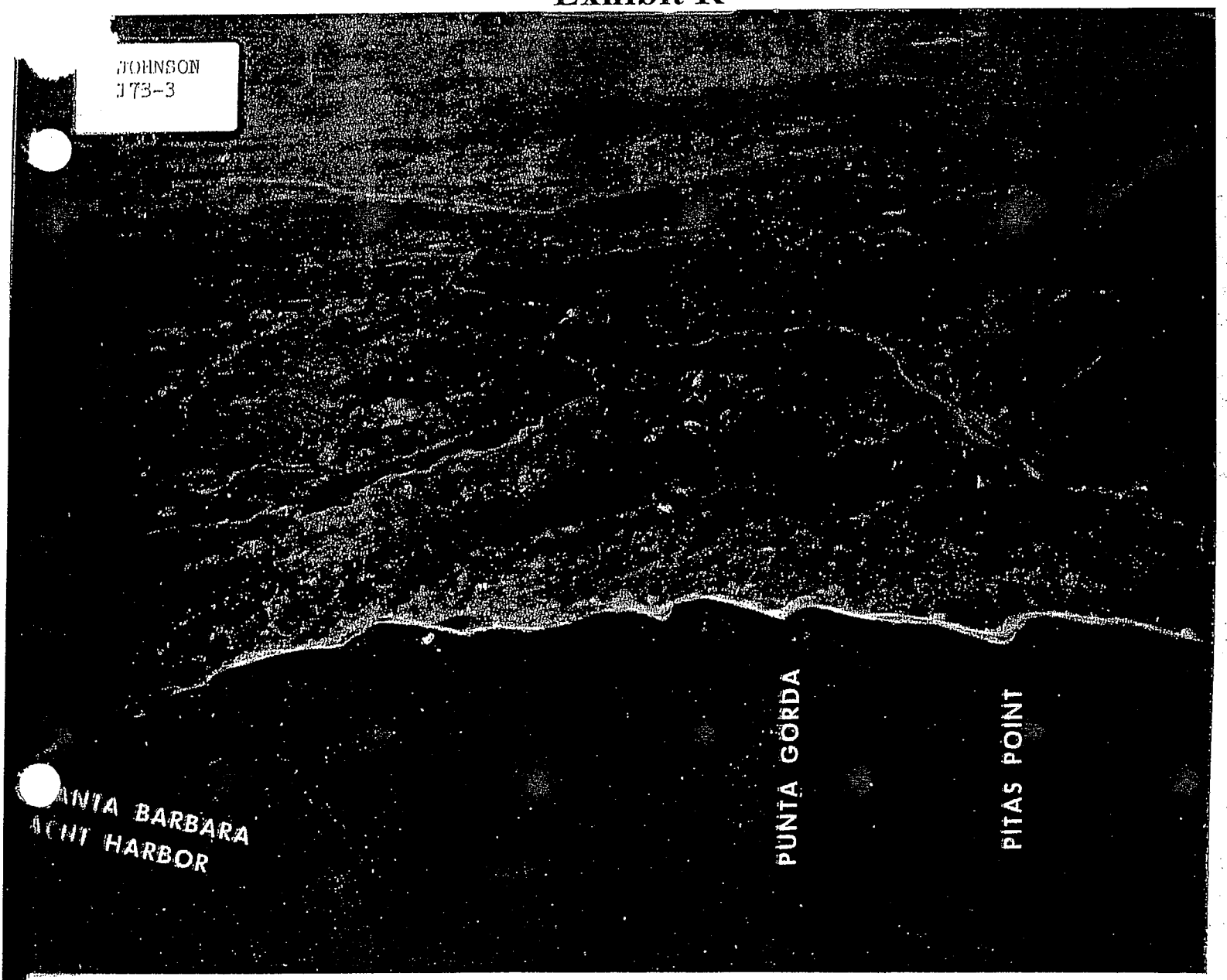
Exhibit R



BEACH MONITORING REPORT

PUNTA GORDA TO PITAS POINT

PREPARED BY THE MATERIALS SECTION

DISTRICT 7

CALIFORNIA DEPARTMENT OF TRANSPORTATION

SEPTEMBER 1975

BEACH MONITORING REPORT
PUNTA GORDA TO PITAS POINT
IN THE VICINITY OF THE
VENTURA FREEWAY CONSTRUCTION
AT SEACLIFF

Engineering Services Branch

Materials Section

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SYLLABUS

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 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 large steep waves generated by storms at sea. This has caused flooding and scour of the unprotected beach frontage, and has also caused repeated damage to improperly founded or poorly constructed revetments (Appendix Plates II and III). In recent history, the meager sand accretions on the narrow beaches in this area, whether above normal or subnormal, have little effect on dissipating the storm wave energy.

The average annual net rate of littoral transport along this shoreline can be roughly estimated, but 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 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 sand erosion and accretions that appear along the shoreline.

A rock revetment such as constructed at Seacliff is considered an expedient way of protecting the shorefront property. Since the construction of the revetment in 1972, a sandy beach has always been present at the Seacliff community.

The unprotected sections of shoreline both up and down coast 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. Constructing a rock revetment around Hobson Park would be an expedient means of holding this shoreline

(Appendix Figure 13). However, the low lying backshore would still be subjected to flooding by storm waves when they might occur in combination with high tides.

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APPENDIX

CHAPTER I

INTRODUCTION

One of the primary considerations for the design and construction of the Ventura Freeway between Punta Gorda and Seacliff was the possible effects of this offshore construction on the natural beach processes. During planning and design of the freeway, State transportation engineers consulted the foremost experts in the field of coastal engineering to evaluate the possibility of adverse effects on the down coast beach frontage. The consensus was that no serious erosion was expected during the time after construction; however, some erosion in the Seacliff area and to the east might be expected as a result of the temporary interception of the littoral drift and the local change in wave refraction pattern immediately eastward of the interchange. A rock revetment was incorporated in the design to protect these properties.

Professor Joseph W. Johnson, consulting engineer, was retained by the State to evaluate the beach processes in the area, and to coordinate and review a monitoring program for the purpose of observing any deviations from the engineering forecasts. If the monitoring surveys indicated appreciable erosion along the Seacliff shoreline, the reveted slope would be extended along the affected properties. A wait-and-see attitude was recommended.

Monitoring of the beach conditions and sand distribution along the coastline from Pitas Point to Punta Gorda was first started by the State on a limited basis in 1963. The methods used were aerial photography and ground elevation surveys extending from the coastline approximately 600 feet seaward.

Beginning in August of the construction year 1970, aerial and ground surveys were made at quarterly intervals. These surveys were supplemented by numerous ground photos, oblique aerial photographs, and by daily inspections by construction and design engineers. The survey data were collected, tabulated, and plotted by State forces. The consulting engineer periodically reviewed and interpreted the data and inspected the site in the field.

This report is intended to summarize the data collected while monitoring the coastline between Pitas Point and Punta Gorda from the years 1963 to 1975. It is also intended to provide conclusions and recommendations in regard to the observed changes in coastline conditions since the freeway was constructed.

CHAPTER II

CONCLUSIONS AND RECOMMENDATIONS

A. Engineering Forecasts

The beach processes along the freeway revetment, and in the down coast area, developed essentially as predicted by Professor Johnson in his reports to design engineer, R. G. Drosendahl, dated April 2, 1969 and May 26, 1969. Seasonal sand accretions were interrupted temporarily by one year of unpredictable heavy erosion (1972-73) in the general Ventura region. This erosion was not associated with the freeway construction.

B. Freeway Revetment

A new recreational beach was formed westerly of the freeway interchange at Seacliff along the offshore revetment. Sand accumulated to form a new shoreline at a steady rate (about 42 cubic yards/foot/year) from April 1971 until May 1972 when this littoral compartment became practically full. Between May 1972 and February 1973 the average rate of accretion was zero. After the compartment was 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, as only minor seasonal erosion has been observed since December 1972.

C. Seacliff Beach

After the 1971-72 winter season, monitoring indicated an absence of normal seasonal sand accretions at Seacliff (Appendix Figure 3). From a detailed inspection by State engineers it was determined that all the various existing shore protection structures along the Seacliff community were improperly founded or constructed, and as a result, were severely damaged by the winter storm waves (Appendix Plates II and III). Based on this determination, in July-August 1972 the State constructed a substantial rock revetment to restore and protect the Seacliff beach frontage. Sand accretions were continually present on the foreshore after the construction of the revetment. With minor maintenance (or control of storm wave runoff over the armor rock backing as has been provided by some beach home owners), 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 (Appendix Figures 6 and 7).

D. Seacliff to Hobson Park

This undeveloped beach frontage is about 400 feet in length. The westerly 100 feet of frontage is protected from erosion by the Seacliff revetment which was constructed in August 1972. The remaining frontage is unprotected (Appendix Plate XI).

During the filling of the freeway compartment by the littoral process, seasonal sand deposits were absent from the foreshore, but returned to the May 1970 condition in the fall of 1972 (Appendix Figure 4). The Line of Ordinary High Tide shifted 20 feet landward during freeway construction but returned to the May 1970 location in May 1972 (Appendix Figure 8).

In the winter of 1972-73, severe erosion of the beach berm resulted from unusual storm waves and the Line of Ordinary High Tide shifted 35 feet landward. The Line of Ordinary High Tide returned seaward in April 1975 to a point 27 feet landward of the May 1970 location (Appendix Figure 8). This line is not likely to recover to the May 1970 location because of the constant seaward flow of groundwater seepage in this area since 1973 (Appendix Figure 11).

In 1973, the total sand quantities, offshore and onshore, equaled the quantities measured in May 1970 (Appendix Figure 4). Only minor quantities of sand depletions were

recorded during erosion cycles, ranging from 4 cubic yards to 10 cubic yards per lineal foot.

The beach berm, including the asphalt and soil overfill existing in 1970, has been reduced by about 3200 cubic yards due to progressive storm wave erosion. This beach berm will be vulnerable to future erosion cycles unless it is protected by a rock revetment (Appendix Figure 13).

E. Hobson Park

Hobson 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 after high tide and storm wave damage since the freeway construction started. This is the only unprotected section of coastline between Punta Gorda and Pitas Point.

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 this offshore rock bottom is several feet higher than the adjacent ocean floors (Appendix Map 3) and was never observed to be covered with sand. The near-shore area of this beach, which has some seasonal sand accretions, has always been vulnerable to storm wave attack

and severe erosion. In 1973-74, erosion of this artificially filled back shore became more extensive due to groundwater seepage from irrigated land on the north side of the old highway (Appendix Figure 11 and Plates VIII and X).

The beach frontage from the end of the existing Seacliff revetment through Hobson Park (Appendix Plate XI) can be restored by replacing the eroded fill. The fill should be lined with rock slope protection (with an underfilter) to armor the reconstructed shoreline against future erosive attacks by storm waves (Appendix Figure 13). The back shore would still be vulnerable to flooding because of its low elevation (Appendix Plates I and VII).

The Line of Ordinary High Tide had moved about 35 feet landward during the severe erosion year, but has recovered to within 27 feet of the May 1970 location in April of 1975 (Appendix Figure 8).

F. Hobson Park to Pitas Point

From Hobson Park to Pitas Point, the monitoring data indicates no significant effect on littoral processes as a result of freeway construction. There was no measurable change in this shoreline, other than seasonal sand accretion and erosion associated with the above-mentioned erosion in the entire Ventura area. The beach fronting Faria Park remains a rock outcrop with little

or no beach as was described in a report by the U.S. Army Corps of Engineers in 1951.

The Line Of Ordinary High Tide along this reach fluctuates seasonally landward and seaward, but shows no significant permanent change since 1970 (Appendix Figures 9 and 10). Since the winter of 1973, groundwater seepage from the flower farms also has an effect on the erosion in this area.

G. General Monitoring Observations and Recommendations

Whenever significant beach sand erosion was observed between Punta Gorda and Pitas Point, unprotected reaches of coastline between Santa Barbara and Oxnard were also experiencing damaging erosion (Appendix Plates IV, V and VI). Erosion in the area under observation during and after construction of the freeway was coincident with a series of storm waves and high tides, with 3 consecutive years of subnormal rainfall, and with a period of ineffective sand bypass from the Santa Barbara Harbor. Substantiating references to these conditions are contained in CHAPTER V of this Report.

It is recommended that monitoring of the beach processes by the Department of Transportation on a regular basis be discontinued, as the data incidcates no probability of significant future changes as the result of freeway construction.

CHAPTER III

MONITORING PROGRAM

A. Ground Surveys

Most of the ground surveys consist of 27 cross sections performed 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 1974. Surveys were based on mean sea level datum.

The longitudinal limits are generally 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 2000 to 3000 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.

B. Aerial Photography

Vertical Aerial Photographs

Documenting the beach with vertical aerial photography began January 5, 1962. From 1970 through 1973 these photos were taken 3 to 4 times a year. A total of 15 sets of photographs were made, the dates of which are tabulated in the Appendix.

The majority of the vertical photographs are of mapping quality. The limits are generally from Pitas Point on the southeast to Punta Gorda on the northwest. Three topography maps were made for the Seacliff-Hobson Park area (1970, 1972, 1973).

Oblique Aerial Photographs

Nine sets of oblique photos have been made in the same area as covered by the verticals, being Pitas Point to Punta Gorda; the first set, November 11, 1967; the latest, September 16, 1974. Oblique photographs augment the vertical aerials.

C. Ground Photography

Some of the ground photographs were taken with high resolution equipment by State professional photographers. Hobson Park and Seacliff Colony have been photographed at 19 different time intervals; the first being March 14, 1969; the most recent, June 30, 1975. The photographs

show the detailed condition of the beach and supplement the aerial pictures.

Other ground photos were made by CALTRANS engineers. These pictures cover several beaches, from Oxnard Shores on the south to Santa Barbara Harbor to the north; the first being May 27, 1969--the most recent, August 28, 1975. This photographic work was performed on 60 different occasions.

D. Regional Inspection

Inspections and observations of beach areas from Oxnard to Santa Barbara by CALTRANS engineers were accomplished during most of the ground operations previously mentioned in this chapter, item A. Ground Surveys and item C. Ground Photography. CALTRANS personnel have made many regional inspections and observations in addition to those mentioned above.

CHAPTER IV

DATA INTERPRETATION

A. General

The quantities of sand accreting in the freeway compartment, and volumes accreting or eroding between Pitus Point and Punta Gorda, 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 volumes at the time of measurement between specific limits could be graphically shown. Graphs showing the quantity of sand between stations for each survey were also made.

Aerial and ground photos were reviewed at regular intervals to detect any visible changes in coastline conditions. When signs of local erosion were evident in the surveyed area, a ground inspection was made by Department of Transportation engineers. The conditions along the entire coastline between Santa Barbara and Oxnard were also inspected and documented.

Topography maps were made from the aerial photographs in years 1970, 1972, and 1973. Changes in shoreline contours and the approximate location of the ordinary mean high tideline in the Seacliff-Hobson Park area were measured from this mapping. Measurements of quarterly changes in the ordinary high-water mark and foreshore and backshore beach elevations were also accurately measured by plotting the cross section survey data.

When tidewater is the boundary in a deed, the title to the ordinary high-water mark is conveyed. Due to constant change in coastlines, any survey picture is good only for the moment for which it was made.

The ordinary high-water mark, or mean high tideline, is an average of all mean high tides over a period of 18.6 years. The elevation of this line on the maps and cross sections prepared by the State is + 1.85' mean sea level.

The position of the mean high tideline can be found at the time each quarterly survey was made so that its ever-changing location can be compared to the 1970 preconstruction location. The location of the ordinary mean high tideline in 1970, according to our preconstruction surveys, can also be compared to the record of

survey prepared by the State Lands Commission in 1950.

B. Freeway Revetment

The plotted survey data indicates the compartment formed by the freeway revetment began filling at a steady rate in April 1971, about 6 months after the start of construction. Except for a winter lag, the accretion continued until May 1972 when the compartment became practically full. At this point in time, the average rate of accretion changed from 42 cubic yards/lineal foot/year to zero cubic yards/lineal foot/year for a period of 8 months. The violent storm waves in 1972 had eroded thousands of cubic yards from the freeway compartment and also caused damaging erosion and loss of houses and improvements along the coastline from Santa Barbara to Oxnard. After the compartment refilled in May 1973, the average rate of sand accretion in the freeway compartment was 10 yards/lineal foot/year.

In 1972-73, and possibly years previous, there was an obvious lag in littoral sand available to the coastline due to ineffective bypass of sand at the Santa Barbara Harbor as previously mentioned. Except for the winter 1968-69, little sand was contributed to the littoral process from local streams. References to these conditions are contained in Chapter V.

The data indicate that the compartment created by the freeway was practically filled with littoral drift sand by May 1972, and the average rate of accretion after 1973 was equivalent to the preconstruction rate of accretion when normal amounts of sand were available to supply the littoral process. A graph (Figure 2) showing the rate and quantity of sand accretion in the freeway compartment is appended.

About 125,000 cubic yards of sand that is measured in the freeway compartment is considered to be the granular fill washed from the construction of underwater freeway fill. This is the calculated amount of overrun of this material as indicated in the final report for the freeway construction prepared by the Resident Engineer.

C. Seacliff

Scour in the Seacliff area about 200' easterly of the freeway revetment was noted at the time revetment construction was completed. Rock slope protection was promptly extended to protect the affected properties, Lot 5 through Lot 10. This scour was attributed to wave refraction at the end of revetment as predicted by Professor Johnson.

From the winter of 1971-72 through the winter of 1972-73, unusual erosion and lack of sand deposition for an extended period of time was noted in the Seacliff area, in the freeway compartment, and on practically all beaches northerly and southerly of the freeway from Santa Barbara to Oxnard (Appendix Figures 2 through 5 and Plates I, II, IV, V, and VI). The cause of erosion was attributed to a series of unusual storm waves at high tides, but the reason for the lack of seasonal littoral sand accretions on the beaches in the area was not clearly evident at the time. The natural reaction of the people who lived along the coastline was to blame the freeway construction for this abnormal occurrence. Logically, this period of widespread heavy erosion could not be considered freeway related since the accretions of sand along the freeway revetment were also affected during this time.

In May 1972, a committee of State engineers made a detailed inspection of the existing walls and revetments constructed by the individual owners in years prior to freeway construction. The consensus was that even though some structures were sturdily built as previously reported by Professor Johnson, all were improperly founded. They were also improperly integrated structurally and functionally, so that wave refraction and reflection from one type was destroying a neighbor's facility. Based on this observation, complete collapse of most of these walls and revetments was considered imminent. Local repairs of existing structures would not provide a solution.

In the face of severe criticism by public officials and property owners and with the lack of convincing documentation at the time of the cause of this unusual erosion cycle, the State decided to build a rock revetment designed to provide permanent protection for the homes at Seacliff. The design and construction of this revetment was described in a report by the Engineering Services Department, Materials Investigations Section, dated September 28, 1972.

By January 1973, the cause of the unusually long and severe erosion cycle became apparent as additional facts and data were gathered. One of the obvious causes was a series of

erosive storm waves with each high tide. An inquiry of the Department of Public Works, Santa Barbara, revealed that their dredging operations were not recently effective. Further inquiry at the U.S. Army Corps of Engineers confirmed the ineffective dredging and bypass of sand at the Santa Barbara Harbor. Rainfall for the year 1971-72 was 74% below normal (5.71 inches). The conclusion was, that for about one year (winter 1971-72 through winter 1972-73), there was little or no sand available to the littoral process above or below the freeway compartment.

After the dredging at Santa Barbara Harbor was taken over by the U.S. Army Corps of Engineers in the winter of 1972-73, the seasonal erosion and accretion cycles gradually returned to normal.

After construction of the Seacliff revetment in August 1972, sand accretions have always been present along the Seacliff shoreline. These accretions have been observed to be 6 to 8 feet deep in the summer months and have also been observed to be utilized by the residents for recreation and sunbathing. Many residents have constructed concrete walkways or stairways from their yard to the sandy beach.

The only significant change in the Line of Ordinary High Tide along the Seacliff community since construction of the freeway began in 1970, was a permanent seaward advance created by the construction of the rock revetment. This "Line" had been progressively advancing landward for many years prior to freeway construction. The revetment now provides a barrier to further landward advance of the Line of Ordinary High Tide, and a reversal, or seaward advancement occurs as sand accumulates against the rock barrier. The net effect of this construction is to provide permanent protection to the improved property and to provide a gain in usable beach frontage.

A plot of the change in the Ordinary High Tide Line from 1953 to 1975 is appended (Figures 6 and 7).

D. Seacliff to Hobson Park

This rectangular strip of undeveloped beach frontage is about 400 feet in length and is bounded by the old State highway to the northeast, the ocean to the southwest, Hobson Park property line to the southeast and a Seacliff residence to the northwest. The Seacliff revetment extends 100 feet easterly across this beach frontage leaving the remaining 300 feet unprotected.

Geologically, this strip of land is a segment of a larger wave-cut bench which included Seacliff and Hobson Park. In geologic time this land was below sea level and the bench was formed by alluvial soil deposits from the mountains when they spread over the back shore beach sands as the sea level lowered or the land was elevated. The natural slope of the ground is about 6% from the mountains to the highway, then becomes nearly flat between the highway and the beach. The natural elevation of the beach frontage is about elevation +6', but the elevation in recent time has been raised to about elevation +10' by alternate deposits of alluvium, beach sand and artificial fill formed or placed behind the natural beach berm.

The total depth of fill and alluvium overlying the seaward sloping wave-cut bedrock surface is about 6 feet. A soil

profile showing the thickness and classification of the alluvium and fill is appended (Figure 12).

In 1973, the alluvial terrace northerly of the old highway was cultivated for flower farming and an irrigation system was installed. Constant irrigation of this land created a seaward groundwater flow which became effluent along the beach and along the filled ground along the backshore. This water caused septic tanks to overflow at Seacliff and Hobson Park and caused ponding, saturation and both surface and subsurface flow across this land to the ocean. The seaward flow of irrigation water made the beach berm more susceptible to erosion, and retarded normal seasonal sand accretion in the affected area. In 1975, a sub-drainage system was installed at Hobson Park and Seacliff which effectively lowered the high groundwater. However, effluent subsurface flow is still evident along the beach near the sand-bedrock contact at low tide (Appendix Plates VII, VIII, IX and X). A schematic diagram of the groundwater condition is appended (Figure 11).

In the prefreeway construction years, the Ordinary High Tide Line moved about 48 feet landward from the recorded location in April 1953 to the location measured by surveys in January 1970. By May 1970, the line moved seaward 18 feet. In August 1971, this line moved landward 20 feet

while the freeway compartment was filling, then returned 20 feet seaward in May 1972 after the freeway compartment was filled (Appendix Figure 8).

In the fall, winter, and spring of 1972-73, the Ordinary High Tide Line moved 35 feet landward during this period of severe erosion in Ventura County. By April 1975, this line returned to a location 27 feet landward of the May 1970 location. A graph showing the fluctuation of the Line of Ordinary High Tide is appended (Figure 8).

A graph of the annual sand distribution of the foreshore and offshore beach is also appended (Figure 4). The beach berm has now recovered to the approximate natural elevation where it normally was without the artificial overfill (Appended Photo Plate XII).

Shortly after the construction of the Seacliff revetment, during the period of the most severe storm erosion, a slightly greater amount of scour of the beach berm occurred near the end of the revetment than occurred on the remainder of the property. This was attributed to wave refraction and turbulence at the revetment end point. However, the major erosion of this property occurred during the storm wave attack in 1972-73 and was not caused by the revetment construction.

To protect this property from future erosion cycles it would be necessary to build a rock revetment. A typical section of a suitable revetment is in the Appendix (Figure 13). This type of structure would prevent future landward migration of the shoreline, but would not prevent flooding of the backshore during periods of storm waves with high tides.

In April 1975, the beach berm in this area has recovered to the May 1970 condition (with the exception of the overfill of asphaltic materials and soil), but will undoubtedly be eroded again this coming winter unless some shore protection is provided. The total quantity of fill lost above the existing beach berm is estimated to be 3200 cubic yards.

E. Hobson Park

Hobson Park has undergone progressive shoreline erosion during periods of high tides and storm waves since January 1970, before freeway construction started. The erosion of the park became very severe in the regional erosion year 1972-73. No efforts were made by the County to restore the eroded park fill since freeway construction started.

In 1974 erosion at the park fill was accelerated due to groundwater seepage from the flower farms northerly of the highway. A subdrainage system was installed in 1975 to control the groundwater seepage. Prior to this time the park was closed due to contaminated effluent groundwater flowing over the park surface to the sea.

The park is situated on a bedrock outcrop with a shallow cover of beach sand, clayey alluvium and fill soil. The more erosion resistant bedrock in this area creates a rocky reef extending seaward normal to the shoreline. The rock outcrop is covered with cobbles, boulders and some sand in the rocky interstices. The elevation of this offshore rocky reef is a few feet higher than the adjacent ocean floor and was never observed to be covered with sand (Appendix Map 3).

The park was apparently developed by filling over the existing shallow deposits of sand, rock and alluvium to raise and level the grade. Storm waves have progressively eroded the fill placed over the rocky beach berm. There are no significant seasonal deposits of sand offshore or nearshore in this area to absorb the storm wave energy.

In May 1975, the County of Ventura, Public Work Agency, had applied for a permit from the U.S. Army Corps of Engineers, to construct a rock revetment and restore the fill at Hobson Park. This is an expedient way to restore and protect the park, in light of the continuing problem of heavy erosion in Ventura County.

F. Hobson Park to Pitas Point

This reach of coastline is bordered by the old coast highway, which has been protected by a rock revetment and sea wall for many years prior to freeway construction. This shore protection prevents erosion of the alluvial terrace, and changes in sand deposition generally follow the countywide patterns of accretion and erosion. No significant permanent change has occurred along the coastline since the freeway was constructed.

Graphs showing the pattern of sand distribution and the movement of the Line of Ordinary High Tide since 1970 are appended (Figures 5, 9 and 10).

Pitas Point remains a rocky outcrop with little or no beach as was described in a U.S. Army Corps of Engineers report dated 1951.

CHAPTER V

REGIONAL EROSION

A. References

References concerning regional erosion in the area of concern are as follows:

Reference #1, Dated 1951 - Beach Erosion Control Report on Cooperative Study of Pacific Coastline of the State of California, Carpenteria to point Mugu, by W. R. Shuler, Lt. Col. Corps of Engineers, District Engineer.

Reference #2, Dated 1971 - National Shoreline Study, California Regional Inventory, by U.S. Army Engineer Division, South Pacific Corps of Engineers.

Reference #3, Dated Jan. 11, 1973, DOT File Santa Barbara Dredging as reported by John Wood, Jr., Project Engineer Operations Branch, Corps of Engineers, to Albert Boost, Engineering Geologist, DOT.

Reference #4, Dated 1972 - Report of Beach Erosion and damages to Ventura County Shoreline, by A. P. Stokes, Director, Department of Public Works, Ventura County.

Reference #5, 1975 - Ventura County Flood Control District - Rainfall Records.

B. Excerpts From References

The following exerpts were taken from the listed references:

From Reference #1, 1951, Geology and Littoral Drift - "A wave cut bench which extends about 1.5 miles eastward from Las Sauces Creek has a maximum width of 1,200' and an elevation of about 15 feet. Along its seaward edge is a low sea cliff fronted by a narrow beach, except near its east end, where conglomerate bedrock is exposed and the beach is strewn with boulders." (Seacliff to Hobson Park.)

From Reference #1, 1951 - "Between Punta Gorda and Ventura River, the highwater shoreline has not advanced since the first survey 1869-70, except where the coastal terrace was widened for the construction of the Coast highway. About 2 miles of shoreline near Seacliff and one mile of shoreline down coast of Pitas Point, receded more than 100 feet since the first survey. The offshore depth contours have moved slightly shoreward, the deepening being most marked south of Pitas Point."

From Reference #1, 1951 - "The shoreline and offshore depth changes previously described are general trends over the period of record. In addition, seasonal changes or temporary local changes frequently cause local shoreline recession that may result in damage to improvements built

too close to shore. These changes may occur without warning at any area under consideration except in those isolated areas now protected by revetments or seawalls."

From Reference #1, 1951 - "Bypassing sand at Santa Barbara harbor should assure the continued availability of considerable amounts of sand from that source to the Ventura County Beaches regardless of the contribution of local streams." Local intermittent streams contributing significant amounts of sand to the beaches being monitored were listed as: Carpenteria, Rincon and Las Sauces Creeks. This only occurs during occasional seasons of heavy rainfall and flood flow.

From Reference #3, 1973 - The City of Santa Barbara conducted the harbor dredging for the Corps until September 30, 1972. The dredging had not been previously effective for the following reasons:

1. The equipment was old
2. The discharge lines were not long enough

The net effect was that the material was being recycled (dredged material was returning to the harbor). On October 16, 1972, the Shellmaker Corporation took over the dredging under contract with the Corps. The contract called for 370,000 cubic yards of dredging to be completed

by January 1973. It was estimated by the Corps, that some of the dredged sand would return to the Harbor, some would remain where discharged, and some would move down coast. Exact amounts could not be determined.

From Reference #2, 1971 - From Rincon Point to the City of Ventura - "There are approximately 2 miles of Santa Buenaventura State Beach protected by groins. The remainder of this coastline is considered to be under critical erosion."

From Reference #1, 1951 - "Occasionally Pacific Ocean storms move landward into coastal waters and generate a more forceful type of wind wave ranging in height from 6 to 10 feet with periods from 8 to 10 seconds. On other occasions, tropical storms have moved northward into the Southern California region and generated wind waves of exceptional height."

From Reference #1, 1951 Rincon Point to Ventura River - "Waves approaching this shore segment between south-southwest and south-southeast can reach shore despite some interference by the island screen."

From Reference #2, 1971 - "If winds of a local storm blow toward the coast, the generated waves will reach the local beach in essentially the form in which they

are generated. Under these conditions, the waves are rather steep; that is, the wave length is only 7 to 20 times the wave height. Short steep waves which usually occur during a storm near the coast tend to tear the beach down."

From Reference #5, 1975 - The following yearly rainfall records are on file at the Ventura County Flood Control District for the gaging station at Seacliff.

Year	Total Rainfall (inches)
1967-68	10.74
1968-69	22.79 (Flood Year)
1969-70	9.27
1970-71	12.20
1971-72	5.71
1972-73	18.56
1973-74	13.43
1974-75	13.24

Mean seasonal rainfall is 22 inches.

From Reference #4, 1972 - Report plate photo dated May 1970 (Before freeway construction) shows Hobson Park severely eroded with no sand. Also, a Report photo dated May 1970 shows Faria Park severely eroded with cobble beach and no sand.

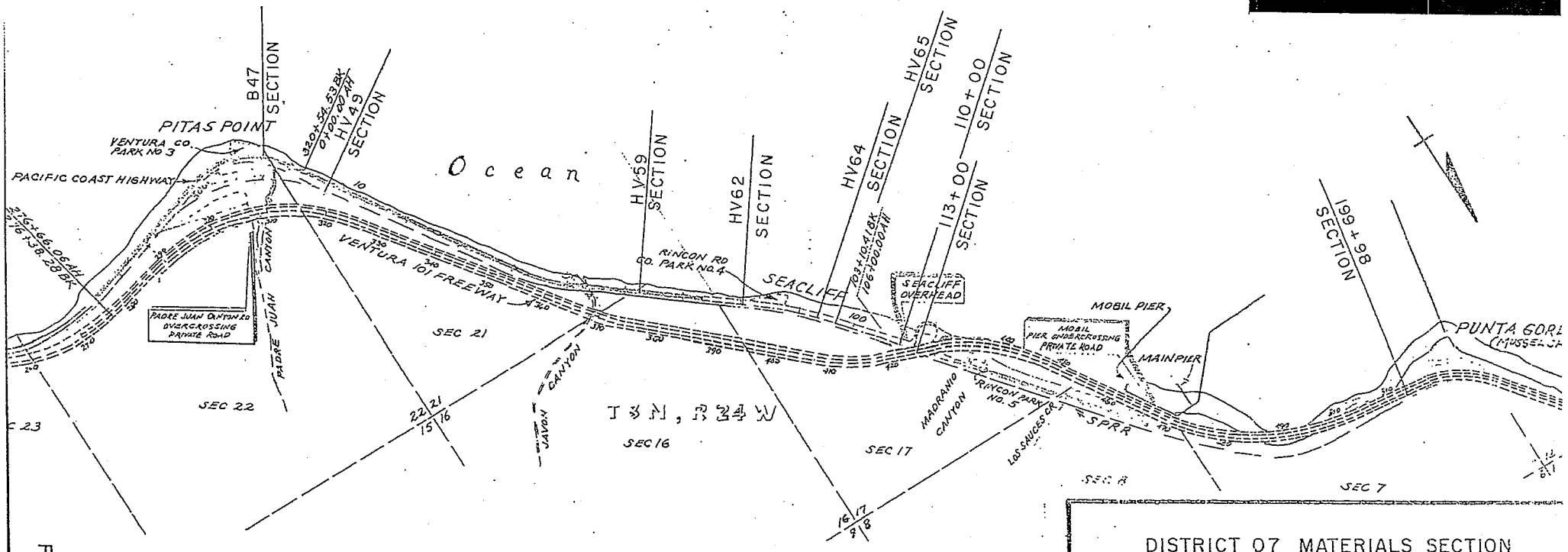


FIG. # 1

DISTRICT 07 MATERIALS SECTION

VICINITY MAP

VENTURA 101 HIGHWAY

BEACH MONITORING REPORT

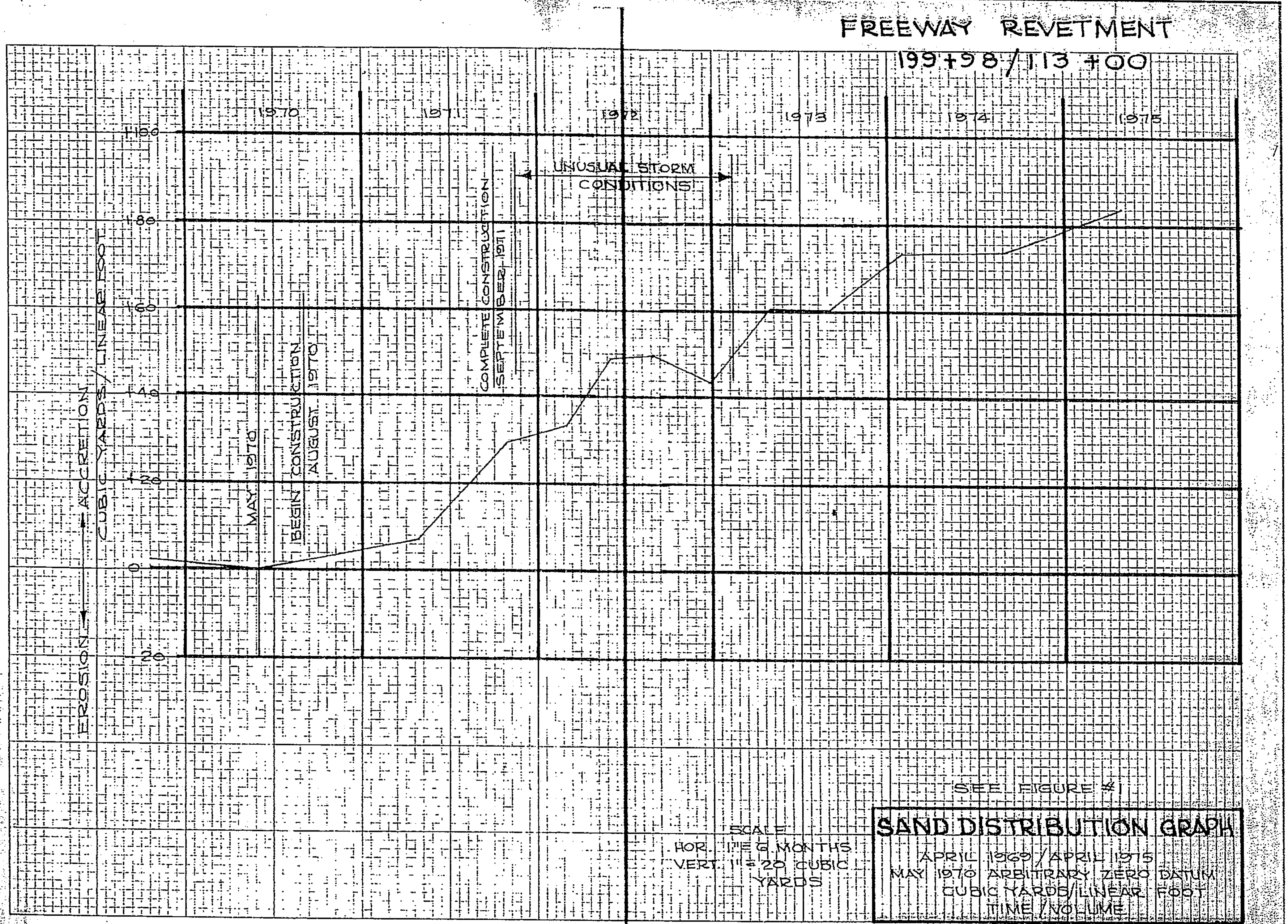
PITAS POINT / PUNTA GORDA

PM 36.6 / 40.8

SCALE: 1" = 2000'

JULY 1975

FIG. # 1


FREEWAY REVETMENT
199+98/113+00
1970
1971
1972
1973
1974
1975
+100
+80
+60
+40
+20
0
-20
EROSION ← → ACCRETION
CUBIC YARDS / LINEAR FOOT
MAY 1970
BEGIN CONSTRUCTION
AUGUST 1970
COMPLETE CONSTRUCTION
SEPTEMBER 1971
UNUSUAL STORM
CONDITIONS
SEE FIGURE #1
SCALE
HOR. 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 #2

SEACLIFF COLONY TO HOBSON PARK
HV64/HV62

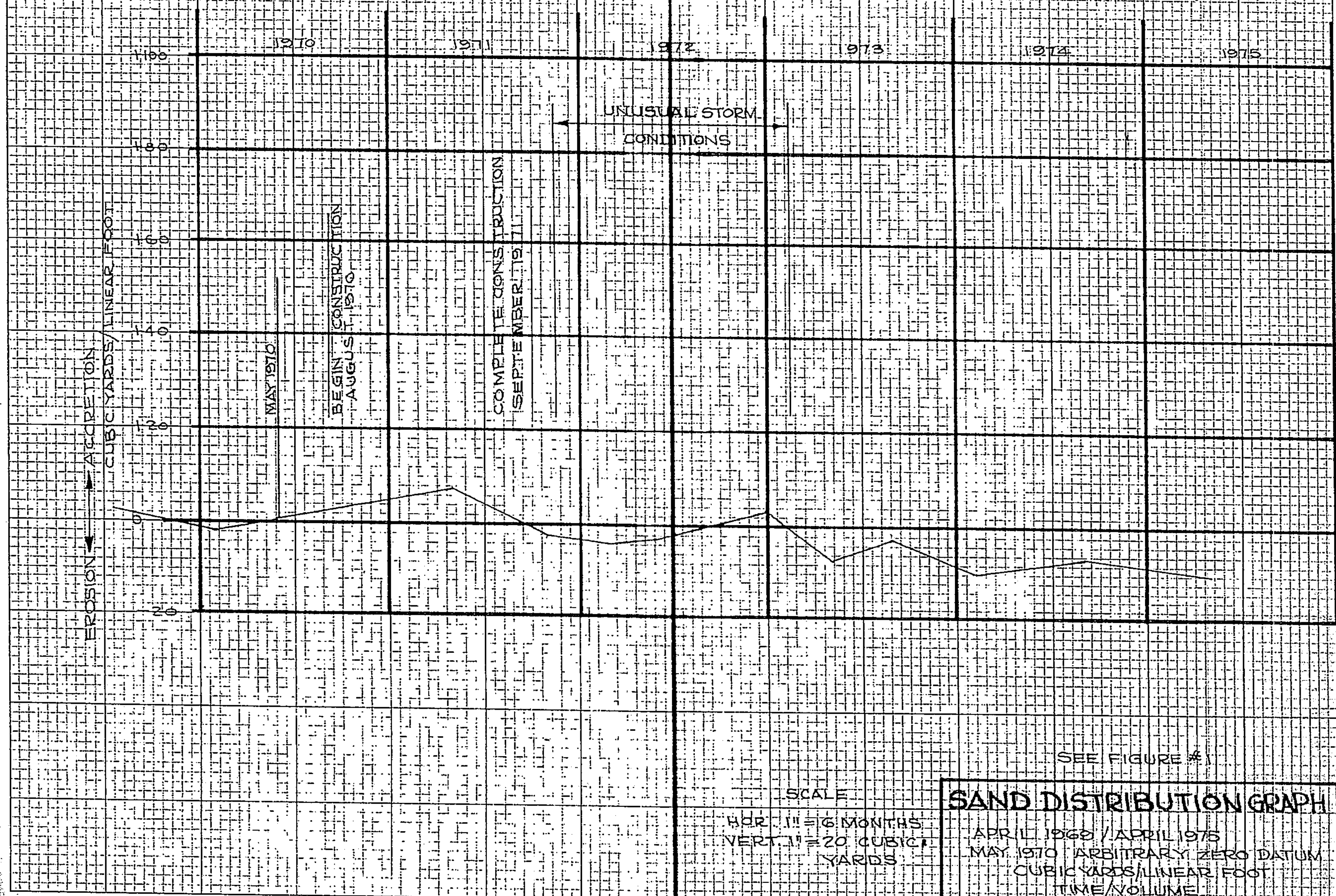
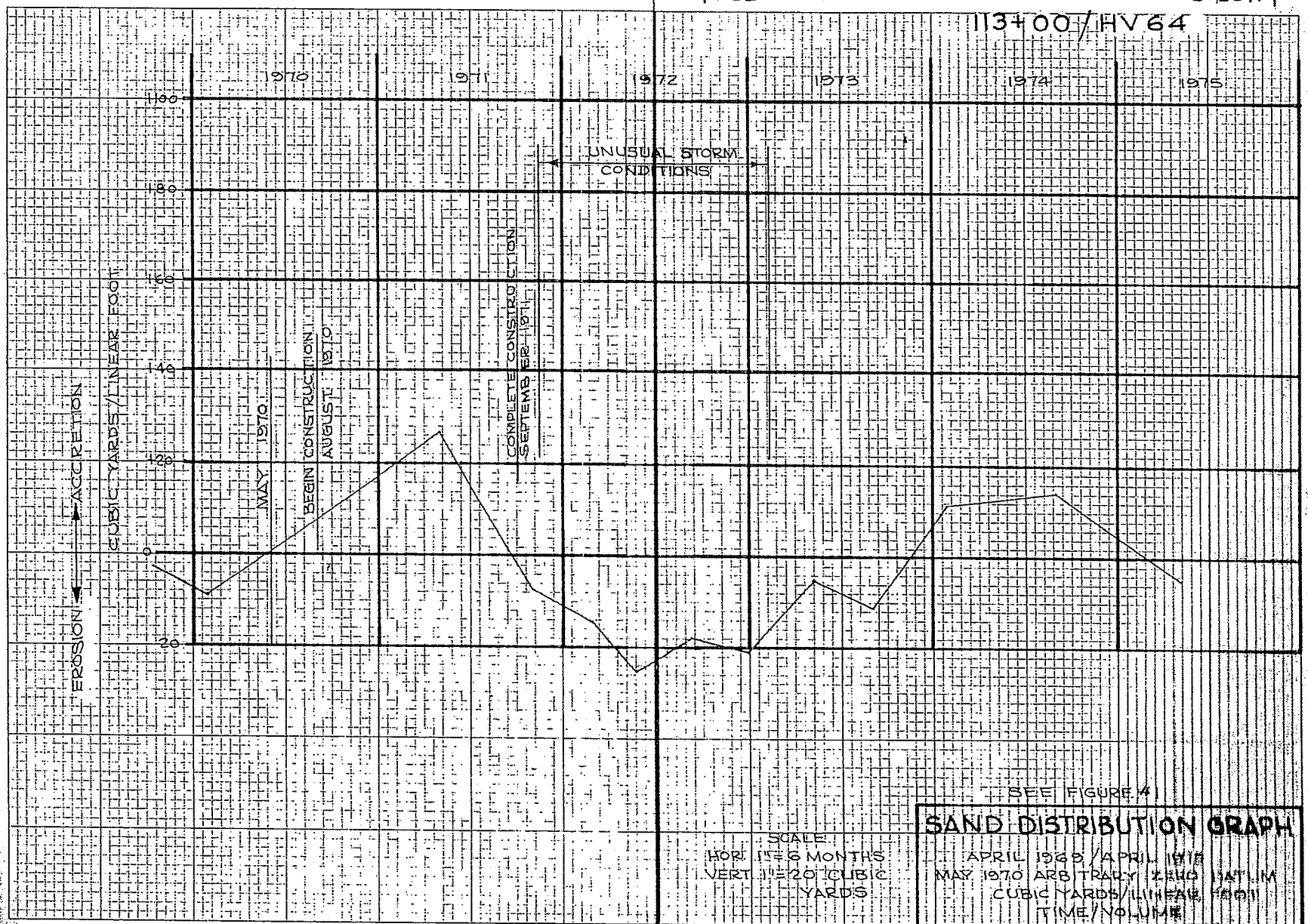


FIGURE #4

FREEWAY REVETMENT THROUGH SEACLIFF COLONY

113+00 / HV64



SEE FIGURE 4

SAND DISTRIBUTION GRAPH

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

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

FIGURE #3

1