Phone: 325-7272
775-6771

PACIFIC SOILS ENGINEERING, INC.
1402 West 240th Street
Harbor City, California 90710

March 11, 1966

Work Order 6164

Lomita Development Co.
6151 West Century Boulevard
Suite 700
Los Angeles, California

Subject: Subsurface drainage study for reservoir located in the southeast corner of Tract No. 24836 in the County of Los Angeles, California.

Reference: Preliminary Soils Investigation report dated January 7, 1966 and Addendum Soils Report dated January 27, 1966.

Gentlemen:

Submitted herewith are the results of a permeability study regarding subsurface drainage of the reservoir located in the southeast corner of the subject tract. This report is not intended to apply to the other reservoirs located on the subject property. Other reservoirs should be analyzed individually.

The purpose of this investigation was to determine the extent and type of subdrainage system necessary because of the existing bottom slab.

FIELD INVESTIGATION

Six (6) 24-inch diameter borings were made with a rotary bucket drill to depths ranging from 12 to 15 feet. Boring locations are presented on Plate A and the logs of borings are presented on Plate B.

LABORATORY INVESTIGATION

Both disturbed and undisturbed samples were returned to the laboratory for permeability tests. Four representative samples were selected for the falling head permeability test. Test results are included with the calculations, presented on Plate C.

DISCUSSION

Nearly 6000 lineal feet of trench were punched through the concrete floor using a truck mounted rig. The width of the trench is eight inches and the broken concrete was left in place. The trenches form annular rings, radiating from the center at 15 foot intervals. At this time the concrete in the trenches is being removed.

The field investigation reveals that the soils beneath the reservoir conform to those found in our original exploration. Generally, the first three feet found directly beneath the slab tend to be silty and clayey sands which are highly oil stained. The underlying soils are fine to medium clean sands. All soils are in a dense state and suitable to receive fill. Most of the soils in the borings had a petroleum odor, however the amount of actual oil contained in the soil is unknown.

Permeability tests were performed on four representative samples using a falling head permeameter. The laboratory results show that even though the soils are oil stained they are still permeable. The value used in the calculations ($K = 0.086 \times 10^{-4}$ cm/sec.) was obtained from a sample with only a slight amount of oil.

The permeability calculations were performed under the assumption that no lateral drainage would occur within the tank area.

The average annual rainfall for this region, according to Los Angeles County Flood Control data, is 13 inches per year. It has been assumed that only one-third of the land will be available to receive precipitation and that only one-half of the precipitation will percolate into the ground.

CONCLUSIONS AND RECOMMENDATIONS

Based upon the results of the field investigation and the resulting permeability computations, the following conclusions and recommendations are presented:

1. The average annual volume of percolating rainfall in the tank area will be on the order of 26,000 cubic feet under the assumptions stated above.

2. If the slab is left as is (utilizing the 6000 lineal feet of open trench), the percolation volume should

be on the order of 26,500 cubic feet assuming the static water surface is 1.0 feet above slab level. If the water depth is increased to 5.0 feet which is not probable the annual volume of percolation should be 53,000 cubic feet.

3. Based on these calculations utilizing the lowest permeability value obtained from the laboratory results, it is considered that the available drainage area is sufficient to handle all expected percolating water. It must also be remembered that these computations have been performed assuming no lateral drainage, and are considered conservative.

Respectfully submitted,

STEVAN PEKOVICH
R.C.E. 14744

Distr.: (3) addressee
(3) Dept. of County Engineer
Grading Division
Attn: Mr. Glen Martin

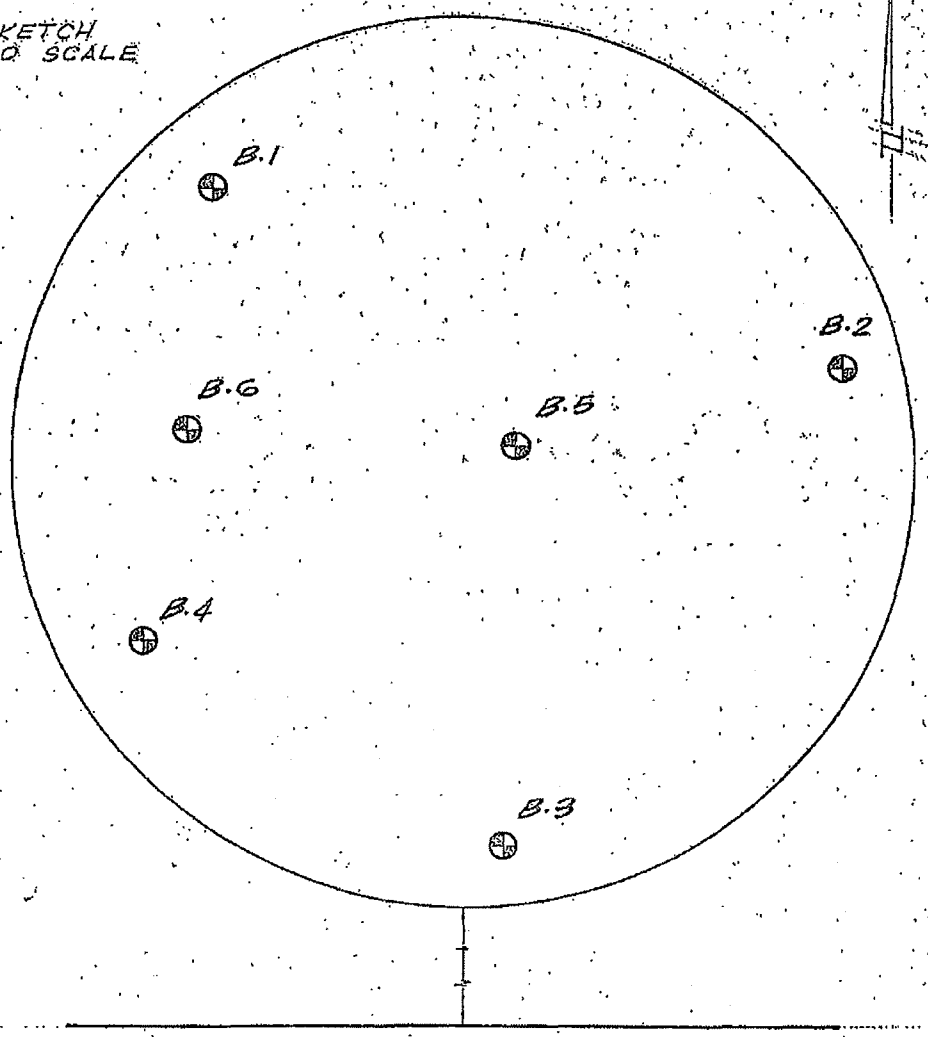
SP/em

PACIFIC SOILS ENGINEERING, INC.

BOTTOM OF RESERVOIR
SE CORNER TRACT 24830
COUNTY OF LOS ANGELES

PLATE A

SKETCH
NO SCALE



APPROX. LOCATION OF BORING

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PLATE B

LOGS OF BORINGS

Boring No.	Depth (ft.)	Classification
1	0.0- 1.0	Black silty sand, dense, oil stained.
	1.5-15.0	Clean fine sand and shells, dense. Coloring varies with depth but is generally stained green. Petroleum odor apparent.
2	0.0- 1.5	Black clayey sand, dense, oil stained.
	1.5- 8.0	Brown medium sand with some clay, oil stained and apparent petroleum odor.
	8.0-11.0	Tan and gray clean sand, oil smell.
	11.0-12.0	Brown clean sand, heavy oil smell.
3	0.0- 2.5	Brown silty sand, dense, oily.
	2.5- 4.5	Brown clean sand, oil smell.
	4.5-10.0	Green fine sand and silt, dense, oil smell.
	10.0-11.5	Tan medium clean sand, dense, oil smell.
	11.5-12.5	Pale green silty fine sand, oil smell.
	12.5-15.0	Gray fine clean sand, oil smell.
4	0.0- 3.0	Black silty sand, oily.
	3.0- 4.5	Black medium clean sand, oily.
	4.5- 6.5	Gray fine clean sand, slightly oily.
	6.5-10.0	Gray lean clay, slightly oily.
	10.0-15.0	Brown fine sand, slightly oily.

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5	0.0- 4.0	Dark brown sand and sea shells, oily.
	4.0- 9.0	Gold and gray fine clean sand, oil smell.
	9.0-14.0	Gray clean sand, dense, no oil smell.
6	0.0- 6.0	Black fine and silty sand, oily, dense.
	6.0-11.0	Gray clayey silt, oil smell.
	11.0-15.0	Gray fine sand, dense, oil smell.

PLATE C

CALCULATIONS

1. Laboratory Permeability Values:

Sample 1, $K = 0.086 \times 10^{-4}$ cm/sec. (slightly oily) Boring 2 @ 1.5 ft.

Sample 2, $K = 10.6 \times 10^{-4}$ cm/sec. (trace of oil) Boring 4 @ 5.0 ft.

Sample 3, $K = 2780 \times 10^{-4}$ cm/sec. (no oil) Boring 5 @ 8.0 ft.

Sample 4, $K = 2.89 \times 10^{-4}$ cm/sec. (oily) Boring 6 @ 3.0 ft.

2. Area of tank bottom:

$$A = \pi \frac{d^2}{4} = \pi \frac{(430)^2}{4} = 145{,}000 \text{ sq.ft.}$$

3. Area available for percolation:

$$A' = 1/3(A) = 1/3(145{,}000) = 48{,}000 \text{ sq.ft.}$$

4. Average annual volume of percolation rainfall:

(Assuming 1/2 of 13 inches of rainfall enters ground)

$$Q = (1/2A')(13/12) = (1/2)(48{,}000)(13/12) = 26{,}000 \text{ cu.ft./yr.}$$

5. Percolation volume using punched trenches:

(A) Area of punched trench

$A = (6000')(8/12) = 4000$ sq.ft.

Assume 50% of this area is available for percolation

$\therefore A = 2000$ sq.ft.

PLATE C - continued:

(B) Percolation assuming water surface 1.0 feet above slab and $k = 0.086 \times 10^{-4}$ cm/sec.

$k = 0.28 \times 10^{-6}$ ft./sec.
$i = H/L = 4/3 = 1.33$

$Q = k\ i\ A$

$Q = (0.28 \times 10^{-6}$ ft./sec.$)(1.33)(2000)$

$Q = 26{,}500$ cu.ft./year

(C) Percolation assuming water surface 5.0 feet above slab.

$Q = (.28 \times 10^{-6}$ ft./sec.$)(2.67)(2000)$

$Q = 53{,}000$ cu.ft./year