To: Capitola City Council Members

Subject: Item 9B, Conceptual Design Grand Avenue Parkway, December 11, 2025

From: Tom Mader

Summary

A decision should be deferred on a landscaping plan for the relocating of the Grand Avenue path along Oakland to Saxon to Central Avenues. Instead, immediately install a light armoring cover on the eroding sandy marine soil layer about 12 feet by 60 feet adjacent to the drain between Oakland and Saxon Avenues to save the existing pathway.

Between Saxon and Central Avenues there is no immediate need to relocate the Grand Avenue path between Saxon and Central Avenues as the cliff edge has only moved back 2 feet over the 32 years from 1993 to 2025, roughly 3/4 of an inch per year. Even at the cliff edge's closest point to the Grand Avenue path, there is still an average of ten feet between Grand Avenue and the cliff edge. The 1993 to 2025 ¾" rate of retreat per year indicates that there are still several decades of usage available on the existing Grand Avenue path.

Data

A) The Pacific Crest Engineering (**PEC**) study chose an inappropriate 1956 data point when many other more recent studies were available, due, it claimed, to "short notice" time constraints, and thus substantially overestimated the rate of cliff retreat.

B) A Rogers Johnson and Associates study of 1993 showed a distance of 35' between the 101 Saxon Avenue property line and the cliff edge.

C) The 10/25 Pacific Crest Engineering study showed, at an exactly similar transect, a 33' distance from the top of the bluff to the 101 Saxon Ave property line.

D) The **PCE** study failed to recognize the sand "fill-in" effect that commenced approximately 30 years after the 1964 construction of the Santa Cruz Harbor jetty and which has dramatically slowed erosion at 101 Saxon Avenue to less than one inch per year between 1993 and 2005.

Next Steps

1) There is clear and immediate need to lightly armor with weighted tarps or plastic netting material, the 10' to 12' marine layer of sandy soil at the top of the cliff between Oakland and Saxon Avenues adjacent to the storm drain. This will virtually halt the undermining of Grand Avenue.

   -There is a $29,800 "netting retention" estimate from Granite Construction.

2) There is a clear need for elevated community viewing benches in areas called "parklets" at the ocean ends of Hollister, Oakland, Saxon and Central Avenues with appropriate landscaping.

3) Establish nature signage at the avenue/cliff junctures to highlight fauna, wildlife and marine life as has been done along the Soquel Creek path.

3. Although no landsliding occurred this past winter in some locations between Central and Oakland Avenues (see heavily vegetated areas on bluff face on Plate 1), the bedrock is primed to topple at those locations due to being notched at the base.

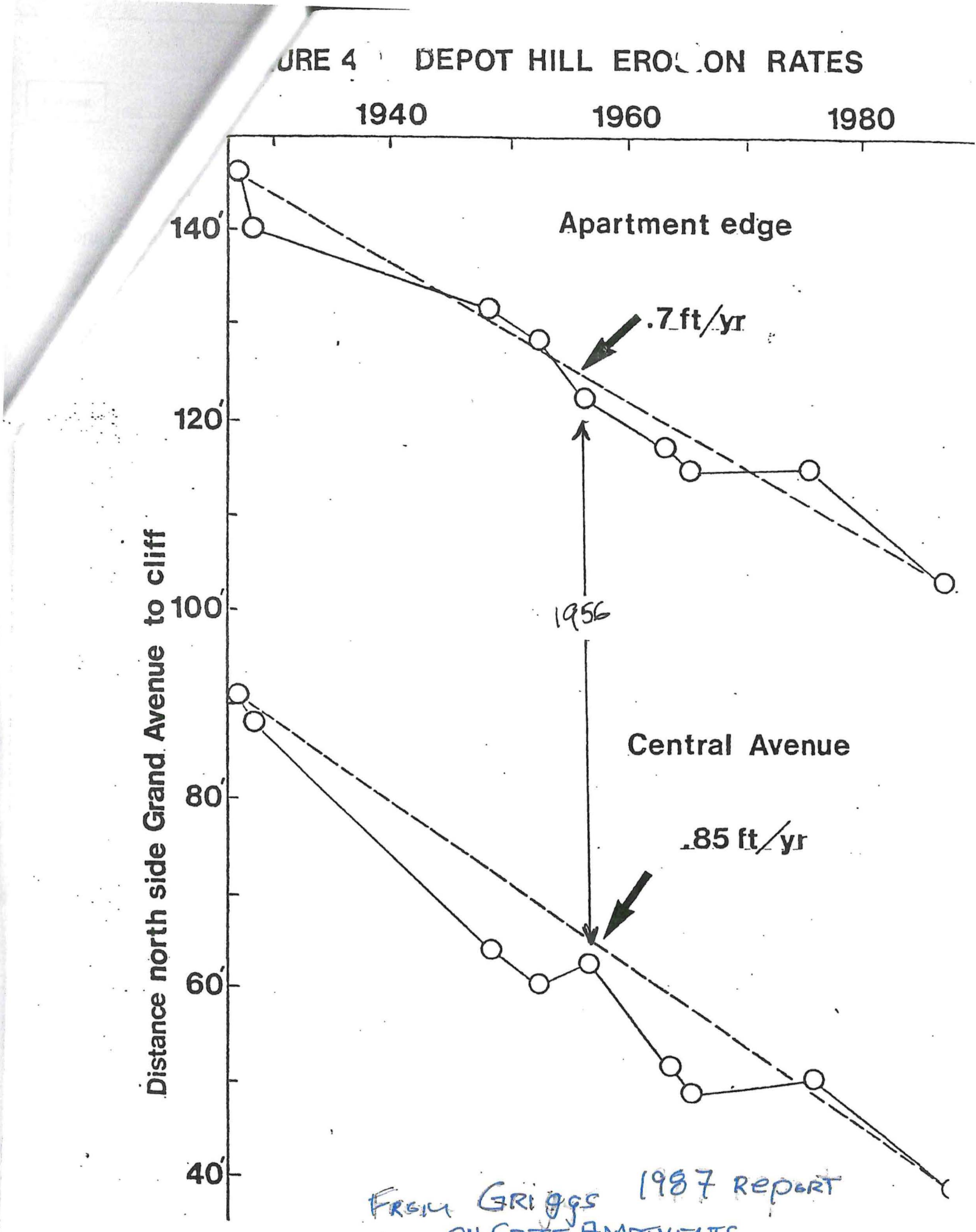
Most of the marine terrace deposits in this area are over steepened and will likely lay back to an average angle of about 38 degrees. This may come about in one to three rainy seasons. A conservative analysis would assume that we will have back-to-back wet seasons for the next several years, which may lay back the marine terrace deposits to the angle of repose. A more liberal analysis would assume that we will enter a drought period of three to five years, followed by wet year. Using those ranges implies that the top of the bluff may retreat significantly within one to six years.

A review of the most recent El Nino status by NOAA (which can be accessed here: https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf) stipulates that "La Niña conditions are present and favored to persist through December 2025 -February 2026, with a transition to ENSO-neutral likely in January-March 2026 (55% chance).*" Although La Nina climatic conditions typically results in lower than average precipitation and relatively smaller storm waves, there is always a chance that large coastal storm waves might impact central California even during a La Nina climatic cycle.

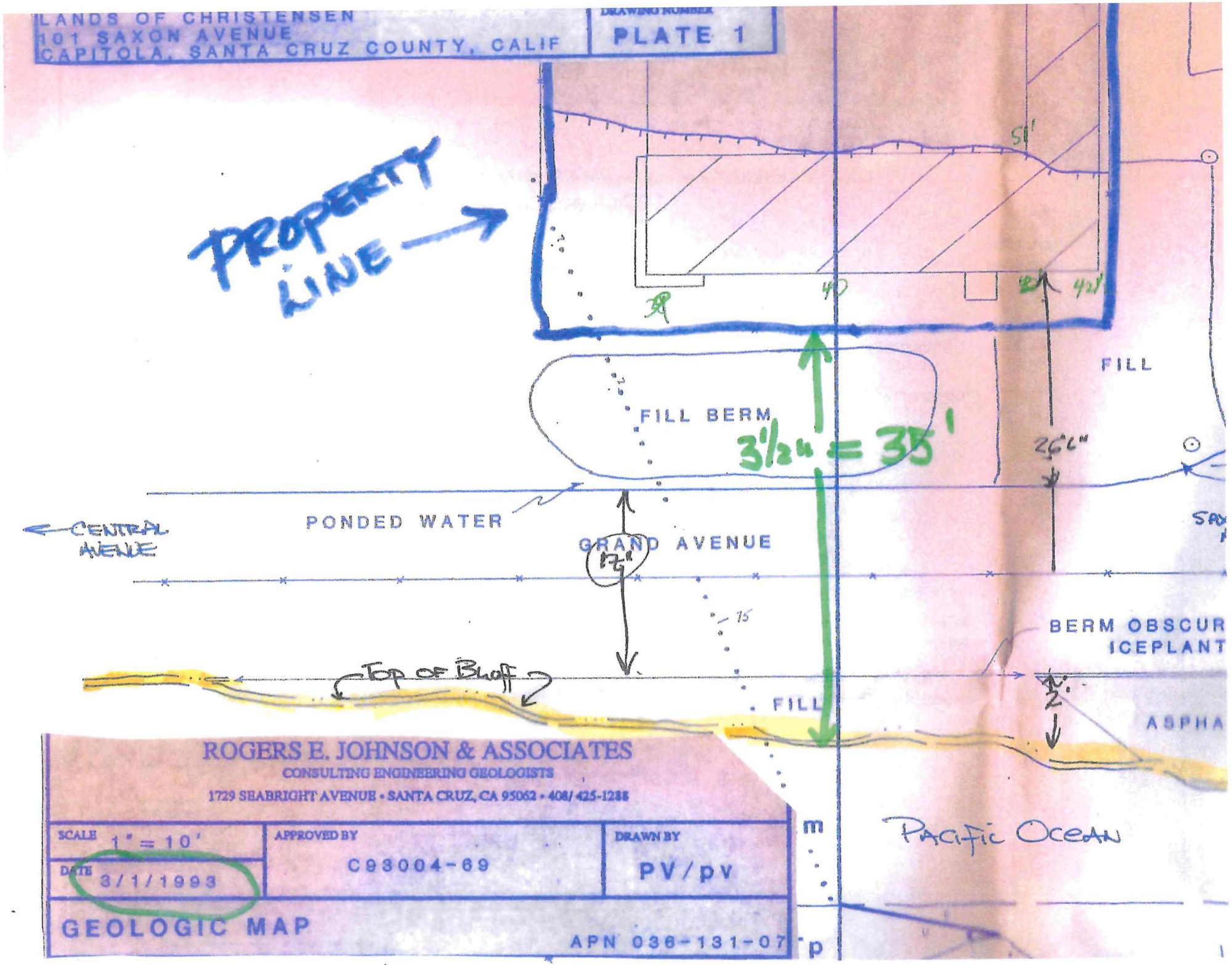
We have used two methods of projecting the future top of bluff retreat for this study. The first method is a simple long range bluff retreat method generated by measuring the difference in time and position of the bluff between the set of stereopair aerial photographs and the current bluff position. The only set of high resolution historical stereopair aerial photos we could procure on short notice were the 1956 set. We measured a variable retreat rate of 0.33 feet per year to 0.66 feet per year for the study area between 1956 and 2025. We used these retreat rates to calculate and plot the projected bluff top position 10 years from now (represented by the purple line on Plate 1).

We also drew transects at select locations in the area of interest and plotted the projected top of bluff assuming the Marine Terrace Deposits will lay back to the angle of repose of about 38 degrees (Represented by the pink line on both the transects and map; see Plate 1) in response to rainfall and earthquakes. Using just this analysis pushes the top of the bluff back between 12 ½ to 22 feet from the current position. In our opinion this line represents the retreat that could happen in one to six years, taking future storms into consideration. **We have not factored in the collapse of the undercut portion of the bluff bedrock or the landsliding and subsequent retreat that would occur in the event of a large magnitude earthquake. If either of those processes are factored in and occur within that time period of one to six years, the amount of bluff retreat may be even greater.**

It is of interest to note that the two methods result in a consistent difference in projected bluff top retreat configuration. The aerial photo method plotting the predicted position of the bluff ten years from now is consistently less than the pure physical model method of using the

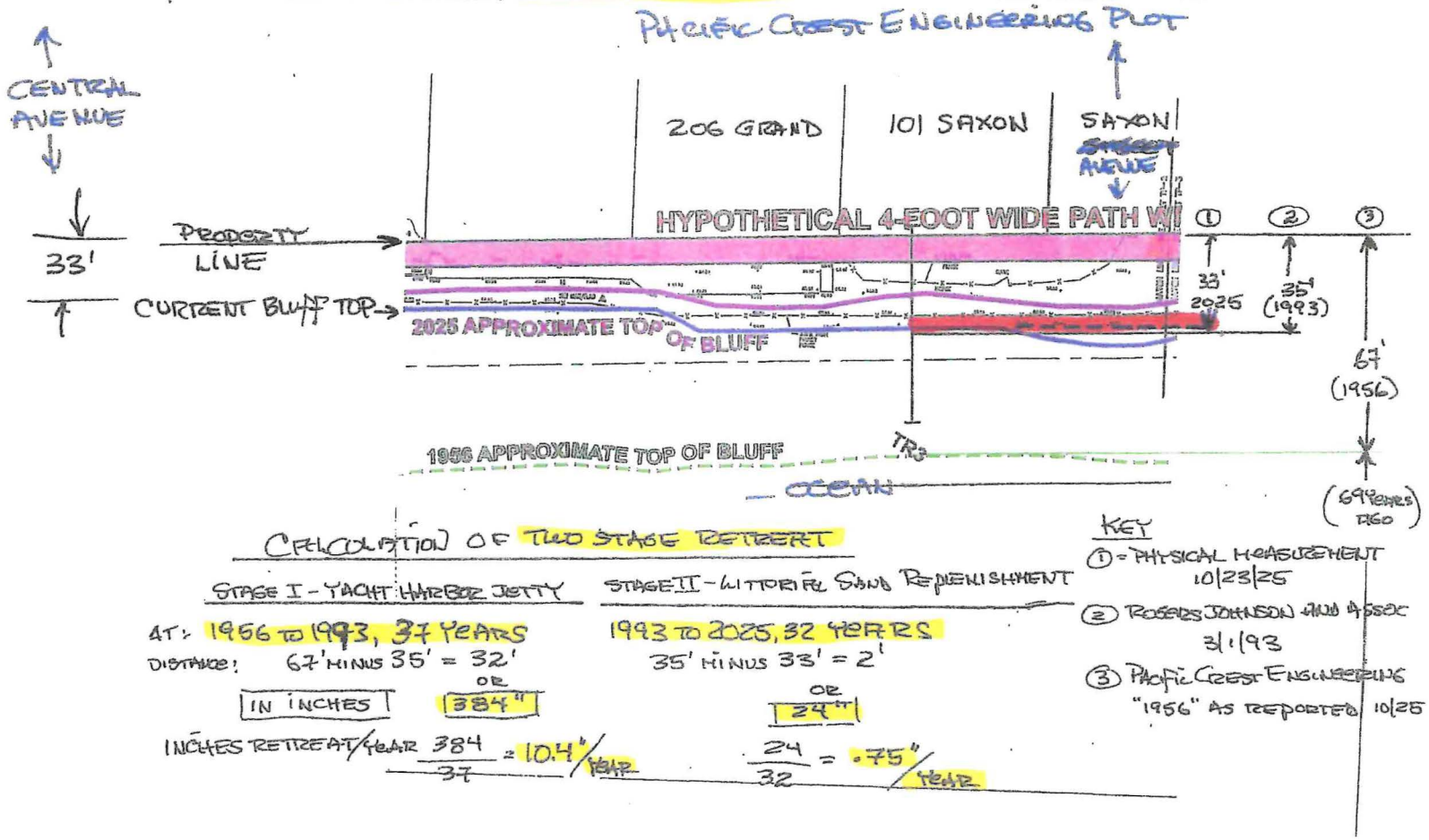


FROM GRIGGS 1987 REPORT ON CREST APARTMENTS


LANDS OF CHRISTENSEN
101 SAXON AVENUE
CAPITOLA, SANTA CRUZ COUNTY, CALIF
DRAWING NUMBER
PLATE 1
PROPERTY LINE
51'
39'
40'
42'
FILL
FILL BERM
3½ = 35'
25'6"
PONDED WATER
CENTRAL AVENUE
GRAND AVENUE
17'
15'
BERM OBSCUR
ICEPLANT
Top of Bluff
FILL
ASPHA
2'
ROGERS E. JOHNSON & ASSOCIATES
CONSULTING ENGINEERING GEOLOGISTS
1729 SEABRIGHT AVENUE • SANTA CRUZ, CA 95062 • 408/425-1288
SCALE 1" = 10'
APPROVED BY C93004-69
DRAWN BY PV/pv
DATE 3/1/1993
GEOLOGIC MAP
APN 036-131-07
PACIFIC OCEAN

TWM 10/2025

CLIFF RETREAT – AT 101 SAXON AVE TRANSECT "TR3" – 1956 TO 2003 TO 2025



CALCULATION OF TWO STAGE RETREAT

STAGE I – YACHT HARBOR JETTY	STAGE II – LITTORAL SAND REPLENISHMENT
AT: 1956 TO 1993, 37 YEARS	1993 TO 2025, 32 YEARS
DISTANCE: 67' MINUS 35' = 32'	35' MINUS 33' = 2'
IN INCHES	OR 384"
OR 24"	
INCHES RETREAT/YEAR $\frac{384}{37}$ = 10.4"/YEAR	$\frac{24}{32}$ = .75"/YEAR

KEY

① = PHYSICAL MEASUREMENT 10/23/25

② ROGERS JOHNSON AND ASSOC 3/1/93

③ PACIFIC CREST ENGINEERING "1956" AS REPORTED 10/25

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CAPITOLA CLIFF EROSION - GRAND AVENUE
OVER THE PAST 60 YEARS

TIME	EVENTS AND COMMENTS
1964	YACHT HARBOR CONSTRUCTION COMPLETED
1965 TO 1993+	CAPITOLA BEACH LOSES SAND AND CLIFF RETREATS AT ABOUT 1'/YEAR DUE TO HARBOR JETTY'S CAPTURE OF SAND
1965 TO 1980s	SAND OCCASIONALLY TRUCKED OUT ONTO CAPITOLA BEACH
1969	CAPITOLA JETTIES COMPLETED
1987	CREST APARTMENTS EVACUATED
1990 TO 1993+	SAND COMPLETELY FILLS THE JETTIES AND MIGRATES REGULARLY ALONG THE DEPOT HILL CLIFF TO NEW BRIGHTON
1993 TO 2025+	CLIFF RETREAT SLOWS DRAMATICALLY ALONG GRAND AVENUE TO ABOUT 3/4'/YEAR BETWEEN SAXON AVE AND CENTRAL