held on ⅛-inch screen; sand—material passing ⅛-inch screen; fine sand—material passing No. 100 sieve; gravel—material retained on ⅛-inch screen; aggregate—sand and gravel mixed in various proportions.

Numerous mechanical analyses were made of samples from test pits on several deposits along the aqueduct right-of-way. Some of these are given in the following table:—

Table 1.—Mechanical Analysis of Various Natural Deposits.

Reference No.	Sample from	Oversize in lbs. per 100 lbs. held on 1½ in. Screens.	Percentage by Weight Passing Screens									
			1½ in.	1 in.	¾ in.	½ in.	¼ in.	⅛ in.	No. 10	No. 20	No. 40	No. 75	No. 100
201	Pit 2, Sec. 11-9-8			100	91.4	80.0	66.9	56.1	36.7	17.9	8.5	2.2	1.9
203	Pit 6, Sec. 11-9-8		100	96.1	93.3	89.1	79.0	68.4	53.1	34.2	13.9	1.1	0.8
204	Pit 2, N.E. ¼ 6-10-8			100	96.6	85.2	56.6	33.9	22.2	11.4	4.4	0.6	0.4
205	Pit 1, S.E. ¼ 7-10-8			100	99.7	97.7	88.2	68.6	30.5	12.0	4.5	0.6	0.5
206	Pit 3, N.E. ¼ 7-10-8		100	97.7	94.0	88.0	75.8	65.6	50.3	23.3	6.4	1.0	0.6
207	Pit 4, Sec. 10-9-8		100	92.3	84.4	76.0	62.5	53.9	43.0	29.8	18.0	1.5	0.7
210	Pit 7, Sec. 11-9-8		100	88.8	79.3	65.5	46.8	37.2	29.0	19.8	12.0	2.6	2.1
215	Pit 5, S.W. ¼ 10-10-7	23.8	100	94.2	86.6	77.8	59.4	44.2	29.0	17.4	7.8	2.7	2.2
220	Pit 3, S.E. ¼ 10-10-7	0.	100	90.4	86.0	75.9	58.8	47.7	34.2	15.4	4.3	1.7	1.5
225	Sec. 23-24, T.8. R.14	0.	100	90.5	83.4	75.1	64.9	58.2	49.9	37.3	29.3	1.2	0.8
227	Average 8 Pits 10-10-7E	8.95	100	91.2	83.8	73.9	56.6	44.7	31.7	18.3	8.6	1.9	1.5

It will be noted that practically all the gravel deposits contain an excess of sand. The intermediate (material passing ½-in. and held on ⅛-in. screen) is also found in excess in most of the deposits. The sands as shown in the above examples are coarse but each deposit usually contains or has adjacent to it quantities of fine sands.

The grading of the sands varied, as may be gathered from the following examples in Table 2.

Table 2.—Mechanical Analysis of Various Sand Samples.

Sand No.	Sample from	⅛ in.	No. 10	No. 20	No. 40	No. 75	No. 100
2	Pit 8, S.W. ¼ 10-10-7	100.0	80.1	55.6	35.7	3.0	1.8
3	Pit 5, S.W. ¼ 10-10-7	100.0	65.4	39.2	17.5	5.9	4.9
5	Pit 7, S.W. ¼ 10-10-7	100.0	62.7	27.0	12.6	5.8	5.0
8	Pit 3, S.E. ¼ 10-10-7	100.0	71.8	32.4	9.1	3.6	3.1
9	Average 8 Pits 10-10-7	100.0	70.9	40.9	19.4	4.2	3.3
10	Fine sand from 10-10-7			100.0	98.3	21.6	16.5
12	Pit 2, S.E. ¼ (fine) 10-10-7	100.0	94.5	87.8	78.5	65.7	18.6
22A	Government Pit Wye Fine Sand						100.0

Table 3.—Weights and Voids of Various Dry Artificial Mixtures from Materials of Gravel Pit No. 1.

Materials				Volume		Weight per cu. ft.		Voids		
Weight of sand.	Weight of intermediate		Weight of coarse.	Total weight in lbs.	Loose in cu. ins.	Rammed in cu. ins.	Loose.	Rammed.	Loose.	Rammed.	Percentage of intermediate to total coarse and intermediate.
25	0	b	75	100	1,483	1,320	116.5	130.9	29.5	20.6	0.0
25	5	b	70	100	1,467	1,310	117.8	131.9	28.5	20.1	6.7
25	10	b	65	100	1,467	1,291	117.8	133.8	28.5	18.7	13.3
25	20	b	55	100	1,411	1,260	122.5	137.2	25.7	16.9	26.7
25	30	b	45	100	1,385	1,296	124.7	133.2	24.4	19.2	40.0
25	40	b	35	100	1,364	1,326	126.7	130.3	23.2	21.2	53.3
25	50	c	25	100	1,389	1,320	124.4	130.9	24.8	20.7	66.7
25	60	c	15	100	1,411	1,348	122.5	128.2	25.9	22.5	80.0
25	75	c	0	100	1,445	1,392	119.5	124.1	27.7	24.9	100.
25	—		—	25	400.6	351.9	108	122.8	34.6	25.5	0
	—		75	75	1,297	1,172	99.9	110.6	39.5	33.1	0
	5	b	70	75	1,285	1,162	100.9	111.4	38.7	32.6	6.7
	10	b	65	75	1,254	1,141	103.4	113.6	37.4	31.4	13.3
	20	b	55	75	1,197	1,093	108.3	118.5	34.5	28.3	26.7
	30	b	45	75	1,147	1,065	112.9	121.7	31.5	26.3	40.0
	40	b	35	75	1,137	1,081	113.9	119.9	31.0	27.3	53.3
	50	c	25	75	1,141	1,093	113.6	118.5	31.2	28.3	66.7
	60	c	15	75	1,153	1,115	112.4	116.2	32.0	29.7	80.0
	75	c	0	75	1,206	1,150	107.4	112.7	35.0	31.8	100
	20	b		20	351.9	314.2	98.2	110	40.6	33.4	100
	29.2	c	26.1	55.3	851.6	801.3	112.5	119.3	31.9	27.8	52.8

a. Sand, ⅛" — 100%; No. 10 — 70.9%; No. 20 — 40.9%; No. 40 — 19.4%; No. 75 — 4.2%; No. 100 — 33%.
b. Intermediate, ½" — 100%; ¼" — 50%; ⅛" — 0%.
c. Intermediate, ½" — 100%; ¼" — 40.8%; ⅛" — 0%.
d. Coarse, 1½" — 100%; 1¼" — 83%; 1" — 66.1%; ¾" — 37.8%; ½" — 0%.