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October 10, 1986

OUR JOB 86234

Bomanite Corporation
3765 N. Goldenrod Avenue
Kerman, CA 93630
Attn: Vaughan Chamness Jr.

SUBJECT: Grasscrete Permeability Tests

Gentlemen:

At your request and authorization, we have performed permeability tests on Grasscrete and soil samples. Permeability tests were performed on four samples.

1. A Grasscrete cell filled with sand.
2. A Grasscrete cell filled with sandy soil.
3. A Grasscrete cell filled with a silty soil.
4. A control sample with the test box filled with only sandy soil.

All of the above samples were prepared in 6" x 6" plastic boxes. Tests no. 1, 2 and 3 had a 6" x 6" section of Grasscrete concrete installed in the box and sealed around the periphory. The center cell was filled with the tested soil.

Test no. 4 was performed in a 6" x 6" box filled to the 6" level with sandy soil as was used in sample no. 2. The soil and sand samples were visually classified and tests were performed to determine maximum density by ASTM D-1557. The results of these classifications and tests are summarized in the Summary of Soil Samples which are enclosed.

The soils in the box and cells was compacted to 85-90% of maximum dry density using a hand tamper and placing the material in layers. Gradation analysis was performed on the three samples of sand and soil used to fill the Grasscrete cells. The results of these tests are presented graphicly and are enclosed.

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After the sample boxes were filled with soil, sod was planted on the soil and allowed to grow for a period of time.

Permeability tests were performed on each of the four samples at various heads of water over the top surface of the samples. The top of the sod was generally six inches above the bottom of the sample which is the reference point.

Water depths of 1", 2" and 3" above the top of the sod were maintained by a wier system to produce total heads of 7, 8 and 9 inches.

The results of the permeability tests are summarized in the enclosure.

The percolation rate was plotted on semi log graph paper to extraplate the percolation rate which would be expected when the water would be at the top of the sod cover.

The sand filled Grasscrete had a percolation rate in excess of 2 inches per hour which is equivalent to a heavy rainfall. The results of the tests performed on sample no. 2 and the control sample no. 4 indicate that the Grasscrete system when filled with the native soils will have as high or higher permeability as the original native soils had.

Respectfully submitted,

BSK & Associates

Robert D. Skaggs

RDS:ka

Enclosures: Summary of Soil Samples
Summary of Permeability Tests
Gradation Analysis
Percolation Rate Chart
Photographs

SUMMARY OF SOIL SAMPLES

SAMPLE NO. 1

Soil Description:	SAND: gray-brown; coarse to fine grained.
Maximum Density by ASTM D-1557:	116.5 pcf
In Place Density:	99.5 pcf
% Compaction:	85.4%

SAMPLE NO. 2

Soil Description:	Silty SAND: brown; medium to fine grained; scattered coarse; light soil.
Maximum Density by ASTM D-1557:	124.9 pcf
In Place Density:	106.5 pcf
% Compaction:	85.3%

SAMPLE NO. 3

Soil Description:	Silty SAND: reddish brown; medium to fine grained; trace of clay.
Maximum Density by ASTM D-1557:	132.5 pcf
In Place Density:	115.2 pcf
% Compaction:	86.9%

SAMPLE NO. 4

Soil Description:	Silty SAND: brown; medium to fine grained; scattered coarse.
Maximum Density by ASTM D-1557:	124.9 pcf
In Place Density:	105.0 pcf
% Compaction:	84.0%

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SUMMARY OF PERMEABILITY TESTS

Cross Sectional Area: 36 sq. inches
Sample Depth: 6 inches

SAMPLE NO. 1 Sand in Grasscrete

Head Inches	Flow Rate per Hour	Percolation Inches/hr.	Hours/in.	Permeability cm/sec, k
7	1647 cc	2.79	0.36	17 x 10-4
8	1967 cc	3.33	0.30	18 x 10-4
9	2419 cc	4.10	0.24	19 x 10-4
6*		2.25	0.44	

SAMPLE NO. 2 Silty SAND: light soil in Grasscrete

7	291 cc	0.49	2.04	3.0 x 10-4
8	318 cc	0.54	1.85	2.8 x 10-4
9	355 cc	0.60	1.66	2.8 x 10-4
6*		0.46	2.17	

SAMPLE NO. 3 Silty SAND: heavy soil in Grasscrete

7	4 cc	0.0067	149	4.1 x 10-6
8	5 cc	0.0083	120	4.4 x 10-6
9	8 cc	0.0136	74	6.3 x 10-6
6*		0.0060	167	

SAMPLE NO. 4 Silty SAND: control

7	61 cc	0.10	10	6.3 x 10-5
8	98 cc	0.17	5.9	8.8 x 10-5
9	133 cc	0.23	4.3	10.6 x 10-5
6*		0.052	19.2	

* The 6" head condition is at the top of the sod, 1/2" above the top of the concrete of the Grasscrete system. This percolation rate is determined by extrapolation of the graphic presentations.

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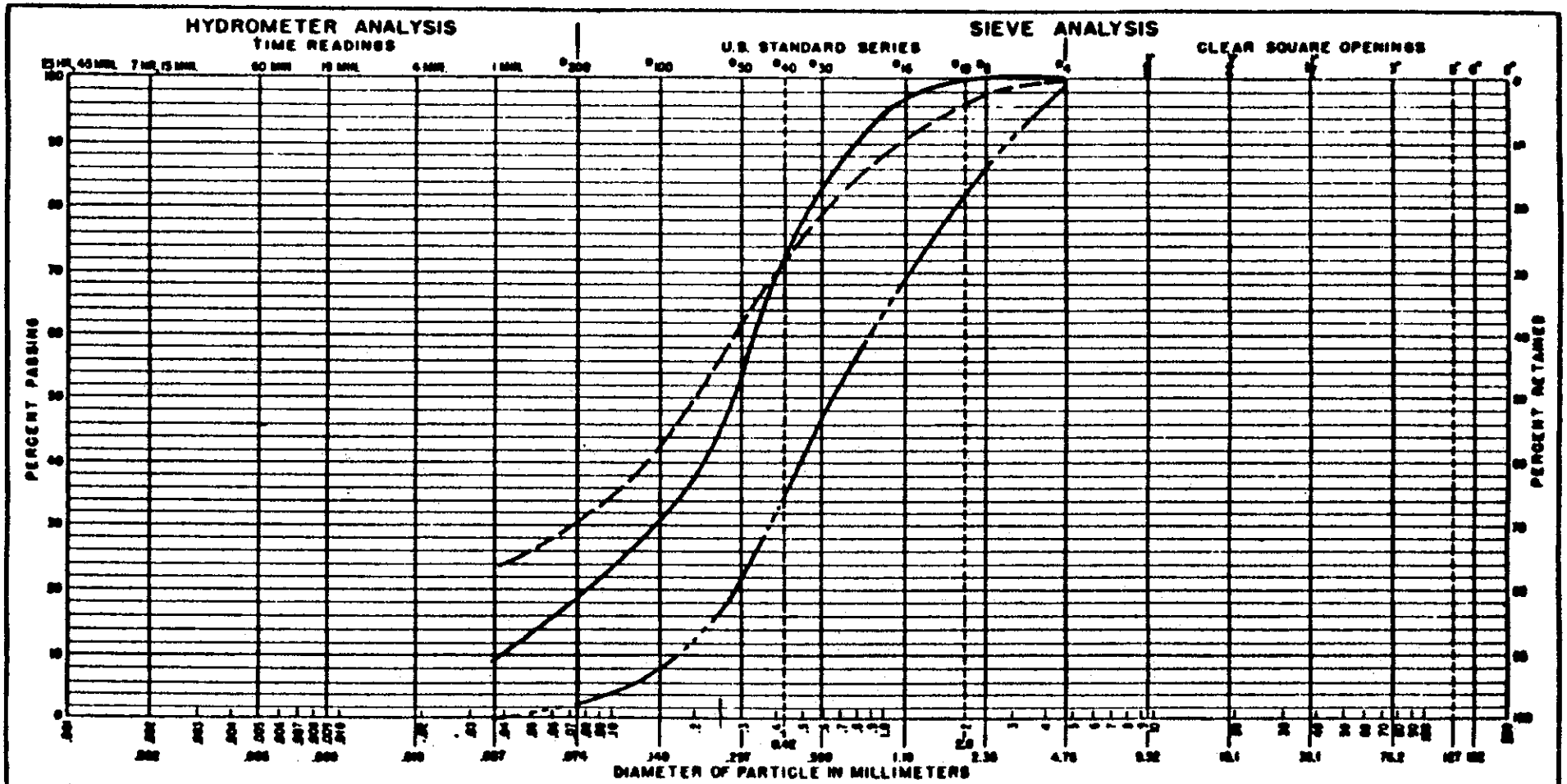

CLAY (PLASTIC) TO SILT (NON-PLASTIC)	SAND			GRAVEL		COBBLES
	FINE	MEDIUM	COARSE	FINE	COARSE	

NOTES:

		SAND	SILT	CLAY	CLASSIFICATION	GRADATION TEST
———	Samples Nos. 2 and 4	82	11	7	Sand	
— — —	Sample No. 3	69	20	11	Silty Sand	
— - - - —	Sample No. 1	96	3	1	Sand	

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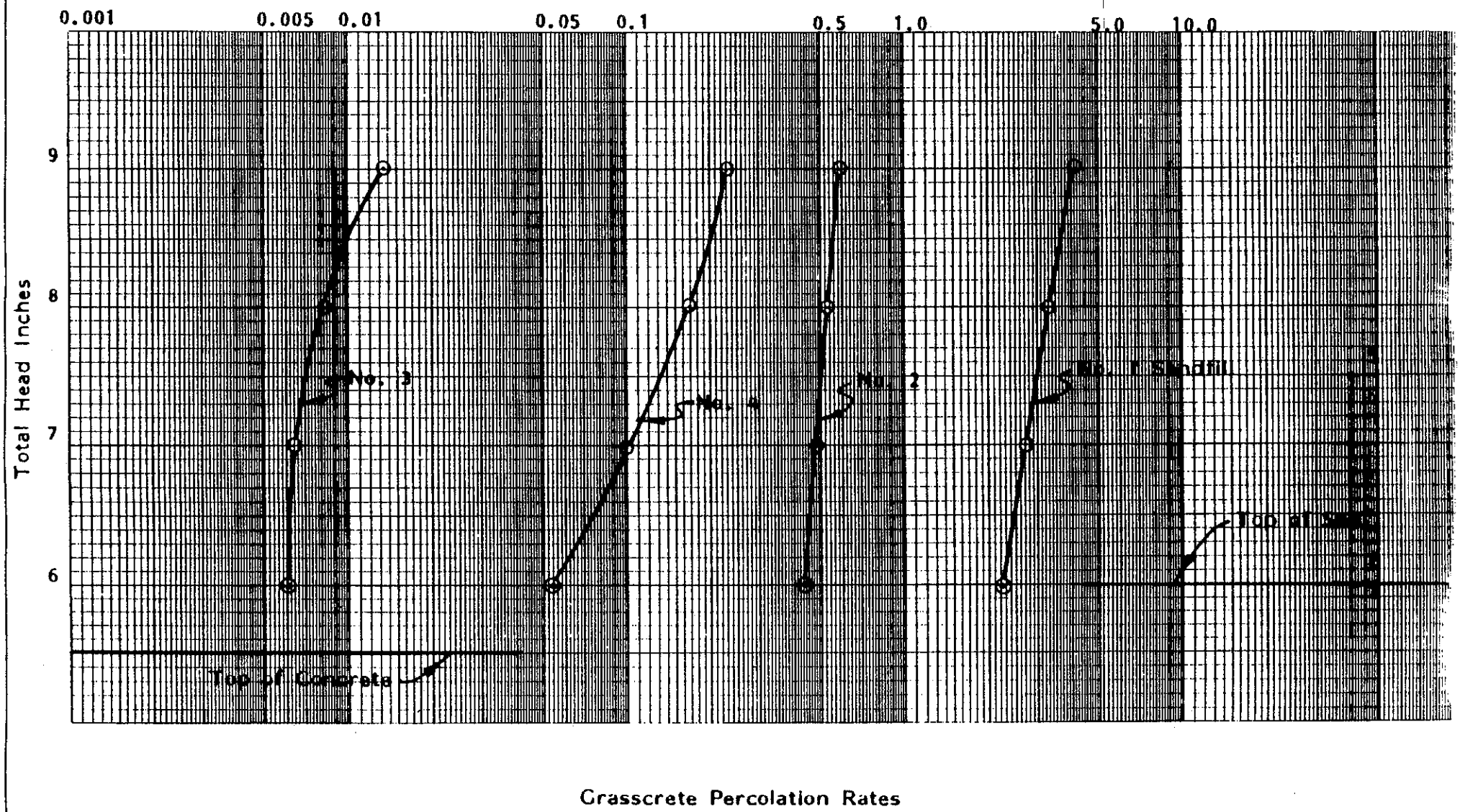
Enclosure 4



Grasscrete Percolation Rates

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