HEAD ABOVE ORIFICE (FT)

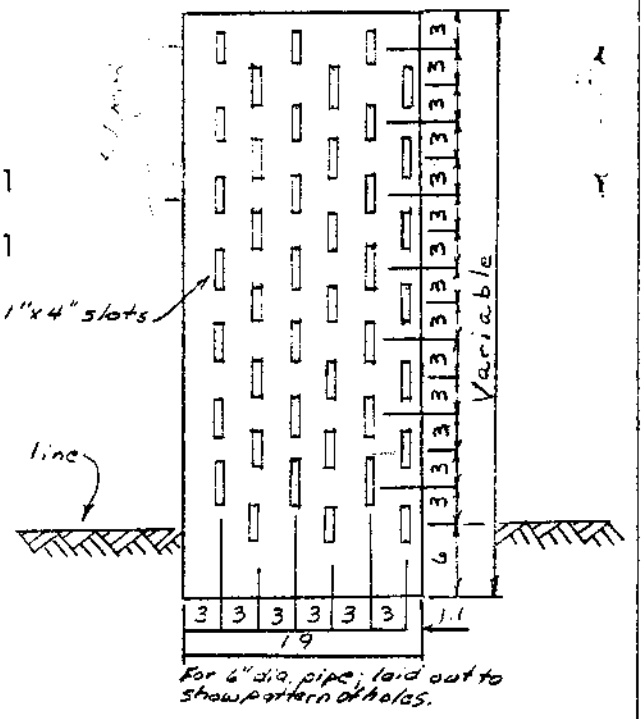
ORIFICE SIZE IN.	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0
2.00	0.10	0.13	0.15	0.17	0.18	0.20	0.21	0.22	0.23	0.25	0.26	0.27	0.28	0.29	0.30	0.31	0.31	0.32	0.33
2.25	0.13	0.16	0.19	0.21	0.23	0.25	0.27	0.28	0.30	0.31	0.32	0.34	0.35	0.36	0.38	0.39	0.40	0.41	0.42
2.50	0.16	0.20	0.23	0.26	0.28	0.31	0.33	0.35	0.37	0.38	0.40	0.42	0.43	0.45	0.46	0.48	0.49	0.50	0.52
2.75	0.20	0.24	0.28	0.31	0.34	0.37	0.40	0.42	0.44	0.46	0.49	0.51	0.52	0.54	0.56	0.58	0.59	0.61	0.63
3.00	0.24	0.29	0.33	0.37	0.41	0.44	0.47	0.50	0.53	0.55	0.58	0.60	0.62	0.65	0.67	0.69	0.71	0.73	0.75
3.25	0.28	0.34	0.39	0.44	0.48	0.52	0.55	0.59	0.62	0.65	0.68	0.71	0.73	0.76	0.78	0.81	0.83	0.85	0.88
3.50	0.32	0.39	0.45	0.51	0.56	0.60	0.64	0.68	0.72	0.75	0.79	0.82	0.85	0.88	0.91	0.94	0.96	0.99	1.01
3.75	0.37	0.45	0.52	0.58	0.64	0.69	0.74	0.78	0.82	0.86	0.90	0.94	0.97	1.01	1.04	1.07	1.11	1.14	1.17
4.00	0.42	0.51	0.59	0.66	0.73	0.78	0.84	0.89	0.94	0.98	1.03	1.07	1.11	1.15	1.19	1.22	1.26	1.29	1.33
4.25	0.47	0.58	0.67	0.75	0.82	0.89	0.95	1.00	1.06	1.11	1.16	1.21	1.25	1.30	1.34	1.38	1.42	1.46	1.50
4.50	0.53	0.65	0.75	0.84	0.92	0.99	1.06	1.13	1.19	1.24	1.30	1.35	1.40	1.45	1.50	1.55	1.59	1.64	1.68
4.75	0.59	0.72	0.84	0.93	1.02	1.11	1.18	1.25	1.32	1.39	1.45	1.51	1.56	1.62	1.67	1.72	1.77	1.82	1.87
5.00	0.66	0.80	0.93	1.04	1.13	1.23	1.31	1.39	1.46	1.54	1.60	1.67	1.73	1.79	1.85	1.91	1.97	2.02	2.07
5.25	0.72	0.88	1.02	1.14	1.25	1.35	1.44	1.53	1.61	1.69	1.77	1.84	1.91	1.98	2.04	2.11	2.17	2.23	2.28
5.50	0.79	0.97	1.12	1.25	1.37	1.48	1.59	1.68	1.77	1.86	1.94	2.02	2.10	2.17	2.24	2.31	2.38	2.44	2.51
5.75	0.87	1.06	1.23	1.37	1.50	1.62	1.73	1.84	1.94	2.03	2.12	2.21	2.29	2.37	2.45	2.53	2.60	2.67	2.74
6.00	0.94	1.16	1.33	1.49	1.63	1.76	1.89	2.00	2.11	2.21	2.31	2.40	2.50	2.58	2.67	2.75	2.83	2.91	2.98
6.25	1.02	1.25	1.45	1.62	1.77	1.91	2.05	2.17	2.29	2.40	2.51	2.61	2.71	2.80	2.89	2.98	3.07	3.15	3.24
6.50	1.11	1.36	1.57	1.75	1.92	2.07	2.21	2.35	2.48	2.60	2.71	2.82	2.93	3.03	3.13	3.23	3.32	3.41	3.50
6.75	1.19	1.46	1.69	1.89	2.07	2.23	2.39	2.53	2.67	2.80	2.92	3.04	3.16	3.27	3.38	3.48	3.58	3.68	3.77
7.00	1.28	1.57	1.82	2.03	2.22	2.40	2.57	2.72	2.87	3.01	3.14	3.27	3.40	3.52	3.63	3.74	3.85	3.96	4.06
7.25	1.38	1.69	1.95	2.18	2.39	2.58	2.75	2.92	3.08	3.23	3.37	3.51	3.64	3.77	3.90	4.02	4.13	4.24	4.35
7.50	1.47	1.80	2.08	2.33	2.55	2.76	2.95	3.13	3.30	3.46	3.61	3.76	3.90	4.04	4.17	4.30	4.42	4.54	4.66
7.75	1.57	1.93	2.23	2.49	2.73	2.94	3.15	3.34	3.52	3.69	3.85	4.01	4.16	4.31	4.45	4.59	4.72	4.85	4.98
8.00	1.68	2.05	2.37	2.65	2.90	3.14	3.35	3.56	3.75	3.93	4.11	4.28	4.44	4.59	4.74	4.89	5.03	5.17	5.30

DISCHARGE RATES OF CIRCULAR ORIFICE IN CFS

UNDERGROUND OUTLET
RISER DESIGN
Density = .22

Note: For 8"-dia. riser, add 2 additional vertical rows.
For 10"-dia. riser, add 4 additional vertical rows.
For 12"-dia. riser, add 6 additional vertical rows.

Capacity of riser @ 1.00 ft. head must exceed flow through orifice.



Capacity in CFS

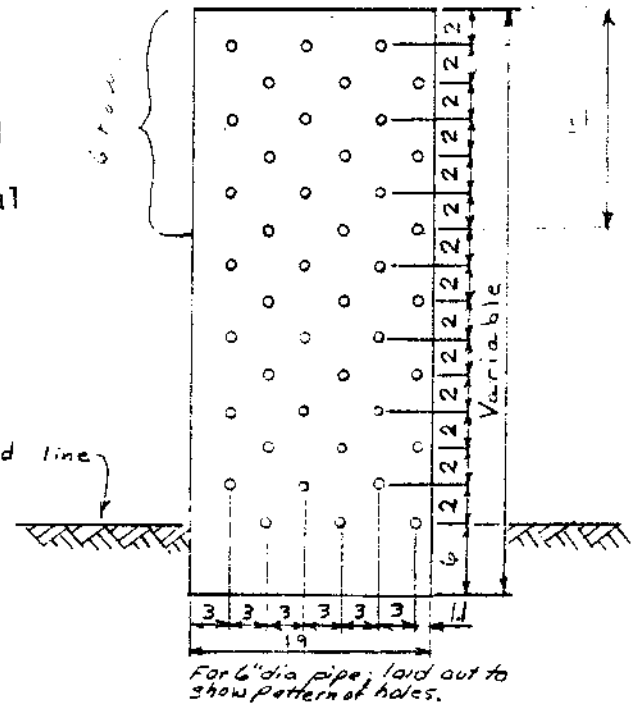
Head Feet	6" dia.	8" dia.	10" dia.	12" dia.
.25	.09	.13	.16	.19
.50	.32	.44	.54	.66
.75	.63	.84	1.03	1.27
1.00	1.00	1.33	1.66	2.00
1.25	1.41	1.89	2.36	2.84
1.50	1.88	2.51	3.13	3.76
1.75	2.38	3.18	3.97	4.77
2.00	2.93	3.91	4.88	5.86
2.25	3.51	4.68	5.85	7.02
2.50	4.12	5.49	6.87	8.24
2.75	4.76	6.35	7.94	9.53
3.00	5.44	7.26	9.07	10.88
3.25				
3.50				
3.75				
4.00				

EXHIBIT 8-8
EFM Notice 24 10/80

UNDERGROUND OUTLET
RISER DESIGN

Note: For 8"-dia. riser, add 2 additional vertical rows.
For 10"-dia. riser, add 4 additional vertical rows.

Capacity of riser @ 1.00 ft. head must exceed flow through orifice.



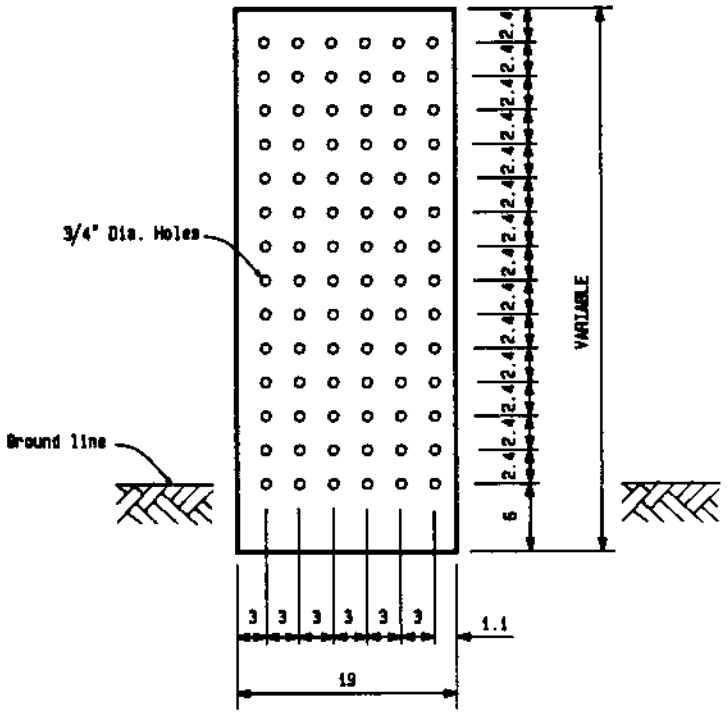
Density .036 Capacity in CFS Density = .06

Head Feet	3/4" dia. holes			1" dia. holes		
	6" dia.	8" dia.	10" dia.	6" dia.	8" dia.	10" dia.
.25	.03	.04	.05	.06	.07	.09
.50	.08	.10	.13	.13	.18	.22
.75	.13	.18	.22	.24	.31	.39
1.00	.20	.26	.33	.35	.47	.59
1.25	.27	.36	.45	.48	.64	.81
1.50	.35	.47	.59	.63	.83	1.05
1.75	.44	.59	.73	.78	1.04	1.31
2.00	.53	.71	.89	.95	1.26	1.58
2.25	.63	.84	1.06	1.13	1.50	1.88
2.50	.74	.98	1.23	1.31	1.74	2.19
2.75	.85	1.13	1.42	1.51	2.01	2.52
3.00	.96	1.28	1.61	1.71	2.28	2.86
3.25	1.08	1.44	1.81	1.93	2.56	3.22
3.50	1.21	1.61	2.09	2.15	2.86	3.59
3.75	1.34	1.78	2.23	2.38	3.16	3.97
4.00	1.47	1.95	2.54	2.61	3.48	4.36

EXHIBIT 8-8
EFM Notice 24 10/80

UNDERGROUND OUTLET
HICKENBOTTOM PREFAB RISER

Capacity of riser @ 1.00 ft. head must exceed flow through orifice.



Example of 8" Dia. pipe laid out to show pattern of holes.

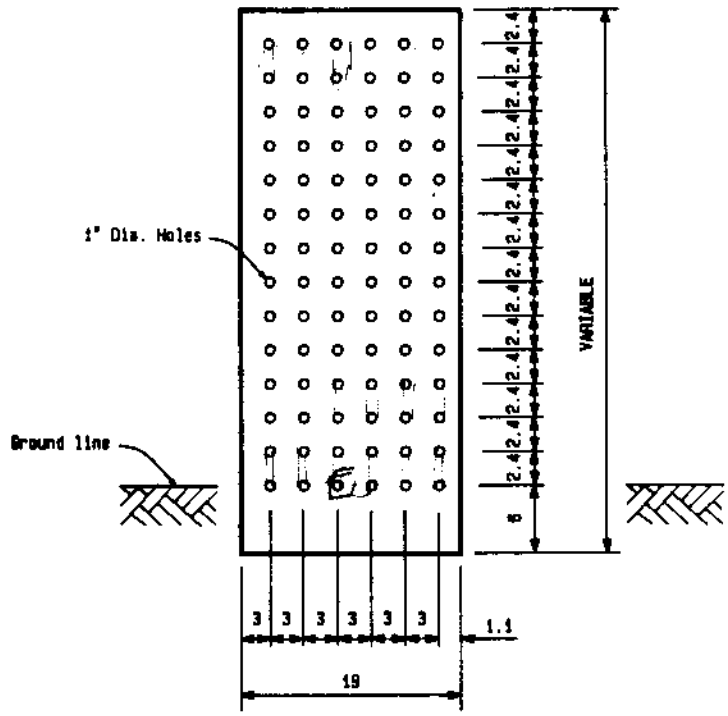
3/4 INCH DIAMETER HOLES
CAPACITY IN CFS

HEAD FEET	6 IN DIAM	8 IN DIAM	10 IN DIAM	12 IN DIAM
0.25	0.06	0.09	0.11	0.13
0.50	0.14	0.19	0.23	0.28
0.75	0.23	0.31	0.38	0.46
1.00	0.33	0.44	0.55	0.66
1.25	0.47	0.62	0.78	0.93
1.50	0.60	0.80	1.00	1.20
1.75	0.74	0.99	1.23	1.48
2.00	0.89	1.19	1.48	1.78
2.25	1.07	1.42	1.78	2.13
2.50	1.24	1.65	2.07	2.48
2.75	1.42	1.89	2.36	2.84
3.00	1.60	2.14	2.67	3.21
3.25	1.81	2.42	3.02	3.63
3.50	2.02	2.69	3.37	4.04
3.75	2.23	2.97	3.71	4.46
4.00	2.44	3.26	4.07	4.89
4.25	2.68	3.58	4.47	5.36
4.50	2.92	3.89	4.86	5.83
4.75	3.15	4.20	5.25	6.30
5.00	3.39	4.52	5.65	6.78
5.25	3.66	4.88	6.10	7.31
5.50	3.92	5.22	6.53	7.83
5.75	4.18	5.57	6.96	8.35
6.00	4.44	5.92	7.40	8.88

EXHIBIT 8-8
EFM Notice 38 6/88

UNDERGROUND OUTLET
HICKENBOTTOM PREFAB RISER

Capacity of riser @ 1.00 ft. head must exceed flow through orifice.



Example of 6" Dia. pipe laid out to show pattern of holes.

1 INCH DIAMETER HOLES
CAPACITY IN CFS

HEAD FEET	6 IN DIAM	8 IN DIAM	10 IN DIAM	12 IN DIAM
0.25	0.11	0.15	0.19	0.23
0.50	0.25	0.33	0.41	0.49
0.75	0.41	0.54	0.68	0.81
1.00	0.59	0.79	0.98	1.18
1.25	0.83	1.11	1.38	1.66
1.50	1.07	1.42	1.78	2.13
1.75	1.32	1.76	2.20	2.63
2.00	1.58	2.11	2.64	3.16
2.25	1.90	2.53	3.16	3.79
2.50	2.20	2.94	3.67	4.41
2.75	2.52	3.36	4.20	5.04
3.00	2.85	3.80	4.75	5.70
3.25	3.22	4.30	5.37	6.45
3.50	3.59	4.79	5.98	7.18
3.75	3.96	5.28	6.60	7.92
4.00	4.34	5.79	7.24	8.69
4.25	4.77	6.36	7.95	9.54
4.50	5.18	6.91	8.64	10.37
4.75	5.60	7.47	9.34	11.21
5.00	6.03	8.04	10.05	12.06
5.25	6.50	8.67	10.84	13.00
5.50	6.96	9.28	11.60	13.92
5.75	7.42	9.90	12.37	14.85
6.00	7.89	10.52	13.16	15.79

EXHIBIT 8-8
EFM Notice 38 6/88