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January 13, 2012 (Revised)
Project No. SL07154-2

Pacifica Companies for the City of Grover Beach
c/o Allison Rolfe
1785 Hancock Street, Suite 100
San Diego, California 92110

SUBJECT: **Seawave Runup Analysis - Revised**
Proposed Grover Beach Lodge
Grover Beach, San Luis Obispo County, California

Dear Ms. Rolfe:

1.0 Introduction

GeoSolutions, Inc. has performed a revised seawave run-up analysis for the proposed Grover Beach Lodge project located on a portion of West Grand Avenue in the City of Grover Beach, California. It has come to our attention that an increased sea level rise factor is required to be considered for the project. This revised analysis utilizes a stated 4.6-foot "global warming factor" for increase in sea level rise (State of California, October, 2010). The original analysis utilized a 1-foot global warming factor for sea level rise. The original Seawave Runup Analysis (GeoSolutions, Inc., August 26, 2010) contains background information for development of the calculations and as such, ancillary documentation is not contained herein (see August 26, 2010 document for figures and plates).

2.0 Stillwater, Tidal, and Global Warming Elevations

The original topography for the site was provided by EDA Design Professionals using City of Grover Beach Data which has a benchmark termed GTA-2. There is a two-foot (2) conversion that is added to the GTA-2 elevation data to convert the data to NGVD29 data (National Geodetic Vertical Datum, see attached sheet for datum addition information). For the purpose of this study, elevation data discussed within this letter will be converted to NGVD29 data unless specified. Existing elevation at the site was utilized for this study.

One of the low elevation points depicted on the site topographic map is approximately 7 feet (GTA-2 elevation). When a conversion factor is added to the GTA-2 data, the low elevation point is approximately 9 feet (NGVD29 datum).

Stillwater elevation is the undisturbed water level or surface of the water if all wave and wind action were to cease (U.S. Army Corps of Engineers, 2002). The geologic and marine parameters for the stillwater analysis were based on 1982-1983 storm conditions on the California coast. According to National Oceanic and Atmospheric Administration (NOAA), the 1982-1983 storm conditions were the strongest and most devastating of the 20th century. To estimate the 100-year stillwater elevation for this analysis, a MLLW (mean-lower low water) tidal datum was used. The following tidal elevations were obtained from a NOAA station datum at Port San Luis, California. The PID number used for Port San Luis was FV0898. The tidal elevation used for this analysis was MHHW (mean higher high water) which is 5.32 feet (MLLW daturm). This NOAA station also indicated that during an epoch from 1983 to 2001 the maximum water level that occurred above MHHW was 2.33 feet. Sea level changes have been anticipated for the next 100 years. Reference data (State of California, October 2010) has estimated a 4.6-foot sea level change for a 100-year period be utilized for the project.

Incorporating the above given data, the 100-year stillwater elevation would be:

> 5.32 feet (which is MHHW) + 2.33 feet (maximum water level, above MHHW) + 4.6 foot (sea level change) which equals 12.25 feet (MLLW).

Since this report utilizes a NGVD 29 data, a conversion from MLLW datum to NGVD 29 datum is utilized. The conversion from 12.25 MLLW to NGVD 29 data is 3.01 feet (subtract 3.01 feet from 12.25 MLLW to get to 9.24 feet NGVD29 stillwater elevation). A low site elevation is approximately 9 feet and a high elevation is approximately 21 feet (both NGVD 29 datum).

The mean high high water level, coupled with a maximum water level and global warming factor is **9.24 feet (NGVD29 datum) which is the still water level calculated for the site**. Since the approximate low elevation at the property is 9 feet (NGVD29 datum), the property is within the mean high high tide with a maximum water level and global warming factor.

3.0 Wave Conditions

Wave and tidal conditions at the site were established based upon parameters included in the "Bank and Shore Protection in California Highway Practice" manual issued by the State of California, Department of Transportation (1960). Additional information is included in the Assessment of 1982-83 Winter Storms Damage, Malibu Coastline" (Denison and Robertson, 1985). In January, 1983, wave heights from 6 to 10 feet with 4- to 6- second periods were recorded and were considered to be the most severe of that winter. Larger waves would break father from shore, reducing wave energy during run-up. Storm surge is estimated at 2.0 feet (Department of Navy, 1984).

4.0 Wave Runup

Wave runup is the maximum vertical extent of wave uprush (height R) on a beach or structure above the still water level (Swenson, 1997). Determination of the wave runup height using procedures in FEMA (2003) is based upon the largest wave which would break on the beach in

the vicinity of the property. This analysis utilized a 10-foot breaking wave (H_o) with a 6 second period (T) and a beach slope angle of 1:10 (horizontal:vertical) with a smooth slope (without a seawall structure). G is a gravity function.

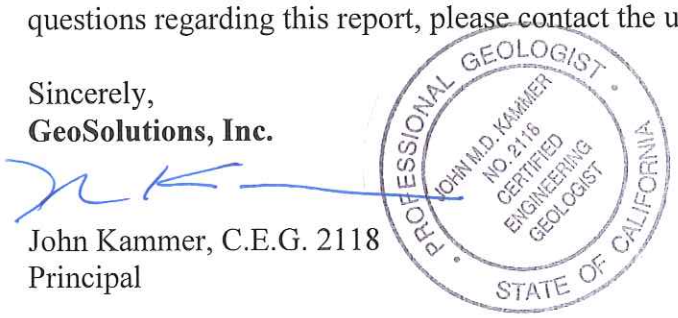
Cot of slope (1/10) = 5.7
H_o/gT^2 = 10/32.2 ft/sec^2 $(6)^2$ = 0.0086
The graph from Sorenson gives a value of R/H_o = 0.75.
R = 0.75/10 = 7.5 feet.

A wave runup of approximately 7.5 feet can be added to the 9.24 foot still water level calculated in section 2.0 of this report.

9.24 + 7.5 feet = **16.74 feet which is the approximate level of the storm runup level for the site** (NGVD29 datum). From a topographic map submitted to our office (Construction Testing and Engineering, Inc.), the dune area between the proposed Lodge and beach area maintains a low elevation of approximately 18.2 feet (NGVD29 datum). The value of the storm runup level is 1.46 feet below the low elevation of the dunes in the vicinity of the property.

We appreciate the opportunity to provide you with professional services. If you should have any questions regarding this report, please contact the undersigned at (805) 543-8539.

Sincerely,
GeoSolutions, Inc.



John Kammer, C.E.G. 2118
Principal

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REFERENCES

Bank and Shore Protection in California Highway Practice, November, 1960, State California Department of Public Works Division of Highways.

Construction Testing and Engineering, Inc., date not supplied, color topographic map of the vicinity of proposed project.

Denison, F.E. and Robertson, H.S., 1982-83 Winter Storms Damage, Malibu Coastline, California Geology, September, 1985.

Department of Navy, U.S. Army Corps of Engineers, 1984, Shore Protection Manual.

EDA Design Professionals, Topographic Map, February 19, 2002.

Federal Emergency Management Agency (FEMA), November 5, 1997, Flood Insurance Rate Map, Community Panel Number 060306-0001C.

FEMA, April, 2003, Guidelines and Specifications for Flood Hazard Mapping Partners, Appendix D.

Seawave Runup Analysis, Proposed Grover Beach Lodge, Grover Beach, San Luis Obispo County, California, by GeoSolutions, Inc., dated August 26, 2010.

Sorensen, R.M., 1997, Basic Coastal Engineering, Chapman and Hall, New York.

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State of California, Tsunami Inundation Map for Emergency Planning, Oceano Quadrangle, July 1, 2009.

State of California Sea-Level Rise Interim Guidance Document, October 2010. Document developed by the Sea-Level Rise Task Force of the Coastal and Ocean Working Group of the California Climate Action Team (CO_CAT), with science support provided by the Ocean Protection Council's Science Advisory Tam and the California Ocean Science Trust.

U.S. Army Corps of Engineers, 2002, Coastal Engineering Manual, Engineer Manual 1110-2-1100, Washington, D.C., Appendix A.