

Street Capacity Calculations

La Orilla Road

56' F-F Street Section with 8" curb

Slope= 0.0344

For water depths less than 0.125 feet

Y= Water depth
 Area = $8 \cdot Y^2$
 P= $\text{SQRT}(257 \cdot Y^2) + Y$
 n= 0.017

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.001	0.170	0.005	0.000	0.001	0.455	0.005	0.801	0.007
0.02	0.003	0.341	0.009	0.002	0.005	0.722	0.014	0.899	0.017
0.04	0.013	0.681	0.019	0.015	0.029	1.146	0.046	1.010	0.041
0.06	0.029	1.022	0.028	0.043	0.086	1.501	0.090	1.080	0.066
0.08	0.051	1.362	0.038	0.093	0.186	1.819	0.146	1.133	0.094
0.1	0.080	1.703	0.047	0.169	0.338	2.111	0.211	1.176	0.124
0.12	0.115	2.044	0.056	0.275	0.549	2.383	0.286	1.212	0.154
0.125	0.125	2.129	0.059	0.306	0.612	2.449	0.306	1.221	0.162

For water depths greater than 0.125 ft but less than 0.405 ft

Y1= Y-0.125
 A2= $A1 + 2 \cdot Y1 + 25 \cdot Y1^2$
 P2= $P1 + \text{SQRT}(2501 \cdot Y1^2)$

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.13	0.136	2.384	0.057	0.325	0.650	2.398	0.312	1.172	0.160
0.16	0.226	3.914	0.058	0.546	1.092	2.419	0.387	1.066	0.174
0.20	0.416	5.955	0.070	1.142	2.285	2.748	0.550	1.083	0.222
0.24	0.686	7.995	0.086	2.162	4.323	3.153	0.757	1.134	0.283
0.28	1.036	10.035	0.103	3.694	7.388	3.567	0.999	1.188	0.351
0.32	1.466	12.076	0.121	5.825	11.649	3.974	1.272	1.238	0.423
0.35	1.793	13.423	0.134	7.598	15.196	4.237	1.468	1.269	0.472
0.39	2.411	15.647	0.154	11.232	22.464	4.659	1.817	1.315	0.556
0.41	2.645	16.412	0.161	12.700	25.399	4.801	1.945	1.330	0.585

For water depths greater than 0.405 ft but less than 0.667 ft

Y2= Y - 0.405
 A3= $A2 + Y2 \cdot 28$
 P3= $P2 + Y2$

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.41	2.785	16.417	0.170	13.837	27.673	4.968	2.037	1.367	0.614
0.44	3.625	16.447	0.220	21.444	42.888	5.916	2.603	1.572	0.782
0.46	4.094	16.463	0.249	26.247	52.494	6.411	2.928	1.672	0.875
0.50	5.305	16.507	0.321	40.354	80.708	7.607	3.803	1.896	1.114
0.55	6.705	16.557	0.405	59.502	119.004	8.874	4.881	2.109	1.388
0.59	7.951	16.601	0.479	78.909	157.818	9.924	5.900	2.268	1.633
0.63	8.945	16.637	0.538	95.890	191.779	10.720	6.754	2.380	1.829
0.67	9.981	16.674	0.599	114.935	229.869	11.515	7.681	2.485	2.034

For water depths greater than 0.667 ft but less than 0.847 ft

Y3= Y - 0.667
 A4= $A3 + 28 \cdot Y3 + 25 \cdot Y3^2$
 P4= $P3 + \text{SQRT}(2501 \cdot Y3^2)$

Capacity of a Double 'A' Storm Drop Inlet

Capacity of the grate:

$$\begin{aligned} L &= 80'' - 2(2'' \text{ ends}) - 14(\tfrac{1}{2}'' \text{ middle bars}) - 6'' \text{ center piece} \\ &= 63'' \\ &= 5.25' \end{aligned}$$

$$\begin{aligned} W &= 25'' - 13(\tfrac{1}{2}'' \text{ middle bars}) \\ &= 18.5'' \\ &= 1.54' \end{aligned}$$

$$\begin{aligned} \text{Area} &= 5.25' \times 1.54' \\ &= 8.09 \text{ ft}^2 \end{aligned}$$

$$\begin{aligned} \text{Effective Area} &= 8.09 - 8.09 (0.5 \text{ clogging factor}) \\ &= 4.04 \text{ ft}^2 \text{ at the grate} \end{aligned}$$

Orifice Equation

$$\begin{aligned} Q &= CA \sqrt{2gH} \\ Q &= 0.6 \times 4.04 \times \sqrt{2 \times 32.2 \times 0.67} \\ Q &= 15.93 \text{ cfs} \end{aligned}$$

Capacity of the Throat:

$$L = 11.00'$$

$$\begin{aligned} H &= 10 \tfrac{3}{4}'' - 4 \tfrac{1}{2}'' \\ &= 6 \tfrac{1}{4}'' \\ &= 0.5208' \end{aligned}$$

$$\begin{aligned} \text{Area} &= 11.0' \times 0.5208' \\ &= 5.73 \text{ ft}^2 \text{ at the throat} \end{aligned}$$

Weir Equation

$$\begin{aligned} Q &= CLH^{(3/2)} \\ Q &= 2.95 \times 5.73 \times 0.67^{(3/2)} \\ Q &= 9.27 \text{ cfs} \end{aligned}$$

Total Capacity:

$$\begin{aligned} Q &= 15.93_{\text{grate}} + 9.27_{\text{throat}} \\ Q &= 25.20 \text{ cfs} \end{aligned}$$

Capacity of a Single 'A' Storm Drop Inlet

Capacity of the grate:

$$\begin{aligned} L &= 40'' - 2(2'' \text{ ends}) - 7(\frac{1}{2}'' \text{ middle bars}) \\ &= 32 \frac{1}{2}'' \\ &= 2.7083' \end{aligned}$$

$$\begin{aligned} W &= 25'' - 13(\frac{1}{2}'' \text{ middle bars}) \\ &= 18.5'' \\ &= 1.54' \end{aligned}$$

$$\begin{aligned} \text{Area} &= 2.7083' \times 1.54' \\ &= 4.18 \text{ ft}^2 \end{aligned}$$

$$\begin{aligned} \text{Effective Area} &= 4.18 - 4.18 (0.5 \text{ clogging factor}) \\ &= 2.09 \text{ ft}^2 \text{ at the grate} \end{aligned}$$

Orifice Equation

$$\begin{aligned} Q &= CA \sqrt{2gH} \\ Q &= 0.6 \times 2.09 \times \sqrt{2 \times 32.2 \times 0.67} \\ Q &= 8.24 \text{ cfs} \end{aligned}$$

Capacity of the Throat:

$$L = 6.50'$$

$$\begin{aligned} H &= 10 \frac{3}{4}'' - 4 \frac{1}{2}'' \\ &= 6 \frac{1}{4}'' \\ &= 0.5208' \end{aligned}$$

$$\begin{aligned} \text{Area} &= 6.50' \times 0.5208' \\ &= 3.39 \text{ ft}^2 \text{ at the throat} \end{aligned}$$

Weir Equation

$$\begin{aligned} Q &= CLH^{(3/2)} \\ Q &= 2.95 \times 3.39 \times 0.67^{(3/2)} \\ Q &= 5.48 \text{ cfs} \end{aligned}$$

Total Capacity:

$$\begin{aligned} Q &= 8.24_{\text{grate}} + 5.48_{\text{throat}} \\ Q &= 13.72 \text{ cfs} \end{aligned}$$