspection Completed in 2004 and Reviewed in Detail
- Sewer CCTV Inspection not yet Completed
- Sewer Replaced in 2001
- Sewer Replaced in 2002
- Sewer Replaced in 2003
- Forcemain
- Old Town Drainage Area
- Marina Hill North Drainage Area
- Marina Hill South Drainage Area
- Bridgeport Drainage Area

AKM

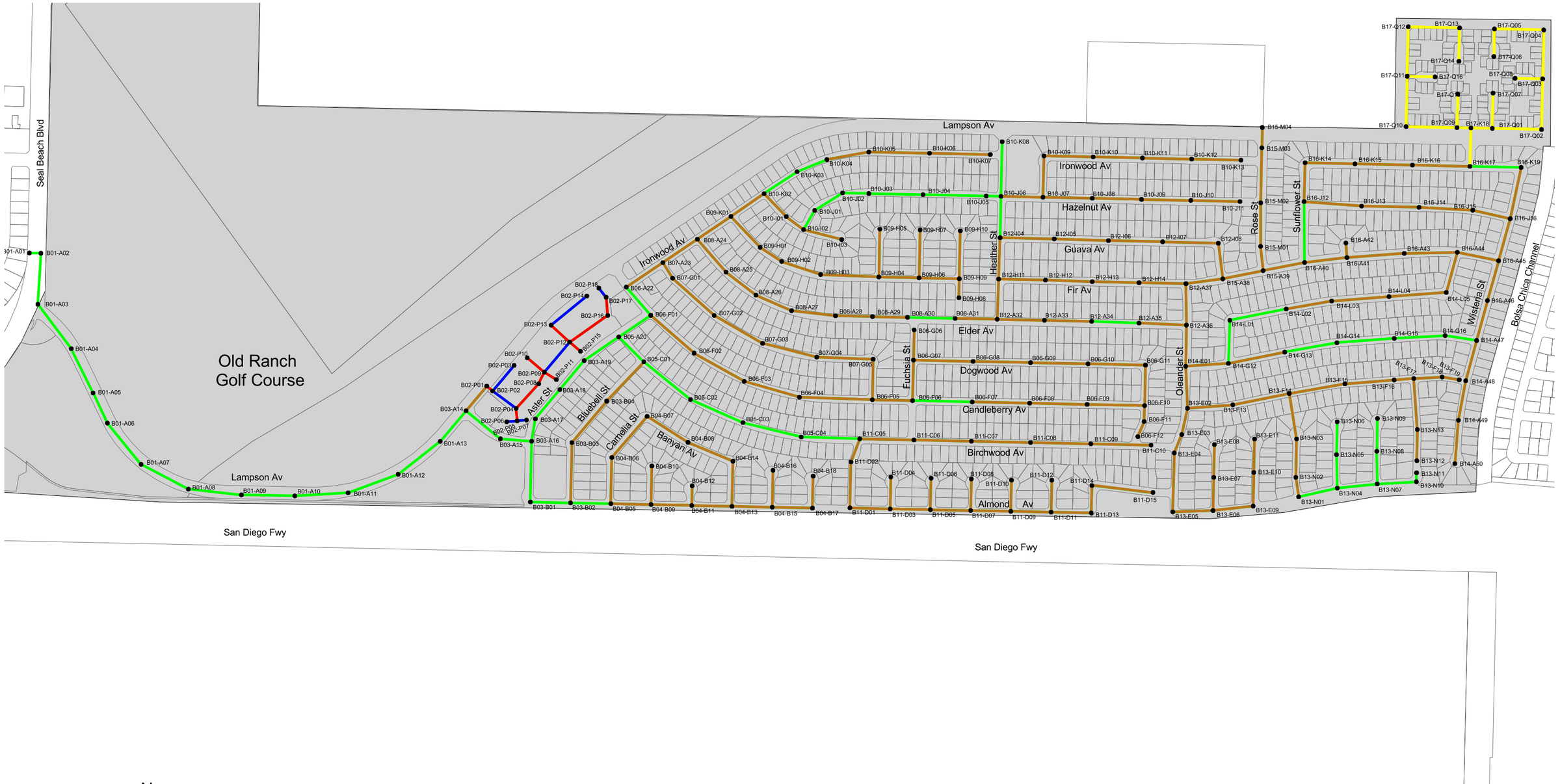
Project No.: 0800592.10

Date: July 2005

City of Seal Beach Sewer Master Plan

CCTV Inspection Locations
Bridgeport, Marina Hill, Old Town

Figure 7-1



AKM

City of Seal Beach Sewer Master Plan

CCTV Inspection Locations
College Park East

Figure 7-2

Project No.: 0800592.10

Date: July 2005

It covered nearly all the sewers in Old Town, except those replaced since 2000, four reaches in Bridgeport, and all of College Park East, excepting the on site sewers in the medium density residential area north of Basswood Street and west of Aster Street. The inspection work was documented on sixty one VHS tapes and 387 written reports covering 372 reaches of sewer. Each report lists the service connections and any deficiencies by location in the inspected pipe. A database summary of the inspection reports was prepared. The summary includes the manhole identification numbers at the beginning and end of the inspected pipe, street location, recording media number, length inspected, pipe size and material, and a tabulation of the deficiencies listed in the written reports. The summary included a condition severity rating provided by the CCTV inspection contractor, National Plant Services. Where reverse setups were necessary because camera was obstructed in one direction, the findings of the two reports were combined into one in the database.

The database summary was used in selecting the reaches for detailed review, which were those that showed structural or operation and maintenance problems. Based upon this criterion, recordings of 188 reaches covering 44,055 feet of sewers were reviewed in detail. Most of these were in the Old Town area. Although there were not many problems in the College Park East area, several representative reaches were selected for detailed review to verify the accuracy of the inspection reports, and to develop insight into the overall condition of the Lampson Avenue Trunk Sewer.

The database summary was updated based upon the findings of the detailed reviews of the recordings. Planning level capital improvement projects were formulated to eliminate the structural deficiencies. Operation and maintenance recommendations were made to improve the operation of the system. The study was documented in a report entitled "Review of Sewer System Closed Circuit Television Reports and Tapes", dated February 2003.

Phase 2 Inspection and Assessment

The Phase 2 inspection work was conducted between April and June 2004, and included 49,035 feet of sewer mostly in Bridgeport, and Marina Hill areas. The inspection work was recorded on DVD's and 227 written reports.

This inspection work was performed in accordance with the PACP standards, which assigns a numerical value to each structural deficiency. The deficiencies and severity ratings are listed in Table 7-1.

Table 7-1
Defect Codes and Condition Grades

Structural Defect Coding		Grade
Crack - circumferential	CC	1
Crack - longitudinal	CL	2
Crack - multiple	CM	3
Crack - spiral	CS	2
Fracture - circumferential	FC	2
Fracture - longitudinal	FL	3
Fracture - multiple	FM	4
Fracture - spiral	FS	3
Broken - soil visible	BSV	5
Broken - void visible	BVV	5
Hole - soil visible	HSV	5
Hole - void visible	HVV	5
Collapsed pipe	XP	5
Deformed - horizontal	DH	5
Deformed - vertical	DV	5
Joint Offset - small	JOS	1[a]
Joint Offset - medium	JOM	3[b]
Joint Offset - large	JOL	5[c]
Joint Separated	JS	2
Joint Angular	JA	2
Surface Damage	S	2
Lining Failure	LF	3
Point Repair - defective	RPPD	4
Sags	MWLS	2

[a] PACP does not have a coding for small offset joints. This coding was developed for this report.
[b] PACP grade is 1. Grade was increased for this report, because defect is considered to be major.
[c] PACP grade is 2. Grade was increased for this report, because defect is considered to be severe.

Operational and maintenance issues and construction features are assigned defect codes and condition grades as shown in Table 7-2

Table 7-2
O&M and Construction Features Defect Codes and Condition Grades

Operational & Maintenance and Construction Features		Grade
Deposits Attached - encrustation	DAE	2
Deposits Attached - grease	DAGS	2
Deposits Attached - other	DAZ	3
Deposits Settled	DS	2
Deposits Ingress	DN	2
Roots Fine - connection	RFC	1
Roots Fine - lateral	RFL	1
Roots Fine - barrel	RFB	2
Roots Tap - connection	RTC	2
Roots Tap - lateral	RTL	2
Roots Tap - barrel	RTB	3
Roots Medium - connection	RMC	3
Roots Medium - lateral	RML	3
Roots Medium - barrel	RMB	4
Roots Ball - connection	RBC	4
Roots Ball - lateral	RBL	4
Roots Ball - barrel	RBB	5
Infiltration - Weeper	IW	2
Infiltration - Dripper	ID	3
Infiltration - Runner	IR	4
Infiltration - Gusher	IG	5
Obstacles	OB	4
Vermin	V	1
Tap (Lateral) factory made - defective	TFD	2
Tap (Lateral) factory made - leaking	TFL	2
Tap (Lateral) break-in - intruding	TBI	3
Tap (Lateral) break-in - defective	TBD	3
Line	L	2
Intruding Seal Material - ring hanging	ISRH	4
Intruding Seal Material - ring broken	ISRB	4
Miscellaneous - camera underwater	MCU	4
Miscellaneous - survey abandoned	MSA	0

A database summary was prepared from the written reports initially to aid in selecting 97 reaches that were reviewed in detail. Additional findings as a result of these reviews were incorporated into the database.

Planning level capital improvement projects were formulated to eliminate the structural deficiencies. Operation and maintenance recommendations were made to improve the operation of the system. The study was documented in a report entitled “Review of Sewer System Closed Circuit Television Reports and Tapes-Phase II”, dated December 2004.

The results of the two studies were then combined to develop a system-wide Sewer System Rehabilitation Plan, considering the capacity needs of the system.

The reaches that have condition, as well as capacity problems have not been included in the Plan, as they will be upsized under the Capacity Assurance Plan. A total of 26,529 feet of pipe is recommended for rehabilitation and replacement. They are grouped into 52 projects, prioritized as shown in Table 7-3. The total estimated cost of the program is estimated at $9,333,000. The actual scope of work for each project will have to be determined through further review of the information. The project priorities should be reviewed by the City annually and adjusted based upon the best information available at such time. Some of these projects may be moved up in phasing to benefit from concurrent projects, such as storm drain construction and street improvement projects.

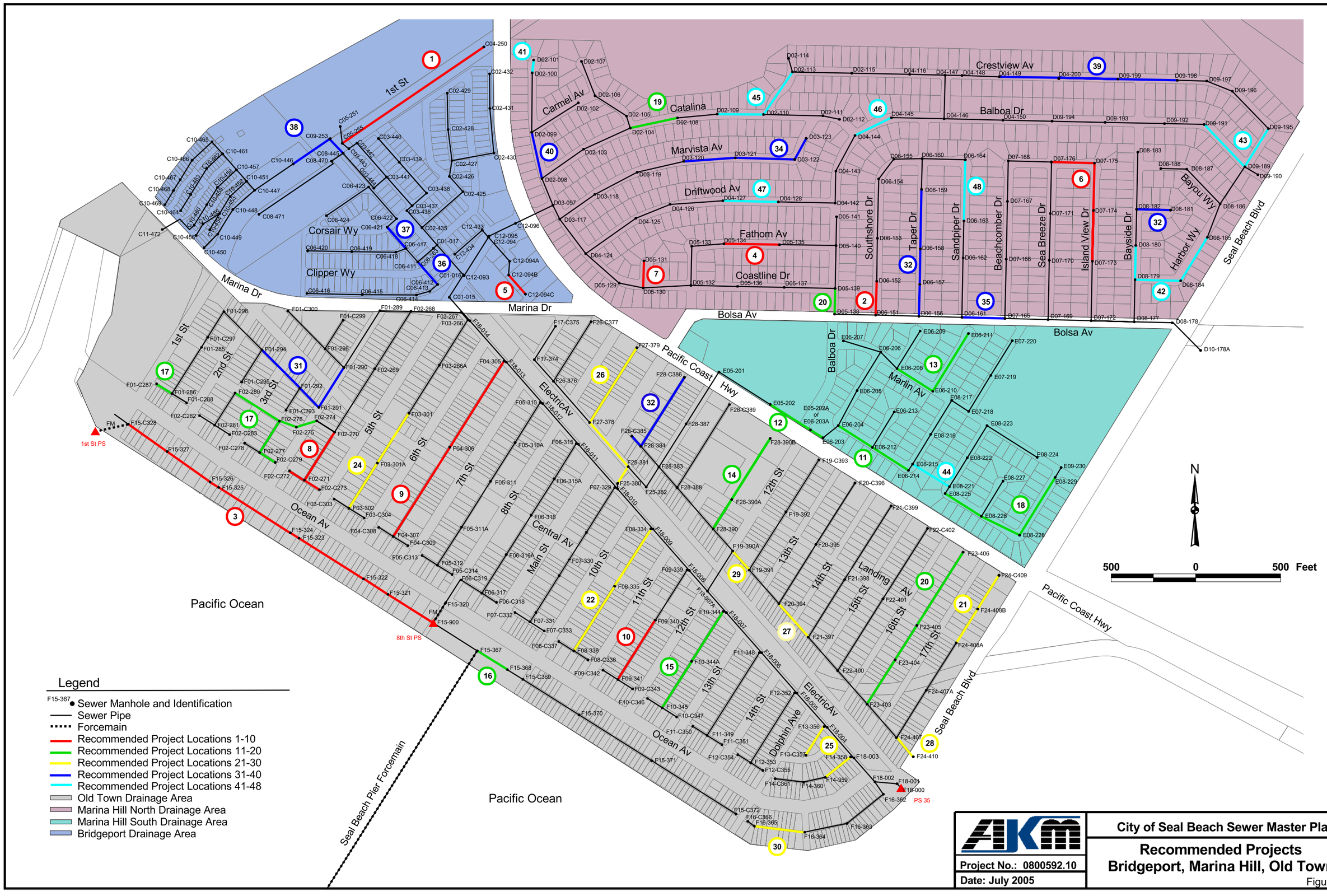
Figures 7-3 and 7-4 illustrate the location of the recommended rehabilitation and replacement projects.

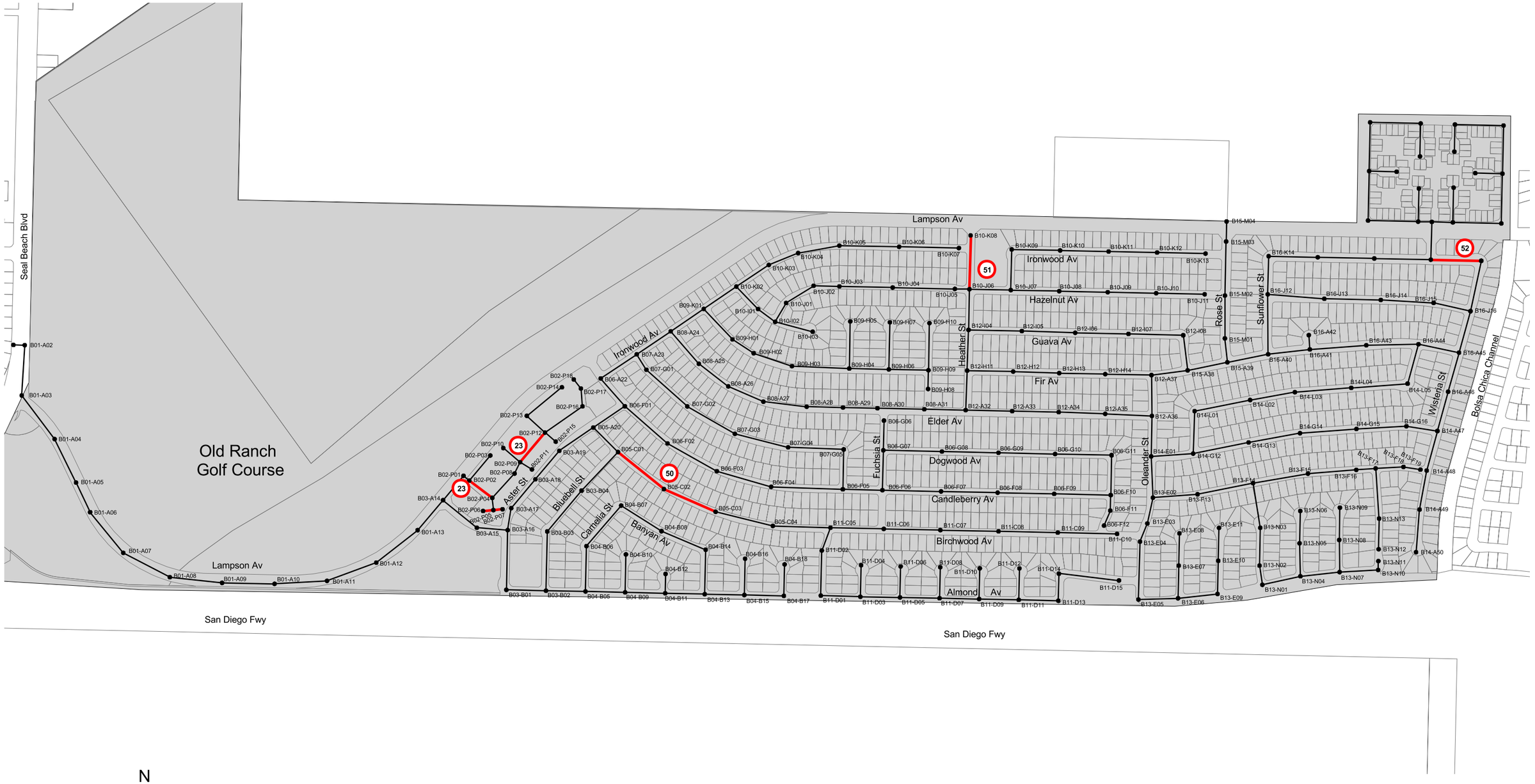
Table 7-3
Sewer System Rehabilitation and Replacement Projects

									Structural Defect Coding																						Operational and Maintenance																			Construction Features																
Total Deficiency Grade	Priority Number	Priority Classification	Location	Manhole		CCTV Date	Pipe		Crack				Fracture				Broken		Hole		Joint					Deformed		Surface Damage	Lining Failure	Point Repair	Deposits				Roots (R)												Obstacles		Vermin	Tap (Lateral)							Infiltration				Sags	Miscellaneous		Notes	Reach Cost ($)	Project Cost ($)
			Street	Start	End		Size (in)	CCTV Length (ft)	C				F				B		H		J					D		S	LF	RP	D				Fine (F)			Tap (T)			Medium (M)			Ball (B)			OB		V	T							I					M			
									L	C	M	S	L	C	M	S	SV	VV	SV	VV	O S	O M	O L	S	A	V	H				AGS	AE	Other	%	B	L	C	B	L	C	B	L	C	B	L	C	Other	%		FD	FL	BI	BA	BC	BD	BL	W	D	R	G		CU	SA			
11	1	VP	FIRST ST	C04-250	C04-255	2004	6	1,010									1	1		6	1										7		J-13						J-1						3	30														1	Top pipe fell in, Broken pipe @ Sta 579, Hole @ Sta 597; Pipe clogged with roots and debris	258,930	258,930
16	2	VP	SOUTH SHORE DR	D06-152	D06-151	2004	8	200		1			1	2		1															1	2															1											5			Multiple Sags, Broken Soil Visible @ Sta 196	78,336	
13	2	P	BALBOA DR	D05-138	D05-139	2004	10	150			2			1					1															2																														Small hole @ Sta 337	74,404	152,740
	3	P	OCEAN AVE. ALLEY	F15-327	F15-326	2002	8	315			1								1		22		1											3						1			1									4									1			Hole @ 65'	115,560	
	3	P	OCEAN AVE. ALLEY	F15-326	F15-324	2002	8	559		1										94		2											21						1			1									12									1			Roots, break-in defect, moderat offset	194,616	
	3	P	OCEAN AVE. ALLEY	F15-322	F15-321	2002	8	170													2											1																	1					2									1	1	1	Camera under water most of the time.	68,580	378,756
30	4	VP	FATHOM AVE	D05-135	D05-134	2004	8	324		1	8						1				2																															9															Break @ Station 319	118,560	118,560
3	5	VP	PARKING LOT S/O 5TH ST	C12-094B	C12-094C	2004	8	150														1	1																																										1	Joint Offset Large @ Sta 75	62,100	62,100
15	6	VP	ISLAND VIEW DR	D07-175	D07-174	2004	8	279	1	5	2												1														1									1				2															Joint Offset Large @ Sta 3	103,760	
18	6	VP	ISLAND VIEW DR	D07-176	D07-175	2004	8	254	2	3	2												1									3	5			1									1				1											2			Joint Offset Large @ Sta 249	95,796	
53	6	P	ISLAND VIEW DR	D07-174	D07-173	2004	8	300	2	3	13			1						1																	1									1				3															Small hole @ Sta 15	110,839	310,395
16	7	VP	EBB TIDE PL	D05-131	D05-130	2004	8	159		1	3							1				1																													2															Broken & Joint Offset @ Sta 153	65,052	65,052
	8	VP	OCEAN AVE. ALLEY	F02-C273	F02-271	2002	6	106															1																									1			1											1		1	Severeoffset joint(2"-3"). Probably leaking.	39,258	
	8	VP	OCEAN AVE. ALLEY	F02-C272	F02-271	2002	6	108													27	1	1																																				1						Severe offset and other open joints.	39,744	
	8	VP	4 TH STREET	F02-271	F02-270	2002	6	332		1							1				76		1							1		2		6									1							3		4			1							5			Severe connection defect	94,176	173,178
	9	VP	6 TH STREET	F04-307	F04-306	2002	6	622			1							2		1		210		2							11		1		9																	4		7			1							2			Major offset joint @ 382'. Probably leaking.	164,646	
	9	VP	6 TH STREET	F04-306	F04-305	2002	6	598		2	1							6		2		224		4							6				4									1							5		12									11			Hole @ 582'.Service connection @ 79' severely misaligned. Several severe cracks at joints.	158,814	323,460
	10	VP	11 TH STREET ALLEY	F09-341	F09-340	2002	6	414									1				128		1							3		1		6													2			8		3			9							1		2	Major offset joint @ 21'. Probably leaking	114,102	114,102
141	11	VP	CRYSTAL COVE WAY	E06-214	E06-212	2004	8	252	6	3	38																						2	3																										15							Grease deposits, Infiltration @ many joints, cracks	95,193	95,193
74	11	P	CRYSTAL COVE WAY	E06-212	E06-204	2004	8	259	4		22																				1			40																				2				3							Multiple cracks @ joints, grease buildup	97,416	97,416
19	12	VP	PCH AT BALBOA DR	E05-202A	E05-202	2004	8	238	1		4									1													4	2																									3	1	1					Hole @ Sta 3, infiltration, corrosion, buried MH	90,683	
5	12	VP	PCH AT BALBOA DR	E06-203A	E06-203	2004	8	22												1																																												Hole @ Sta 5, corroded interior pipe	20,634	111,318
17	13	VP	LAGUNA PL	E06-210	E06-211	2004	8	400			4									1																														3							2							Hole @ Sta 337, infiltration weepers	143,123	
63	13	P	MARLIN AVE	E06-210	E06-208	2004	8	250	1	1	20																																									1							3							Multiple cracks @ joints, grease buildup	94,526	237,649
11	14	VP	LANDING AVE	F28-390A	F28-390B	2004	6	394			1			1						1	2	1										4																					7	1		3	7											1	Hole @ Sta 184, Grease build-up; Survey Abandoned	109,242	
0	14	P	ALLEY S/O LANDING AVE	F28-390	F28-390A	2004	6	109																																												2											1	Camera blocked due to intruding connection	39,987	149,229
	15	VP	12 TH STREET ALLEY	F10-344A	F10-344	2002	6	345		1							1				145											8				16						2			2									7			3						4			Service conn. @ 83' severely misaligned;probably leaking	97,335	
	15	P	12 TH STREET ALLEY	F10-345	F10-344A	2002	6	320		1	2												110											5				33						2									1		11			4			1							Cracks, roots, infiltration,grease	91,260	188,595
	16	VP	BEACH PARKING LOT	F15-368	F15-367	2002	8	228									1		1		4										2																					1															Hole in pipe @ 207'	87,372	87,372
	17	VP	OCEAN AVE. ALLEY	F01-C287	F01-286	2002	6	127		1	1							2				11		3							1		2		1																	1		1			2							1			Pipe material missing 121'. Major offset joint.	44,361	
	17	VP	3RD STREET ALLEY	F02-277	F02-276	2002	6	219		1							1				79	1	1	1								2		1																					6			1							3			Large hole @ 64' (patched). Offset @ 63'(seperatedjoint)	66,717	
	17	VP	CENTRAL AVE ALLEY	F02-275	F02-274	2002	6	132											1		7											1				2																													1	1		Hole in pipe @ 3' (can see soil)	45,576	
	17	VP	OCEAN AVE. ALLEY	F02-C279	F02-277	2002	6	108									1				35	2												2																				1									1			Broken pipe and cracks at 5', minor offsets	39,744	
	17	P	CENTRAL AVE ALLEY	F02-280	F02-276	2002	6	306			1										44	1																																			1							3			Break-in defect @ 264'.	87,858	284,256
178	18	VP	BERYL COVE PL	E08-229	E08-228	2004	8	401		10	29				1					1																	1													14			1												Cracks at many joints, Hard. Asph. In downstream MH	143,408	
97	18	P	EMERALD COVE WAY	E08-228	E08-226	2004	8	252		12	25			1	2																																				2															Multiple cracks throughout sewer line	95,161	
141	18	P	EMERALD COVE WAY	E08-226	E08-225	2004	8	252		3	19																																										1															Damage to manhole invert, Hardened asphalt manhole	95,226	333,795
7	19	VP	CATALINA AVE	D02-108	D02-104	2004	8	297			2											1	1									1				J-12		1																4															Joint Offset @ end manhole, Roots @ several joints	109,728	109,728
	20	VP	16 TH STREET ALLEY	F23-406	F23-405	2002	8	506.6									1				25	2	5							2																					1		1									2			Major offset joints;several with soil or gasket exposed.	177,638	
	20	P	16 TH STREET ALLEY	F23-404	F23-403	2002	8	309													24													2		1									1																							Heavy roots @ connection 117'; offset laterals.	113,616	
	20	P	ELECTRIC AVE.	F19-391	F19-390A	2002	8	148													8													1																1														1	4	1	High flows, inspections ends due to mineral deposits.	61,452	352,706
	21	VP	SEAL BEACH BLVD. ALLEY	F24-C409	F24-408B	2002	8	236									1				36	2	3	1																												4		3												Hole @ 149'(can see soil)Major offset joint@ 204' (seperated)	89,964	
	21	VP	SEAL BEACH BLVD. ALLEY	F24-408B	F24-408A	2002	8	238													32		3																														1															Major offset joints @ 23',28',55',119'	90,612	180,576
	22	P	10 TH STREET	F08-335	F08-334	2002	6	399									1		5		110		1							9				7																	2		6			4							10	2		Break in defects.Soil exposed.Holes	110,457	
	22	P	10 TH STREET	F08-336	F08-335	2002	6	450									1				151	1								16		1		2													2			5		12			7							7		2	Grease,intruding break-in,offset laterals	122,850	233,307
5	23	P	OLD RANCH ROAD	B02-P05	B02-P07	2004	6	57									1				2												2	3																																		1	Pipe broken and filled with debris	27,351	
1	23	P	OLD RANCH ROAD	B02-P05	B02-P06	2004	6	64														1																																											1	Possible broken pipe @ Sta. 61, Survey Abandoned	29,052	
0	23	VP	OLD RANCH ROAD	B02-P12	B02-P09	2004	8	241																																																							1	Reverse setup - Scales block camera @ Sta 70	91,584	
0	23	VP	OLD RANCH ROAD	B02-P02	B02-P04	2004	8	177																																																							1	Survey Abandoned due to Scale	70,848	218,835
	24	VP	5 TH STREET ALLEY	F03-302	F03-301A	2002	6	315			1						3		2		124		1							6																					1		8												Several medium cracks and holes (2 patched); two seperated joints.	90,045	
	24	P	5 TH STREET ALLEY	F03-301A	F03-301	2002	6	348									1		1		112									1				14													1						7			3							2		1	Minor offset joints, intruding pipe, break in defects,roots.	98,064	188,109
	25	VP	DOLPHIN AVE.	F13-C357	F13-356	2002	6	200													2			1																									1																	1	Major offset joint @ 21' (separated)	62,100	
	25	VP	OCEAN AVE. ALLEY	F14-359	F14-358	2002	6	198			1									1		69		2							2				1													1			9		2			8							1	1	1	Major offset joint @ 114. Misaligned laterals.	61,614	123,714
	26	VP	ELECTRIC AVE.	F27-C379	F27-378	2002	8	517										1			5		3							3															1										2	4									Major offset joints @ 77', 294', 337'. Heavy roots in lateral.	181,008	
	26	VP	ELECTRIC AVE.	F25-381	F25-380	2002	12	120										1			14									1		3																	1													2	1		1		1	High infilitration @ 79', heavy calcium, camera blocked by csale.	71,820	

Table 7-3
Sewer System Rehabilitation and Replacement Projects

									Structural Defect Coding																						Operational and Maintenance																			Construction Features																
Total Deficiency Grade	Priority Number	Priority Classification	Location	Manhole		CCTV Date	Pipe		Crack				Fracture				Broken		Hole		Joint					Deformed		Surface Damage	Lining Failure	Point Repair	Deposits				Roots (R)												Obstacles		Vermin	Tap (Lateral)							Infiltration				Sags	Miscellaneous				
			Street	Start	End		Size (in)	CCTV Length (ft)	C				F				B		H		J					D		S	LF	RP	D				Fine (F)			Tap (T)			Medium (M)			Ball (B)			OB		V	T							I					M		Notes	Reach Cost ($)	Project Cost ($)
									L	C	M	S	L	C	M	S	SV	VV	SV	VV	O S	O M	O L	S	A	V	H				AGS	AE	Other	%	B	L	C	B	L	C	B	L	C	B	L	C	Other	%		FD	FL	BI	BA	BC	BD	BL	W	D	R	G		CU	SA			
	26	P	ELECTRIC AVE.	F27-378	F25-381	2002	8	346													26												5														1															1	1	High flow, camera blocked by mineral deposits.	125,604	378,432
	27	P	ELECTRIC AVE.	F21-397	F20-394	2002	8	259													6		1								3		3																	2		4									6	3		Offset joint @ 253",high flow, sags	97,416	97,416
	28	P	ELECTRIC AVE.	F24-410	F24-407	2002	8	160													21																													4		1												Offset joint from 116' to 152', offset laterals	65,340	65,340
	30	P	OCEAN AVE. ALLEY	F16-365	F16-364	2002	6	299										2		1	41										3		1														1			4		1			7						1		1	Cracks, misaligned connection,camera blocked by intruding connection.	86,157	86,157
	31	P	4 TH STREET	F01-291	F01-290	2002	8	272			2						8				53		1										5		1																							1			3			Cracks, infiltration	101,628	
	31	P	CENTRAL AVE ALLEY	F01-294	F01-292	2002	8	317													3		5								4																														2			Moderate offsets	116,208	
	31	P	CENTRAL AVE ALLEY	F01-292	F01-291	2002	8	156													1																																								1	2		Sag, high flows.	64,044	281,880
63	32	P	TAPER DR	D06-159	D06-158	2004	8	350		4	15			1	3																																			1														Multiple cracks and fractures	126,900	
19	32	VP	TAPER DR	D06-158	D06-157	2004	8	211		1	5			1								1																									1	20		3														Concrete in Invert, defects in joints	81,770	
12	32	VP	TAPER DR	D06-157	D06-156	2004	8	189		1	2			2								1																									1	20					1								2			Possible concrete in Invert @ Sta 0	74,629	
1	32	VP	ALLEY E/O MAIN ST	F28-384	F28-C386	2004	8	481														1											2																				1											Joint Offset Medium @ Sta 192	169,263	
0	32	VP	ALLEY E/O MAIN ST	F28-384	F28-C385	2004	6	81																																					1									1										1	Survey Abandoned due to Root Ball @ Sta 75 (100%)	33,183	485,745
7	34	VP	MAR VISTA AVE	D03-122	D03-123	2004	8	141			2											1																												1														Joint Offset Medium @ Sta 3	59,158	
57	34	P	MAR VISTA AVE	D03-122	D03-121	2004	8	350		4	17			1																																				8														Multiple cracks	126,932	
69	34	P	MAR VISTA AVE	D03-121	D03-120	2004	8	305			21			1	1						5														J-1		1													8														Multiple cracks	112,336	298,427
16	35	VP	BOLSA AVE	D07-165	D06-161	2004	8	255		1	4			1								1																																										Grease, cracks, Joint Offset Medium @ Sta 250	96,240	96,240
5	36	VP	ALLEY N/O MARINA DR	C06-412	C06-411	2004	8	175			1											2																																										Grease, Joint Offset Medium @ Sta 22 and 25	70,258	70,258
5	37	P	CORSAIR WAY	C06-421	C06-417	2004	8	167												1											1		1	2															10															Small hole @ Sta 13 filled with cockroaches	67,624	
2	37	VP	FIRST ST	C10-446	C09-253	2004	10	271														2																									1	1					1											Joint Offset Medium @ Sta 192 & 222	123,239	190,863
1	38	VP	FIRST ST	C09-253	C08-445	2004	10	104														1									1																																	Joint Offset Medium @ Sta 6	55,426	55,426
53	39	P	CRESTVIEW AVE	D09-199	D09-198	2004	8	346	1	2	15				1																				J-1		2	J-1			J-1		1			1				5			3											Multiple cracks and root problems	125,734	
43	39	P	CRESTVIEW AVE	D09-199	D04-200	2004	8	350	2	4	6		4		1			2																	1		3													3			1										1	Camera blocked @ joint with intruding concrete	126,900	
51	39	P	CRESTVIEW AVE	D04-200	D04-149	2004	8	350	1	1	14			1	1																				J-4		4	J-1			J-2					2							1											Multiple cracks and root balls in laterals	126,900	379,534
43	40	P	COASTLINE DR	D02-099	D02-098	2004	8	280		3	13							1			1										1																			4														Concrete Intruding @ Sta 10	104,285	104,285
8	41	P	COASTLINE DR	D02-100	D02-101	2004	8	76							1			1			4										1		4																												1			Broken pipe	38,124	38,124
76	42	P	HARBOR WAY	D08-185	D08-184	2004	8	350	2	3	21			1	1																1				J-4		2						1																					Multiple cracks throughout sewer line	126,838	
71	42	P	HARBOR WAY	D08-184	D08-179	2004	8	266	2	2	21			1																																				4														Multiple cracks	99,830	
45	42	P	BAYSIDE DR	D08-180	D08-179	2004	8	202	1	1	12			1	1																																			3														Multiple cracks	79,026	305,694
61	43	P	CATALINA AVE	D09-191	D09-189	2004	8	344		6	17			2																					J-1								1							3														Multiple cracks and fractures	125,031	
41	43	P	CRESTVIEW AVE	D09-195	D09-189	2004	8	262		2	12			1	1																						2									1	2	2		3														Multiple cracks and clogged w/ debris	98,323	223,354
130	44	P	JADE COVE WAY	E08-221	E08-215	2004	8	254			25				1																				J-4								2							2														Roots from Sta 65-106, Sta 200-211, Cracks 163-249	95,828	95,828
51	45	P	CATALINA AVE	D02-110	D02-109	2004	8	273		4	11			1	3																1												2							6														Fractures @ Sta 4, 150, 173, and 267	101,984	
33	45	P	AVALON DR	D02-113	D02-110	2004	8	303		6	7			1	1																				J-1	1		J-1																										Cracks	111,704	213,689
52	46	P	CATALINA AVE	D04-145	D04-144	2004	8	239	2	2	14				1						2																1													3														Multiple cracks	90,784	90,784
43	47	P	DRIFTWOOD AVE	D04-128	D04-127	2004	8	327			11			1	2																				J-5		5													9														Multiple cracks	119,477	119,477
41	48	P	SANDPIPER DR	D06-164	D06-163	2004	8	361	2	4	11																										3						2							5														Cracked and fractured laterals, joints had multiple cracks	130,519	130,519
43	49	P	CORAL PL	D08-181	D08-182	2004	8	199		2	13			1																																				1														Multiple cracks	77,905	77,905
	50	P	BIRCHWOOD AVE.	B05-C03	B05-C02	2002	8	365													7	9	1								1		1																			1									14			Sags, offsets	131,760	
	50	P	BIRCHWOOD AVE.	B05-C02	B05-C01	2002	8	361													2	10											7																									6	1		9			High infiltration, mineral deposits	130,464	262,224
	51	VP	HEATHER STREET	B10-K08	B10-J06	2002	8	334													4		2								2		11																									1			1			Major offset joint @ 5'	121,716	121,716
	52	VP	IRONWOOD AVE.	B16-K19	B16-K17	2002	8	311													3		1																																						2			Severely seperated joint @ 136'. Rest of pipe ok.	114,264	114,264
							Total	**26,529**																																																										**9,332,650**	**9,332,650**


Bridgeport Drainage Area
Marina Hill South Drainage Area
Marina Hill North Drainage Area
Old Town Drainage Area
Pacific Ocean
Pacific Ocean
1st St
2nd St
3rd St
5th St
6th St
7th St
8th St
Marina Dr
Marina Dr
Clipper Wy
Corsair Wy
Carmel Av
Catalina
Crestview Av
Balboa Dr
Marvista Av
Driftwood Av
Fathom Av
Coastline Dr
Southshore Dr
Taper Dr
Sandpiper Dr
Beachcomber Dr
Sea Breeze Dr
Island View Dr
Bayside Dr
Harbor Wy
Bayou Wy
Seal Beach Blvd
Bolsa Av
Bolsa Av
Balboa Dr
Marlin Av
Pacific Coast Hwy
Pacific Coast Hwy
Seal Beach Blvd
Ocean Av
Ocean Av
Central Av
Main St
ElectricAv
ElectricAv
Dolphin Ave
10th St
11th St
12th St
13th St
14th St
15th St
16th St
17th St
Landing Av
12th St
13th St
14th St
1st St PS
8th St PS
PS 35
Seal Beach Pier Forcemain
FM
FM
N
500 0 500 Feet
Legend
Sewer Manhole and Identification
Sewer Pipe
Forcemain
Recommended Project Locations 1-10
Recommended Project Locations 11-20
Recommended Project Locations 21-30
Recommended Project Locations 31-40
Recommended Project Locations 41-48
Old Town Drainage Area
Marina Hill North Drainage Area
Marina Hill South Drainage Area
Bridgeport Drainage Area
Project No.: 0800592.10
Date: July 2005
City of Seal Beach Sewer Master Plan
Recommended Projects
Bridgeport, Marina Hill, Old Town
Figure 7-3



AKM	City of Seal Beach Sewer Master Plan
Project No.: 0800592.10	Recommended Projects College Park East
Date: July 2005	Figure 7-4

Section 8

CAPITAL IMPROVEMENT PLAN

8.1 Purpose

The ultimate goal of a capital improvement program is to provide the City with a short and long-range planning tool to implement the construction of needed infrastructure improvements in an orderly manner, and to keep pace with the City's growth. To accomplish this goal, it is necessary to determine the estimated cost of the projects included in the capital improvement program and prioritize them to result in reliable service in a fiscally responsible manner. Funding mechanisms to finance the improvements can then be identified to implement the program.

The needed capital improvement projects were identified as a result of the analyses conducted and described in Sections 5, 6, and 7 of this report. These projects are listed in Table 8-1, and shown on Figures 8-1 and 8-2. The individual system replacement and rehabilitation projects are not listed in Table 8-1, rather annual budgets are provided. Once the capacity improvement projects are completed, the additional funding will be available to replace the aging system

8.2 Proposed Capital Improvement Projects

Project No.1 Lampson Avenue Trunk Sewer-East of Seal Beach Boulevard to Los Alamitos Sub-trunk

Capacity analysis of the collection system indicated that the depth at peak dry weather to pipe diameter ratios would exceed 0.64 in the two downstream reaches of Lampson Avenue Trunk Sewer. One is 312 feet of 15-inch pipe along the east side of Seal Beach Boulevard north of Lampson Avenue, between Manholes B01-A03 and B01-A02. The other is 60 feet of 12-inch pipe between Manhole B01-A02 and Orange County Sanitation District's 30-inch diameter Los Alamitos Sub-trunk Sewer. Additionally, these two reaches were rated poor and very poor by the condition assessment of the system. The 12-inch sewer terminates at the Los Alamitos Sub-trunk below the pipe soffit, which is not desirable. Closed circuit television inspection of the two reaches showed that there are no existing laterals. Therefore, it appears that better conditions can be developed if these two reaches are eliminated by constructing 190 feet of 18-inch diameter pipe from east of Lampson Avenue (Manhole B01-A03) to a manhole on the Los Alamitos Sub-trunk Sewer west of Seal Beach Boulevard and south of Bixby Channel.

This project is recommended to be constructed in Year 1 of the Capital Improvement Plan. The cost of implementing this project is estimated at $190,000.

Project No.2 Year 1 Replacement and Rehabilitation Projects

These are spot repair, pipe relining, and replacement projects that will eliminate the structural deficiencies identified through CCTV inspection and condition assessment. They are located throughout the City.

Project No.3 Pump Station No. 35 Improvements

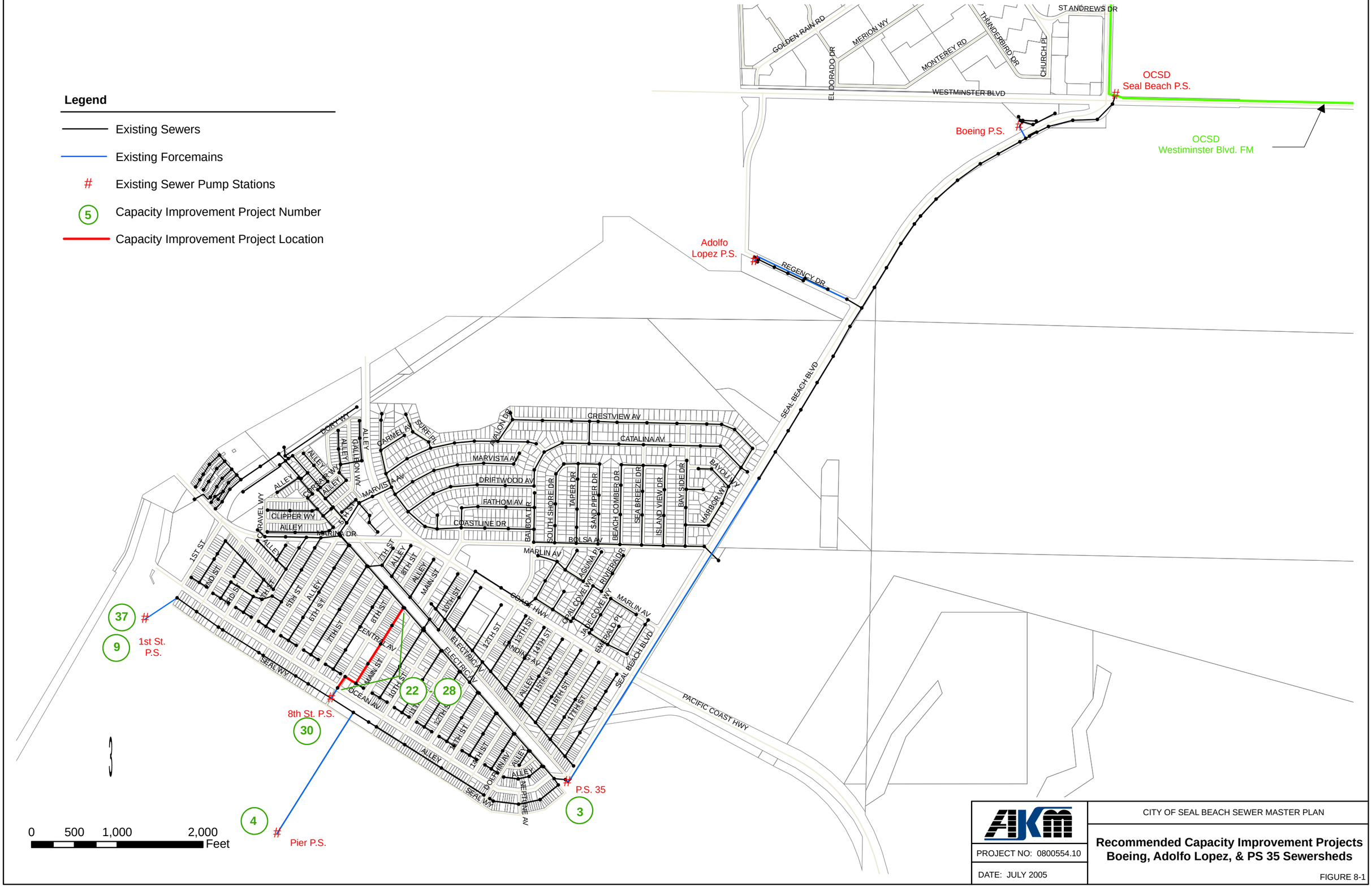
Pump Station No.35 appears to be in good condition, but requires some upgrades to provide continuous, reliable service with adequate capacity. The City of Seal Beach is in the process of replacing the electrical and control equipment, and the electric motors. The project will provide inverter duty motors which will be operated by variable frequency drives to minimize cycling and

Table 8-1
Recommended 10-Year Capital Improvement Program

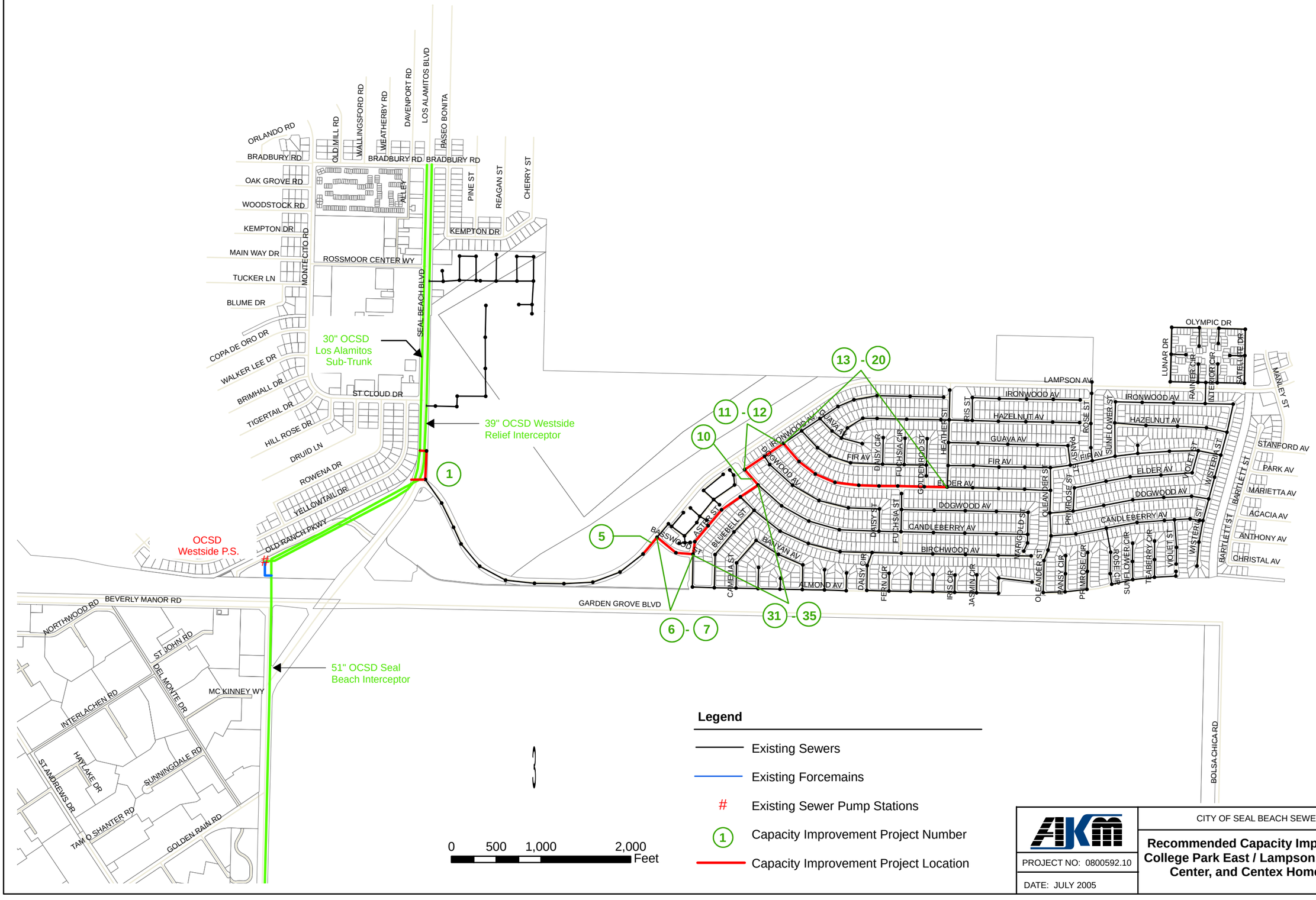
CIP Program Year	Project No.	Location	Existing Size	Proposed Size	Quantity	Project Cost ($)	Annual CIP Cost ($)
1	1	Seal Beach Blvd, east of Lampson Ave. to Los Alamitos Sub-trunk		18	190	240,000	
	2	Sewer System Rehabilitation Projects		8	1200	1,000,000	1,240,000
2	3	Pump Station No.35 Improvements-Phase 2		-	1	800,000	
	4	Pier Pump Station Improvements		-	1	515,000	
	5	Lampson Ave. south of Basswood St.	15	18	244	222,000	
	6	Basswood St. east of Lampson Ave.	12	18	270	245,000	
	7	Basswood St. west of Aster St.	12	18	191	176,000	
	8	Sewer System Rehabilitation Projects		-	Various	100,000	
	9	Sewer System Rehabilitation Project-1st Street Pump Station		-	1	181,000	2,239,000
3	10	Candleberry Ave. east of Ironwood Ave.	10	15	222	175,000	
	11	Ironwood Ave. west of Dogwood Ave.	10	15	268	210,000	
	12	Ironwood Ave. west of Elder Ave.	10	15	254	199,000	
	13	Elder Ave. east of Ironwood Ave.	8	12	265	168,000	
	14	Elder Ave. east of Ironwood Ave.	8	12	230	147,000	
	15	Elder Ave. east of Ironwood Ave.	8	12	237	151,000	
	16	Elder Ave. east of Ironwood Ave.	8	12	272	172,000	
	17	Elder Ave. west of Heather St.	8	12	225	144,000	
	18	Elder Ave. west of Heather St.	8	12	220	141,000	
	19	Elder Ave. west of Heather St.	8	12	290	183,000	
	20	Elder Ave. west of Heather St.	8	12	256	162,000	
	21	Sewer System Rehabilitation Projects		-	Various	248,000	2,100,000
4	22	Eighth St. Alley south of Electric Ave.	8	15	9	15,000	
	23	Eighth St. Alley south of Electric Ave.	8	15	244	198,000	
	24	Eighth St. Alley north of Central Ave.	8	15	255	206,000	
	25	Eighth St. Alley south of Central Ave.	8	15	274	221,000	
	26	Eighth St. Alley north of Ocean Ave. Alley	8	15	269	217,000	
	27	Ocean Ave. Alley east of Eighth St.	8	15	145	121,000	
	28	Eighth St. north of Ocean Ave.	8	15	160	133,000	
	29	Sewer System Rehabilitation Projects		-	Various	239,000	1,350,000
5	30	8th Street Pump Station		2x500 gpm	1	1,519,000	1,519,000
6	31	Aster St. north of Basswood St.	12	15	138	123,000	
	32	Aster St. west of Candleberry Ave	12	15	233	201,000	
	33	Aster St. west of Candleberry Ave	12	15	230	198,000	
	34	Aster St. west of Birchwood Ave.	12	15	255	219,000	
	35	Aster St. west of Candleberry Ave	12	15	253	217,000	
	36	Sewer System Rehabilitation Projects		-	Various	292,000	1,250,000
7	37	1st Street Pump Station Replacement		2x125 gpm	1	597,000	
	38	Sewer System Rehabilitation Projects		-	Various	691,000	1,288,000
8	39	Sewer System Rehabilitation Projects		-	Various	1,326,000	1,326,000
9	40	Sewer System Rehabilitation Projects		-	Various	1,366,000	1,366,000
10	41	Sewer System Rehabilitation Projects		-	Various	1,407,000	1,407,000
		Total					15,085,000

Legend

- Existing Sewers
- Existing Forcemains
- # Existing Sewer Pump Stations
- (5) Capacity Improvement Project Number
- Capacity Improvement Project Location



AKM	CITY OF SEAL BEACH SEWER MASTER PLAN
PROJECT NO: 0800554.10	**Recommended Capacity Improvement Projects Boeing, Adolfo Lopez, & PS 35 Sewersheds**
DATE: JULY 2005	FIGURE 8-1



AKM

PROJECT NO: 0800592.10

DATE: JULY 2005

CITY OF SEAL BEACH SEWER MASTER PLAN

Recommended Capacity Improvement Projects College Park East / Lampson, Old Ranch Towne Center, and Centex Homes Sewersheds

FIGURE 8-2

the need to surcharge the influent sewers. The proposed project will replace the existing three pumps and the suction and discharge piping at the pump station, and will reline the wet well. Two duty pumps will have a combined capacity of 3000 gpm, which is the expected ultimate peak wet weather flow to the station.

The recommended project will also install a radio controlled SCADA system to monitor and control the pump station. The existing automatic dialer will be maintained as a backup facility.

Project No.3 is recommended to be constructed in Year 2 of the Capital Improvement Plan. The estimated cost of the project is $800,000.

Project No.4 Pier Pump Station Improvements

This project is recommended to locate the pump station so that the equipment can be easily accessed for repair and replacement, with up to date controls, telemetry, and emergency power connection. The pump station should be located downstream of a grease interceptor that should be installed by the restaurant.

It is recommended to be implemented in year 2 of the Capital Improvement Plan. The estimated cost of the project is $515,000.

Project No.5, 6, 7 College Park East Sewers, Phase 1- Lampson Avenue and Basswood Street

Three reaches of sewer in Basswood Street (12-inch) and Lampson Avenue (15") have depths at peak dry weather flow that exceed the City's criterion. The two reaches in Basswood Street between Aster Street and Lampson Avenue total 481 feet. They should be replaced with 15-inch pipes from Manhole B03-A16 to B03-A14. The reach in Lampson Avenue is just south of Basswood Street, extending from Manhole B03-A14 to B03-A13. This 244 feet reach should be replaced with an 18-inch diameter pipe.

These projects are recommended to be implemented in Year 2 of the Capital Improvement Plan. The total cost of the project is estimated at $643,000.

Project No.8 Year 2 Replacement and Rehabilitation Projects

These are spot repair, pipe relining, and replacement projects that will eliminate the structural deficiencies identified through CCTV inspection and condition assessment. They are located throughout the City. Proposed Year 2 budget is $206,000.

Project No.9 1st Street Pump Station Improvements

This project will rehabilitate the 1st Street Pump Station's wet well, pumps, and valves until the development of the DWP property. It is recommended to be implemented in Year 2 of the Capital Improvement Plan. The estimated cost is $181,000.

Project No.10-20 College Park East Sewers, Phase 2- Candleberry Avenue, Ironwood Avenue, and Elder Avenue

The system evaluation showed that the pipes in Elder Avenue between Oleander Street and Ironwood Avenue exceeded the City's peak dry weather flow depth to pipe diameter ratio criterion for existing pipes. However, the four reaches of sewer totaling 1153 feet between Oleander Street and Heather Street would meet the criterion by diverting all or most of the flow west at the intersection of Fir Avenue and Oleander Street.

It is recommended that this diversion be made to relieve the sewers in Elder Avenue east of Heather Street. The 8-inch diameter sewers in Elder Avenue between Heather Street and

Ironwood Avenue, totaling 1995 feet should be replaced with 12-inch diameter sewers.

Two reaches of 10-inch diameter sewer in Ironwood Avenue between Elder Street and Candleberry Avenue (Manhole B08-A24 to B06-A22), and one reach of 10-inch diameter sewer in Candleberry Avenue between Ironwood Avenue and Aster Street (Manhole B06-A22 to B06-A21) have peak dry weather depth of flow to pipe diameter ratios exceeding the City's criterion. These three reaches totaling 788 feet should be replaced with 15-inch pipe.

These projects should be planned for Year 3 of the Capital Improvement Plan. The total project cost is estimated at $1,852,000.

Project No.21 Year 3 Replacement and Rehabilitation Projects

These are spot repair, pipe relining, and replacement projects that will eliminate the structural deficiencies identified through CCTV inspection and condition assessment. They are located throughout the City. Proposed Year 3 budget is $248,000.

Project No. 22-28 Replacement of Ocean Avenue Alley and 8th Street Alley Sewers

Approximately 1356 feet of 8-inch gravity sewer in 8th Street and the 8th Street Alley , and 300 L.F. of 8-inch sewer south of Ocean Avenue north of the Pier feeding the 8th Street Pump Station exceed the depth to diameter ratio of 0.8 with the pumped flows (peak wet weather). Additionally, the existing sewer in the 8th Street Alley, to which the 8th Street Pump Station discharges, has a grease problem, and is on the City's Hot Spot list. It serves the restaurants and shops located on Main Street.

Two possible alternatives to mitigate the capacity issue in 8th Street and the Alley can be further evaluated prior to the design of the mitigation project taking into account the selected capacity of the replacement 8th Street Pump Station. One would be to replace the existing force main with a new one in 8th Street, bypassing the alley and making capacity available. A second alternative would be to replace the existing sewer with one at a steeper slope since the receiving sewer in Electric Avenue is significantly deeper.

The City will conduct further evaluation of the 8-inch sewer east of the 8th Street Pump Station. The depth to diameter ratio exceeds 0.8 with the pump capacity of the Pier Pump Station. However, since the Pier Pump Station can discharge only about 250 gallons over a two minute period every 20 minutes during the peak period, actual flow conditions will be verified prior to embarking on a replacement project.

The estimate provided is based upon replacing the existing sewer in 8th Street and the alley with a 15-inch diameter sewer at a steeper slope. These projects are recommended to be constructed in Year 4 of the Capital Improvement Plan. The total project cost is estimated at $1,111,000.

Project No. 30 8th Street Pump Station Replacement

This project is recommended to replace the City's oldest pump station with a new submersible facility. It will have two pumps of approximately 400 gpm capacity, emergency storage, and a permanent standby generator. It can be constructed across the beach parking access from the existing station.

It is recommended to be implemented on Year 5 of the Capital Improvement Plan. The estimated project cost is $1,519,000.

Project No.31-35 College Park East Sewers, Phase 3- Aster Street between Candleberry Avenue and Basswood Street

The existing 12-inch sewers in Aster Street have depth to diameter ratios between 0.63 and 0.80 with peak dry weather flows. They will need to be replaced with 856 feet of 15-inch diameter pipe between manholes B06-A21 and B03-A16.

Project No's 31-35 are recommended to be implemented in Year 6 of the Capital Improvement Plan. The total cost of the project is estimated at $958,000.

Project No. 37 1st Street Pump Station Replacement

This project will replace the existing pump station with a new facility that will accommodate the future flows from the DWP property. It is recommended as a submersible pump station with two 120 gpm pumps in a PVC lined wet well. Sufficient emergency storage, a portable generator connection, manual transfer switch, and telemetry equipment should be provided.

It should be constructed when the DWP property is developed, expected to be by Year 7 of the Capital Improvement Plan. The project cost is estimated at $597,000.

Project No.36-41 Year 7, 8, 9, and 10 Replacement and Rehabilitation Projects

These are spot repair, pipe relining, and replacement projects that will eliminate the structural deficiencies identified through CCTV inspection and condition assessment. They are located throughout the City. Proposed budgets are $691,000, $1,326,000, 1,366,000, and $1,407,000 for years 7 through 10 of the Capital Improvement Plan.

The replacement and rehabilitation projects will continue well beyond the first 10 years to update the aging asset and maintain it in proper condition.

8.3 Cost Estimates

The construction costs contained herein are current prices and were derived by utilizing bid tabulations to obtain unit costs from similar projects in the Southern California area. Construction costs can be expected to fluctuate as changes occur in the economy. These costs should therefore be re-evaluated and updated annually, based on the Engineering News Record (ENR) Index for Los Angeles Area. The costs contained within this study are based upon and July 2005 Los Angeles Area ENR Index of 8289.

It should be noted that most of the improvements recommended are conceptual in nature based on available planning information. Therefore, they should not be considered as absolute for final design. Further analysis and refinement will be necessary prior to commencing work on the final plans, specifications and estimates package for each project.

The cost estimates that follow were generated by estimating the quantities of required items for each improvement and applying the unit prices discussed earlier to obtain a total estimated construction cost. An amount equal to approximately 25 percent was then added to the construction cost to cover technical services and contingencies. The resultant sum is the total estimated project cost.

The cost estimates for the recommended projects, as well as the required annual expenditures through the first 10 years of the Capital Improvement Plan are listed in Table 8-1.

Section 9

SEWER ENTERPRISE FINANCIAL ANALYSIS

9-1 Existing Sewer System

The City of Seal Beach (City) provides wastewater collection service to approximately 5000 customers in most areas within its corporate boundaries. The wastewater collection system consists of 32 miles of gravity pipes ranging in size from 6-inch to 24-inch in diameter and 730 manholes. Additionally, the City owns and operates seven sewer pump stations within its service area. All wastewater from the service area is conveyed to Orange County Sanitation District (OCSD) facilities for treatment and disposal. Because of its location in relation to the OCSD treatment facilities, very few OCSD facilities cross the City's service area. This required the City to construct a long force main and a trunk sewer in Seal Beach Boulevard, and a long trunk sewer in Lampson Avenue to reach OCSD facilities.

The City's wastewater collection system was constructed between 1920 and the present. Most of the older pipes do not meet current industry standards. Partly because of lack of adequate knowledge of the system, and partly because of lack of a dedicated funding source, there was not a regular replacement program for the aging infrastructure until 1999 when the Pump Station No.35 force main failed in Seal Beach Boulevard. Following costly emergency repairs to this vital facility, the City replaced the force main with a 24-inch diameter gravity sewer line between south of Catalina Avenue and the Boeing Pump Station south of Westminster Avenue in 2000. The deteriorating manholes on the existing 24-inch Seal Beach Trunk Sewer north of Boeing Pump Station were lined to protect against further damage and extend their useful life.

9-2 Previous Studies and Improvements

The City completed its first comprehensive Sewer System Master Plan in 1999. The Master Plan primarily addressed the capacity problems and the pump stations. The condition assessment of the gravity system was based upon limited closed circuit television inspection reports available. A financial study was completed in 2001 to evaluate funding alternatives for the operation and maintenance of the system and for implementing the Master Plan recommended capital improvement program. One of the assumptions of the financial study was that grant funding would be available for some of the capital improvements. The financial plan recommended establishing a Capital Improvement Fund with its charges to help implement the capital improvement program. Another recommendation of the financial study was to issue Certificates of Participation in two parts ($3,750,000, and $1,300,000) to help construct several important projects. The first portion was issued in 2001. These funds have been used to:

- Replace the Boeing Pump Station
- Pay for the City's portion of the new Adolfo Lopez Pump Station
- Construct the Aquatic Park Pump Station No.1 force mains from the pump station to the City of Huntington Beach system
- Replace the pumps at the Aquatic Park Pump Station No.1
- Abandon the Aquatic Pump Station No.2
- Abandon the Marina Community Center Pump Station
- Replace the sewers in the Main Street Alley

- Replace the sewers in 13th,14th, and 15th Street Alleys north of Electric Avenue
- Replace the 13th and 14th Street Alleys south of Electric Avenue
- Conduct closed circuit television inspection and condition assessment of the entire system

The City was able to obtain some grant funding from Orange County Sanitation District for a portion of the replacement cost of its sewers in the Old Town alleys. However, qualifying for additional funding is very difficult, as it is tied directly to reduction in infiltration and inflow with very restrictive standards. Therefore, the financial plan recommended in 2001 is not fully funded partly due to this shortfall in grant funding, and partly due to significant increases in construction costs.

9-3 Sunset Aquatic Park System

The City of Seal Beach provides water and wastewater service to the Sunset Aquatic Park, owned by the County of Orange. The 63 acre park was acquired by the County from the US Navy in 1963. It has 276 boat slips, boat ramps, and picnic areas. The Park is segregated from the main City area by the National Wildlife Preserve and the US Naval Weapons Station. It is situated much closer to neighborhoods in Huntington Beach than those in Seal Beach. As a result, the Park is infrequently used by residents of Seal Beach.

The sewer system, in particular, is expensive to operate and maintain. Although the City charges the County a fee for providing sewer service, it is grossly inadequate when compared to the operation and maintenance costs incurred annually by the City. The cost burden has therefore fallen upon the rate payers of Seal Beach, who derive little benefit from the Park.

The Park had been served by two pump stations (Aquatic Park Pump Station No.1 and No.2) in series and long force mains that conveyed the wastewater to the City's gravity system in Marlin Avenue west of Seal Beach Boulevard. The force main of Aquatic Park Pump Station No.2, which crossed under Anaheim Bay, failed in 1985, and again in March 2003. Since locating the failure is extremely difficult under Anaheim Bay, the City of Seal Beach pumped the wastewater into a 1500 gallon holding tank, from where it was hauled daily by truck to disposal.

In order to minimize the possibility of future spills due to force main failures, the City of Seal Beach reached an agreement with the City of Huntington Beach to convey the wastewater from this area to the City of Huntington Beach system. Two new grinder type pumps and 3,900 feet of dual 2-inch force mains were installed to implement the conveyance to the City of Huntington Beach System. In fact, a third parallel force main of 4-inch diameter was also installed to accommodate larger pumps at the Aquatic Park Pump Station No.1 when the City of Huntington Beach system is improved to accept larger flows. The City of Seal Beach incurred costs of over $450,000 for these improvements. Additional improvements of approximately $300,000 will be necessary to bring this pump station up to current standards. Based upon estimated useful lives of the various components of work, and 4 percent interest, the annual cost of the improvements is estimated at $44,000. The annual cost of inspection, maintenance, recordkeeping and regulatory compliance is estimated at $36,600. The resulting total cost of this facility is $80,600 per year.

The revenue from the five meters at the park is estimated at $11,000 per year. Therefore, the City's ratepayers are paying for the difference of $69,600 per year. The City should recover this cost from the County of Orange.

9.4 Waste Discharge Requirements

The Regional Water Quality Control Board, Santa Ana Region issued Order No. R8-2002-0014, General Waste Discharge Requirements for Sewage Collection Agencies in Orange County, on April 26, 2002. The Order prohibits the discharge of untreated sewage to any surface water stream, natural or man made, or to any drainage system intended to convey storm water runoff to surface water streams. The Order includes numerous provisions, including:

- Properly fund, manage, operate, and maintain all parts of the collection system (Provision 7 on Page 8)
- Limit fats, oils, greases, and other debris that may cause blockages in the sewage collection system, and prepare a Grease Control Program by December 30, 2004 (Provision 12(viii) on Page 12)
- Provide adequate capacity to convey base flows and peak flows, including wet weather flows, and document it in a System Evaluation and Capacity Assurance Plan by July 30, 2005 (Provision 12(ix) on Page 13)
- Identify and prioritize structural deficiencies in the entire system, with short term and long term rehabilitation actions, and document it in a Sewer System Rehabilitation Plan by September 30, 2005 (Provision 12(iv)(F) on Page 9
- Prepare a Sewer System Management Plan (SSMP) to address all requirements of the Order by September 30, 2005 (Provision 12 on Page 18)

The Regional Board enacted Order No. R8-2002-0014 under the authority of the Porter-Cologne Water Quality Control Act ("Porter-Cologne Act") which appears at Water Code sections 13020 et. seq. The Porter-Cologne Act authorizes administrative enforcement remedies, including monetary civil penalties, against any agency that violates an order issued pursuant to the Act. Failing to submit an SSMP or submitting an SSMP that fails to demonstrate that the agency is adequately funding, managing, operating and maintaining its system, as the Order requires, is a violation of the Order. The Regional Board can administratively issue cease and desist orders and/or impose up to $10,000 per day for each day of violation or petition the Superior Court to impose up to $25,000 per day for each day of violation. [Water Code section 13385] Additionally, since the Order states that the Regional Board will consider the adequacy of the SSMP in any enforcement action (Provision 12 at Page 8), an inadequate SSMP, including inadequate financing, can subject an agency to more severe monetary civil penalties for sewer spills. The Porter-Cologne Act empowers the Regional Board to seek fines of up to $25 per gallon of sewage not cleaned up [Water Code section 13385] and issue abatement orders which carry up to $15,000 per day fines for non-compliance. [Water Code section 13350]. Further, federal law empowers the Regional Board to seek up to $32,500 in penalties for each spill which violates the Clean Water Act. [33 U.S.C. §1319] An inadequate SSMP could be grounds for the Regional Board seeking the upper limit of allowable penalties in any one of these enforcement actions.

9-5 Compliance with Waste Discharge Requirements

The City of Seal Beach submitted all the required elements of the SSMP up to date. These consisted of:

- SSMP Development Plan before September 30, 2002
- Sanitary Sewer Overflow Emergency Response Plan before January 1, 2003

- Preventative Maintenance Plan before June 15, 2003
- Legal Authority before July 30, 2004
- Grease Control Program before December 30, 2004
- System Evaluation and Capacity Assurance Plan before July 30, 2005

The City has two pending submittals. These are:

- Sewer System Rehabilitation Plan on or before September 30, 2005
- Sewer System Management Plan (SSMP) on or before September 30, 2005

The City conducted additional flow monitoring, updated its system hydraulic model, and conducted hydraulic capacity analyses of its system. The City also conducted field observation of some of its facilities to verify the hydraulic model results. Based upon the information developed from this effort, technical portion of the System Evaluation and Capacity Assurance Plan component of the SSMP has been completed. This plan includes a list of projects to improve the system's capacity to meet the City's capacity criteria. An approved financial plan to fund these improvements will be the final element of the System Evaluation and Capacity Assurance Plan.

The City conducted closed circuit television (CCTV) inspection of nearly the entire gravity system between 2002 and 2004. Based upon the information developed from reviews of the CCTV inspection reports and recordings, the City completed the technical portion of its Sewer System Rehabilitation Plan. This plan provides recommendations for improving the structural integrity of the system, addressing broken pipes, holes in pipes, offset joints, and other defects that may lead to collapse, failure, blockage, and sewer spills. As with the Capacity Assurance Plan, an approved financial plan is needed to complete the Sewer System Rehabilitation Plan.

9-6 Capital Improvement Program

The improvements needed for capacity improvements and condition improvements have been compiled in a comprehensive Capital Improvement Program. The recommended 10-year Capital Improvement Program is shown in Table 9-1. The capital improvements will continue well beyond the ten year schedule, addressing condition deficiencies and replacing the system that has exceeded its useful life.

9-7 Existing Sewer Enterprise

The existing sewer enterprise has a Maintenance and Operation Fund (M/O, or Fund 043), and a Capital Improvement Fund (Fund 044). The M/O fund has been in existence for a number of years to support the operation and maintenance of the City's gravity system and pump stations. Until 2001, a dedicated revenue source did not exist for replacing infrastructure. The Capital Improvement Fund was established in 2001 to provide this dedicated revenue source for supporting the implementation of the capital improvement program recommended by the Sewer System Master Plan.

In evaluating the funding needs for proper operation and maintenance of the wastewater collection system, and for implementing the recommended capital improvements, the first step was to analyze the revenues and expenses of the Maintenance and Operation Fund and the Capital Fund. It was based upon the average water use for each customer class and water meter size.

Table 9-1
Recommended 10-Year Capital Improvement Program

CIP Program Year	Project No.	Location	Existing Size	Proposed Size	Quantity	Project Cost ($)	Annual CIP Cost ($)
1	1	Seal Beach Blvd, east of Lampson Ave. to Los Alamitos Sub-trunk		18	190	240,000	
	2	Sewer System Rehabilitation Projects		8	1200	1,000,000	1,240,000
2	3	Pump Station No.35 Improvements-Phase 2		-	1	800,000	
	4	Pier Pump Station Improvements		-	1	515,000	
	5	Lampson Ave. south of Basswood St.	15	18	244	222,000	
	6	Basswood St. east of Lampson Ave.	12	18	270	245,000	
	7	Basswood St. west of Aster St.	12	18	191	176,000	
	8	Sewer System Rehabilitation Projects		-	Various	100,000	
	9	Sewer System Rehabilitation Project-1st Street Pump Station		-	1	181,000	2,239,000
3	10	Candleberry Ave. east of Ironwood Ave.	10	15	222	175,000	
	11	Ironwood Ave. west of Dogwood Ave.	10	15	268	210,000	
	12	Ironwood Ave. west of Elder Ave.	10	15	254	199,000	
	13	Elder Ave. east of Ironwood Ave.	8	12	265	168,000	
	14	Elder Ave. east of Ironwood Ave.	8	12	230	147,000	
	15	Elder Ave. east of Ironwood Ave.	8	12	237	151,000	
	16	Elder Ave. east of Ironwood Ave.	8	12	272	172,000	
	17	Elder Ave. west of Heather St.	8	12	225	144,000	
	18	Elder Ave. west of Heather St.	8	12	220	141,000	
	19	Elder Ave. west of Heather St.	8	12	290	183,000	
	20	Elder Ave. west of Heather St.	8	12	256	162,000	
	21	Sewer System Rehabilitation Projects		-	Various	248,000	2,100,000
4	22	Eighth St. Alley south of Electric Ave.	8	15	9	15,000	
	23	Eighth St. Alley south of Electric Ave.	8	15	244	198,000	
	24	Eighth St. Alley north of Central Ave.	8	15	255	206,000	
	25	Eighth St. Alley south of Central Ave.	8	15	274	221,000	
	26	Eighth St. Alley north of Ocean Ave. Alley	8	15	269	217,000	
	27	Ocean Ave. Alley east of Eighth St.	8	15	145	121,000	
	28	Eighth St. north of Ocean Ave.	8	15	160	133,000	
	29	Sewer System Rehabilitation Projects		-	Various	239,000	1,350,000
5	30	8th Street Pump Station		2x500 gpm	1	1,519,000	1,519,000
6	31	Aster St. north of Basswood St.	12	15	138	123,000	
	32	Aster St. west of Candleberry Ave	12	15	233	201,000	
	33	Aster St. west of Candleberry Ave	12	15	230	198,000	
	34	Aster St. west of Birchwood Ave.	12	15	255	219,000	
	35	Aster St. west of Candleberry Ave	12	15	253	217,000	
	36	Sewer System Rehabilitation Projects		-	Various	292,000	1,250,000
7	37	1st Street Pump Station Replacement		2x125 gpm	1	597,000	
	38	Sewer System Rehabilitation Projects		-	Various	691,000	1,288,000
8	39	Sewer System Rehabilitation Projects		-	Various	1,326,000	1,326,000
9	40	Sewer System Rehabilitation Projects		-	Various	1,366,000	1,366,000
10	41	Sewer System Rehabilitation Projects		-	Various	1,407,000	1,407,000
		Total					15,085,000

9-7.1 Sewer Maintenance and Operation (M/O) Fund

Revenues

The revenues for the Maintenance and Operation Fund are mainly derived from the sewer service charges, which are 22 percent of the water bills of customers connected to the sewer system. Sewer service charges vary by adjustments to the water charges, which were last reviewed in 2003. The water rates have planned increases through fiscal year 2008-2009, in addition to adjustments for water purchase costs.

They will be reviewed at that time to ascertain that the Water Enterprise is adequately funded. It is expected that the revenues (rates) will increase at the rate of inflation or by the increase in the Engineering News Record (ENR) index for the Los Angeles area beyond fiscal year 2008-2009. For this study, such increase was assumed to be 3 percent per year.

In addition to sewer service charges, the Maintenance and Operation Fund receives revenue from interest earned on the fund balance. The revenue from interest accounts for about 0.7 percent of the total revenue for this fund.

Expenditures

The expenditures of the M/O Fund include salaries and benefits, contract professional services, equipment and materials, depreciation, overhead, utilities and regulatory compliance. The two primary expenditures of M/O Fund are salaries and regulatory compliance, which make up 54% of the total expenditures. Total expenditures for fiscal year 2005-2006 are estimated to be $538,000. Future years' expenditures are expected to increase at the rate of inflation.

9-7.2 Sewer Capital Improvement Fund

Revenues

The revenues of the Capital Improvement Fund are comprised of three components. The primary component is the Capital Fund Charge, which was established in 2001 for the purpose of providing a dedicated revenue source for the capital improvement program recommended by the 1999 Master Plan. These charges have not been updated since that time.

The second source of revenue for the Capital Improvement Fund is interest earned on the fund balance.

The third source of revenue is from connection fees assessed to new development or redevelopment that will increase wastewater flows to the system. This is not a continuous source of revenue and is therefore not accounted for in the financial analysis of the sewer enterprise.

Expenditures

The primary expenditure in the Capital Improvement Fund is the capital improvements. The current capital improvement schedule was recommended after the completion of the City of Seal Beach Sewer Master Plan in 1999. The other expenditure of the Capital Improvement Fund is the existing debt service which is a continuing debt obligation for the 2001 Certificates of Participation issued by the City of Seal Beach.

9-8 Proposed Financing Alternatives

Review of the revenues and expenditures of the M/O Fund and the Capital Improvement Fund shows that the existing rate structure cannot generate sufficient revenue to implement the recommended capital improvements. Sewer facilities last for several generations and consideration should be given as to how the needed facilities are to be funded.

To overcome the revenue shortfall, two different financing alternatives were formulated and evaluated. The first is a pay-as-you-go-alternative, whereas the second proposes the issuance of additional bonded indebtedness to construct the needed capital improvements. Both alternatives implement the recommended capital improvement program.

9-8.1 Alternative 1- Pay-As-You-Go

With a pay-as-you-go alternative, projects are completed as sufficient funds are collected from the existing customers. Therefore, existing customers pay for the entire cost of the facilities that will last 75 years or more, and will be used by future generations. Because facilities with significant costs are included in the capital improvement program, substantial rate increases

are usually necessary in the first several years with this alternative.

The minimum revenue requirement is that which will pay for maintenance and operations, the capital improvement program. Additionally, an M/O Fund reserve of 50 percent of the total annual M/O Fund expenditures is proposed.

To implement the recommended capital improvement program, the Capital Fund Charges would have to be raised by a factor of 4.03 in the first three years. Additionally, the initial increases cause such high Capital Improvement Fund balances in later years that the rates would actually have to be decreased in the fourth year in order to reach a reasonable fund balance.

With this alternative, the Capital Fund Charges are increased by 150 percent in the first year, 50 percent in the next year, 12 percent in the following year, then decreased by 25 percent in the fourth year (2008-2009). They are then kept constant until 2017-2018. The increases in Capital Fund Charges between fiscal year 2004-2005 and 2016-2017 for a single family residential customer with a ¾-inch water meter are shown on Figure 9-1. The revenues and expenses of the M/O Fund and Capital Fund and the annual balances for this alternative are shown in Table 9-2. Table 9-3 shows the Capital Fund Charge increases by meter size for Alternative 1.

Figure 9-1
Alternative 1 (Pay -As-You-Go) Capital Fund Charges
Single Family Residential Customer with 3/4" Water Meter

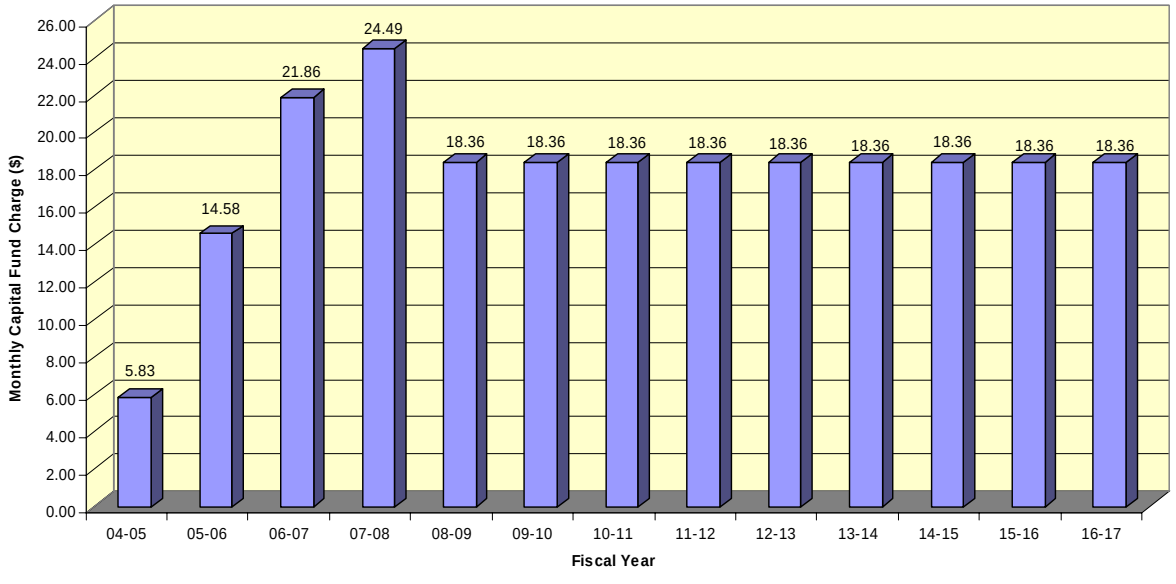


TABLE 9-2
CITY OF SEAL BEACH SEWER IMPROVEMENT FINANCING PLAN
ALTERNATIVE 1- Pay-As-You-Go w/Large Initial Capital Fund Charge Increase

OPERATING FUND

	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20
Revenues:																
Interest	-	5,222	5,379	5,540	5,707	5,878	6,054	6,236	6,423	6,616	6,814	7,019	7,229	7,446	7,669	7,899
Service Charge	602,000	704,340	739,557	776,535	807,596	831,824	856,779	882,482	908,957	936,225	964,312	993,242	1,023,039	1,053,730	1,085,342	1,117,902
Total Revenues	**602,000**	**709,562**	**744,936**	**782,075**	**813,303**	**837,702**	**862,833**	**888,718**	**915,380**	**942,841**	**971,126**	**1,000,260**	**1,030,268**	**1,061,176**	***1,093,011***	***1,125,801***
Expenditures:																
Salaries	184,090	189,612	195,301	201,160	207,194	213,410	219,813	226,407	233,199	240,195	247,401	254,823	262,468	270,342	278,452	286,806
Benefits	40,154	41,359	42,599	43,877	45,194	46,550	47,946	49,384	50,866	52,392	53,964	55,583	57,250	58,968	60,737	62,559
Equipment/Supplies	8,488	8,743	9,005	9,275	9,554	9,840	10,136	10,440	10,753	11,075	11,408	11,750	12,102	12,465	12,839	13,225
Utilities	27,980	28,820	29,684	30,575	31,492	32,437	33,410	34,412	35,445	36,508	37,603	38,731	39,893	41,090	42,323	43,592
Professional Services	58,885	60,652	62,471	64,345	66,276	68,264	70,312	72,421	74,594	76,832	79,137	81,511	83,956	86,475	89,069	91,741
Regulatory Compliance	100,000	103,000	106,090	109,273	112,551	115,927	119,405	122,987	126,677	130,477	134,392	138,423	142,576	146,853	151,259	155,797
Intergovernmental	4,544	4,680	4,820	4,965	5,114	5,267	5,425	5,588	5,756	5,928	6,106	6,289	6,478	6,673	6,873	7,079
Depreciation	39,408	40,590	41,808	43,062	44,354	45,684	47,055	48,467	49,921	51,418	52,961	54,550	56,186	57,872	59,608	61,396
Overhead	50,557	52,073	53,635	55,244	56,902	58,609	60,367	62,178	64,043	65,965	67,944	69,982	72,082	74,244	76,471	78,765
Other	8,137	8,381	8,633	8,892	9,158	9,433	9,716	10,007	10,308	10,617	10,935	11,264	11,601	11,949	12,308	12,677
Total Expenditures	***522,242***	***537,910***	***554,047***	***570,668***	***587,788***	***605,422***	***623,585***	***642,292***	***661,561***	***681,408***	***701,850***	***722,906***	***744,593***	***766,931***	***789,939***	***813,637***
Net Profit	79,758	171,653	190,889	211,407	225,514	232,280	239,248	246,426	253,818	261,433	269,276	277,354	285,675	294,245	303,073	312,165
Ending Fund Balance	**379,758**	**432,774**	**459,844**	**488,430**	**510,849**	**526,174**	**541,959**	**558,218**	**574,965**	**592,214**	**609,980**	**628,279**	**647,128**	**666,542**	**686,538**	**707,134**
Transfer to Capital	**118,636**	**163,819**	**182,820**	**203,096**	**216,954**	**223,463**	**230,167**	**237,072**	**244,184**	**251,510**	**259,055**	**266,827**	**274,831**	**283,076**	**291,569**	**300,316**
Operating Fund balance	**261,121**	**268,955**	**277,024**	**285,334**	**293,894**	**302,711**	**311,792**	**321,146**	**330,781**	**340,704**	**350,925**	**361,453**	**372,296**	**383,465**	**394,969**	**406,818**

CAPITAL FUND

	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20
Bond Proceeds		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Fund Charges	541,276.80	1,353,192.00	2,029,788.00	2,273,362.56	1,705,021.92	1,705,021.92	1,705,021.92	1,705,021.92	1,705,021.92	1,705,021.92	1,705,021.92	1,705,021.92	1,705,021.92	1,705,021.92	1,705,021.92	1,705,021.92
Interest		18,255.24	18,292.54	12,242.53	14,213.53	20,119.30	22,883.36	31,211.78	39,094.87	46,255.49	52,647.38	58,224.71	62,839.42	66,543.26	69,181.43	70,799.87
Transfer from Operating	118,636.30	163,819.05	182,820.42	203,096.17	216,954.41	223,463.04	230,166.93	237,071.94	244,184.10	251,509.62	259,054.91	266,826.56	274,831.35	283,076.29	291,568.58	300,315.64
Total Capital Fund Revenue	659,913.10	**1,535,266.29**	**2,230,900.96**	**2,488,701.27**	**1,936,189.86**	**1,948,604.26**	**1,958,072.21**	**1,973,305.64**	**1,988,300.89**	**2,002,787.03**	**2,016,724.21**	**2,030,073.19**	**2,042,692.69**	**2,054,641.48**	**2,065,771.93**	**2,076,137.43**
Debt Service																
Principal	75,000.00	80,000.00	85,000.00	85,000.00	90,000.00	95,000.00	100,000.00	105,000.00	110,000.00	115,000.00	120,000.00	130,000.00	135,000.00	145,000.00	150,000.00	160,000.00
Interest	217,151.26	213,401.26	209,401.26	205,151.26	200,901.26	196,401.26	191,651.26	186,651.26	181,270.00	175,632.50	169,595.00	163,145.00	156,060.00	148,635.00	140,587.50	132,187.50
Total Debt Service	292,151.26	293,401.26	294,401.26	290,151.26	290,901.26	291,401.26	291,651.26	291,651.26	291,270.00	290,632.50	289,595.00	293,145.00	291,060.00	293,635.00	290,587.50	292,187.50
Capital Improvements	500,000.00	1,240,000.00	2,239,000.00	2,100,000.00	1,350,000	1,519,000	1,250,000	1,287,500.00	1,339,000.00	1,392,560.00	1,448,262.40	1,506,192.90	1,566,440.61	1,629,098.24	1,694,262.17	1,762,032.65
Total Capital Expenses	**792,151.26**	**1,533,401.26**	**2,533,401.26**	**2,390,151.26**	**1,640,901.26**	**1,810,401.26**	**1,541,651.26**	**1,579,151.26**	**1,630,270.00**	**1,683,192.50**	**1,737,857.40**	**1,799,337.90**	**1,857,500.61**	**1,922,733.24**	**1,984,849.67**	**2,054,220.15**
Net Available	**(132,238.16)**	**1,865.03**	**(302,500.30)**	**98,550.01**	**295,288.60**	**138,203.00**	**416,420.95**	**394,154.38**	**358,030.89**	**319,594.53**	**278,866.81**	**230,735.29**	**185,192.08**	**131,908.24**	**80,922.26**	**21,917.28**
Ending Balance	912,761.84	914,626.87	612,126.57	710,676.57	1,005,965.17	1,144,168.18	1,560,589.13	1,954,743.51	2,312,774.40	2,632,368.93	2,911,235.73	3,141,971.03	3,327,163.11	3,459,071.35	3,539,993.61	3,561,910.89
Capital Fund Charge Increase	0%	150%	50%	12%	-25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Table 9-3
Capital Improvement Charges-Pay as you go Alternative 1

Meter Size	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17
Residential													
1	8.06	20.15	30.23	33.85	25.39	25.39	25.39	25.39	25.39	25.39	25.39	25.39	25.39
2	23.32	58.30	87.45	97.94	73.46	73.46	73.46	73.46	73.46	73.46	73.46	73.46	73.46
3	165.36	413.40	620.10	694.51	520.88	520.88	520.88	520.88	520.88	520.88	520.88	520.88	520.88
4	276.66	691.65	1,037.48	1,161.97	871.48	871.48	871.48	871.48	871.48	871.48	871.48	871.48	871.48
1.5	14.84	37.10	55.65	62.33	46.75	46.75	46.75	46.75	46.75	46.75	46.75	46.75	46.75
3/4	5.83	14.58	21.86	24.49	18.36	18.36	18.36	18.36	18.36	18.36	18.36	18.36	18.36
5/8	5.83	14.58	21.86	24.49	18.36	18.36	18.36	18.36	18.36	18.36	18.36	18.36	18.36
		150%	50%	12%	-25%	0%	0%	0%	0%	0%	0%	0%	0%
Meter Size	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17
Commercial/Government													
1	13.78	34.45	51.68	57.88	43.41	43.41	43.41	43.41	43.41	43.41	43.41	43.41	43.41
2	72.08	180.20	270.30	302.74	227.05	227.05	227.05	227.05	227.05	227.05	227.05	227.05	227.05
3	199.28	498.20	747.30	836.98	627.73	627.73	627.73	627.73	627.73	627.73	627.73	627.73	627.73
4	359.34	898.35	1,347.53	1,509.23	1,131.92	1,131.92	1,131.92	1,131.92	1,131.92	1,131.92	1,131.92	1,131.92	1,131.92
6	507.74	1,269.35	1,904.03	2,132.51	1,599.38	1,599.38	1,599.38	1,599.38	1,599.38	1,599.38	1,599.38	1,599.38	1,599.38
8	1060.00	2,650.00	3,975.00	4,452.00	3,339.00	3,339.00	3,339.00	3,339.00	3,339.00	3,339.00	3,339.00	3,339.00	3,339.00
10	1060.00	2,650.00	3,975.00	4,452.00	3,339.00	3,339.00	3,339.00	3,339.00	3,339.00	3,339.00	3,339.00	3,339.00	3,339.00
1.5	18.02	45.05	67.58	75.68	56.76	56.76	56.76	56.76	56.76	56.76	56.76	56.76	56.76
3/4	6.36	15.90	23.85	26.71	20.03	20.03	20.03	20.03	20.03	20.03	20.03	20.03	20.03
5/8	6.36	15.90	23.85	26.71	20.03	20.03	20.03	20.03	20.03	20.03	20.03	20.03	20.03
Total Bill For 5/8" Residential	11.11	20.81	28.47	31.49	26.76	26.96	27.16	27.36	27.57	27.79	28.01	28.24	28.48

9-8.2 Alternative 2-Combination Pay-As-You-Go and Pay-As-You-Use

With this alternative, new $7,000,000 bonded indebtedness is incurred in order to keep the annual increases in the Capital Fund Charges to a maximum of 20 percent. It should be noted that the City had the option to issue Certificates of Participation in the amount of $1,300,000 as part of the funding program developed in 2001. Since this would not generate the revenues needed to fund the improvements recommended by the Master Plan Update that are based upon a more detailed study, the City decided against proceeding with the second issue. The City will have $6,000,000 for the capital improvement projects from the recommended $7,000,000 bond issue after the debt service reserve of $440,000 and other issuance costs. This amount will support nearly four years of capital improvements.

The minimum revenue requirement is that which will pay for maintenance and operations, and the capital improvement program. An M/O Fund reserve of 50 percent of the total annual M/O Fund expenditures is proposed with Alternative 2 as well. The bond proceeds will cover the debt service reserve.

Because of the immediate cash infusion from the debt issuance, the annual revenues do not have to cover the full cost of the capital improvements in the initial years. Therefore, it is possible to implement gradual increases in the Capital Fund Charges. With this alternative, they are increased at 20 percent in the first three years, 15 percent in the following three years, 12 percent, 10 percent, and 5 percent in the next three years, and 3 percent for all subsequent years. The increases in the Capital Fund Charges for the single family residential customer with a ¾" water meter are shown on Figure 9-2. Figure 9-3 illustrates the annual increases in the Capital Fund Charges for this size meter. Table 9-4 shows the annual revenues, expenditures, and balances of the M/O Fund and the Capital Fund for this alternative. Table 9-5 illustrates the Capital Fund Charge increases broken down by meter size.

9.9 Recommendation

Figure 9-4 illustrates the capital fund charges for the two alternatives evaluated. It is clear that significantly higher increases in the Capital Fund Charges are needed with the Pay-As-You-Go alternative. It is recommended that the City of Seal Beach adopt Alternative 2 to provide the needed funding for its sewer enterprise.

9-10 Comparison with Other Orange County Agency Rates

Table 9-6 and Figure 9-5 show the monthly residential bills for the next 4 years in comparison to the several Orange County cities.

The City of Anaheim charges commercial and industrial customers $5.98 per toilet and sink, which provides majority of the revenues. The system dates back to 1900.

Although Huntington Beach has large capital improvement needs, it also has 54,000 customers to share the cost.

Garden Grove Sanitary District is in the process of seeking an update of its rate structure, and revenue increases. Garden Grove has over 33,000 customers. Its system dates back to 1923.

Fullerton is in the process of updating its rates to implement a capital improvement program at $6.5 million per year. Fullerton has 28,700 customers. Fullerton's system was constructed between 1913 and the present.

Figure 9-2
Alternative 2 (Combination) Capital Fund Charges
Single Family Residential Customer with 3/4" Water Meter

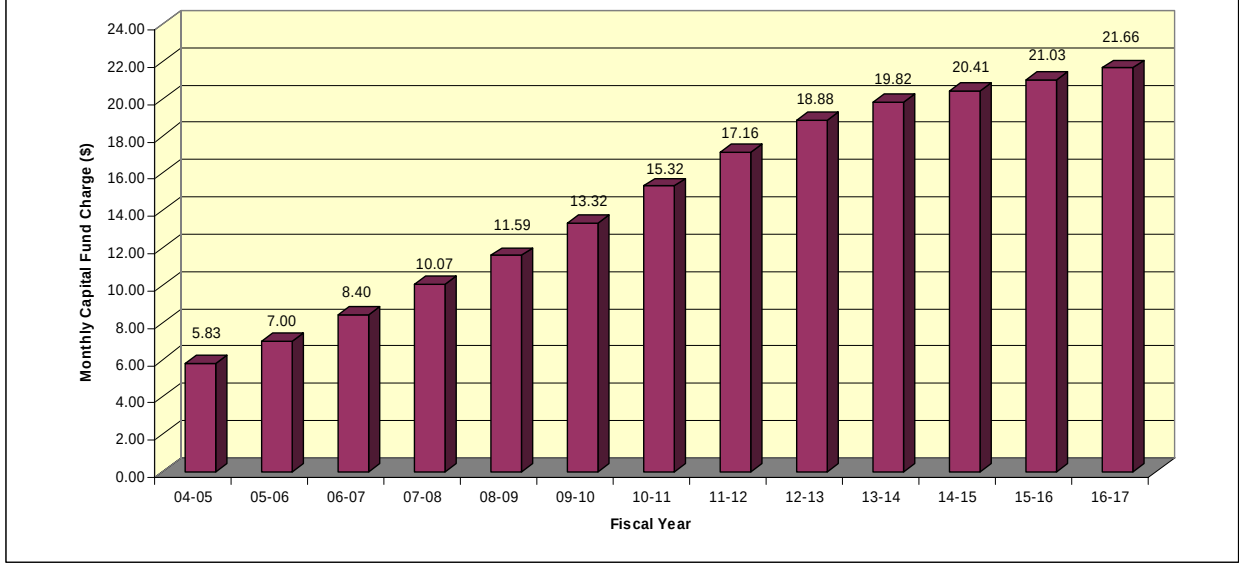


Figure 9-3
Annual Increases in Capital Fund Charges-Alternative 2

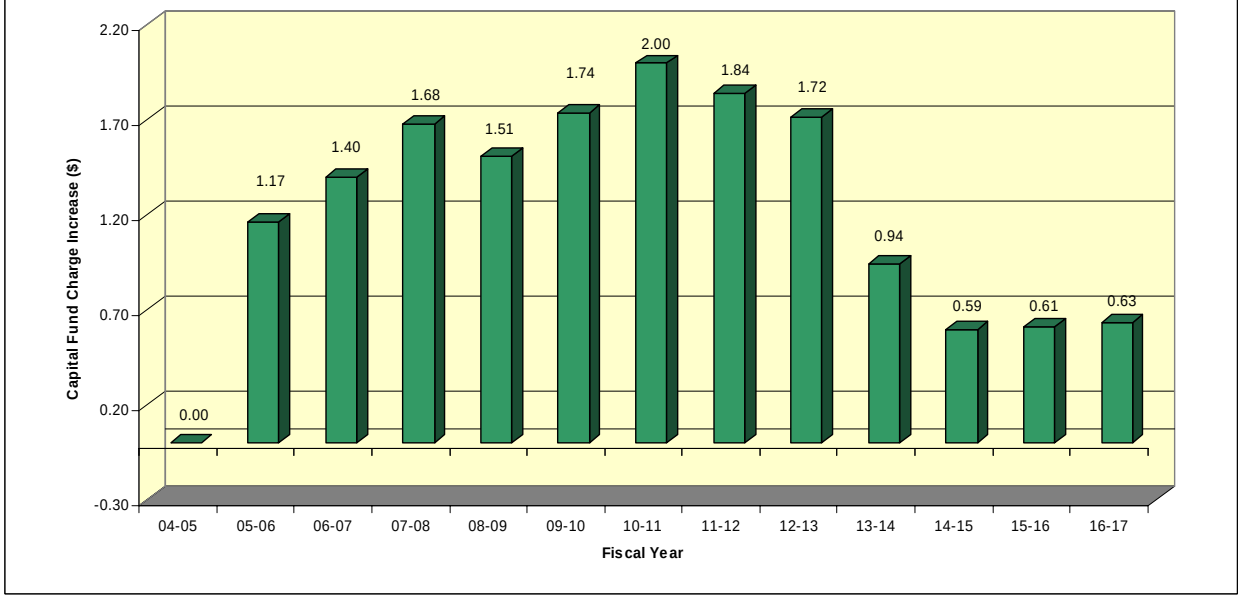


Table 9-4
CITY OF SEAL BEACH SEWER IMPROVEMENT FINANCING PLAN
ALTERNATIVE 2- $7 Millon Bond Issue

MAINTENANCE AND OPERATING FUND

	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20
Revenues:																
Interest	0	5,222	5,379	5,541	5,707	5,878	6,055	6,237	6,424	6,617	6,815	7,020	7,230	7,447	7,671	7,901
Service Charge	602,000	704,340	739,557	776,535	807,596	831,824	856,779	882,482	908,957	936,225	964,312	993,242	1,023,039	1,053,730	1,085,342	1,117,902
Total MO Fund Revenues	***602,000***	***709,562***	***744,936***	***782,075***	***813,303***	***837,703***	***862,834***	***888,719***	***915,381***	***942,842***	***971,127***	***1,000,261***	***1,030,269***	***1,061,177***	***1,093,013***	***1,125,803***
Expenditures:																
Salaries	184,090	189,612	195,301	201,160	207,194	213,410	219,813	226,407	233,199	240,195	247,401	254,823	262,468	270,342	278,452	286,806
Benefits	40,154	41,359	42,599	43,877	45,194	46,550	47,946	49,384	50,866	52,392	53,964	55,583	57,250	58,968	60,737	62,559
Equipment/Supplies	8,488	8,743	9,005	9,275	9,554	9,840	10,136	10,440	10,753	11,075	11,408	11,750	12,102	12,465	12,839	13,225
Utilities	27,980	28,820	29,684	30,575	31,492	32,437	33,410	34,412	35,445	36,508	37,603	38,731	39,893	41,090	42,323	43,592
Professional Services	58,885	60,652	62,471	64,345	66,276	68,264	70,312	72,421	74,594	76,832	79,137	81,511	83,956	86,475	89,069	91,741
Regulatory Compliance	100,000	103,000	106,100	109,300	112,600	116,000	119,500	123,100	126,800	130,600	134,500	138,500	142,700	147,000	151,400	155,900
Intergovernmental	4,544	4,680	4,820	4,965	5,114	5,267	5,425	5,588	5,756	5,928	6,106	6,289	6,478	6,673	6,873	7,079
Depreciation	39,408	40,590	41,808	43,062	44,354	45,684	47,055	48,467	49,921	51,418	52,961	54,550	56,186	57,872	59,608	61,396
Overhead	50,557	52,073	53,635	55,244	56,902	58,609	60,367	62,178	64,043	65,965	67,944	69,982	72,082	74,244	76,471	78,765
Other	8,137	8,381	8,633	8,892	9,158	9,433	9,716	10,007	10,308	10,617	10,935	11,264	11,601	11,949	12,308	12,677
Total MO Fund Expenditures	***522,242***	***537,910***	***554,057***	***570,696***	***587,838***	***605,495***	***623,680***	***642,405***	***661,684***	***681,531***	***701,959***	***722,982***	***744,717***	***767,077***	***790,080***	***813,740***
Net Profit	79,758	171,653	190,879	211,380	225,466	232,208	239,154	246,314	253,697	261,312	269,169	277,279	285,552	294,100	302,933	312,063
Ending Fund Balance	**664,758**	**432,774**	**459,834**	**488,408**	**510,813**	**526,127**	**541,902**	**558,154**	**574,899**	**592,154**	**609,934**	**628,258**	**647,043**	**666,458**	**686,472**	**707,103**
Transfer to Capital	**403,636**	**163,819**	**182,805**	**203,060**	**216,895**	**223,379**	**230,062**	**236,951**	**244,057**	**251,388**	**258,955**	**266,767**	**274,685**	**282,920**	**291,432**	**300,233**
MO Fund Balance	**261,121**	**268,955**	**277,029**	**285,348**	**293,919**	**302,747**	**311,840**	**321,202**	**330,842**	**340,765**	**350,979**	**361,491**	**372,358**	**383,539**	**395,040**	**406,870**

CAPITAL FUND

	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20
Bond Proceeds		0	7,000,000	0	0	0	0	0	0	0	0	0	0	0	0	0
Capital Fund Charges	541,277	649,532	779,439	935,326	1,075,625	1,236,969	1,422,514	1,593,216	1,752,538	1,840,165	1,895,370	1,952,231	2,010,798	2,071,122	2,133,255	2,197,253
Interest		23,955	10,033	89,178	56,294	40,819	25,002	18,087	13,837	12,065	11,374	11,125	11,250	11,879	12,946	14,584
Transfer from Operating	403,636	163,819	182,805	203,060	216,895	223,379	230,062	236,951	244,057	251,388	258,955	266,767	274,685	282,920	291,432	300,233
Total Capital Fund Revenue	944,913	**837,306**	**7,972,277**	**1,227,565**	**1,348,814**	**1,501,167**	**1,677,578**	**1,848,255**	**2,010,432**	**2,103,618**	**2,165,698**	**2,230,123**	**2,296,732**	**2,365,920**	**2,437,633**	**2,512,070**
Debt Service																
New Debt	0	0	481,638	481,638	481,638	481,638	481,638	481,638	481,638	481,638	481,638	481,638	481,638	481,638	481,638	481,638
Principal	75,000	80,000	85,000	85,000	90,000	95,000	100,000	105,000	110,000	115,000	120,000	130,000	135,000	145,000	150,000	160,000
Interest	217,151	213,401	209,401	205,151	200,901	196,401	191,651	186,651	181,270	175,633	169,595	163,145	156,060	148,635	140,588	132,188
Total Existing Debt Service	292,151	293,401	294,401	290,151	290,901	291,401	291,651	291,651	291,270	290,633	289,595	293,145	291,060	293,635	290,588	292,188
Capital Improvements	500,000	1,240,000	2,239,000	2,100,000	1,350,000	1,519,000	1,250,000	1,287,500	1,326,125	1,365,909	1,406,886	1,449,093	1,492,565	1,537,342	1,583,463	1,630,966
Bond Issuance Cost			1,000,000													
Total Capital Expenses	**792,151**	**1,533,401**	**4,015,039**	**2,871,789**	**2,122,539**	**2,292,039**	**2,023,289**	**2,060,789**	**2,099,033**	**2,138,179**	**2,178,119**	**2,223,875**	**2,265,263**	**2,312,615**	**2,355,688**	**2,404,792**
Net Available	**152,762**	**(696,095)**	**3,957,238**	**(1,644,224)**	**(773,725)**	**(790,872)**	**(345,711)**	**(212,534)**	**(88,601)**	**(34,561)**	**(12,421)**	**6,247**	**31,469**	**53,305**	**81,945**	**107,278**
Ending Balance	1,197,762	501,667	4,458,905	2,814,681	2,040,956	1,250,084	904,373	691,839	603,238	568,676	556,256	562,503	593,972	647,278	729,222	836,501
Capital Fund Charge Increase	0%	20%	20%	20%	15%	15%	15%	12%	10%	5%	3%	3%	3%	3%	3%	3%

Table 9-5
Capital Improvement Charges with $ 7M Bond Alternative

Meter Size	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17
Residential													
1	8.06	9.67	11.61	13.93	16.02	18.42	21.18	23.72	26.10	27.40	28.22	29.07	29.94
2	23.32	27.98	33.58	40.30	46.34	53.29	61.29	68.64	75.51	79.28	81.66	84.11	86.63
3	165.36	198.43	238.12	285.74	328.60	377.89	434.58	486.73	535.40	562.17	579.04	596.41	614.30
4	276.66	331.99	398.39	478.07	549.78	632.25	727.08	814.33	895.77	940.55	968.77	997.83	1,027.77
1.5	14.84	17.81	21.37	25.64	29.49	33.91	39.00	43.68	48.05	50.45	51.96	53.52	55.13
3/4	5.83	7.00	8.40	10.07	11.59	13.32	15.32	17.16	18.88	19.82	20.41	21.03	21.66
5/8	5.83	7.00	8.40	10.07	11.59	13.32	15.32	17.16	18.88	19.82	20.41	21.03	21.66
% increase	0%	20%	20%	20%	15%	15%	15%	12%	10%	5%	3%	3%	3%
Meter Size	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17
Commercial/Government													
1	13.78	16.54	19.84	23.81	27.38	31.49	36.21	40.56	44.62	46.85	48.25	49.70	51.19
2	72.08	86.50	103.80	124.55	143.24	164.72	189.43	212.16	233.38	245.05	252.40	259.97	267.77
3	199.28	239.14	286.96	344.36	396.01	455.41	523.72	586.57	645.23	677.49	697.81	718.75	740.31
4	359.34	431.21	517.45	620.94	714.08	821.19	944.37	1,057.70	1,163.47	1,221.64	1,258.29	1,296.04	1,334.92
6	507.74	609.29	731.15	877.37	1,008.98	1,160.33	1,334.38	1,494.50	1,643.95	1,726.15	1,777.93	1,831.27	1,886.21
8	1060.00	1,272.00	1,526.40	1,831.68	2,106.43	2,422.40	2,785.76	3,120.05	3,432.05	3,603.65	3,711.76	3,823.12	3,937.81
10	1060.00	1,272.00	1,526.40	1,831.68	2,106.43	2,422.40	2,785.76	3,120.05	3,432.05	3,603.65	3,711.76	3,823.12	3,937.81
1.5	18.02	21.62	25.95	31.14	35.81	41.18	47.36	53.04	58.34	61.26	63.10	64.99	66.94
3/4	6.36	7.63	9.16	10.99	12.64	14.53	16.71	18.72	20.59	21.62	22.27	22.94	23.63
5/8	6.36	7.63	9.16	10.99	12.64	14.53	16.71	18.72	20.59	21.62	22.27	22.94	23.63

Figure 9-4
Monthly Capital Fund Charges for the Two Alternatives

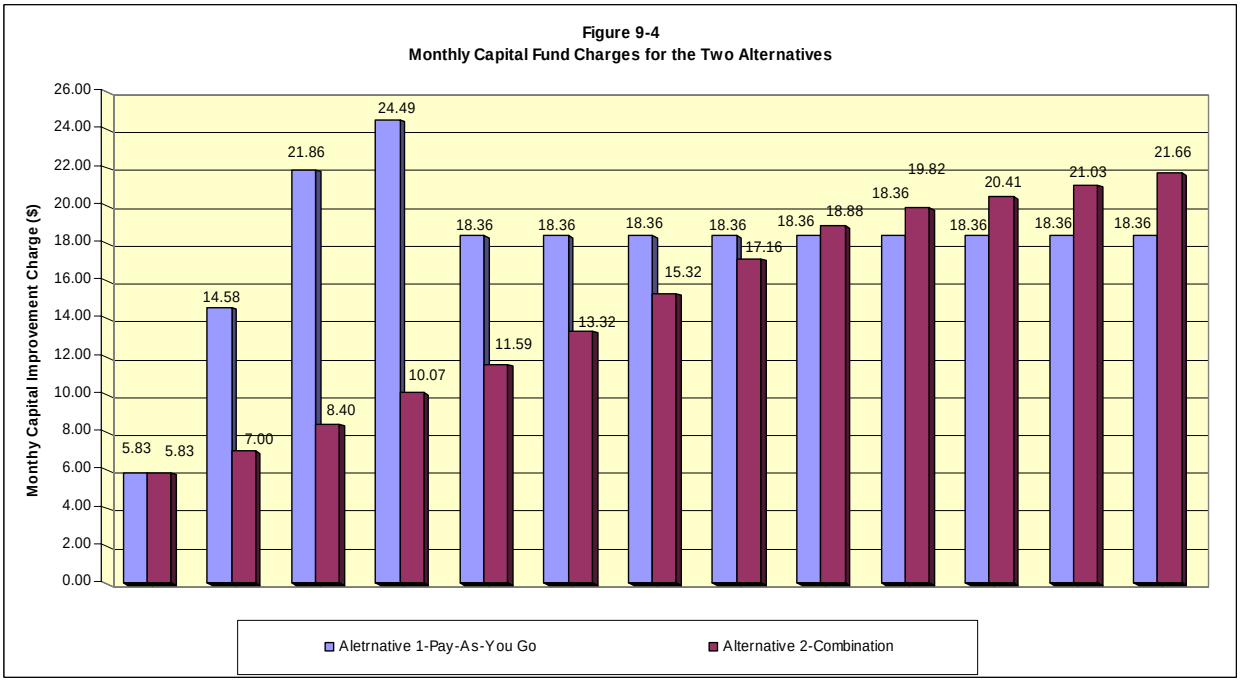
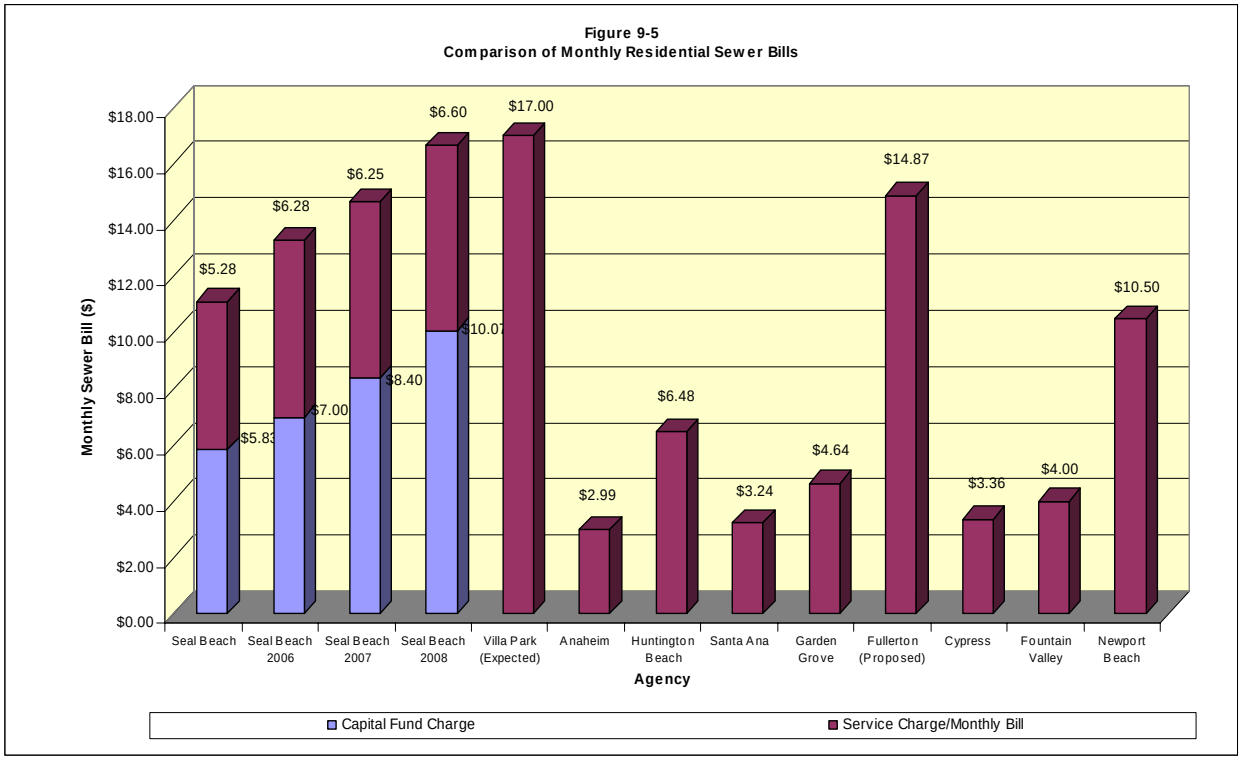


Figure 9-5
Comparison of Monthly Residential Sewer Bills



Cypress has not updated its rates in over five years, and plans to conduct a study in the near future. Cypress has a $24 million (2003 dollars) capital improvement program. Its system was constructed between 1950 and 2003.

Fountain Valley's system dates back to 1960. Fountain Valley benefits from its location where several OCSD trunk sewers cross the service area. Fountain Valley's system connects to these trunk sewers at a number of locations, which helps maintain smaller pipes.

Newport Beach has 26,000 customers. The sewer rates were updated in 2005, with planned increases for the next two years. Newport Beach's system was constructed between 1905 and the present.

The City of Villa Park's system is much newer than Seal Beach's, dating back to 1960. Villa Park has one pump station, and 2,100 customers. For systems with small number of customers, although the capital improvement needs may not be as high as large systems, there are fewer customers that have to share the burden, resulting in higher rates.

Table 9-6
Comparison of Monthly Sewer Bills

Agency	Monthly Sewer Bill
Seal Beach	$11.11
Seal Beach 2006	$13.28
Seal Beach 2007	$14.65
Seal Beach 2008	$16.25
Villa Park (Expected)	$17.00
Anaheim	$2.99
Huntington Beach	$6.48
Santa Ana	$3.24
Garden Grove	$4.64
Fullerton (Proposed)	$14.87
Cypress	$3.36
Fountain Valley	$4.00
Newport Beach	$10.50