DANA POINT HARBOR REVITALIZATION

PRELIMINARY SHORELINE MANAGEMENT PLAN

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Preliminary Shoreline Management Plan

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Purpose and Scope

The purpose of the Dana Point Harbor Shoreline Management Plan is to carry out the policies as set forth in the Dana Point Harbor Revitalization Plan & District Regulations, to implement the key policy provisions as required by the California Coastal Commission and to provide recommendations for protecting Harbor facilities and users from the effects of coastal flooding over time by:

- Setting clear goals and objectives for managing sea level rise and potential impacts of flooding resulting from significant storm events and other acts of nature.
- Identifying benchmarks and milestones to routinely measure and monitor changes over time.
- Establishing recognized pathways of communications to help avert or minimize negative events associated with flooding to the greatest extent practicable.
- Continue to work with federal, state and local agencies to develop guidelines for structures to resist both wave uprush and tsunami wave impacts.
- Provide engineering recommendations for managing drainage in landside areas of the Harbor consistent with adopted standards and regulations and require the use of appropriately sized detention basins wherever applicable to reduce the risks from flooding.
- Support pubic education programs for emergency preparedness and disaster response.
- Provide information regarding pending storm events, disaster evacuation routes, areas susceptible to shoreline wave uprush to boater groups, merchants and other user groups. Hold emergency drills in various areas of the Harbor to test the effectiveness of emergency preparedness plans.

The scope of this plan focuses on the implementation of the Harbor LCP-required monitoring components in the absence of established regulatory standards for the design and protection of Harbor structures and coastal resources that are subject to potential damage resulting from sea level rise and episodic storm events that may have impacts to the operations of Dana Point Harbor and ensuring public safety.

Background / Existing Conditions

The County of Orange and U.S. Army Corps of Engineers (USACE) originally constructed Dana Point Harbor in the late 1960's. The northern half of the Harbor is referred to as the Cove region while the southern half is referred to as the Island region. The northern and southern regions are divided into eastern and western basins by a bridge (Island Way) that provides vehicle access from the Cove side of the Harbor to the Island side, thereby dividing the existing Harbor into quadrants. The Harbor is a coastal reentrant or cove protected by the headlands at Dana Point. The protected cove was created through differing resistance to wave erosion of two bedrock formations (Capistrano Formation and San Onofre Breccia) exposed along a fault in the steep coastal bluff. The Harbor was constructed by excavation of the basins after initially dewatering through the construction of a cofferdam. The basins were originally designed to be excavated to a consistent elevation of -10 feet below mean low level water (MLLW), but due to the hardness of the bedrock material, the northwestern area was only excavated to an approximate level of -8 feet below MLLW.

Artificial fill, beach sand and alluvial deposits underlie the Harbor. The results of numerous geotechnical field explorations conducted for the Dana Point Harbor Revitalization Plan indicate the presence of fill to depths that vary from approximately 10 to 20 feet on the Cove side and to depths of approximately 23 to 30 feet below the Island side of the Harbor. The fill material that underlies the Cove side of the Harbor is described as being composed of a fine to medium grained sand, with varying clay content that exhibits loose to medium relative density on the basis of field testing (N-values). The fill material encountered below the Island side of the Harbor is identified as consisting primarily of sand with a loose to medium relative density and silt and clay content slightly higher than that identified on the Cove side. (Leighton Consulting, Inc., January 2008)

The existing Harbor topography gently slopes from the northwest to the southeast, with a grade change of approximately 20 feet from Dana Point Harbor Drive to the top of the bulkhead. A distinct grade change of 5 to 10 feet occurs at the northerly edge of the surface parking lots, where an existing 2:1 fill slope exists immediately adjacent to Dana Point Harbor Drive.

Under current conditions, most on-site flows in Dana Point Harbor and a portion of off-site runoff from the surrounding streets are collected in a series of grate inlets, catch basins and roof drainage pipes and are conveyed for discharge directly into the Harbor marinas through a series of local outfall pipes, County-owned storm drains and/or direct sheet flow from sloped sidewalks and hardscape areas.

The Revitalization Plan Final EIR No. 591 (FEIR) included a Program WQMP that addressed storm water runoff management, satisfying the regulatory requirements of the County of Orange, City of Dana Point and other agencies having jurisdiction over water quality control. Individual development projects proposed in the Harbor will rely upon a site-specific approach for the site design, source control and treatment control Best Management Practices (BMPs) to mitigate storm water runoff pollution conditions as they are identified. The Program WQMP recommends categories of treatment BMPs applicable to the specific land use within the Planning Areas to be considered at the time of each Coastal Development Permit (CDP) is reviewed for approval. Presently, the water quality goals for Dana Point Harbor include compliance with the 2011 Model WQMP and Technical Guidance Document requirements for incorporating low impact development (LID) principles into the a projects design wherever feasible. Amendments to the WQMP will be processed as individual projects are analyzed, advances in water quality technologies are developed and new regulatory standards are implemented.

The Harbor is fully sheltered from the open ocean by almost 8,000 lineal feet of federal breakwater, the interior East and West Basins providing berthing for approximately 2,400 small craft. Landside areas of the Harbor have been established by approximately 5,100 linear feet of cast in place concrete gravity quay wall and 230-foot boat ramp section; sloped concrete panels protect approximately 2,300 linear feet of the bulkhead and the remaining 2,570 linear feet is stabilized with riprap. The design elevation at the top of the quay wall varies between approximately +9.5 to +10.0 feet Mean Lower Low Water (MLLW)[1]. The toe of the panel protection system consists of a concrete triangular thrust footing with a design depth of 2 feet below finished grade and founded in natural bedrock (Noble, 2003).

Engineering assessments of the existing quay wall system indicate that the shoreline protection in place presently has a remaining design life of approximately 55 years (2070) with normal maintenance and may require some repair or replacement of sections experiencing more severe deterioration. The overall structural condition of the exposed portions of the quay wall and concrete revetment were visually surveyed in 2003 by BlueWater Design Group and reported in a Bulkhead Structural Evaluation Report summarized the wall system as appearing to be in relatively good condition for the age of the structure and continual exposure to salt water, the elements and tides.

The floating structures are constructed from modular concrete encased foam pontoons. Each pontoon ranges in width from 3 to 4 feet for the fingers; 6 to 8 feet for the end ties and main walks, varying in length from 8 to 10 feet. The typical main walk is an 8 by 8 foot pontoon float. The finger floats vary throughout the Harbor based on the length of the individual slips, with timber walers to hold the float units together. These timbers run along the edges of the float and are bolted to the concrete floats. Generally, the pontoon decks cantilever out over the pontoons approximately 3 inches throughout the marinas. The docks are anchored with concrete piles or concrete filled steel pipe piles that are approximately 14 inches in diameter. Many of the existing piles are corroded and in need of replacement or repair that is contemplated as part of the Dana Point Harbor Marina Improvement Project.

The grading proposed as part of the Commercial Core Revitalization Project will result in grades within the Harbor remaining essentially the same as existing conditions with only minor cuts and fills, generally ranging from between 1 to 2 feet. There are however, specific areas within the proposed Commercial Core Revitalization Project requiring more significant grading to create development pads for future structures. The proposed parking deck will require cuts of approximately 2 to 4 feet to provide access opportunities from adjacent surface parking areas. Creation of some individual building pads will require variable depths of cut and fill to create pedestrian linkages between the existing and proposed facilities.

Recently conducted geotechnical investigations determined that groundwater elevations range from 8 feet below mean sea level (MSL) to 6 feet above MSL or depths between 8 to 14 feet below existing Harbor grades (GMU Geotechnical, 2013). Groundwater elevations throughout the landside areas of the Harbor are controlled by the elevation of water within the adjacent marinas, but are also influenced by the topography, particularly adjacent to the seawalls. Elevation variations are also associated with the time of day as it relates to the local tidal cycle and therefore are assumed to fluctuate with the tides, the lunar cycle and rainfall events.

[1] The civil engineering for the Commercial Core Project is based on the NGVD29 datum information. The Wave Uprush Analysis prepared by Everest International Consultants is based on the Mean Lower Low Water datum resulting in a 2.72 foot variation in references to the base height of the seawall.

The Harbor is not located within a published Alquist-Priolo Earthquake Fault Zone and no known active faults are reported as being shown on current geological maps. The nearest known active fault is the offshore segment of the Newport-Inglewood fault that is located approximately 2.4 miles southwest of the Harbor and is capable of generating a maximum earthquake magnitude (M_w) of 7.1. In addition, the Harbor is located within 7 miles of the surface projection of the San Joaquin Hills Blind Thrust that is capable of generating a maximum earthquake magnitude (M_w) of 6.6. Given the proximity to these and numerous other active and potentially active faults in the region, it is likely that the Harbor will continue to be subject to earthquake ground motions in the future as is the case for all of Southern California (GMU Geotechnical, 2013).

Structures and other facilities in the Harbor are underlain by hard to very hard bedrock and a relatively shallow mantle of engineered fill material. The stiffness and shear wave velocity of the Capistrano Formation bedrock is anticipated to control the seismic response. The Harbor is classified as Class C (very dense soil or soft rock). Based on the geologic and geotechnical investigations prepared for the Harbor, it has been determined that the site is suitable for the existing and proposed grading and construction of improvements provided any identified site hazards are mitigated in accordance with the recommendations of subsequent project-level geologic/geotechnical studies and are in accordance with the City of Dana Point and County of Orange Grading and Building Codes (as regularly amended).

Sea Level Rise

For many centuries, atmospheric concentrations of global greenhouse gases (GHG) were considered to be relatively stable. As the advent of the industrial age has intensified, the combustion of fossil fuels from activities associated with industrial growth and transportation expanded, thereby increasing concentrations of carbon dioxide in the atmosphere. The result has been an observed increase in average global temperature. The current consensus among scientists is that continued increases in atmospheric greenhouse gases will likely raise ambient global temperatures and also lead to changes in regional climate and historic weather patterns. As air temperatures rise over most areas, temperatures in others may become more variable and potentially more volatile. Rainfall distribution and storm patterns will likely also be affected. Some atmospheric modeling suggests that as polar ice melts, sea levels will rise and thereby have an impact on the frequency of future inundation events in coastal areas.

Sea level is not uniform everywhere and is continually changing. Numerous natural processes affect sea level at any given place and time; from tides that produce hourly changes in sea level, to tectonic forces that take place over millions of years. In coastal areas, sea level is measured relative to the elevation of the land. Thus, factors that affect both ocean levels and land elevations must be equally considered when calculating projections of regional sea level rise (SLR). Macro atmospheric trends having an influence on tidal levels include climate patterns such as El Niño, changes in sea water temperatures, the gravitational effects of shifts in the large mass glaciers and ice sheets, the geologic and seismic movement of land and subsurface geology, the coastal area erosion process as well as a number of different types of direct and indirect human influences.

Local mean sea level (LMSL) is defined as the height of the sea with respect to a land benchmark, averaged over a period of time long enough that fluctuations caused by waves and tides as well as any vertical movements of the land. Historic sea level rise is documented as occurring at a rate of approximately 1.8 mm per year for the past century, in part as a result of human-induced climate change and other factors. It is currently assumed that climate change will continue to incrementally increase sea level over time.

Ocean water levels, in part also determine the process of shaping the beaches along the Orange County coast. The primary local factors that affect ocean water levels in Orange County are: (1) astronomical tides; (2) sea level rise; (3) storms; and (4) global climatic oscillations. Astronomical tides in Orange County are of the mixed semidiurnal type, with two highs and two lows of unequal heights occurring each lunar day. Because tides occur at a large spatial scale, the tidal characteristics are similar at coastal locations throughout Orange County, including Dana Point Harbor. Tidal characteristics computed for the tidal epoch from 1983 to 2001 for the Newport Bay entrance are shown on the following table provide tidal characteristic measures for the Newport Bay Entrance (NOAA, 2003) in relation to the Mean Lower Low Water (MLLW) vertical datum. Each of these represent either extreme recorded events or defined vertical means as calculated by NOAA over the tidal epoch and given relative to a constant fixed vertical survey datum. The North American Vertical Datum of 1988 is the most recent vertical survey datum available. Mean Lower Low Water (MLLW) is the common low tide datum used for describing tidal characteristics.

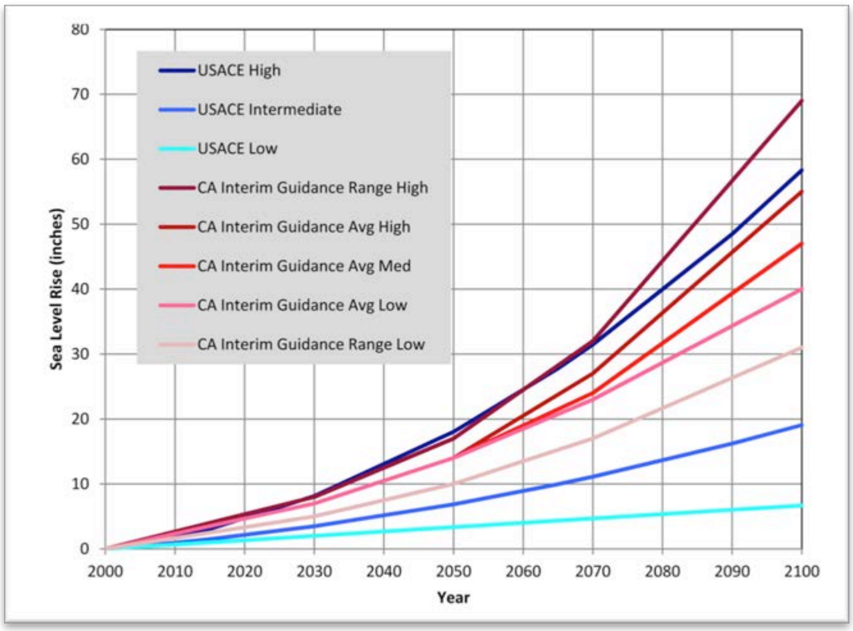
Tidal Characteristics at Newport Bay Entrance

Datum or Level	Elevation (Feet, MLLW)
Maximum Measured Water Level (1-28-1983)	7.67
Mean Higher High Water (MHHW)	5.41
Mean High Water (MHW)	4.67
Mean Tide Level (MTL)	2.80
Mean Sea Level (MSL)	2.77
Mean Low Water (MLW)	0.92
North American Vertical Datum of 1988	0.18
Mean Lower Low Water (MLLW)	0.00
Lowest Measured Water Level (1-20-1988)	-2.35

Source: NOAA (National Oceanic and Atmospheric Administration), 2003

The U.S. Army Corps of Engineers (USACE) and many California State agencies have issued general guidance provisions for incorporating sea level rise into the designs of federal or state agency coastal projects. USACE guidance states that potential sea level change must be considered in every USACE coastal activity as far inland as the extent of estimated tidal influence and recommends a multiple scenario approach to address modeling uncertainties and help develop better risk-informed alternatives (USACE, 2011a). These scenarios cover a broad range of sea level changes termed low, intermediate and high as shown on the following Sea Level Rise Projections Table for the current century.

Sea Level Rise Projections



Source: Orange County Coastal Regional Sediment Management Plan, Everst International Consultants, Inc., April 2012

As shown, the low scenario is an extension of historical global rates (1.7 millimeters per year), since the local Newport Beach tide gage did not record a sufficient duration of data to provide a high confidence level of extrapolation. This global rate is between other, nearby local rates observed at La Jolla and Los Angeles (2.1 and 0.8 millimeters per year, respectively). The intermediate and high scenarios are based on equations provided by USACE. The State of California also has provided ranges to consider as interim sea level rise guidance (CO-CAT, 2010) until a final report from the National Academy of Sciences is published. These interim guidance assumptions are also shown for reference. The selection of a projection for use in determining design considerations is presently based on the agency's context-specific considerations of risk tolerance and adaptive capacity in the application of regulations and design standards.

Storm-induced changes in nearshore water levels arise from storm surges (lowered barometric pressures, wind shear and wave set up) and fresh water runoff. For example, the lowest locally recorded barometric pressure occurred during a storm on January 18, 1988. The combined storm induced changes resulted in water levels that are historically approximately 0.7 feet above predicted astronomical levels at the Los Angeles Outer Harbor tide gage (USACE, 2002b). The fresh water component includes rainfall runoff and dam release and is particularly important for inland beaches such as those within Newport Bay and Huntington Harbor.

The OC Sheriff - Harbor Patrol maintains statistical records for conditions in Dana Point Harbor, including tidal height, wave intervals, air temperature and barometric pressure. Measurements are generally recorded twice daily (morning and afternoon) and although the interval of information available is not sufficient to establish tidal statistics (a full epoch of 19 years is typically required to provide statistically significant conclusions), it does demonstrate relevant trends for the 7 year period between 2006 and 2012 (see next page).

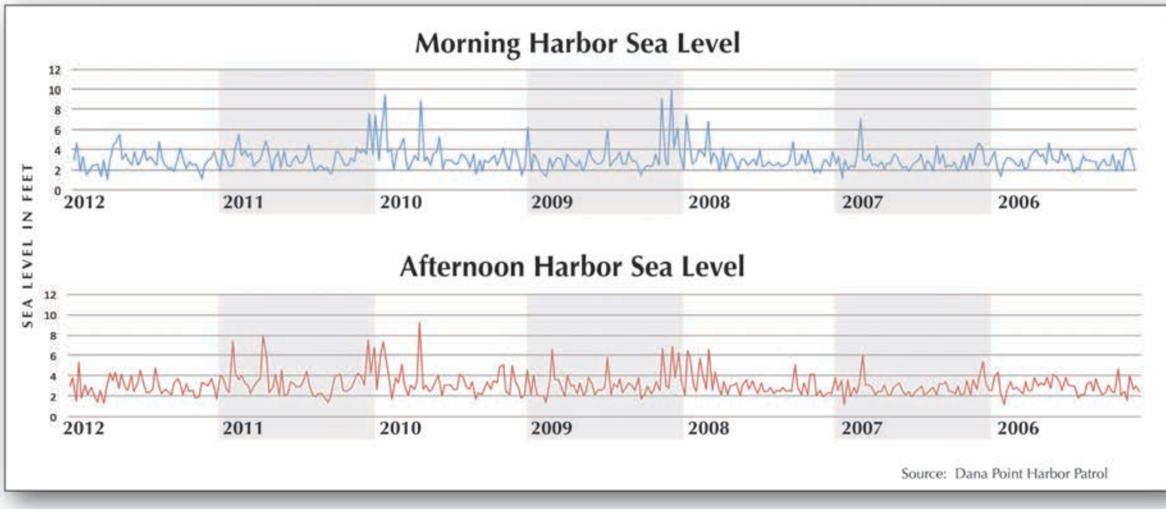
A more detailed data set is also summarized on tables for each year in Appendices A with examples of the Data Logs provided in Appendices B. As indicated by each of the graphs, for the timeframe data has been provided, the Harbor has generally maintained a variation in tide levels of approximately 2 to 3 feet (with some intermittent periods of storm influence), barometric pressures generally ranging between 29.75 and 30.2 inches of mercury and air temperatures between 60 and 80 degrees Fahrenheit.

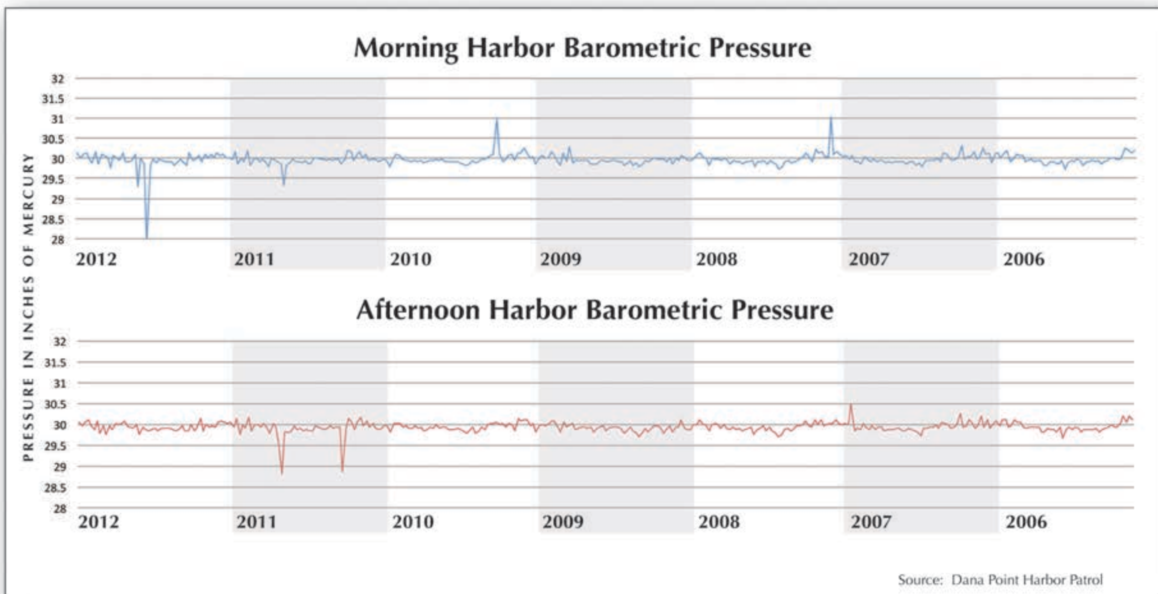
El Niño Southern Oscillations and Pacific Decadal Oscillations are global scale cyclic climatic variations that impact the local sea levels. El Niño has a frequency of every four to seven years and resulting in temporary increases in sea level on the west coast of North and South Americas. For example, during the major El Niño event of the 1997-1998 season, monthly mean sea levels in southern California were increased by up to approximately 1 foot (Flick, 1998 as reported in USACE, 2002b). On a longer time scale, the Pacific Decadal Oscillation was recently shown to be a likely cause of suppressed sea levels on the west coast of North America and may lead to a rapid increase in local sea levels (Bromirski et. al., 2010).

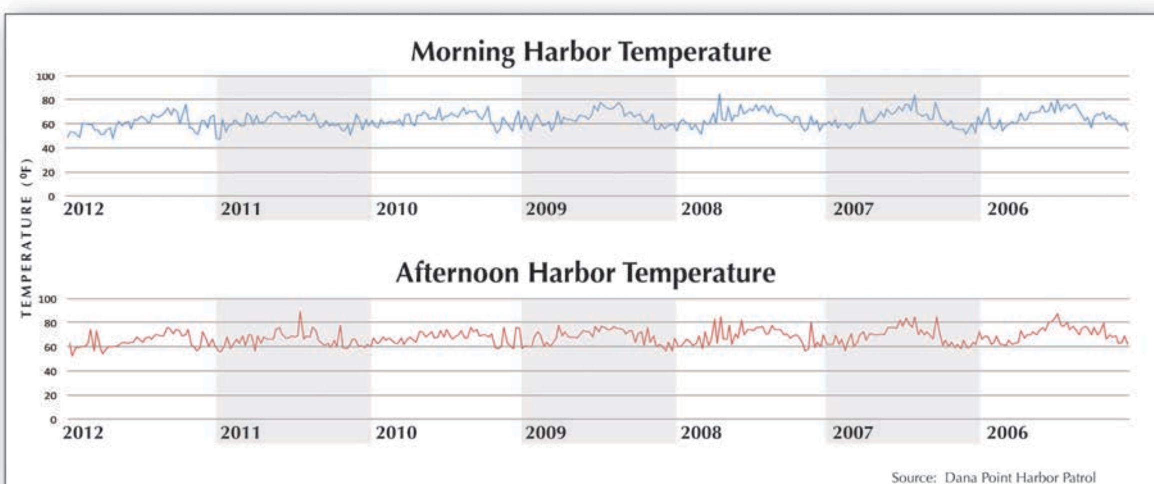
Waves are the driving force in generating long shore currents, sediment transport in the littoral zone and shoreline changes. Ocean waves impacting the Orange County coast are produced by four sources (USACOE, 2002b; Moffatt & Nichol, 2009a). The Northern hemisphere swell is derived from extra-tropical cyclones that occur in the northern Pacific Ocean and comprises the most severe waves reaching the Orange County coast. These tropical storm swells are derived from hurricanes off the west coast of Mexico during the summer and early fall. Most of these hurricanes take a westerly track, sending swells out to the Pacific Ocean. On occasion, a northwest track sends swell up to southern California, with the swell window ranging from 155 degrees to 200 degrees (USACOE, 2002b).

Southern hemisphere swell is derived from extra-tropical cyclones from the South Pacific Ocean with the majority occurring from spring through early fall. These swells approach from about 170 degrees to 215 degrees, decaying significantly as they traverse across the Pacific Ocean.

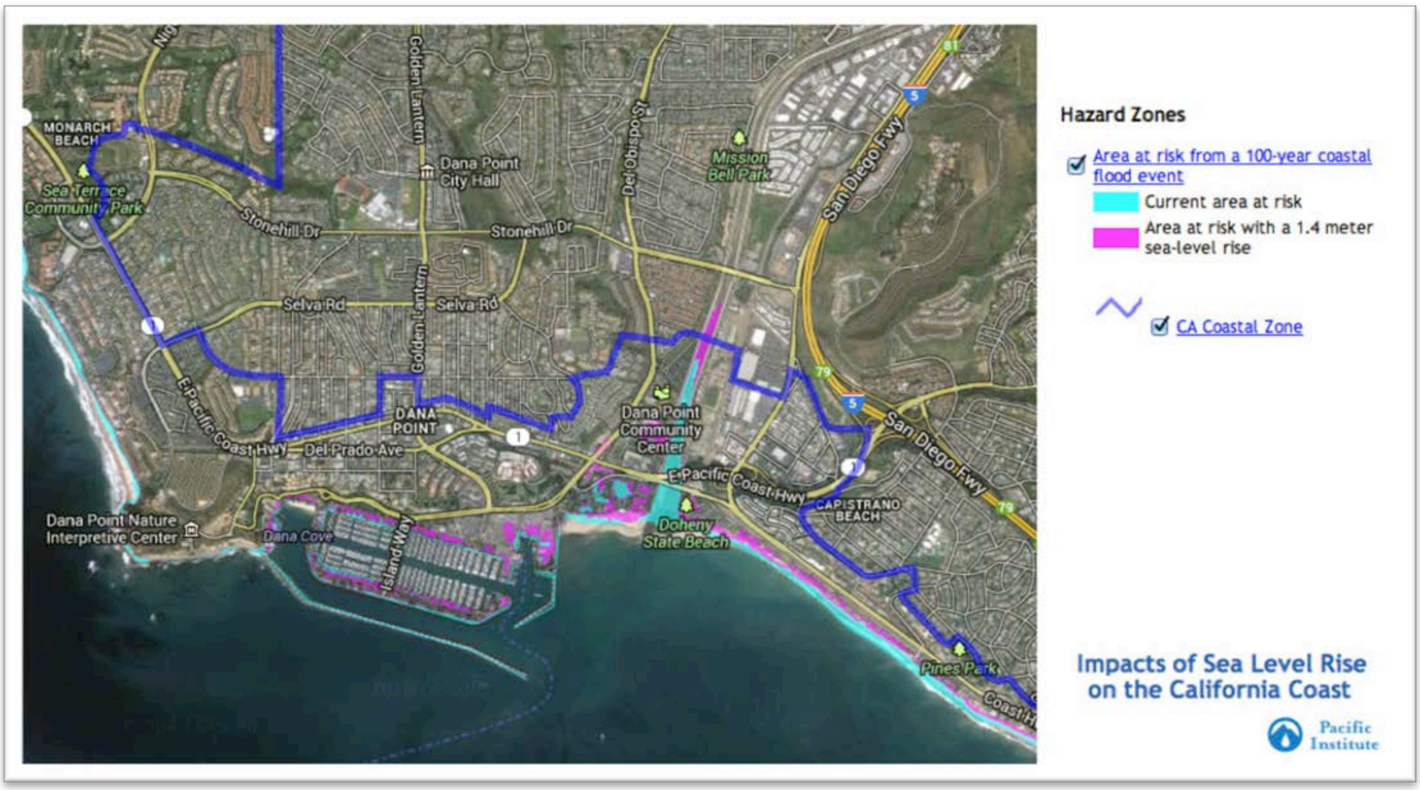
Local sea is the term applied to steep, short period waves that are typically generated by local winds and northwest winds in the outer coastal waters. The local winds can be further separated into pre-frontal winds from the southeast, gradient winds during the passage of a winter low-pressure system from the west and westerly sea breezes. With the predominance of wave energy reaching the Orange County coast from the northern hemisphere, wave driven currents typically run from northwest to southeast throughout the winter and spring. As this coast is also significantly exposed to southern swell, resulting in seasonal climatic cycles and a range of wave conditions.


Morning Harbor Sea Level
Afternoon Harbor Sea Level
SEA LEVEL IN FEET
12
10
8
6
4
2
0
2012
2011
2010
2009
2008
2007
2006
Source: Dana Point Harbor Patrol


Morning Harbor Barometric Pressure
Afternoon Harbor Barometric Pressure
PRESSURE IN INCHES OF MERCURY
32
31.5
31
30.5
30
29.5
29
28.5
28
2012
2011
2010
2009
2008
2007
2006
Source: Dana Point Harbor Patrol


Morning Harbor Temperature
Afternoon Harbor Temperature
TEMPERATURE (ºF)
100
80
60
40
20
0
2012
2011
2010
2009
2008
2007
2006
Source: Dana Point Harbor Patrol

Current scientific investigations by a number of investigators have concluded that it is likely that global mean sea level (MSL) is a phenomenon that has been increasing. This is the general conclusion of no fewer than 13 studies of MSL change over various periods during the last 100 years. The present assessments do not foresee a sea level rise of ≥1 meter during the next century. Nonetheless, the implied rate of rise for the best-estimate projection corresponding to the IPCC's "Business-As-Usual Scenario" is about 3 to 6 times faster than the rate experienced over the last century. The global estimates range from about 0.5mm (0.02 in.)/year to 3.0mm (0.12 in.)/year, with most estimations in the range of 1.0 to 2.0mm (0.039 to 0.078 in.)/year. For the southern California coastal areas (south of Cape Mendocino), sea level is anticipated to rise 4 to 30 cm (2 to 12 inches) by 2030, 12 to 61cm (5 to 24 inches) by 2050 and 42 to 167 cm (17 to 66 inches) by 2100[2] are consistent with to other typically referenced global SLR estimates. The following exhibit depicts areas of risk from a 100-year coastal flood event in the area of Dana Point Harbor as reported by the Pacific Institute.



For the planning process, most damage in coastal areas is attributable to storms, particularly in conditions where the confluence of large waves, storm surges and high tides during a strong El Niño period. Although to date there is no consensus about how climate change will ultimately affect the severity of storms, several longitudinal studies have reported trends indicating that the largest waves have been getting higher, storm event winds are getting stronger and sea level is increasing in height

[2] Sea Level Rise for the Coasts of California, Oregon and Washington: Past, Present and Future, National Academy of Sciences, 2012, National Academies Press, Washington, DC

over the past few decades. These observational records are not of sufficient duration to be conclusive, but do provide an indication of potential trends.

The California Coastal Commission has prepared a Draft Sea-Level Rise Policy Guidance document to provide guidance on how to address sea-level rise in new Local Coastal Programs and Coastal Development Permits in accordance with currently established Coastal Act policies. Policy guidance in separated into the following principle groups:

Use of Science to Guide Decisions (Coastal Act Sections 30006.5 and 30335.5)

- Acknowledge and address sea-level rise as necessary in planning and permitting decisions.
- Use the best available science to determine locally relevant (context-specific) sea-level rise projections for all stages of planning, project design and permitting reviews.
- Recognize scientific uncertainty by using scenario planning and adaptive management techniques.

Minimize Coastal Hazards through Planning and Development Standards (Coastal Act Sections 30253, 30235, 30001 and 30001.5)

- Avoid significant coastal hazard risks where feasible.
- Minimize hazard risks to new development over the life of authorized structures.
- Avoid or minimize coastal resource impacts when addressing risks to existing development.
- Account for the social and economic needs of the people of the state; assure priority for coastal-dependent and coastal-related development over other development.
- Property owners should assume the risks associated with new development in hazardous areas.

Maximize Protection of Public Access, Recreation and Sensitive Coastal Resources (Coastal Act Chapter 3 and Section 30235)

- Provide for maximum protection of public beach and recreational resources in all coastal planning and regulatory decisions.
- Maximize natural shoreline values and processes and embrace green infrastructure and living shorelines; avoid the perpetuation of shoreline armoring.
- Address other potential coastal resource impacts (wetlands, habitat, scenic, etc.) from hazard minimization decisions, consistent with the Coastal Act.
- Address the cumulative impacts and regional contexts of planning and permitting decisions.
- Require mitigation of unavoidable pubic coastal resource impacts related to permitting and shoreline management decisions.
- Include best available information on resource valuation in mitigation of coastal resource impacts.

Maximize Agency Coordination and Public Participation (Coastal Act Chapter 5 and Sections 30006, 30320, 30339, 30500, 30503 and 30711)

- Coordinate planning and regulatory decisions making with other appropriate state, local and federal agencies; support research and monitoring efforts.
- Consider conducting vulnerability assessments and adaptation planning at the regional level.
- Provide for maximum public participation in planning and regulatory processes.

The Dana Point Harbor Revitalization Plan & District Regulations includes several policies related to sea level rise, including:

> *Siting and design of new shoreline development anywhere in Dana Point Harbor and the siting and design of new or replacement shoreline protective devise shall take into account anticipated future changes in sea level, based on the best available scientific information and projections or range or projections of future sea level.*
> (LUP Policy I-8.6.5-1)

> *Due to the uncertainties about future sea level rise, a range of likely and extreme rises in sea level shall be used in the planning phase to assess project sensitivity to future water levels, identify possible consequences to the development and the surrounding area if the anticipated sea level is exceeded and determine the minimum acceptable amount of future seal level rise that can be used for design purposes.*
> (LUP Policy I-8.6.5-2)

> *OC Dana Point Harbor shall study the potential impacts of sea level rise and flooding of San Juan Creek on the existing or proposed structures along the seawall.*
> (LUP Policy I-8.6.5-3)

In acknowledgement of Coastal Act policies and resulting from the issuance of an executive order in 2008 by Governor Arnold Schwarzenegger that directed California state agencies to plan for sea-level rise and coastal impacts, the California Coastal Commission included a Special Provision in the Dana Point Harbor Revitalization Plan and District Regulations (Chapter II-3, Special Provision 11) stating the following:

> *A Shoreline Management Plan for Dana Point Harbor shall be submitted to the City of Dana Point for review prior to or concurrent with the first Coastal Development Permit for development of the Commercial Core area and shall be periodically updated (every 5 years) to include an assessment of seasonal and long-term shoreline changes and the potential for flooding or damage from sea-level rise, waves, storm surge or seiches and provide recommendations for protection of existing and proposed development, pubic improvements, coastal access, public opportunities for coastal recreation and coastal resources. The Shoreline Management Plan shall also evaluate evacuation routes (including Marine Commercial Planning Area 4 in the event of incapacitation of the Island Bridge) and the feasibility of hazard avoidance, retrofitting existing or proposing new protection devices and restoration of the sand supply in appropriate areas of the Harbor as required.*

Assessments of sea level rise at state and regional levels are challenging because data on the geophysical process involved are relatively sparse and there are no universally agreed-upon models or approaches for accurately projecting future sea level rise.

Wave Uprush Analysis

Dana Point Harbor is sheltered against ocean swells and storm waves primarily by two rubble mound breakwaters that establish an outer perimeter boundary and generally limit ocean storm waves entering the Harbor to the main entrance. Using software developed by the USACE (ACES program within CEDAS), a wave uprush analysis was conducted to evaluate if wave uprush at the seawalls and public boat launch ramp can result in overtopping conditions and the corresponding wave overtopping rates if wave overtopping does occur. Factors influencing the onset of wave overtopping and the overtopping rate considered as part of the analysis included: wave conditions (height and period), water level (tides, wind setup, tsunami and sea level rise) and water depth in front of the seawall and boat launch ramp structures, as well as the actual structure characteristics (type and slope) and the bottom slope of the marinas in front of the structure.

The Wave Uprush Analysis was prepared using the criteria established in Land Use Plan Policy I-8.6.3-4 of the Dana Point Harbor Revitalization Plan and District Regulations, that states:

> *Require all Coastal Development Permit applications for new development on a beach or other waterfront area or on a coastal bluff property with the potential to be subject to wave action to assess the potential for flooding or damage from sea level rise, waves, storm surge or seiches, through a wave uprush and impact reports prepared by a licensed civil engineer with expertise in coastal processes. The conditions that shall be considered in a wave uprush study are: a seasonally eroded beach combined with long-term (75 years) erosion, high tide conditions, combined with long-term (75 year) projections for sea level rise; storm waves from a 100-year event or a storm that compares to the 1982/83 El Niño event.*

The analysis also considered conditions for wave overtopping created by a potential seismic event in accordance with Land Use Plan Policy I-8.6.3-6 that states:

> *OC Dana Point Harbor shall prepare an assessment of the potential wave run-up from a seiche or tsunami near the Harbor during a major seismic event including but not limited to an event on the Newport-Inglewood Fault and/or San Jacinto Mountains Fault prior to submittal of the first Coastal Development Permit for development of the Commercial Core.*

The specific assumptions using 100-year storm wave condition estimates (wave height of 2.1 feet and a peak wave period of 15.5 seconds) for preparation of the study included:

1. Mean High High Water level (represents a water level that is higher than approximately 95% of all the water levels recorded in a 19 year tidal epoch) for the year 2015 (representing the current condition).
2. The effects of adding 1 and 2 foot tsunamis to the 2015 conditions.
3. The effects of projected lower bound (0.53 feet), moderate (1.34 foot) and higher bound

(2.57 feet) sea level rise for the year 2060 (year 2060 was selected because is 10 years in advance of the anticipated 100-year usable life of the existing seawall to allow for the preparation of the required studies to determine any design standards/recommendations for retrofitting and/or replacement of the sea wall).

4. The effects of projected lower bound (1.28 feet), moderate (2.59 feet) and upper bound (4.67 feet) sea level rise for the year 2090 (2090 represents the economic life of the new Commercial Core structures).

The results of the Wave Uprush Analysis (Everest International Consultants, Inc., August 2014) based on noted assumptions and modeling results include:

- Under current conditions (2015), limited overtopping can be anticipated during high tide (MHHW) and a 100 year storm event.
- Seawalls with riprap construction are less likely to have overtopping events.
- For the same water levels and wave conditions, overtopping at the boat launch ramp is anticipated to be higher than at the seawalls.
- Under current conditions (2015), the combination of a 1 to 2 foot tsunami event during a 100 year storm is anticipated to cause overtopping at both the seawalls and boat launch ramp (factor of 4.5).
- For the analysis year of 2060, with projected sea level rise, there is a further increase in the incidence of overtopping at the seawalls and boat launch ramp (factor of 7.3).
- For the analysis year of 2090, with higher bound projections for sea level rise, some areas in the Harbor are likely to be inundated during MHHW levels.
- For the analysis year of 2090, with a moderate projection of sea level rise, there is projected to be a substantial increase in wave overtopping at the sea walls and boat launch ramp in comparison to the projected incidence rates under current conditions (2015).

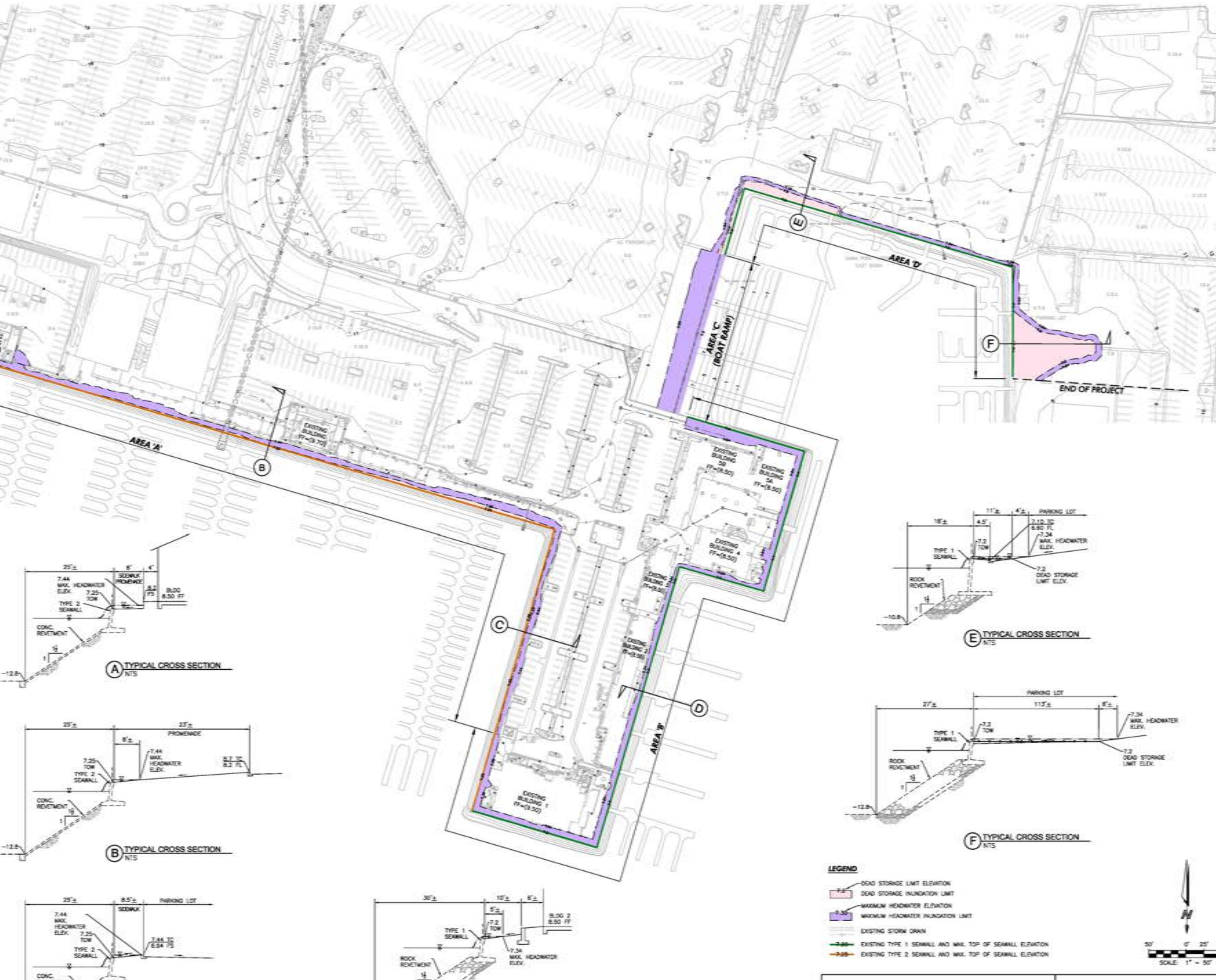
Wave Overtopping Flood Inundation Mapping

To illustrate Harbor landside flood inundation limits (footprint and elevation) resulting from events of wave overtopping at the seawalls and boat launch ramp as analyzed in the Wave Uprush Analysis prepared by Everest International Consultants, a series of inundation maps were prepared by Fuscoe Engineering (dated September 2014) and are provided on the following pages. Flood inundation levels for the four maps were determined using the following methodology:

- Topography and grading conditions were reviewed to determine if storage capacity (depressions) are present to provide storage capacity in the event overtopping occurs.
- Headwater dimensions were calculated to determine the required height needed to push the wave overtopping volume over the top of the existing seawall as water returns to the marina (see Appendices C) and then headwater elevations were projected into the site to determine inundation areas.
- Projected flood limits were compared with finish floor elevations to determine minimum vertical separations between calculated flood elevations and buildings.

As shown, the exhibits depict two limits: Limit 1 represents the projected level line from the top of the seawall (shown in red) and is generally a depression capable of storing water after the wave condition recedes with an available capacity (Va) limited to and less than the volume of water calculated to overtop the seawall (Vt). Wave uprush volume (Vt) calculations assume a1 hour duration period and 15.5 second wave cycle. Because the volume of the water generated by the wave overtopping condition exceeds the available storage capacity, the difference in volume will return to the marina over the top of the seawall. Limit 2 represents a projected level line from a calculated headwater elevation needed to push the water over the top of the seawall at maximum wave overtopping rates. Wave overtopping rates (not including storage) vary depending on the type of structure they collide with (seawall or boat launch ramp) and are shown to be at the maximum height in the Everest report during a tide condition analyzed using 2015 MHHW plus a 2 foot tsunami event. The headwater elevations were determined using a generic weir equation assuming a 1 foot crest length based on wave overtopping rates (discharges) presented in cubic feet per second per linear foot.

The analysis included the existing conditions in the Harbor; year 2015 with a 100-year storm event and a 1 to 2 foot tsunami; year 2060 with a 100-year storm event and projected low, moderate and high sea level rise; and year 2090 with a 100-year storm event and predicted low, moderate and high sea level rise. (Note: Year 2060 was selected because it occurs ten years in advance of the anticipated 100-year usable life of the existing seawall, thereby allowing for the preparation of the required studies to determine any design standards/recommendations for seawall replacement and year 2090 represents the economic life of the new Commercial Core buildings as established by LUP Policy I-8.6.1-11 of 75 years.) Since no modifications to the existing seawalls are currently proposed, the prepared wave uprush and inundation analysis were conducted based on existing seawall conditions and high tide ocean levels, combined with long-term (75 years) projections for sea-level rise and the intensity of a 100-year storm event. A 100-year storm event is defined as having a one percent chance of occurring in any given year, or on the average will occur once in every 100 years.



AREA 'A'
- MAXIMUM TOP OF SEAWALL ELEVATION: 7.25
- DEAD STORAGE LIMIT VOLUME: 0.01 AC-FT
- MAXIMUM HEADWATER ELEVATION: 7.44

AREA 'B'
- MAXIMUM TOP OF SEAWALL ELEVATION: 7.2~7.4
- DEAD STORAGE LIMIT VOLUME: 0 AC-FT
- MAXIMUM HEADWATER ELEVATION: 7.34~7.54

AREA 'C'
- MAXIMUM CREST ELEVATION: 7.2
- DEAD STORAGE LIMIT VOLUME: 0 AC-FT
- MAXIMUM HEADWATER ELEVATION: 7.56

AREA 'D'
- MAXIMUM TOP OF SEAWALL ELEVATION: 7.2
- DEAD STORAGE LIMIT VOLUME: 0.01 AC-FT
- MAXIMUM HEADWATER ELEVATION: 7.34

WAVE OVERTOPPING RATES (cubic ft per sec per linear ft)

CONDITION	TYPE 1 SEAWALL	TYPE 2 SEAWALL	BOAT RAMP
2015 MHHW	0.008 cfs	0.026 cfs	0.183 cfs
2015 MHHW + 1-ft TSUNAMI	0.036 cfs	0.077 cfs	0.331 cfs
2015 MHHW + 2-ft TSUNAMI	0.141 cfs	0.219 cfs	0.589 cfs

NOTES:
1. SOURCE: WAVE UPRUSH ANALYSIS REPORT PREPARED BY EVEREST INTERNATIONAL CONSULTANT INC., APRIL 7, 2014.
2. INUNDATION LIMITS SHOWN ON EXHIBIT UTILIZE THE MOST CONSERVATIVE WAVE OVERTOPPING RATE (2015 MHHW + 2-FT TSUNAMI) LISTED IN TABLE.
3. THE PARAMETERS CONTROLLING THE ONSET OF WAVE OVERTOPPING AND THE OVERTOPPING RATE INCLUDE WAVE CHARACTERISTICS (CAUSED BY A 100-YEAR STORM), WATER LEVEL, AND WATER DEPTH IN FRONT OF THE SEAWALL AND BOAT RAMP STRUCTURES, AS WELL AS THE STRUCTURE CHARACTERISTICS (TYPE AND SLOPE) AND BOTTOM SLOPE IN FRONT OF THE STRUCTURE.

DANA POINT HARBOR REVITALIZATION PROJECT
EXISTING CONDITION
WAVE UPRUSH INUNDATION MAP
SEPTEMBER 11, 2014

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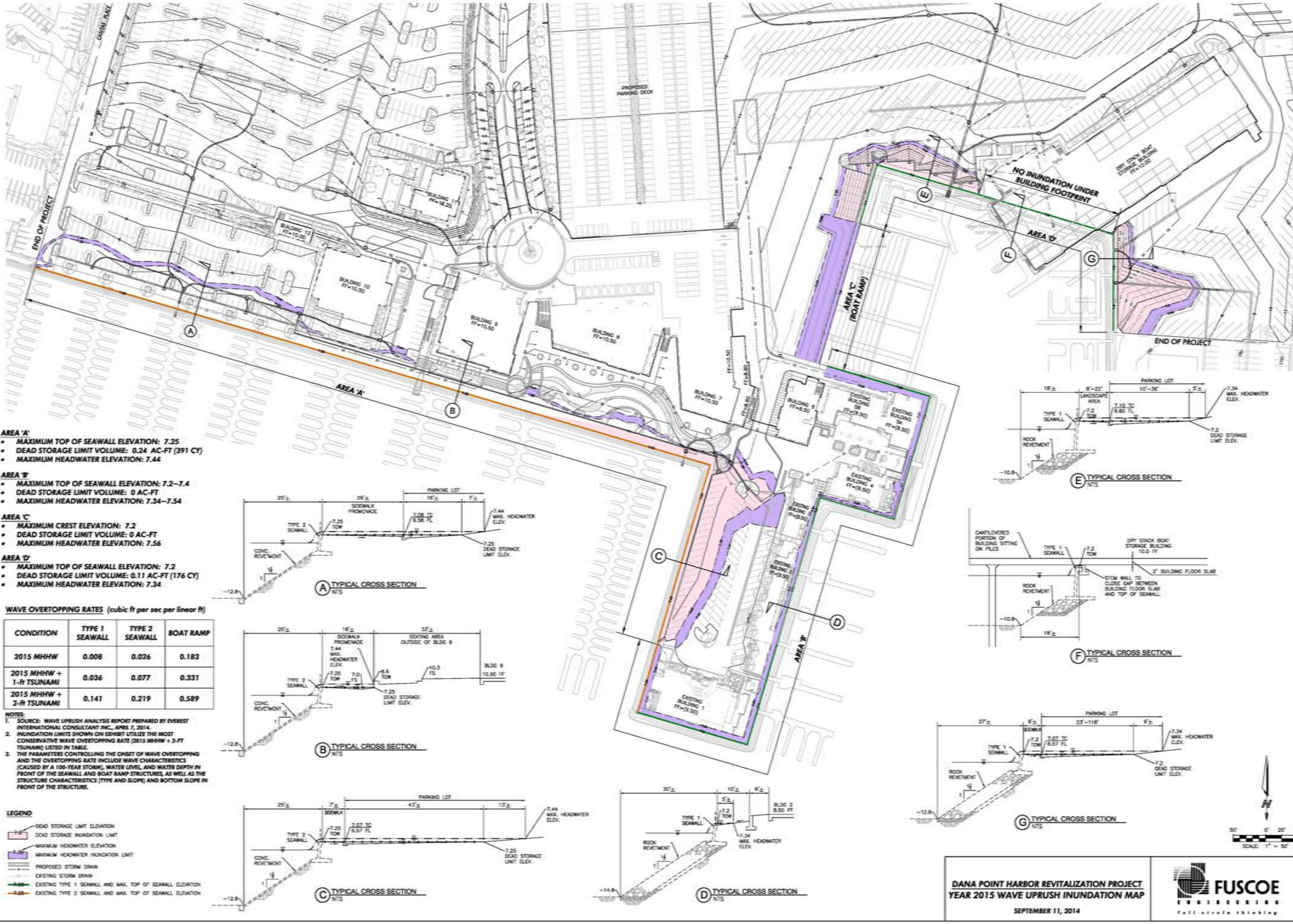
Full circle thinking



AREA 'A'

- MAXIMUM TOP OF SEAWALL ELEVATION: 7.25
- DEAD STORAGE LIMIT VOLUME: 0.24 AC-FT (391 CY)
- MAXIMUM HEADWATER ELEVATION: 7.44

AREA 'B'

- MAXIMUM TOP OF SEAWALL ELEVATION: 7.2–7.4
- DEAD STORAGE LIMIT VOLUME: 0 AC-FT
- MAXIMUM HEADWATER ELEVATION: 7.34–7.54

AREA 'C'

- MAXIMUM CREST ELEVATION: 7.2
- DEAD STORAGE LIMIT VOLUME: 0 AC-FT
- MAXIMUM HEADWATER ELEVATION: 7.56

AREA 'D'

- MAXIMUM TOP OF SEAWALL ELEVATION: 7.2
- DEAD STORAGE LIMIT VOLUME: 0.11 AC-FT (176 CY)
- MAXIMUM HEADWATER ELEVATION: 7.34

WAVE OVERTOPPING RATES (cubic ft per sec per linear ft)

CONDITION	TYPE 1 SEAWALL	TYPE 2 SEAWALL	BOAT RAMP
2015 MHHW	0.008	0.026	0.183
2015 MHHW + 1-ft TSUNAMI	0.036	0.077	0.331
2015 MHHW + 2-ft TSUNAMI	0.141	0.219	0.589

NOTES:

1. SOURCE: WAVE UPRUSH ANALYSIS REPORT PREPARED BY EVEREST INTERNATIONAL CONSULTANT INC., APRIL 7, 2014.
2. INUNDATION LIMITS SHOWN ON EXHIBIT UTILIZE THE MOST CONSERVATIVE WAVE OVERTOPPING RATE (2015 MHHW + 2-FT TSUNAMI) LISTED IN TABLE.
3. THE PARAMETERS CONTROLLING THE ONSET OF WAVE OVERTOPPING AND THE OVERTOPPING RATE INCLUDE WAVE CHARACTERISTICS (CAUSED BY A 100-YEAR STORM), WATER LEVEL, AND WATER DEPTH IN FRONT OF THE SEAWALL AND BOAT RAMP STRUCTURES, AS WELL AS THE STRUCTURE CHARACTERISTICS (TYPE AND SLOPE) AND BOTTOM SLOPE IN FRONT OF THE STRUCTURE.

LEGEND

- DEAD STORAGE LIMIT ELEVATION
- DEAD STORAGE INUNDATION LIMIT
- MAXIMUM HEADWATER ELEVATION
- MAXIMUM HEADWATER INUNDATION LIMIT
- PROPOSED STORM DRAIN
- EXISTING STORM DRAIN
- EXISTING TYPE 1 SEAWALL AND MAX. TOP OF SEAWALL ELEVATION
- EXISTING TYPE 2 SEAWALL AND MAX. TOP OF SEAWALL ELEVATION

DANA POINT HARBOR REVITALIZATION PROJECT
YEAR 2015 WAVE UPRUSH INUNDATION MAP

SEPTEMBER 11, 2014

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AREA 'A'

- MAXIMUM TOP OF SEAWALL ELEVATION: 7.25
- DEAD STORAGE LIMIT VOLUME: 0.24 AC-FT (391 CY)
- MAXIMUM HEADWATER ELEVATION: 7.53

AREA 'B'

- MAXIMUM TOP OF SEAWALL ELEVATION: 7.2–7.4
- DEAD STORAGE LIMIT VOLUME: 0 AC-FT
- MAXIMUM HEADWATER ELEVATION: 7.43–7.63

AREA 'C'

- MAXIMUM CREST ELEVATION: 7.2
- DEAD STORAGE LIMIT VOLUME: 0 AC-FT
- MAXIMUM HEADWATER ELEVATION: 7.65

AREA 'D'

- MAXIMUM TOP OF SEAWALL ELEVATION: 7.2
- DEAD STORAGE LIMIT VOLUME: 0.11 AC-FT (176 CY)
- MAXIMUM HEADWATER ELEVATION: 7.43

WAVE OVERTOPPING RATES (cubic ft per sec per linear ft)

CONDITION	TYPE 1 SEAWALL	TYPE 2 SEAWALL	BOAT RAMP
2060 MHHW (with 0.53 ft SLR-LOW)	0.018	0.046	0.251
2060 MHHW (with 1.34 ft SLR-MODERATE)	0.058	0.110	0.403
2060 MHHW (with 2.57 ft SLR-HIGH)	0.293	0.395	0.816

NOTES:

1. SOURCE: WAVE UPRUSH ANALYSIS REPORT PREPARED BY EVEREST INTERNATIONAL CONSULTANT INC., APRIL 7, 2014.
2. INUNDATION LIMITS SHOWN ON EXHIBIT UTILIZE THE MOST CONSERVATIVE WAVE OVERTOPPING RATE (2060 MHHW WITH 2.57 FT SLR) LISTED IN TABLE.
3. THE PARAMETERS CONTROLLING THE ONSET OF WAVE OVERTOPPING AND THE OVERTOPPING RATE INCLUDE WAVE CHARACTERISTICS (CAUSED BY A 100-YEAR STORM), WATER LEVEL, AND WATER DEPTH IN FRONT OF THE SEAWALL AND BOAT RAMP STRUCTURES, AS WELL AS THE STRUCTURE CHARACTERISTICS (TYPE AND SLOPE) AND BOTTOM SLOPE IN FRONT OF THE STRUCTURE.

LEGEND

- DEAD STORAGE LIMIT ELEVATION
- DEAD STORAGE INUNDATION LIMIT
- MAXIMUM HEADWATER ELEVATION
- MAXIMUM HEADWATER INUNDATION LIMIT
- PROPOSED STORM DRAIN
- EXISTING STORM DRAIN
- EXISTING TYPE 1 SEAWALL AND MAX. TOP OF SEAWALL ELEVATION
- EXISTING TYPE 2 SEAWALL AND MAX. TOP OF SEAWALL ELEVATION

DANA POINT HARBOR REVITALIZATION PROJECT
YEAR 2060 WAVE UPRUSH INUNDATION MAP
SEPTEMBER 11, 2014

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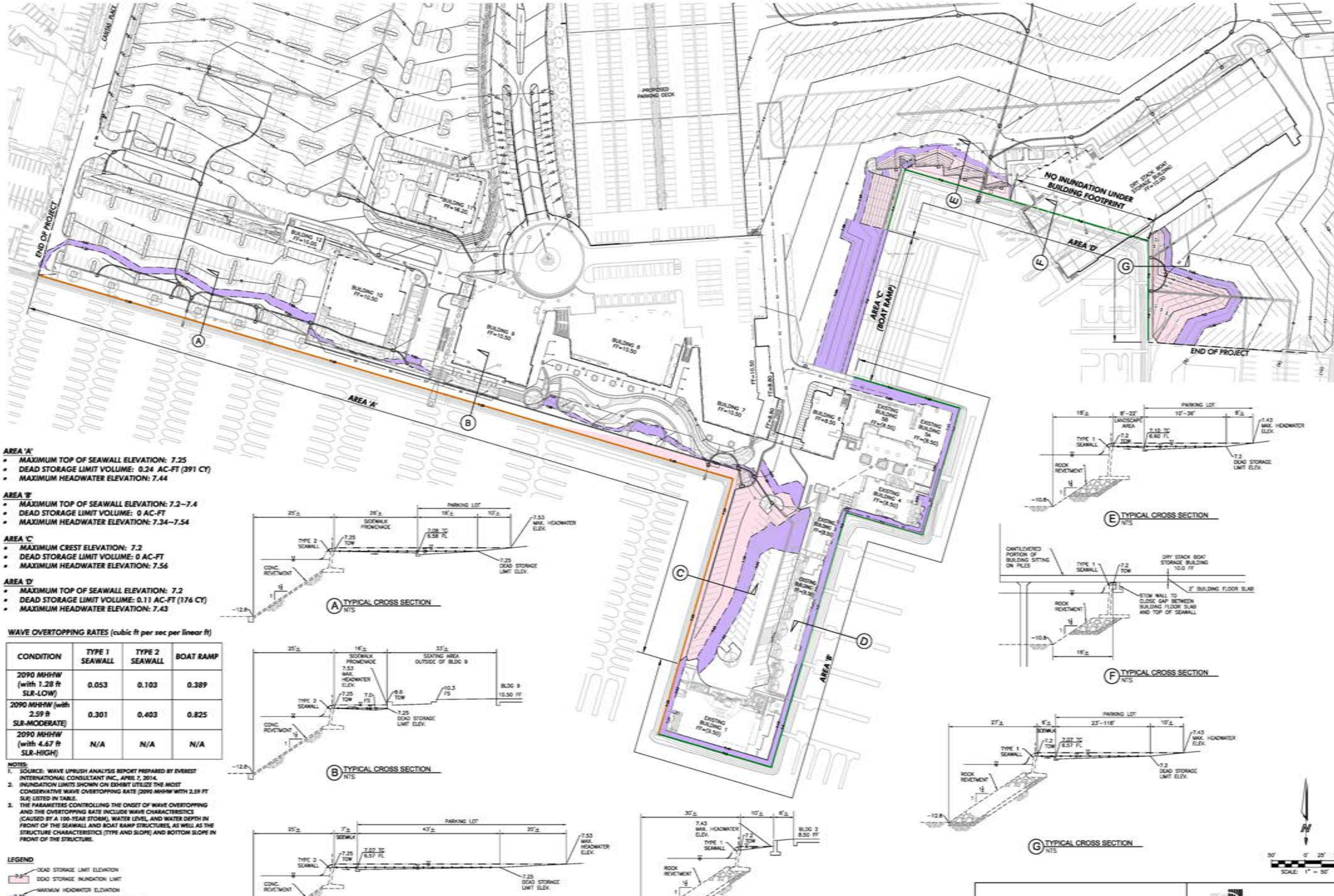

AREA 'A'
- *MAXIMUM TOP OF SEAWALL ELEVATION: 7.25*
- *DEAD STORAGE LIMIT VOLUME: 0.24 AC-FT (391 CY)*
- *MAXIMUM HEADWATER ELEVATION: 7.44*

AREA 'B'
- *MAXIMUM TOP OF SEAWALL ELEVATION: 7.2~7.4*
- *DEAD STORAGE LIMIT VOLUME: 0 AC-FT*
- *MAXIMUM HEADWATER ELEVATION: 7.34~7.54*

AREA 'C'
- *MAXIMUM CREST ELEVATION: 7.2*
- *DEAD STORAGE LIMIT VOLUME: 0 AC-FT*
- *MAXIMUM HEADWATER ELEVATION: 7.56*

AREA 'D'
- *MAXIMUM TOP OF SEAWALL ELEVATION: 7.2*
- *DEAD STORAGE LIMIT VOLUME: 0.11 AC-FT (176 CY)*
- *MAXIMUM HEADWATER ELEVATION: 7.43*

WAVE OVERTOPPING RATES *(cubic ft per sec per linear ft)*

CONDITION	TYPE 1 SEAWALL	TYPE 2 SEAWALL	BOAT RAMP
2090 MHHW (with 1.28 ft SLR-LOW)	0.053	0.103	0.389
2090 MHHW (with 2.59 ft SLR-MODERATE)	0.301	0.403	0.825
2090 MHHW (with 4.67 ft SLR-HIGH)	N/A	N/A	N/A

NOTES:
1. SOURCE: WAVE UPRUSH ANALYSIS REPORT PREPARED BY EVEREST INTERNATIONAL CONSULTANT INC., APRIL 7, 2014.
2. INUNDATION LIMITS SHOWN ON EXHIBIT UTILIZE THE MOST CONSERVATIVE WAVE OVERTOPPING RATE (2090 MHHW WITH 2.59 FT SLR) LISTED IN TABLE.
3. THE PARAMETERS CONTROLLING THE ONSET OF WAVE OVERTOPPING AND THE OVERTOPPING RATE INCLUDE WAVE CHARACTERISTICS (CAUSED BY A 100-YEAR STORM), WATER LEVEL, AND WATER DEPTH IN FRONT OF THE SEAWALL AND BOAT RAMP STRUCTURES, AS WELL AS THE STRUCTURE CHARACTERISTICS (TYPE AND SLOPE) AND BOTTOM SLOPE IN FRONT OF THE STRUCTURE.

LEGEND
- DEAD STORAGE LIMIT ELEVATION
- DEAD STORAGE INUNDATION LIMIT
- MAXIMUM HEADWATER ELEVATION
- MAXIMUM HEADWATER INUNDATION LIMIT
- PROPOSED STORM DRAIN
- EXISTING STORM DRAIN
- EXISTING TYPE 1 SEAWALL AND MAX. TOP OF SEAWALL ELEVATION
- EXISTING TYPE 2 SEAWALL AND MAX. TOP OF SEAWALL ELEVATION

DANA POINT HARBOR REVITALIZATION PROJECT
YEAR 2090 WAVE UPRUSH INUNDATION MAP
SEPTEMBER 11, 2014

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The results of the analysis indicate that under the adverse conditions described, some level of wave uprush can be anticipated in the Harbor without implementing any currently proposed Commercial Core Project improvements. This finding is consistent with anecdotal information provided from recent events where a small amount of splash in areas adjacent to the seawall on Dana Wharf was observed. In the 2015 condition, overtopping of the seawalls and boat ramp can be expected to occur during high tide (MHHW) and a 100-year storm event. When a 1 to 2 foot tsunami event is combined with water levels during a 100-year storm event, an increase in overtopping is anticipated (i.e., at MHHW, including the effect of a 1 foot tsunami will increase overtopping rates from 0.008 ft^3/sec/foot to 0.036 ft^3/sec/foot or by a factor of 4.5). For Year 2060, with the projected sea level rise, there is expected to be an increase in wave overtopping as compared to Year 2015 (i.e., at MHHW, for a moderate projection of sea-level rise of 1.34 feet, wave overtopping will increase from 0.008 ft^3/sec/foot to 0.058 ft^3/sec/foot or by a factor of 7.3) and for the Year 2090, with the projections of sea level rise of 4.67 feet (higher bound), the area is expected to experience some level of inundation (i.e., water elevation higher than the crest elevation of the seawall) during periods of high tide (MHHW) in the Dana Wharf parking lot, the boater parking area adjacent to Commercial Core Buildings 10 and 12, the boat launch ramp and surface dry boat storage area immediately adjacent to the shipyard. As indicated on the Wave Uprush Inundation Maps, for all years studied there are no instances where projected flooding events contribute to an increase in the incidence of wave overtopping sufficient to cause the flooding of any new or existing structures in the areas studied.

Potential Impacts Associated With Sea-Level Rise in Dana Point Harbor

- Low lying parking areas, pedestrian walkways located immediately adjacent to the seawall, water/wastewater, stormwater infrastructure, utility infrastructure are at risk of impaired function due to flooding and/or inundation.
- Damage to piers, docks and marina facilities from increased wave action and higher water levels.
- Decreased bridge (Island Bridge) clearances due to increased and prolonged increases in tidal heights and increase probability of a bridge failure due to water-related damage to the bridge structure.
- Decreased Baby Beach sand area.
- Limit effectiveness of stormwater management practices by increased groundwater levels and effects of saltwater intrusion.
- Vertical accessways and boat launch areas could become inaccessible due to flooding.
- Damage to recreational areas and facilities due to increased wave damage (particularly on the Island – PA 4).

Adaptive Measures

The California Adaptation Planning Guide (APG) was developed by the California Emergency Management Agency and the California Natural Resources Agency to provide guidance and support information for communities in responding to impacts associated with climate change. The planning activities include a process for conducting vulnerability assessments and developing adaptive strategies and priorities for the management of coastal-related resources. The Harbor LCP contemplated the iterative nature for this planning process in establishing the requirement to periodically update (every 5 years) the Shoreline Management Plan to provide assessments of seasonal and long-term shoreline changes.

Potential flooding impacts in the Harbor were evaluated as part of FEIR No. 591 using qualitative assessments of the project design-related effects in the context of the existing conditions in the Harbor and current reports and publications including the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM), Orange County Local Drainage Manual and specific hydrological studies prepared for the project. All proposed on-site storm drain systems have been designed for a 10-year frequency, high confidence storm event. The Conceptual Grading Plan for the Commercial Core Project has been specifically designed to avoid the direct release of storm runoff over the seawall and to redirect flows away from the seawall to pre-treatment BMP's incorporated as part of the Preliminary Water Quality Management Plan improvements.

As anticipated in the certified Harbor LCP, FEIR No. 591 and Final SEIR No. 613, numerous regulatory provisions, including Land Use Plan Policies, Implementing Provisions (development standards and requirements), as well as Project Design Features, standard conditions of approval and mitigation measures have been incorporated into the design and regulatory approval process for the Dana Point Harbor Revitalization Plan and Commercial Core Project. The future implementation of the Dana Point Harbor Revitalization Plan involves the careful consideration of providing public access to the marine-related, recreation and visitor-serving facilities as mandated by the California Coastal Act, in addition to ensuring that sound planning principles are incorporated into the design of future projects and the protection of Harbor structures and coastal resources that are subject to potential damage resulting from sea level rise and episodic storm events that may have impacts to the operations of Dana Point Harbor and ensuring public safety.

Specific examples of how the existing regulatory standards have been incorporated into project design for the Commercial Core Project to minimize the current and projected effects of flooding include parameters for both the siting and floor elevation of proposed new development. As stated in Policy I-8.6.7-5, "*Creation of the Festival Plaza and Pedestrian Promenade along the waterfront's edge provides for an extended structural setback from the bulkhead area.*" Building setbacks for new structures located adjacent to the seawall in Day Use Commercial Planning Area 2 generally ranges from between 60 to 240 feet. In other landside Planning Areas of Dana Point Harbor, existing structures are generally setback a minimum of 8 feet from the seawall. The Boater Service Buildings have been designed to provide boater-related support facilities that are less susceptible to a major flooding event (i.e., restrooms, lockers/showers, storage, laundry, etc.) on the first level and marine-related administrative, professional and business office uses on the second floor.

Also as stated in Policy I-8.6.7-13, "*Conformance with the latest Uniform Building Code, California Building Code or International Building Code and County Ordinances can be expected to satisfactorily mitigate the effect of seismic ground shaking. Conformance with applicable codes and ordinances shall occur in conjunction with the issuance of Building Permits in order to ensure that over excavation of soft, broken rock and clayey soils within sheared zones will be required where development is planned.*" Further, LCP Policy I-8.7-14 states that: "*Engineering design for all structures shall be based on the probability that new structures will be subjected to strong* *ground motion during the lifetime of the development. Construction plans shall be subject to the County review and shall include applicable standards, which address seismic design parameters."* LCP Policy I-8.6.7-15 states: "*Mitigation of earthquake ground shaking shall be incorporated into the design and construction in accordance with Uniform Building Code requirements and site-specific design."*

The Commercial Core Project includes approximately 28,500 square feet of existing buildings that will remain and 85,200 square feet of new restaurant, retail, office and other uses. The following table describes the relationship between the existing/proposed finish floor elevations relative to the top of the existing seawall.

Existing & Proposed Commercial Core Project Finished Floor Elevations
Dana Point Harbor Visitor-Serving Commercial Project (Planning Area 2)

Percent of Existing Buildings to Remain	**Percent of Proposed Buildings**	**Finished Floor Elevation** (From the top of the seawall)	**Percent of Total Project Buildings**
67	4	1 to 2 feet above	20
29	0	2 to 3 feet above	7
0	47	3 to 4 feet above	35
4	49	More than 8 feet above	38

As indicated by the table, the Finish Floor Elevations (FFE) of the Commercial Core buildings in Planning Area 2 (existing and proposed new buildings) are/were designed to be elevated at least one foot above the top of the existing seawall elevation, thereby avoiding potential issues related to flooding due to intermittent seawall overtopping during a major storm event and assuming accepted estimates for increases in sea level rise. The Commercial Core Project replaces approximately 47% of the existing buildings located in Mariners Village, Mariners Alley with structures in excess of 3 feet above the existing elevation of the seawall and approximately 49% of the new buildings are designed in excess of 8 feet above the existing elevation of the seawall.

Additionally, the regulatory provisions that are currently in place as part of the policies and implementing provisions of the certified Dana Point Harbor Revitalization Plan and District Regulations, certified Final EIR No. 591 and Final Subsequent EIR No. 613, as well as project-level conditions of approval imposed with discretionary actions by the City of Dana Point will ensure the appropriate level of monitoring, planning and adherence to design, engineering and construction standards are implemented with all future Harbor Revitalization Plan projects.

<u>Relevant Plans and Studies</u>

Additional Programs and Studies Related to Sea Level Rise and Shoreline Protection, including the Orange County Coastal Regional Sediment Management Plan (Draft Report), makes recommendations for future programs and studies in support of protecting coastal resources. The Sea Level Rise Beach Sustainability Study is summarized as entailing preparation of engineering and economics study to determine the nourishment requirements necessary to offset projected sea level rise impacts throughout the Orange County coastline. The primary purpose of this study is to determine whether, where and how much beach and near shore nourishment would be necessary to offset sea level rise impacts on the Orange County coast. The study includes a calculation of the recreational and shore protection costs of unmitigated shoreline erosion resulting from sea level rise (SLR). In addition, it includes development of conceptual solutions and associated costs to mitigate the sea level raise scenarios recommended by government agencies. Results from this study would be used in long-term planning for the County of Orange and coastal cities affected by the potential impacts associated with sea level rise.

U.S. Army Corps of Engineers

At the federal level, the USACE and USEPA have recognized that SLR considerations need to be incorporated into the design life of all federally funded projects. However, with no adopted mandates or policies in place to evaluate the effect of SLR on new projects (other than internal memoranda in response to Hurricane Katrina and Hurricane Rita), the standard of reference has remained a 1987 National Research Council report that assumed three hypothetical SLR scenarios for the year 2100: 0.5 meter, 1 meter and 1.5 meters in SLR. This assumption framework was updated in July 2009 by the USACE's, using a multiple scenario approach where levels of risk were assigned to the National Research Councils criteria to evaluate impacts.

Federal Emergency Management Agency

The National Flood Insurance Program administered by FEMA is the primary mechanism for communities receiving flood protection, but does not include SLR as an evaluation tool for mapping potential flood insurance hazards. With the recent disasters from major storm events on a national level, FEMA has embarked upon a mapping modernization effort that involves updating flood insurance rate maps, many dating from the 1970 and 1980 period. With SLR and settlement of levees, many flood program facilities nationwide no longer meet CFR 65.10 requirements that were responsible for establishment of "preliminary" flood maps to be issued that show communities in the flood plain. In addition, many of the cities and counties that FEMA mapped as flood prone were required by 2010 to demonstrate that their levees were adequate to protect against a 1% annual chance flood event to obtain certification.

FEMA has also update its mapping approach for areas vulnerable to coastal flooding to a risk-based methodology. This approach includes the reevaluation of present sea levels, estimating extreme high water elevations due to tides, surges, tsunamis and determining a plan based on local SLR trends in the development of Special Flood Hazard Area designations and design considerations to remove such determinations when no longer applicable.

The current Flood Insurance Study (FIS) published by FEMA indicates that Dana Point Harbor is located within Zones AE, VE and X (see FIRM Map No. 06059C0504J and 06059C0508J, dated December 3, 2009). The land portions of the Harbor (except a portion of Dana Wharf and the southeastern portion of PA 1) are in Zone X, which is outside the 500 year flood zone. The southeastern portion of PA 1 is within a subsection of Zone X, which indicates it is within the 500 year flood zone and within the 100 year flood zone with an average depth of less than 1 foot. Zone AE is considered to have a base flood elevation of 9 feet and Zone VE, which includes the seawalls has a base flood elevation of 23 feet.

<u>San Juan Creek</u>

In August 2002, the U.S. Army Corps of Engineers published a study titled "San Juan Creek Watershed Management Study" to provide analytical tools and data to aid in the decision making process for the management of the watershed resources. The San Juan Creek watershed is a diverse mix of open space and urbanized areas and is comprised of approximately 176 sq. miles that generally extends from the Cleveland National Forest in the Santa Ana Mountains to the Pacific Ocean at Doheny State Beach. Included as part of the watershed basin are 23 canyons with three primary watercourses: San Juan Creek, Trabuco Creek and Oso Creek. Elevations range from approximately 5,700 feet on Santiago Peak to sea level.

The San Juan Creek watershed is currently being adversely affected by a variety of water resource and related land use resource problems, including changes in hydrologic regime, channel instability, habitat loss, ecosystem degradation and declines in water quality. Recent adverse conditions have resulted in areas of channel downcutting that have negatively impacted infrastructure in the floodplain and riparian areas. Flooding in the watershed is attributable to the overtopping of the channel facility or the failure of the levee system. To date, the only incident for the San Juan Creek watershed occurred in 1996 when emergency levee reinforcement was required to overt a potential failure from undermining the concrete creek lining. Subsequent hydrologic and hydraulic studies determined the overtopping frequency at approximately 2% exceedance (approximately 50-year) event.

The creeks of San Juan, Oso and Trabuco were channelized by Orange County (without involvement of the USACE) during the 1960's by constructing slope protection consisting of 4 inch thick unreinforced concrete panels. Storm flows have scoured the sandy channel invert below the bottom of the embedded unreinforced concrete channel lining leading to uplift and loss of the concrete panels during storm events in 1998, 2005 and recently in December 2010. The Corps provided emergency reconstruction and rehabilitation of the channel levees (under PL 84-99) during the 2005 storms when approximately 1,250 feet of channel lining was lost on San Juan Creek and the exposed earthen levee was nearly lost due to scour. Emergency placement of large riprap was required to contain storm flows. Since the 2005 event, the unstable levees have continued to deteriorate, most recently in December 2010 when a storm event caused significant damage.

OC Public Works is taking measures to address the most critical risk areas of San Juan and Trabuco Creeks to protect the surrounding community from the risks associated with levee failure through the construction of sheet pile improvements. The 8-phased sheet pile improvements are located along 8,200 linear feet of the creek between Stonehill Drive and the I-5 Freeway, as well as 8,400 linear feet of Trabuco Creek from its confluence with San Juan Creek to upstream of Del Obispo Street. The sheet pile is being installed are approximately 48 feet sections, with about 31 to 34 feet extending below the channel bottom to provide long-term bank stability. Phase I through III of the project are currently completed.

The San Juan Creek Flood Risk Management Feasibility Study is a joint study between the U.S. Army Corps of Engineers and the Orange County Flood Control District that is evaluating flood risk management alternative measures along the lower portions of San Juan, Trabuco and Oso Creeks. The study is an adjunct study of an earlier investigation with a focus on understanding flooding features in the lower portions of the watershed. The current study is underway with an analysis of baseline conditions. Objectives following completion, include:

- Reduce the risk of flood damage in the lower portions of the watershed;
- Address stream bank erosion and channel instability; and
- Maintain habitat function and utilization to the maximum extent practicable.

To determine the effects flooding of San Juan Creek has on the existing and proposed structures in the Harbor, a review of the flood mapping, original performed in 2009 and updated earlier this year 2014 (see attached FEMA Mapping Panel 05059C0504J effective 12-3-2009 Letter of Map Revision 14-09-1405P effective 2-19-2014), shows no inundation as a result of the 1% inundation line (100 year flood) for San Juan Creek. The inundation line also does not show flow traveling overland from the San Juan Creek to the Harbor.

For a continued program, OC Dana Point Harbor will consult with OC Flood Control on at least a yearly basis to go over any changes to the San Juan Creek watershed that could affect the Harbor.

City of Dana Point

The City's Emergency Plan designates procedures that will be followed in responding to anticipated emergencies within the City of Dana Point. The Plan describes how the City will prepare for, respond to and recover from an emergency or disaster. The Plan is consistent with State and Federal guidelines regarding disaster planning. Additionally, the City maintains an

Emergency Operations Center and communications equipment to coordinate City services during local emergencies.

Evacuation routes are shown on the Designated Emergency Evacuation Routes and Emergency Facilities Exhibit of the City's General Plan. As indicated, Pacific Coast Highway, Dana Point Harbor Drive and Street of the Golden Lantern are designated as evacuation routes in the City. Tsunami evacuation signs are currently posted at 11 locations along Dana Point Harbor Drive, Street of the Golden Lantern and Pacific Coast Highway.

Designated Emergency Evacuation Routes

Source: City of Dana Point General Plan, Public Safety Element

<u>County of Orange</u>

The County's Emergency Response Plan provides a detailed summary of the County organization and identifies the responsibilities of each component agency in the event of a disaster. The Orange County and Operational Area Emergency Operations Center is used for managing disaster response and recovery for County agencies and departments and constituents served by the County. The center also coordinates disaster response and recovery for its operational area and coordinates operations resource requirements and availability with the State Regional Operations Center. The County acts as a central point for coordination and operational, administrative and support needs of the emergency responders. The center is staffed with personnel from all agencies within the County and various operational area jurisdictions and agencies.

The protocol followed for management of potential disasters involving Dana Point Harbor includes:

1. OC Dana Point Harbor Director and/or Emergency Response Coordinator are notified by OC Sheriff's Department and/or Alert OC of event or pending event.
2. City of Dana Point Police Services Event Supervisor assumes lead responsibility for implementation of necessary evacuation procedures and closing/controlling entry into the Harbor.

Although the San Onofre Nuclear Generating Station (SONGS) is currently being decommissioned, federal regulations require that an alert and notification system be in place to help protect the health and safety of the general public. The Community Alert Siren System is a network of sirens strategically located within the plant's Emergency Planning Zone (EPZ) to provide that service. One siren is located in Dana Point Harbor.

The EPZ is the area surrounding SONGS and includes:

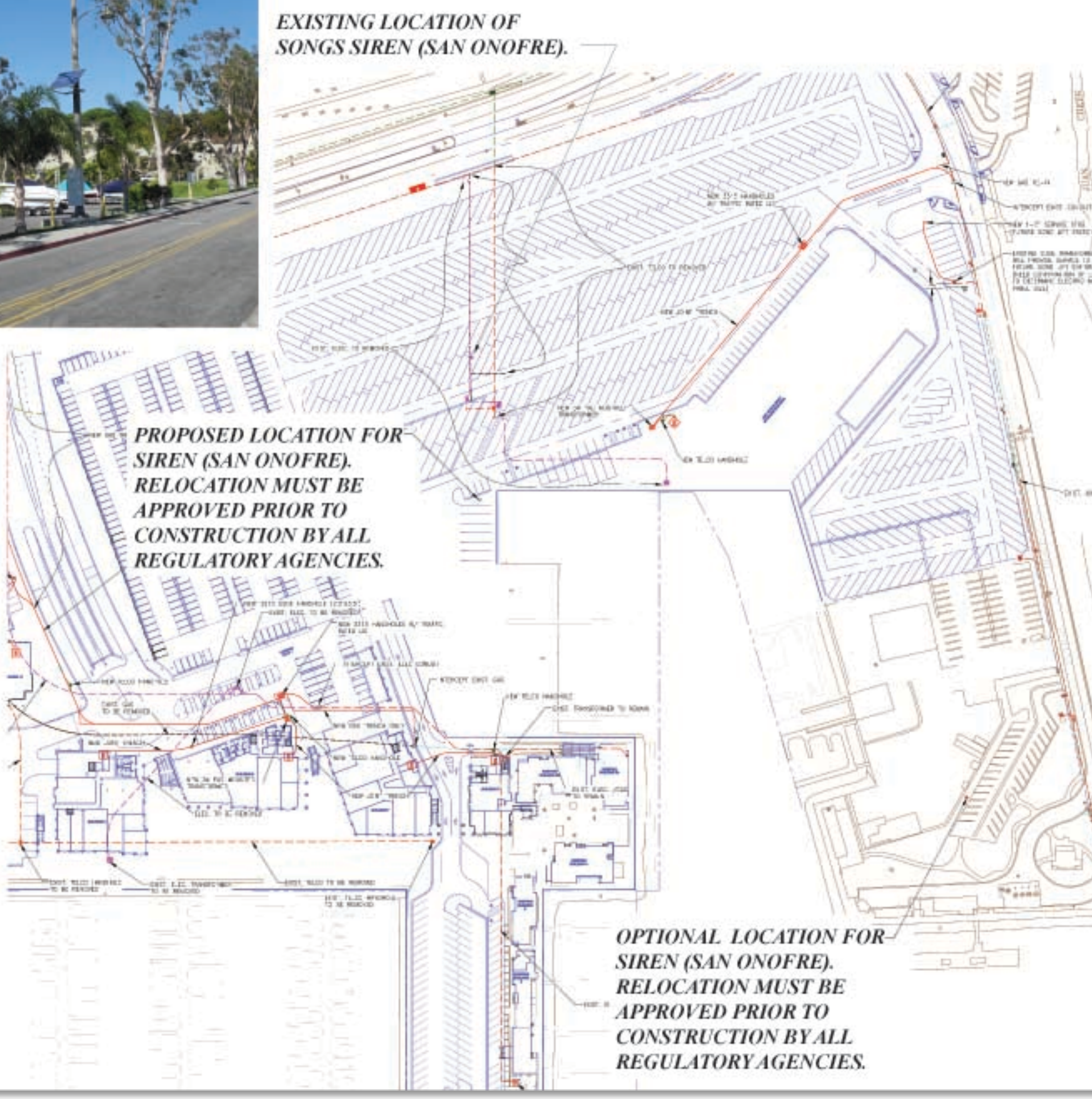
- City of Dana Point
- City of San Clemente
- City of San Juan Capistrano
- Marine Corps Base Camp Pendleton
- California State Parks
- Orange County (unincorporated areas south of Ortega Highway)

The sirens are only activated by local and/or regional government officials in the event of an emergency and have only one meaning: there is important emergency information available - turn on your television or radio. Community Alert Sirens may also be used to alert the public in the event for a wide variety of emergencies, including tsunamis, earthquakes, and SONGS-related events.

In the event an emergency occurs that requires Harbor notification, the SONGS warning siren is activated by the Dana Point Emergency Response Coordinator in coordination with City officials.

In the event of failure of the Island Bridge, evacuations of the Island area of the Harbor (PA 4) would be coordinated by OC Sheriff – Harbor Patrol and OC Dana Point Harbor staff, utilizing County and/or sport fishing vessels to ferry individuals to landside areas of the Harbor.

Photo of the existing SONGS tower located in Dana Point Harbor adjacent to Embarcadero Place



Source: Commercial Core Project CDP13-0018 Utilities Plan, Butsko Utility Design, Inc., March 2014

OC Dana Point Harbor

To ensure the timely dissemination of information to boaters, business owners special user groups and the general public, OC Dana Point Harbor maintains a website that provides current information on a variety of Harbor-related topics. The website can be accessed at: http://ocdph.com

In addition to the website, OC Dana Point Harbor staff also provide an extensive list of interested parties with ongoing advisories pertaining to activities and special events, items of general interest, potential restrictions due to construction or maintenance activities (land and waterside areas), as well as general boater-related weather or sea condition notices. Weather advisories from the National Oceanic and Atmospheric Administration (NOAA) National Weather Service and marine advisories issued by the U.S. Coast Guard are monitored by OC Dana Point Harbor staff and distributed via e-mail as they become available. Examples of recent advisories that have been distributed to provide notification of a range of topics are provided in Appendices D. Emergency preparedness drill announcements are also distributed in the same manner when conducted.

Tsunamis

Tsunamis, as defined by the City of Dana Point Public Safety Element (July 9, 1991) are seismically induced sea waves generated by offshore earthquake, submarine landslide or volcanic activity. Great magnitude waves have not historically been recorded in Orange County because the coastline is somewhat protected from the north by the coastal configuration (Palos Verdes Peninsula and Point Conception) and the offshore islands (Santa Catalina and San Clemente Islands). Locally the Headlands also protect most of the Dana Point coastline from tsunamis, which might originate from the north. The city's coast is more exposed to damage from a more rare tsunami or other storm waves that originate from the south.

California is at risk from both local and distant tsunamis. Eighty-two possible or confirmed tsunamis have been observed or recorded in California during historic times. Most of these events were small and only detected by tide gages. Eleven were large enough to cause damage and four events caused deaths. Two tsunami events caused major damage. The 1960 Chilean earthquake produced a great tsunami that impacted the entire Pacific basin. Damage was reported in California ports and harbors from San Diego to Crescent City and losses exceeded one million dollars. The worst event was the 1964 tsunami generated by the M 9.2 Alaska earthquake that killed 12 in Northern California and caused over $15 million in damages. The peak wave height was 21 feet in Crescent City and 29 city blocks were inundated. Wave oscillations in San Francisco Bay lasted more than 12 hours causing nearly $200,000 in damages to boats and harbor structures.

The Cascadia subduction zone will produce the State's largest tsunami. The Cascadia subduction zone is similar to the Alaska- Aleutian trench that generated the magnitude 9.2 1964 Alaska earthquake and the Sunda trench in Indonesia that produced the magnitude 9.3 December 2004 Sumatra earthquake. Native American accounts of past Cascadia earthquakes suggest tsunami wave heights on the order of 60 feet, comparable to water levels in Aceh Province Indonesia. Water heights in Japan produced by the 1700 Cascadia earthquake were over 15 feet, comparable to tsunami heights observed on the African coast after the Sumatra earthquake. The Cascadia subduction zone last ruptured January 26, 1700, creating a tsunami that left markers in the geologic record from Humboldt County, California to Vancouver Island, Canada and is noted in written records in Japan. At least seven ruptures of the Cascadia subduction zone are observed in the geologic record.

The National Oceanic and Atmospheric Administration (NOAA) has statutory responsibility to provide tsunami warnings, which are disseminated in California through the Governor's Office of Emergency Services. Local jurisdictions have the responsibility for ordering and canceling evacuations. The California Geological Survey has statutory authority to conduct tsunami inundation mapping, contingent on State program funding. The Governor's Office of Emergency Services (OES) has contracted with the University of Southern California for preliminary tsunami inundation mapping with funding from NOAA through the National Tsunami Hazard Mitigation Program (Program). This Program supports tsunami hazard mitigation in the states of California, Oregon, Washington, Alaska and Hawaii. As shown on the following page, the Tsunami Inundation Map for Emergency Planning for the Dana Point Quadrangle/San Juan Capistrano Quadrangle, prepared by the California Emergency Management Agency (March 2009), all of Dana Point Harbor is subject to tsunami inundation.

Tsunamis cause damage to man-made structures in several ways, primarily from water currents and the impact of waterborne debris. The incoming waves cause flooding and push vessels into land-based structures. The withdrawing waves causes vessels and boats to hit bottom and damages power plants and other facilities that use sea water for cooling. The strong currents scour foundation material from under structures and carry debris. Debris carried by the water batters people and property, and is responsible for much of the damage from tsunamis. Secondary effects, such as fire and the release of hazardous materials, can escalate the disaster to a greater catastrophe. These effects are difficult to predict. The exposure of our built environment to possible tsunami damage varies dramatically along the California coast. The flooding produced by the tsunamis depends strongly on local topography. The historical tsunami record suggests that the tsunami hazard in the Southern California region, from the Palos Verdes Peninsula, south to San Diego has a moderate likelihood of occurrence.

The current building codes are primarily focused on constructing buildings resistant to earthquakes do not, in general, address the forces likely to arise from tsunamis. FEMA's Coastal Construction Manual (FEMA 55), developed to provide design and construction guidance for structures built in coastal areas, addresses seismic loads for coastal structures and provides information on tsunami and associated loads. However, the authors of the Coastal Construction Manual concluded that tsunami loads are far too great and that, in general, it is not feasible or practical to design "normal" structures to withstand these loads. Many structures, including those throughout Dana Point Harbor are designed to resist forces directed towards the structure; however, once water enters the structure and draw-down occurs outside of the structure, walls may be compromised, resulting in serious damage.

The topography of Dana Point provides significant protection for the majority of the City. Unlike other coastal communities where much of the developed area is at or very near sea level, very high bluffs back the Dana Point Coast. The low-lying area between these bluffs and the ocean is the local

Tsunami Hazard Zone. The projected worst-case scenario for a tsunami in Southern California is a 10-12m run-up or approximately 40 foot change in mean sea level. In the unlikely event of an emergency, federal regulations require that an alert and notification system be in place to help protect the health and safety of the public.

In the event of a tsunami warning or advisory, OC Dana Point Harbor uses the following protocol:

- Dana Point Police Services assumes the lead responsibility for ordering necessary evacuations, closing/controlling entry into the Harbor and overseeing the evacuation of boats as appropriate to deeper water.
- OC Dana Point Harbor staff will notify businesses and marina operators.
- OC Dana Point Harbor staff will set up an evacuation assembly point at the Selva parking lot;
- Marina Operators will contact and advise vessel live-aboards, guest dock customers and all boaters of the tsunami warning and any designated evacuation procedures.
- Dana Point Harbor Patrol will conduct patrols of all dock areas by water, advising persons on the docks of the potential tsunami threat.

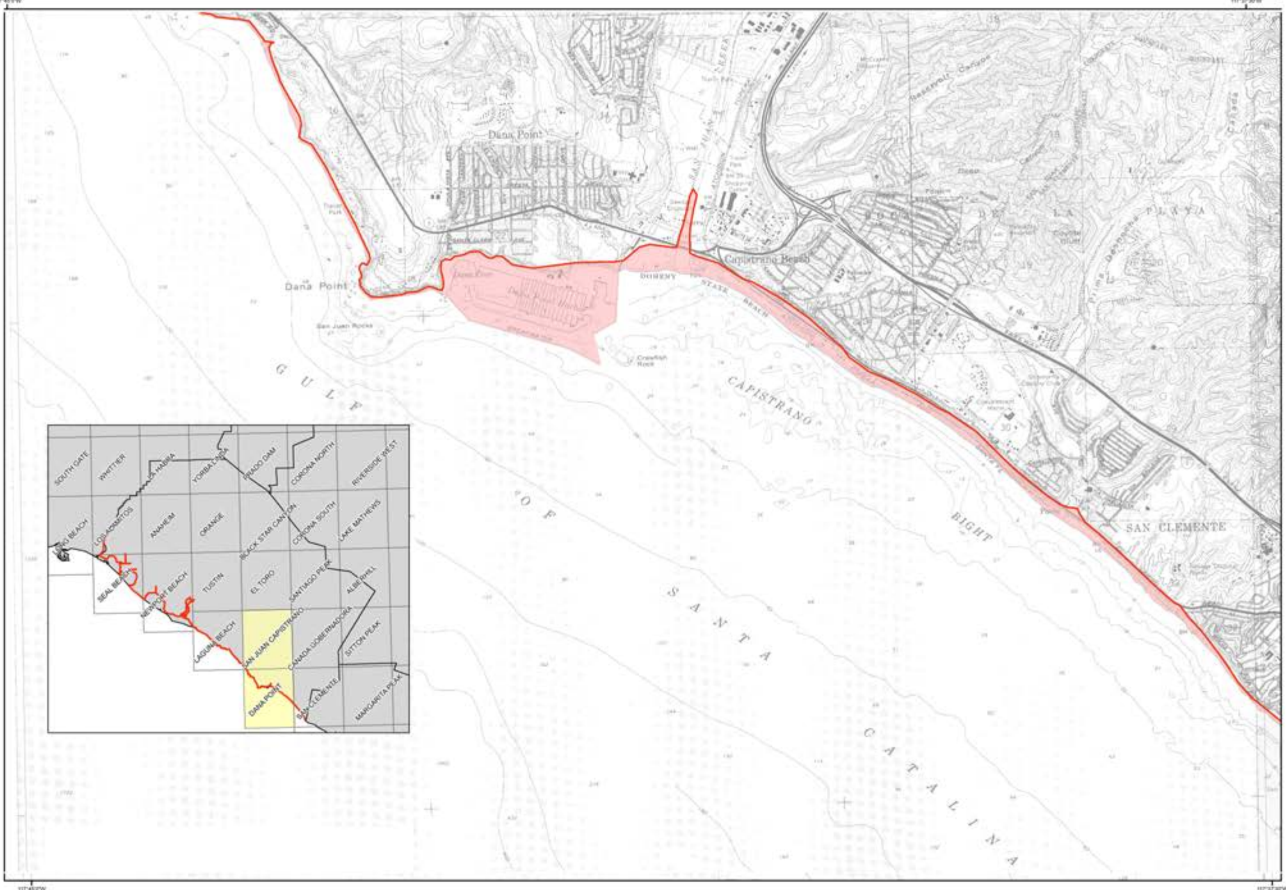
The types of tsunami alerts include:

- Tsunami Warning – issued when a potential tsunami with significant widespread inundation is imminent or expected. Warnings are intended to alert the public that widespread, dangerous coastal flooding accompanied by powerful currents is possible and may continue for several hours after the arrival of the initial wave.
- Tsunami Advisory – issued due to the threat of a potential tsunami and may include closing beach areas, evacuating marina areas and recommending the repositioning of vessels to deep waters when there is time to safely do so.
- Tsunami Watch – issued to alert emergency management officials and the public of an event that may later impact the watch area.
- Major Earthquake – initiates evacuation of Harbor facilities immediately and may not allow formal alert procedures to be initiated.

California Emergency Management Agency
California Geological Survey
University of Southern California

Tsunami Inundation Map for Emergency Planning
Dana Point Quadrangle/San Juan Capistrano Quadrangle

State of California
County of Orange



METHOD OF PREPARATION

Initial tsunami modeling was performed by the University of Southern California (USC) Tsunami Research Center funded through the California Emergency Management Agency (CalEMA) by the National Tsunami Hazard Mitigation Program. The tsunami modeling process utilized the MOST (Method of Splitting Tsunamis) computational program (Version 0), which allows for wave evolution over a variable bathymetry and topography used for the inundation mapping (Titov and Gonzalez, 1997; Titov and Synolakis, 1998).

The bathymetric/topographic data that were used in the tsunami models consist of a series of nested grids. Near-shore grids with a 3 arc-second (75- to 90-meters) resolution or higher, were adjusted to "Mean High Water" sea-level conditions, representing a conservative sea level for the intended use of the tsunami modeling and mapping.

A suite of tsunami source events was selected for modeling, representing realistic local and distant earthquakes and hypothetical extreme undersea, near-shore landslides (Table 1). Local tsunami sources that were considered include offshore reverse-thrust faults, restraining bends on strike-slip fault zones and large submarine landslides capable of significant seafloor displacement and tsunami generation. Distant tsunami sources that were considered include great subduction zone events that are known to have occurred historically (1960 Chile and 1964 Alaska earthquakes) and others which can occur around the Pacific Ocean "Ring of Fire."

In order to enhance the result from the 75- to 90-meter inundation grid data, a method was developed utilizing higher-resolution digital topographic data (3- to 10-meters resolution) that better defines the location of the maximum inundation line (U.S. Geological Survey, 1993; Intermap, 2003; NOAA, 2004). The location of the enhanced inundation line was determined by using digital imagery and terrain data on a GIS platform with consideration given to historic inundation information (Lander, et al., 1993). This information was verified, where possible, by field work coordinated with local county personnel.

The accuracy of the inundation line shown on these maps is subject to limitations in the accuracy and completeness of available terrain and tsunami source information, and the current understanding of tsunami generation and propagation phenomena as expressed in the models. Thus, although an attempt has been made to identify a credible upper bound to inundation at any location along the coastline, it remains possible that actual inundation could be greater in a major tsunami event.

This map does not represent inundation from a single scenario event. It was created by combining inundation results for an ensemble of source events affecting a given region (Table 1). For this reason, all of the inundation region in a particular area will not likely be inundated during a single tsunami event.

References:

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National Atmospheric and Oceanic Administration (NOAA), 2004, Interferometric Synthetic Aperture Radar (IfSAR) Digital Elevation Models from GeoSAR platform (EarthData): 3-meter resolution data.

Titov, V.V., and Gonzalez, F.I., 1997, Implementation and Testing of the Method of Tsunami Splitting (MOST): NOAA Technical Memorandum ERL PMEL – 112, 11 p.

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TSUNAMI INUNDATION MAP FOR EMERGENCY PLANNING

State of California ~ County of Orange
DANA POINT QUADRANGLE
SAN JUAN CAPISTRANO QUADRANGLE

March 15, 2009

SCALE 1:24,000

Table 1: Tsunami sources modeled for the Orange County coastline.

Sources (M = moment magnitude used in modeled event)		Areas of Inundation Map Coverage and Sources Used		
		Long Beach Harbor	Newport Harbor	Dana Point
Local Sources	Catalina Fault	X	X	X
	Channel Island Thrust Fault			X
	Newport-Inglewood Fault	X	X	X
	San Mateo Thrust Fault			X
	Palos Verdes Submarine Landslide #1	X	X	
	Palos Verdes Submarine Landslide #2	X	X	
Distant Sources	Cascadia Subduction Zone #3 (M9.2)	X		X
	Central Aleutians Subduction Zone#1 (M8.9)	X		X
	Central Aleutians Subduction Zone#2 (M8.9)	X		X
	Central Aleutians Subduction Zone#3 (M9.2)	X	X	X
	Chile North Subduction Zone (M9.4)	X	X	X
	1960 Chile Earthquake (M9.3)	X	X	X
	1952 Kamchatka Earthquake (M9.0)			X
	1964 Alaska Earthquake (M9.2)	X	X	X
	Japan Subduction Zone #2 (M8.8)	X		X
	Kuril Islands Subduction Zone #2 (M8.8)	X		X
	Kuril Islands Subduction Zone #3 (M8.8)	X		X
	Kuril Islands Subduction Zone #4 (M8.8)	X		X

MAP EXPLANATION

Tsunami Inundation Line
Tsunami Inundation Area

PURPOSE OF THIS MAP

This tsunami inundation map was prepared to assist cities and counties in identifying their tsunami hazard. It is intended for local jurisdictional, coastal evacuation planning uses only. This map, and the information presented herein, is not a legal document and does not meet disclosure requirements for real estate transactions nor for any other regulatory purpose.

The inundation map has been compiled with best currently available scientific information. The inundation line represents the maximum considered tsunami runup from a number of extreme, yet realistic, tsunami sources. Tsunamis are rare events; due to a lack of known occurrences in the historical record, this map includes no information about the probability of any tsunami affecting any area within a specific period of time.

Please refer to the following websites for additional information on the construction and/or intended use of the tsunami inundation map:

State of California Emergency Management Agency, Earthquake and Tsunami Program: http://www.oes.ca.gov/WebPage/oeswebsite.nsf/Content/B1EC51BA215931768825741F005E8D80?OpenDocument

University of Southern California – Tsunami Research Center: http://www.usc.edu/dept/tsunamis/2005/index.php

State of California Geological Survey Tsunami Information: http://www.conservation.ca.gov/cgs/geologic_hazards/Tsunami/index.htm

National Oceanic and Atmospheric Agency Center for Tsunami Research (MOST model): http://nctr.pmel.noaa.gov/time/background/models.html

MAP BASE

Topographic base maps prepared by U.S. Geological Survey as part of the 7.5-minute Quadrangle Map Series (originally 1:24,000 scale). Tsunami inundation line boundaries may reflect updated digital orthophotographic and topographic data that can differ significantly from contours shown on the base map.

DISCLAIMER

Emergency Response Plan

The City's Emergency Plan designates procedures that will be followed in responding to anticipated emergencies within the City of Dana Point. The plan describes how the City will prepare for, respond to and recover from an emergency or disaster. It is consistent with state and federal guidelines regarding disaster planning. This includes consistency with the State Administrative Manual (SAM) policies for disasters as well as Federal Emergency Management Agency (FEMA) guidelines. Additionally, the City maintains an Emergency Operations Center (EOC) and communications equipment to coordinate City services during local emergencies such as fires and power outages. Orange County's Emergency Response Plan provides a detailed summary of the countywide organization and identifies the responsibilities of each component agency in the event of a disaster. The Orange County and Operational Area Emergency Operations Center (OC OA/EOC) is used for managing disaster response and recovery for County agencies, departments and constituents served by the County. The OC OA/EOC coordinates disaster response and recovery for its operational area (including all political subdivisions of Orange County) and coordinates operations resource requirements and availability with the State Regional Operations Center. The OC OA/EOC acts as a central point for coordination, and operational, administrative and support needs of the emergency workers.

The OC OA/EOC is staffed with personnel from agencies within the County and various operational area jurisdictions and agencies (this may include but not limited to County personnel from law enforcement, public works, transportation, fire services, etc.) depending on the nature of the emergency. According to the City's General Plan, Pacific Coast Highway, Dana Point Harbor Drive and Street of the Golden Lantern are designated as evacuation routes. Cove Road is also designated as a secondary evacuation route.

Recommendations

1. The analysis of a range of likely changes in future sea level provides some opportunity to adapt to changing sea level. Such evaluations provide some flexibility with regard to the uncertainty concerning sea level rise, providing an approach to progressively analyze projects in the face of uncertainty that would not involve the imposition of mandatory design standards based upon future sea level evaluations that may not be realized during the economic life of a particular project or structure.
2. OC Dana Point Harbor will consult on at least an annual basis to evaluate any changes to the San Juan Creek Watershed that could affect the Harbor.
3. OC Dana Point Harbor will conduct consultations with OC Flood Control staff on at least an annual basis to review any changes to the San Juan Creek watershed have the potential to affect the Harbor breakwater or other shoreline hazard protection devices.
4. Improvements in the management of potential flooding events due to revisions in regulatory standards and/or new available technologies will be evaluated as part of subsequent updates to the Shoreline Management Plan.
5. Designated emergency evacuation routes will be coordinated with the City of Dana Point to ensure a well coordinated public information program.
6. The design of future structures will consider adequate setback distances from the seawall to minimize damage associated with existing and projected storm wave uprush and sea level rise.

7. Regular assessments of the shoreline protective devices maintenance expenditures in the Harbor shall be completed to determine the reliability of useful life estimates
8. Regular monitoring of groundwater levels will be conducted as future projects are evaluated to determine any impacts, if any on infrastructure, drainage and water quality devices.
9. Any replacement of marina dock facilities should be in accordance with Department of Boating and Waterways design standards and construction guidelines.

Conclusion

Implementation of the Dana Point Harbor Revitalization Plan satisfies a number of Local Coastal Program Land Use Plan Policies in compliance with the California Coastal Act. These policies include principle objectives related to the siting of development to facilitate coastal-dependent priority uses as well as providing recreational amenities to encourage coastal access by the public.

It is clear that the science of climate change and sea level rise is evolving and is presently proceeding with little guidance from state or federal agencies. As of this writing, there are no regional or local action plans or general or specific plan provisions to reduce the effects of sea level rise. Additionally, the County of Orange and the City of Dana Point have each not adopted any quantitative thresholds of significance for sea level rise as it relates to the placement of structures within areas potentially susceptible to the effects of sea level rise and/or wave uprush.

Presently there are wide deviations in the reliability of data interpretation conclusions. Possible reasons likely have to do with durations used to acquire data, number of monitoring stations, reliability of the measurement devices, standardized protocols data gathering, technological advances in measurement devices and methods of data aggregation and analysis. Nonetheless, it is significant that, despite the differences, both the recent and earlier studies all find a positive trend in global MSL, although systematic bias can be attributed to any such investigations.

Continued efforts to incorporate adaptive design solutions as architectural, engineering and technological solutions are developed, supplemented with on-going monitoring should negate the effects of the various estimates of SLR over the life of the proposed Dana Point Harbor Revitalization Plan facilities and ensure public safety to the greatest extent practicable.

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   Preliminary Geological/Geotechnical Assessment Report for the Dana Point Harbor Revitalization Project Environmental Impact Report

10. BlueWater Design Group, January 2005
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    Geotechnical Engineering Exploration and Analysis for the Proposed Renovations to Dana Point Harbor, City of Dana Point, California

12. US Army Corps of Engineers, October 2011
Sea Level Change Considerations for Civil Works Programs

13. California Department of Boating and Waterways, Layout and Design Guidelines for Marina Berthing Facilities, July 2005

14. Preliminary Geological/Geotechnical Assessment Report For the Dana Point Harbor Revitalization Project Environmental Impact Report, GeoPentech, January 2004

APPENDICES

2012 DATA SUMMARY

Date	Time	State of Sea		Air Temp	Pressure
		Height (feet)	Period (seconds)		
01/01/12	0930	2.9	13.3	49	30.12
01/01/12	1535	3	13.3	63	30.05
01/07/12	0930	4.7	15.4	53	30.01
01/07/12	1530	3.8	15.4	52	29.95
01/15/12	0815	1.8	13.3	53	30.10
01/15/12	1635	1.5	13.3	59	30.04
01/22/12	0800	3.3	13.3	51	30.12
01/22/12	1625	5.3	15.4	59	30.10
01/30/12	0808	1.5	13.3	49	29.99
01/30/12	1530	1.8	13.3	60	29.95
02/07/12	0830	1.8	14.3	60	29.88
02/07/12	1500	3.1	14.4	60	29.87
02/17/12	1000	2.5	13.3	60	30.15
02/17/12	1530	2.1	12.5	63	30.07
02/23/12	0950	2.4	9.1	59	29.85
02/23/12	1540	2.9	9.1	74	29.78
2/25/12	0900	2.6	12.5	59	30.09
2/25/12	1700	2.2	11.8	57	29.97
03/04/12	0730	1.3	16.7	55	30.07
03/04/12	1430	1.4	16.7	73	29.74
03/11/12	0800	3	14.3	55	30.01
03/11/12	1630	2.6	14.3	59	29.97
03/18/12	0750	10.0	8.3	51	29.76
03/18/12	1545	10.3	7.7	54	29.86
03/27/12	0825	3	15.4	51	30.08
03/27/12	1635	2.8	13.3	58	30.01
03/31/12	0745	4.5	18.2	55	30.01
03/31/12	1530	4.3	18.2	60	29.98
04/11/12	0900	4.8	5.0	57	24.96
04/11/12	1630	3.5	14.3	60	30.03
04/15/12	0730	5.5	9.1	48	30.13
04/15/12	1535	4.4	11.8	60	30.09
04/22/12	0730	3.1	10.0	58	29.92
04/22/12	1545	2.8	15.4	61	29.93
04/30/12	0730	3.5	14.3	62	29.91
04/30/12	1600	4.2	15.4	63	29.94
05/07/12	0730	3.0	14.3	58	29.95
05/07/12	1530	2.9	14.3	64	29.89
05/13/12	0805	2.4	14.3	61	30.09
05/13/12	1530	2.6	20.0	63	29.98
05/25/12	0730	3.8	8.3	62	29.31
05/25/12	1620	4.0	8.3	64	29.74
05/27/12	0725	2.5	7.1	56	30.02
05/27/12	1700	2.5	5.9	64	29.92
06/03/12	0715	3.0	8.3	64	29.84
06/03/12	1525	3.3	7.1	68	29.87
06/10/12	0930	4.0	11.1	63	24.88
06/10/12	1630	4.6	10.5	66	29.85
06/22/12	1615	2.9	15.4	66	29.81
06/22/12	0930	3.1	7.1	64	29.88
06/25/12	0930	3.3	13.3	65	29.98
06/25/12	1630	2.4	13.3	67	29.89

2012 DATA SUMMARY (continued)

Date	Time	State of Sea		Air Temp	Pressure
		Height (feet)	Period (seconds)		
07/03/12	0930	3.0	7.7	63	29.87
07/03/12	1600	2.4	12.5	68	29.85
07/08/12	0930	2.5	14.3	60	29.98
07/08/12	1700	2.7	14.3	66	29.90
07/17/12	0930	4.8	10	68	29.96
07/17/12	1700	4.8	10	70	29.91
07/23/12	0730	3.0	16.7	66	29.93
07/23/12	1530	3.0	16.7	70	29.90
07/30/12	0730	2.4	15.4	65	29.92
07/30/12	1615	2.3	15.4	69	29.91
08/05/12	0730	2.1	22.2	67	29.93
08/05/12	1715	2.7	20.0	69	29.88
08/12/12	no data	no data	no data	no data	no data
08/12/12	no data	no data	no data	no data	no data
08/21/12	0930	2.2	17.8	70	29.83
08/21/12	1530	2.5	18.2	76	29.84
08/27/12	1030	1.9	5.9	73	29.93
08/27/12	1600	2.1	13.3	75	29.86
09/02/12	no data	no data	no data	no data	no data
09/02/12	no data	no data	no data	no data	no data
09/09/12	no data	no data	no data	no data	no data
09/09/12	no data	no data	no data	no data	no data
09/15/12	0830	3.0	15.4	67	29.98
09/15/12	1530	3.3	15.4	71	29.96
09/20/12	1030	4.2	11.3	72	29.89
09/20/12	1530	3.7	14.3	74	29.83
09/30/12	no data	no data	no data	no data	no data
09/30/12	no data	no data	no data	no data	no data
10/07/12	0830	3.0	13.3	70	29.83
10/07/12	1600	3.2	15.4	73	29.83
10/13/12	0900	2.1	12.5	60	30.14
10/13/12	1600	2.1	12.5	69	30.00
10/19/12	1030	2.8	13.3	70	29.94
10/19/12	1630	3.2	14.3	70	29.84
10/28/12	no data	no data	no data	no data	no data
10/28/12	no data	no data	no data	no data	no data
11/05/12	1100	2.5	11.8	76	29.98
11/05/12	1600	2.5	9.1	74	29.93
11/11/12	0900	2.6	14.3?	57	30.06
11/11/12	1530	2.6	14.3	61	30.14
11/18/12	no data	no data	no data	no data	no data
11/18/12	no data	no data	no data	no data	no data
11/25/12	0930	2.0	13.3	57	29.93
11/25/12	1630	1.8	13.3	60	29.85
12/02/12	no data	no data	no data	no data	no data
12/02/12	no data	no data	no data	no data	no data
12/09/12	no data	no data	no data	no data	no data
12/09/12	no data	no data	no data	no data	no data
12/16/12	no data	no data	no data	no data	no data
12/16/12	no data	no data	no data	no data	no data
12/23/12	no data	no data	no data	no data	no data
12/23/12	no data	no data	no data	no data	no data
12/30/12	no data	no data	no data	no data	no data
12/30/12	no data	no data	no data	no data	no data

2011 DATA SUMMARY

Date	Time	State of Sea		Air Temp	Pressure
		Height (feet)	Period (seconds)		
01/02/11	0900	1.1	11.8	52	30.10
01/02/11	1500	1.9	16.7	57	29.99
01/08/11	0900	2.4	15.4	51	30.00
01/08/11	1530	3.3	14.3	59	29.94
01/16/11	0900	3.0	15.4	63	30.11
01/16/11	1500	3.2	15.4	72	29.95
01/25/11	0900	3.1	15.4	63	30.02
01/25/11	1500	3.0	15.4	66	29.94
01/30/11	0900	3.8	11.8	57	30.12
01/30/11	1530	3.7	12.5	60	30.04
02/06/11	0830	2.8	14.3	65	30.08
02/06/11	1550	2.9	14.3	66	30.07
02/13/11	0830	1.9	14.3	67	30.10
02/13/11	1550	1.7	14.3	61	30.06
02/20/11	0850	4.0	6.7	48	30.01
02/20/11	1530	4.0	7.1	57	30.02
02/27/11	0830	3.1	7.7	47	30.00
02/27/11	1530	3.8	9.1	56	30.06
03/06/11	1120	2.3	14.3	64	29.98
03/06/11	1530	2.7	5.9	61	29.94
03/13/11	0930	2.5	13.3	53	30.15
03/13/11	1530	2.4	13.5	68	30.15
03/20/11	0920	4.1	13.3	58	29.84
03/20/11	1530	7.4	5.6	58	29.74
03/26/11	0900	5.5	15.4	59	30.00
03/26/11	1500	4.1	14.3	62	29.98
04/02/11	0900	3.4	16.7	64	29.90
04/02/11	1530	3.6	15.4	66	29.90
04/10/11	0930	3.9	14.3	60	30.20
04/10/11	1530	4.0	14.3	63	30.18
04/17/11	0800	3.3	7.7	58	29.83
04/17/11	1530	3.2	8.3	69	29.85
04/24/11	0815	3.7	16.7	58	29.98
04/24/11	1540	3.1	15.4	61	29.98
05/01/11	0930	2.3	15.4	69	30.01
05/01/11	1615	2.3	14.3	70	30.00
05/08/11	0955	2.7	6.3	66	29.92
05/08/11	1445	3.0	15.4	70	29.92
05/15/11	0840	3.0	13.3	59	29.98
05/15/11	1500	3.4	4.8	57	30.02
05/22/11	0930	3.7	7.7	67	29.92
05/22/11	1530	3.7	13.3	69	29.90
05/29/11	0930	4.9	7.1	61	29.78
05/29/11	1530	7.9	8.3	63	29.78
06/05/11	0930	3.9	9.1	61	30.02
06/05/11	1530	5.8	11.1	68	30.02
06/13/11	0930	1.9	14.3	62	29.96
06/13/11	1530	2.4	13.3	66	29.93
06/18/11	0930	3.1	12.5	66	29.92
06/18/11	1600	2.9	14.3	66	29.57
06/26/11	0930	3.8	16.7	66	29.84
06/26/11	1530	4.1	16.7	66	24.80

2011 DATA SUMMARY (continued)

Date	Time	State of Sea		Air Temp	Pressure
		Height (feet)	Period (seconds)		
07/04/11	1045	2.2	13.3	70	29.32
07/04/11	1630	2.1	10.5	74	29.8
07/10/11	0900	3.9	20	69	29.83
07/10/11	1530	4.6	18.2	76	29.82
07/18/11	0900	2.5	5.9	65	29.87
07/18/11	1630	2.0	6.3	71	29.82
07/24/11	0930	2.3	11.8	65	29.98
07/24/11	1530	2.3	13.3	67	29.97
07/30/11	0930	2.9	14.3	66	29.91
07/30/11	1530	3.4	4.2	67	no data
08/08/11	0845	3.4	16.7	63	29.93
08/08/11	1530	3.2	16.7	69	29.89
08/14/11	0750	2.7	15.4	67	29.87
08/14/11	1630	2.9	15.4	68	29.84
08/22/11	0745	2.7	11.8	65	29.94
08/22/11	1530	3.0	10.0	69	29.88
08/27/11	0930	3.2	7.7	71	29.84
08/27/11	1600	3.4	18.2	89	29.86
09/02/11	0900	4.5	18.2	66	29.87
09/02/11	1700	4.5	18.2	66	29.83
09/12/11	0800	2.9	10	67	30.01
09/12/11	1640	3.1	16.7	69	29.95
09/18/11	0930	1.9	12.5	63	30.01
09/18/11	1640	2.0	13.3	68	29.94
09/24/11	0710	2.2	13.3	64	29.97
09/24/11	1500	1.9	15.4	67	29.91
10/02/11	0915	2.4	8.3	69	29.97
10/02/11	1500	2.3	8.1	73	29.88
10/04/11	0930	2.1	10	61	29.94
10/04/11	1630	2.3	11.8	65	29.91
10/17/11	0730	2.2	12.5	57	29.99
10/17/11	1530	1.9	10.0	63	29.97
10/23/11	0800	1.6	10.5	58	29.94
10/23/11	1530	1.4	12.5	61	29.91
10/30/11	0900	1.7	15.4	63	29.99
10/30/11	1500	1.9	15.4	63	29.94
11/06/11	1015	3.8	15.4	58	29.98
11/06/11	1530	3.7	15.4	59	29.93
11/13/11	0830	3.8	7.1	59	29.84
11/13/11	1700	4.0	6.7	65	24.88
11/20/11	1030	3.1	3.9	58	29.97
11/20/11	1530	4.1	5.0	60	29.90
11/27/11	0740	2.5	12.5	60	30.20
11/27/11	1545	2.6	13.3	78	30.13
12/04/11	0945	2.5	13.3	55	30.16
12/04/11	1530	2.5	12.5	59	30.08
12/11/11	0930	3.2	16.7	54	29.96
12/11/11	1545	2.7	16.7	58	29.88
12/18/11	1000	2.8	13.3	59	30.10
12/18/11	1530	2.9	16.7	60	30.05
12/27/11	0930	4.1	14.3	50	30.16
12/27/11	1530	3.8	14	66	30.16

2010 DATA SUMMARY

Date	Time	State of Sea		Air Temp	Pressure
		Height (feet)	Period (seconds)		
01/02/10	0930	3.7	11.8	60	30.02
01/02/10	1530	4.3	11.1	66	29.96
01/12/10	0930	4.0	13.3	68	30.10
01/12/10	1530	3.8	13.3	60	30.08
01/17/10	0930	3.5	12.5	62	29.96
01/17/10	1530	3.1	13.3	61	29.92
01/23/10	0930	7.6	14.3	55	29.99
01/23/10	1530	7.5	15.4	59	30.01
01/30/10	0930	3.6	14.3	64	29.97
01/30/10	1530	4.3	14.3	62	29.90
02/07/10	0930	7.4	14.3	58	29.90
02/07/10	1530	6.8	14.3	60	29.88
02/17/10	0930	3.0	13.3	63	29.95
02/17/10	1530	2.7	13.3	67	29.90
02/21/10	0900	5.8	11.8	58	29.99
02/21/10	1500	6.0	12.5	63	29.98
02/28/10	0900	9.4	16.7	57	29.90
02/28/10	1600	7.3	14.3	64	29.93
03/07/10	0900	3.8	14.3	64	29.79
03/07/10	1600	5.8	14.3	68	29.80
03/14/10	0930	4.0	13.3	60	30.01
03/14/10	1530	3.5	13.3	65	30.01
03/21/10	0930	2.0	13.3	61	30.10
03/21/10	1600	1.7	14.3	67	30.02
03/26/10	0930	4.0	15.4	62	30.06
03/26/10	1530	3.8	13.3	65	30.02
04/03/10	0930	4.2	14.3	61	29.98
04/03/10	1530	3.3	15.4	63	29.92
04/12/10	0930	5.1	14.3	62	29.94
04/12/10	1530	5.1	10.0	63	29.95
04/17/10	0930	3.0	16.7	64	29.94
04/17/10	1530	3.1	15.4	67	29.90
04/26/10	0930	2.0	15.4	58	29.93
04/26/10	1530	2.0	15.4	62	29.90
05/02/10	1200	2.8	7.7	67	29.95
05/02/10	1550	3.1	10.5	66	29.95
05/08/10	0930	3.4	13.3	68	29.91
05/08/10	1530	2.7	13.3	68	29.90
05/15/10	0930	2.9	16.7	61	29.95
05/15/10	1530	3.4	16.7	65	29.94
05/23/10	0930	8.9	8.3	58	29.87
05/23/10	1530	9.2	18.2	64	29.85
05/30/10	0930	2.8	9.1	67	29.90
05/30/10	1530	2.7	9.1	72	29.88
06/06/10	0900	3.3	11.1	67	29.94
06/06/10	1530	3.1	11.8	72	29.94
06/14/10	0930	2.4	18.2	70	29.95
06/14/10	1530	2.5	16.7	68	29.90
06/19/10	0930	3.6	7.7	68	29.99
06/19/10	1530	2.7	15.4	70	29.98
06/26/10	0930	3.8	16.7	64	29.94
06/26/10	1530	3.5	18.2	72	29.91

2010 DATA SUMMARY (continue)

Date	Time	State of Sea		Air Temp	Pressure
		Height (feet)	Period (seconds)		
07/05/10	0900	5.2	16.7	65	29.97
07/05/10	1530	4.0	16.7	67	29.94
07/11/10	0930	2.1	15.4	64	29.92
07/11/10	1530	2.0	15.4	68	29.92
07/17/10	0930	2.9	6.7	73	29.91
07/17/10	1530	3.1	15.4	73	29.88
07/25/10	0930	3.0	15.4	63	29.90
07/25/10	1530	3.1	15.4	68	29.88
08/01/10	0930	3.0	16.7	66	29.93
08/01/10	1530	3.1	16.7	74	29.88
08/08/10	0930	2.6	15.4	66	29.90
08/08/10	1530	2.7	14.3	69	29.89
08/14/10	0930	2.6	6.3	69	29.88
08/14/10	1530	2.7	61.6	66	29.86
08/21/10	0930	3.6	16.7	67	29.84
08/21/10	1530	4.1	16.7	69	29.83
08/28/10	0930	3.4	16.7	65	29.82
08/28/10	1530	3.8	15.4	70	29.79
09/07/10	0945	2.9	10	69	29.85
09/07/10	1600	3.0	9.1	73	29.83
09/11/10	0945	2.2	13.3	73	29.96
09/11/10	1530	2.7	15.4	67	29.92
09/19/10	0930	3.6	15.5	68	29.88
09/19/10	1700	3.4	14.3	67	29.78
09/25/10	0930	1.6	14.3	71	29.90
09/25/10	1530	1.7	10.0	76	29.84
10/03/10	0930	2.9	15.4	70	29.97
10/03/10	1530	2.4	15.4	72	29.92
10/10/10	0930	1.9	10.0	71	29.98
10/10/10	1530	2.2	10.0	74	29.86
10/17/10	0930	3.0	14.3	66	30.02
10/17/10	1540	2.8	14.3	69	30.00
10/23/10	0930	2.7	16.7	64	30.07
10/23/10	1530	3.4	16.7	70	30.03
10/31/10	0930	3.1	12.5	67	30.10
10/31/10	1530	2.7	10.5	70	30.03
11/07/10	0930	3.4	11.1	74	31.00
11/07/10	1530	3.5	12.5	68	30.06
11/13/10	0900	2.5	15.4	62	30.10
11/13/10	1530	3.3	7.1	71	29.98
11/21/10	0930	3.3	15.4	58	29.92
11/21/10	1600	4.9	6.3	59	30.02
11/28/10	0930	4.2	7.1	52	29.97
11/28/10	1530	5.1	6.7	58	29.94
12/05/10	0900	2.4	16.7	56	30.06
12/05/10	1530	2.5	15.4	60	30.02
12/12/10	0930	2.0	10.0	65	30.11
12/12/10	1530	2.1	8.3	76	29.99
12/19/10	0930	4.0	4.8	61	29.94
12/19/10	1500	5.0	4.8	63	29.85
12/26/10	0940	4.0	8.3	58	30.14
12/26/10	1500	3.3	13.3	61	30.14

2009 DATA SUMMARY

Date	Time	State of Sea		Air Temp	Pressure
		Height (feet)	Period (seconds)		
01/06/09	0930	2.8	14.3	54	30.12
01/06/09	1530	2.9	15.4	58	30.08
01/11/09	0930	1.5	13.3	63	30.24
01/11/09	1530	1.8	16.7	76	30.10
01/18/09	0930	2.4	16.7	71	30.12
01/18/09	1530	2.2	13.3	75	30.10
01/26/09	0930	6.2	7.1	56	30.00
01/26/09	1530	4.6	6.7	58	29.96
02/01/09	0930	1.9	12.5	66	30.04
02/01/09	1530	2.1	7.1	61	30.02
02/07/09	0930	3.5	11.8	63	29.84
02/07/09	1530	4.0	12.5	60	29.82
02/15/09	0930	2.9	10.0	54	30.02
02/15/09	1530	2.0	8.3	60	29.95
02/22/09	1000	2.1	11.8	62	30.06
02/22/09	1530	2.0	16.7	68	30.00
03/01/09	0930	1.6	15.4	68	30.00
03/01/09	1530	2.0	14.3	72	29.95
03/08/09	0930	1.3	11.8	64	30.00
03/08/09	1600	1.4	11.8	70	30.00
03/16/09	0930	3.2	14.3	58	30.15
03/16/09	1530	3.4	15.4	60	30.09
03/22/09	0930	2.2	11.1	59	30.06
03/22/09	1530	6.6	6.3	64	30.08
03/30/09	0930	3.1	14.3	62	29.96
03/30/09	1830	3.6	14.3	60	29.94
04/03/09	0900	3.2	7.1	54	29.82
04/03/09	1530	3.6	8.3	63	29.80
04/12/09	0930	3.1	6.7	60	30.12
04/12/09	1530	3.0	16.7	67	30.04
04/19/09	0930	2.0	14.3	71	29.90
04/19/09	1530	1.9	14.3	78	29.92
04/26/09	0930	3.5	14.3	59	30.00
04/26/09	1530	4.0	8.3	69	30.00
05/03/09	0930	2.9	14.3	65	30.00
05/03/09	1530	3.0	15.4	72	30.02
05/11/09	0930	2.7	9.1	64	29.89
05/11/09	1530	3.1	9.1	68	29.88
05/17/09	0930	2.3	7.7	64	29.94
05/17/09	1530	2.3	7.7	68	29.90
05/24/09	0930	3.0	14.3	63	29.96
05/24/09	1530	3.3	14.3	68	29.94
05/31/09	0930	1.8	15.4	62	29.96
05/31/09	1530	2.0	13.3	67	29.92
06/07/09	0930	2.5	15.4	67	29.95
06/07/09	1530	2.5	14.3	71	29.90
06/15/09	0930	4.0	16.7	66	29.95
06/15/09	1530	3.8	15.4	73	29.94
06/21/09	0930	3.2	7.1	66	29.86
06/21/09	1530	3.1	9.1	72	29.82
06/29/09	0930	2.7	16.7	64	29.84
06/29/09	1530	2.2	16.7	72	29.90

2009 DATA SUMMARY (continued)

Date	Time	State of Sea		Air Temp	Pressure
		Height (feet)	Period (seconds)		
07/05/09	0930	2.6	14.3	67	29.96
07/05/09	1530	2.7	16.7	68	29.92
07/12/09	0930	2.7	14.3	75	29.96
07/12/09	1530	2.6	13.3	77	29.97
07/18/09	0930	3.1	14.3	71	29.91
07/18/09	1530	2.9	13.3	72	29.84
07/25/09	0930	6.0	16.7	78	29.91
07/25/09	1530	5.8	15.4	77	29.91
08/01/09	0930	2.3	9.1	75	29.94
08/01/09	1530	2.2	13.3	76	29.94
08/08/09	0930	2.9	11.8	73	29.96
08/08/09	1530	3.2	14.3	74	29.93
08/15/09	0930	3.1	10.0	72	29.92
08/15/09	1530	2.9	9.1	74	29.92
08/22/09	0930	3.8	18.2	72	29.90
08/22/09	1530	3.7	16.7	77	29.89
08/31/09	0930	2.6	8.3	75	29.81
08/31/09	1530	2.4	10.0	75	29.78
09/05/09	0930	2.6	8.3	78	29.87
09/05/09	1530	2.9	7.7	75	29.83
09/14/09	0930	3.8	14.3	74	29.96
09/14/09	1530	3.3	13.3	74	29.94
09/22/09	0945	2.8	15.4	66	29.82
09/22/09	1500	3.0	15.4	71	29.85
09/27/09	0930	3.0	16.7	69	29.88
09/27/09	1530	2.6	13.3	73	29.78
10/03/09	0930	2.6	20.0	70	29.78
10/03/09	1530	3.8	10.5	73	29.70
10/11/09	0900	1.5	11.8	65	29.86
10/11/09	1530	1.7	12.5	64	29.82
10/18/09	0930	2.0	13.3	67	29.95
10/18/09	1600	2.3	14.3	71	29.90
10/24/09	0930	2.5	13.3	68	29.92
10/24/09	1530	3.0	10.0	72	29.82
11/03/09	0930	2.3	16.7	63	29.98
11/03/09	1530	2.3	10.5	61	29.91
11/09/09	0930	2.5	15.4	61	30.01
11/09/09	1530	2.6	15.4	67	29.96
11/14/09	0930	3.5	7.1	63	29.99
11/14/09	1530	3.4	8.3	64	29.96
11/25/09	0930	2.5	15.4	68	29.99
11/25/09	1530	2.6	14.3	69	29.94
11/28/09	0930	9.0	8.3	56	29.80
11/28/09	1530	6.7	8.3	60	29.77
12/06/09	0930	2.9	2.0	55	29.91
12/06/09	1530	3.0	18.2	62	29.88
12/12/09	0930	2.5	14.3	60	30.01
12/12/09	1530	2.8	3.7	60	29.96
12/22/09	0930	10.0	8.3	56	29.85
12/22/09	1530	6.9	8.3	57	29.80
12/28/09	0930	4.1	14.3	58	30.02
12/28/09	1530	3.8	15.4	64	29.94

2008 DATA SUMMARY

Date	Time	State of Sea		Air Temp	Pressure
		Height (feet)	Period (seconds)		
01/06/08	0930	6.1	14.3	59	29.96
01/06/08	1530	6.3	12.5	57	29.94
01/13/08	0930	3.4	15.4	60	30.07
01/13/08	1530	3.5	14.2	67	30.12
01/20/08	0930	2.1	16.7	54	30.00
01/20/08	1530	2.1	15.4	60	29.90
01/27/08	0930	7.5	7.7	61	29.96
01/27/08	1530	6.5	7.7	60	29.86
02/03/08	0930	4.4	14.3	64	29.95
02/03/08	1530	5.7	6.3	64	29.86
02/10/08	1000	2.6	16.7	61	30.02
02/10/08	1530	3.0	15.4	66	29.99
02/17/08	0900	2.9	15.4	60	30.10
02/17/08	1530	2.5	15.4	64	30.00
02/24/08	0930	3.9	4.8	55	30.12
02/24/08	1530	5.7	18.2	61	30.12
03/02/08	0930	3.8	16.7	59	30.00
03/02/08	1530	4.1	16.7	63	29.98
03/09/08	0930	3.3	7.7	56	30.00
03/09/08	1530	2.7	12.5	69	29.98
03/16/08	0930	6.8	7.7	51	29.83
03/16/08	1530	6.6	11.8	58	29.83
03/23/08	0930	2.6	15.4	63	30.02
03/23/08	1530	2.6	10.0	72	30.00
03/30/08	0930	3.7	6.7	59	29.98
03/30/08	1530	4.4	7.7	61	30.02
04/06/08	0930	3.2	14.3	61	29.98
04/06/08	1530	2.8	13.3	65	30.00
04/13/08	0930	1.9	13.3	69	29.94
04/13/08	1530	2.2	12.5	83	29.90
04/20/08	0930	4.2	18.2	60	30.00
04/20/08	1530	3.4	16.7	63	30.00
04/27/08	0930	2.1	13.3	85	29.94
04/27/08	1530	2.2	13.3	85	29.90
05/04/08	0930	3.5	7.1	64	29.86
05/04/08	1530	3.0	6.7	66	29.86
05/11/08	0945	3.6	14.3	63	29.94
05/11/08	1530	3.1	14.3	66	29.92
05/18/08	0930	2.7	12.5	74	29.90
05/18/08	1530	3.3	13.3	78	29.88
05/25/08	0945	2.0	13.3	62	29.92
05/25/08	1530	2.0	13.3	62	29.90
06/08/08	0930	3.1	11.1	67	29.84
06/08/08	1530	3.1	18.2	71	29.84
06/15/08	0930	3.1	14.3	66	29.90
06/15/08	1530	3.6	18.2	67	29.88
06/22/08	0930	2.5	15.4	76	29.92
06/22/08	1530	2.7	14.3	82	29.90
06/29/08	0930	2.7	16.7	68	29.96
06/29/08	1530	3.5	15.4	70	29/92
07/06/08	0930	3.1	8.3	70	29.80
07/06/08	1530	2.8	7.7	74	29.76

2008 DATA SUMMARY (continued)

Date	Time	State of Sea		Air Temp	Pressure
		Height (feet)	Period (seconds)		
07/14/08	0915	2.5	12.5	72	29.92
07/14/08	1520	2.3	12.5	74	29.88
07/21/08	0930	3.9	14.3	71	29.92
07/21/08	1530	3.3	14.3	73	29.90
07/27/08	0930	2.3	15.4	76	29.96
07/27/08	1530	2.5	15.4	76	29.96
08/03/08	0930	2.4	14.3	71	29.86
08/03/08	1530	2.5	9.1	76	29.83
08/10/08	0930	2.8	11.1	75	29.94
08/10/08	1430	2.9	10.5	77	29.92
08/17/08	0930	2.5	16.7	74	29.88
08/17/08	1530	2.3	13.3	71	29.84
08/24/08	0930	2.4	15.4	69	29.84
08/24/08	1530	2.6	15.4	71	29.78
08/30/08	0930	2.7	15.4	75	29.74
08/30/08	1530	2.5	14.3	78	29.70
09/07/08	0930	2.3	18.2	68	29.78
09/07/08	1530	2.9	18.2	74	29.75
09/14/08	0930	2.4	13.3	66	29.93
09/14/08	1530	2.5	15.4	74	29.88
09/21/08	0930	2.6	14.3	68	29.94
09/21/08	1530	2.6	11.1	74	29.90
09/29/08	0930	3.0	14.3	67	29.87
09/29/08	1530	2.5	13.3	70	29.83
10/05/08	0930	4.8	15.4	66	29.90
10/05/08	1530	5.1	14.3	71	29.88
10/12/08	0930	2.5	11.8	64	29.95
10/12/08	1530	2.9	3.2	67	29.95
10/19/08	0930	2.6	14.3	61	30.00
10/19/08	1530	2.2	20.0	69	29.96
10/26/08	0930	3.6	14.3	66	30.04
10/26/08	1530	3.3	14.3	70	29.98
11/02/08	no data	no data	no data	no data	no data
11/02/08	no data	no data	no data	no data	no data
11/09/08	no data	no data	no data	no data	no data
11/09/08	no data	no data	no data	no data	no data
11/16/08	no data	no data	no data	no data	no data
11/16/08	no data	no data	no data	no data	no data
11/23/08	no data	no data	no data	no data	no data
11/23/08	no data	no data	no data	no data	no data
11/30/08	no data	no data	no data	no data	no data
11/30/08	no data	no data	no data	no data	no data
12/06/08	0930	2.6	13.3	65	30.12
12/06/08	1530	2.1	13.3	68	30.07
12/14/08	0930	3.9	6.7	58	30.02
12/14/08	1530	4.1	6.3	63	29.97
12/22/08	0930	2.6	3.3	54	29.90
12/22/08	1530	4.2	5.3	57	29.94
12/28/08	0930	1.7	6.7	56	30.22
12/28/08	1530	2.0	11.8	58	30.12

2007 DATA SUMMARY

Date	Time	State of Sea		Air Temp	Pressure
		Height (feet)	Period (seconds)		
01/08/07	0930	2.1	9.1	66	30.12
01/08/07	1530	2.6	14.3	80	30.00
01/16/07	0930	1.7	15.4	59	30.16
01/16/07	1530	1.9	14.3	59	30.10
01/21/07	0930	2.9	14.3	63	30.04
01/21/07	1530	2.2	13.3	64	29.97
01/28/07	0930	2.9	15.4	54	30.05
01/28/07	1530	2.4	12.5	60	30.00
02/04/07	0930	2.3	11.1	60	31.04
02/04/07	1530	2.3	12.5	70	30.03
02/12/07	0930	3.8	13.3	59	30.09
02/12/07	1530	3.8	15.4	62	30.03
02/20/07	0940	2.6	12.5	62	30.16
02/20/07	1530	2.6	12.5	62	30.10
02/25/07	0930	3.3	5.9	58	30.09
02/25/07	1530	3.5	5.9	62	30.02
03/05/07	0930	1.1	15.4	64	30.04
03/05/07	1530	1.2	15.4	70	30.00
03/14/07	0930	3.0	15.4	57	30.07
03/14/07	1530	3.6	15.4	62	30.02
03/19/07	0930	2.1	12.5	60	29.99
03/19/07	1530	1.9	13.3	66	29.98
03/25/08	0930	2.4	13.3	60	30.06
03/25/08	1530	2.9	12.8	57	30.50
04/01/07	0930	2.2	18.2	58	29.90
04/01/07	1530	2.3	18.2	64	29.85
04/08/07	0930	3.4	15.4	56	29.91
04/08/07	1530	3.1	15.4	71	29.90
04/15/07	0930	7.1	9.1	61	29.86
04/15/07	1530	6.1	8.3	60	29.88
04/23/07	0930	3.0	18.2	60	30.03
04/23/07	1530	3.1	15.4	64	30.03
04/29/07	0930	3.0	13.3	61	29.98
04/29/07	1530	3.1	13.3	70	29.94
05/06/07	0930	3.6	10.0	73	29.90
05/06/07	1530	2,9	10.0	72	29.86
05/13/07	0930	2.4	7.1	62	29.98
05/13/07	1530	2.2	6.7	65	29.95
05/20/07	0930	2.6	9.1	61	29.90
05/20/07	1530	2.5	9.1	71	29.87
05/27/07	0930	2.3	15.4	62	29.94
05/27/07	1530	2.5	15.4	71	29.93
06/03/07	0930	2.8	14.3	62	29.94
06/03/07	1530	3.1	15.4	70	29.94
06/10/07	0930	2.1	13.3	66	29.87
06/10/07	1530	2.2	13.3	70	29.85
06/17/07	0930	2.7	15.4	70	29.90
06/17/07	1530	2.0	16.7	71	29.88
06/24/07	0930	2.6	9.1	65	29.87
06/24/07	1530	2.8	9.1	70	29.86
07/01/07	0930	3.6	7.7	72	29.90
07/01/07	1530	3.1	7.7	76	29.88
07/08/07	0930	3.4	14.3	69	29.90
07/08/07	1530	3.3	13.3	76	29.89

2007 DATA SUMMARY (continued)

Date	Time	State of Sea		Air Temp	Pressure
		Height (feet)	Period (seconds)		
07/16/07	0930	2.6	8.3	68	29.90
07/16/07	1530	2.5	7.1	76	29.89
07/23/07	0930	2.2	9.1	71	29.91
07/23/07	1530	2.2	9.1	75	29.85
07/29/07	0930	2.3	8.3	74	29.86
07/29/07	1530	2.5	6.3	82	29.84
08/05/07	0930	1.8	12.5	71	29.93
08/05/07	1530	1.9	12.5	77	29.91
08/13/07	0915	2.4	11.8	76	29.92
08/13/07	1530	2.5	10.5	84	29.88
08/19/07	0930	2.7	20.0	76	29.83
08/19/07	1530	2.7	20.0	79	29.84
08/26/07	0930	2.9	14.3	71	29.89
08/26/07	1530	3.0	14.3	76	29.80
09/03/07	0930	3.6	15.4	84	29.78
09/03/07	1530	2.2	16.7	85	29.72
09/10/07	0930	2.0	12.5	69	29.94
09/10/07	1530	2.3	13.3	70	29.90
09/16/07	0930	2.9	16.7	67	29.94
09/16/07	1530	2.7	16.7	74	29.91
09/23/07	0930	2.5	14.3	66	29.94
09/23/07	1530	2.9	14.3	70	29.92
09/30/07	0930	1.9	16.7	68	29.95
09/30/07	1530	2.2	7.1	72	29.94
10/06/07	0930	4.2	7.7	64	30.02
10/06/07	1530	3.2	9.1	69	29.98
10/14/07	0930	2.6	15.4	64	29.92
10/14/07	1530	3.2	14.3	66	29.89
10/22/07	0930	3.6	14.3	78	30.14
10/22/07	1530	3.4	15.4	85	30.06
10/28/07	0930	2.2	12.5	69	30.09
10/28/07	1530	2,5	11.1	73	30.02
11/04/07	0930	2.5	16.7	64	30.02
11/04/07	1530	2.5	16.7	61	29.98
11/11/07	0930	2.3	14.3	62	29.95
11/11/07	1530	2.3	13.3	65	29.89
11/18/07	0930	2.8	13.3	58	29.99
11/18/07	1530	3.0	13.3	60	29.94
11/25/07	0930	1.9	15.4	63	30.00
11/25/07	1530	2.2	15.4	64	29.98
12/02/07	0930	2.2	15.4	57	30.31
12/02/07	1530	2.3	14.3	59	30.26
12/09/07	0930	3.4	11.8	56	29.97
12/09/07	1530	3.5	9.1	62	29.92
12/16/07	0930	2.0	15.4	55	30.04
12/16/07	1530	2.1	14.3	58	29.97
12/25/07	0945	3.7	12.5	no data	30.04
12/25/07	1500	3.6	15.4	65	30.10
12/30/07	0930	2.4	7.1	51	30.16
12/30/07	1530	2.7	7.7	59	30.06

2006 DATA SUMMARY

Date	Time	State of Sea		Air Temp	Pressure
		Height (feet)	Period (seconds)		
01/01/06	0930	4.1	13.3	57	29.98
01/01/06	1530	3.9	11.8	59	29.91
01/07/06	0915	4.6	14.3	60	30.00
01/07/06	1520	5.4	14.3	64	29.97
01/16/06	0930	4.1	6.7	52	30.25
01/16/06	1530	3.3	9.1	62	30.20
01/23/06	0930	2.6	14.3	66	30.10
01/23/06	1530	2.6	8.3	72	29.92
01/29/06	0930	2.4	12.2	59	30.12
01/29/06	1530	2.6	11.8	66	30.10
02/05/06	0930	3.1	15.4	66	29.88
02/05/06	1545	3.8	15.4	69	29.90
02/12/06	0950	3.8	14.3	73	30.12
02/12/06	1600	4.4	13.3	68	30.02
02/20/06	0930	2.2	16.7	59	30.14
02/20/06	1530	2.3	13.3	62	30.09
02/26/06	0930	1.4	15.4	56	30.02
02/26/06	1630	1.2	14.3	64	29.96
03/06/06	0930	2.4	11.1	57	30.12
03/06/06	1530	2.6	16.7	69	30.10
03/13/06	0930	3.2	10.0	64	30.19
03/13/06	1530	3.4	10.0	62	30.12
03/20/06	0830	3.2	11.0	54	29.93
03/20/06	1530	2.7	7.7	62	29.93
03/26/06	0930	2.9	6.7	58	29.98
03/26/06	1530	2.9	7.7	61	29.97
04/01/06	0945	2.6	3.3	59	30.10
04/01/06	1530	2.6	16.7	65	30.10
04/08/06	0940	2.3	14.3	62	30.06
04/08/06	1530	2.3	15.4	62	30.05
04/17/06	0930	3.1	15.4	60	30.06
04/17/06	1530	3.4	6.3	63	30.05
04/22/06	0930	2.1	14.3	62	29.90
04/22/06	1530	2.6	5.0	64	29.92
04/30/06	1020	2.2	14.3	69	29.96
04/30/06	1645	2.6	14.3	73	29.90
05/06/06	0930	3.3	16.7	63	29.98
05/06/06	1530	3.8	15.4	67	29.94
05/15/06	0930	3.8	15.4	64	29.92
05/15/06	1530	3.0	14.3	70	29.94
05/20/06	0930	3.9	14.3	70	29.94
05/20/06	1530	3.3	14.3	70	29.92
05/29/06	0930	3.3	6.7	69	29.96
05/29/06	1530	3.1	7.7	72	29.94
06/04/06	0930	3.6	7.7	70	29.82
06/04/06	1530	3.8	8.3	70	29.82
06/11/06	0945	2.6	16.7	70	29.82
06/11/06	1600	2.8	16.7	73	29.82
06/20/06	1000	4.7	18.2	75	29.92
06/20/06	1530	4.1	16.7	76	29.91
06/25/06	0900	3.1	13.1	70	29.92
06/25/06	1500	3.8	15.4	73	29.86
07/02/06	0930	3.0	15.4	71	29.89
07/02/06	1530	3.4	14.3	80	29.88
07/09/06	1000	2.7	14.3	78	29.84
07/09/06	1530	2.6	15.4	80	29.80

2006 DATA SUMMARY (continued)

Date	Time	State of Sea		Air Temp	Pressure
		Height (feet)	Period (seconds)		
07/16/06	0930	4.0	14.3	69	29.96
07/16/06	1530	3.8	10.0	84	29.92
07/24/06	0930	2.9	10.0	80	29.74
07/24/06	1530	3.1	14.3	87	29.66
07/31/06	0930	3.6	16.7	71	29.88
07/31/06	1530	3.0	15.4	78	29.86
08/05/06	0930	2.8	14.3	75	29.94
08/05/06	1530	3.0	14.3	77	29.92
08/11/06	0930	1.7	12.5	76	29.91
08/11/06	1540	1.8	12.5	80	29.86
08/18/06	1020	2.2	10.0	72	29.98
08/18/06	1500	2.2	15.0	74	29.94
08/23/06	0930	2.1	16.7	76	29.95
08/23/06	1530	2.1	15.4	77	29.91
09/04/06	0930	3.4	7.7	76	29.82
09/04/06	1530	3.2	7.1	74	29.80
09/11/06	0930	2.9	15.4	71	29.92
09/11/06	1500	3.4	15.4	70	29.87
09/17/06	0915	3.0	14.3	67	29.90
09/17/06	1500	2.5	18.2	75	29.86
09/24/06	0900	2.8	13.3	63	29.94
09/24/06	1530	3.7	14.3	77	29.86
10/01/06	0930	2.8	14.3	65	29.92
10/01/06	1530	2.7	11.8	75	29.88
10/08/06	1000	2.0	14.3	57	29.94
10/08/06	1550	2.2	14.3	70	29.90
10/15/06	1010	2.6	14.3	65	29.86
10/15/06	1530	2.4	13.3	67	29.82
10/24/06	0930	3.1	14.3	68	29.90
10/24/06	1530	3.1	15.4	70	29.87
10/29/06	0930	2.4	14.3	67	29.95
10/29/06	1530	2.5	14.3	72	29.90
11/06/06	0930	2.5	15.4	70	30.00
11/06/06	1530	2.4	14.3	79	29.94
11/12/06	0945	3.6	9.1	64	30.02
11/12/06	1545	4.7	9.1	66	29.98
11/19/06	0930	1.9	13.3	67	29.98
11/19/06	1530	2.2	13.3	70	29.94
11/26/06	0930	2.9	8.3	64	29.98
11/26/06	1530	2.5	7.7	68	29.94
12/04/06	0930	1.8	14.3	64	30.10
12/04/06	1530	1.6	13.3	69	30.02
12/12/06	0930	3.8	15.4	60	30.26
12/12/06	1530	4.0	14.3	63	30.20
12/18/06	0900	4.2	9.1	58	30.19
12/18/06	1500	2.7	125	64	30.04
12/24/06	0930	3.6	13.1	61	30.12
12/24/06	1530	3.0	12.5	69	30.20
12/31/06	0930	2.1	15.4	54	30.20
12/31/06	1530	2.5	13.3	62	30.10

DATE (month and year): Jan 2006 | NOAA FORM 72-5A (5-73)

U. S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

FORM APPROVED O.M.B. NO. 41-R2734

MARINE COASTAL WEATHER LOG — COASTAL STATION

STATION NAME: DANA POINT | STATE: CA | STATION CALL: 9L0 | LOCATION: 33 27 N (Latitude) 117 41 W (Longitude)

(1) DATE	(2) TIME	(3) SKY COND.	(3) PRESENT WEATHER	(4) VISIBILITY (miles)	(5) WIND DIR	(5) WIND SPEED (knots)	(6) STATE OF SEA HEIGHT (feet)	(6) STATE OF SEA PERIOD (sec.)	(7) SEA WATER TEMP °C/°F	(8) AIR TEMP °C/°F	(9) PRESSURE	(10) REMARKS
1/28	9:30	P/C		20	SSE	3	2.4	12.5	57.0	59.5	30.22	L. 46.4°
1/28	3:30	P/C		15	SW	4	2.2	15.4	57.8°	64.2°	30.14	H. 64.8°
1/29	9:30	P/C		15	SE	4	2.4	12.2	57.4	58.9	30.12	
1/29	3:30	P/C		15	SW	5	2.6	11.8	57.6	65.8	30.10	
1/30	950	PC	HAZY	5	W	5	3.2	16.7	57.7	58.8	30.10	L: 45.5
1/30	350	PC		8	W	5	3.0	15.4	58.4	61.9	30.01	H: 65.7
1/31	9:45	P/C	Hazy	10	SE	5	3.1	6.3	57.8°	61.7°	30.02	L 54.1°
1/31	3:30	C	Hazy	20	W	10	3.6	6.3	58.6°	65.7°	29.98	H. 66.4

NOAA FORM 72-5A (5-73) SUPERSEDES PREVIOUS EDITION

DATE (month and year): JAN 2006 | NOAA FORM 72-5A (5-73)

U. S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

FORM APPROVED O.M.B. NO. 41-R2734

MARINE COASTAL WEATHER LOG — COASTAL STATION

STATION NAME: DANA POINT | STATE: CA | STATION CALL: 9L0 | LOCATION: 33 27 N (Latitude) 117 41 W (Longitude)

(1) DATE	(2) TIME	(3) SKY COND.	(3) PRESENT WEATHER	(4) VISIBILITY (miles)	(5) WIND DIR	(5) WIND SPEED (knots)	(6) STATE OF SEA HEIGHT (feet)	(6) STATE OF SEA PERIOD (sec.)	(7) SEA WATER TEMP °C/°F	(8) AIR TEMP °C/°F	(9) PRESSURE	(10) REMARKS
1/19	1000	P/C		10	NNW	8-10	5.0	7.1	57.7	59.7	30.06	L 47.1
1/19	3:30	P/C		15	WNW	10-15	5.5	15.4	57.6	62.6	30.02	H- 65.5 Gusts to 20
1/20	9:15	Scattered clouds		20	ENE	2	4.3	14.3	57.0	56.8°	30.14	L 42.1°
1/20	3:30	C		25	WNW	10	4.3	13.3	57.5°	65.5°	30.18	H. 65.5°
1/21												L. 40.1°
1/21	3:30	C		20	WNW	[illegible]	3.0	9.1	57.9°	59.9°	30.02	H. 61.9
1/22												
1/22	330	C		25	WNW	10	3.1	6.7	57.7°	71°	29.98	
1/22	930	C		20	WNW	4	2.6	14.3	55.9	65.7	30.10	L: 52.3 / H- 72.9
1/22	1530	C		20	NNE	11	2.6	8.3	57.0	71.8	29.92	
1/24	930	C		15	NNE	8	2.6	15.4	56.8	70	29.91	L: 55.2
1/24	1530	PC		15	SE	15	2.6	14.3	57.0	62.4	29.93	H: 73.6
1/25	1000	P/C		25	SSE	7	2.5	13.3	56.7°	59°	30.08	L 46.8°
1/25	3:30	P/C		25	SSW	5	2.7	13.3	57.7°	61.5°	30.06	H 61.7°
1/26	9:30	P/C		20	N	3	1.9	12.5	57.3°	59.5°	30.16	L 48.6°
1/26	3:30	P/C		20	WSW	5	1.8	15.4	58.3°	62.2°	30.10	H 63.5°
1/27	9:35	P/C		15	S	3	3.1	14.3	57.7°	61.3°	30.16	L 48.7°
1/27	4:00	P/C		15	W	8	3.1	14.3	58.8°	62.1°	30.10	H. 65.5°

DATE (month and year): JAN 2006 | NOAA FORM 72-5A (5-73)

U. S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

MARINE COASTAL WEATHER LOG —— COASTAL STATION

FORM APPROVED O.M.B. NO. 41-R2734

STATION NAME: DANA POINT | STATE: CA | STATION CALL: 9LØ | LOCATION: 33 27 N (Latitude) 117 41 W (Longitude)

(1) DATE	(2) TIME	(3) SKY COND.	(3) PRESENT WEATHER	(4) VISIBILITY (miles)	(5) WIND DIR	(5) WIND SPEED (knots)	(6) STATE OF SEA HEIGHT (feet)	(6) STATE OF SEA PERIOD (sec.)	(7) SEA WATER TEMP ☐C ■F	(8) AIR TEMP ☐C ■F	(9) PRESSURE	(10) REMARKS
1/10	945	C/SY		30	SE	4	2.9	11.8	59.2	62.9	30.10	L- 45.4
1/10	245	C/SY		25	WSW	4	2.8	11.8	60.7	67.6°	30.02	H- 68°
1/11	1000	P/CY		20	WSW	4	3.1	10.5	60.4	60.4	30.02	L- 41.9°
1/11	850	CY		15	SSW	4	3.2	15.4	60.2	61°	29.96	H- 63.5
1/12	925	CY		15	NNE	3	3.0	14.3	59.3	58.5	30.00	L- 45.6
1/12	310	P/CY		10	WNW	8-10	2.9	13.3	60.2	62.4°	29.94	H- 68°
1/13	9:48	P/C		10	SSE	2	2.4	15.4	59.3°	56.7°	30.02	L. 46.2°
1/13	3:13	P/C		12	S	4	2.5	14.3	64.8°	59.8°	29.98	H-64.6°
1/14	9:40	P/C		15	S	5	2.3	13.3	59.2°	62.6°	30.02	L. 51.3°
1/14	3:48	CY		15	SW	4	3.7	15.4	59.3°	60.1°	30.00	H-66.7° Trace rain
1/15												
1/15	4:15	P/C		15	NW	14	6.2	12.5	58.9°	57°	30.06	
1/16	930	PC		15	CALM		4.1	6.7	58	52	30.25	L: 37°
1/16	330	PC		15	SW	2	3.3	9.1	58	62	30.20	H:62
1/17	930	PC		15	CALM		2.3	11.1	58	60.6	30.25	L:43°
1/17	1530	PC		15	SW	6	2.1	11.8	59.2	61.3	30.18	H:65.8
1/18	945	P/CY		25	ENE	4	2.0	10.5	58.2	59.7	30.16	L- 37°
1/18												H-66.7°

DATE (month and year): JAN 2006 | NOAA FORM 72-5A (5-73)

U. S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

MARINE COASTAL WEATHER LOG —— COASTAL STATION

FORM APPROVED O.M.B. NO. 41-R2734

STATION NAME: DANA POINT | STATE: CA | STATION CALL: 9LØ | LOCATION: 33 27 N (Latitude) 117 41 W (Longitude)

(1) DATE	(2) TIME	(3) SKY COND.	(3) PRESENT WEATHER	(4) VISIBILITY (miles)	(5) WIND DIR	(5) WIND SPEED (knots)	(6) STATE OF SEA HEIGHT (feet)	(6) STATE OF SEA PERIOD (sec.)	(7) SEA WATER TEMP ☐C ■F	(8) AIR TEMP ☐C ■F	(9) PRESSURE	(10) REMARKS
1/1	0930	CLDY		10	S	8	4.1	13.3	59.5	57	29.98	
1/1	1530	CLDY		8	ESE	6	3.9	11.8	59.8	59	29.91	
1/2	0950	CY	Ⓡ	1/2	SSE	20-22	5.9	5.3	59.3	59.9	29.92	L- 57.4 R@ 0930 = .17, Gusts to 30
1/2	3:34	CY		5	WSW	8-10	7.9	7.1	59.1	60.3°	29.94	H- 60 R@ 1530 = .40 → .57
1/3	1008	P/CY		20	NE	6	4.9	15.4	59.5	57.4	30.20	L-46.6 R@ 0800 = .04
1/3	320	P/CY		15	WNW	10-12	5.9	15.4	59.7	58°	30.16	H- 61°
1/4	950	P/CY		20	WSW	4	3.8	14.3	59.5	60.6	30.19	L- 45.5
1/4	300	PCY		10	WNW	8	4.1	14.3	71.1	60.1	30.12	H- 72.1°
1/5	930	P/CY		15	WSW	3	3.2	14.3	59.1°	68.2	30.18	L- 59.9
1/5	330	P/CY		25	ESE	3	3.3	10.0	61.2°	74.2°	30.18	H- 81°
1/6	10:20	C		25	W	4	4.8	14.3	59.6°	81.8°	30.02	L- 60.8°
1/6	3:50	C		25	WSW	2	4.1	11.8	61.8°	77°	29.94	H-81.9°
1/7	9:15	C →	Scattered clouds	20	WSW	4	4.6	14.3	59.3°	59.7°	30.00	L-52.3°
1/7	3:20	C	Hazy	15	W	4	5.4	14.3	60.4°	63.7°	29.97	H.63.7°
1/8												
1/8	330	C	HAZY	8	W	6	4.8	9.1	59.7	63	29.98	
1/9	940	P/CY		10	WSW	3	3.6	13.3	59°	62°	30.12	L- 45
1/9	330	C		10	WNW	8-10	3.1	12.5	59.8	70°	30.05	H-71

FUSCOE ENGINEERING

Memo

Project: Dana Point Harbor Revitalization Project

Date: September 10, 2014

Subject: Wave Overtopping Flood Inundation Mapping

Flood map exhibits for the Dana Point Harbor Commercial Core Revitalization Project have been prepared to illustrate landside flood inundation limits (footprint and elevation) that would result if wave overtopping at the Harbor's seawall and/or boat launch ramp occurred during a storm event. Flood inundation maps are included as Attachment 1. Flood inundation limits were determined based on information presented in the Dana Point Harbor Wave Uprush Analysis study prepared by Everest International Consultants on April 7, 2014. The Everest wave uprush analysis was conducted using the ACES program within the CEDAS (version 4.03) suite of programs developed by the U.S. Army Corps of Engineers (Veri-Tech, Inc., 2009) to evaluate whether wave uprush at the seawalls and the boat ramp will result in wave overtopping, and the corresponding wave overtopping rates if wave overtopping does occur. The parameters controlling the onset of wave overtopping and the overtopping rate include wave characteristics (height and period), water level and water depth in front of the seawall and boat ramp structures, as well as the structure characteristics (type and slope) and bottom slope in front of the structure.

Wave overtopping rate results for various analyzed water level and wave conditions are presented in Table 3 of the Everest report (see Attachment 2). Conditions include analysis for low, moderate, and high sea level rise (SLR) projections during long term event years (2060 and 2090) as well as analysis for a Tsunami event during a 2015 occurrence. Only the highest overtopping rate for any given analyzed event year was used to determine flood inundation levels. Additionally, 2015 event year overtopping rates were used to analyze flood inundation levels for the current (existing) topography surface and for the proposed project grading condition, resulting in four flood inundation maps being produced; 2015 existing condition, 2015 proposed grading condition, 2060 proposed grading condition, and 2090 proposed grading condition. Flood inundation levels for the four maps was determined using the following process:

1. Topography and grading conditions were reviewed to determine if storage capacity (depressions) were present and to determine the volume of available storage capacity V_A (dead storage volume). This volume was listed on the exhibits. Wave overtopping rates from Table 3 of the Everest report were converted to wave uprush volumes (V_T)

16795 Von Karman, Suite 100, Irvine, California 92606 ▪ tel 949.474.1960 ▪ fax 949.225.6090 ▪ www.fuscoe.com

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by assuming a one-hour duration and 15.5 second wave cycle. V_A and V_T were compared to determine if available storage capacity was larger than wave uprush volume. If $V_A > V_T$ then all of the wave uprush volume can be stored in depressions below the top of seawall elevation. This was not the case as V_T always significantly exceeded V_A, meaning the difference in volume will return to the marina over the top of the seawall. Storage depression areas (areas lower than the top of seawall elevation) and maximum top of seawall elevations are shown on the exhibits and vary depending on location in the harbor. Wave uprush volume calculations are provided in Attachment 3. Elevations on the exhibits are based on 1929 NGVD datum and are different than elevations discussed in the Everest report, which are based on MLLW datum, a difference of 2.72 feet.

2. Upon determination that $V_T > V_A$, headwater dimensions were calculated to represent the required head needed to push the wave overtopping volume over the top of the seawall as the volume returns to the marina. The effects of storage were ignored in the calculation. The headwater dimensions were calculated with a generic weir equation utilizing the highest overtopping rate for any given event year from Table 3 of the Everest report. Headwater calculations are provided in Attachment 4. Headwater dimensions were then added to top of seawall elevations to determine headwater elevations, and headwater elevations were projected into the site on a level line until intersecting with the ground surface. The intersection lines (flood inundation limit) are plotted and shown in purple on the flood inundation exhibits.

3. Flood inundation limits were compared against building finished floor elevations to evaluate if flooding occurred at any structure. The minimum vertical separation between flood headwater elevation and building finished floor elevation occurs in Area B (Wharf area) on the Year 2060 Inundation Map where the difference is 0.85 feet (8.50 FF-7.65 headwater elevation). All other separations are greater.

Estimated Overtopping Rates during a 100-year Storm Wave Event for Types 1 and 2 Seawalls and Boat Ramp at the Commercial Core Project Location

Condition	Water Level (ft, MLLW)	Structure Overtopped by Wave?			Wave Overtopping Rate (cubic ft per sec per linear ft)		
		Type 1 Seawall	Type 2 Seawall	Boat Ramp	Type 1 Seawall	Type 2 Seawall	Boat Ramp
2015 MHHW	5.41	yes	yes	yes	0.008	0.026	0.183
2015 MHHW + 1-ft Tsunami	6.41	yes	yes	yes	0.036	0.077	0.331
2015 MHHW + 2-ft Tsunami	7.41	yes	yes	yes	0.141	0.219	0.589
2060 MHHW (with 0.53 ft SLR - Low)	5.94	yes	yes	yes	0.018	0.046	0.251
2060 MHHW (with 1.34 ft SLR - Moderate)	6.75	yes	yes	yes	0.058	0.110	0.403
2060 MHHW (with 2.57 ft SLR - High)	7.98	yes	yes	yes	0.293	0.395	0.816
2090 MHHW (with 1.28 ft SLR - Low)	6.69	yes	yes	yes	0.053	0.103	0.389
2090 MHHW (with 2.59 ft SLR - Moderate)	8.00	yes	yes	yes	0.301	0.403	0.825
2090 MHHW (with 4.67 ft SLR - High)	10.02	Inundated*	Inundated	Inundated	N/A	N/A	N/A

** Water level higher than crest elevation of structure*
N/A = not applicable

ATTACHMENT 2

9/10/14

Dana Point Harbor Revitalization Project
Wave Uprush Volume (V_T) Calculations
2015 Condition

Type 1 Seawall: Highest overtopping rate is 0.141 cfs/per foot of wall
So, in one hour duration period and 15.5 second wave cycle

$$V_{\text{per foot of wall}} = \left(\frac{0.141\ FT^3}{S}\right)\left(\frac{3600S}{15.5}\right) = 32.75\ FT^3 \text{ per foot of wall in 1 hr duration}$$

$$\text{and } V_T = \left(\frac{32.75\ FT^3}{FT}\right)(1680\ FT) = 55{,}017\ FT^3 = 1.26\ Ac\cdot FT$$

Type 2 Seawall: Highest overtopping rate is 0.219 cfs/per foot of wall
So, in one hour duration period and 15.5 second wave cycle,

$$V_{\text{per foot of wall}} = \left(\frac{0.219\ FT^3}{S}\right)\left(\frac{3600S}{15.5}\right) = 50.86\ FT^3 \text{ per foot of wall in 1 hr duration}$$

$$\text{and } V_T = \left(\frac{50.86\ FT^3}{FT}\right)(1525\ FT) = 77{,}568\ FT^3 = 1.78\ Ac\cdot FT$$

Boat Ramp: Highest overtopping rate is 0.589 cfs/per foot of wall
So, in one hour duration period and 15.5 second wave cycle,

$$V_{\text{per foot of wall}} = \left(\frac{0.589\ FT^3}{S}\right)\left(\frac{3600S}{15.5}\right) = 136.80\ FT^3 \text{ per foot of wall in 1 hr duration}$$

$$\text{and } V_T = \left(\frac{136.80\ FT^3}{FT}\right)(225\ FT) = 30{,}780\ FT^3 = 0.71\ Ac\cdot FT$$

ATTACHMENT 3

Headwater Calculation for Type 1 Seawall (Year 2015)

Project Description

Solve For	Headwater Elevation

Input Data

Discharge	0.14	ft³/s
Crest Elevation	7.20	ft
Weir Coefficient	2.69	US
Crest Length	1.00	ft

Results

Headwater Elevation	7.34	ft
Headwater Height Above Crest	0.14	ft
Flow Area	0.14	ft²
Velocity	1.00	ft/s
Wetted Perimeter	1.28	ft
Top Width	1.00	ft

ATTACHMENT 4

Headwater Calculation for Type 2 Seawall (Year 2015)

Project Description

Solve For	Headwater Elevation

Input Data

Discharge	0.22	ft³/s
Crest Elevation	7.25	ft
Weir Coefficient	2.69	US
Crest Length	1.00	ft

Results

Headwater Elevation	7.44	ft
Headwater Height Above Crest	0.19	ft
Flow Area	0.19	ft²
Velocity	1.17	ft/s
Wetted Perimeter	1.38	ft
Top Width	1.00	ft

ATTACHMENT 4

Headwater Calculation for Boat Ramp (Year 2015)

Project Description

Solve For	Headwater Elevation

Input Data

Discharge	0.59	ft^3/s
Crest Elevation	7.20	ft
Weir Coefficient	2.69	US
Crest Length	1.00	ft

Results

Headwater Elevation	7.56	ft
Headwater Height Above Crest	0.36	ft
Flow Area	0.36	ft^2
Velocity	1.62	ft/s
Wetted Perimeter	1.73	ft
Top Width	1.00	ft

ATTACHMENT 4

Headwater Calculation for Type 1 Seawall (Year 2060)

Project Description

Solve For	Headwater Elevation

Input Data

Discharge	0.29	ft³/s
Crest Elevation	7.20	ft
Weir Coefficient	2.69	US
Crest Length	1.00	ft

Results

Headwater Elevation	7.43	ft
Headwater Height Above Crest	0.23	ft
Flow Area	0.23	ft²
Velocity	1.28	ft/s
Wetted Perimeter	1.45	ft
Top Width	1.00	ft

ATTACHMENT 4

Headwater Calculation for Type 2 Seawall (Year 2060)

Project Description

Solve For	Headwater Elevation

Input Data

Discharge	0.40	ft³/s
Crest Elevation	7.25	ft
Weir Coefficient	2.69	US
Crest Length	1.00	ft

Results

Headwater Elevation	7.53	ft
Headwater Height Above Crest	0.28	ft
Flow Area	0.28	ft²
Velocity	1.43	ft/s
Wetted Perimeter	1.56	ft
Top Width	1.00	ft

ATTACHMENT 4

Headwater Calculation for Boat Ramp (Year 2060)

Project Description

Solve For	Headwater Elevation

Input Data

Discharge	0.82	ft³/s
Crest Elevation	7.20	ft
Weir Coefficient	2.69	US
Crest Length	1.00	ft

Results

Headwater Elevation	7.65	ft
Headwater Height Above Crest	0.45	ft
Flow Area	0.45	ft²
Velocity	1.81	ft/s
Wetted Perimeter	1.91	ft
Top Width	1.00	ft

ATTACHMENT 4

Headwater Calculation for Type 1 Seawall (Year 2090)

Project Description

Solve For	Headwater Elevation

Input Data

Discharge	0.30	ft^3/s
Crest Elevation	7.20	ft
Weir Coefficient	2.69	US
Crest Length	1.00	ft

Results

Headwater Elevation	7.43	ft
Headwater Height Above Crest	0.23	ft
Flow Area	0.23	ft^2
Velocity	1.29	ft/s
Wetted Perimeter	1.46	ft
Top Width	1.00	ft

ATTACHMENT 4

Headwater Calculation for Type 2 Seawall (Year 2090)

Project Description

Solve For	Headwater Elevation

Input Data

Discharge	0.40	ft^3/s
Crest Elevation	7.25	ft
Weir Coefficient	2.69	US
Crest Length	1.00	ft

Results

Headwater Elevation	7.53	ft
Headwater Height Above Crest	0.28	ft
Flow Area	0.28	ft^2
Velocity	1.43	ft/s
Wetted Perimeter	1.56	ft
Top Width	1.00	ft

ATTACHMENT 4

Headwater Calculation for Boat Ramp (Year 2090)

Project Description

Solve For	Headwater Elevation

Input Data

Discharge	0.83	ft³/s
Crest Elevation	7.20	ft
Weir Coefficient	2.69	US
Crest Length	1.00	ft

Results

Headwater Elevation	7.66	ft
Headwater Height Above Crest	0.46	ft
Flow Area	0.46	ft²
Velocity	1.82	ft/s
Wetted Perimeter	1.91	ft
Top Width	1.00	ft

ATTACHMENT 4

OC Dana Point Harbor (County of Orange)

Community Notice

South County Community Alert Siren Test on Wednesday, October 15th Between 10:00 AM and Noon

Community Alert Sirens will be heard in the City of Dana Point. Residents will hear a long steady siren sound three times, lasting about three minutes each.

* DO NOT CALL 911.
* This is only a test. No action necessary.
* This test is an annual Federal requirement for San Onofre Nuclear Generating Station (SONGS). During a real emergency, the sirens would alert you; at that point, turn on your radio or television for instructions.

It is important that residents and businesses know that this is only a test and there is no actual emergency.

On The Horizon:

Turkey Trot	November 26 & 27
IlluminOcean	Nov. 26 - Jan. 4
Holidays in the Harbor	December 5
Boat Rides with Santa	December 6 & 7
Boat Parade of Lights	December 5,6 & 12,13

If you wish to unsubscribe from future mailings, please call OC Dana Point Harbor at (949)923-2236.

www.OCDPH.com

OC COUNTY OF ORANGE DanaPointHarbor

Boater Notice

High Surf Expected

The National Weather Service
has issued a High Surf Advisory

- Timing: Today through Friday at 1:00 AM
- Location: Orange County Beaches.
- Large surf, strong rip currents and possible coastal flooding through Thursday.
- Surf of 7 to 10 feet along South facing beaches. Wednesday, Widespread 8 to 11 feet across the County with occasional sets of 12 to 15 feet at favored beaches, Thursday 7 to 10 feet gradually subsiding.
- Surf will be very strong, and rip currents will create extremely dangerous swimming and surfing conditions.
- Use caution when transiting harbor entrances.

For current weather conditions or additional information,
please visit the National Oceanic and Atmospheric Administration online at:
www.NOAA.gov or call (858) 675-8700.

If you wish to unsubscribe from future mailings, please call OC Dana Point Harbor at (949) 923-2236.

www.OCDPH.com

OC COUNTY OF ORANGE DanaPointHarbor

Weather Advisory

High Winds and Surf Expected
Thursday, January 10 - Saturday, January 12

The National Weather Service reports that rough seas and windy conditions are expected over coastal waters behind a cold front. High tides and surf are expected Thursday through Saturday. Low-lying areas are most susceptible including beach parking lots and areas around bays and harbors. High surf is expected along west facing beaches Thursday afternoon through Saturday.

Strong winds can create challenging boating conditions and make driving difficult. Everyone should use extra caution.

2013-01-10	1:09 AM PST	1.35 feet	Low Tide
2013-01-10	7:22 AM PST	6.88 feet	High Tide
2013-01-10	2:30 PM PST	-1.73 feet	Low Tide
2013-01-10	8:48 PM PST	4.38 feet	High Tide
2013-01-11	1:59 AM PST	1.17 feet	Low Tide
2013-01-11	8:08 AM PST	6.95 feet	High Tide
2013-01-11	3:12 PM PST	-1.79 feet	Low Tide
2013-01-11	9:29 PM PST	4.57 feet	High Tide
2013-01-12	2:47 AM PST	1.05 feet	Low Tide
2013-01-12	8:53 AM PST	6.77 feet	High Tide
2013-01-12	3:52 PM PST	-1.62 feet	Low Tide
2013-01-12	10:10 PM PST	4.69 feet	High Tide

For current weather conditions or additional information, please visit the National Oceanic and Atmospheric Administration online at: www.NOAA.gov or call (858) 675-8700.

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www.OCDPH.com

OC DanaPointHarbor

Community Notice

Emergency Preparedness Drill

Tuesday, October 28th
4:30 PM to 6:00 PM

On October 28th, from 4:30 PM to 6:00 PM, there will be an emergency preparedness drill at the Ocean Institute.

There will be emergency vehicles on the roads and vessels on the water during the drill. The Ocean Institute parking lot entrance will be closed to incoming traffic during this time.

For more information, please contact the Ocean Institute, Nathan Taxel at 949-496-2274, ext. 344

On The Horizon:

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IlluminOcean	Nov. 26 - Jan. 4
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Boat Parade of Lights	December 5,6 & 12,13

If you wish to unsubscribe from future mailings, please call OC Dana Point Harbor at (949)923-2236.

www.OCDPH.com

OC COUNTY OF ORANGE DanaPointHarbor

Weather Advisory

Heavy Rainfall and High Wind Expected
Friday, February 28 - Sunday, March 2

The National Weather Service has issued a Special Weather Statement effective from Friday through Sunday Morning.

Heavy rainfall and high winds are expected over waters with isolated waterspouts or tornadoes near the Orange County Coast. Strong winds can create challenging boating conditions, and can make driving difficult, everyone should use extra caution.

Elevated surf and strong rip currents are expected. Waves and surf will increase to 8 to 10 feet with possible higher sets through Saturday evening.

For current weather conditions or additional information, please visit the National Oceanic and Atmospheric Administration online at: www.NOAA.gov or call (858) 675-8700.

On the Horizon:

Festival of Whales	March 1-2 and 8-9

If you wish to unsubscribe from future mailings, please call OC Dana Point Harbor at (949) 923-2236.

www.OCDPH.com

COUNTY OF ORANGE
OC DanaPointHarbor

Community Notice

The Great California Shake Out

October 17, 2013 at 10:17 AM

Major earthquakes may happen anywhere you work, live, or travel in California. The ShakeOut is our chance to practice together how to protect ourselves, and for everyone to become better prepared. The goal is to save lives and prevent disasters from becoming catastrophes.

10:17 AM on 10/17, join millions of Californians who want to take quake-safe action when seconds count. In order to act quickly, you must practice what to do – ShakeOut is that opportunity.

Register for free at www.ShakeOut.org/california/register to learn more about what to do.

Invite friends and family to practice for their safety, too!

On The Horizon:

Elephant Parade Exhibition	August 23 - November 17
Turkey Trot	November 28
Holidays in the Harbor	December 6
Boat Rides with Santa	December 6 & 7
Boat Parade of Lights	December 5,6 & 12,13

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