Appendix I1

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
LEGEN

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 equalled 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.
Appendix 2  Impervious Area Calculations
## IMPERVIOUSNESS CALCULATIONS

### EXISTING CONDITION

<table>
<thead>
<tr>
<th>Ground Cover</th>
<th>Area (Ac)</th>
<th>% Impervious, ( a_i )</th>
<th>% Pervious, ( a_p )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std. Pavement &amp; Sidewalk</td>
<td>17.4</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Building</td>
<td>4.8</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Landscaping</td>
<td>3.1</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Lagoon</td>
<td>3.9</td>
<td>12%</td>
<td>88%</td>
</tr>
<tr>
<td>Piers</td>
<td>2.0</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Total/Overall</strong>*</td>
<td>31.2</td>
<td>79%</td>
<td>21%</td>
</tr>
</tbody>
</table>

### PROPOSED CONDITION

<table>
<thead>
<tr>
<th>Ground Cover</th>
<th>Area (Ac)</th>
<th>% Impervious, ( a_i )</th>
<th>% Pervious, ( a_p )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std. Pavement &amp; Sidewalk</td>
<td>8.0</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Permeable Pavers</td>
<td>8.2</td>
<td>25%</td>
<td>75%</td>
</tr>
<tr>
<td>Building</td>
<td>7.1</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Landscaping &amp; Filtration Planters</td>
<td>2.0</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Lagoon</td>
<td>3.9</td>
<td>20%</td>
<td>80%</td>
</tr>
<tr>
<td>Piers</td>
<td>2.0</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Total/Overall</strong>*</td>
<td>31.2</td>
<td>64%</td>
<td>36%</td>
</tr>
</tbody>
</table>

*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
THE WATERFRONT

PREPARED FOR:

SOUTH SIDE

HYDROLOGY MAP - EXISTING CONDITION

SEE SHEET HYD-1.01

REDONDO BEACH, CA

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LEGEND

SUPPORT/HEAVY EQUIPMENT
NOSE NUMBER
OVERRIDE AREA / ACREAGE
SOIL TYPE
SOIL PROPERTY
SLOPE AREA TERMINAL
PROJECTED AREA
OVERFLOW STRUCTURE
OVERFLOW STRUCTURE
OUTLET
DIRECTION OF FLOW

THE WATERFRONT
Redondo Beach, CA
HYDROLOGY MAP - EXISTING CONDITION

STATE OF CALIFORNIA

PSOMAS

IN THE CITY OF REDONDO BEACH
COUNTY OF LOS ANGELES

INVOICE NO. 1

UNIT PRICE

DISTRIBUTOR

DATE: 7/23/2015