

## SECTION 8

### PUMP STATIONS

#### 8-1 INTRODUCTION

The City of Seal Beach is served by two storm water pump stations. One of these, the West End Pump Station located adjacent to the San Gabriel River between the Seal Beach Mobile Home Park and the Oakwood Apartments, is owned by the City. The Seal Beach Pump Station, located east Seal Beach Boulevard and north of Electric Avenue is owned and operated by the Orange County Flood Control District. This section describes the two pump stations, and provides recommendations for future improvements. The locations of the pump stations and their respective tributary areas are shown on Figure 8-1.

#### 8-2 WEST END PUMP STATION

The West End Pump Station is located east of the San Gabriel River, between the Seal Beach Mobile Home Park and the Oakwood Apartment complex. It is situated on a 9,300 SF, rectangular shaped lot, bounded by residential units to the north, south and east, and the San Gabriel River to the west. Driveway access to the pump station is available from the south via Welcome Lane.

Interim improvements to the West End Pump Station were completed in 2007, which increased the pump station capacity from 111 cfs to approximately 200 cfs. Although the pump station capacity increased significantly, it is still less than the peak flow from a 25-year storm.

##### 8-2.1 Tributary Area

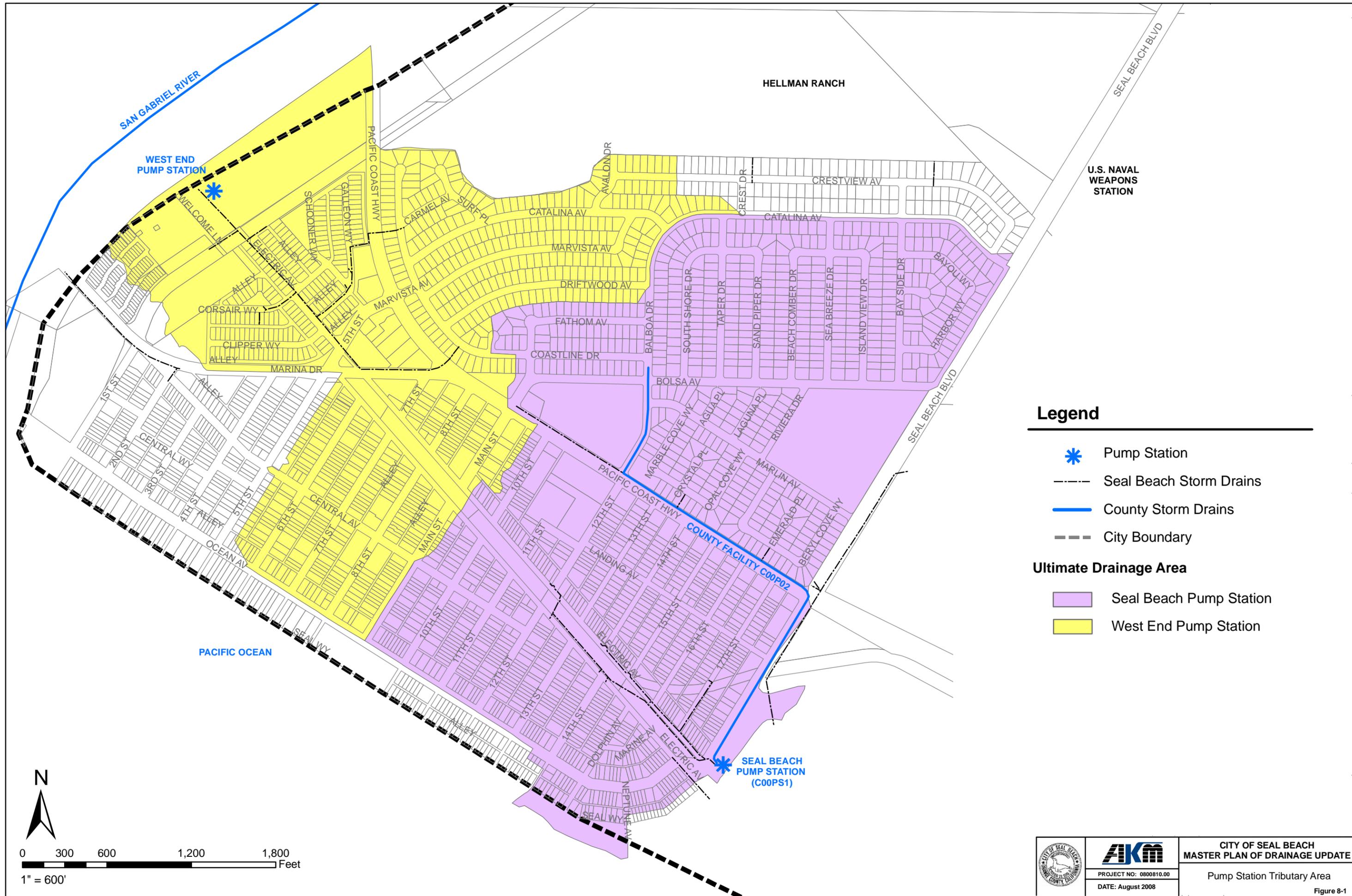
The West End Pump Station tributary area covers approximately 173 acres of primarily residential and partially commercial land uses. The tributary area includes parts of the Marina Hill North, Old Town, and Bridgeport communities. It is bounded by Hellman Ranch to the north; Crest Drive, Balboa Drive, Ebb Tide Place, Silver Shoals Avenue, 10<sup>th</sup> Street and Main Street to the east; Ocean Avenue, and Marina Drive to the South, and the San Gabriel River to the west.

The street elevations in the tributary area vary from 52 feet above mean sea level (amsl) near Crestview Avenue, east of Avalon Drive, to 6.3 feet in the Seal Beach Mobile Home Park. The maximum water level elevation in the San Gabriel River is about 12 feet, and the top of the levee elevation is approximately 14 feet. Therefore, the runoff requires pumping into the San Gabriel River.

##### 8-2.2 Design Flow

The minimum level of protection for areas that are in sump conditions is the peak runoff from a 25-year frequency design storm.

In 2002, AKM Consulting Engineers prepared the West End Pump Station Preliminary Design Report. The hydrologic studies were performed based upon the topographic information from the U.S.G.S maps. The tributary area was determined to be roughly 165 acres. The 25 year storm peak runoff at the West End Pump Station was calculated as 251 cfs.

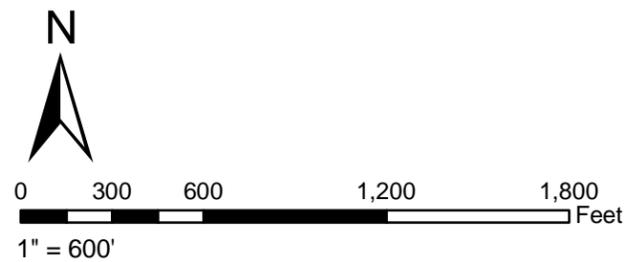


**Legend**

-  Pump Station
-  Seal Beach Storm Drains
-  County Storm Drains
-  City Boundary

**Ultimate Drainage Area**

-  Seal Beach Pump Station
-  West End Pump Station



		<b>CITY OF SEAL BEACH</b> <b>MASTER PLAN OF DRAINAGE UPDATE</b>
	PROJECT NO: 0800810.00	Pump Station Tributary Area
	DATE: August 2008	Figure 8-1

Recently, the City obtained detailed topographic maps at 1"=40' scale with one foot elevation contours. The hydrologic studies conducted based upon this detailed information determined a tributary area of 173 acres, and shorter times of concentration. The resulting peak runoff from the 25-year storm is 296 cfs.

### **8-2.3 Tributary Storm Drain System**

The northerly portions of Marina Hill North drain to Carmel Avenue and Coastline Drive. A 36"x22" CMP arch conveys the runoff from the area through an easement to Pacific Coast Highway where an 18-inch drain carries the runoff to Galleon Way. The storm drain increases first to 24-inch then to 30-inch, and outlets to the mainline drain on Electric Avenue.

The southerly portions of Marina Hill North drain to Coastline Drive east of Driftwood Avenue. The runoff from the area is conveyed in a 5-ft (W) x 1.92-ft (H) reinforced concrete box (RCB) across an easement and Pacific Coast Highway to Marina Drive. The storm drain transitions first to a 4-ft (W) x 1-ft (H) RCB, then to a 30-inch RCP, and then to a 36-inch RCP on Marina Drive. On Electric Avenue, the drain increases to a 5-ft (W) x 3-ft (H) RCB across 5<sup>th</sup> Street, where it changes to a 58-inch by 36-inch arch, and outlets into the mainline drain at Galleon Way. The mainline drain is a double 58-inch (W) x 36-inch (H) arch to the alley north of Galleon Way, a 72-inch (W) x 44-inch (H) arch to Corsair Way, a double 6-ft (W) x 3-ft (H) RCB First Street, a double 6-ft (W) x 5-ft (H) RCB across First Street, and a double 6-ft (W) x 3.25-ft (H) RCB to the pump station forebay.

Runoff from portions of the Old Town and Bridgeport communities drain to the mainline facility through the streets and small connecting drains.

### **8-2.4 Existing Pump Station**

The original pump station was constructed in 1955 with two pumps, and a total capacity of 111 cfs. It provided protection from approximately a 5-year storm.

The City completed the West End Pump Station Preliminary Design Report in 2002. This study recommended a new parallel pump station to bring the total capacity to the peak flow from the 25-year storm. However, due to budget limitations, the City implemented an interim project to maximize the capacity at the existing pump station. The project, which was completed in 2007, replaced the top slab of the sump structure to support the larger pumps and equipment, provided two 100 cfs capacity variable frequency drive operated pumps, replaced the electrical equipment, controls and telemetry, replaced a portion of the 30-inch discharge pipes with 36-inch discharge pipes, constructed a new pre-fabricated building to house the mechanical and electrical equipment, and provided a 350 kW natural gas engine generator with outdoor enclosure to operate one pump during commercial power outages.

### **8-2.5 Recommended Future Improvements**

The existing capacity of 200 cfs is less than the peak flow from the 25-year design storm. Therefore, the total pumping capacity will need to be increased to meet the criteria. The additional capacity should be provided in a parallel pump station at the property adjacent to the existing pump station. The capacity of the parallel pump station should be no less than the capacity of the existing pump station so that when either pump station is taken out of service in the future, the existing level of protection is not reduced. The cost to construct a pump station which will provide 25-year level protection will be lower than the cost to construct the recommended pump station. However, the difference in cost is not proportional to the capacity of the pump

station. The cost to construct a 200 cfs pump station (\$8.5 million) is estimated to be slightly over 10 percent greater than the cost of a 100 cfs pump station (\$7.5 million).

### **8-3 SEAL BEACH PUMP STATION**

The Orange County Flood Control District (OCFCD) owns and operates the Seal Beach Pump Station (C00PS1), located on the northeast corner of Seal Beach Boulevard and Electric Avenue. This facility was constructed in 1971 to convey 255 cfs, which was the peak flow from a 10-year storm. Originally, two of the three pumps were installed. The third pump was added in 1976. One Orange County Flood Control District Facility, the Seal Beach Storm Drain (C00S02), and one City of Seal Beach storm drain facility convey the entire runoff to the pump station.

The OCFCD analyzed the pump station in 1996 following the flooding experienced during the January 4, 1995 storm, which was greater than a 100-year storm. A detailed hydrology study was not conducted. The 25-year discharge was estimated as 310 cfs based upon the hydrology study conducted for C00S01, and City of Seal Beach provided design flow of 143 cfs for its drainage facilities. The pump station was upgraded in 1997 with three 57,000 gpm (127 cfs) pumps, which increased its capacity to 381 cfs.

#### **8-3.1 Tributary Area**

The Seal Beach Pump Station tributary area covers 249 acres of primarily residential land use. Commercial land uses can be found along Pacific Coast Highway and Seal Beach Boulevard. McGaugh Elementary School is located between Marlin Avenue and Bolsa Avenue west of Seal Beach Boulevard, and Zoeter Field is north of Landing Avenue between 10<sup>th</sup> and 12<sup>th</sup> Streets.

The tributary area is divided into the Seal Beach Pump Station Drainage Area North and Seal Beach Pump Station Drainage Area South. Seal Beach Pump Station Drainage Area North includes 143 acres in Marina Hill North, Marina Hill South, and along Seal Beach Boulevard south of Pacific Coast Highway. It is generally bound by Catalina Avenue and Driftwood Avenue to the north; Ebb Tide Place and Balboa Drive to the west, Pacific Coast Highway and the Electric Avenue Alley to the south, Seal Beach Boulevard to the east. This area drains to the pump station via the Seal Beach Storm Drain. Street elevations vary from 56 feet above mean sea level (amsl) near Catalina Avenue and Sea Breeze Drive to 5.4 feet on Seal Beach Boulevard near the Electric Avenue Alley.

Seal Beach Pump Station Drainage Area South includes 106 acres in the Old Town area, generally south of Pacific Coast Highway east of Main Street, north of Ocean Avenue, and east of Seal Beach Boulevard. This area drains to the City storm drains on Electric Avenue, which extend east to Seal Beach Boulevard. The City drains confluence in a single 54-inch drain, which terminates at the Seal Beach Pump Station. Street elevations in the tributary area vary from 22.4 feet amsl at Main Street and Ocean Avenue to 5.1 feet amsl on Electric Avenue between 16<sup>th</sup> street and 17<sup>th</sup> Street.

The original hydrology study was completed by the Orange County Flood Control District in July, 1968, based upon a preliminary edition of the 1969 Hydrology Manual. The drainage area included the entire area south of Pacific Coast Highway, east of Main Street, and north of Ocean Avenue; as well as the area south and east of Ocean Avenue, east of the 14<sup>th</sup> Street Alley. The results of this study were utilized in determining the pump station capacity, and in sizing the first reach of the Seal Beach Storm Drain between the pump station and Pacific Coast Highway.

Another hydrologic study entitled “Hydrology Report, Seal Beach Storm Drain, Facility No. C00P02, Seal Beach Pump Station, Facility No. C00PS1” was completed in September 1975. The purpose of this study was to determine the 10- and 25-year reach discharges for the Seal Beach Storm Drain from the Seal Beach Pump Station to the intersection of Bolsa Avenue and Sandpiper Drive. The study also determined the 10- and 25-year discharges for the Seal Beach Pump Station. The pump station tributary area was nearly identical to the one shown in the 1968 study, with the exception of the small area east of Neptune Avenue and south easterly of the Ocean Avenue Alley. This area is shown to drain to a City of Seal Beach Pump Station with a capacity of 28 cfs at the south east end of Electric Avenue. The 1975 study indicates that the City of Seal Beach Pump Station also received runoff through an older storm drain system on the north side of Electric Avenue, which had a capacity of 20 cfs. It also indicated that facilities have been installed which will allow the older storm drain system to be connected the Seal Beach Pump Station if in the future the station capacity is increased above 255 cfs. It appears that the flows from the old storm drain on the north side of Electric Avenue have been connected to the pump station’s influent drains. The City of Seal Beach Pump Station has been removed. The runoff tributary to the south west corner of Electric Avenue and Ocean Avenue currently drains into a 15-inch storm drain that extends south westerly to Anaheim Bay.

### **8-3.2 Design Flow**

The minimum level of protection for areas that are in sump conditions is the peak runoff that would result from a 25-year frequency design storm. The hydrologic calculations conducted with the currently available information result in a design flow of 403 cfs. This is slightly higher than the existing pump station capacity of 381 cfs.

### **8-3.3 Tributary Storm Drain System**

The Seal Beach Pump Station Drainage Area North is tributary to the Seal Beach Pump Station via the Seal Beach Storm Drain, Facility No. C00P02. The area north of Bolsa Avenue and east of Balboa Drive drains southwesterly to the intersection of Balboa Drive and Bolsa Avenue through the streets. The runoff is collected into the 54-inch diameter Seal Beach Storm Drain through two 21-foot and two 7-foot catch basins. This facility extends south on Balboa Drive to Pacific Coast Highway, picking up the runoff between Marlin Avenue and Bolsa Avenue. The area west of Balboa Drive and north of Pacific Coast Highway drains westerly and southerly to Pacific Coast Highway, where it is picked up by a 15-inch drain that extends east and confluences with the Seal Beach Storm Drain at Balboa Drive. The Seal Beach Storm Drain is 78-inch in diameter on Pacific Coast Highway between Balboa Drive and 300 feet west of Seal Beach Boulevard. It is 66-inch on Pacific Coast Highway easterly to Seal Beach Boulevard, and on Seal Beach Boulevard between Pacific Coast Highway and the pump station. The area between Marlin Avenue and Pacific Coast Highway drains to double 22” W x 14” H corrugated metal arch pipes at Crystal Place and Emerald Place, which outlet southerly to Seal Beach Storm Drain on Pacific Coast Highway. The area south of Pacific Coast Highway drains southerly and easterly to Seal Beach Boulevard, where the runoff is picked up at several catch basins and conveyed to the Seal Beach Storm Drain. A small area east of Seal Beach Boulevard and generally south of Landing Avenue also drains to the Seal Beach Storm Drain.

The Seal Beach Pump Station Drainage Area South is tributary to the Seal Beach Pump Station via the City storm drains on Electric Avenue. The area between Main Street and 12<sup>th</sup> Street drains to the intersection of 12<sup>th</sup> Street and Electric Avenue. The runoff from the north is picked up in an 18-inch drain, which extends to the south side of Electric Avenue as a 24-inch drain. The Electric Avenue Storm Drain extends east to 14th Street as a 42-inch drain on the south side of Electric Avenue, increases to 48-inch diameter and extends northeasterly to the east of 16<sup>th</sup> Street where it increases to 54-inch diameter. It extends further east on the

south side of the southerly curb of the westbound Electric Avenue to Seal Beach Boulevard where it curves first northerly, then easterly, terminating at the Seal Beach Pump Station. Another City facility extends along the north side of Electric Avenue between 14<sup>th</sup> Street and Seal Beach Boulevard, where it confluences with the Electric Avenue Storm Drain. This facility starts as a 24-inch drain at 14<sup>th</sup> Street, increases to 27-inch at 15<sup>th</sup> Street, then to 30-inch east of 16<sup>th</sup> Street. It picks up local runoff at 15<sup>th</sup>, 16<sup>th</sup>, and 17<sup>th</sup> Streets. The Electric Avenue Storm Drain also picks up local drainage at the intersection of Seal Beach Boulevard and Electric Avenue.

The Seal Beach Storm Drain and the Electric Avenue Storm Drain were designed to operate with a maximum water surface elevation of -2.0 feet at the Seal Beach Pump Station wet well. The Reconnaissance Level Study conducted by the County in 1996 determined that the Seal Beach Storm Drain and the Electric Avenue Storm Drain could convey 200 cfs and 160 cfs to the pump station without exceeding the top of curb in the tributary area with a wet well level of -2.0 feet.

#### **8-3.4 Existing Pump Station**

The existing pump station's wet well is a 35.17 feet wide and 33 feet long rectangular reinforced concrete structure. Its bottom and top elevations are - 15.75 feet and 6.50 feet, respectively. The 54-inch and 66-inch influent drains enter the wet well on the west side with invert elevations of -8.29 and -8.66 respectively. The runoff passes through a trash barrier before being pumped to Anaheim Bay.

The existing pumps are single stage Johnston Model 42 PO pumps with design capacities of 57,000 gpm (127 cfs) at a bowl assembly total head of 14 feet operating at 440 rpm. They are driven by 250 horsepower natural gas engines. The pump station has propane backup system to power the facility in case of natural gas service outage.

The discharge pipes are 42-inch steel pipes at the pump station, and reinforced concrete pipes between the pump station and the Anaheim Bay outlet. The Los Angeles County Pump Station Design Manual recommends a maximum discharge pipe velocity of 10 feet per second. The Federal Highway Administration suggested criterion is a maximum velocity of 12 feet per second for concrete pressure pipes. The velocity at the pump capacity of 127 cfs is 13.2 feet per second, which exceeds both of these values.

The existing pump station design is not in accordance with the current Hydraulic Institute Standards recommendations. It is undersized and has limited storage capacity.

#### **8-3.5 Recommended Future Improvements**

The original pump station was designed to convey the peak runoff from the design 10-year storm based upon the 1969 Hydrology Manual criteria. Therefore, many pump station components, including the discharge pipes, were sized for a much lower flow than the currently calculated design flow. The Orange County Flood Control District increased the capacity of the pump station as much as reasonably possible in 1997. Therefore, the design capacity cannot be provided at the existing pump station without attenuating the peak flow to the existing pump station capacity. This would require a flow-by retarding basin of approximately 3 acre feet capacity.

When the Seal Beach Pump Station is replaced at the end of its useful life, it should have a minimum capacity of 410 cfs to provide the flood protection to its tributary area in accordance with the existing goals. The ultimate drainage area should include the properties located between Electric Avenue and Neptune Avenue south of Ocean Avenue.