

Summary of Hydrology Design Intent

**Redondo Beach Waterfront
Redondo Beach, CA
Summary of Hydrology Design Intent**

**For:
CenterCal Properties, LLC**

Psomas Project No: 2CEN110100

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1.0 Summary of Hydrology Intent

The Redondo Beach Waterfront current site consists of parking structures, parking lots, restaurants and shops with minimal landscaping. The site consists of approximately 31.2 acres of land, 24.2 acres of which is hardscape and buildings, and 7 acres is landscaping and a seaside lagoon. The overall weighted impervious area is approximately 79%. There are no streams or river courses running through the site or which receive runoff from the site. The site currently drains directly to existing drain inlets and catch basins which connect to existing storm drains that outlet directly to the Pacific Ocean or the Redondo Beach King Harbor.

The Redondo Beach Waterfront proposed development will include shops, restaurants, parking structures and minimal surface parking lots. It will contain about 17.1 acres of hardscape and buildings, 8.2 acres of permeable pavement/pavers, and 5.9 acres of landscaping and a seaside lagoon. The weighted impervious area will be approximately 64%.

The proposed project will generally maintain the same drainage areas and discharge points as that of the existing condition. The drainage from the north portion of the site discharges into both King Harbor and Redondo Beach Harbor. Approximately 4.0 acres discharges into the King Harbor marina to the north, including the Joe's Crab Shack restaurant site, and the parking lots along the east side of Portofino Way. The Seaside Lagoon site (4.3 acres) currently sheet flows and comingles directly with the swimming lagoon, which has a pump and filter to recirculate the water. The main central parking lots and restaurants on the north side of the project (6.2 acres) drain into catch basins and grate inlets and connect into the existing 84" RCP storm drain main which discharges into the harbor just south of the lagoon. The remainder of the north portion of the site and the boardwalk (3.6 acres) discharge through small pipes (i.e. 18" or less) into the harbor.

Approximately 4.7 acres of the south portion of the project drains primarily into deck drains and into small pipes (i.e. 8" through 16") that discharge directly into the ocean through the rock revetment on the west side of the parking structure; approximately 2.2 acres including the boardwalk, rooftop-decks/plazas, steps and the old carousel drain into grate inlets and storm drain pipes and directly into the marina basin, and approximately 4.2 acres in the vicinity of the south entrance to the existing parking structure including Coral Way drain to the south drain into a 36" RCP storm drain and into the ocean. Also, there is a pump station adjacent to the drop-off which collects and discharges water from the lower level of the road and parking structure into the 36" storm drain.

To mitigate the pollutant runoff from the site, the proposed drainage systems will be designed to include the current Los Angeles County Low Impact Development (LID) standards to treat both the quantity and quality of flow.

The quantity and quality of flow will be mitigated by implementing best management practices (BMP) including, but not limited to, permeable pavers, infiltration, bio-filtration planters, modular wetlands and french drains. These best management practices will help reduce runoff and pollutants from discharging into the Pacific Ocean.

The proposed development will have approximately 15% more pervious area than the existing condition, and the runoff will be directed away from impervious surfaces and into landscaped areas, landscaped features (i.e. planter boxes) or other pervious areas, which will help prevent erosion or siltation from entering the storm drain system and Pacific Ocean. A summary of the site imperviousness can be found in Appendix 2.

There are currently two large storm drain lines that are routing off-site flows through the site. A portion of these facilities will be rerouted around proposed buildings, but will reconnect just upstream of the existing discharge location into the harbor.

The off-site tributary drainage area for these storm drains are not changing. The proposed project may utilize the existing on-site inlets to these pipes for drainage. The existing storm drains are capable of accepting the proposed site runoff.

No habitable structures lies within a 100-year flood hazard area, as defined by FEMA. Although the proposed buildings on the pier are within the horizontal limits of the 100-year flood plain, their finished floor elevations (i.e. elevs. 20 to 25) are a minimum of 9 feet above the 100-year flood elevation (i.e. elev. 11) as shown on the FEMA map. There are also some non-habitable structures within the 100-year flood zone, including the pier columns and boat docks. See Appendix 1 for the FEMA Flood Insurance Rate Map “Firmette” exhibits.

2.0 Appendices

Appendix 1 FEMA – Flood Insurance Rate Maps

LEGEND



SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- ZONE A** No Base Flood Elevations determined.
- ZONE AE** Base Flood Elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- ZONE AR** Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- ZONE A99** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.



FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.



OTHER FLOOD AREAS

- ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

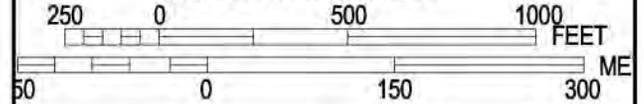


OTHER AREAS

- ZONE X** Areas determined to be outside the 0.2% annual chance floodplain.
- ZONE D** Areas in which flood hazards are undetermined, but possible.



MAP SCALE 1" = 500'



COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS



OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

- Base Flood Elevation line and value; elevation in feet*
(EL 987)
- Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

- Cross section line
- Transect line
- Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 1000-meter Universal Transverse Mercator grid values, zone 11
- 5000-foot grid ticks: California State Plane coordinate system, V zone (FIPSZONE 0405), Lambert Conformal Conic
- Bench mark (see explanation in Notes to Users section of this FIRN panel)
- River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

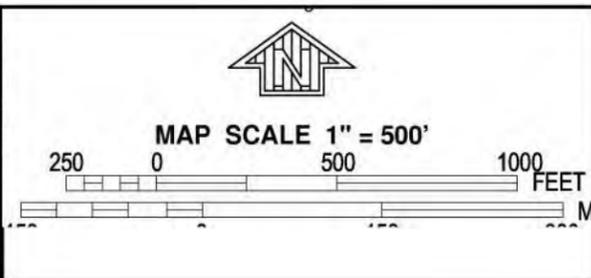
EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
September 26, 2008
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

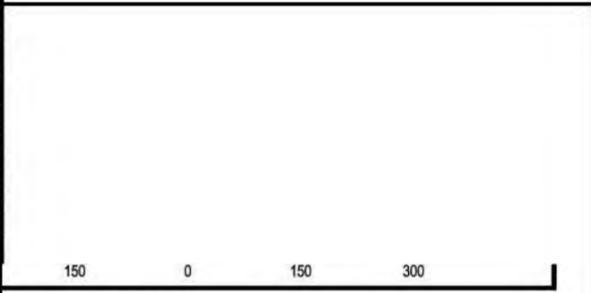
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.



This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



**CITY OF REDONDO
060150**



NFIP **PANEL 1907F**

**FIRM
FLOOD INSURANCE RATE MAP
LOS ANGELES COUNTY,
CALIFORNIA
AND INCORPORATED AREAS**

PANEL 1907 OF 2350
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

| COMMUNITY | NUMBER | PANEL | SUFFIX |
|--------------------------|--------|-------|--------|
| HERMOSA BEACH, CITY OF | 060124 | 1907 | F |
| MANHATTAN BEACH, CITY OF | 060138 | 1907 | F |
| REDONDO BEACH, CITY OF | 060150 | 1907 | F |
| TORRANCE, CITY OF | 060165 | 1907 | F |

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

**MAP NUMBER
06037C1907F**

**EFFECTIVE DATE
SEPTEMBER 26, 2008**

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

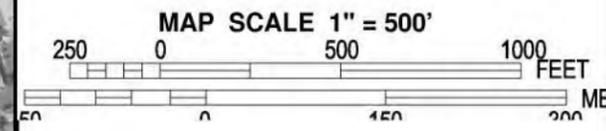
33°50'37.50"
118°24'22.50" 370 000m E

371 000m E JOINS PANEL 1909

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24'22.50"
50"

JOINS PANEL 1907



NFIP

PANEL 1909F

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP
LOS ANGELES COUNTY,
CALIFORNIA
AND INCORPORATED AREAS

PANEL 1909 OF 2350
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

| COMMUNITY | NUMBER | PANEL | SUFFIX |
|------------------------|--------|-------|--------|
| REDONDO BEACH, CITY OF | 060150 | 1909 | F |
| TORRANCE, CITY OF | 060165 | 1909 | F |

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.



MAP NUMBER
06037C1909F
EFFECTIVE DATE
SEPTEMBER 26, 2008

Federal Emergency Management Agency

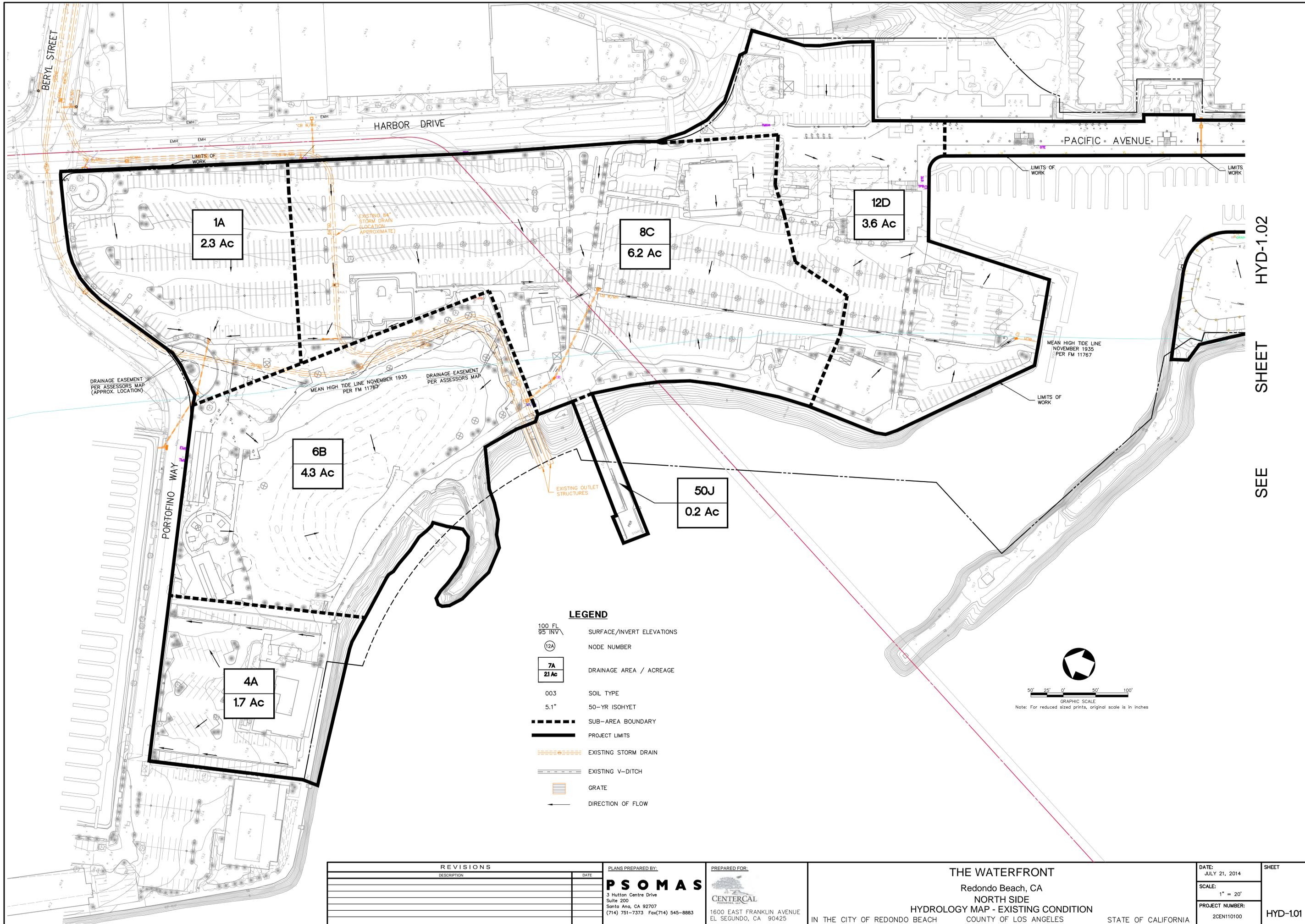
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Appendix 2 Impervious Area Calculations

| IMPERVIOUSNESS CALCULATIONS | | | |
|--|------------------|---|---|
| EXISTING CONDITION | | | |
| GROUND COVER | AREA (Ac) | % IMPERVIOUS, a_i | % PERVIOUS, a_p |
| STD. PAVEMENT & SIDEWALK | 17.4 | 100% | 0% |
| BUILDING | 4.8 | 100% | 0% |
| LANDSCAPING | 3.1 | 0% | 100% |
| LAGOON | 3.9 | 12% | 88% |
| PIERS | 2.0 | 100% | 0% |
| TOTAL/OVERALL* | 31.2 | 79% | 21% |
| PROPOSED CONDITION | | | |
| GROUND COVER | AREA (Ac) | % IMPERVIOUS, a_i | % PERVIOUS, a_p |
| STD. PAVEMENT & SIDEWALK | 8.0 | 100% | 0% |
| PERMEABLE PAVERS | 8.2 | 25% | 75% |
| BUILDING | 7.1 | 100% | 0% |
| LANDSCAPING & FILTRATION PLANTERS | 2.0 | 0% | 100% |
| LAGOON | 3.9 | 20% | 80% |
| PIERS | 2.0 | 100% | 0% |
| TOTAL/OVERALL* | 31.2 | 64% | 36% |

*The project site is an approximately 36-acre portion of the waterfront (approximately 31.2 acres is land, including Seaside Lagoon, and 4.8 acres is water area made up of Basin 3 [3.5 acres] and the proposed boat ramp area near Mole D [1.3 acres]) the northern portion (approximately 19.5 acres [including approximately 1.3 acres of water area for the proposed boat ramp area near Mole D]), the southern portion (approximately 13 acres), and Basin 3 (approximately 3.5 acres of water area).

Appendix 3 Hydrology Maps



HYD-1.02
SHEET
SEE

| REVISIONS | | DATE |
|-------------|--|------|
| DESCRIPTION | | |
| | | |
| | | |
| | | |

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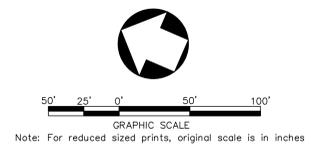
| | | | |
|--|--|-------------------------------|---------|
| <p>THE WATERFRONT Redondo Beach, CA NORTH SIDE HYDROLOGY MAP - EXISTING CONDITION</p> | | DATE: JULY 21, 2014 | SHEET |
| | | SCALE: 1" = 20' | HYD-101 |
| <p>IN THE CITY OF REDONDO BEACH COUNTY OF LOS ANGELES STATE OF CALIFORNIA</p> | | PROJECT NUMBER: 2CEN110100 | |

SEE SHEET HYD-1.01



LEGEND

- 100 FL / 95 INV \ SURFACE/INVERT ELEVATIONS
- (12A) NODE NUMBER
- 7A
21 Ac DRAINAGE AREA / ACREAGE
- 003 & 010 SOIL TYPE
- 5.1" 50-YR ISOHYET
- SUB-AREA BOUNDARY
- PROJECT LIMITS
- EXISTING STORM DRAIN
- EXISTING V-DITCH
- GRATE
- DIRECTION OF FLOW



| REVISIONS | | DATE |
|-------------|--|------|
| DESCRIPTION | | |
| | | |
| | | |
| | | |

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 EL SEGUNDO, CA 90425

THE WATERFRONT
 Redondo Beach, CA
 SOUTH SIDE
 HYDROLOGY MAP - EXISTING CONDITION
 IN THE CITY OF REDONDO BEACH COUNTY OF LOS ANGELES STATE OF CALIFORNIA

| | |
|-------------------------------|-------------------------|
| DATE: JULY 21, 2014 | SHEET HYD-102 |
| SCALE: 1" = 20' | |
| PROJECT NUMBER: 2CEN110100 | |