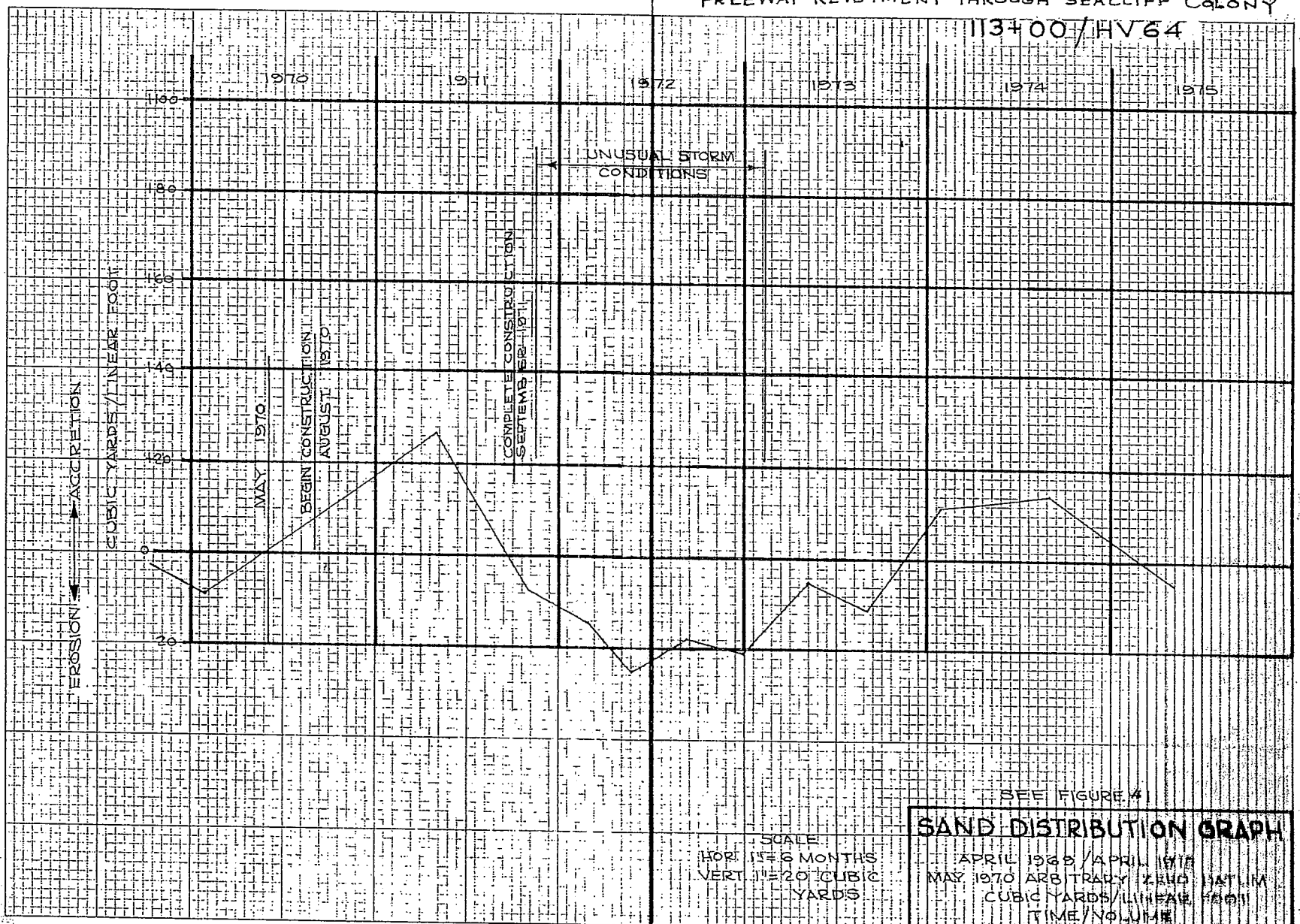
FREEWAY REVETMENT THROUGH SEACLIFF COLONY

113+00 / HV 64



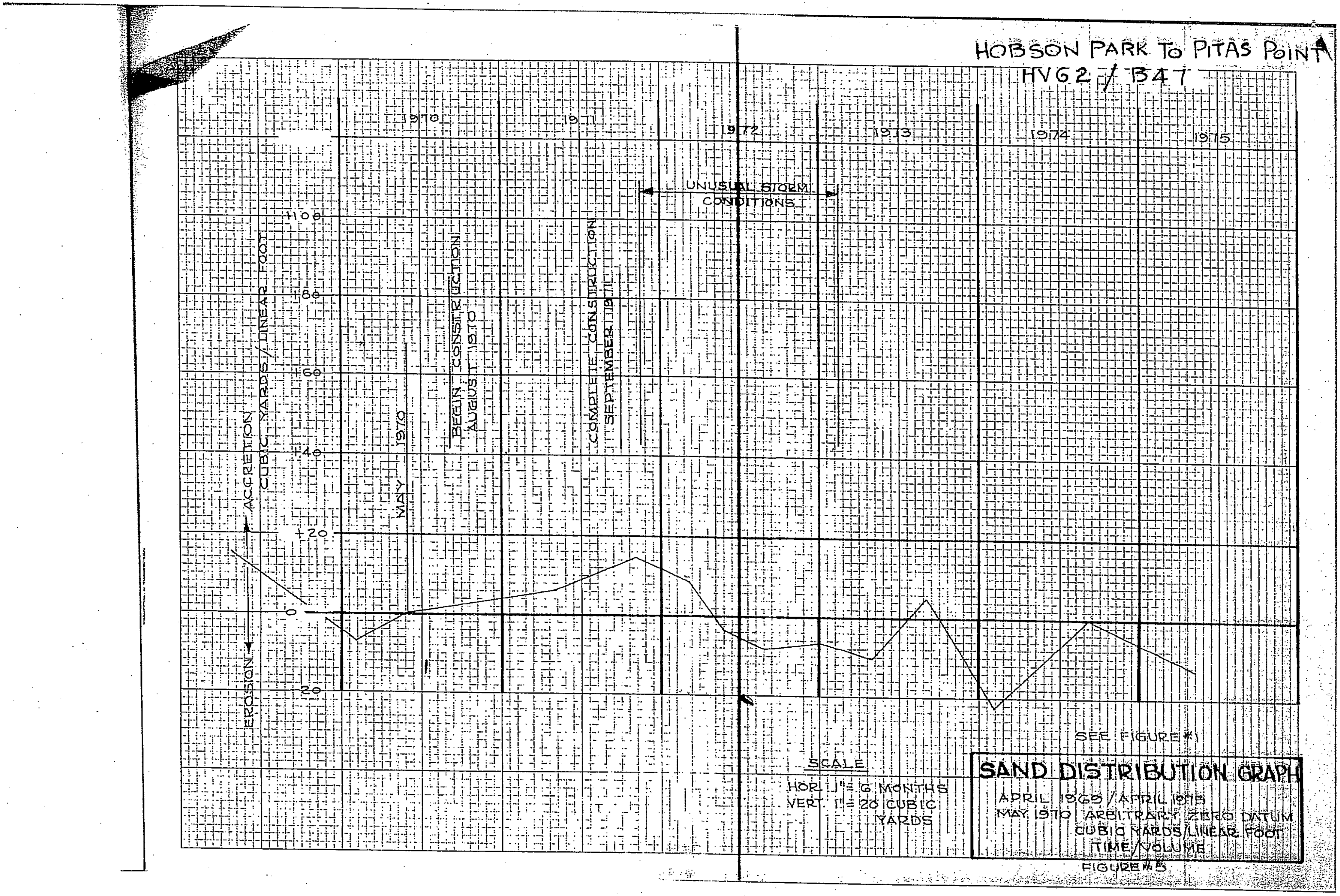
SEE FIGURE #1

SAND DISTRIBUTION GRAPH

APRIL 1969 / APRIL 1970
MAY 1970 ARBITRARY ZERO DATUM
CUBIC YARDS / LINEAR FOOT
TIME / VOLUME

SCALE
HOR. 1" = 6 MONTHS
VERT. 1" = 20 CUBIC YARDS

FIGURE #3


HOBSON PARK To PITAS POINT
HV62 / B47
1970
1971
1972
1973
1974
1975
UNUSUAL STORM CONDITIONS
+100
+80
+60
+40
+20
0
20
ACCRETION
EROSION
CUBIC YARDS/LINEAR FOOT
MAY 1970
BEGIN CONSTRUCTION AUGUST 1970
COMPLETE CONSTRUCTION SEPTEMBER 1971
SEE FIGURE #1
SCALE
HORI. 1" = 6 MONTHS
VERT. 1" = 20 CUBIC YARDS
SAND DISTRIBUTION GRAPH
APRIL 1969 / APRIL 1975
MAY 1970 ARBITRARY ZERO DATUM
CUBIC YARDS/LINEAR FOOT
TIME/VOLUME
FIGURE #3

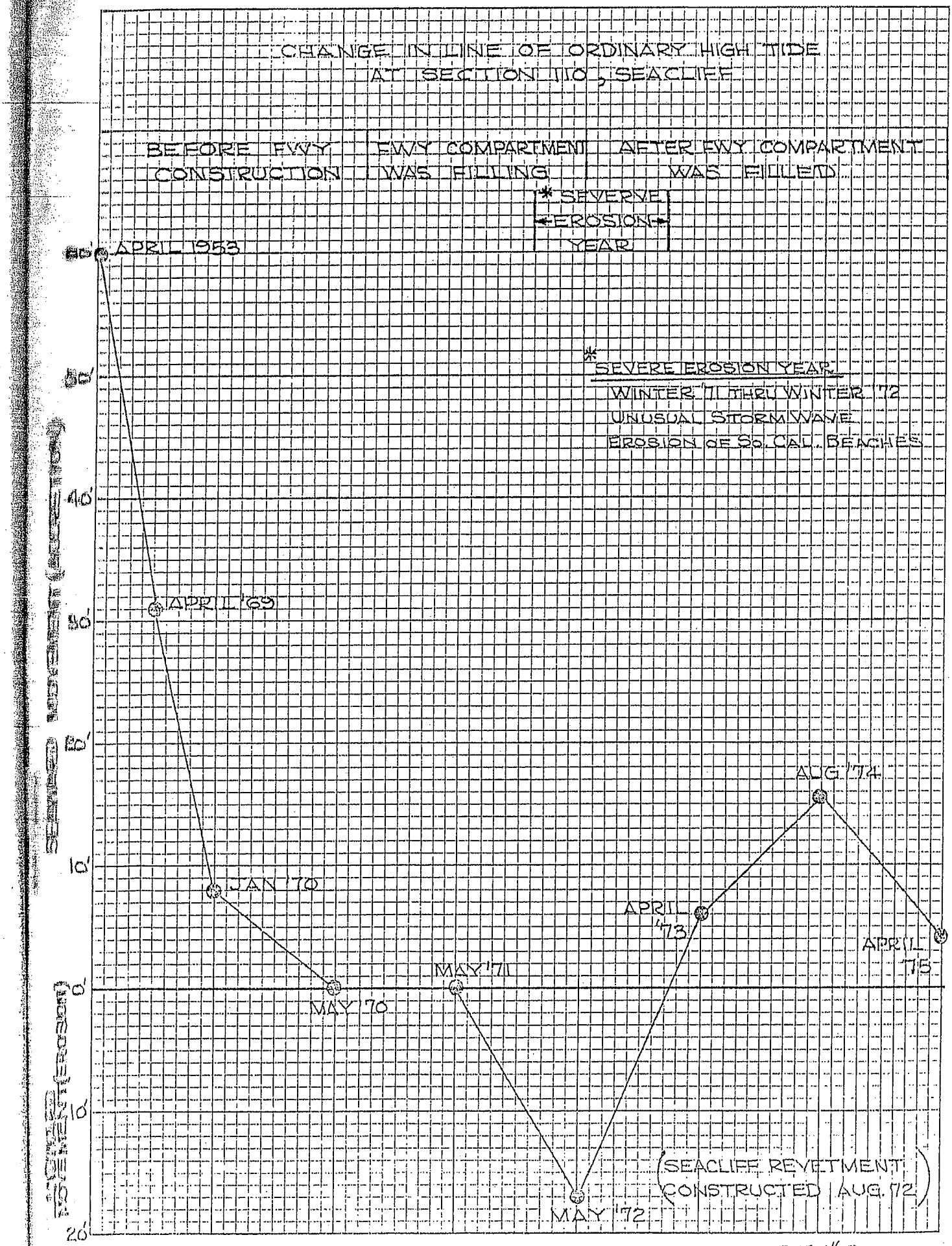
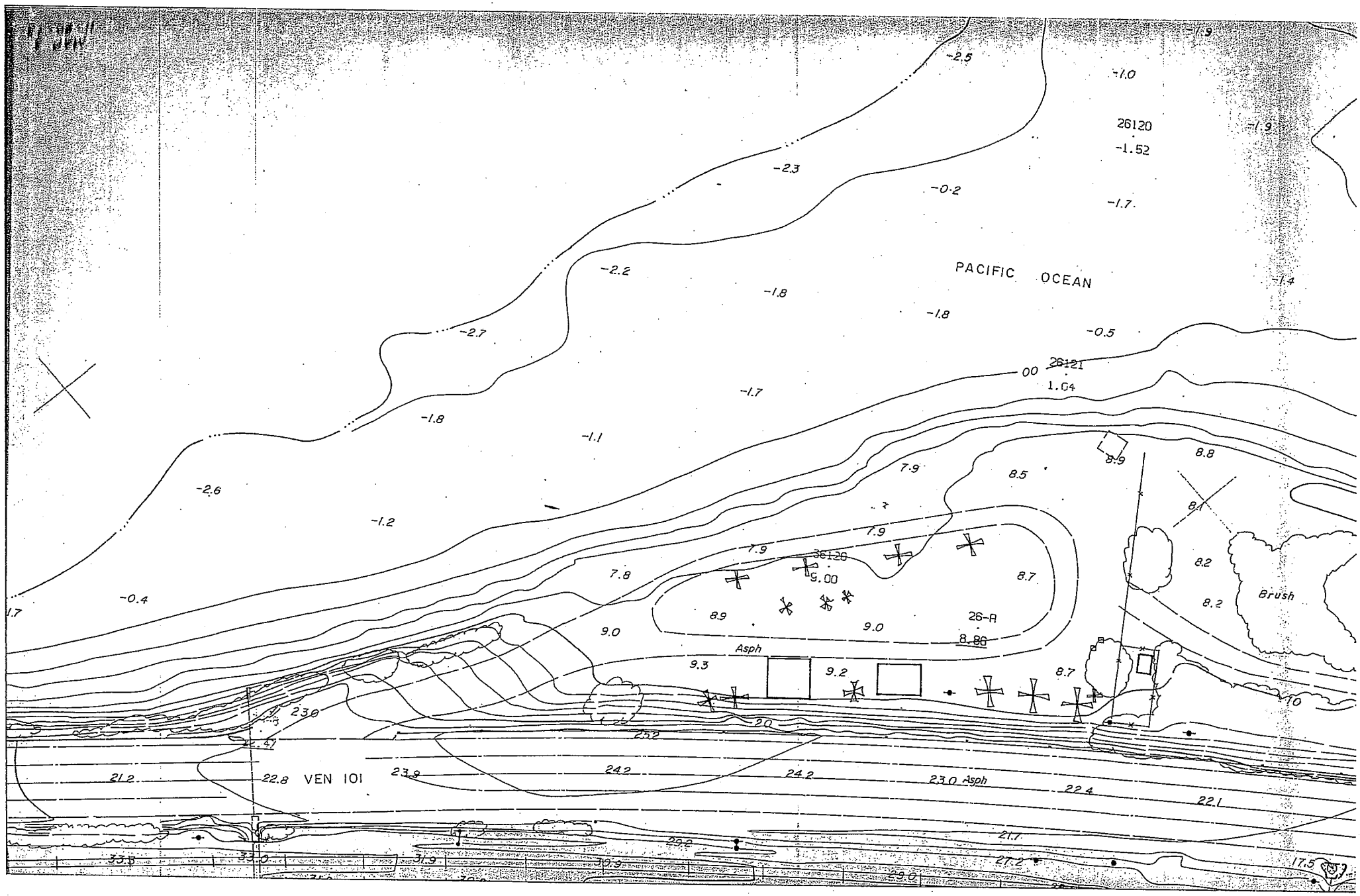
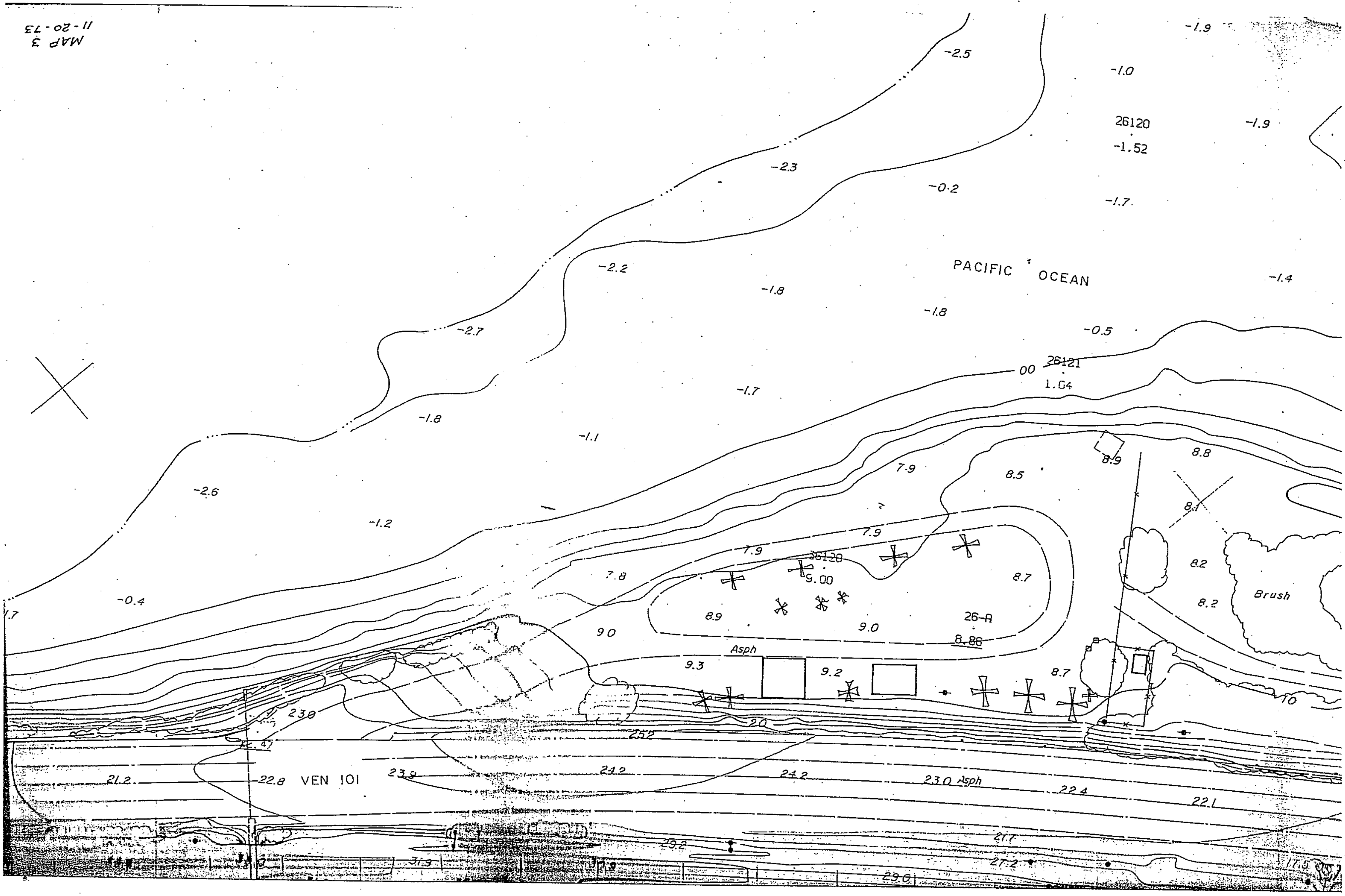
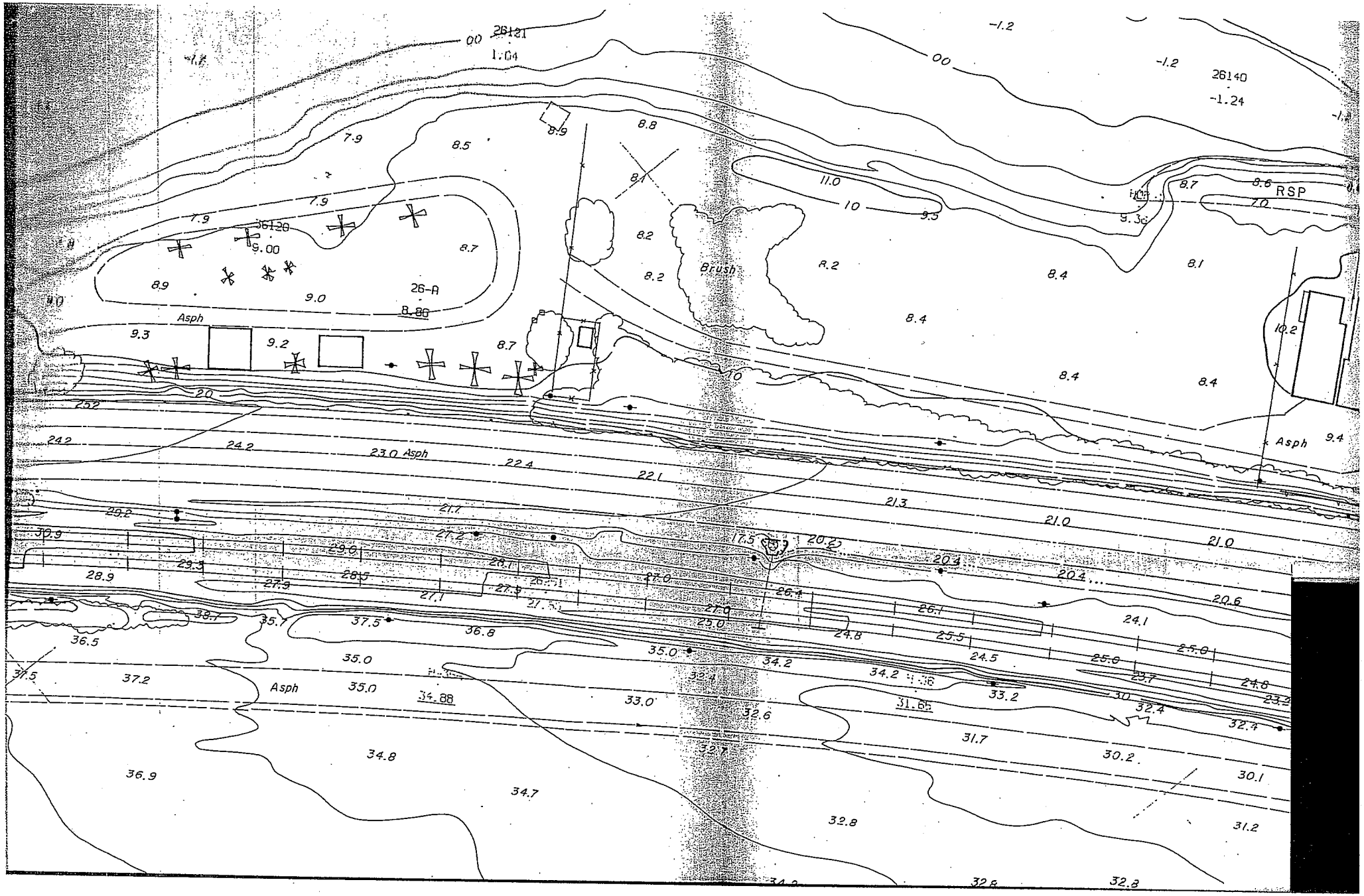
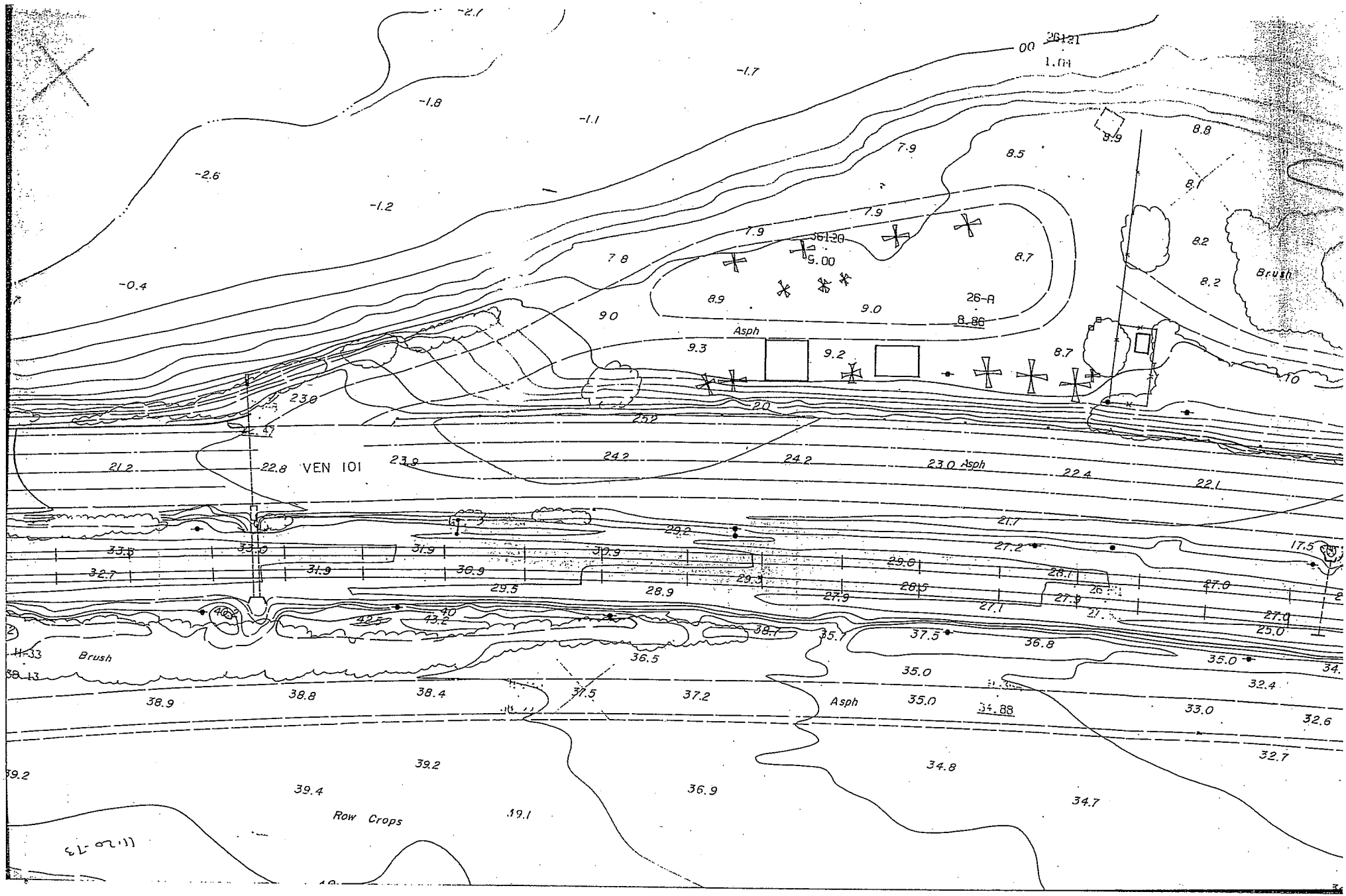

CHANGE IN LINE OF ORDINARY HIGH TIDE
AT SECTION 110, SEACLIFF
BEFORE FWY CONSTRUCTION
FWY COMPARTMENT WAS FILLING
AFTER FWY COMPARTMENT WAS FILLED
* SEVERE EROSION YEAR
APRIL 1953
APRIL '63
JAN '70
MAY '70
MAY '71
MAY '72
APRIL '73
AUG '74
APRIL '75
60'
50'
40'
30'
20'
10'
0'
10'
20'
SEACLIFF REVETMENT CONSTRUCTED AUG. 72
* SEVERE EROSION YEAR
WINTER '11 THRU WINTER '12
UNUSUAL STORM WAVE
EROSION OF SO. CAL. BEACHES

FIGURE #6

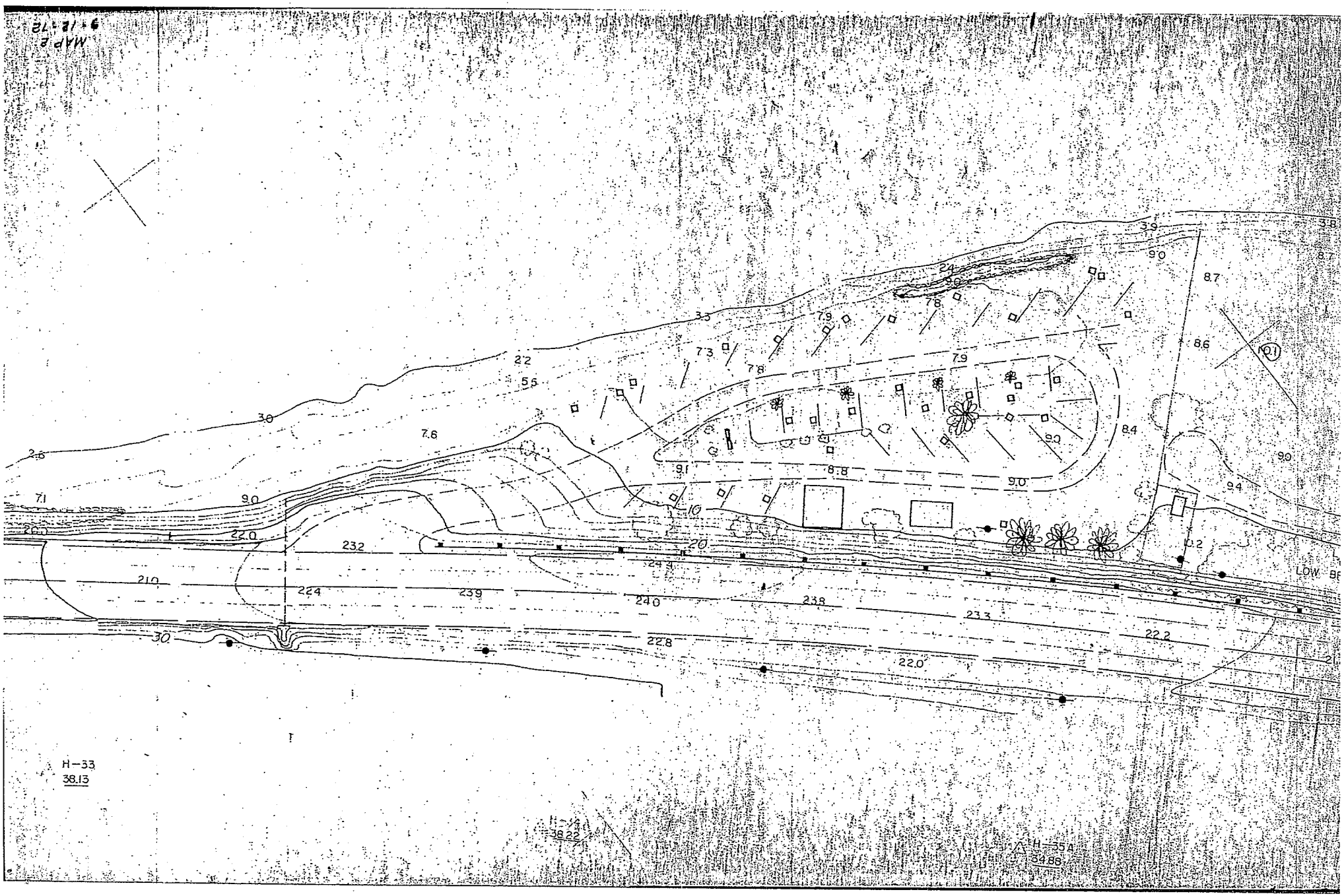

PACIFIC OCEAN
VEN 101
Asph
Brush
26120
-1.52
26121
1.04
36126
9.00
26-A
8.86
-2.5
-2.3
-2.2
-2.7
-2.6
-1.8
-1.2
-0.4
-1.0
-0.2
-1.7
-1.8
-1.1
-1.7
-1.8
-0.5
-1.4
-1.9
8.8
8.5
7.9
8.9
8.1
8.2
8.2
8.7
7.9
7.8
8.9
9.0
9.0
9.3
9.2
8.7
23.0
25.2
21.2
22.8
23.9
24.2
24.2
23.0 Asph
22.4
22.1
21.7
29.2
33.5
33.0
31.9
30.9
29.8
27.2
17.5

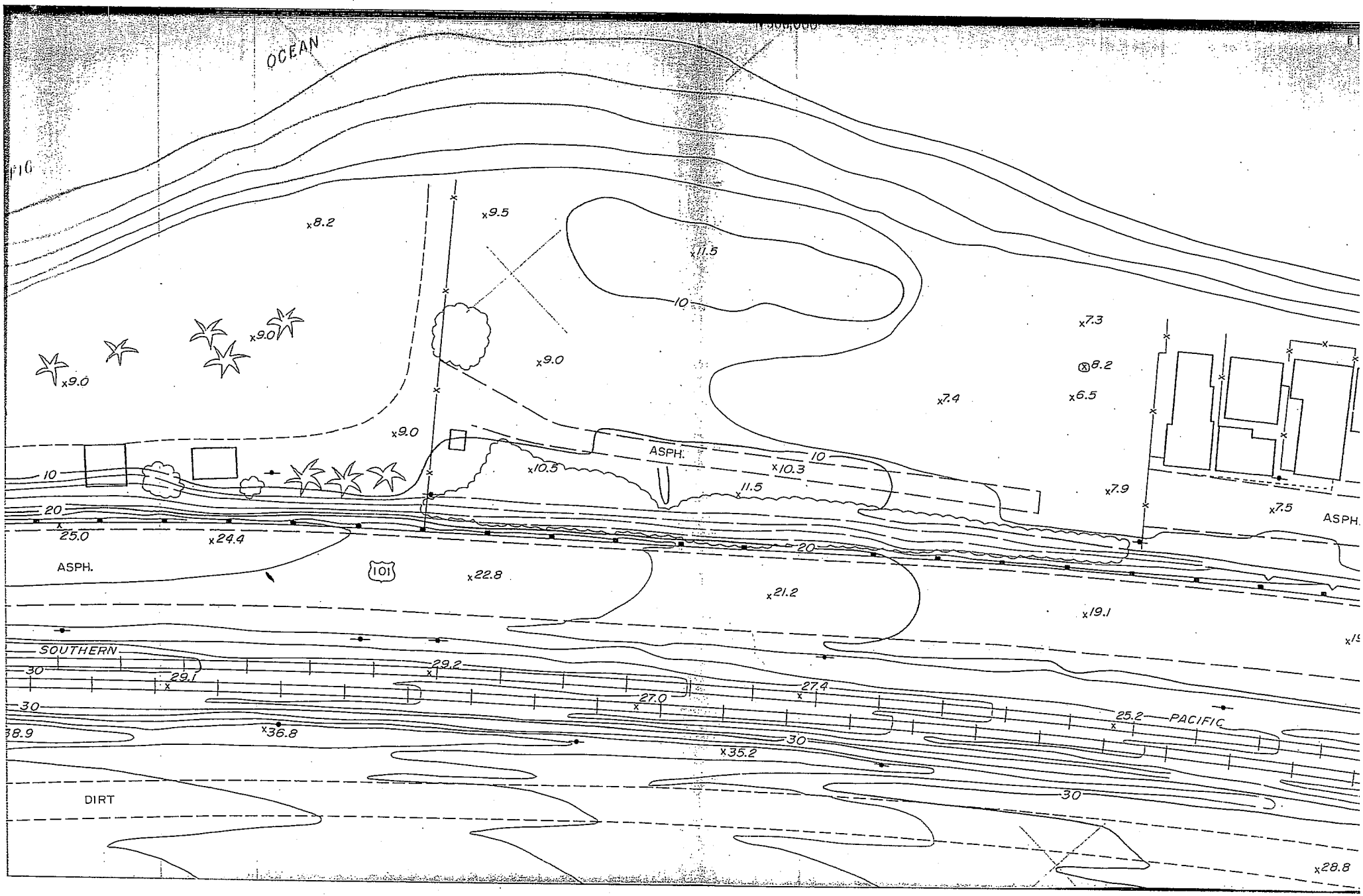

MAP 3
11-20-73
PACIFIC OCEAN
VEN 101
Asph
Brush
26120
-1.52
26121
1.04
26-A
8.86
26120
9.00
-2.5
-1.0
-1.9
-1.9
-2.3
-0.2
-1.7
-1.4
-2.2
-1.8
-1.8
-0.5
-2.7
00
-1.7
-1.8
-1.1
-2.6
-1.2
-0.4
7.9
8.5
8.9
8.8
8.1
7.9
7.9
7.8
8.7
8.2
8.2
8.9
9.0
9.0
9.3
9.2
8.7
23.8
20
25.2
21.2
22.8
23.9
24.2
24.2
23.0
22.4
22.1
29.2
21.7
27.2
31.9
29.0
10

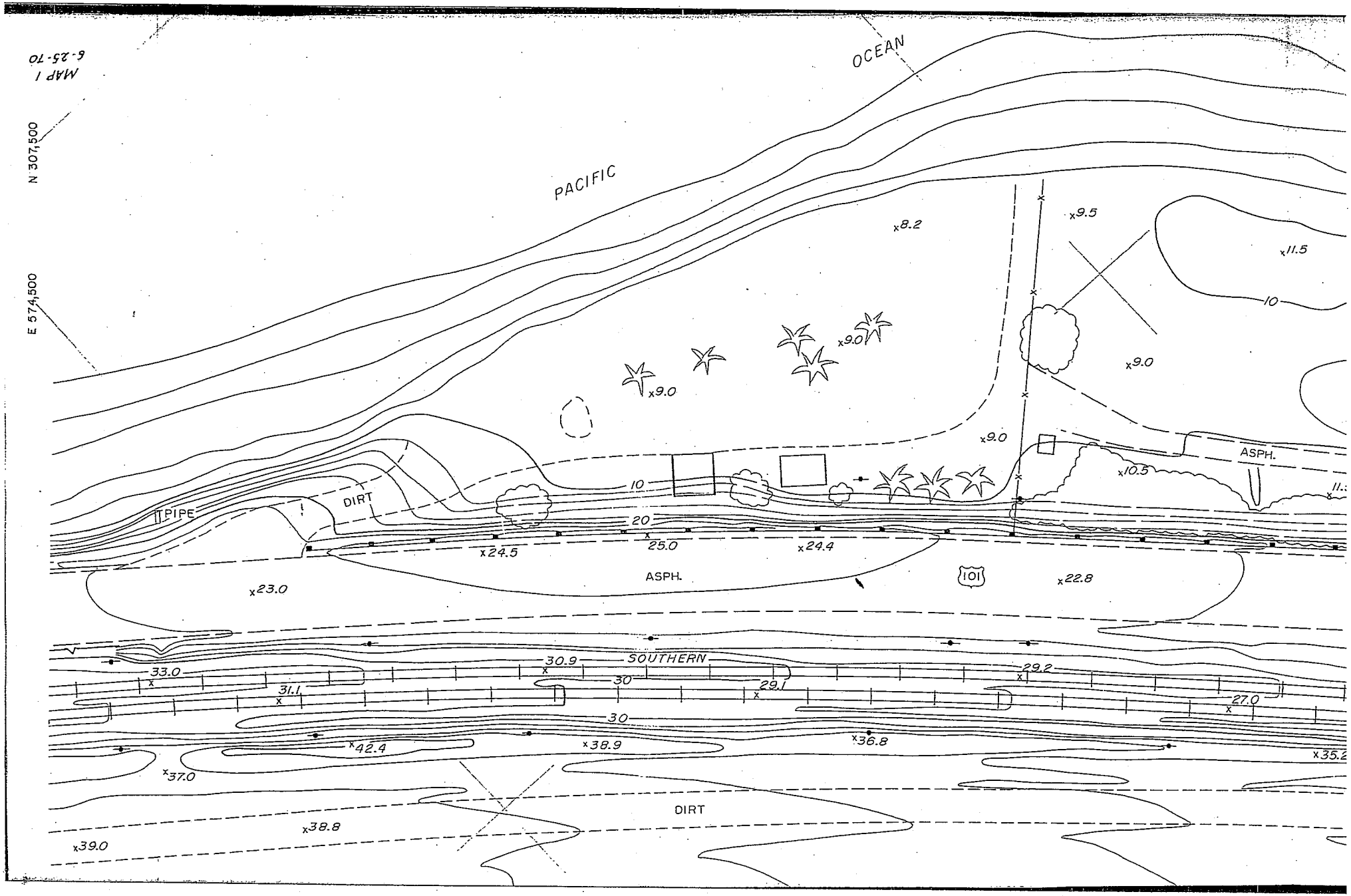

26121
1.04
26140
-1.24
RSP
Brush
Asph
26-A
8.86
9.00
34.88
31.65

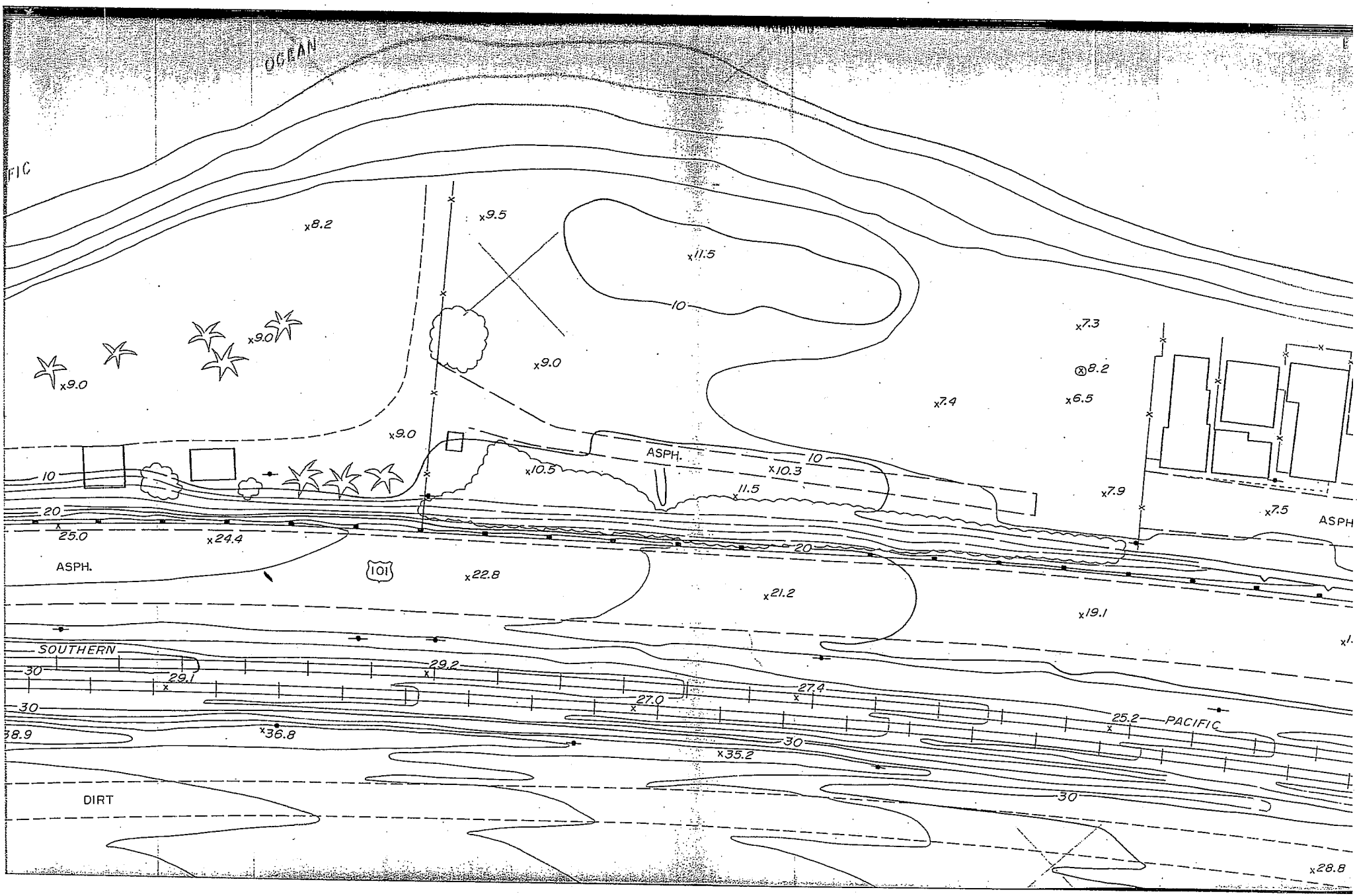

VEN 101
Asph
Brush
Row Crops
26-A
8.86
5.00
Asph
34.88


PACIFIC
OCEAN
LOW BRUSH
H-35A
34.88
H-35
31.65


MAP 2
9/12/72
H-33
38.13
H-34
38.22
H-35
34.88
LOW


OCEAN
8.2
9.5
11.5
10
9.0
9.0
9.0
9.0
10.5
10.3
11.5
7.3
8.2
7.4
6.5
7.9
7.5
ASPH.
ASPH.
10
20
25.0
24.4
20
ASPH.
101
22.8
21.2
19.1
SOUTHERN
30
29.1
29.2
27.0
27.4
30
38.9
36.8
35.2
30
25.2
PACIFIC
DIRT
30
28.8


MAP 1
6-25-70
N 307,500
E 574,500
OCEAN
PACIFIC
x8.2
x9.5
x11.5
10
x9.0
x9.0
x9.0
x9.0
ASPH.
x10.5
PIPE
DIRT
10
20
x24.5
25.0
x24.4
ASPH.
101
x22.8
x23.0
33.0
31.1
30.9
SOUTHERN
30
29.1
29.2
27.0
30
x42.4
x38.9
x36.8
x35.2
x37.0
DIRT
x38.8
x39.0


OCEAN
FIC
x8.2
x9.5
x11.5
10
x9.0
x9.0
x9.0
x9.0
x7.3
⊗8.2
x7.4
x6.5
ASPH.
10
x10.5
x10.3
11.5
x7.9
x7.5
ASPH
10
20
25.0
x24.4
20
ASPH.
101
x22.8
x21.2
x19.1
SOUTHERN
30
29.1
29.2
27.4
27.0
30
38.9
x36.8
30
x35.2
25.2
PACIFIC
DIRT
30
x28.8

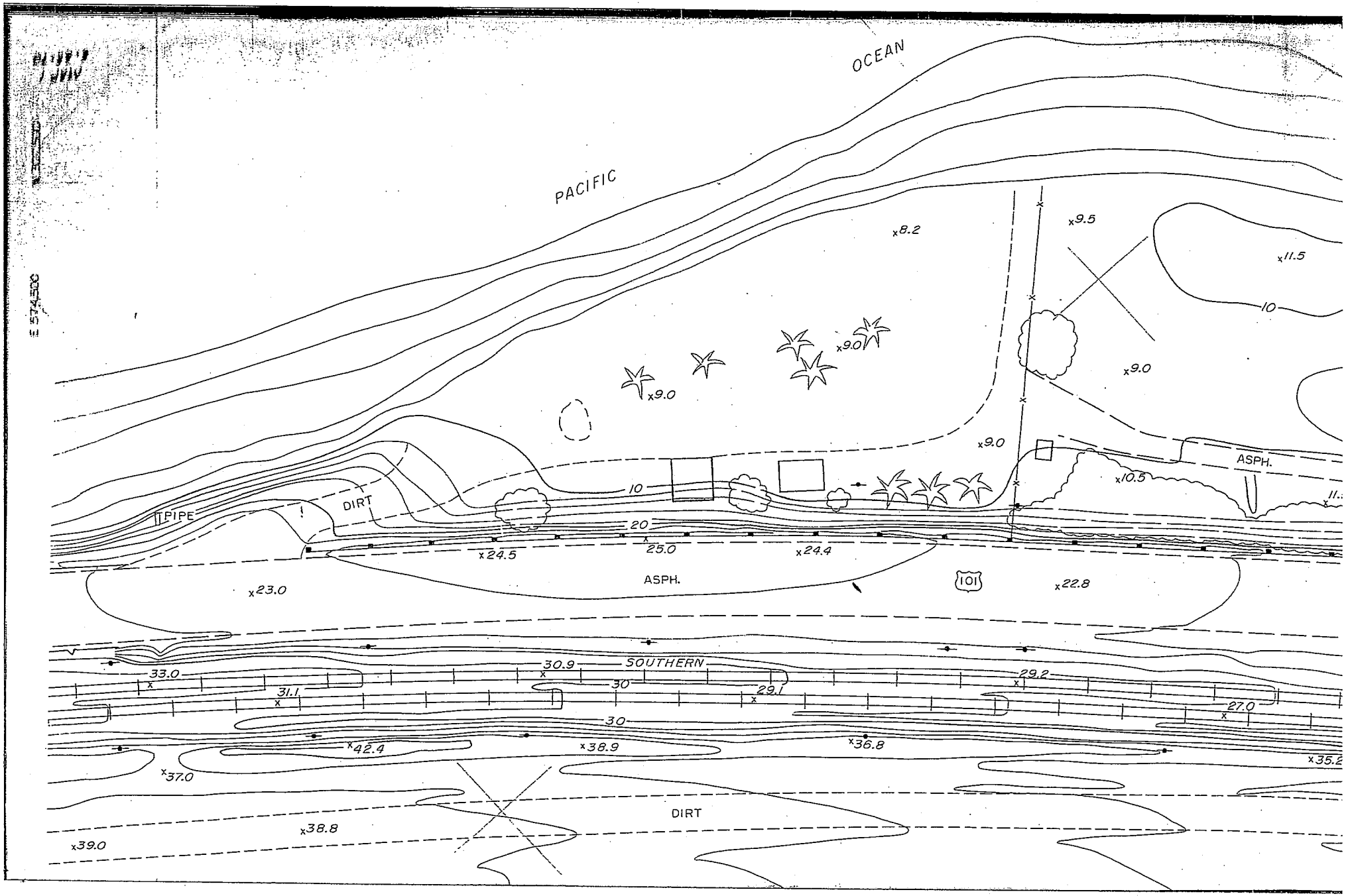

OCEAN
PACIFIC
E 574500
x8.2
x9.5
x11.5
10
x9.0
x9.0
x9.0
x9.0
ASPH.
x10.5
PIPE
DIRT
10
20
x24.5
25.0
x24.4
ASPH.
101
x23.0
x22.8
33.0
31.1
30.9
SOUTHERN
30
29.1
29.2
27.0
30
x42.4
x38.9
x36.8
x35.2
x37.0
DIRT
x38.8
x39.0

TABLE I

BEACH MONITORING RECORDS

Aerial Photographs (Vertical)	Aerial Photographs (Oblique)	Ground Photographs 8x10	Snapshots		Cross Sections
1-5-62					
9-30-69	11-14-67	3-14-69	5-27-69	1-24-73	Sta 113+00 to Punta Gorda
4-22-70 San Bar. Co. Line to Ven River	12-1-71	11-4-71	2-20-70	2-21-73	
	5-24-72			3-7-73	11-28-63
	6-12-72	12-1-71 color	10-19-71	3-16-73	
6-25-70	8-26-72			3-27-73	Sta 110+00 to Punta Gorda
	10-6-72 color*	12-1-71	11-3-71	4-24-73	5-24-68
12-4-70		12-30-71	11-4-71	5-22-73	4-14-69*
	12-19-72			5-24-73	
4-8, 15-71	8-27-73 color	1-28-72	12-1-71	6-4-73	1-26-70*
				6-11-73	
8-30-71	9-16-74	2-25-72	1-11-72	7-2-73	5-12-70*
11-3-71		4-20-72	4-10-72	8-27-73	9-1-70*
				9-7-73	
2-26-72		5-18-72	4-20-72		12-23-70*
				10-19-73	
6-1-72		8-25-72	5-2-72	10-26-73	4-5-71*
			5-3-72	10-30-73	
9-12-72		9-8-72		11-19-73	7-21-71 Constr.
			8-8-72	11-29-73	8-4-71 Constr.
11-19-72		9-22-72	8-14-72		8-9-71*
			8-21-72	1-9-74	8-19-71 Constr.
2-13-73		11-20-72	8-22-72	2-1-74	
			8-23-72	9-17-74	9-15-71 Constr.
San Bar. Co. Line to Ven River 4-14-73		2-15-73	8-30-72	9-26-74	10-6-71 Constr.
					11-9-71*
		6-22-73	9-1-72	1-23-75	11-17-71 Constr.
			10-20-72	2-6-75	1-5-72 Constr.
11-20-73		8-27-73	10-23-72	4-23-75	2-21-72 Constr.
				5-7-75	2-23-72*
		12-7-73	11-3-73	5-16-75	5-3-72*
			11-13-72	6-4-75	5-30-72 (Diver)
		9-17-74	11-20-72	6-12-75	7-1-72 Constr.
			11-21-72		
		6-30-75	11-22-72		9-1-72*
			11-29-72		9-12-72 Hobson Park
					10-16-72
			12-19-72		Sea Cliff Colony
					12-22-72*
			1-15-73		5-4-73*
			1-17-73		8-73*
					1-74*
					8-74*
					4-75*

Pitas Point to Punta Gorda unless otherwise designated

* Pitas Pt/ Punta Gorda

Hobson Park & Sea Cliff Colony

* Pitas Pt/Punta Gorda

RECOMMENDED SLOPE PROTECTION AND
RESTORATION FOR HOBSON PARK AREA

SCALE 1" = 20'

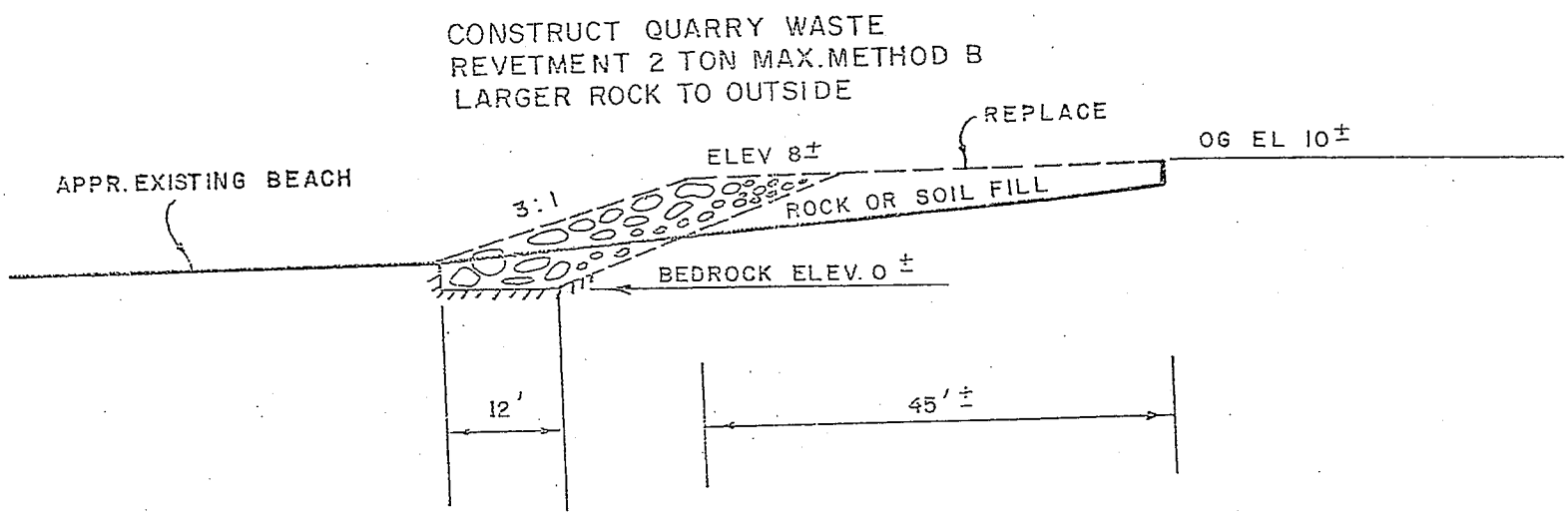


FIGURE 13

APPROXIMATE SOIL PROFILE
NEAR HV 64, EROSION SCARP
BETWEEN HOBSON PARK AND
SEACLIFF

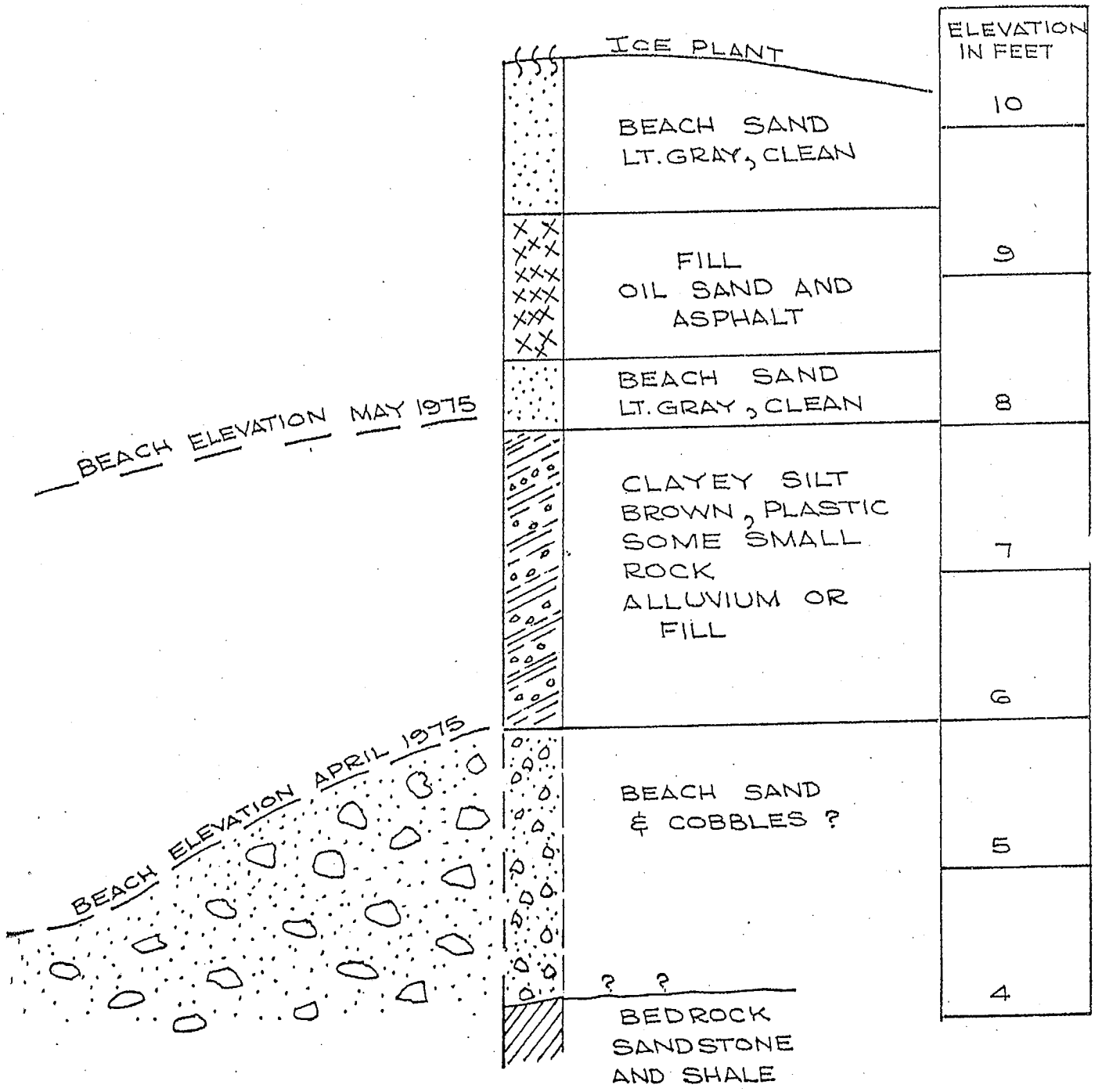
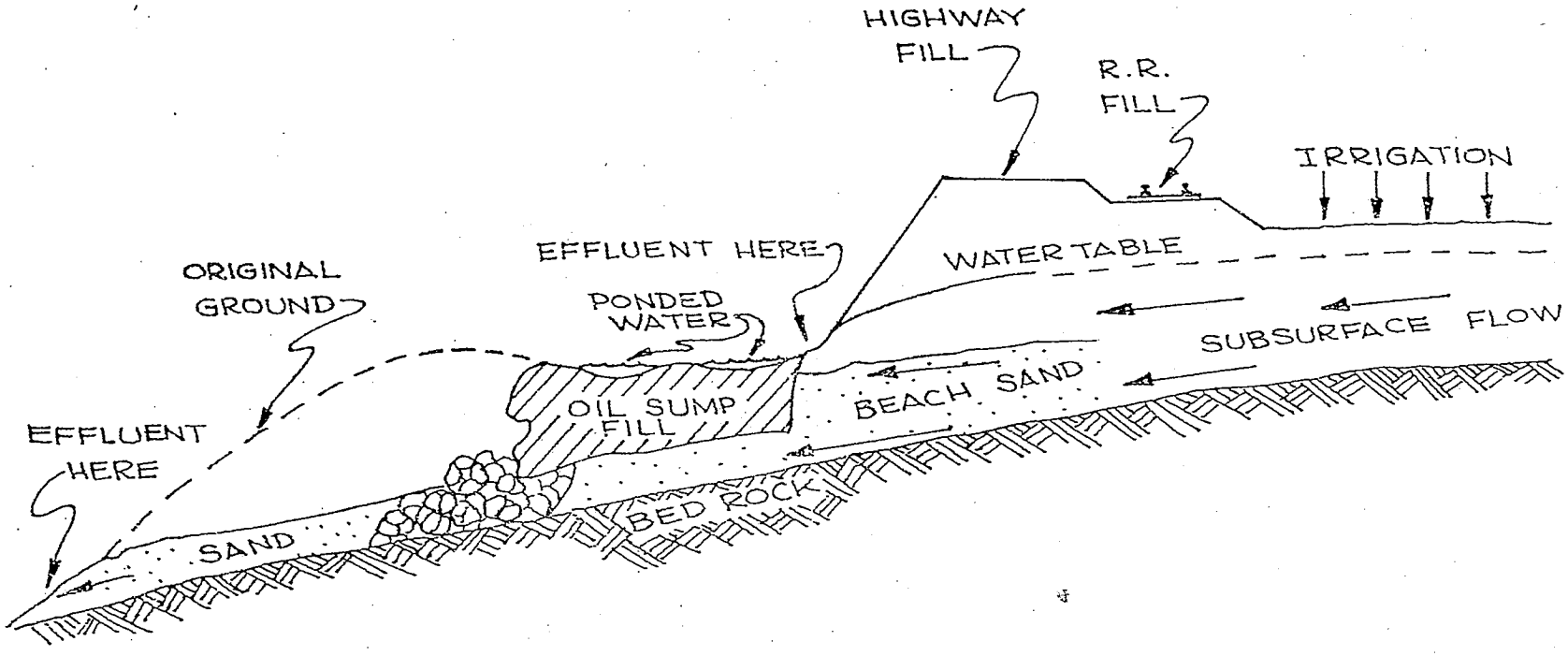


FIGURE 12



GROUNDWATER SEEPAGE DIAGRAM
SEACLIFF TO HOBSON PARK
07 213-308201

FIGURE 11

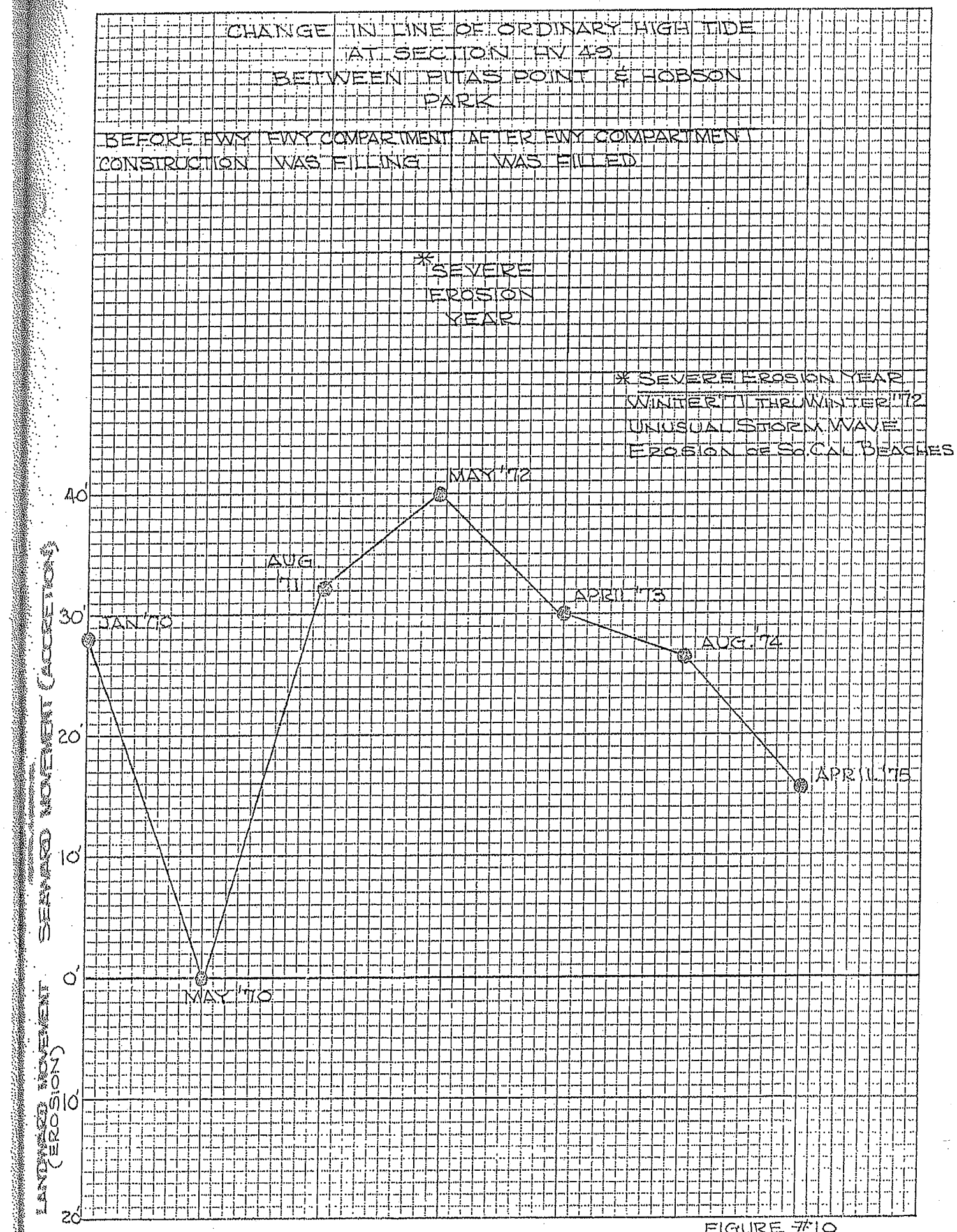

CHANGE IN LINE OF ORDINARY HIGH TIDE
AT SECTION HV 49
BETWEEN PITAS POINT & HOBSON PARK
BEFORE FWY CONSTRUCTION
FWY COMPARTMENT WAS FILLING
AFTER FWY COMPARTMENT WAS FILLED
*SEVERE EROSION YEAR
*SEVERE EROSION YEAR
WINTER '71 THRU WINTER '72
UNUSUAL STORM WAVE
EROSION OF So. CAL. BEACHES
MAY '72
AUG '71
APRIL '73
AUG. '74
APRIL '75
JAN '70
MAY '70
40'
30'
20'
10'
0'
10'
20'
LANDWARD MOVEMENT (EROSION)
SEAWARD MOVEMENT (ACCRETION)

FIGURE #10

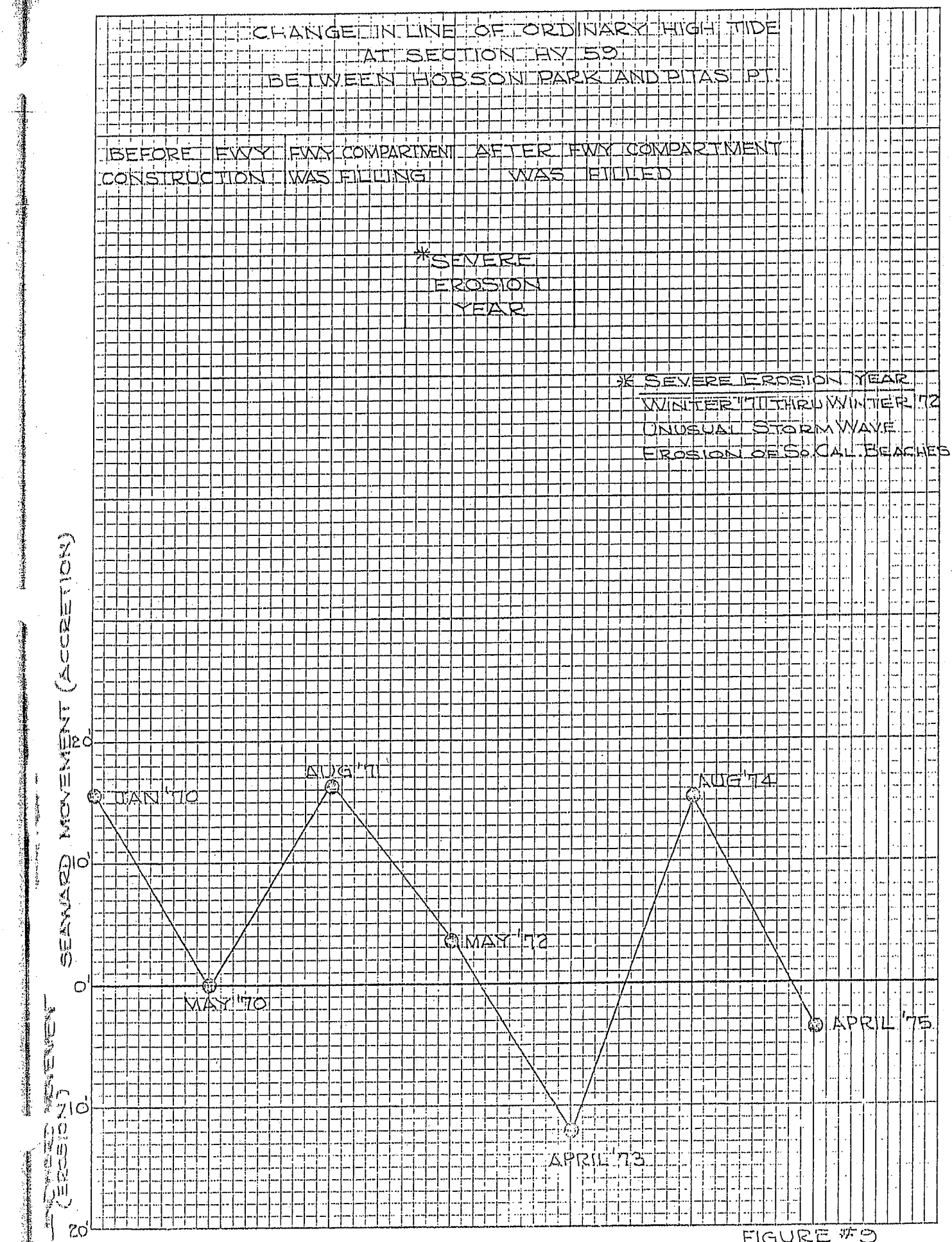

CHANGE IN LINE OF ORDINARY HIGH TIDE
AT SECTION AY 59
BETWEEN HOBSON PARK AND PITAS PT.
BEFORE FWY CONSTRUCTION
FWY COMPARTMENT WAS FILLING
AFTER FWY COMPARTMENT WAS FILLED
*SEVERE EROSION YEAR
*SEVERE EROSION YEAR
WINTER '71 THRU WINTER '72
UNUSUAL STORM WAVE
EROSION OF So. CAL. BEACHES
SEAWARD MOVEMENT (ACCRETION)
LANDWARD MOVEMENT (EROSION)
20'
10'
0'
10'
20'
JAN '70
MAY '70
AUG '71
MAY '72
APRIL '73
AUG '74
APRIL '75

FIGURE #9

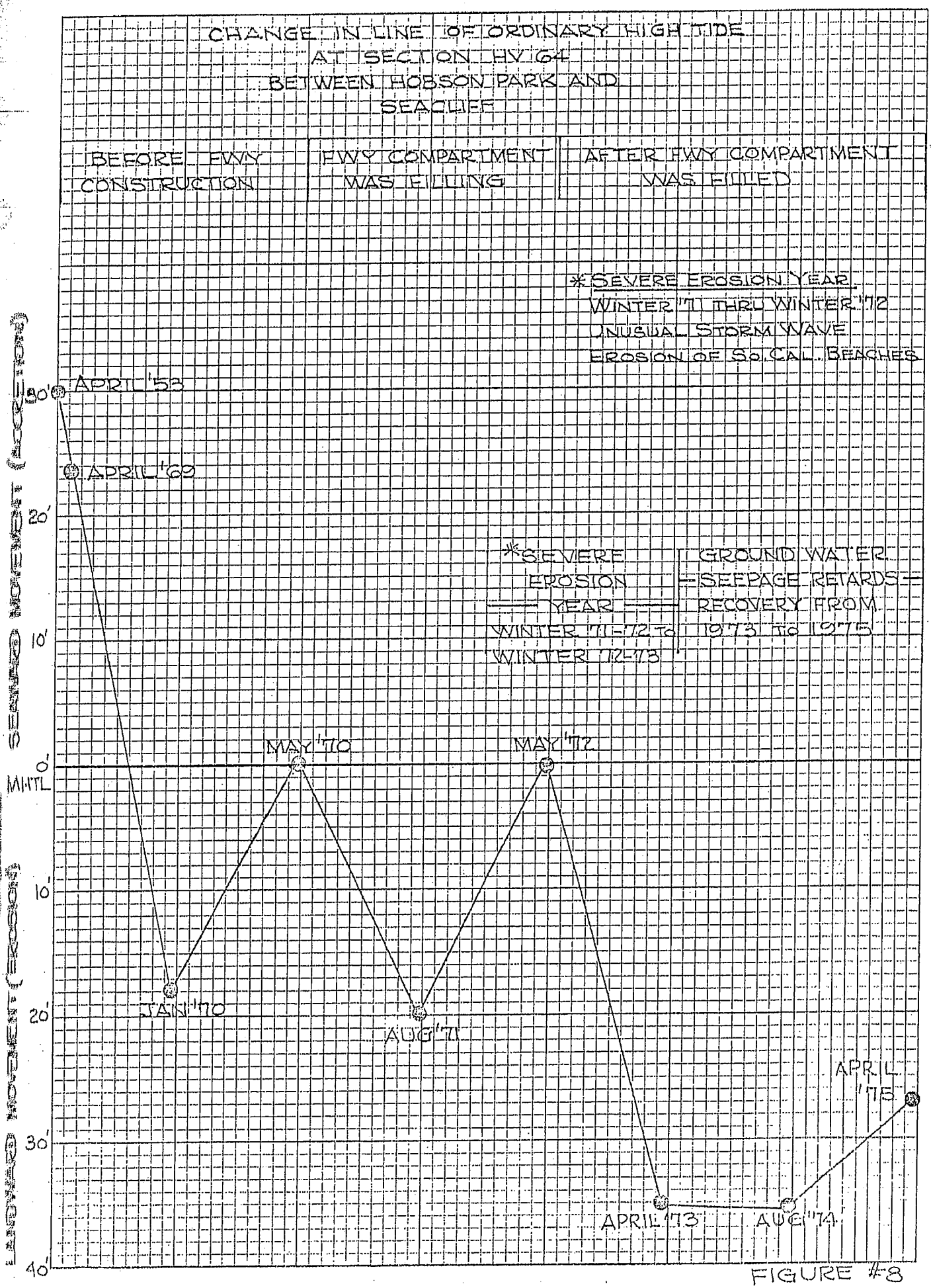

CHANGE IN LINE OF ORDINARY HIGH TIDE
AT SECTION HY 64
BETWEEN HOBSON PARK AND
SEACLIFF
BEFORE FWY CONSTRUCTION
FWY COMPARTMENT WAS FILLING
AFTER FWY COMPARTMENT WAS FILLED
*SEVERE EROSION YEAR
WINTER '71 THRU WINTER '72
UNUSUAL STORM WAVE
EROSION OF SO. CAL. BEACHES
*SEVERE EROSION YEAR
WINTER '71-'72 TO WINTER '72-'73
GROUND WATER
—SEEPAGE RETARDS—
RECOVERY FROM
1973 TO 1975
SEAWARD
LANDWARD
50'
40'
30'
20'
10'
0'
MHTL
APRIL '53
APRIL '69
JAN '70
MAY '70
AUG '71
MAY '72
APRIL '73
AUG '74
APRIL '75

FIGURE #8

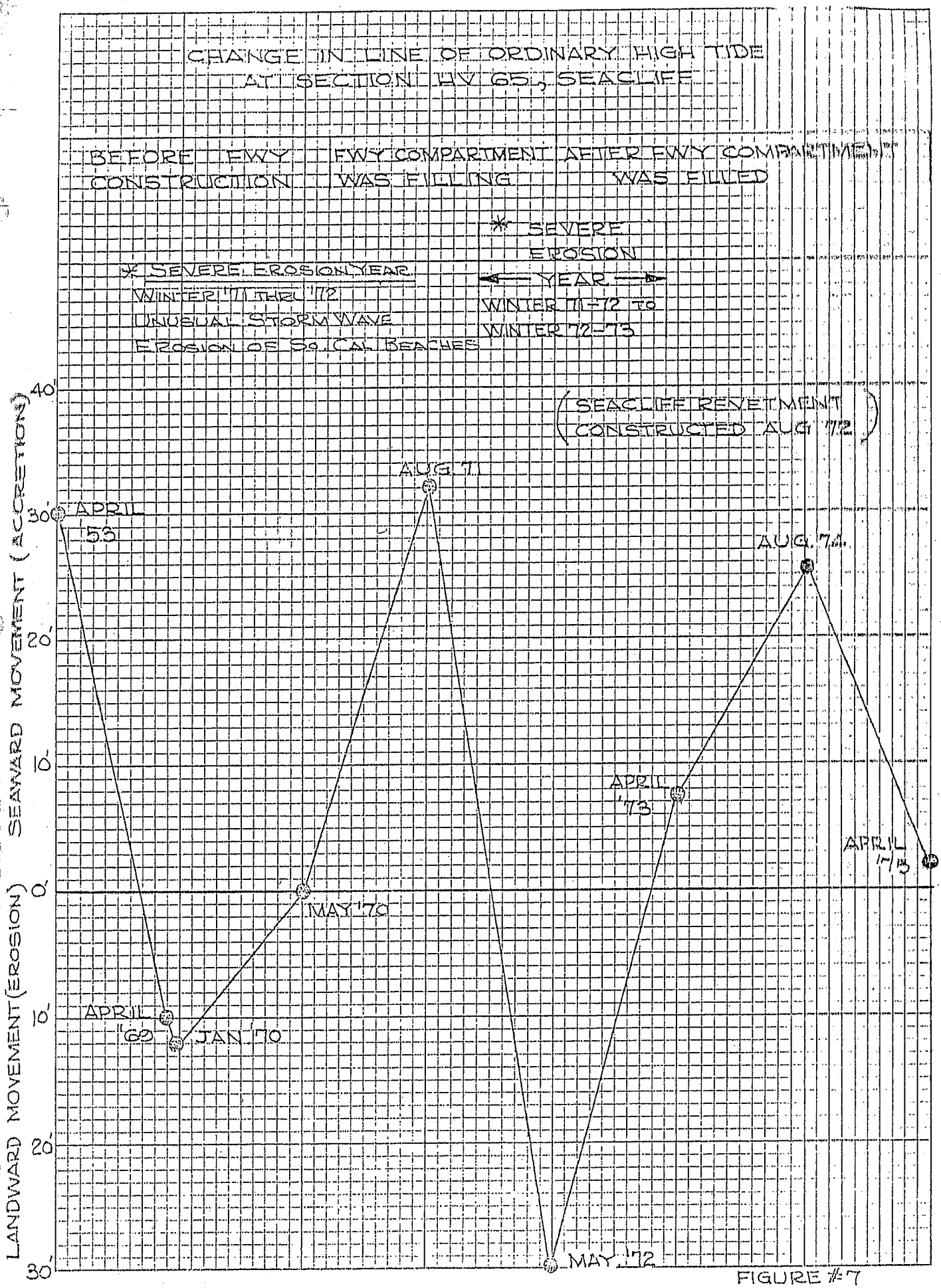

CHANGE IN LINE OF ORDINARY HIGH TIDE
AT SECTION HV 65, SEACLIFF
BEFORE FWY CONSTRUCTION
FWY COMPARTMENT WAS FILLING
AFTER FWY COMPARTMENT WAS FILLED
* SEVERE EROSION YEAR
WINTER '71 THRU '72
UNUSUAL STORM WAVE
EROSION OF So. CAL. BEACHES
* SEVERE EROSION
YEAR
WINTER 71-72 TO
WINTER 72-73
(SEACLIFF REVETMENT CONSTRUCTED AUG '72)
LANDWARD MOVEMENT (EROSION)
SEAWARD MOVEMENT (ACCRETION)
40'
30'
20'
10'
0'
10'
20'
30'
APRIL '69
JAN '70
MAY '70
AUG. 71
MAY '72
APRIL '73
AUG. 74
APRIL 1-75

FIGURE #7

Record number: 1
System number: 009776347
PT Archive/Manuscript
AU Cramer, A. J.
MT Beach monitoring report, Punta Gorda to Pitas Point in the vicinity of the Ventura Freeway construction at Seaclif
DP 1975.
PH 31 leaves, folded leaves of plates : ill., photos ; 29 cm.
LO UC Berkeley WRCA JOHNSON 173-3 UCB
ZZ

Record number: 2
System number: 011210576
PT Archive/Manuscript
AU Johnson, J. W. (Joe William),
MT Beach monitoring, Punta Gorda to Pitas Point, Ventura County, Seacliff area, California /
DP 1975.
PH 1 v. : ill. ; 29 cm.
LO UC Berkeley WRCA JOHNSON 173-2 UCB
ZZ

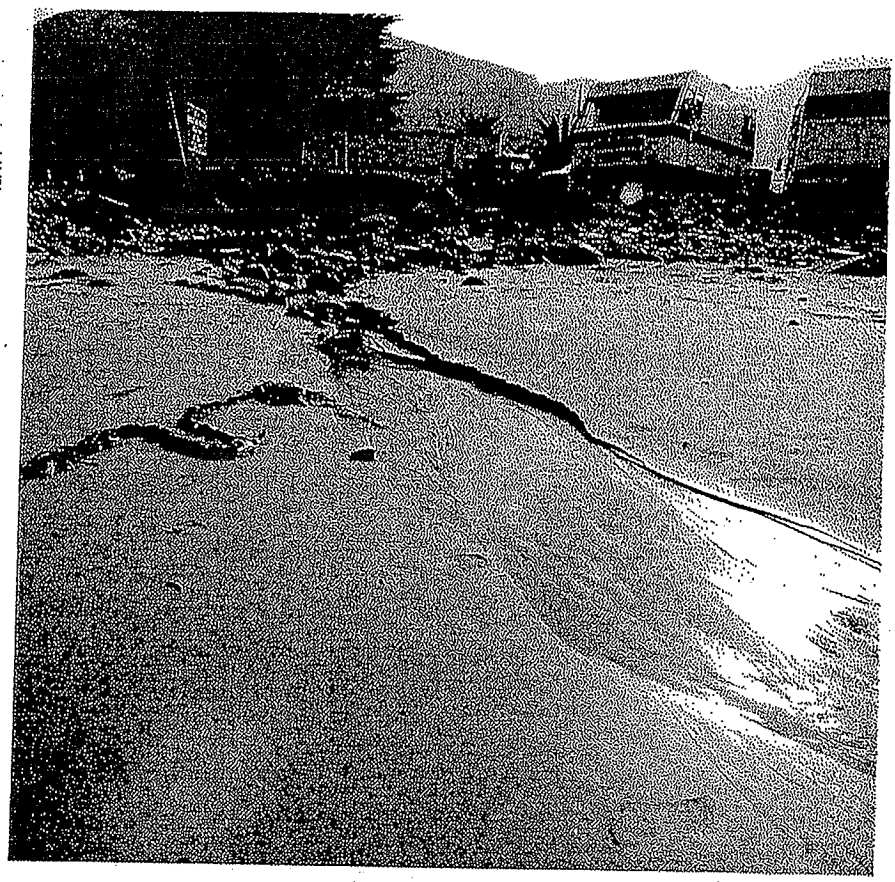
Record number: 3
System number: 011215093
PT Archive/Manuscript
AU Johnson, J. W. (Joe William),
MT Seacliff, Ventura Co. correspondence and reports [re proposed freeway].
DP 1969-1972.
PH 1 v. : ill. ; 29 cm.
LO UC Berkeley WRCA JOHNSON 173-1 UCB
ZZ

Record number: 4
System number: 011215104
PT Archive/Manuscript
AU Johnson, J. W. (Joe William),
MT Seacliff, Ventura County re proposed freeway construction.
DP 1963-1973.
PH 3 envelopes.
LO UC Berkeley WRCA JOHNSON 173-4 - 173-6 UCB
ZZ

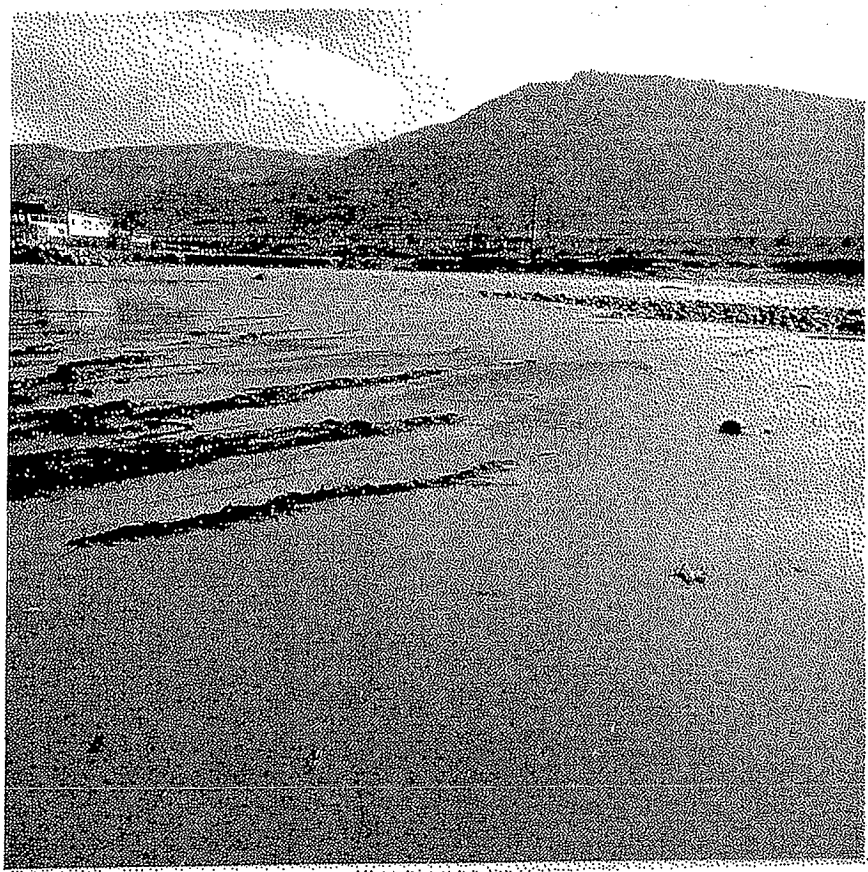
Wide sandy beach between Hobson Park and Seacliff at high tide + 4 (11:30 a.m. 8-28-75)

IX

Aerial view showing erosive seaward flow of ponded groundwater from irrigated fields causing [illegible]osure of Hobson Park (9-16-74)



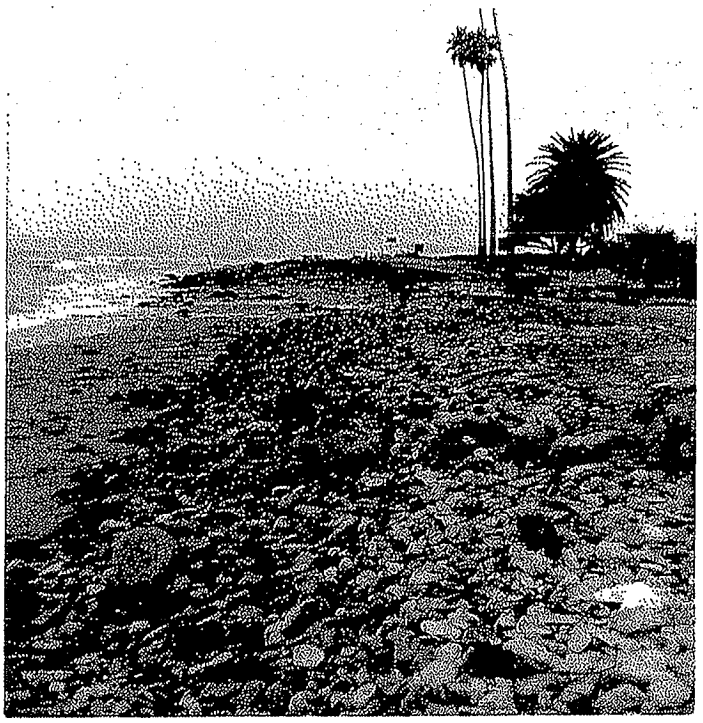
Seaward groundwater flow
at Hobson Park (6-30-75)

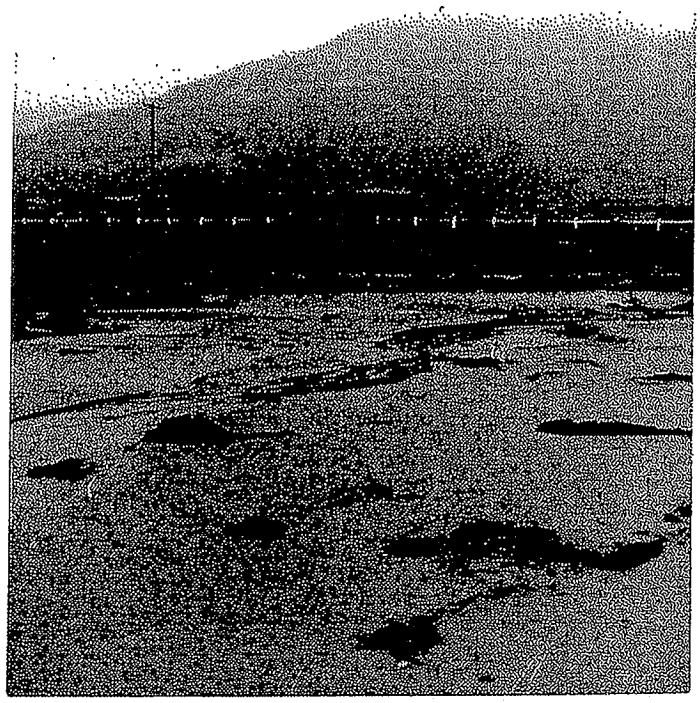


Effluent groundwater seepage in beach sand between

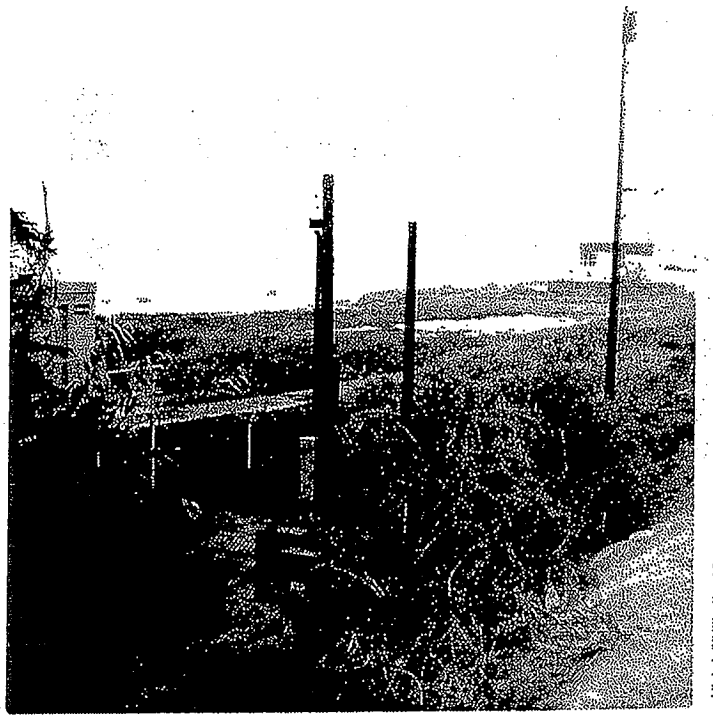
9-24-74

Groundwater seepage and erosion at Hobson Park (9-24-74)





Erosive seaward flow of groundwater between Hobson Park and Seacliff (9-24-74)



Waves Pound Beach Area Near Ventura

Ventura

Thirty-nine homes were damaged and a fire station evacuated as 12-foot waves pounded the Rincon Beach area northeast of here yesterday.

At one point along U.S. 101, where the freeway is separated from the sea by only a retaining wall and a narrow strip of beach, the breakers covered the four-lane highway with sand, seaweed and other debris and nearly halted traffic.

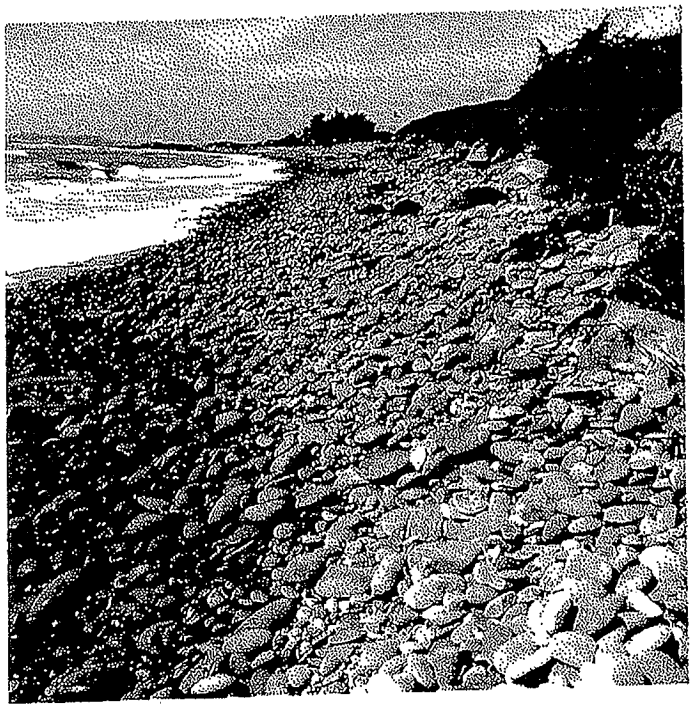
In the Rincon area, 38 firemen were evacuated when the surf began swirling through their stationhouse. The equipment was removed and the men put to work sandbagging the facility to keep it in service.

Of the 39 homes damaged, four suffered major were flooded to a depth of two feet.

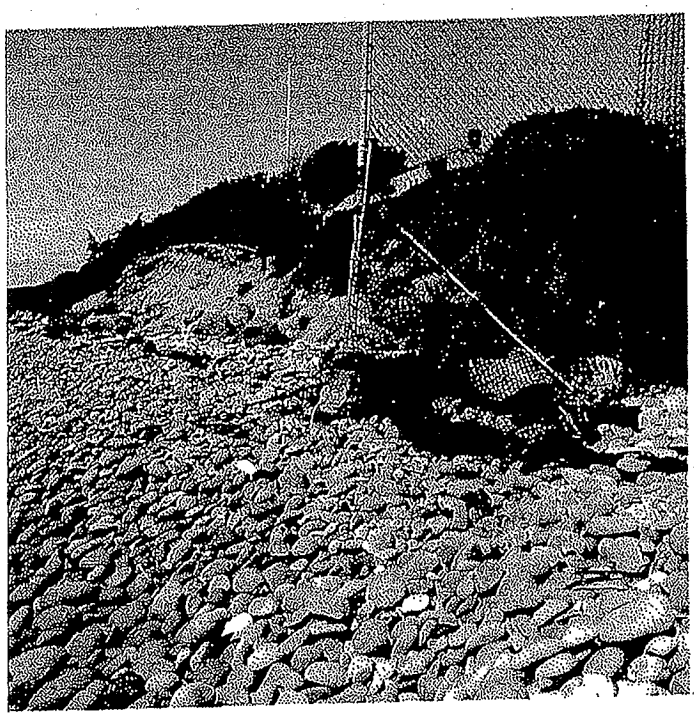
Most of the homes were unoccupied weekend retreats and authorities said there were no reports of injuries.

United Press

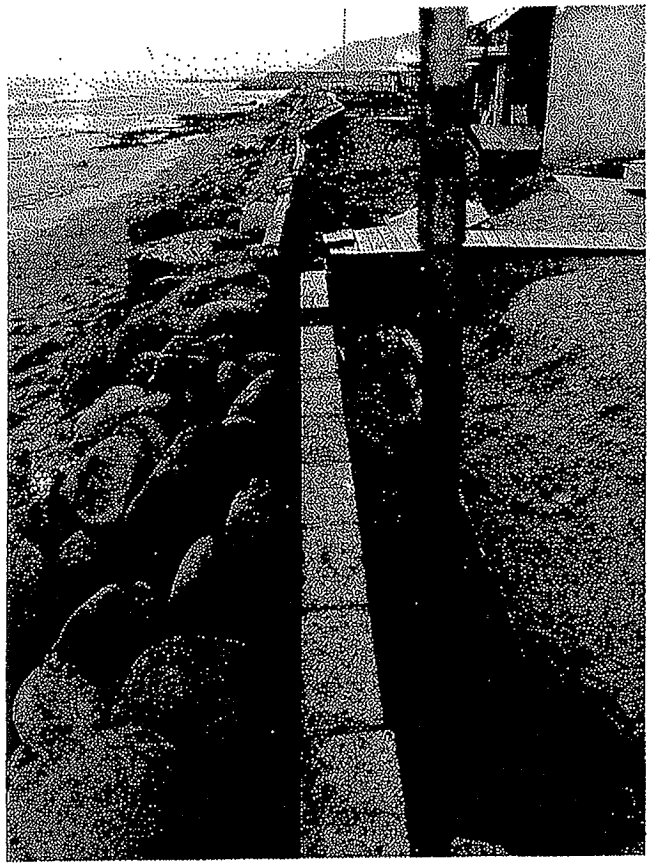
Storm wave erosion and property damage at Oxnard Shores (1-24-73)



Storm wave erosion at Sandy Land
North of Carpenteria State Beach (3-7-73)



Storm wave erosion at the Santa Barbara Biltmore Hotel (2-21-73)



No.
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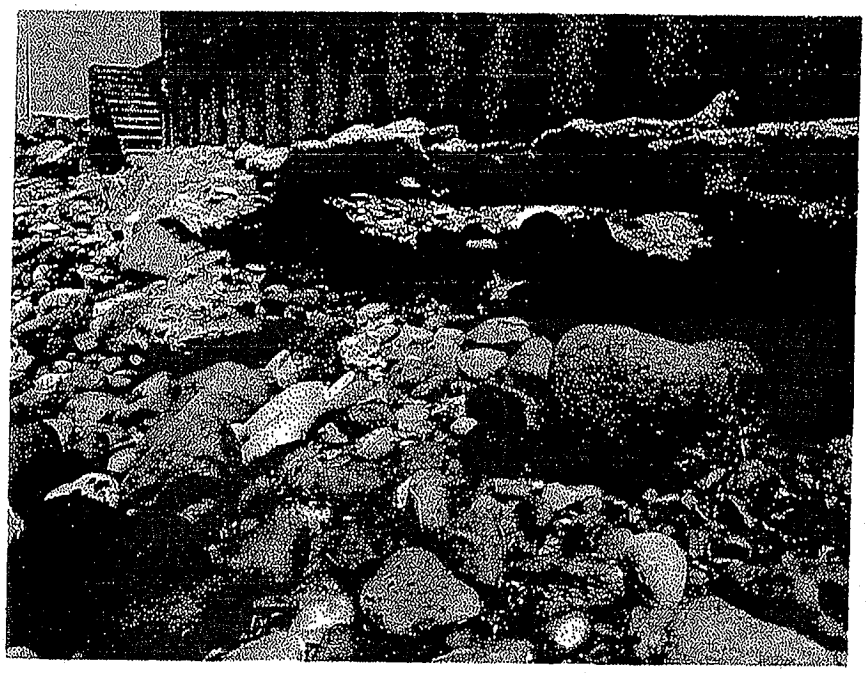
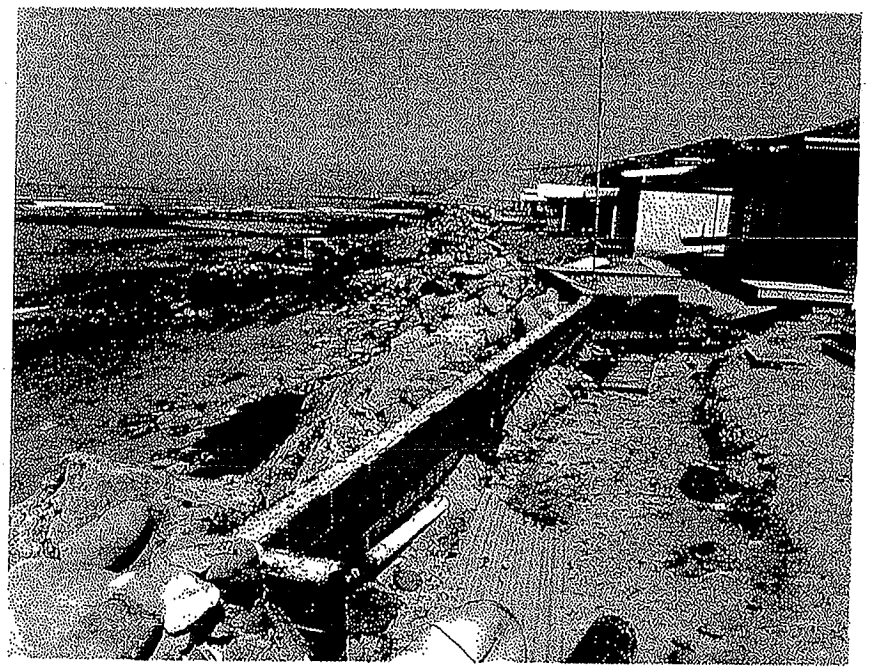
37, 38 R
5-18-72

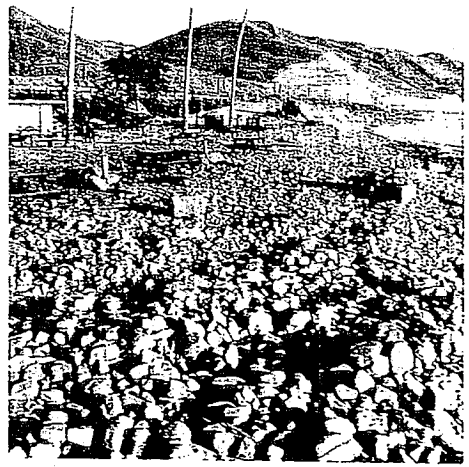
Improperly founded revetments and walls at Seacliff severely damaged by storm waves (5-18-72)

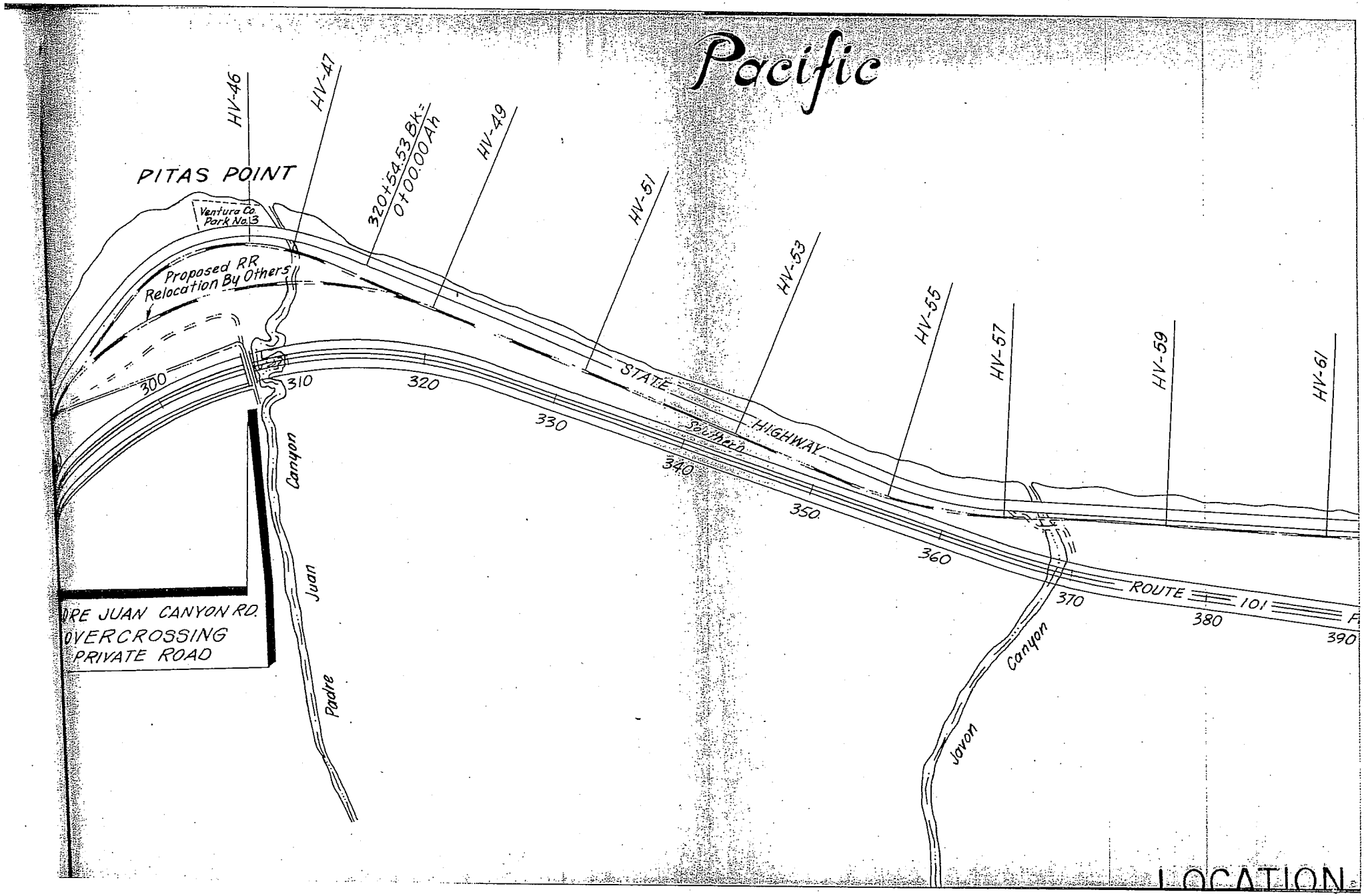


Owner-built Seacliff revetments founded on cobbles and sand undermined by storm waves (4-20-72)



Storm wave flooding and erosion at Hobson Park (1-15-72)

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PITAS POINT
Ventura Co.
Park No. 3
Proposed RR
Relocation By Others
STATE
Southern
HIGHWAY
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320
330
340
350
360
370
380
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ROUTE
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Canyon
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Padre
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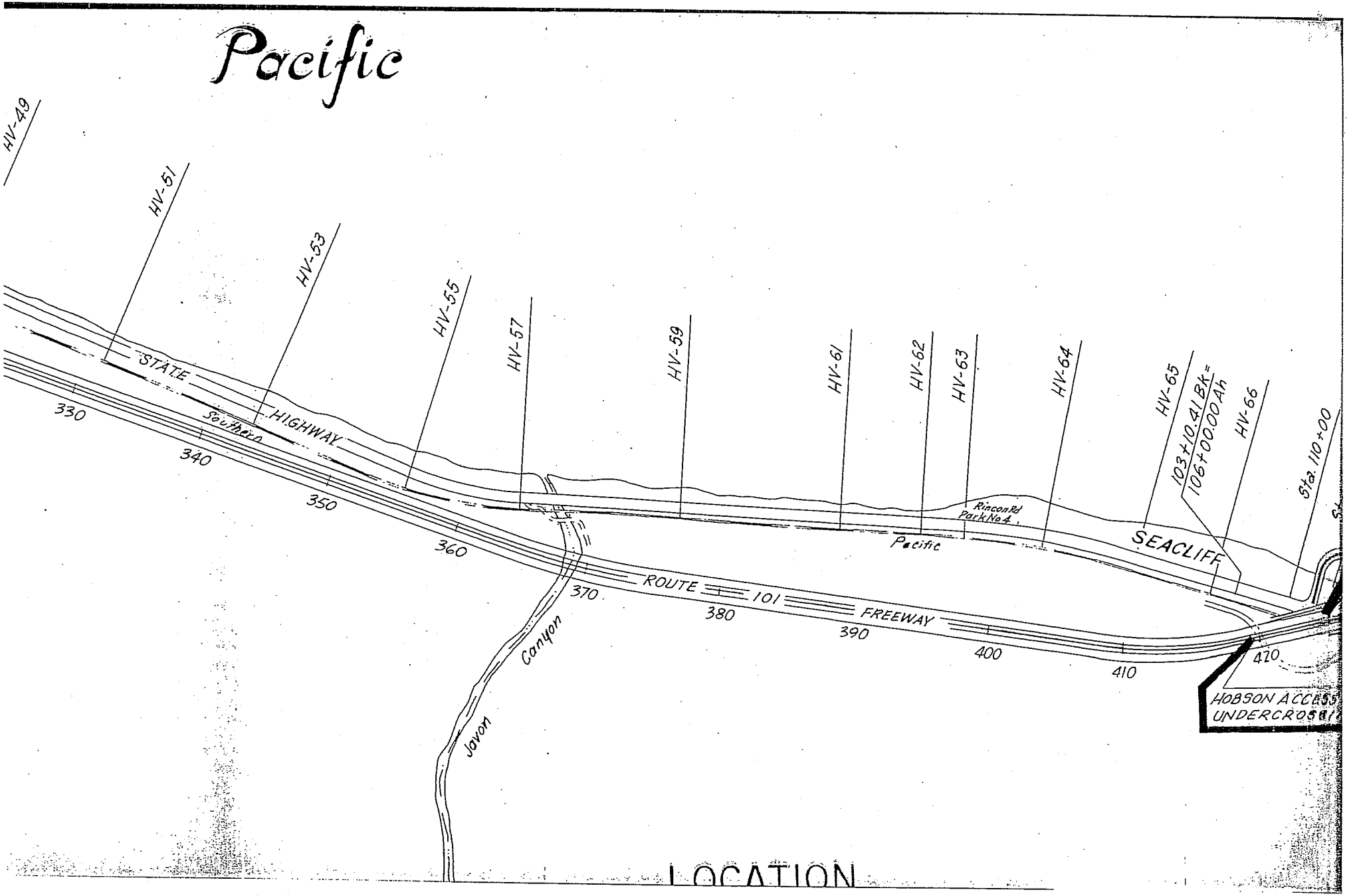
Javon
ORE JUAN CANYON RD.
OVERCROSSING
PRIVATE ROAD
LOCATION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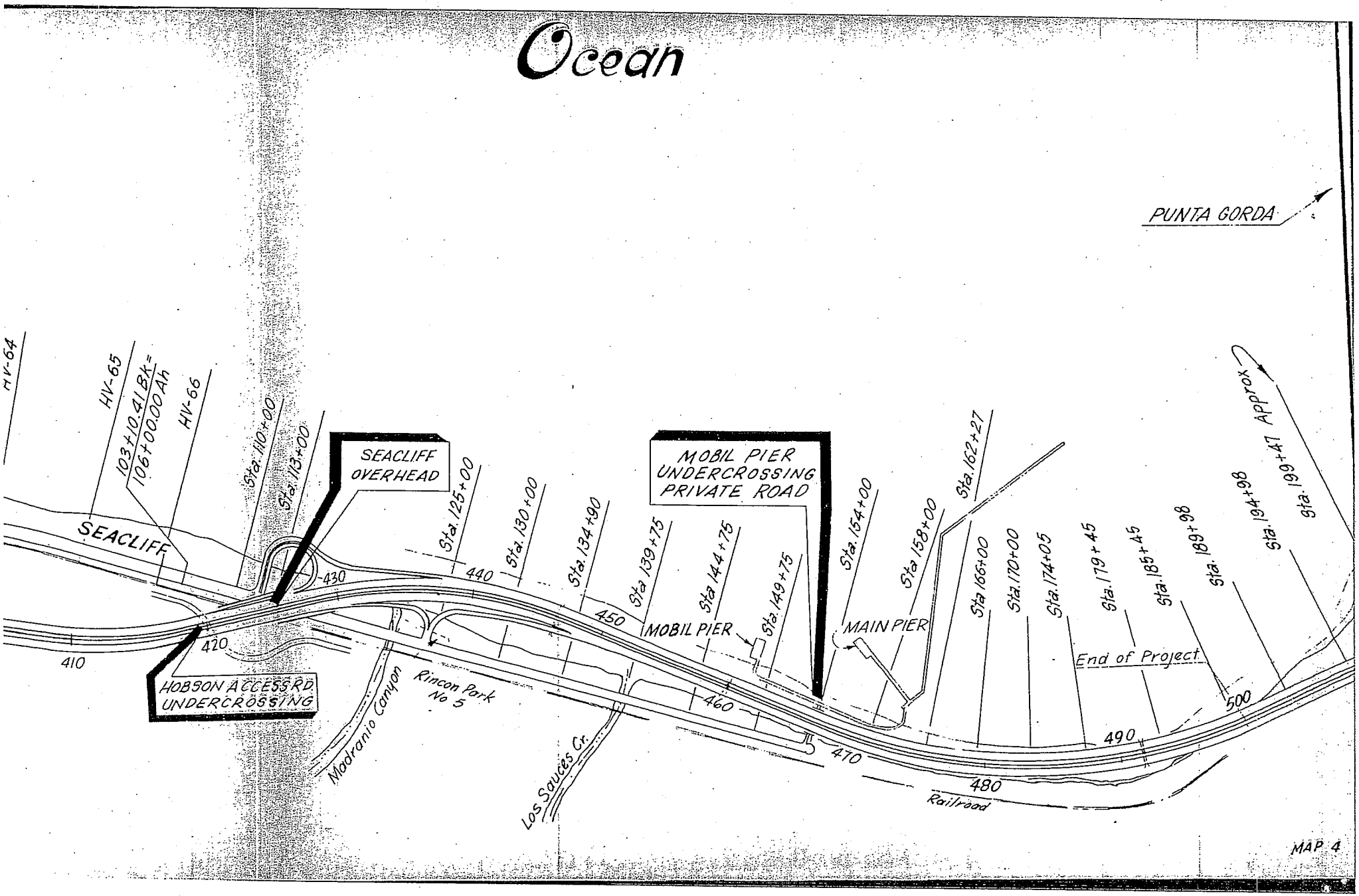
Rincon Rd
Park No 4.
Pacific
SEACLIFF
ROUTE
101
FREEWAY
Canyon
Javon
HOBSON ACCESS
UNDERCROSS
LOCATION


Ocean
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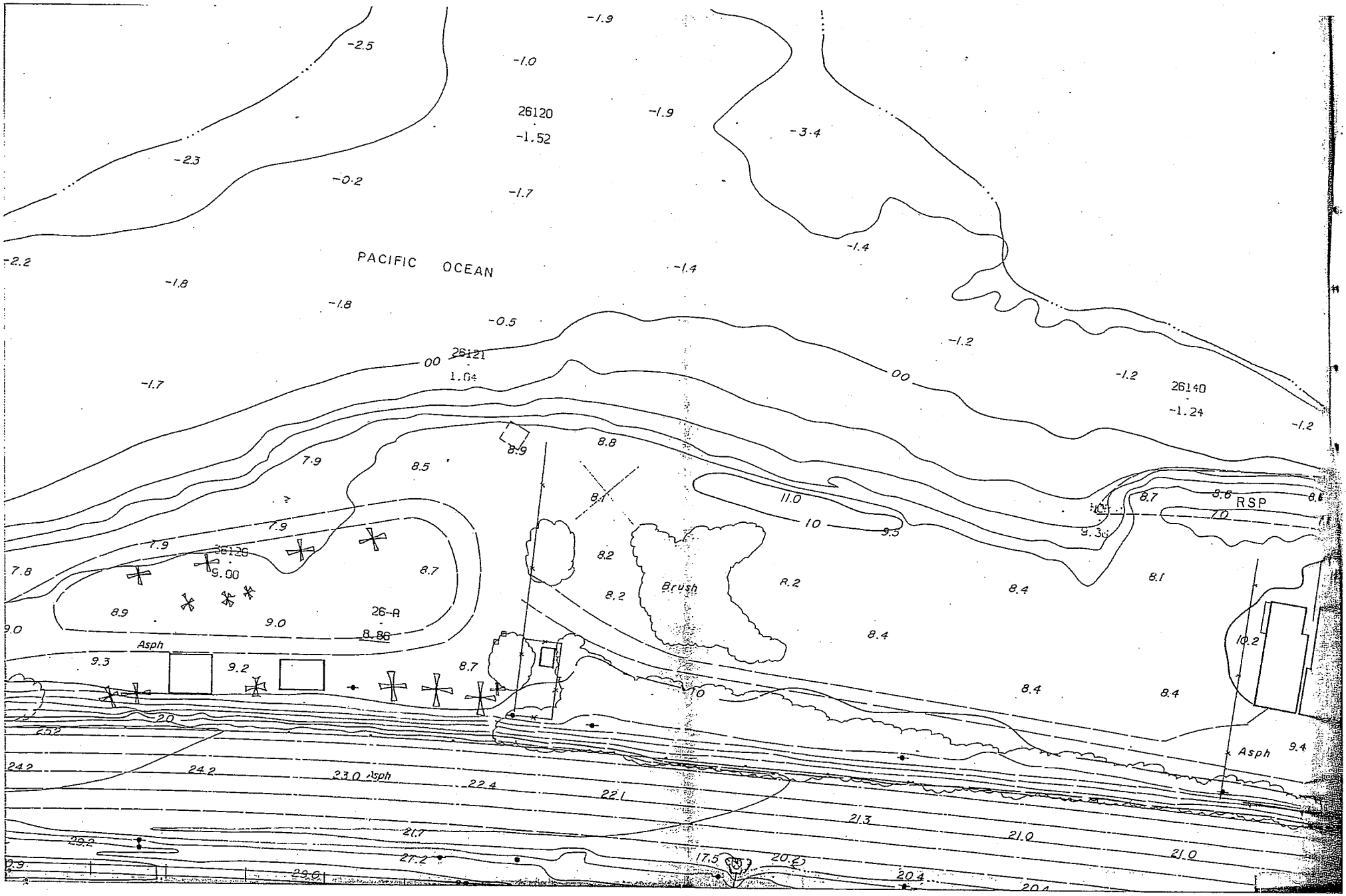
Sta. 113+00
SEACLIFF
SEACLIFF OVERHEAD
MOBIL PIER UNDERCROSSING PRIVATE ROAD
Sta. 125+00
Sta. 130+00
Sta. 134+90
Sta. 139+75
Sta. 144+75
Sta. 149+75
Sta. 154+00
Sta. 158+00
Sta. 162+27
Sta. 166+00
Sta. 170+00
Sta. 174+05
Sta. 179+45
Sta. 185+45
Sta. 189+98
Sta. 194+98
Sta. 199+47 Approx
410
420
430
440
450
460
470
480
490
500
MOBIL PIER
MAIN PIER
End of Project
HOBSON ACCESS RD. UNDERCROSSING
Rincon Park No 5
Madrano Canyon
Los Sauces Cr.
Railroad
MAP 4


PACIFIC OCEAN
26120
-1.52
26121
1.04
26140
-1.24
26-A
8.86
RSP
Brush
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Asph
-2.5
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-3.4
-2.3
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Exhibit R

Shore Processes at A Man-Made Headland

By A. J. Cramer and R. D. Pauly
California Department of Transportation
Los Angeles, California

INTRODUCTION

In the redesign of Highway 101 near Ventura, California, to freeway standards, it was necessary to locate approximately 7,000 feet of the roadbed on an offshore fill between Punta Gorda and Seacliff (Figs. 1 & 2). The maximum width of this fill was approximately 500 feet. One of the primary considerations in the design and construction of this section of the highway was the possible effect on the natural beach processes. Considering that the predominant wave direction in the Santa Barbara Channel is from the west, a littoral drift of approximately 280,000 cubic yards per year (as determined by a 20-year record of accretion and dredging at Santa Barbara Harbor)[1] is expected to be moved from west to east along the general reach of shoreline from Santa Barbara to Port Hueneme. The effect of constructing the Seacliff Interchange was to create a man-made headland which would cause a temporary interruption of the normal littoral drift; that is, an accumulation of sand could be expected on the upcoast side of the headland and some erosion probably would occur on the downcoast side. After a few years, it would be expected that the littoral compartment upcoast from the Seacliff Interchange would become filled and, thereafter, the normal littoral drift of about 280,000 cubic yards per year would be reestablished along this general reach of shoreline. The shoreline again would be in equilibrium with the natural conditions of wave action and sediment supply. The usual seasonal changes in the beach profiles due to varying wave conditions throughout the year of course would occur as they have for centuries.

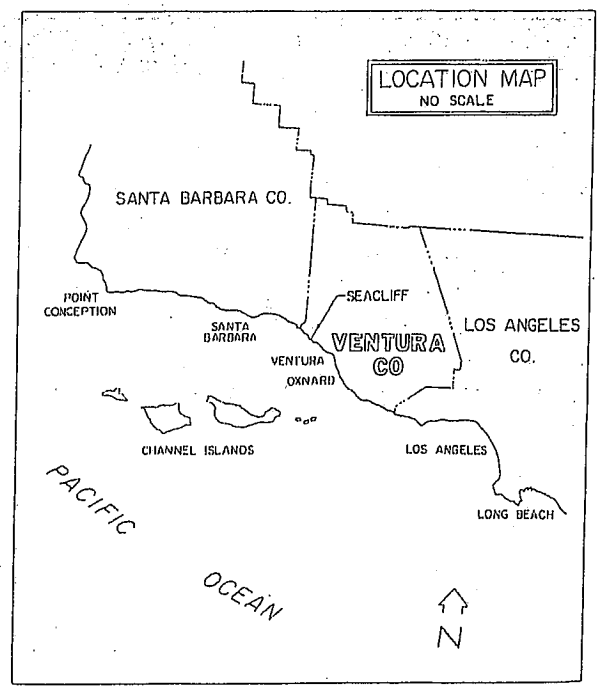


Fig. 2 Location Map

The vacation homes at the Seacliff Colony have historically been subject to damage, as evidenced by the seawalls constructed over the years by each homeowner. Unfortunately, most of these walls were poorly designed and constructed. Many of these walls were poorly maintained and had deteriorated badly. The seabed in front of the Seacliff Colony is a rock formation with a relatively thin layer of sand, which moves onshore and offshore with the seasons.

As mentioned above, some shoreline erosion in the Seacliff area was to be expected because of the interruption of the littoral drift by the construction of the Seacliff Interchange. To obtain some measure of the erosion caused by the construction of the interchange, as compared with the natural erosion which has occurred in this area over the years (as a result of constructing the houses and seawalls too close to the water), it was recommended that a monitoring program be instituted in the Seacliff area to document the condition of the shoreline prior to the start of the freeway construction, and then continue the program until a new equilibrium shoreline condition appeared to have been reached.[2] The monitoring program consisted of the following:

A. **Ground Surveys.** A series of approximately 35 beach ranges in the reach between Punta Gorda and Pitas Point (Fig. 3). Periodic profiles were made before and after construction.

B. **Aerial Photographs.** Both oblique and vertical photographs were made periodically before and after construction.

C. **Ground Photographs.** To document details of the condition of the seawalls, beach conditions, etc., ground photographs at the Seacliff Colony were made periodically before and after construction.

Exhibit R

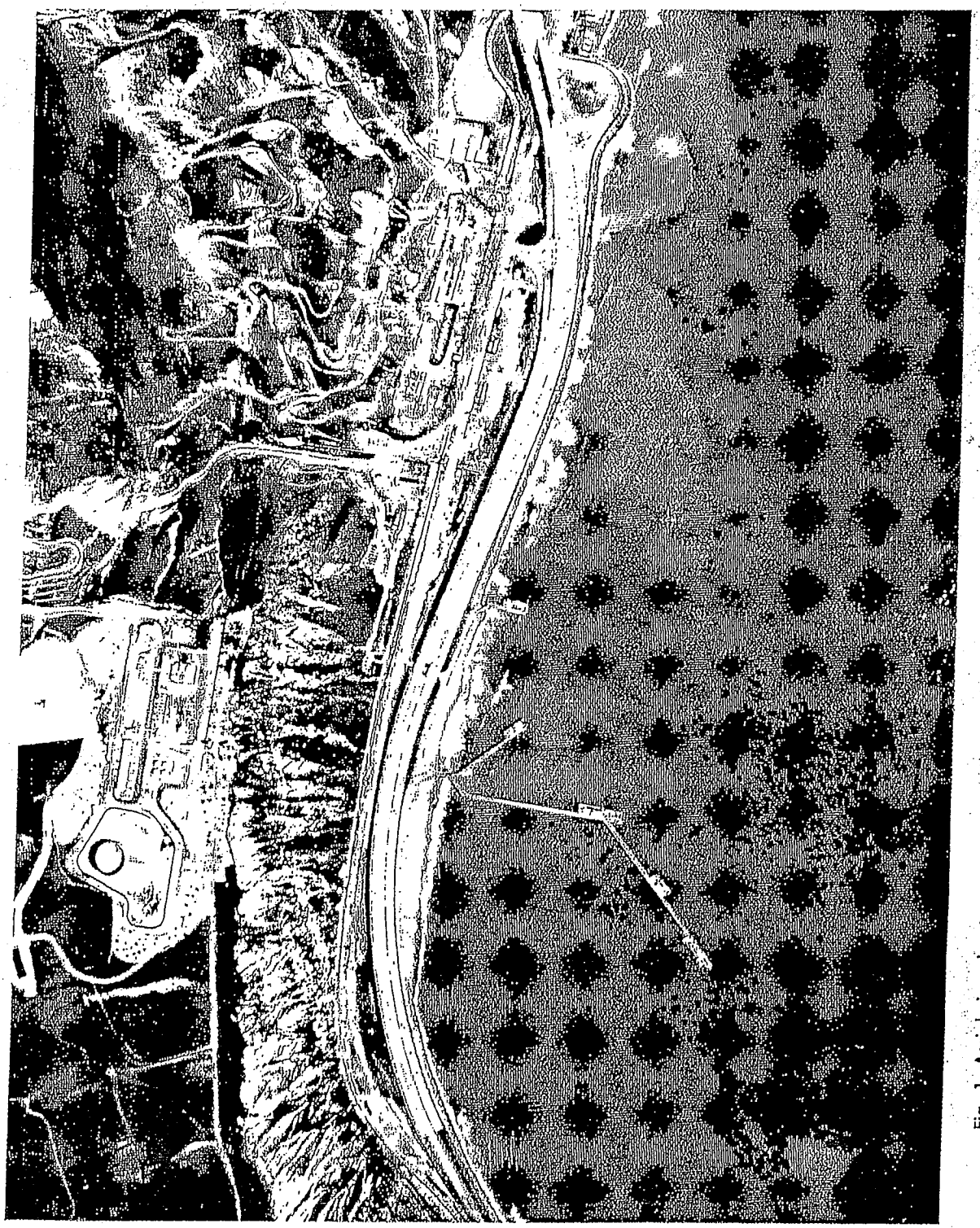


Fig. 1. Aerial view showing freeway revetment section of Highway 101 between Punta Gorda and Seacliff Interchange, March 13, 1978. The western limit of the Seacliff Colony is at the extreme right. (Photograph by the California Department of Boating and Waterways)

Exhibit R

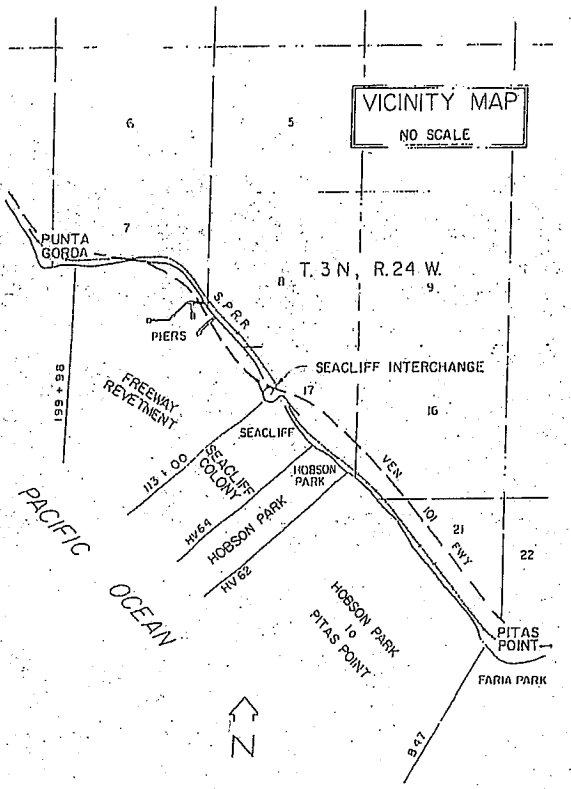


Fig. 3 Vicinity Map

D. Regional Inspections. Inspections of the shoreline for a considerable distance, both upcoast and downcoast from Seacliff (Santa Barbara to Oxnard), were made to document unusual shoreline changes which were due to natural or man-made conditions unrelated to the construction at Seacliff.

This monitoring program was started prior to the beginning of construction of the freeway section in the ocean in August 1970 and was continued into 1975, with ground photos and beach profiles being taken as late as April 1975.

SUMMARY OF MONITORING PROGRAM

To effectively summarize the character of shoreline changes which occurred in the general Seacliff area during the six-year monitoring period following the start of construction of the freeway in August 1970, the shoreline between Punta Gorda and Pitas Point was divided into four reaches, which are briefly described as follows (Fig. 3):

1. Freeway Revetment. This is the portion of the freeway which was placed on an offshore fill starting at Range 199 + 98 and terminated at the Seacliff Interchange (Range 113 + 00). A heavy rock revetment protects the fill from wave attack.
2. Seacliff Colony. This community of vacation homes has, over the years, been protected against wave action by individually constructed revetments and seawalls—most of these required substantial annual maintenance by the homeowner.
3. Hobson Park. This is a small Ventura County Park extensively used by visitors for overnight camping and offshore clamming.
4. Hobson Park to Pitas Point. This is a narrow beach along the old highway revetment used by daytime visitors.

The most important aspect of the monitoring program for the above four reaches were the ground surveys, which consisted of 35 range lines, which were profiled at 18 time intervals. These surveys were initiated in November 1963; the last survey was completed in April 1975. From 1970, cross sections were taken at frequent intervals (2 to 4 times a year) through 1975. Surveys were based on mean-sea-level datum. As shown in Figure 3, the longitudinal limits are from Pitas Point to Punta Gorda, a distance of approximately 4 miles. The lateral length of these cross sections vary, usually between 500 and 900 feet into the ocean from the shoreline.

The cross section survey completed in May 1972 was extended 2,000 to 3,000 feet beyond the limits of the previous and later surveys. Sonic depth-finding apparatus, coupled with conventional field survey equipment, was used to establish ocean floor elevations. These data were compared with a previous deep water survey made by the U.S. Army Corps of Engineers during the period of December 1964 to March 1965.

The volume of sand accreting in the freeway revetment compartment, and volumes accreting or eroding between Punta Gorda and Pitas Point, were calculated each quarter after the construction of the revetment began. The sections were plotted and quantity calculations were made by the average-end-area method. The reference elevation used in calculating quantities was the bottom elevation as measured prior to construction in May 1970. By plotting the quantities against time, the rate of sand accretion, or erosion, and the total volume at the time of measurement between specific limits could be graphically shown.

For each of the four reaches described above, diagrams were prepared to show the cubic yards of sand accretion, or erosion, per foot of shoreline for the six-year period from April 1969 to April 1975 (Figs. 4, 5, 7, 9). A discussion of the data for each reach follows.

Freeway Revetment

When construction was started, a new recreational beach was formed westerly of the Seacliff Interchange along the revetment. Sand accumulated at a steady rate of 42 cubic yards per lineal foot per year from April 1971 until May 1972, when this littoral compartment became practically full (Fig. 4). Between May 1972 and February 1973, the average rate of accretion was zero. After the compartment was almost full, the average rate of sand accretion along the freeway revetment was about 10 cubic yards per lineal foot per year, which is approximately the preconstruction accretion rate (1969–70) when sand was available to the littoral process. This beach is expected to remain stable due to the groin effect of the oil pier abutments (Fig. 1), as only minor seasonal adjustment of the shoreline has been observed since December 1972.

Exhibit R

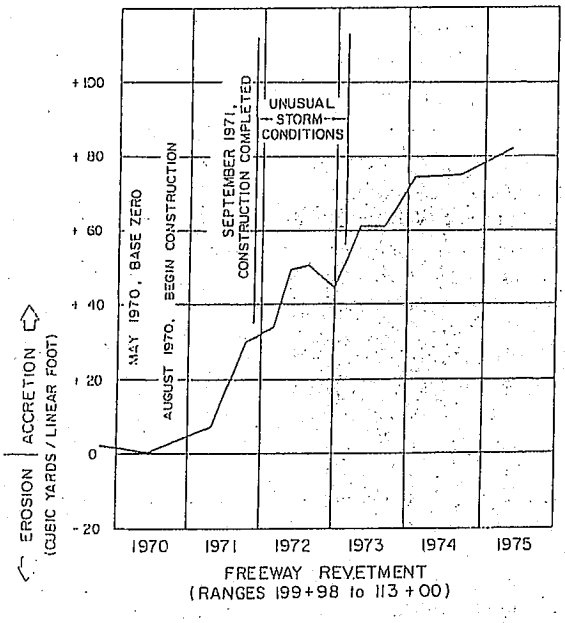


Fig. 4 Erosion and accretion vs. time, Freeway Revetment reach

Seacliff Colony

After the 1971–72 winter season, monitoring indicated an absence of normal seasonal sand accretions at Seacliff Colony (Fig. 5). From a detailed inspection by State Engineers, it was determined that all the various existing shore protection structures along the Seacliff Colony were improperly founded or constructed and, as a result, were severely damaged by the unusual winter storm waves. Based on this determination, in July–August 1972 the State constructed a substantial rock revetment to restore and protect the Seacliff beach frontage (Fig. 6). Sand accretion

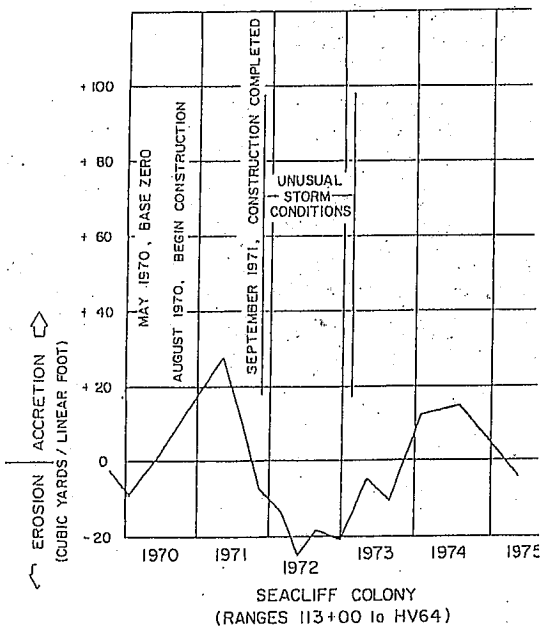


Fig. 5 Erosion and accretion vs. time, Seacliff Colony reach

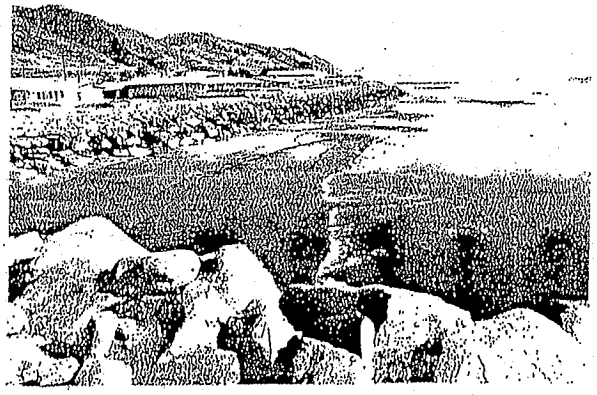


Fig. 6 Seacliff Colony revetment, February 15, 1973. (Photograph by the California Department of Transportation)

was continually present on the foreshore after the construction of the revetment. With minor maintenance (or control of storm wave splash over the armor rock backing, as has been provided by some beach homeowners), it is estimated that this revetment will have a 50-year design life. The construction of the Seacliff revetment has moved the line of Ordinary-High-Tide seaward, as compared to the 1970 location before freeway construction.

Hobson Park

The park and the adjacent undeveloped beach frontage had experienced progressive erosion from storm waves before construction of the freeway began. No efforts were made to restore and maintain the man-made beach frontage at the park by high tide and storm wave damage after the freeway construction started. In the Hobson Park area, the nearshore and offshore beach consists of a bedrock outcrop covered with cobbles and boulders with some coarse sand in the rocky interstices. The elevation of the offshore rock bottom is several feet higher than the adjacent ocean floor and was never observed to be covered with sand; hence, the limited accretion and erosion in the area as illustrated by Figure 7.

In 1976, the State constructed an extension of the Seacliff revetment around Hobson Park (Fig. 8). Prior to this time, the park had been periodically closed due to septic tank overflow and accelerated erosion of the seaside campsites. The park was on the verge of becoming a total loss. Recent development of constantly irrigated flower farms (Fig. 8), upslope from the park, created heavy seaward effluent groundwater flow on the park grounds and along the beach. The revetment construction, and the installation of a subdrain, fully restored the park grounds and the adjacent land to the original usable area developed in years prior to freeway construction.

The Seacliff monitoring program provided some of the important engineering data for the design of this unique, effective and economical revetment. The revetment was constructed at low tide in 100-foot increments for a total length of 900 feet. Slope protection rock was placed against a sand embankment covered with plastic filter cloth. The rock consisted of round-

Exhibit R

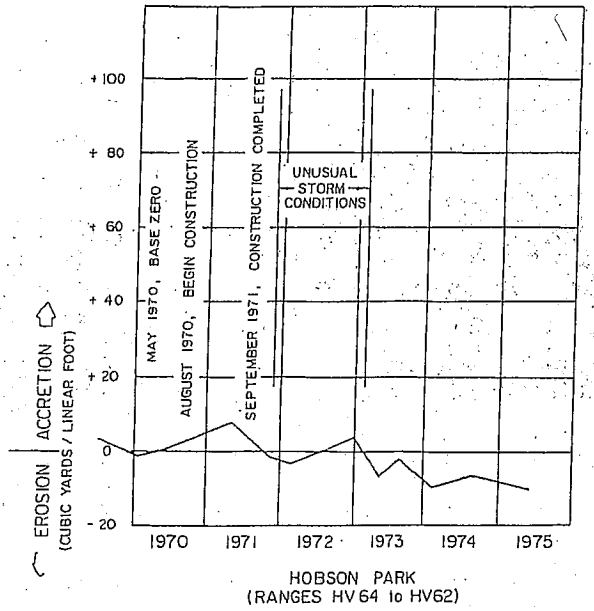


Fig. 7 Erosion and accretion vs. time, Hobson Park reach

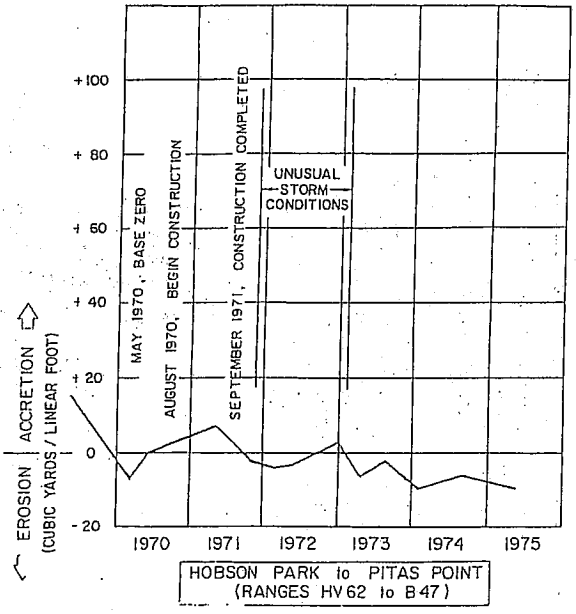


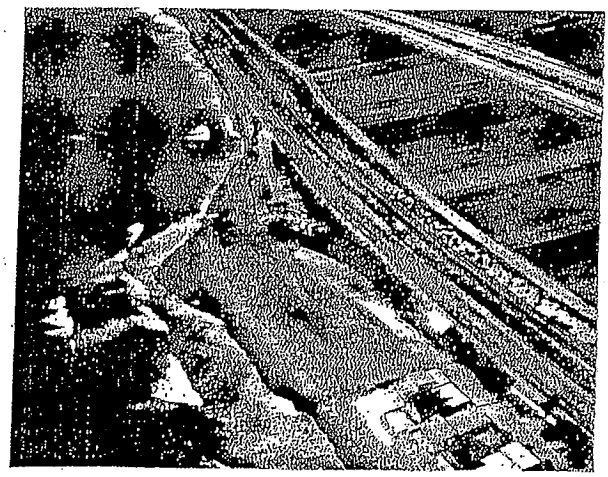
Fig. 9 Erosion and accretion vs. time, Hobson Park to Pitas Point reach

ed, hard, lime-cemented sandstone boulders obtained at low cost from a land-clearing project in the Upper Ojai Valley.

The project was completed for a total cost of $72,000. Excluding the costs of several thousand yards of backshore restoration fill and expensive construction delays caused by unseasonal heavy rainstorms, the actual cost of the rock structure was less than $50 per lineal foot. Since construction was completed, the Hobson Park revetment has been exposed to three seasons of severe storm wave attack with no significant rock displacement or backshore erosion.

Hobson Park to Pitas Point

In this reach, the monitoring data indicated no significant effect on littoral processes as a result of freeway construction (Fig. 9). There was no measurable change in this shoreline, other than seasonal sand accretion and erosion as observed on all beaches along the California coast. The beach fronting Faria Park has always been a rock outcrop with little or no beach sand.



ig. 8 Hobson Park revetment, October 12, 1976. Note sterly end of Seacliff Colony to the lower left and flower farm to the upper left. (Photograph by the California Department of Transportation)

SUMMARY

The coastline between Punta Gorda and Pitas Point has been periodically monitored by the U.S. Army Corps of Engineers for many years, and progressive erosion has been reported since 1869. In their *National Shoreline Study, California Regional Inventory*, published in 1971, the unprotected reaches of this coastline were reported as undergoing critical erosion.

Monitoring done by the State of California since the inception of the freeway, indicates the offshore revetment has an insignificant effect on the forces of nature causing the downcoast erosion. Historically and currently, damaging erosion occurs in this area when high tides are coincidental with high waves. This has caused flooding and scour of the unprotected beach frontage and has also caused repeated damage to improperly founded or poorly constructed revetments.

The average annual net rate of littoral transport along this shoreline can be roughly estimated, but it is apparently not regular from year to year. The amount of sand available to the beaches by littoral transport is affected by dredging of the Santa Barbara Harbor and by the amount of high-intensity rainfall and runoff from local upcoast streams. Seasonal beach erosion and accretion patterns have not always been consistent in the area, and the rate of loss of littoral sand frequently exceeds the rate of supply. Other factors, such as observed periodic changes in wave direction and intensity, also vary the location of beach

erosion and accretion that appear along the shoreline.

A rock revetment such as constructed at Seacliff Colony and Hobson Park is considered an expedient way of protecting the shorefront property. Since the construction of the Seacliff revetment in 1972 and the Hobson Park revetment in 1976, a sandy beach has always been present along these shorelines.

The unprotected sections of shoreline, both up and downcoast from Seacliff, are experiencing continuing cycles of storm wave erosion. Historically, these beaches have rarely had a significant deposit of sand except during short periods of time when conditions governing littoral transport and accretion were exceptionally favorable.

The practical application of the science of coastal engineering, foundation engineering, soil mechanics and materials engineering can result in the design and construction of economical coastline revetments to restore, enhance, and preserve valuable beaches and shoreline properties.

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1. JOHNSON, J. W., "Littoral-Drift Problem at Shore-Line Harbors," *Trans. American Society of Civil Engineers*, Vol. 124, 1959, pp. 525–546.
2. CRAMER, A. J. AND R. D. PAULY, *Beach Monitoring Report, Punta Gorda to Pitas Point, Ventura Freeway Construction at Seacliff*, California Department of Transportation, District 7, Los Angeles, CA, September 1975.

"PLANS SET FOR COASTAL ZONE 80"

Plans are set for COASTAL ZONE 80, an interdisciplinary conference to provide an opportunity for all professionals involved in the coastal zone to convene and exchange information and views. This conference follows the highly successful COASTAL ZONE 78 which attracted over 1200 attendees. The conference will be held at the Diplomat Resort Hotel in Hollywood, Florida, during November 17–20, 1980. The purpose of the conference is to provide a forum for interdisciplinary discussion of all aspects of coastal resource management, conservation and utilization. The major issues to be addressed include: role of states in Ocean Management, onshore impact of offshore energy development, protection of the environment, management of development, improving inter-governmental coordination, and increasing access. COASTAL ZONE 80 is sponsored by the American Society of Civil Engineers and the Office of Coastal Zone Management. Other sponsors will be announced. Approximately 2000 professionals are expected to attend this milestone conference in coastal zone management.

Contact: For additional information on COASTAL ZONE 80 and to receive a copy of the Call for Papers, please write:

Billy L. Edge, Chairman
COASTAL ZONE 80
Department of Civil Engineering
Clemson University
Clemson, South Carolina 29631