



# PACIFIC ENGINEERING GROUP

Consulting Engineers

3500 E. Camino Avenue  
Suite 250  
Oxnard, CA 93030

Phone: 805.278.9283  
Fax: 805.485.6730

Agenda Item 10  
SMMC  
3/18/13

October 26, 2009

**Arya Group**  
**C/O Michael Barsocchini and Associates**  
**3502 Coast View Drive**  
**Malibu, CA 90265**

**Subject:** Wave Uprush Study Addendum #2  
24024 Malibu Road  
Malibu, CA 90265

- Reference:**
1. Wave Uprush Study  
24024 Malibu Road  
Malibu, CA 90265  
By: Pacific Engineering Group  
Dated: March 17, 2008
  2. Site Survey  
24024 Malibu Road  
Malibu, CA 90265  
By: Danielson Surveying  
Dated: June 7, 2007
  3. Septic OWTS Plan  
24024 Malibu Road  
Malibu, CA 90265  
By: Ensitu Engineering  
Date: September 2009
  4. Wave Uprush Study Addendum #1  
24024 Malibu Road  
Malibu, CA 90265  
By: Pacific Engineering Group  
Dated: September 14, 2009

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**Our Project: # 08108.FAT.WUS**

**Dear Mr. Barsocchini:**

This addendum is written to address the need for a Variance to the City Municipal Code Section regarding the construction of a proposed bulkhead structure to protect an On-site Wastewater Treatment System (OWTS) in a recently designated FEMA VE Zone.

Per the City of Malibu Public Works Department, the variance is needed due to a section in the City Municipal Code requiring no structures with non-breakaway walls be constructed in a designated "V" Zone below the Base Flood Elevation (BFE) indicated on the applicable FEMA Flood Insurance Rate Map (FIRM). Only structures with breakaway walls can be constructed in the VE zone below the BFE provided that the area behind the breakaway walls is only used for non-habitable uses such as structure access, vehicle storage, or light storage, that the breakaway walls are designed for a 20 PSF ultimate load, and that if the breakaway walls fail, the residence structure above is not harmed in any way and the residence is not supported by the breakaway walls. Separate Residence Foundation Piles and Support Columns in the VE zone below the BFE are allowed provided that those vertical structural members are designed for all anticipated wave uprush forces and anticipated beach erosion.

The proposed bulkhead protective structure will be ancillary to a new single family beach residence proposed for the subject property. The bulkhead is proposed to be below the proposed residence approximately 33.5 feet seaward of the Malibu Road right-of-way line - in the VE zone below the BFE. The proposed bulkhead is to be constructed on a separate concrete pile foundation independent of the residence pile foundation. The proposed residence structure will not bear on the proposed bulkhead structure. The residence structure and foundation will be designed for all anticipated wave forces and will not rely on any protection from the proposed bulkhead. The proposed bulkhead will be constructed to protect only the On-site Wastewater Treatment System (OWTS) located under the proposed residence.

## **1.0 Background**

1.1 The subject property is currently a vacant beach lot located on the seaward side of Malibu Road at 24024 Malibu Road in the City of Malibu. The subject property is part of a small group of vacant lots located between residential properties developed with single family residences similar to the proposed residence.

1.2 The 1998 El Nino winter storms produced significant erosion on the subject property and the adjacent properties. During this time, a portion of Malibu Road just 50 feet west of the subject property was eroded almost to the centerline of the street. For a few months after the storm this portion of Malibu Road was only one lane since the east bound lane south of the centerline was washed out due to storm wave uprush and the associated beach scour. The eroding of Malibu Road at this location was the only location that the road had actually eroded due to the storms.

1.3 In response to the 1998 winter storm erosion of this portion of Malibu Road, the County of Los Angeles Public Works Department constructed a 180-foot long concrete pile supported concrete bulkhead along the Malibu Road right-of-way line to retain the road fill and protect Malibu Road from further storm wave uprush erosion. About the same time, just to the west of this concrete bulkhead a rock revetment approximately 100 feet long was constructed to protect the road embankment as well.

1.4 The referenced Wave Uprush Study prepared by Pacific Engineering Group determined that storm wave uprush limit without the existing concrete bulkhead installed by the County would occur 26 feet landward of the Malibu Road right-of-way line, consistent with the erosion that took place during the 1998 storm events. With this wave uprush limit occurring on the subject property, there is no location on the subject property to install any size OWTS without the required protection of a protective structure such as the proposed bulkhead. Therefore any residence proposed on the subject property will require an OWTS, and that OWTS will require a protective structure to protect it from storm wave uprush and beach scour associated with winter storms. If no bulkhead is allowed, then no residence can be constructed on the subject property that is serviced by an OWTS.

## **2.0 FEMA Flood Insurance Rate Map (FIRM).**

2.1 The FIRM maps published by FEMA divide the coastal areas into flood zones with an associated Base Flood Elevation (BFE). Zones that are designated V, V1-V30, and VE are coastal zones subjected to high velocity wave action. Structures located in the V Zones must be high enough so that the bottom of the lowest horizontal structural member (LHSM) is above the BFE. The City of Malibu adds a 1-foot "freeboard" above this BFE. The FIRM along with a Wave Uprush Study prepared by a Coastal Engineer - the elevation of the residence, location of any protective structure, and design wave uprush forces are established.

From November 1985 to September 26, 2008 the FIRM map associated with the subject property was FIRM #065043 0788C. This map designated the V8 Zone to be located approximately 75 feet seaward of the Malibu Road right-of-way line. This V8 Zone had an associated BFE at elevation +14.0 Ft. NGVD. Based on this location the entire residence and the bulkhead would have been located landward of the V8 Zone and located entirely in a designated "C" Zone. This would have allowed the subject residence and bulkhead to be constructed as currently proposed.

Starting September 26, 2008 the new FIRM #065043 1537F designated the new VE Zone on the subject property to be located 18-23 feet seaward of the Malibu Road right-of-way line. This VE zone has an associated BFE at elevation +17.0 Ft. NAVD (+14.7 Ft. NGVD). Based on this current FIRM, the proposed bulkhead would be constructed in the VE Zone in violation of the City of Malibu Municipal Code according to the City Public Works Department.

## **2.2 Definition of VE Zone (FEMA)**

The VE and V1-V30 Zones are defined by FEMA as follows:

2.2.1 Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base Flood Elevations (BFE) derived from detailed analyses are shown at selected intervals within these zones.

2.2.2 The VE and V1-V30 Zones are Coastal High Hazard Areas of special flood hazard extending from offshore to the inland limit of the **Primary Frontal Dune** and subject to **High Velocity Wave Action** from storms or seismic sources. The Primary Frontal Dune is defined:

A. "The Primary Frontal Dune is the nearly continuous mound or ridge of sand with relatively steep seaward slopes immediately landward and adjacent to the beach subject to erosion and overtopping from high tides and waves during major coastal storm. The inland limit of the Primary Frontal Dune occurs at the point where there is a distinct change from a relatively steep slope to a relatively mild slope."

The berm at the top of the foreshore slope separating the foreshore slope and the "flat" backshore beach is the Primary Frontal Dune on the subject property. Based on the referenced site survey, this Primary Frontal Dune is located approximately 33-35 feet seaward of the Malibu Road right-of-way line.

B. Since the lateral water force limit used to design breakaway walls in the V-Zones is 20.0 PSF, this will be taken as the defining limit separating high velocity wave action from lower velocity wave action. A wave producing a lateral force of 20.0 PSF has a breaking wave velocity of 4.5 feet per second (fps). This corresponds to a wave with a breaking wave depth of 0.63 feet. With a design still water elevation at +7.5 Ft. MLLW as analyzed in the referenced Wave Uprush Study, this wave will break where the foreshore slope is at elevation +6.87 Ft MLLW ( El. +4.07 Ft. NGVD). This location (where the breaking wave velocity slows to 4.5 fps) on the existing beach profile occurs 56 feet seaward of the Malibu Road right-of-way line.

Since the location of the primary frontal dune and the landward limit of High Velocity Wave Action are at different locations on the subject property, this study will use the most conservative of 2.2.2.A and 2.2.2.B for the landward limit of the VE Zone which would be the Primary Frontal Dune located 33 feet to 35 feet seaward of the Malibu Road right-of-way line. The VE-Zone located 18-23 feet seaward of the Malibu Road right-of-way line shown on the current FIRM used by the City seems arbitrary whereas the location of the Primary Frontal Dune located 33-35 feet seaward of the Malibu Road right-of-way line is a more appropriate location and is in conformance with the FEMA definitions of the VE Zone.

### **3.0 Proposed Bulkhead**

3.1 The proposed bulkhead located approximately 33.5 feet from the Malibu Road right-of-way line will be designed for the extreme wave conditions and extreme beach scour depth outlined in the referenced Wave Uprush Study. This design provides for a bulkhead that is both structurally sound and long lasting. Based on the design wave forces the bulkhead should have a factor of safety in excess of 1.5, and will provide adequate protection of the proposed OWTS.

3.2 The proposed bulkhead located approximately 33.5 feet seaward of the Malibu Road right-of-way line will not have a significant effect on shoreline or coastal processes such as littoral drift or localized beach erosion. The bulkhead would be located sufficiently landward as to have no negative effect on the adjacent properties.

3.3 The top of the proposed bulkhead at +16.0 NGVD as outlined in the referenced Wave Uprush Study will be at an elevation high enough not to be overtopped by storm wave action, and the bottom of the bulkhead at elevation -1.5 Ft. NGVD will be low enough not to be undermined by storm beach scour.

### **4.0 Variance Recommended**

4.1 The findings of this addendum indicate that the location of the FEMA VE Zone shown on the current FIRM is arbitrary, excessively landward, and the location does not conform to FEMA's own definition of the VE Zone parameters.

4.2 Locating the proposed timber bulkhead landward of the VE Zone currently defined by FEMA on the referenced FIRM would likely limit or even eliminate the space needed for an appropriated OWTS for any residence proposed on the subject property similar in size and occupancy to the surrounding residential properties. This would result in exceptional hardship to the applicant since the property could not be developed with a single-family residence (SFR) serviced by an OWTS similar to the surrounding residential units in this neighborhood.

4.3 The bulkhead constructed approximately 33.5 feet seaward of the Malibu Road right-of-way line would have no negative effects on the beach or adjacent properties and therefore granting a variance would not result in; an increase in flood heights, additional threats to public safety, extraordinary public expense, or conflict with current municipal ordinances including the City of Malibu Local Coastal Plan (LCP).

4.4 The subject property is a lot with an area of one-half acre or less conforming to section 60.6, 44 CFR Ch.1 of the Federal Code of Regulations.

4.5 Based on the findings of this addendum it is recommended that the City of Malibu issue a variance to allow the proposed timber bulkhead to be built on the subject property 33.5 feet seaward of the Malibu Road right-of-way line in order to protect the proposed OWTS for the proposed single family residence.

If you have any additional questions regarding this report you can contact us at (805) 278-9283.

**Respectfully submitted**

**Pacific Engineering Group**



**Reg K. Browne PE  
President / Principal Engineer  
CE 40552**



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