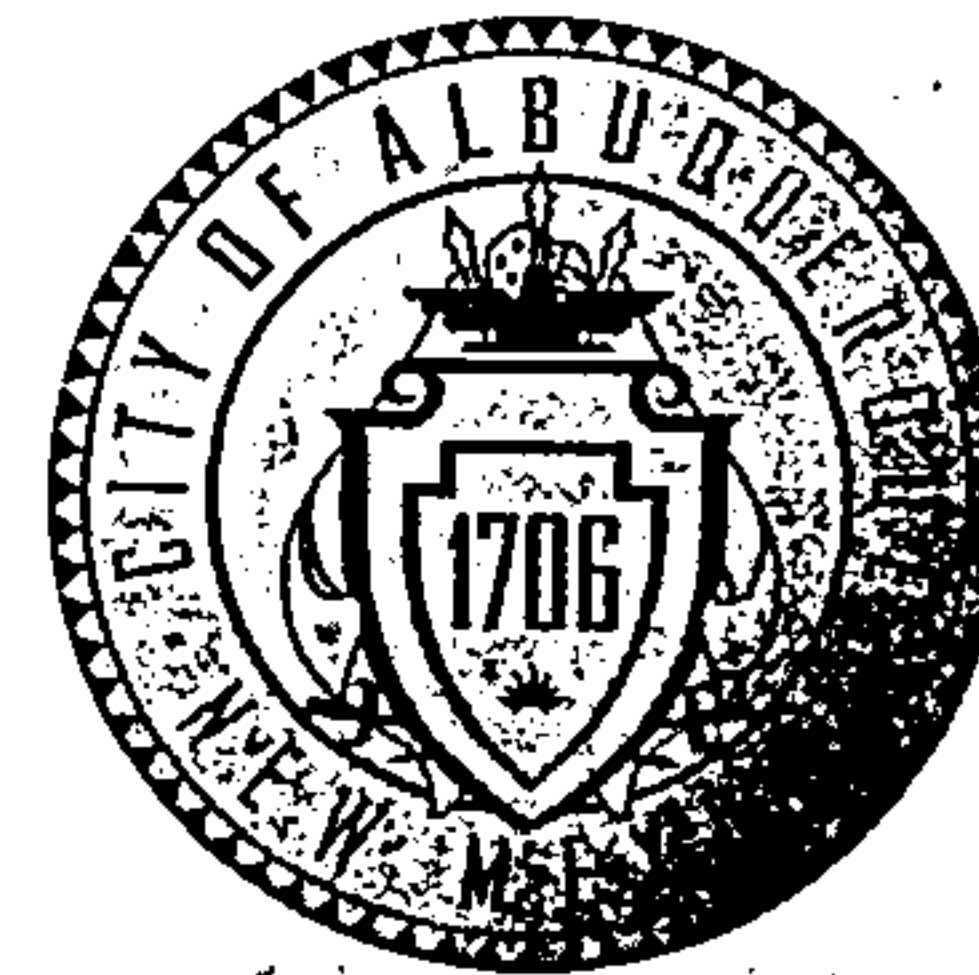


CITY OF ALBUQUERQUE



May 8, 2008

Kevin J. Murtagh, P.E.
BOHANNAN-HUSTON, INC.
7500 Jefferson Street NE
Albuquerque, NM 87109

RE: Andalucia @ La Luz- Unit 3, (F-11/D015B)
Engineers Certification for Release of Financial Guaranty
Engineers Stamp dated 09/30/2005
Engineers Certification dated 5/06/2008

Mr. Murtagh:

PO Box 1293

Based upon the information provided in your Engineer's Certification submittal dated 05/08/2008, the above referenced plan is adequate to satisfy the Grading and Drainage Certification for Release of Subdivision Improvement Agreement, (SIA).

Albuquerque

If you have any questions, you can contact me at 924-3982.

Sincerely,

NM 87103

Timothy E. Sims
Plan Checker, Planning Dept. - Hydrology
Development and Building Services

www.cabq.gov

C: Marilyn Maldonado, COA# 730885
File

Ronald D. Brown, Chair
Daniel F. Lyon, Vice Chair
J. Berg, Secretary-Treasurer
J. Asst. Secretary-Treasurer
Danny Hernandez, Director

John P. Kelly, P.E.
Executive Engineer



**Albuquerque
Metropolitan
Arroyo
Flood
Control
Authority**

2600 Prospect N.E., Albuquerque, NM 87107
Phone: (505) 884-2215 Fax: (505) 884-0214

FILE 060205 005

FAXED

October 12, 2005

Mr. Kevin Murtagh, P.E.
Bohannan-Huston, Inc.
7500 Jefferson St. NE, Courtyard I
Albuquerque, New Mexico 87109

Re: Drainage Report for Andalucia at La Luz, Unit 3, ZAP F-11
Engineer's Stamp Dated September 30, 2005

Dear Mr. Murtagh:

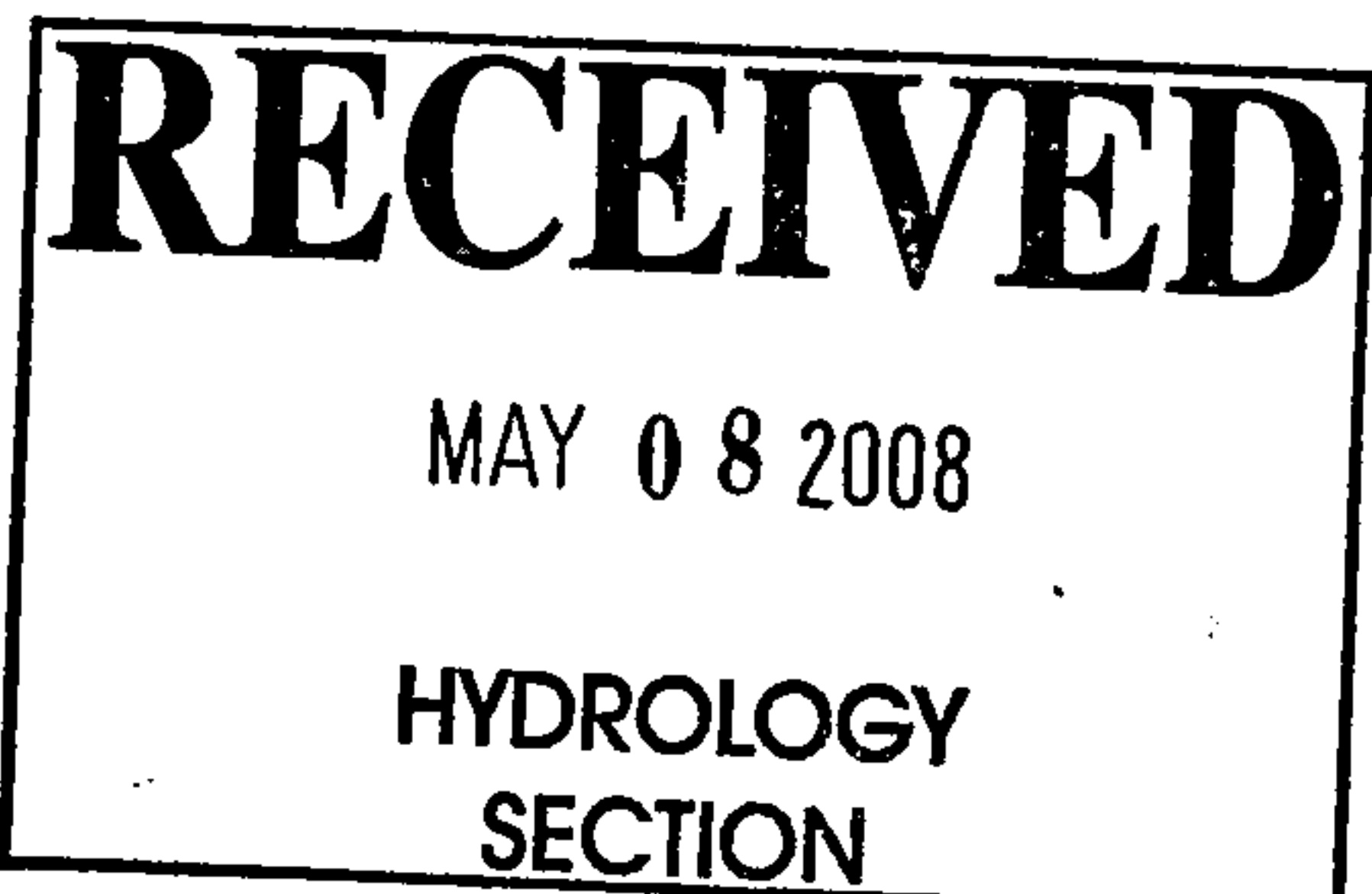
AMAFCA reviewed the referenced report with respect to storm water discharge to the San Antonio Arroyo. AMAFCA will accept direct discharge from the six lots adjacent to the arroyo provided that there is only one riprap rundown to the arroyo. Flow from the lots will be collected in a riprap swale parallel to the back lot wall.

If you have any questions, please call me at 884-2215.

Sincerely,
AMAFCA

Lynn M. Mazur, P.E., C.F.M.
Development Review Engineer

Cc: Brad Bingham, COA Hydrology



DRAINAGE REPORT
FOR
ANDALUCIA AT LA LUZ - UNIT 3

SEPTEMBER 30, 2005

Prepared for:

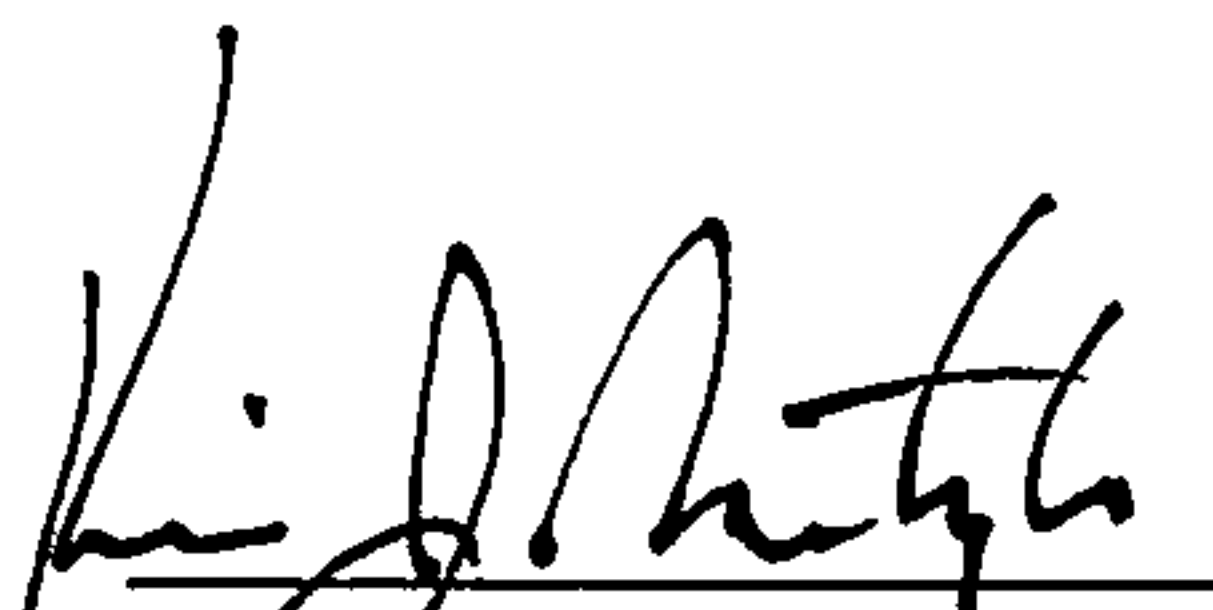
ANDALUCIA DEVELOPMENT CO., INC.
8300 CARMEL AVE NE - STE 401
ALBUQUERQUE, NM 87122

Prepared by:



BOHANNAN HUSTON, INC.
COURTYARD I
7500 JEFFERSON STREET NE
ALBUQUERQUE, NM 87109

PREPARED BY:


Kevin J. Murtagh, P.E.

9-30-05
Date

 9/30/05
Jared M. Lee, E.I. Date

Bohannon Huston INC.

I. PURPOSE

The purpose of this report is to present the drainage management plan for Andalucia at La Luz – Unit 3 and to obtain approval of the preliminary/final plat and grading plan by the City of Albuquerque. The proposed development of Andalucia at La Luz – Unit 3 consists of 60 single-family detached residential lots on approximately 13.53 acres and 9.30 acres of undeveloped land.

II. METHODOLOGIES

Site conditions will be analyzed for a 10-year and 100-year, 6-hour storm event in accordance with the City of Albuquerque Drainage Ordinance and the Development Process Manual (DPM) Volume 2, Design Criteria, Section 22.2, Hydrology, for the City of Albuquerque, January 1993.

The site, as described in the 'Site Location and Characteristics' section below, is approximately 22.83 acres, divided into sub-basins for analysis purposes. Therefore, Part A of the DPM, Section 22.2, which provides a simplified procedure for projects with sub-basins smaller than 40 acres, was used. Free discharge from the site into the fully improved San Antonio Arroyo located north of the site will be utilized as per discussions with AMAFCA and as stated by the San Antonio Arroyo LOMR prepared by this office dated September 8, 1997 which delineates developed basins which discharge into the arroyo. Additional information related to this report can be found in *Drainage Report For Andalucia at La Luz - Phase 1* Dated Sept 11, 2003 prepared by Bohannon Huston Inc.

III. SITE LOCATION AND CHARACTERISTICS

Andalucia is a development located east of Coors Boulevard. The project is located near the San Antonio Arroyo. More specifically, Unit 3 is bordered by Namaste Road to the south,

Coors Boulevard to the west, by the San Antonio Arroyo to the north and Monte Frio Dr. to the east. The site will be accessible from Coors Boulevard and Namaste Road. The 22+ acre site has been mass graded in conjunction with Andalucia at La Luz – Phase 1.

IV. EXISTING HYDRAULIC AND HYDROLOGIC CONDITIONS

In its existing condition, the site has been mass graded. The site is divided into ^{Four}~~three~~ (4) existing basins, Existing Basins 1, 2, 3 & 4; see Existing Drainage Basin Map in the Exhibit section at the back of this report. The natural soils consist of loose to dense, clean to silty sand. Little vegetation exists on the site due to the recent mass grading. Slopes on the site range from 12% to 1%, retaining walls are existing at the south side of the site along Namaste. The San Antonio Arroyo flows through the site.

Please refer to the Existing Basin Map in Exhibit 3. Existing Basin 1 (3.84 ac $Q_{100}=9.38\text{cfs}$) on the south end of the site flows mainly to the east and then in Monte Frio Dr. The flow is collected in the existing inlet in sump condition at the north end of Monte Frio Drive. Existing Basin 2 (13.31 ac $Q_{100}=38.16\text{cfs}$) encompass the remaining land south of the San Antonio Arroyo and discharges north directly into the arroyo. Existing Basin 3 (5.25ac $Q_{100}=12.83\text{cfs}$) consists of the land north of the San Antonio Arroyo to the Sevilla Ave entrance road and discharges south directly into the arroyo. Existing Basin 4 (0.43 ac $Q_{100}=1.05\text{cfs}$) is along the west side of the site. The small amount of flow from this basin is directed to the west by an existing berm and flows in an existing asphalt swale along Coors Blvd north to the arroyo. The arroyo then carries all of the discharge from these basins to the Rio Grande. There are no recognized FEMA Floodplains within the proposed development.

V. PROPOSED HYDRAULIC AND HYDROLOGIC CONDITIONS

The site will discharge runoff into the San Antonio Arroyo which is located north of the site. This will be accomplished through a proposed onsite and offsite public storm drain system. This system will convey the 100-year storm event into the fully improved San Antonio Arroyo.

For additional assistance throughout this portion of the report, please refer to the Proposed Drainage Basin Map, Coors Blvd. Improvements Drainage Management Plan and the Grading and Drainage Plan enclosed in the Exhibit section of this report.

Runoff generated by Andalucia at La Luz – Unit 3 will be conveyed in the hard lined streets (Rolled & Std. C&G) and will be collected an inlet in sump condition near the curve transition of Marbella Drive and Eduardo Avenue. The runoff will then be conveyed to the existing storm drain system in Monte Frio Dr. and discharge to the San Antonio Arroyo. Since no emergency spillway is available the inlets and grates have been designed for 2 x100 yr storm.

A. On-Site Basins

The proposed developed site has been apportioned into four (4) main basins which are described as follows:

Basin A (2.94.15ac, $Q_{100}=9.76\text{cfs}$) consists of Sacate Ave. and the lots 1-15. Runoff from Basin A will flow east in Sacate Ave. to Monte Frio Dr. where the flow will continue north in Monte Frio Dr. and will combine with flow from the existing subdivision to the east, Andalucia at La Luz – Unit 1. All combined flows will be collected in an existing single grate Type "A" inlet in sump condition at the end north end of Monte Frio Dr. A street hydraulics analysis for Monte Frio Dr. can be found in Appendix B of this report.

Basin B has been divided into two subbasins which are described as follows. Basin B2 (1.00 ac, $Q_{100}=2.27\text{cfs}$) is an area west of Marbella Drive containing a retaining wall and landscaping. Runoff will drain over the wall and through weep holes in the walls to Marbella Drive. Basin B1 (3.67 ac, $Q_{100}=12.17\text{cfs}$) contains Marbella Drive and Eduardo Ave. and lots 41-54. Runoff from Basin B1 will combine with flow from Basin B2 and will be conveyed in Marbella Drive to Eduardo Ave and flow to the east. Two Single Grate Type 'A' inlets in sump condition in Eduardo Ave at Marbella Drive will collect the flow and be conveyed in the storm drain in Eduardo Ave to the existing storm drain system in Monte Frio Drive and discharge to the San Antonio Arroyo.

Basin C (5.12ac, $Q_{100}=16.98\text{cfs}$) encompasses Cayetana Place and lots 16-40. Runoff from Basin C will be conveyed in Cayetana Place and flow to the north to Eduardo Ave. Flow will be collected in the same aforementioned sump inlets and be conveyed to the existing storm drain system in Monte Frio.

Basin E (0.80, $Q_{100}=2.65\text{cfs}$) lots 55-60. All of the lots in Basin E drain to the backyards, through turn blocks and directly to the San Antonio Arroyo via cobble rundowns.

Basin D (9.30ac, $Q_{100}= 29.04\text{cfs}$) is bisected by the San Antonio Arroyo. This area is mass graded and will remain undeveloped at this time. All runoff generated in this basin will flow overland and discharge to the San Antonio Arroyo, which will then be conveyed to the Rio Grande.

In summary, the proposed inlets, both onsite and offsite will collect all of the runoff generated by Andalucia at La Luz – Unit 3 and convey it to the San Antonio Arroyo which will carry it to the Rio Grande. See Appendix C, Inlet Analysis, for flow distributions.

B. Off-Site Basins

Offsite basin OFF A (4.35 ac, $Q_{100}= 18.16\text{cfs}$) which does not impact the developed site, is a portion of Coors Blvd. from Namaste road to the north property boundary. Coors Blvd. is generally cross sloped and runoff drains east to the curb and gutter improvements along the east side. A street hydraulics analysis (Appendix B) of Coors Blvd. at the north property line indicates that no inlets are required in the area. Additionally this analysis also indicates that at least one lane will be free of runoff during the 10-yr storm event. Runoff will be conveyed along the curb and gutter to an inlet in sump condition north of the San Antonio Arroyo and will outfall to the arroyo via storm drain. For more drainage information on Coors Blvd. please refer to the Coors Blvd Improvements - Drainage Management Plan in Exhibit 5 of this report.

VI. CONCLUSION

This report provides hydrologic and hydraulic considerations of the proposed development of Andalucia at La Luz – Unit 3. These flows can be safely conveyed by the improvements proposed in this plan to the existing San Antonio Arroyo, which has adequate capacity to accept such runoff. This information provides adequate supporting documentation and guidance for approval of this report. Erosion and dust control, consisting of erosion control berms, silt fencing and sedimentation basins, are proposed to prevent soil washing or blowing into paved streets, storm drains, and existing development areas. Therefore, we believe this report supports the preliminary/final plat and grading plan submittals and should be approved as requested.

EX1	3.84	0	0.00%	0.00%	100.00%	0.00%	5.67	11.01
EX2	13.31	0	0.00%	0.00%	100.00%	0.00%	19.64	38.16
EX3	5.25	0	0.00%	0.00%	100.00%	0.00%	7.75	15.05
EX4	0.43	0	0.00%	0.00%	100.00%	0.00%	0.63	1.23
SUBTOTAL	22.83	0					33.69	65.45

ANDALUCIA AT LA LUZ - PHASE 3

BASIN I.D.	AREA (AC)	UNITS #	% LAND TREATMENT				DISCHARGE (CFS)	
			A	B	C	D ¹	10 YR	100YR
HYDROLOGICAL VOLUMETRIC & DISCHARGE DATA (DEVELOPED)								
A	2.94	14	0.00%	27.36%	27.36%	45.27%	5.64	9.76
B1	3.67	15	0.00%	27.36%	27.36%	45.27%	7.04	12.17
B2	1.00		0.00%	70.00%	30.00%	0.00%	0.97	2.27
C	5.12	25	0.00%	27.36%	27.36%	45.27%	9.82	16.98
E	0.80	6	0.00%	27.36%	27.36%	45.27%	1.53	2.65
D	9.30	TRACT A-1	0.00%	0.00%	83.00%	17.00%	15.96	29.04
SUBTOTAL	22.83	60.00					23.47	72.88
OFF-A	4.35	0	0.00%	5.00%	5.00%	90.00%	11.78	18.16

NOTES: 1) Impervious percentages were calculated from the DPM equation A-4, with the remaining percentages distributed to land treatments B and C

A-1/1

26FF-44R/W - 2% CROSS SLOPE ROLL C&G

SACATE TO
LOTS 3 & 13

MANNING'S N = 0.017 SLOPE = 0.014

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	1.3	5	11.0	0.6	9	35.2	0.3
2	8.4	1.1	6	22.0	0.4	10	35.6	0.3
3	8.8	1.1	7	33.0	0.1	11	44.0	0.5
4	9.0	0.4	8	35.0	0.0			

WSEL	DEPTH	FLOW	FLOW	WETTED	FLOW	TOPWID	TOTAL
FT.	INC	AREA	RATE	PER	VEL	PLUS	ENERGY
		SQ. FT.	(CFS)	(FT)	(FPS)	OBSTRUCTIONS	(FT)
0.050	0.050	0.020	0.017	0.827	0.861	1.715	0.062
0.100	0.100	0.079	0.109	1.654	1.367	2.510	0.129
0.150	0.150	0.186	0.290	3.173	1.560	3.997	0.188
0.200	0.200	0.403	0.710	5.730	1.762	6.523	0.248
0.250	0.250	0.746	1.550	8.287	2.078	9.049	0.317
0.300	0.300	1.216	2.923	10.843	2.405	11.575	0.390
0.350	0.350	1.821	4.755	14.363	2.611	15.075	0.456
0.400	0.400	2.685	7.335	19.785	2.731	20.036	0.516
0.450	0.450	3.789	11.166	24.913	2.947	25.155	0.585
0.500	0.500	5.167	16.293	30.698	3.153	30.898	0.655

Q = 7.75

d = 0.40

E = 0.51

26FF-44R/W - 2% CROSS SLOPE STD C&G SACATE FROM
 MANNING'S N = 0.017 SLOPE = 0.014 LOTS 3 & 13

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	1.3	5	11.0	0.6	9	35.2	0.7
2	8.4	1.1	6	22.0	0.4	10	35.6	0.7
3	8.8	1.1	7	33.0	0.1	11	44.0	0.9
4	9.0	0.5	8	35.0	0.0			

WSEL	DEPTH	FLOW	FLOW	WETTED	FLOW	TOPWID	TOTAL
FT.	INC	AREA	RATE	PER	VEL	PLUS	ENERGY
		SQ.FT.	(CFS)	(FT)	(FPS)	OBSTRUCTIONS	(FT)
0.050	0.050	0.020	0.017	0.822	0.855	1.702	0.061
0.100	0.100	0.078	0.106	1.645	1.357	2.484	0.129
0.150	0.150	0.183	0.283	3.159	1.548	3.958	0.187
0.200	0.200	0.398	0.696	5.711	1.750	6.471	0.248
0.250	0.250	0.738	1.525	8.263	2.066	8.983	0.316
0.300	0.300	1.204	2.881	10.815	2.393	11.496	0.389
0.350	0.350	1.796	4.871	13.368	2.713	14.009	0.464
0.400	0.400	2.513	7.591	15.920	3.021	16.521	0.542
0.450	0.450	3.356	11.133	18.472	3.318	19.034	0.621
0.500	0.500	4.345	15.284	21.910	3.517	22.393	0.692
0.550	0.550	5.503	20.559	25.349	3.736	25.752	0.767
0.600	0.600	6.799	28.187	26.786	4.146	27.110	0.867
0.650	0.650	8.109	37.714	26.889	4.651	27.136	0.986
0.700	0.700	9.455	46.518	28.817	4.920	28.548	1.077
0.750	0.750	10.918	56.079	31.194	5.137	30.886	1.160
0.800	0.800	12.497	66.889	33.571	5.352	33.224	1.246

sum A
 $Q \approx 9.79 \text{ cfs}$
 $d = 0.43$

$E = 0.54 < 0.81$ ok

24FF-42R/W - ROLL MARBELLA TO LOT 44

MANNING'S N = 0.017 SLOPE = 0.037

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.5	5	11.0	0.1	9	33.2	0.3
2	8.4	0.3	6	21.0	0.3	10	33.6	0.3
3	8.8	0.3	7	31.0	0.1	11	42.0	0.5
4	9.0	0.0	8	33.0	0.0			

WSEL	DEPTH	FLOW	FLOW	WETTED	FLOW	TOPWID	TOTAL
FT.	INC	AREA	RATE	PER	VEL	PLUS	ENERGY
		SQ. FT.	(CFS)	(FT)	(FPS)	OBSTRUCTIONS	(FT)
0.050	0.050	0.040	0.055	1.654	1.391	2.510	0.080
0.100	0.100	0.159	0.351	3.308	2.207	4.100	0.176
0.150	0.150	0.372	0.936	6.346	2.518	7.075	0.249
0.200	0.200	0.806	2.292	11.460	2.845	12.126	0.326
0.250	0.250	1.492	5.006	16.573	3.355	17.178	0.425
0.300	0.300	2.431	9.441	21.687	3.883	22.229	0.535
0.350	0.350	3.622	16.000	26.615	4.418	27.120	0.654
0.400	0.400	5.112	25.038	32.186	4.898	31.770	0.773
0.450	0.450	6.817	36.969	36.837	5.423	36.420	0.907
0.500	0.500	8.754	51.815	41.489	5.919	41.070	1.045

Q = 3.07 cfs

d = 0.22

E = 0.36

24FF-42R/W - STD MARBELLA LOT 44 TO EDUARDO

MANNING'S N = 0.017 SLOPE = 0.037

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	5	11.0	0.1	9	33.2	0.7
2	8.4	0.7	6	21.0	0.4	10	33.6	0.7
3	8.8	0.7	7	31.0	0.1	11	42.0	0.9
4	9.0	0.0	8	33.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ. FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.039	0.054	1.645	1.381	2.484	0.080
0.100	0.100	0.156	0.343	3.290	2.191	4.048	0.175
0.150	0.150	0.364	0.924	6.137	2.539	6.814	0.250
0.200	0.200	0.773	2.227	10.786	2.881	11.385	0.329
0.250	0.250	1.410	4.778	15.436	3.388	15.956	0.429
0.300	0.300	2.276	8.904	20.086	3.911	20.527	0.538
0.350	0.350	3.371	14.909	24.735	4.423	25.098	0.654
0.400	0.400	4.581	24.784	24.839	5.411	25.123	0.855
0.450	0.450	5.791	36.537	24.942	6.309	25.148	1.069
0.500	0.500	7.003	50.014	25.045	7.141	25.174	1.293
0.550	0.550	8.217	65.095	25.148	7.922	25.199	1.526
0.600	0.600	9.431	81.686	25.251	8.661	25.224	1.767
0.650	0.650	10.647	99.710	25.354	9.365	25.250	2.014
0.700	0.700	11.934	109.987	29.106	9.217	28.050	2.021
0.750	0.750	13.452	121.655	33.757	9.043	32.700	2.022
0.800	0.800	15.204	136.880	38.409	9.003	37.350	2.061

$$Q = 12.79 \text{ cfs}$$

$$d = 0.33$$

$$E = 0.61 < 0.85 \text{ OK}$$

26FF-44R/W - ROLL

CHAYETANK

TOLLOT 20435

MANNING'S N = 0.017 SLOPE = 0.033

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.5	5	11.0	0.1	9	35.2	0.3
2	8.4	0.3	6	22.0	0.4	10	35.6	0.3
3	8.8	0.3	7	33.0	0.1	11	44.0	0.5
4	9.0	0.0	8	35.0	0.0			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.040	0.053	1.654	1.328	2.510	0.077
0.100	0.100	0.159	0.335	3.308	2.109	4.100	0.169
0.150	0.150	0.372	0.894	6.346	2.405	7.075	0.240
0.200	0.200	0.806	2.189	11.460	2.717	12.126	0.315
0.250	0.250	1.492	4.781	16.573	3.204	17.178	0.410
0.300	0.300	2.431	9.017	21.687	3.709	22.229	0.514
0.350	0.350	3.642	14.696	28.616	4.036	29.120	0.603
0.400	0.400	5.232	23.879	34.187	4.564	33.770	0.724
0.450	0.450	7.037	35.941	38.838	5.108	38.420	0.856
0.500	0.500	9.074	50.919	43.489	5.611	43.070	0.990

Q = 2.07 cfs

d = 0.29

E = 0.49 < 0.51 ok

26FF-44R/W - STD CAH ETANA LOTS 20435

MANNING'S N = 0.017 SLOPE = 0.033 TO EDUARDO

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	5	11.0	0.1	9	35.2	0.7
2	8.4	0.7	6	22.0	0.4	10	35.6	0.7
3	8.8	0.7	7	33.0	0.1	11	44.0	0.9
4	9.0	0.0	8	35.0	0.0			

WSEL	DEPTH	FLOW	FLOW	WETTED	FLOW	TOPWID	TOTAL
FT.	INC	AREA	RATE	PER	VEL	PLUS	ENERGY
		SQ.FT.	(CFS)	(FT)	(FPS)	OBSTRUCTIONS	(FT)
0.050	0.050	0.039	0.052	1.645	1.319	2.484	0.077
0.100	0.100	0.156	0.327	3.290	2.093	4.048	0.168
0.150	0.150	0.366	0.873	6.318	2.387	6.996	0.239
0.200	0.200	0.795	2.146	11.423	2.699	12.021	0.313
0.250	0.250	1.476	4.703	16.527	3.187	17.047	0.408
0.300	0.300	2.408	8.888	21.631	3.691	22.072	0.512
0.350	0.350	3.591	15.024	26.735	4.184	27.098	0.622
0.400	0.400	4.901	25.160	26.838	5.134	27.123	0.810
0.450	0.450	6.211	37.253	26.941	5.998	27.148	1.009
0.500	0.500	7.523	51.141	27.045	6.798	27.174	1.219
0.550	0.550	8.837	66.700	27.148	7.548	27.199	1.436
0.600	0.600	10.151	83.832	27.251	8.258	27.224	1.661
0.650	0.650	11.467	102.457	27.354	8.935	27.250	1.892
0.700	0.700	12.854	113.746	31.106	8.849	30.050	1.918
0.750	0.750	14.472	126.313	35.757	8.728	34.700	1.935
0.800	0.800	16.324	142.289	40.408	8.717	39.350	1.982

$Q = 1678 \text{ cfs}$
 $d = 0.36$

$E = 0.66 < 0.85$ OK

MANNING'S N = 0.017 SLOPE = 0.010

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	0.9	5	11.0	0.1	9	35.2	0.7
2	8.4	0.7	6	22.0	0.4	10	35.6	0.7
3	8.8	0.7	7	33.0	0.1	11	44.0	0.9
4	9.0	0.0	8	35.0	0.0			

WSEL	DEPTH	FLOW	FLOW	WETTED	FLOW	TOPWID	TOTAL
FT.	INC	AREA	RATE	PER	VEL	PLUS	ENERGY
		SQ. FT.	(CFS)	(FT)	(FPS)	OBSTRUCTIONS	(FT)
0.050	0.050	0.039	0.028	1.645	0.704	2.484	0.058
0.100	0.100	0.156	0.175	3.290	1.118	4.048	0.119
0.150	0.150	0.366	0.466	6.318	1.275	6.996	0.175
0.200	0.200	0.795	1.146	11.423	1.442	12.021	0.232
0.250	0.250	1.476	2.512	16.527	1.702	17.047	0.295
0.300	0.300	2.408	4.747	21.631	1.972	22.072	0.360
0.350	0.350	3.591	8.025	26.735	2.235	27.098	0.428
0.400	0.400	4.901	13.438	26.838	2.742	27.123	0.517
0.450	0.450	6.211	19.898	26.941	3.203	27.148	0.610
0.500	0.500	7.523	27.315	27.045	3.631	27.174	0.705
0.550	0.550	8.837	35.626	27.148	4.032	27.199	0.803
0.600	0.600	10.151	44.777	27.251	4.411	27.224	0.903
0.650	0.650	11.467	54.724	27.354	4.772	27.250	1.004
0.700	0.700	12.854	60.754	31.106	4.727	30.050	1.047
0.750	0.750	14.472	67.466	35.757	4.662	34.700	1.088
0.800	0.800	16.324	75.999	40.408	4.656	39.350	1.137

$$Q = 1.67 \text{ cfs (EDUARDO)} + 17.53 \text{ cfs (BNSINC)} = 19.2 \text{ cfs}$$

$$d = 0.44'$$

$$E = 0.60 < 0.85 \quad \text{OK}$$

PC PROGRAM STREAM

SEPTEMBER 1994

24ff/42rw std full 6.00% MONTEFRID

MANNING'S N= .017 SLOPE= .06

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	0.85	5	11.00	0.13	9	33.17	0.67
2	8.37	0.67	6	21.00	0.32	10	33.63	0.67
3	8.83	0.67	7	31.00	0.13	11	42.00	0.85
4	9.00	0.00	8	33.00	0.00	12	0.00	0.00
WSEL	DEPTH	FLOW	FLOW	WETTED	FLOW	TOPWID	VEL	ENERGY
(FT)	INC	AREA	RATE	PER	VEL	(FT)	HEAD	HEAD
	(FT)	SQ. FT.	(CFS)	(FT)	(FPS)		(FT)	(FT)
0.05	0.05	0.04	0.1	1.71	1.77	1.63	0.05	0.10
0.10	0.10	0.16	0.5	3.41	2.81	3.25	0.12	0.22
0.15	0.15	0.39	1.2	6.82	3.16	6.58	0.16	0.31
0.20	0.20	0.84	3.1	11.92	3.66	11.60	0.21	0.41
0.25	0.25	1.55	6.7	17.03	4.33	16.63	0.29	0.54
0.30	0.30	2.50	12.5	22.13	5.01	21.65	0.39	0.69
0.35	0.35	3.68	22.1	24.73	6.01	24.18	0.56	0.91
0.40	0.40	4.89	35.4	24.84	7.25	24.20	0.82	1.22
0.45	0.45	6.10	51.1	24.94	8.38	24.23	1.09	1.54
0.50	0.50	7.31	68.9	25.04	9.42	24.25	1.38	1.88
0.55	0.55	8.53	88.8	25.15	10.41	24.28	1.68	2.23
0.60	0.60	9.74	110.5	25.25	11.35	24.30	2.00	2.60
0.65	0.65	10.96	134.1	25.35	12.24	24.33	2.33	2.98
0.70	0.70	12.24	147.2	29.10	12.02	28.05	2.24	2.94
0.75	0.75	13.76	162.0	33.76	11.77	32.70	2.15	2.90
0.80	0.80	15.51	181.5	38.41	11.70	37.35	2.13	2.93
0.85	0.85	17.50	205.5	43.06	11.75	42.00	2.14	2.99

$$Q_{100} = (\text{FROM UNIT 1}) 11.3 + (\text{BASIN A}) 9.79 = 21.09 \text{ cfs}$$

$$d = .34$$

$$E = .87 \approx .85 \text{ OK}$$

COORS BLVD. - half

MANNING'S N = 0.017 SLOPE = 0.020

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.0	1.4	3	34.8	0.7	5	37.0	0.1
2	34.4	0.7	4	35.0	0.0	6	85.0	1.1

WSEL FT.	DEPTH INC	FLOW AREA SQ. FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
0.050	0.050	0.020	0.020	0.822	1.027	1.242	0.066
0.100	0.100	0.078	0.127	1.645	1.630	2.024	0.141
0.150	0.150	0.182	0.342	3.119	1.872	3.458	0.205
0.200	0.200	0.393	0.832	5.571	2.120	5.871	0.270
0.250	0.250	0.724	1.808	8.023	2.498	8.283	0.347
0.300	0.300	1.175	3.395	10.475	2.890	10.696	0.430
0.350	0.350	1.747	5.716	12.928	3.272	13.109	0.516
0.400	0.400	2.440	8.883	15.380	3.641	15.521	0.606
0.450	0.450	3.253	13.001	17.832	3.996	17.934	0.698
0.500	0.500	4.187	18.171	20.284	4.339	20.347	0.793
0.550	0.550	5.242	24.487	22.736	4.671	22.760	0.889
0.600	0.600	6.417	32.040	25.188	4.993	25.172	0.988
0.650	0.650	7.713	40.921	27.640	5.305	27.585	1.088
0.700	0.700	9.166	49.483	31.995	5.399	31.463	1.153
0.750	0.750	10.860	59.750	36.851	5.502	36.318	1.221
0.800	0.800	12.797	72.328	41.707	5.652	41.173	1.297
0.850	0.850	14.977	87.353	46.563	5.832	46.028	1.379
0.900	0.900	17.400	104.975	51.419	6.033	50.883	1.466
0.950	0.950	20.066	125.350	56.275	6.247	55.738	1.557
1.000	1.000	22.974	148.638	61.131	6.470	60.593	1.651
1.050	1.050	26.125	174.998	65.987	6.699	65.448	1.748
1.100	1.100	29.519	204.587	70.843	6.931	70.303	1.847

$$Q_{10-yr} = 11.78 \text{ cfs}$$

$$d = 0.43 < 0.5 \quad \text{ok}$$

$$d_{\text{one tree lane}} = 0.78' > d = 0.43 \quad \text{ok}$$

E-9/9

Type "A" Sump - Marbella

ANALYSIS OF AN INLET IN A SUMP CONDITION - At Marbella and Edwardo - each side

INLET TYPE: Single Grate Type "A" with curb opening wings on both sides on inlet.

WEIR: $Q=C*L*H^{1.5}$

Wing opening

C= 3.0

L= 4.0 ft

$Q=3.0(4.0')H^{1.5}=12.0H^{1.5}$

Grate opening

C=3.0

L(single grate)=[(2.67')+2(1.8')]=6.2'

$Q=3.0(6.27)H^{1.5}=18.81H^{1.5}$

ORIFICE: $Q=C*A*(2*G*H)^{0.5}$

Grate opening

C=0.6

A(single grate)=4.09 sf

$Q=2.46*(64.4*H)^{0.5}$

Wing opening

C=0.6

A=2.0 sf

$Q=1.2*(64.4*H)^{0.5}$

	WS ELEVATION ABOVE INLET	HEIGHT	Q (CFS) WEIR WING OPENING	Q (CFS) WEIR SINGLE GRATE	Q (CFS) ORIFICE SINGLE GRATE	TOTAL Q (CFS)	COMMENTS:
~FL @ INLET	0.00	0.00	0.00	0.00	0.00	0.00	Flow at single "A" inlet w/ two wing openings
	0.10	0.10	0.38	0.59	6.24	1.35	Weir controls on grate analysis
	0.20	0.20	1.07	1.68	8.82	3.83	
	0.30	0.30	1.97	3.09	10.80	7.03	
	0.40	0.40	3.04	4.76	12.47	10.83	
	0.50	0.50	4.24	6.65	13.94	15.14	Q(100 yr) =17.0 cfs at this depth
	0.60	0.60	5.58	8.74	15.27	19.90	
TOP OF CURB	0.70	0.70	7.03	11.02	16.50	25.07	
	0.80	0.80	8.59	13.46	17.64	30.63	
	0.90	0.90	10.25	16.06	18.71	36.55	Q(2x100 yr) =34.0 cfs at this depth
ROW LIMIT	1.00	1.00	12.00	18.81	19.72	42.81	

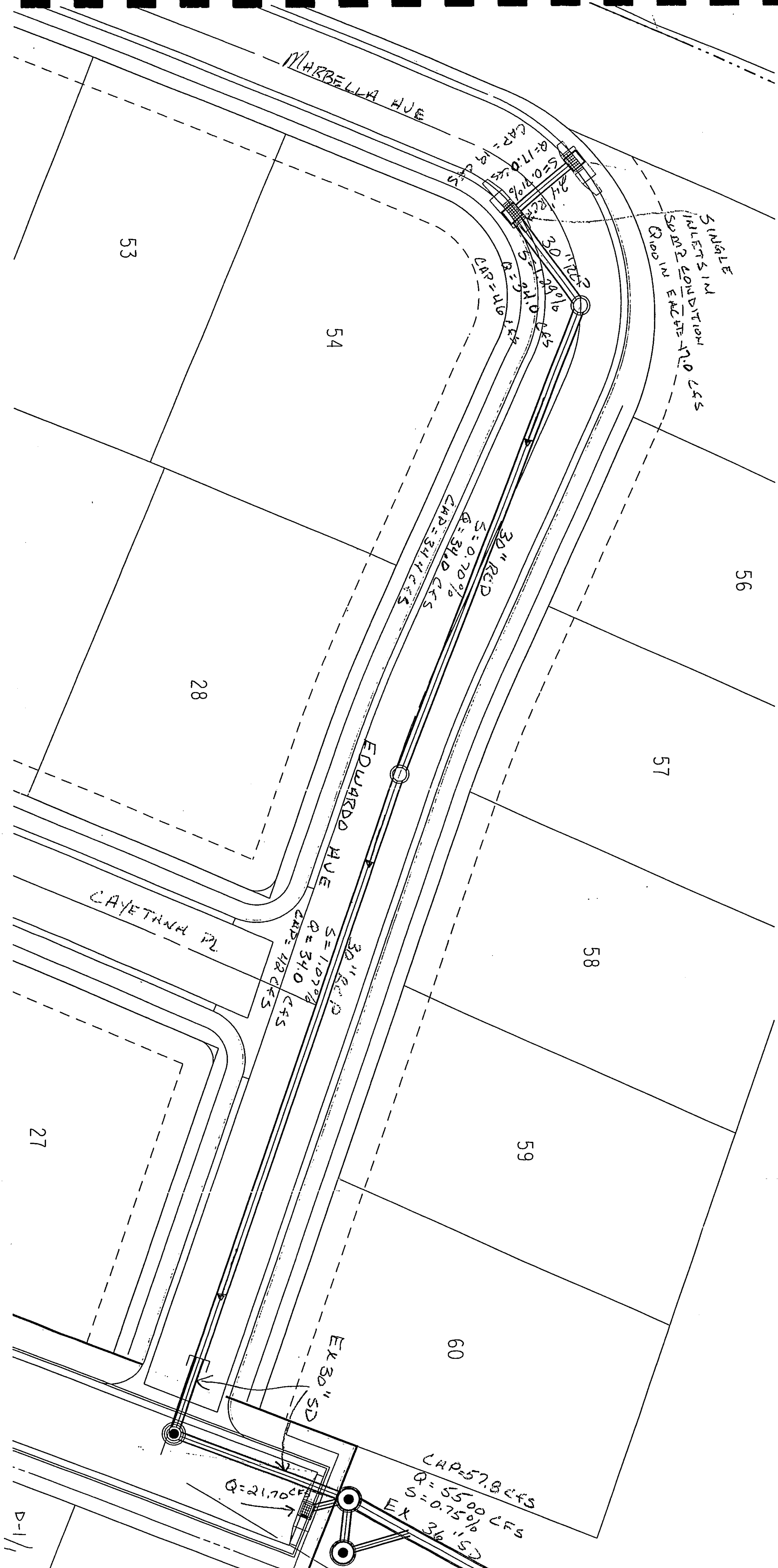
NOTE:

The total runoff intercepted by the inlet at the low point in the road is:

THE 100 YR STORM EVENT =16.7 CFS at the sump condition

THE 2x100 YR STORM EVENT =33.4 CFS at the sump condition

1/1-2



SINGLE
INLETS IN
SIDE CONDITION
Grid in Elevation 17.0

24" RCP
S=0.010
Q=17.0
CAP=19.45
30" RCP
S=0.010
Q=34.0
CAP=10.15

30" RCP
S=0.010
Q=34.0
CAP=34.45

30" RCP
S=1.070
Q=34.0
CAP=42.45

36" SD
S=0.750
Q=21.70
CAP=57.85

D-1/1