INVESTIGATION OF CHILDREN'S POOL
LA JOLLA, CALIFORNIA

Prepared for:

PARK AND RECREATION DEPT.,
CITY OF SAN DIEGO
2581 QUIVIRA COURT
SAN DIEGO, CA 92109

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APRIL 29, 1998
TESD PROJECT NO. 64541

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April 29, 1998

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TESD Project No. 64541

PROJECT: Investigation of Children's Pool
La Jolla, California

SUBJECT: Phase I, Feasibility of Reopening Sluiceways

INTRODUCTION

The purpose of this Phase I study is to determine the feasability of opening the four sluiceways that were constructed in the original breakwater. In addition, we provided a cost estimate for the construction operation to open the sluiceways. We also described the need and recommendations for preventative maintenance.

BACKGROUND

Our investigation of the existing conditions took place on April 7, 1989. The original design of the breakwater placed four feet wide by six feet high sluiceways through the concrete structure. The sluiceways are located approximately 50 feet from the beach (south) end of the breakwater. Four sluiceways are located through the breakwater. For the purpose of discussion, the sluiceways are identified by numbers 1 through 4 with number 1 located closest to the beach.

Photographs 6 through 10 show the ocean side of the breakwater. The indentations and openings in the wall are locations where the four sluiceways were plugged with concrete.

FINDINGS

Beach Side: A backhoe was used to excavate the sand on the beach side in order to expose the opening of the outboard sluiceway. (Photographs #1 and #2) The water table was found six inches below the top of the sluiceway opening. During our field work it appeared that the water table did not vary appreciably with the tide. The openings of the sluiceways appear to be protected. The top six inches of each step was continued across the opening. Refer to photographs 2 through 5 and Plate # 1. This condition was found for the top two steps on the outboard sluiceway and we assume the same condition exists for the remainder of the openings. The surface of the ground water contained clean pieces of styrofoam, candy wrappers, etc. This is an indication that there is currently some water movement through the sluiceways. This side of the sluiceway is plugged with rounded cobbles, seaweed and debris. Photograph #5.

Ocean Side: The four sluiceways had been plugged with concrete on the oceanside. The original openings can be detected by indentations and hollow areas in the exterior wall. Refer to photographs 6 through 10.

Three of the four sluiceways had openings in the bottom of the plugs. Sluiceway #2 had an opening three feet high and extended three feet into the breakwater. Sluiceway #3 is about on foot high. Sluiceway #4 is about one-half foot high. These openings were probably caused by ware action erosions.

These sluiceways are protected by four large (approximately 1 1/2 inch in diameter) vertical steel bars spaced about nine inches on center.

A jackhammer was used to determine the difficulty in removing the concrete plugs. Although it was possible to break the concrete, the plugs are hard and it will take a considerable amount of energy to remove the concrete blocking the openings. (Photographs # 10)

Plate # 1 also shows a section through the breakwater and illustrates the conditions as they existed at 2:00 pm on April 7, 1998. The tide was -0.2 feet. The ground water inside the breakwater was approximately four feet above the water level on the ocean side of the breakwater.

CORING THROUGH THE WALKWAY

We were requested by Mr. Larry Kuzminski of City Engineering Department to core through the walkway. The purpose was to determine if metal plates had originally been installed above the sluiceway as a part of a gate to control the water flow.

Core #1 (photograph # 13) was cut in the center of the walkway directly above the outboard sluiceway. Due to horizontal cracks in the concrete, the 12-inch core was in three sections. Sand was encountered directly below the core. A hand auger was used to determine that the sand extended a minimum of three feet below the walkway.

Core #2 (photograph # 13) was cut 12 feet outboard from core #1. The concrete extended to a depth of 20-inches. Sand was encountered below the concrete.

IMPORTED RED SOIL

Red silty sand containing clay soil was observed on the inside of the cove at the interface of the sea wall and the sandstone cliff. This material extends approximately 24 feet along the wall and 12 feet along the sand stone. The thickness varies from two to three feet. This soil was probably placed in this location to prevent leakage at the interface of the sandstone and the concrete sea wall. (Photograph # 15) The following presents the results of our laboratory testing performed on a sample of this soil.

Amount of material finer than #4 sieve	100%
Amount of material finer than #200 sieve	36%
Amount of sand	64%
Amount of silt	20%
Amount of clay	16%

Liquid Limit	31%
Plasticity Index	18%
USCS Classification	SC

BEACH SAND

The amount of beach sand that needs to be removed for a smaller beach and to allow the sluiceways to operated will be determined in Phase II.

CONCLUSIONS

The sluiceways can be opened by removing the concrete plugs that were placed on the ocean side of the breakwater. Debris will need to be cleared out of the remaining section of each sluiceway.

As a result of the sand encountered in the interior of the breakwater and above the outboard sluiceway, we believe that the breakwater was constructed to install a gate and gate hoist over each sluiceway. However, we do not believe that these gates were installed.

If the beach sand is removed, care should be used to not disturb the red silty sand located at the interface between the breakwater concrete and sandstone. Removing this soil may allow erosion and undermining of the abutment connections. This red soil should remain covered or protected by some other erosion control method.

ESTIMATED COST TO OPEN SLUICEWAYS

Based on concrete plugs on ocean side and remainder of sluiceways filled with debris.

• Remove railing and replace	$ 4,000.00
• 10,000 lb. breaker to work from inside breakwater and extend over breakwater	
• Improve ramp for beach access	$ 2,000.00
• 2 - 4 hour shifts per plug 4 plugs x 8 hours x $250.00/hour	$ 8,000.00
• Divers to cut debris bars (4 per sluiceway) and clean up after breaker (2 - 4 hour shifts per plug)	
• 4 plugs x 8 hours x $200.00/hour	$ 6,400.00
• Jack hammer - compressor	$ 640.00
• Cutting equipment (underwater)	$ 600.00
SUBTOTAL	**$ 21,640.00**
Supervision, overhead and profit - 40%	$ 8,656.00
TOTAL	**$ 30,296.00**

BUDGET $ 40,000.00 plus cost of removal of sand

We are still investigating the cost of installing exterior gates on the sluiceways. It is possible that the gates can be constructed with plastic. This information will follow.

PREVENTATIVE MAINTENANCE

During this investigation we observed considerable deterioration to reinforced concrete at the following two locations:

- The walk way deck of the breakwater. This reinforced concrete was reportedly placed in 1982 or 1983. The reinforcing steel has corroded causing cracks in the edge of the concrete. Refer to photograph #11.

- The reinforced concrete deck of the life guard station. The same condition exists.

Consideration should be given to filling the cracks with epoxy. This will extend the life of these structural elements.

If we can be of further assistance, please do not hesitate to call the office.

Sincerely,

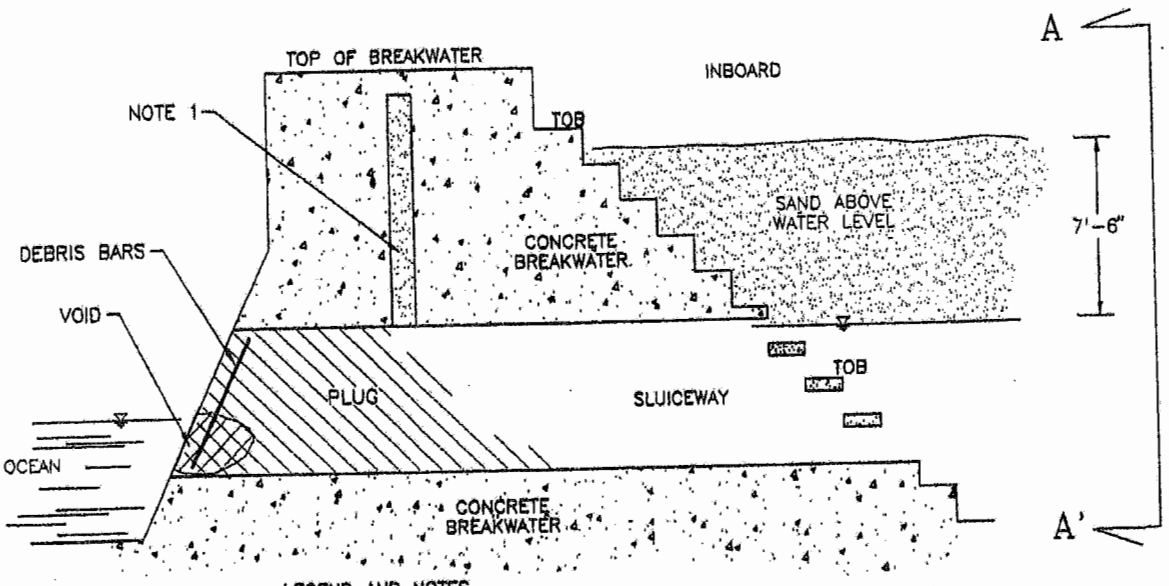
TESTING ENGINEERS-SAN DIEGO, INC.

Thomas H. Chapman, RCE 12882
President

Larry Clark, RCE 26151, GE 219
Civil Engineer
Geotechnical Engineer
(Renewal Date 2/30/01)

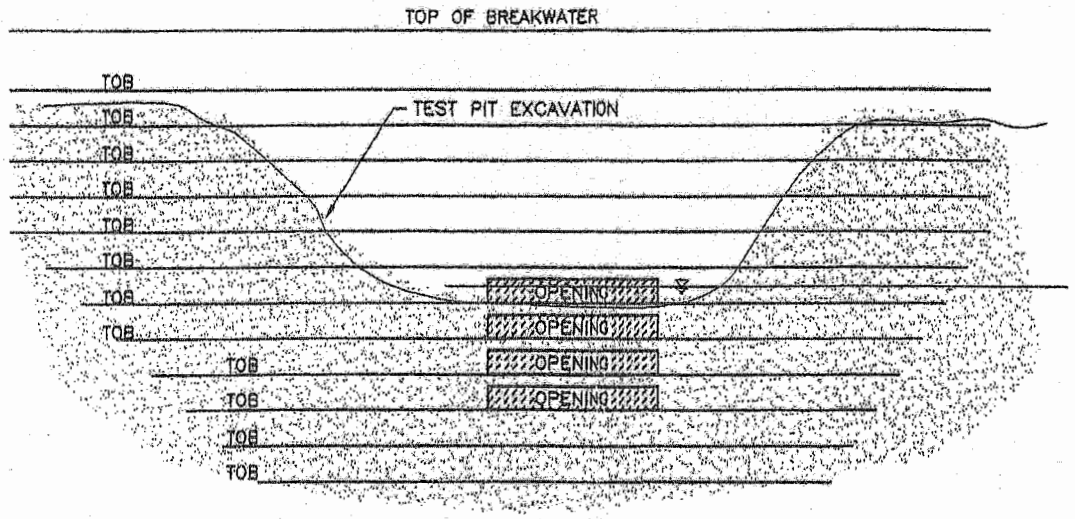
Attachments: Plate # 1
Photographs

CROSS-SECTION OF BREAKWATER



LEGEND AND NOTES
TOB = TOP OF BENCH
▽ = WATERLEVEL AT -0.2 TIDE
NOTE 1: VOID FOR GATE CONTROL FULL OF SAND

INBOARD FACE OF BREAKWATER
(SECTION A - A')



LEGEND
TOB = TOP OF BENCH
▽ = WATERLEVEL AT -0.2 TIDE

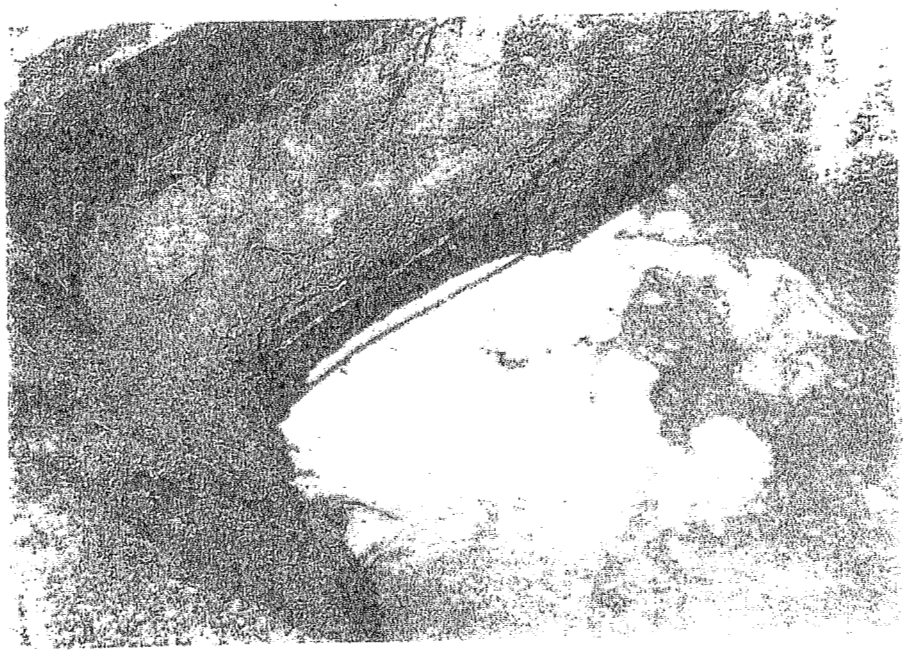
BREAKWATER DETAILS
TESTING ENGINEERS - SAN DIEGO

PHOTOGRAPHS

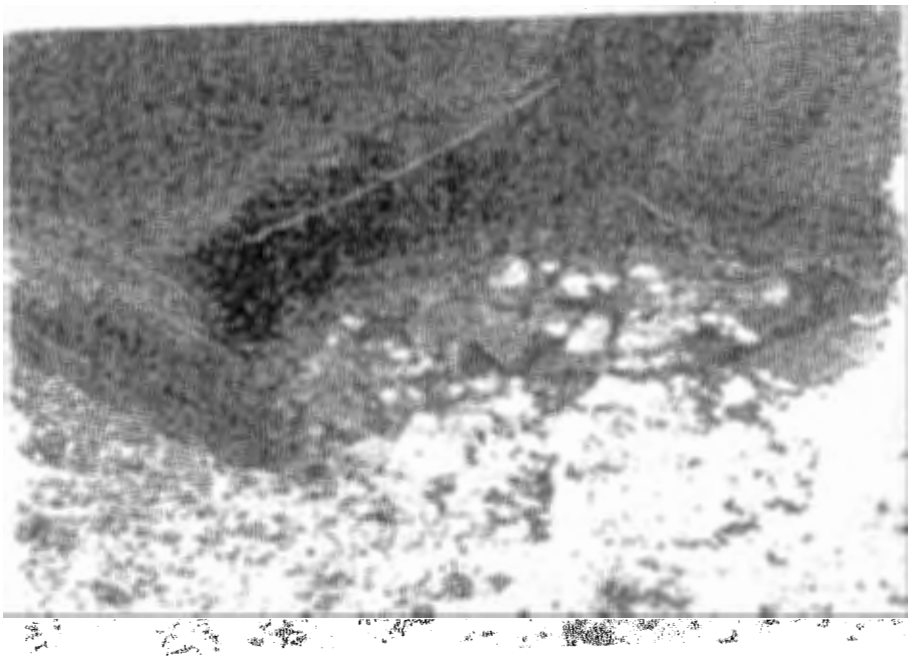
PHOTOGRAPHS

1. Backhoe adjacent to outboard sluiceway.

2. Excavation to six-inch (6") below top of outboard sluiceway.

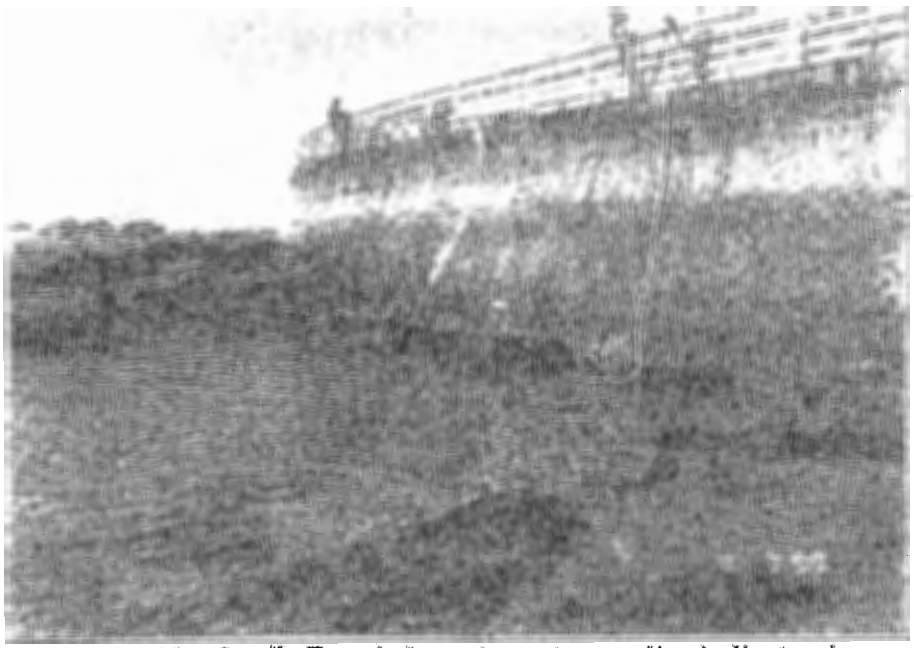


3. Water table six-inch (6") below top of outboard sluiceway.



4. Note: debris in ground water.

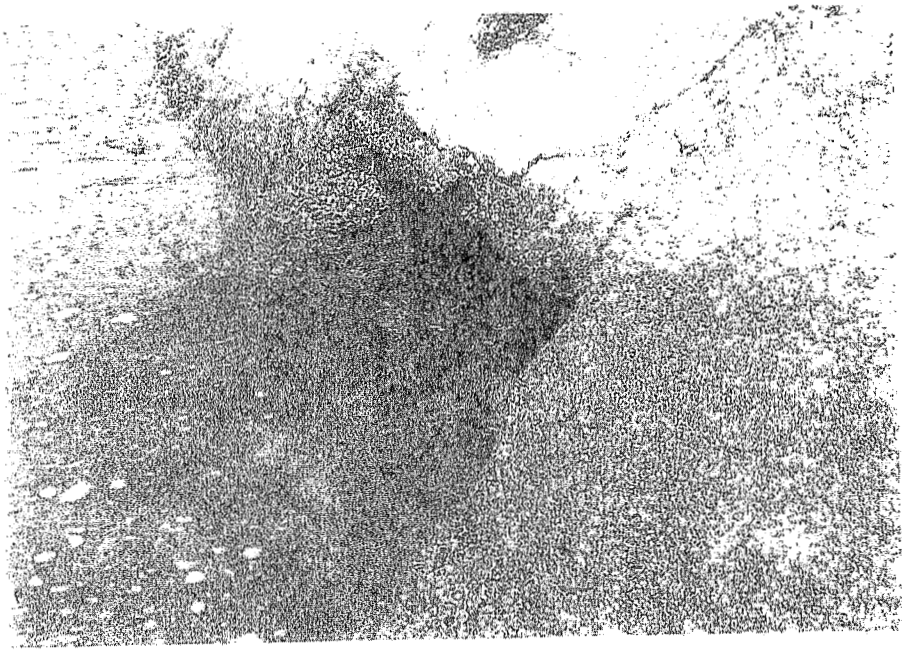
5. Top entrance to sluiceway. Reinforcing steel spans concrete over sluiceway.



6. Ocean side side of wall. Four indentations at water line indicate where sluiceways were plugged.

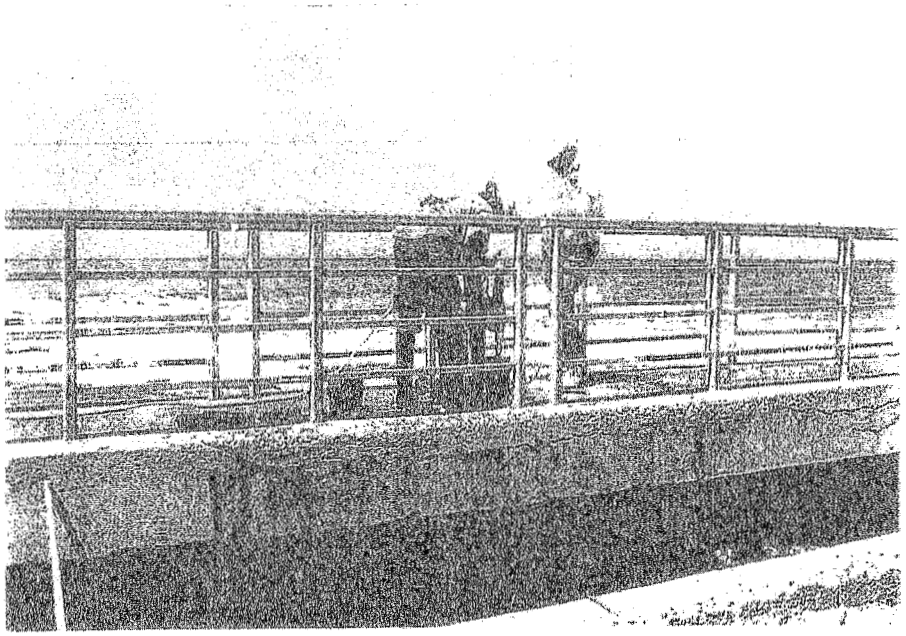
7. Opening at bottom of sluiceway.

8. Opening at bottom of sluiceway.

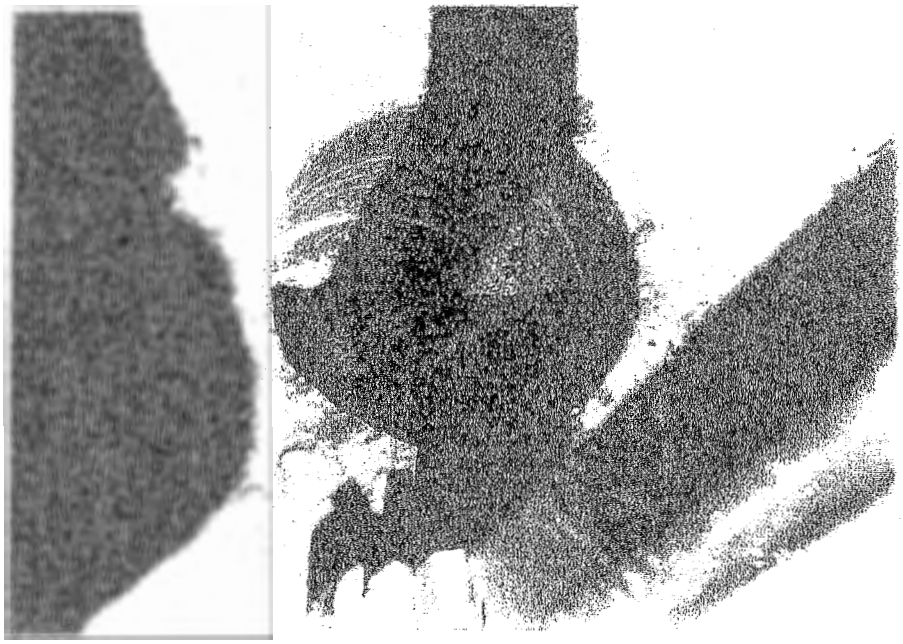


9. Opening at bottom of sluiceway. Note: debris bars

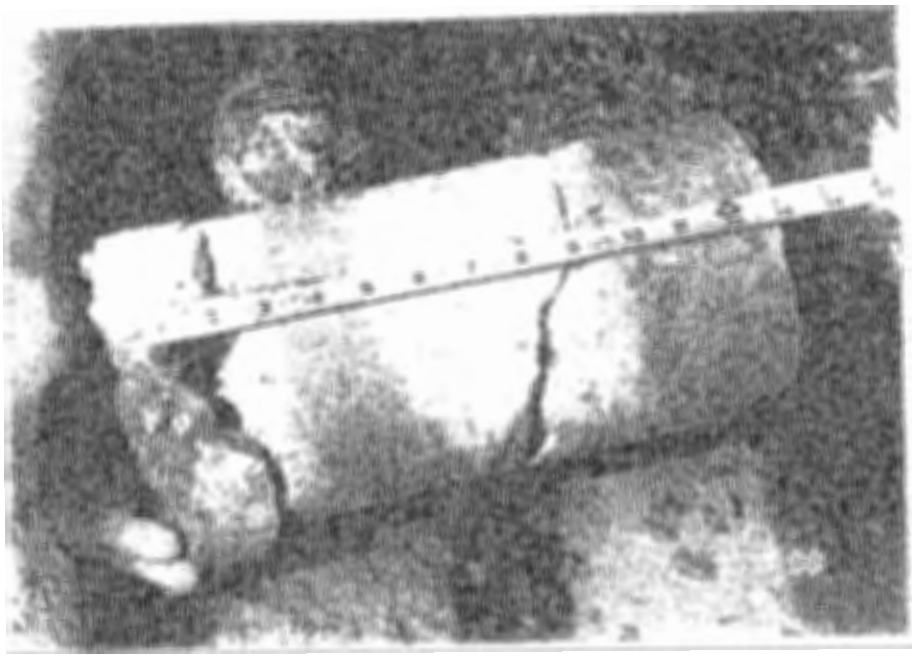
10. Jackhammer breaking concrete in sluiceway plug.



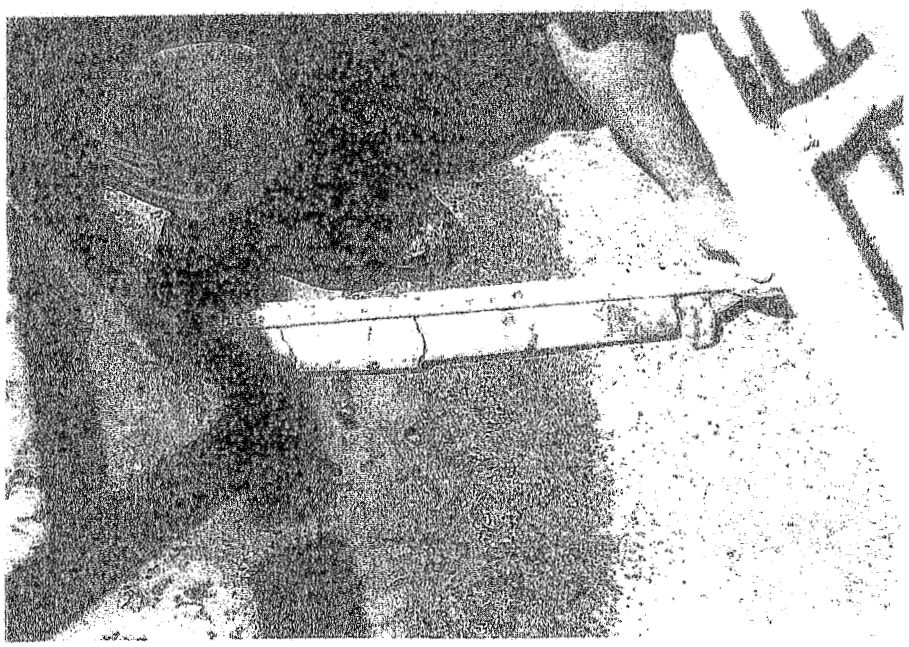
11. Coring above outboard sluiceway. Core #1.



12. Core hole #1 - Note: sand in bottom.



13. Core #1



14. Core #2

15. Red Clay

16. Beach - April 7, 1998