



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

September 5, 2002

Ron Bohannon, PE
Tierra West LLC
8509 Jefferson NE
Albuquerque, NM 87113

**Re: Los Suenos Subdivision Tracts F & G Grading Plan and Drainage Report
Engineer Stamp date 8-6-02 (A11/D4A)**

Dear Mr. Bohannon,

Based on information provided in your submittal dated 8-6-02, the above referenced plan is approved For Preliminary Plat action by the DRB.

If you have any questions, you can contact me at 924-3986.

Sincerely,

Bradley L. Bingham, PE
Sr. Engineer, Planning Dept.
Development and Building Services

C: file

DRAINAGE REPORT

For

**Los Suenos
Subdivision**



Prepared by

Tierra West, LLC
8509 Jefferson NE
Albuquerque, New Mexico 87113

Prepared for

Falcon Ridge, LLC
12512 Modesto Ave NE
Albuquerque, New Mexico 87122

Revised
March 15, 2001
January 29, 2002
July 30, 2002


Ronald R. Bohannon P.E. No. 7868



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Location

The site is located on the northwest corner of McMahon Boulevard and Bandelier. The site is the proposed location of a 199 unit, single-family subdivision. The site is shown on the attached Zone Atlas Map A-11 and contains approximately 40.1 acres. The purpose of this report is to provide the drainage analysis and management plan for the subdivision.

Existing Drainage Conditions

The site is currently undeveloped. There is one existing basin on the site with an undeveloped runoff rate of 50 cfs. This basin sheet flows from west to east across the site. Upland flows currently enter the site at its western property line from two upland basins. The upland basins total approximately 73.6 acres with an undeveloped runoff rate of approximately 95 cfs. These flows currently drain through the site from west to east.

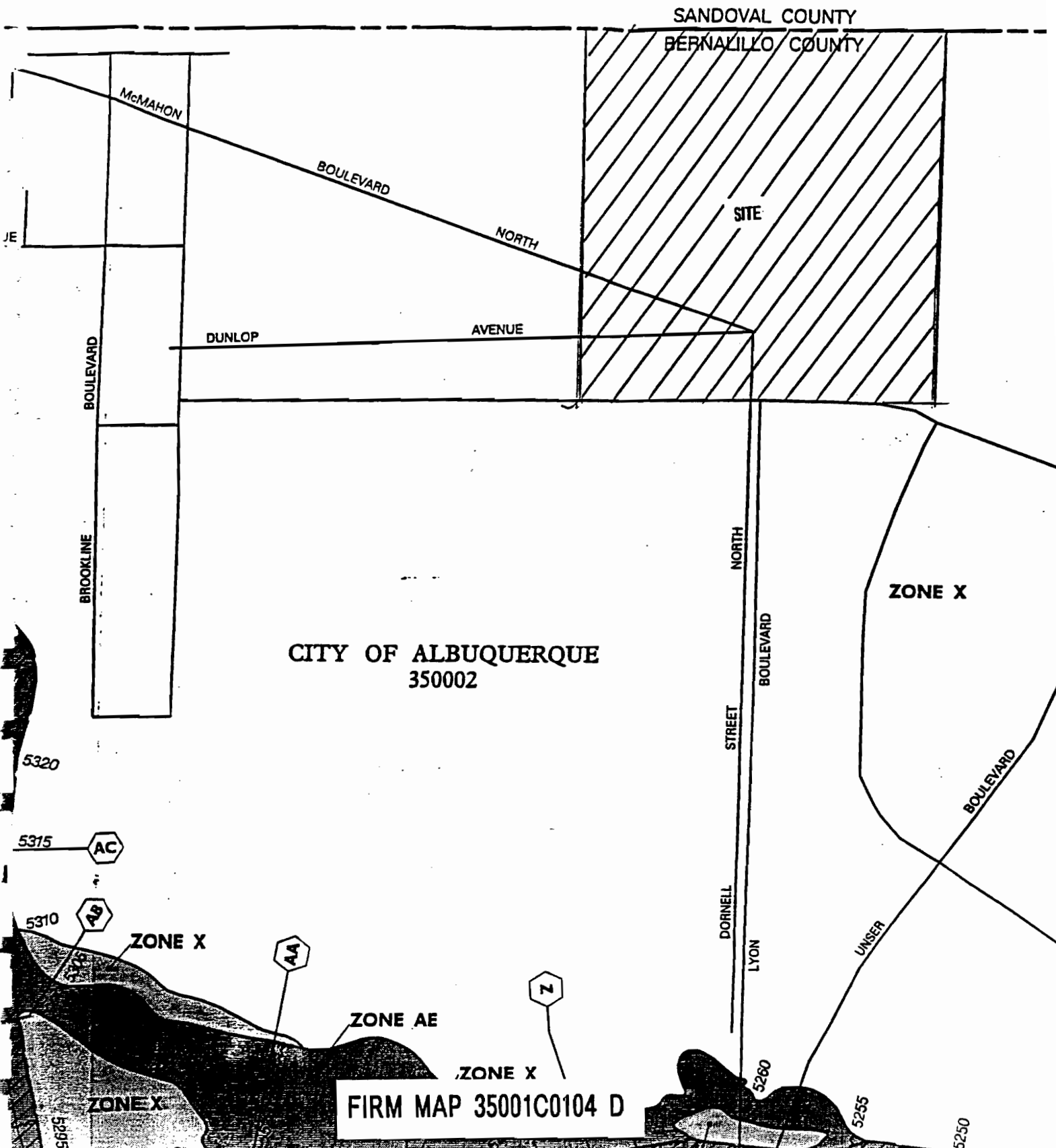
FIRM Map and Soil Conditions

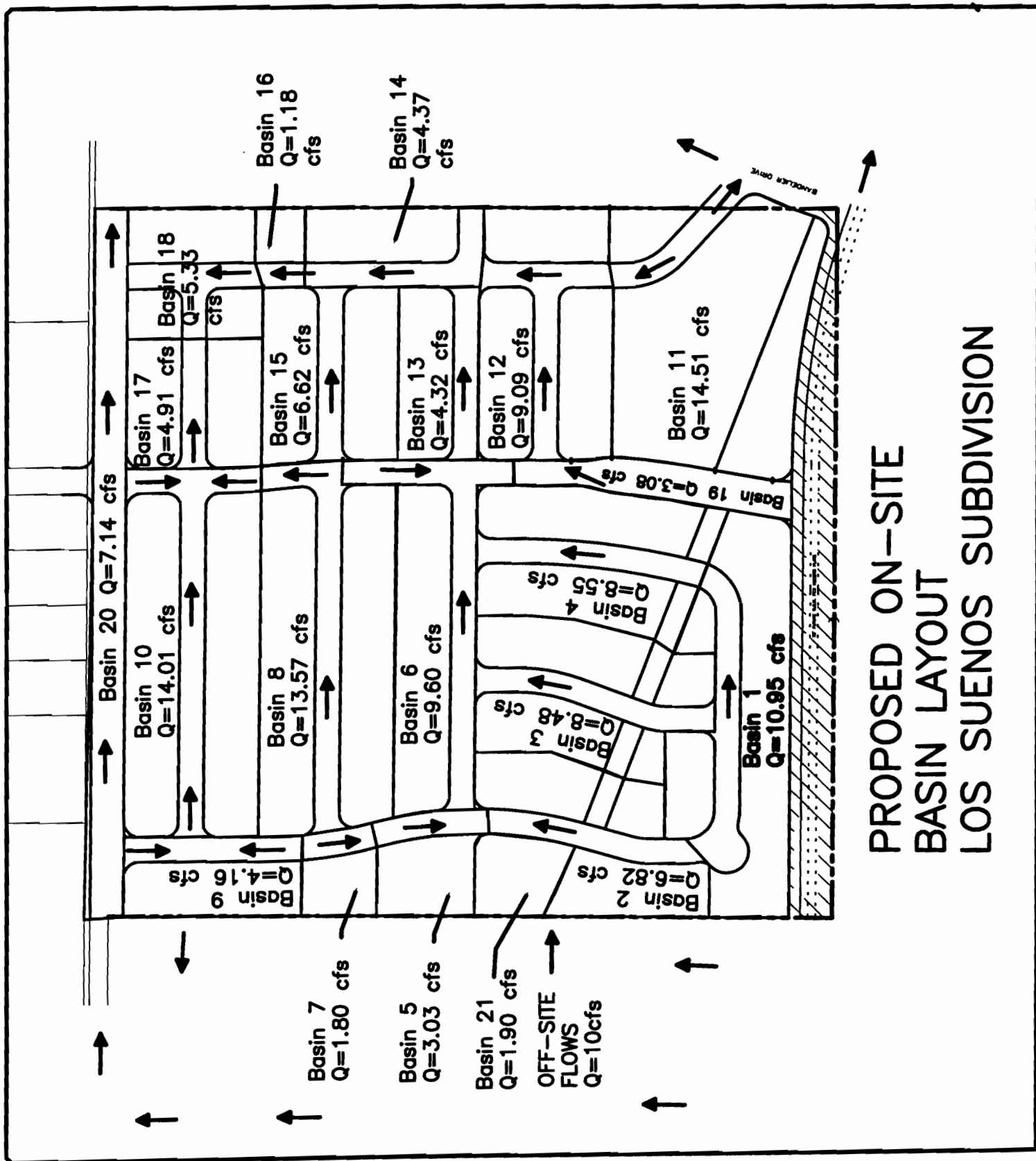
The site is located on FIRM Map 35001C0104 D as shown on the attached excerpt. The map shows that the site does not lie within any 100-year flood plains.

The site contains two soils from the Soil Conservation Service Soil Survey of Bernalillo County. A Bluepoint loamy fine sand and a Madurez loamy fine sand. Both soils have slow runoff, moderate to rapid permeability and the hazard of soil blowing is severe.

On-Site Drainage Management Plan

A temporary detention pond will be constructed at the northeast corner of the Park Hill Subdivision adjacent to the west property line. This pond will intercept the flows from the off-site, undeveloped basins. A maximum flow rate of 10 cfs will enter the site from the cul-de-sac located in the southeast corner of the Park Hill Subdivision. This flow will be conveyed from the west property line to the Desert Dreamer Street in a concrete channel located adjacent to the existing utility corridor.





PROPOSED ON-SITE
BASIN LAYOUT
LOS SUENOS SUBDIVISION

The on-site proposed drainage management plan is to collect the flows from the nineteen on-site basins in the streets. Construction of a storm drain system is required in Night Whisper Road and in Dreamy Way Drive to carry developed flows in excess of the street's capacity. The streets and the storm drain will convey flows to a master storm drain line in Black Arroyo Boulevard which will be constructed under a separate contract. Basin 11 was originally planned and modeled as a commercial area with a small landscaped area in the southwest corner of the basin. This area has since been revised to develop the basin with residential lots. The flow rates indicated in the previous report and in this report conservatively reflect runoff from Basin 11 as if it were to be developed as a commercial site. The runoff reflected in the report is 14.51 cfs for this basin and it will be 11.2 cfs when developed as residential lots.

Flows developed in McMahon Boulevard are programmed to be conveyed east in the proposed McMahon storm drain system, currently being constructed by others. Flows developed in Black Arroyo Boulevard will be contained within its right-of-way and will, along with developed flows from the several subdivisions including Los Suenos Subdivision, be conveyed to the Black Arroyo Dam via the planned master storm drain line. This master storm drain includes a 42" to 48" storm drain will carry the flows from Park Hill in Black Arroyo Boulevard adjacent to Los Suenos Subdivision.

In the interim, while the storm drain in Black Arroyo is being constructed, a temporary retention pond will be constructed in the Black Arroyo R.O.W. at the northeast corner of the site. The pond will be sized to handle the flows from a 2-year storm event. Upon completion of the master storm drain, the pond will be reclaimed and Black Arroyo Road will be constructed to the approved grades.

Master Storm Drain Plan

The above-described system is per the master storm drain plan designed by Bohannon-Houston and approved by the City of Albuquerque. Under this plan, a storm drain is currently being

constructed in Black Arroyo Boulevard that will convey the flows from subdivisions immediately to the south of Black Arroyo to the Black Arroyo Dam

Summary

The site is currently undeveloped. The on-site flows and the flows from the off-site basins to the west will be conveyed in the streets and in an onsite storm drain to the master storm drain designed and approved for Black Arroyo Boulevard. Developed flows from the Los Suenos Subdivision have a maximum flow rate of 144 cfs. These flows combined with the 180 cfs anticipated for the upland properties will be conveyed to the Black Arroyo Dam

Flows from the offsite basins to the west of the site will be detained in a temporary detention pond located within Park Hill Subdivision. Ultimately the developed flows from these upland basins will be routed through a storm drain pipe in Black Arroyo Boulevard. Under interim conditions, developed onsite flows will be retained in a temporary pond located within Black Arroyo R.O.W. which is sized to handle a 2-year storm event.

Los Suenos JN 990072

Revised Grading Plan (Ponds in Basins 18 & 21 Eliminated & Developed with Residential Lots)

Weighted E Method

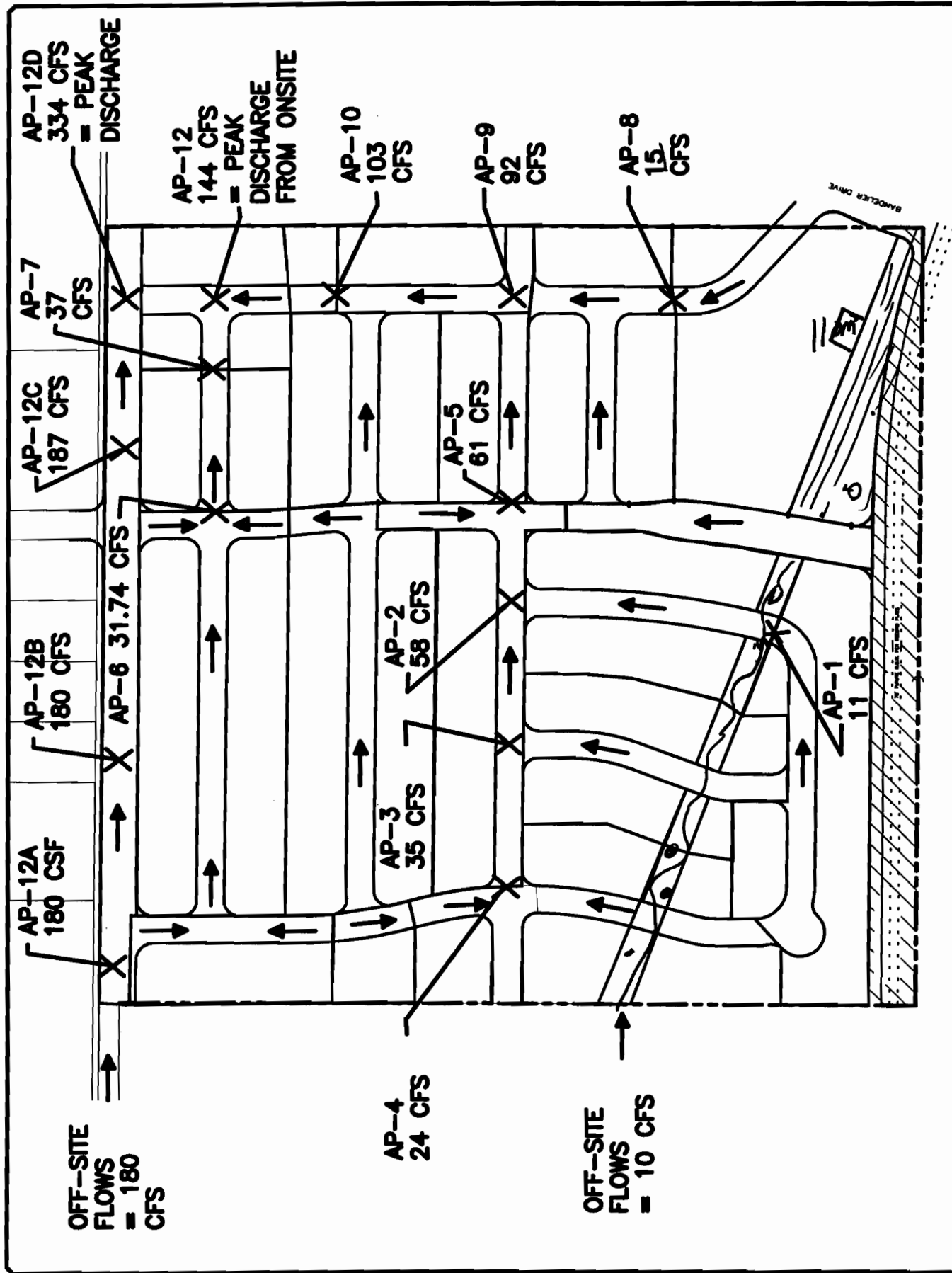
Develeped																			
Basin	Area (sf)	Area (acres)	Area (Sq.Miles)	Treatment A		Treatment B		Treatment C		Treatment D		100-Year				2-Year			
				%	(acres)	%	(acres)	%	(acres)	%	(acres)	Weighted E (ac-ft)	Volume (ac-ft)	Flow 6hr cfs	Volume-10day (ac-ft)	Flow 24hr cfs	Weighted E (ac-ft)	Volume (ac-ft)	Flow cfs
1	129769	2.98	0.004655	0%	0	20%	0.596	15%	0.4469	65%	1.936	1.563	0.388	10.95	0.63	11.03	0.488	0.121	3.50
2	86115	1.98	0.003089	0%	0	20%	0.395	30%	0.5931	50%	0.988	1.416	0.233	6.82	0.35	6.86	0.398	0.066	1.97
3	104695	2.40	0.003755	0%	0	20%	0.481	25%	0.6009	55%	1.322	1.465	0.293	8.48	0.46	8.53	0.428	0.086	2.54
4	105609	2.42	0.003788	0%	0	20%	0.485	25%	0.6061	55%	1.333	1.465	0.296	8.55	0.46	8.60	0.428	0.086	2.56
5	35704	0.82	0.001281	0%	0	20%	0.164	15%	0.1229	65%	0.533	1.563	0.107	3.01	0.17	3.03	0.488	0.033	0.96
6	104860	2.41	0.003761	0%	0	10%	0.241	10%	0.2407	80%	1.926	1.742	0.349	9.60	0.59	9.67	0.589	0.118	3.38
7	21816	0.50	0.000783	0%	0	20%	0.100	20%	0.1002	60%	0.260	1.514	0.063	1.80	0.10	1.82	0.458	0.019	0.56
8	164090	3.77	0.005886	0%	0	20%	0.753	20%	0.7534	60%	2.360	1.514	0.475	13.57	0.75	13.66	0.458	0.144	4.20
9	50248	1.15	0.001802	0%	0	20%	0.231	20%	0.2307	60%	0.692	1.514	0.146	4.16	0.23	4.18	0.458	0.044	1.29
10	169458	3.89	0.006078	0%	0	20%	0.778	20%	0.778	60%	2.334	1.514	0.491	14.01	0.78	14.10	0.458	0.148	4.34
11	172340	3.96	0.006182	0%	0	30%	1.187	0%	0	70%	2.769	1.580	0.521	14.51	0.86	14.62	0.507	0.167	4.72
12	113574	2.61	0.004074	0%	0	25%	0.652	20%	0.5215	55%	1.434	1.449	0.315	9.09	0.49	9.14	0.423	0.092	2.69
13	47194	1.08	0.001693	0%	0	10%	0.108	10%	0.1083	80%	0.867	1.742	0.157	4.32	0.26	4.35	0.589	0.053	1.52
14	47800	1.10	0.001715	0%	0	10%	0.110	10%	0.1097	80%	0.878	1.742	0.159	4.37	0.27	4.41	0.589	0.054	1.54
15	80063	1.84	0.002872	0%	0	20%	0.368	20%	0.3676	60%	1.103	1.514	0.232	6.62	0.37	6.66	0.458	0.070	2.05
16	12940	0.30	0.000464	0%	0	10%	0.030	10%	0.0297	80%	0.238	1.742	0.043	1.18	0.07	1.19	0.589	0.015	0.42
17	59340	1.36	0.002129	0%	0	20%	0.272	20%	0.2725	60%	0.817	1.514	0.172	4.91	0.27	4.94	0.458	0.052	1.52
18	58228	1.34	0.002089	0%	0	10%	0.134	10%	0.1337	80%	1.069	1.742	0.194	5.33	0.33	5.37	0.589	0.066	1.88
19	31748	0.73	0.001139	0%	0	0%	0.000	10%	0.0729	90%	0.656	1.872	0.114	3.08	0.19	3.10	0.660	0.040	1.14
20	82227	1.89	0.002949	0%	0	10%	0.189	10%	0.1888	80%	1.510	1.742	0.274	7.52	0.46	7.58	0.589	0.093	2.65
21	22982	0.53	0.000824	0%	0	20%	0.106	20%	0.1055	60%	0.317	1.514	0.067	1.90	0.11	1.91	0.458	0.020	0.59
TOTALS				39.04 ACRES								5.089 AC-FT	143.79 CFS	8.187 AC-FT	144.76 CFS		1.587 AC-FT	46.01 CFS	

Street Capacity Summary

Under Ultimate Conditions W/ 12.0 cfs Offsite Flows

Analysis Point	Street	Street Slope (%)	Street Width (ft)	Curb Height (inches)	Basins Contributing to Street	Flow (cfs)	Street Capacity (cfs)	Storm Drain Pipe Diameter (inches)	Pipe Slope %	Pipe Capacity (cfs)	Remaining System Capacity (cfs)
AP-1	Sleepy Nights	2.29	28	4	1	11	19				8
AP-2	Night Whisper	1.08	28	8	1,2,3,4,5,7,21,Part 6(1/3)	58	65				7
AP-3	Night Whisper	4.00	28	8	3,2,5,7,21,Part 6(2/3)	35	39				4
AP-4	Night Whisper	4.00	28	4	2,5,7,21	24	39				16
AP-5	Night Whisper	1.08	28	8	1,2,3,4,5,6,7,21	61	65				4
AP-6	Night Shadow	3.57	28	8	8,9,10	32	42				10
AP-7	Night Shadow	2.19	28	8	8,9,10,17	37	53				17
AP-8	Dreamy Way	2.82	28	8	11	15	47				32
AP-9	Dreamy Way	0.60	28	8	1,2,3,4,5,6,7,21,11,19,12,13	92	48	36	0.6	52	8
AP-10	Dreamy Way	0.60	28	8	1,2,3,4,5,6,7,21,11,19,12,13,14,15	103	48	42	0.6	78	23
AP-12	Dreamy Way	0.60	28	8	1,2,3,4,5,6,7,21,11,19,12,13,14,15,18	144	48	48	1.63	184	40
AP-12A	Westside Blvd	3.50	40	8	Upland basins	180	49	42	3.6	191	11
AP-12B	Westside Blvd	3.41	40	8	Upland basins + Part of 20	180	57	42	3.6	191	11
AP-12C	Westside Blvd	2.01	40	8	Upland basins + Part of 20	187	76	48	2.81	241	54
AP-12D	Westside Blvd	0.68	40	8	Upland + Entire Site	334	48	66	0.98	334	0

* Note: - Storm sewer to be constructed to carry excess flows to detention pond.



ANALYSIS POINTS

STORM DROP INLET-EFFECTIVE AREA Double 'C'

Area at the grate:

$$\begin{aligned} L &= 88.75'' - 2(6'' \text{ ends}) - 6'' \text{ center piece} - 14(\frac{1}{2}'' \text{ middle bars}) \\ &= 63.75'' \\ &= 5.3125' \end{aligned}$$

$$\begin{aligned} W &= 25.5'' - 13(\frac{1}{2}'' \text{ middle bars}) \\ &= 19'' \\ &= 1.583' \end{aligned}$$

$$\begin{aligned} \text{Area} &= 1.583' \times 5.3125' \\ &= 8.41 \text{ ft}^2 \end{aligned}$$

$$\begin{aligned} \text{Effective Area} &= 8.41 - 8.41 (0.5 \text{ clogging factor}) \\ &= 4.21 \text{ ft}^2 \text{ at the grate} \end{aligned}$$

Area at the throat:

$$\begin{aligned} L &= 88-\frac{3}{4}'' \\ &= 7.3958' \end{aligned}$$

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

$$\begin{aligned} \text{Area} &= 7.3958' \times 0.5208' \\ &= 3.85 \text{ ft}^2 \text{ at the throat} \end{aligned}$$

Total Area:

$$\begin{aligned} \text{Area} &= 4.21_{\text{grate}} + 3.85_{\text{throat}} \\ &= 8.06 \text{ ft}^2 \end{aligned}$$

DROP INLET CALCULATIONS

Basin	TYPE OF INLET	AREA (SF)	Q (CFS)	H (FT)	H ALLOW (FT)
AP-9 ₁₂	Double 'C'	8.06	24.41	0.3956	0.67
	Double 'C'	8.06	24.41	0.3956	0.67

ORIFICE EQUATION

$$Q = CA \sqrt{2gH}$$

$$C = 0.6$$

$$g = 32.2$$

Street Capacity Calculations - AP1

Sleepy Nights /Sandman

28' F-F Street Section with 4" curb

Slope= 2.29%

For water depths less than 0.0625 feet

Y= Water depth

Area = $16 \cdot Y^2$

P= $\text{SQRT}(1025 \cdot Y^2) + Y$

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)
0.010	0.002	0.33	0.00	0.00	0.00	0.38	0.00	0.67	0.0057
0.020	0.006	0.66	0.01	0.00	0.01	0.60	0.01	0.75	0.0134
0.025	0.010	0.83	0.01	0.01	0.01	0.70	0.02	0.78	0.0177
0.035	0.020	1.16	0.02	0.02	0.03	0.87	0.03	0.82	0.0268
0.045	0.032	1.49	0.02	0.03	0.07	1.03	0.05	0.86	0.0365
0.052	0.043	1.72	0.03	0.05	0.10	1.14	0.06	0.88	0.0437
0.060	0.058	1.98	0.03	0.07	0.14	1.25	0.08	0.90	0.0520
0.063	0.063	2.06	0.03	0.08	0.16	1.29	0.08	0.91	0.0547

For water depths greater than 0.0625 ft but less than 0.3025 ft

Y1= Y-0.0625

A2= $A1 + 2 \cdot Y1 + 25 \cdot Y1^2$

P2= $P1 + \text{SQRT}(2501 \cdot Y1^2) + Y1$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.063	0.064	2.09	0.03	0.08	0.16	1.29	0.08	0.90	0.0550
0.100	0.173	3.98	0.04	0.28	0.56	1.63	0.16	0.91	0.0882
0.130	0.311	5.51	0.06	0.61	1.21	1.95	0.25	0.95	0.1218
0.160	0.495	7.04	0.07	1.12	2.23	2.25	0.36	0.99	0.1586
0.200	0.810	9.08	0.09	2.14	4.28	2.64	0.53	1.04	0.2110
0.230	1.099	10.61	0.10	3.21	6.41	2.92	0.67	1.07	0.2522
0.271	1.562	12.68	0.12	5.11	10.23	3.27	0.89	1.11	0.3103
0.303	1.983	14.31	0.14	7.02	14.05	3.54	1.07	1.14	0.3573

For water depths greater than 0.3025 ft but less than 0.333 ft

Y2= Y - 0.3025

A3= $A2 + Y2^2 \cdot 14$

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)
0.303	1.990	14.31	0.14	7.06	14.13	3.55	1.08	1.14	0.3586
0.304	2.002	14.31	0.14	7.14	14.28	3.57	1.08	1.14	0.3609
0.306	2.034	14.31	0.14	7.33	14.66	3.60	1.10	1.15	0.3669
0.310	2.088	14.31	0.15	7.65	15.30	3.67	1.14	1.16	0.3767
0.313	2.123	14.32	0.15	7.86	15.73	3.71	1.16	1.17	0.3831
0.320	2.228	14.32	0.16	8.52	17.04	3.83	1.22	1.19	0.4025
0.332	2.391	14.34	0.17	9.59	19.17	4.01	1.33	1.23	0.4329
0.333	2.410	14.34	0.17	9.71	19.41	4.03	1.34	1.23	0.4363

For water depths greater than 0.333 ft but less than 0.513 ft

Y3= Y - 0.333

A4= $A3 + 14 \cdot Y3 + 25 \cdot Y3^2$

P4= $P3 + \text{SQRT}(2501 \cdot Y3^2)$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.335	2.438	14.44	0.17	9.85	19.70	4.04	1.35	1.23	0.4390
0.360	2.807	15.69	0.18	11.79	23.58	4.20	1.51	1.23	0.4733
0.380	3.123	16.69	0.19	13.51	27.03	4.33	1.64	1.24	0.5015
0.420	3.809	18.67	0.20	17.47	34.93	4.58	1.92	1.25	0.5595
0.460	4.597	20.70	0.22	22.30	44.59	4.85	2.23	1.26	0.6217
0.504	5.535	22.89	0.24	28.42	56.83	5.13	2.59	1.27	0.6907
0.513	5.740	23.34	0.25	29.80	59.60	5.19	2.66	1.28	0.7052

Street Capacity Calculations - AP2

Sandman/Night Whisper
28' F-F Street Section with 8" curb
Slope= 1.08%

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	0.00	0.17	0.00	0.00	0.00	0.25	0.00	0.45	0.003
0.02	0.00	0.34	0.01	0.00	0.00	0.40	0.01	0.50	0.007
0.04	0.01	0.68	0.02	0.01	0.02	0.64	0.03	0.57	0.018
0.06	0.03	1.02	0.03	0.02	0.05	0.84	0.05	0.61	0.029
0.08	0.05	1.36	0.04	0.05	0.10	1.02	0.08	0.63	0.042
0.1	0.08	1.70	0.05	0.09	0.19	1.18	0.12	0.66	0.056
0.12	0.12	2.04	0.06	0.15	0.31	1.34	0.16	0.68	0.070
0.125	0.13	2.13	0.06	0.17	0.34	1.37	0.17	0.68	0.074

For water depths greater than 0.125 ft but less than 0.365 ft

Y1= Y-0.125

A2= $A1 + 2 \cdot Y1 + 25 \cdot Y1^2$

P2= $P1 + \text{SQRT}(2501 \cdot Y1^2) + Y1$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.130	0.14	2.38	0.06	0.18	0.36	1.34	0.17	0.66	0.072
0.160	0.23	3.91	0.06	0.31	0.61	1.36	0.22	0.60	0.077
0.200	0.42	5.95	0.07	0.64	1.28	1.54	0.31	0.61	0.099
0.240	0.69	8.00	0.09	1.21	2.42	1.77	0.42	0.64	0.127
0.285	1.08	10.27	0.11	2.19	4.38	2.03	0.58	0.67	0.162
0.320	1.47	12.08	0.12	3.26	6.53	2.23	0.71	0.69	0.192
0.355	1.91	13.87	0.14	4.62	9.25	2.42	0.86	0.72	0.224
0.365	2.05	14.37	0.14	5.06	10.13	2.48	0.90	0.72	0.233

For water depths greater than 0.365 ft but less than 0.667 ft

Y2= Y - 0.365

A3= $A2 + Y2^2$

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)
0.370	2.12	14.38	0.15	5.35	10.71	2.53	0.94	0.73	0.241
0.400	2.54	14.41	0.18	7.23	14.46	2.85	1.14	0.79	0.292
0.442	3.12	14.45	0.22	10.22	20.44	3.27	1.45	0.87	0.364
0.500	3.94	14.51	0.27	14.98	29.96	3.81	1.90	0.95	0.466
0.540	4.50	14.55	0.31	18.66	37.33	4.15	2.24	1.00	0.537
0.558	4.75	14.56	0.33	20.46	40.93	4.31	2.40	1.02	0.570
0.565	4.85	14.57	0.33	21.12	42.25	4.36	2.46	1.02	0.582
0.667	6.27	14.67	0.43	32.34	64.68	5.16	3.44	1.11	0.768

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

Y3= Y - 0.667

A4= $A3 + 14 \cdot Y3 + 25 \cdot Y3^2$

P4= $P3 + \text{SQRT}(2501 \cdot Y3^2)$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.7	6.76	16.32	0.41	34.14	68.27	5.05	3.53	1.06	0.759
0.72	7.09	17.32	0.41	35.46	70.93	5.01	3.60	1.04	0.758
0.74	7.43	18.32	0.41	36.96	73.92	4.98	3.68	1.02	0.759
0.76	7.79	19.32	0.40	38.63	77.25	4.96	3.77	1.00	0.762
0.78	8.17	20.32	0.40	40.46	80.92	4.95	3.86	0.99	0.767
0.8	8.58	21.32	0.40	42.46	84.91	4.95	3.96	0.98	0.774
0.847	9.60	23.68	0.41	47.80	95.60	4.98	4.22	0.95	0.794
0.513	3.3301	9.00	0.37	15.59	31.18	4.68	2.40	1.15	0.6176

Street Capacity Calculations - AP3

Dream Weaver/Night Whisper
28' F-F Street Section with 8" curb
Slope= 4.00%

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	0.00	0.17	0.00	0.00	0.00	0.49	0.00	0.85	0.008
0.02	0.00	0.34	0.01	0.00	0.00	0.78	0.02	0.97	0.019
0.04	0.01	0.68	0.02	0.02	0.03	1.24	0.05	1.09	0.045
0.06	0.03	1.02	0.03	0.05	0.09	1.62	0.10	1.16	0.073
0.08	0.05	1.36	0.04	0.10	0.20	1.96	0.16	1.22	0.104
0.1	0.08	1.70	0.05	0.18	0.36	2.28	0.23	1.27	0.136
0.12	0.12	2.04	0.06	0.30	0.59	2.57	0.31	1.31	0.170
0.125	0.13	2.13	0.06	0.33	0.66	2.64	0.33	1.32	0.178

For water depths greater than 0.125 ft but less than 0.365 ft

Y1= Y - 0.125

A2= $A1 + 2 \cdot Y1 + 25 \cdot Y1^2$

P2= $P1 + \text{SQRT}(2501 \cdot Y1^2) + Y1$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.130	0.14	2.38	0.06	0.35	0.70	2.59	0.34	1.26	0.176
0.160	0.23	3.91	0.06	0.59	1.18	2.61	0.42	1.15	0.192
0.200	0.42	5.95	0.07	1.23	2.46	2.96	0.59	1.17	0.245
0.240	0.69	8.00	0.09	2.33	4.66	3.40	0.82	1.22	0.312
0.285	1.08	10.27	0.11	4.21	8.43	3.90	1.11	1.29	0.395
0.320	1.47	12.08	0.12	6.28	12.56	4.29	1.37	1.34	0.465
0.355	1.91	13.87	0.14	8.90	17.79	4.66	1.66	1.38	0.537
0.365	2.05	14.37	0.14	9.74	19.49	4.77	1.74	1.39	0.558

For water depths greater than 0.365 ft but less than 0.667 ft

Y2= Y - 0.365

A3= $A2 + Y2^2 \cdot 14$

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)
0.370	2.12	14.38	0.15	10.30	20.61	4.87	1.80	1.41	0.576
0.400	2.54	14.41	0.18	13.92	27.83	5.49	2.20	1.53	0.688
0.442	3.12	14.45	0.22	19.66	39.33	6.30	2.78	1.67	0.845
0.500	3.94	14.51	0.27	28.83	57.65	7.33	3.66	1.83	1.065
0.540	4.50	14.55	0.31	35.92	71.84	7.99	4.31	1.92	1.218
0.558	4.75	14.56	0.33	39.38	78.76	8.29	4.63	1.95	1.289
0.565	4.85	14.57	0.33	40.65	81.31	8.39	4.74	1.97	1.315
0.667	6.27	14.67	0.43	62.24	124.47	9.92	6.62	2.14	1.713

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

Y3= Y - 0.667

A4= $A3 + 14 \cdot Y3 + 25 \cdot Y3^2$

P4= $P3 + \text{SQRT}(2501 \cdot Y3^2)$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.7	6.76	16.32	0.41	65.70	131.39	9.72	6.80	2.05	1.706
0.72	7.09	17.32	0.41	68.25	136.50	9.63	6.94	2.00	1.709
0.74	7.43	18.32	0.41	71.13	142.26	9.58	7.09	1.96	1.716
0.76	7.79	19.32	0.40	74.34	148.68	9.54	7.25	1.93	1.728
0.78	8.17	20.32	0.40	77.86	155.73	9.53	7.43	1.90	1.743
0.8	8.58	21.32	0.40	81.71	163.41	9.53	7.62	1.88	1.761
0.847	9.60	23.68	0.41	91.99	183.98	9.58	8.11	1.83	1.814
0.513	3.330	9.00	0.37	30.00	60.00	9.01	4.62	2.22	1.3720

Street Capacity Calculations - AP4

Desert Dreamer/Night Whisper

28' F-F Street Section with 4" curb

Slope= 4.00%

For water depths less than 0.0625 feet

$$Y = \text{Water depth}$$

$$\text{Area} = 16 \cdot Y^2$$

$$P = \text{SQRT}(1025 \cdot Y^2) + Y$$

$$n = 0.017$$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.010	0.002	0.33	0.00	0.00	0.00	0.50	0.01	0.88	0.0084
0.020	0.006	0.66	0.01	0.01	0.01	0.79	0.02	0.99	0.0197
0.025	0.010	0.83	0.01	0.01	0.02	0.92	0.02	1.03	0.0259
0.035	0.020	1.16	0.02	0.02	0.05	1.15	0.04	1.09	0.0391
0.045	0.032	1.49	0.02	0.04	0.09	1.36	0.06	1.13	0.0531
0.052	0.043	1.72	0.03	0.07	0.13	1.50	0.08	1.16	0.0633
0.060	0.058	1.98	0.03	0.10	0.19	1.65	0.10	1.19	0.0753
0.063	0.063	2.06	0.03	0.11	0.21	1.70	0.11	1.20	0.0791

For water depths greater than 0.0625 ft but less than 0.3025 ft

$$Y1 = Y - 0.0625$$

$$A2 = A1 + 2 \cdot Y1 + 25 \cdot Y1^2$$

$$P2 = P1 + \text{SQRT}(2501 \cdot Y1^2) + Y1$$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.063	0.064	2.09	0.03	0.11	0.22	1.70	0.11	1.20	0.0796
0.100	0.173	3.98	0.04	0.37	0.75	2.16	0.22	1.20	0.1274
0.130	0.311	5.51	0.06	0.80	1.60	2.58	0.33	1.26	0.1754
0.160	0.495	7.04	0.07	1.48	2.95	2.98	0.48	1.31	0.2276
0.200	0.810	9.08	0.09	2.83	5.66	3.49	0.70	1.38	0.3018
0.230	1.099	10.61	0.10	4.24	8.48	3.86	0.89	1.42	0.3600
0.271	1.562	12.68	0.12	6.76	13.52	4.33	1.17	1.47	0.4419
0.303	1.983	14.31	0.14	9.28	18.56	4.68	1.42	1.50	0.5081

For water depths greater than 0.3025 ft but less than 0.333 ft

$$Y2 = Y - 0.3025$$

$$A3 = A2 + Y2 \cdot 14$$

$$P3 = P2 + Y2$$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.303	1.990	14.31	0.14	9.34	18.67	4.69	1.42	1.50	0.5098
0.304	2.002	14.31	0.14	9.43	18.87	4.71	1.43	1.51	0.5130
0.306	2.034	14.31	0.14	9.69	19.37	4.76	1.46	1.52	0.5212
0.310	2.088	14.31	0.15	10.11	20.22	4.84	1.50	1.53	0.5348
0.313	2.123	14.32	0.15	10.39	20.79	4.90	1.53	1.54	0.5437
0.320	2.228	14.32	0.16	11.26	22.52	5.06	1.62	1.57	0.5705
0.332	2.391	14.34	0.17	12.67	25.34	5.30	1.76	1.62	0.6124
0.333	2.410	14.34	0.17	12.83	25.66	5.32	1.77	1.63	0.6171

For water depths greater than 0.333 ft but less than 0.513 ft

$$Y3 = Y - 0.333$$

$$A4 = A3 + 14 \cdot Y3 + 25 \cdot Y3^2$$

$$P4 = P3 + \text{SQRT}(2501 \cdot Y3^2)$$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.335	2.438	14.44	0.17	13.02	26.04	5.34	1.79	1.63	0.6209
0.360	2.807	15.69	0.18	15.58	31.16	5.55	2.00	1.63	0.6694
0.380	3.123	16.69	0.19	17.86	35.72	5.72	2.17	1.64	0.7090
0.420	3.809	18.67	0.20	23.08	46.17	6.06	2.54	1.65	0.7907
0.460	4.597	20.70	0.22	29.47	58.94	6.41	2.95	1.67	0.8779

Street Capacity Calculations - AP5

Sweet Dreams/Night Whisper
28' F-F Street Section with 8" curb
Slope= 1.08%

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	0.00	0.17	0.00	0.00	0.00	0.25	0.00	0.45	0.003
0.02	0.00	0.34	0.01	0.00	0.00	0.40	0.01	0.50	0.007
0.04	0.01	0.68	0.02	0.01	0.02	0.64	0.03	0.57	0.018
0.06	0.03	1.02	0.03	0.02	0.05	0.84	0.05	0.61	0.029
0.08	0.05	1.36	0.04	0.05	0.10	1.02	0.08	0.63	0.042
0.1	0.08	1.70	0.05	0.09	0.19	1.18	0.12	0.66	0.056
0.12	0.12	2.04	0.06	0.15	0.31	1.34	0.16	0.68	0.070
0.125	0.13	2.13	0.06	0.17	0.34	1.37	0.17	0.68	0.074

For water depths greater than 0.125 ft but less than 0.365 ft

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

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.130	0.14	2.38	0.06	0.18	0.36	1.34	0.17	0.66	0.072
0.160	0.23	3.91	0.06	0.31	0.61	1.36	0.22	0.60	0.077
0.200	0.42	5.95	0.07	0.64	1.28	1.54	0.31	0.61	0.099
0.240	0.69	8.00	0.09	1.21	2.42	1.77	0.42	0.64	0.127
0.285	1.08	10.27	0.11	2.19	4.38	2.03	0.58	0.67	0.162
0.320	1.47	12.08	0.12	3.26	6.53	2.23	0.71	0.69	0.192
0.355	1.91	13.87	0.14	4.62	9.25	2.42	0.86	0.72	0.224
0.365	2.05	14.37	0.14	5.06	10.13	2.48	0.90	0.72	0.233

For water depths greater than 0.365 ft but less than 0.667 ft

Y2= Y - 0.365
A3= $A2 + Y2^2 \cdot 14$
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)
0.370	2.12	14.38	0.15	5.35	10.71	2.53	0.94	0.73	0.241
0.400	2.54	14.41	0.18	7.23	14.46	2.85	1.14	0.79	0.292
0.442	3.12	14.45	0.22	10.22	20.44	3.27	1.45	0.87	0.364
0.500	3.94	14.51	0.27	14.98	29.96	3.81	1.90	0.95	0.466
0.540	4.50	14.55	0.31	18.66	37.33	4.15	2.24	1.00	0.537
0.558	4.75	14.56	0.33	20.46	40.93	4.31	2.40	1.02	0.570
0.565	4.85	14.57	0.33	21.12	42.25	4.36	2.46	1.02	0.582
0.667	6.27	14.67	0.43	32.34	64.68	5.16	3.44	1.11	0.768

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

Y3= Y - 0.667
A4= $A3 + 14 \cdot Y3 + 25 \cdot Y3^2$
P4= $P3 + \text{SQRT}(2501 \cdot Y3^2)$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.7	6.76	16.32	0.41	34.14	68.27	5.05	3.53	1.06	0.759
0.72	7.09	17.32	0.41	35.46	70.93	5.01	3.60	1.04	0.758
0.74	7.43	18.32	0.41	36.96	73.92	4.98	3.68	1.02	0.759
0.76	7.79	19.32	0.40	38.63	77.25	4.96	3.77	1.00	0.762
0.78	8.17	20.32	0.40	40.46	80.92	4.95	3.86	0.99	0.767
0.8	8.58	21.32	0.40	42.46	84.91	4.95	3.96	0.98	0.774
0.847	9.60	23.68	0.41	47.80	95.60	4.98	4.22	0.95	0.794
0.513	3.330	9.00	0.37	15.59	31.18	4.68	2.40	1.15	0.6176

Street Capacity Calculations - AP6 Night Shadow/Sweet Dreams

28' F-F Street Section with 8" curb

Slope= 3.57%

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	0.00	0.17	0.00	0.00	0.00	0.46	0.00	0.82	0.008
0.02	0.00	0.34	0.01	0.00	0.00	0.74	0.01	0.92	0.018
0.04	0.01	0.68	0.02	0.01	0.03	1.17	0.05	1.03	0.042
0.06	0.03	1.02	0.03	0.04	0.09	1.53	0.09	1.10	0.068
0.08	0.05	1.36	0.04	0.09	0.19	1.85	0.15	1.15	0.097
0.1	0.08	1.70	0.05	0.17	0.34	2.15	0.22	1.20	0.127
0.12	0.12	2.04	0.06	0.28	0.56	2.43	0.29	1.24	0.158
0.125	0.13	2.13	0.06	0.31	0.62	2.50	0.31	1.24	0.166

For water depths greater than 0.125 ft but less than 0.365 ft

Y1= Y - 0.125

A2= $A1 + 2 \cdot Y1 + 25 \cdot Y1^2$

P2= $P1 + \text{SQRT}(2501 \cdot Y1^2) + Y1$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.130	0.14	2.38	0.06	0.33	0.66	2.44	0.32	1.19	0.164
0.160	0.23	3.91	0.06	0.56	1.11	2.46	0.39	1.09	0.178
0.200	0.42	5.95	0.07	1.16	2.33	2.80	0.56	1.10	0.228
0.240	0.69	8.00	0.09	2.20	4.40	3.21	0.77	1.16	0.290
0.285	1.08	10.27	0.11	3.98	7.96	3.68	1.05	1.22	0.367
0.320	1.47	12.08	0.12	5.93	11.87	4.05	1.30	1.26	0.433
0.355	1.91	13.87	0.14	8.41	16.81	4.40	1.56	1.30	0.500
0.365	2.05	14.37	0.14	9.21	18.41	4.50	1.64	1.31	0.519

For water depths greater than 0.365 ft but less than 0.667 ft

Y2= Y - 0.365

A3= $A2 + Y2^2 \cdot 14$

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)
0.370	2.12	14.38	0.15	9.73	19.47	4.60	1.70	1.33	0.537
0.400	2.54	14.41	0.18	13.15	26.29	5.19	2.07	1.45	0.642
0.458	3.35	14.46	0.23	20.84	41.67	6.23	2.85	1.62	0.846
0.500	3.94	14.51	0.27	27.23	54.47	6.92	3.46	1.72	0.995
0.540	4.50	14.55	0.31	33.93	67.87	7.55	4.08	1.81	1.139
0.558	4.75	14.56	0.33	37.20	74.41	7.83	4.37	1.85	1.205
0.565	4.85	14.57	0.33	38.41	76.81	7.93	4.48	1.86	1.229
0.667	6.27	14.67	0.43	58.80	117.59	9.37	6.25	2.02	1.603

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

Y3= Y - 0.667

A4= $A3 + 14 \cdot Y3 + 25 \cdot Y3^2$

P4= $P3 + \text{SQRT}(2501 \cdot Y3^2)$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.7	6.76	16.32	0.41	62.06	124.13	9.18	6.42	1.93	1.596
0.72	7.09	17.32	0.41	64.48	128.95	9.10	6.55	1.89	1.598
0.74	7.43	18.32	0.41	67.20	134.40	9.05	6.69	1.85	1.604
0.76	7.79	19.32	0.40	70.23	140.46	9.01	6.85	1.82	1.615
0.78	8.17	20.32	0.40	73.56	147.12	9.00	7.02	1.80	1.629
0.8	8.58	21.32	0.40	77.19	154.38	9.00	7.20	1.77	1.646
0.847	9.60	23.68	0.41	86.91	173.81	9.05	7.67	1.73	1.695
0.513	3.330	9.00	0.37	28.34	56.68	8.51	4.37	2.09	1.2842

Street Capacity Calculations - AP7

Night Shadow/East Pond
28' F-F Street Section with 8" curb
Slope= 2.19%

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	0.00	0.17	0.00	0.00	0.00	0.36	0.00	0.64	0.005
0.02	0.00	0.34	0.01	0.00	0.00	0.58	0.01	0.72	0.013
0.04	0.01	0.68	0.02	0.01	0.02	0.91	0.04	0.81	0.030
0.06	0.03	1.02	0.03	0.03	0.07	1.20	0.07	0.86	0.049
0.08	0.05	1.36	0.04	0.07	0.15	1.45	0.12	0.90	0.070
0.1	0.08	1.70	0.05	0.13	0.27	1.68	0.17	0.94	0.092
0.12	0.12	2.04	0.06	0.22	0.44	1.90	0.23	0.97	0.115
0.125	0.13	2.13	0.06	0.24	0.49	1.95	0.24	0.97	0.121

For water depths greater than 0.125 ft but less than 0.365 ft

Y1= Y-0.125

A2= $A1 + 2 \cdot Y1 + 25 \cdot Y1^2$

P2= $P1 + \text{SQRT}(2501 \cdot Y1^2) + Y1$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.130	0.14	2.38	0.06	0.26	0.52	1.91	0.25	0.94	0.119
0.160	0.23	3.91	0.06	0.44	0.87	1.93	0.31	0.85	0.128
0.200	0.42	5.95	0.07	0.91	1.82	2.19	0.44	0.86	0.164
0.240	0.69	8.00	0.09	1.72	3.45	2.52	0.60	0.90	0.210
0.285	1.08	10.27	0.11	3.12	6.23	2.88	0.82	0.95	0.267
0.320	1.47	12.08	0.12	4.65	9.29	3.17	1.01	0.99	0.315
0.355	1.91	13.87	0.14	6.58	13.17	3.45	1.22	1.02	0.365
0.365	2.05	14.37	0.14	7.21	14.42	3.53	1.29	1.03	0.379

For water depths greater than 0.365 ft but less than 0.667 ft

Y2= Y - 0.365

A3= $A2 + Y2^2 \cdot 14$

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)
0.370	2.12	14.38	0.15	7.62	15.25	3.60	1.33	1.04	0.392
0.400	2.54	14.41	0.18	10.30	20.59	4.06	1.62	1.13	0.471
0.442	3.12	14.45	0.22	14.55	29.10	4.66	2.06	1.23	0.582
0.500	3.94	14.51	0.27	21.33	42.66	5.42	2.71	1.35	0.737
0.540	4.50	14.55	0.31	26.67	53.33	5.92	3.20	1.42	0.847
0.558	4.75	14.56	0.33	29.14	58.28	6.13	3.42	1.45	0.896
0.565	4.85	14.57	0.33	30.08	60.16	6.21	3.51	1.46	0.914
0.667	6.27	14.67	0.43	46.05	92.10	7.34	4.90	1.58	1.197

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

Y3= Y - 0.667

A4= $A3 + 14 \cdot Y3 + 25 \cdot Y3^2$

P4= $P3 + \text{SQRT}(2501 \cdot Y3^2)$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.7	6.76	16.32	0.41	48.61	97.22	7.19	5.03	1.51	1.189
0.72	7.09	17.32	0.41	50.50	101.00	7.13	5.13	1.48	1.190
0.74	7.43	18.32	0.41	52.63	105.26	7.09	5.24	1.45	1.193
0.76	7.79	19.32	0.40	55.00	110.01	7.06	5.37	1.43	1.200
0.78	8.17	20.32	0.40	57.61	115.23	7.05	5.50	1.41	1.210
0.8	8.58	21.32	0.40	60.46	120.91	7.05	5.64	1.39	1.221
0.847	9.60	23.68	0.41	68.07	136.14	7.09	6.00	1.36	1.257
0.513	3.330	9.00	0.37	22.20	44.40	6.67	3.42	1.64	0.9607

Street Capacity Calculations - AP9

Dreamy Way/Night Whisper
28' F-F Street Section with 8" curb
Slope= 0.60%

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	0.00	0.17	0.00	0.00	0.00	0.19	0.00	0.33	0.002
0.02	0.00	0.34	0.01	0.00	0.00	0.30	0.01	0.38	0.005
0.04	0.01	0.68	0.02	0.01	0.01	0.48	0.02	0.42	0.011
0.06	0.03	1.02	0.03	0.02	0.04	0.63	0.04	0.45	0.019
0.08	0.05	1.36	0.04	0.04	0.08	0.76	0.06	0.47	0.027
0.1	0.08	1.70	0.05	0.07	0.14	0.88	0.09	0.49	0.036
0.12	0.12	2.04	0.06	0.11	0.23	1.00	0.12	0.51	0.045
0.125	0.13	2.13	0.06	0.13	0.26	1.02	0.13	0.51	0.047

For water depths greater than 0.125 ft but less than 0.365 ft

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

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.130	0.14	2.38	0.06	0.14	0.27	1.00	0.13	0.49	0.046
0.160	0.23	3.91	0.06	0.23	0.46	1.01	0.16	0.45	0.049
0.200	0.42	5.95	0.07	0.48	0.95	1.15	0.23	0.45	0.062
0.240	0.69	8.00	0.09	0.90	1.81	1.32	0.32	0.47	0.081
0.285	1.08	10.27	0.11	1.63	3.26	1.51	0.43	0.50	0.104
0.320	1.47	12.08	0.12	2.43	4.87	1.66	0.53	0.52	0.123
0.355	1.91	13.87	0.14	3.45	6.89	1.81	0.64	0.53	0.144
0.365	2.05	14.37	0.14	3.77	7.55	1.85	0.67	0.54	0.150

For water depths greater than 0.365 ft but less than 0.667 ft

Y2= Y - 0.365
A3= $A2 + Y2^2 \cdot 14$
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)
0.370	2.12	14.38	0.15	3.99	7.98	1.89	0.70	0.55	0.156
0.400	2.54	14.41	0.18	5.39	10.78	2.13	0.85	0.59	0.190
0.442	3.12	14.45	0.22	7.62	15.23	2.44	1.08	0.65	0.240
0.500	3.94	14.51	0.27	11.16	22.33	2.84	1.42	0.71	0.309
0.540	4.50	14.55	0.31	13.91	27.82	3.09	1.67	0.74	0.358
0.558	4.75	14.56	0.33	15.25	30.50	3.21	1.79	0.76	0.380
0.565	4.85	14.57	0.33	15.74	31.49	3.25	1.84	0.76	0.389
0.667	6.27	14.67	0.43	24.10	48.21	3.84	2.56	0.83	0.517

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

Y3= Y - 0.667
A4= $A3 + 14 \cdot Y3 + 25 \cdot Y3^2$
P4= $P3 + \text{SQRT}(2501 \cdot Y3^2)$

Depth (ft)	Area (ft ²)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.7	6.76	16.32	0.41	25.44	50.89	3.76	2.63	0.79	0.509
0.72	7.09	17.32	0.41	26.43	52.87	3.73	2.69	0.77	0.507
0.74	7.43	18.32	0.41	27.55	55.10	3.71	2.74	0.76	0.507
0.76	7.79	19.32	0.40	28.79	57.58	3.70	2.81	0.75	0.508
0.78	8.17	20.32	0.40	30.16	60.31	3.69	2.88	0.74	0.511
0.8	8.58	21.32	0.40	31.64	63.29	3.69	2.95	0.73	0.515
0.847	9.60	23.68	0.41	35.63	71.26	3.71	3.14	0.71	0.527
0.513	3.330	9.00	0.37	11.62	23.24	3.49	1.79	0.86	0.4171