~~Alan Jelton~~ ~~Does this do it for you~~ ~~Perry~~ Keeped copy

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~~January 8,~~ August 20 1980

City Council
City of Rancho Palos Verdes
30940 Hawthorne Boulevard
Rancho Palos Verdes, California 90274

Subject: PLAN FOR CONTROL OF GEOLOGIC HAZARD
Proposed Special Assessment District
Abalone Cove Landslide Area
Rancho Palos Verdes, California

Gentlemen:

In accordance with your request, we have prepared this letter describing:

1. The need for the proposed special assessment district to control the ~~presently active~~ Abalone Cove landslide.
2. Background on the landslide history and existing control measures
3. The proposed plan of control for the Abalone Cove landslide.
4. The area which should be included within the proposed special assessment district.

NEED FOR THE PROPOSED SPECIAL ASSESSMENT DISTRICT

A special assessment district is needed to fund the cost of controlling the Abalone Cove landslide. This landslide covers an area of about 80 acres and includes 25 private residences, segments of Wayfarer's Chapel, Abalone Cove County Beach and Palos Verdes Drive South, and several privately owned

undeveloped parcels. In addition, 11 residences are located immediately above the head of the slide and are in imminent danger of becoming involved in the slide if movement were to continue unabated. Prolonged movement within the Abalone Cove landslide could, through the removal of lateral support, cause activation of a large inactive landslide including about 70 residences in the area upslope from the Abalone Cove landslide.

BACKGROUND ON LANDSLIDE HISTORY AND EXISTING CONTROL MEASURES

The Abalone Cove landslide forms the southwestern part of an ancient landslide complex (Fig. 1). So far as is known, only relatively small localized landslides were active within the complex during the historic period prior to 1956. In August, 1956, slide movement began in the eastern part of the complex in the area extending inland from Portuguese Bend. This landslide, referred to as the Portuguese Bend landslide, covers an area of about 250 acres and is still active over its entire extent. Although movement averages only a fraction of an inch per day, cumulative displacement exceeds 200 feet over much of its seaward part.

Historic activity within the Abalone Cove landslide began to occur in the beach area seaward from Palos Verdes Drive South sometime between 1974 and 1976. The area north of Palos Verdes Drive South began to move in the Spring of 1978 following one of the rainiest winters on record. The amount and rate of displacement are greatest along the toe of the landslide near the beach and decrease in the inland direction toward the head of the landslide. Total horizontal displacement along the center of the slide is about 30 feet at the beach, 15 feet at Palos Verdes Drive South and only 2 to 3 feet near the head of the slide. Studies of the landslide indicated that movement was activated by the accumulation of groundwater within the landslide mass and that slide movement could probably stopped by removing

groundwater. A dewatering project was subsequently developed and initiated with costs paid by the Abalone Cove Homeowners Protective Association. The project included instalation of six dewatering wells equiped with electric turbine pumps, several observation wells and a pipeline to transport water from the dewatering wells to the ocean (Fig. 2). The first two dewatering wells were placed in operation on March 3, 1980, and the sixth well was placed in operation on May 13, 1980. As of August 20, 1980, 18 million gallons (55 acre-feet) of groundwater have been removed by the six wells. This has had a stabilizing effect on the landslide. Movement appears to have stopped within the upper third of the landslide and has nearly stopped within the central part. If slowing continues along its present trend, the entire slide should stop moving by about mid October.

Measures undertaken to control the Abalone Cove landslide should have only a minor beneficial effect on the adjacent Portuguese Bend landslide. The seaward parts of two landslides are separated by a narrow wedge of stable ground supported by Portuguese Point (Fig. 1). There is probably little communication between groundwater systems on either side of the stable wedge. The head of the Abalone Cove landslide links with the Portuguese Bend landslide and part of the water removed from dewatering wells WW-3 and WW-4 probably migrates from the western part of the Portuguese Bend landslide.

Because the Abalone Cove landslide acts as a buttress to the ancient inactive landslide upslope from it and because dewatering wells WW-1 and WW-6 remove grounwater from the inactive landslide, the control program improves the stability of the area upslope from the Abalone Cove landslide.

PLAN OF CONTROL

The plan of control is composed of two elements: (1) a dewatering system, and (2) a plan to improve surface drainage within the slide area so as to reduce the recharge of groundwater from surface runoff.

The existing dewatering system of six wells appear to be adequate. Consequently, no new wells are planned. The operation and maintenance of the wells will be necessary on a permanent basis. Periodic monitoring of observation wells will be needed to make sure the water table is kept below the critical level. The dewatering pipeline will require maintenance and may require replacement by a more permanent pipeline.

Slide movement has disrupted surface drainage throughout most of the slide area. In many places runoff water drains into open fissures or closed depressions from which it permeates downward to replenish the groundwater. In order to prevent this, it will be necessary to reconstruct drainage courses and make them as impermeable as possible. This includes drainage along all roads within the slide area and a means of transporting drainage from roads to the sea. The channel along Altimira Canyon should be made impermeable along the segment between Palos Verdes Drive South and Nacissa Drive. The most feasible method might be to place a continuous 72-inch corrugated steel culver along this segment of the channel and attach it to existing culverts beneath the roads. It would also be desirable to seal the channel of Altamira Canyon within the remainder of the slide area.

AREAS BENEFITTING FROM CONTROL OF LANDSLIDE

We recommend the establishment of three benefit zones as shown on the accompanying map.

Zone I: This zone includes all properties within the active landslide and

several properties along the edge of the landslide which are in imminent danger of becoming incorporated into the slide if movement were to continue unabated. These properties will receive the greatest benefit from control of the Abalone Cove landslide.

Zone II: This zone includes properties within the acient landslide complex upslope from the Abalone Cove landslide. These properties might become involved in landslide movement if the Abalone Cove landslide were allowed to continue to move without control. These properties also contribute to the groundwater problem through their surface runoff and onsite sewage disposal. These properties are not likely to become involved in sliding toward the Portuguese Bend landslide as long as the Abalone Cove landslide is kept stable.

Zone 3: This includes properties within a triangular area of the ancient landslide complex which lies northeast of the Abalone Cove landslide and north of the Portuguese Bend landslide. This area would probably become involved in sliding if Zone II became involved; however, it might become involved in movement with the Portuguese Bend landslide even if the Abalone Cove landslide is kept stable. Therefore, this zone will benefit less than the other two zones from control of the Abalone Cove landslide.