BOHANNAN HUSTON
Courtyard One
7500 JEFFERSON NE
Albuquerque
NEW MEXICO 87109
voice 505.823.1000
fax 505.821.0892

DRAINAGE REPORT
VENTANA RANCH SUBDIVISION
TRACT I

OCTOBER 11, 2000

PREPARED FOR:

LAS VENTANAS LIMITED PARTNERSHIP
#10 TRAMWAY LOOP NE
ALBUQUERQUE, NM 87122

I hereby certify that I am a registered professional engineer licensed to practice in the State of New Mexico, that this report was prepared by me or under my supervision and is true and accurate to the best of my knowledge and belief.

Pamela L. Larrañaga 10/13/00
Pamela L. Larrañaga, P.E. # 14674 Date

Rev. 10/26/00

PAMELA L. LARRAÑAGA
NEW MEXICO
14674
REGISTERED PROFESSIONAL ENGINEER

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I. INTRODUCTION AND PURPOSE

The purpose of this report is to present the drainage management plan for Tract I of the Ventana Ranch Subdivision for preliminary plat and grading plan approval by the Development Review Board (DRB). The proposed development of Tract I consists of 76 single family detached residential lots on approximately 12.6 acres. Please refer to the location maps included as Figure 1 following the text.

II. METHODOLOGIES AND REFERENCES

The Drainage Ordinance and the Development Process Manual (DPM) are utilized to develop this plan. The modified rational method contained within the July 1997 edition of the Development Process Manual (DPM) is utilized to determine the hydrologic discharges and volumes generated by this development. Hydraulic analysis of the typical street sections is performed utilizing Manning's Equation for proposed street slopes. This analysis identifies the street flow capacities allowed within the typical street sections, and the number of proposed storm drain inlets required to intercept street flow from the surface.

The existing approved drainage report referenced in the preparation of this plan is the "Las Ventanas Subdivision Drainage Master Plan" (LVDMP) prepared by Bohannan Huston (originally dated April 1995 and updated October 1995). This report identifies downstream drainage improvements, including the AMAFCA Las Ventanas Drainage Facility #1 (LVDF #1), which was completed by AMAFCA in 1999, to which developed flows from this tract will drain. See Appendix A for excerpts from this report.

III. SUMMARY OF RELATED PLATTING / SITE DEVELOPMENT PLAN ACTIONS

A copy of the preliminary plat is included as Plate 5. The preliminary plat has been submitted concurrently with this drainage report for review and approval from the DRB. The construction plans for the public infrastructure, which will be reviewed by the Design Review Committee (DRC), are currently being developed.

Also, there is an approved Environmental Planning Commission (EPC) Site Plan in place for Ventana Square. Ventana Square encompasses Ventana Ranch, Tracts G and H. Please refer to the location maps included as Figure 1.

IV. SITE LOCATION AND CHARACTERISTICS

Ventana Ranch is a 940-acre development located west of Paradise Hills between Paseo del Norte and Irving Boulevards. Tract I is located at the entrance of the Ventana Ranch Master Plan north of Paradise Boulevard. The tract is bound by LVDF #1 to the north, Paradise Boulevard to the south, the existing Bernalillo County baseball fields to the east, and Ventana Ranch Tract G, a currently vacant tract, to the west. The site will be accessible from a new subdivision entrance off of Paradise Boulevard.

In its existing condition, the site consists of undulating terrain with slopes from 5% to less than 1%. Existing drainage patterns direct the runoff to the north into the LVDF #1. The site was previously mass graded by the owner, per an approved mass-grading plan for Ventana Ranch, as a fill site for excess material from another project (COA SAD 226). Please refer to Plate 3, the Mass Grading Plan, for further information.

V. EXISTING HYDRAULIC AND HYDROLOGIC CONDITIONS

The existing conditions map from the "Las Ventanas Drainage Master Plan" (Plate 2) shows that the tract lies primarily within existing Basin 316, which drains north toward the existing playa, which has now become the LVDF #1.

Existing drainage facilities downstream of this tract include the LVDF #1, which was completed by AMAFCA in 1999, and the Las Ventanas Dam Outfall 60" Storm Sewer, which was completed by AMAFCA in 1998. Tract I drains to this existing LVDF #1 in its current and proposed conditions, which in turn goes to the Outfall Storm Sewer.

VI. PROPOSED HYDRAULIC AND HYDROLOGIC CONDITIONS

Discharge generated by Tract I will be collected by and flow through the internal streets when fully developed. This development will be graded to convey runoff toward two low points located near the center of the tract. This runoff will then be collected by storm drain inlets and conveyed through the proposed storm drain system to the north. This system will then discharge to an existing 48" RCP outfall with a flap gate that connects directly to the LVDF#1. The storm drain system, including all drainage basins and flow rates, is shown on Plate 3. The HGL analysis of this storm drain system is shown in Appendix C. Tract I will be graded according to the grading plans in Plate 1.

The north half of Paradise Boulevard from Universe Boulevard to a high point just west of the Tract I east property line, drains to the existing inlet near the proposed entrance to Tract I. The developed flows for this inlet are included in hydrologic and hydraulic analysis contained in Appendices B and C. There is an existing 30" storm drain that extends across Paradise to the south that is currently capped. Upon development, a portion of future Tract J will drain to the existing 30" storm drain, across Paradise Boulevard. At this time, there is no drainage impact from the south (Tract J).

VII. CONCLUSION

The LVDMP governs the development of Tract I of the Ventana Ranch Subdivision. Increases in runoff, depth and velocity due to proposed development are within parameters anticipated within the previously approved Master Drainage Plan for this area. These flows can be safely conveyed by the improvements proposed in this drainage plan to existing drainage facilities, which have adequate capacity to accept such runoff. Erosion and dust control, consisting of erosion control berms, snow fencing and sedimentation basins, are proposed to prevent soil washing or blowing into paved streets, storm drains, and existing development areas.

Table 1

Flowrates for Existing and Developed Conditions

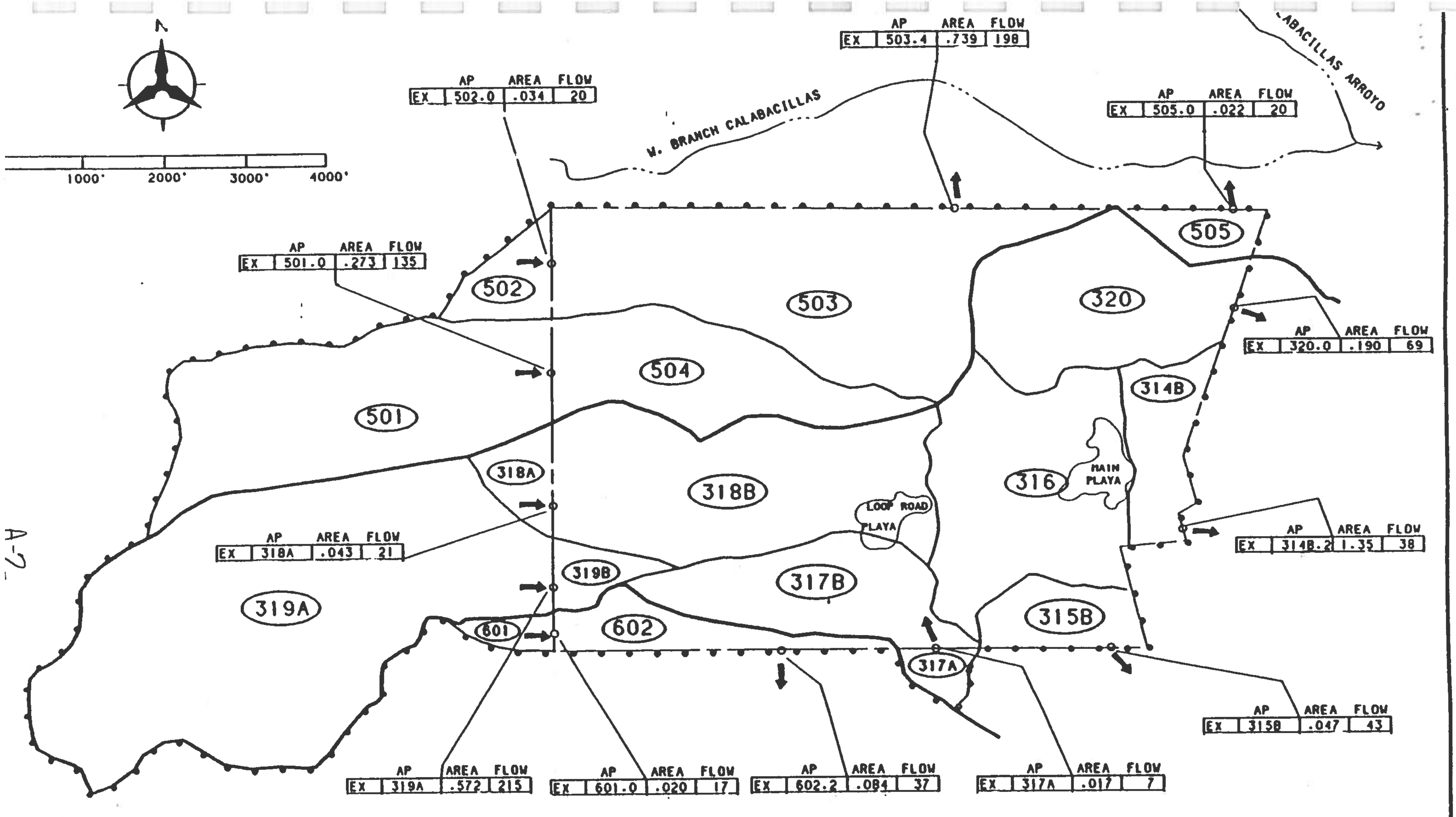
Flow Into Las Ventanas Subdivision

EXISTING			DEVELOPED		
Analysis ID	Drainage Area (sq mi)	Flow (cfs)	Analysis ID	Drainage Area (sq mi)	Flow (cfs)
501	.273	135	501.0	.273	432
502.0	.034	20	502.0	.034	76
318A	.043	21	318A	.043	96
319A	.572	215	319A	.572	959
601.0	.020	17	601.0	.020	45
317A	.017	7	317A	.017	38

Flow Out of Las Ventanas Subdivision

EXISTING			DEVELOPED		
Analysis ID	Drainage Area (sq mi)	Flow (cfs)	Analysis ID	Drainage Area (sq mi)	Flow (cfs)
503.4	.739	198	503E.1	.080	115
505.0	.022	20	505.2	2.28	92
320.0	.190	69	320.0	.190	0
314B.2	1.35	38	314BS	.023	34
315B	.047	43	315B.1	.047	39*
602.2	.084	37	602.2	.084	0

*Developed flow = 0 cfs if a retention pond is used in Basin 315B.
Developed flow = 39 cfs if a detention pond is used.



ANALYSIS PT. I.D.
CONTRIBUTING DRAINAGE AREA (SQ. MILE)
PEAK FLOW (cfs)

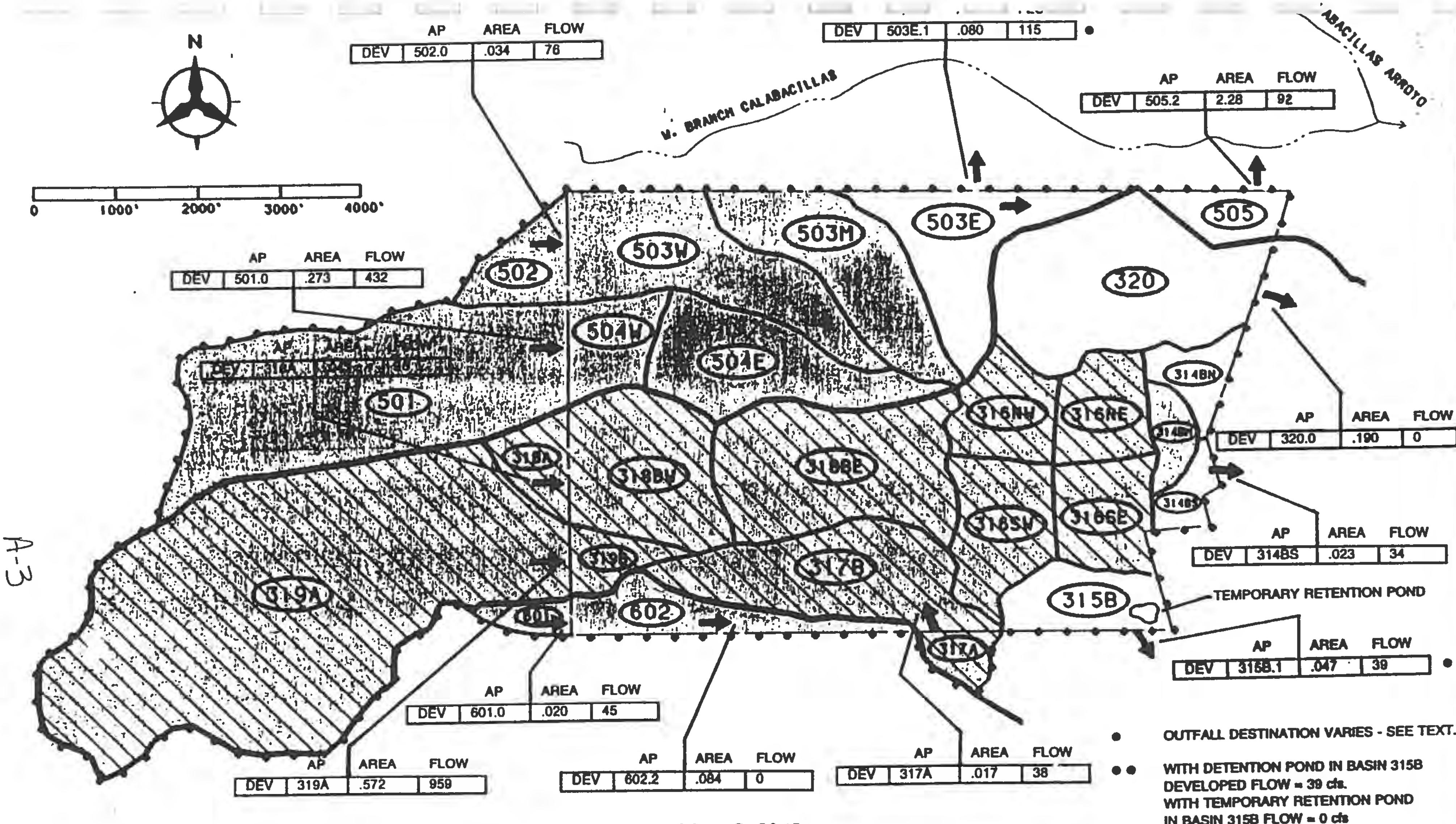
EXISTING CONDITION		AP	AREA	FLOW
	EX	501.0	.273	179

EXISTING FLOW DIRECTION

EXISTING FLOWS IN LAS VENTANAS
FIGURE 4

LAS VENTANAS
DRAINAGE MASTER PLAN

APR. 1995 JOB NO. 94118.20



● OUTFALL DESTINATION VARIES - SEE TEXT.

●● WITH DETENTION POND IN BASIN 315B DEVELOPED FLOW = 39 cfs. WITH TEMPORARY RETENTION POND IN BASIN 315B FLOW = 0 cfs

601 BASIN ID.

• • • STUDY AREA LIMITS

— — — BOUNDARY OF LAS VENTANAS

—— BOUNDARY OF PIEDRAS MARCADAS WATERSHED FROM MOLZEN-CORBIN 1993 PIEDRAS MARCADAS DRAINAGE MANAGEMENT PLAN (PMDMP)

CONTRIBUTING BASINS FROM PMDMP

BASINS DIVERTED FROM WEST CALABACILLAS TO PIEDRAS MARCADAS.

NOTE: FOR PROPOSED DEVELOPED CONDITIONS FLOW PATHS & DIVERSIONS, SEE FIGURE 6.

CONTRIBUTING BASINS FOR LAS VENTANAS DRAINAGE & RECREATION FACILITY NO. 1 DEVELOPED CONDITIONS

FIGURE 5

LAS VENTANAS
DRAINAGE MASTER PLAN
APR. 1995
JOB NO. 94118.20

subdivision into the North Branch Piedras Marcadas Channel or the storm drain extended from Universe Boulevard to accommodate this flow.

6.4 Proposed Detention Ponds

Three of the four detention ponds in the developed model are less than 10 feet deep with storage volumes less than 10 acre-feet. Two of the four ponds, LVDF No. 1 and No. 2, are proposed AMAFCA ponds. The other two ponds are city ponds.

The largest pond, LVDF No. 1, is proposed to occupy over 34 acres and will be sized for 5-year sediment accumulation. LVDF No. 2 is in a depression area in the east of Basin 320 and intercepts flows from Basin 320. This pond operates in parallel with Facility No. 1 and is proposed to be less than 10 acre-feet in storage volume and 7 feet in depth. Flowrates are reduced from 293 cfs to 32 cfs.

Table 2 compares existing and developed data for this facility and lists data for LVDF No. 2.

Table 2
Proposed AMAFCA Ponds

	Contributing Area (sq mi)	Inflow (cfs)	Outflow (cfs)	Storage (ac-ft)
LVDF No. 1				
Existing	1.28	139	0	33
PMDMP Developed	1.28	1808	251	73
BHI Developed	2.045	2998	49	143
LVDF No. 2	0.190	293	32	9.99

The main reasons for the difference in LVDF No. 1 developed flows from the PMDMP are:

- ➢ The Las Ventanas drainage scheme maximizes the drainage area into the pond by diversions of "500" and "600" basins. This has increased the contributing basin area to over 2 square miles from the PMDMP's 1.3 square miles. This correspondingly has reduced the flows going to the Calabacillas and the Middle Branch Piedras Marcadas.

- ➢ The Las Ventanas development scenario is different from that assumed by the PMDMP.

The differences in the contributing drainage areas are pictured in Figure 5, Contributing Basins for Las Ventanas Drainage Facility No. 1.

The two city ponds in Basin 503W and Basin 315B are summarized in Table 3. Following Table 3 are brief descriptions of flow scenarios for the ponds.

Table 3

City Ponds

Name	Drainage Area (sq mi)	Flowrate (cfs) In	Flowrate (cfs) Out	Storage (ac-ft)	Total Depth (ft)
503W Pond	.034	73	13	1.7	3.5
315B Pond	.047	107	0	4.5	7

The city pond in Basin 503W intercepts flows from Basin 502 entering Las Ventanas just south of the northwest corner of the subdivision. This pond reduces flows from 73 cfs to 13 cfs.

The city pond proposed for Basin 315B is a temporary retention pond because there is no existing storm drain into which these flows can be discharged. As long as it is a temporary retention pond, maintenance will be the responsibility of the property owner. The pond may be reconstructed into detention or eliminated when downstream improvements or capacity become available. As a detention pond, flows are reduced from 107 cfs to 39 cfs, which approximates the existing condition flowrates.

6.5 Synopsis of Developed Flow

The following is a synopsis of the flow patterns for Las Ventanas:

➢ West Branch Calabacillas Diversion System: Basins 502, 503W, 503M, 504E, and 316NW are routed to LVDF No. 1 via the West Branch Calabacillas Diversion Channel, 316NE is added to these flows, and the sum is discharged into LVDF No. 1 from the northwest.

➢ North Branch Piedras Marcadas System: Basins 501, 504W, 319A, 319B, 318A, 318B, 317A, and 316SW are routed via Tributary A, Tributary B, and the North Branch Piedras Marcadas Channel. Basins 601, 602, and 317A are routed as street flows to the North Branch Piedras Marcadas Channel and summed. The combined flows are summed with 316SE and discharged from the ehannel into LVDF No. 1 from the west.

➢ Basin 320 discharges to LVDF No. 2 in the east of Basin 320. Facility No. 2's discharges are added to the same pipe that outfalls from LVDF No. 1. Basin 505 is also added to this pipe as it exits Las Ventanas at the northeast corner of the property. The sum of the flows are conveyed to the West Branch of the Calabacillas.

- Tributary "A" and Tributary "B" Channels join at a confluence located in the park at the well site. This confluence will need to be analyzed and modeled in the future during design. From here, the channel becomes the North Branch Piedras Marcadas Channel, a 7-foot deep channel.

- The North Branch Piedras Marcadas Channel flows east across Las Ventanas paralleling an existing water line easement, crossing Rainbow Boulevard and the Loop Road. It travels 3200 feet, gathering local flows and off-site flows from the southwest comer of Las Ventanas before reaching Universe Boulevard.

- At the intersection of Universe Boulevard and North Branch Piedras Marcadas Channel, the channel increases to 8' deep and flows east 800 feet before discharging to the west side of LVDF No. 1.

7.3.3 Outfall to the Calabacillas Summary (Includes Las Ventanas Drainage Facilities No. 1 and No. 2 and Reaches 6, 7, and 8)

- LVDF No. 1 is a detention pond with 143 ac-ft of storage that occupies over 34 acres of land. This pond accommodates all of the flows discharged to it from the West Branch Calabacillas Diversion Channel and the North Branch Piedras Marcadas Channel, and will be sized for 5-year sediment accumulation. Total peak inflow in the 100-year storm is 2998 cfs, which is attenuated to a peak outflow of 49 cfs.

- The outfall from Facility No. 1 is a 42" storm drain (Reach 6) that flows north 2250 feet to where it intercepts the outfall of LVDF No. 2.

- LVDF No. 2 is a detention pond with a storage of less than 10 ac-ft and accommodates local flows from the region north of LVDF No. 1. Total peak inflow in the 100-year storm is 293 cfs, which is attenuated to a peak outflow of 32 cfs. This pond outfalls to a 36" pipe (Reach 7) that flows eastward a distance of 150 feet.

- At the confluence of the outfall from LVDF No. 2, the 42" outfall pipe from LVDF No. 1 increases to a 60" pipe (utilizing the 60" pipe that was salvaged from Golf Course Road) (Reach 8).

- Over a distance of 1500 feet, the 60" pipe gathers local flows from the northeast region of Las Ventanas, crosses Irving Boulevard, and outfalls to the West Branch of the Calabacillas Arroyo.

- The outfall discharges through a drainage easement to the West Branch of the Calabacillas, directly north of the northeast corner of Las Ventanas. This is to be a joint trench with a waterline being installed by New Mexico Utilities, Inc. (NMUI). In addition to the original 25' drainage easement, NMUI has acquired a 20' easement, and Sandia is obtaining an additional 15' easement for AMAFCA, for a total easement width of 60 feet.

- A USBR Type IV baffle-wall energy dissipator is proposed to reduce the velocity of the 92 cfs flows where it exits to the natural arroyo.

7.4 Development and Infrastructure Phasing

This section describes the anticipated project phasing with respect to the permanent and interior construction of the AMAFCA outfall facilities. The interior drainage facilities are described in a separate report entitled "Las Ventanas Subdivision Interim Drainage Facilities." Dedication of temporary and permanent easements will occur at platting.

Sandia Properties intends to develop the Las Ventanas Subdivision from the south to the north. The southern one-third of the property will be constructed first. Due to the shallow depth to rock on the eastern portion of the site, earth from the western portion will be placed on the eastern portion to provide enough soil cover for utility services. This will minimize the amount of rock excavation.

The anticipated yearly build-out for Las Ventanas will be 190 to 250 lots. Table 4, Development and Drainage Outfall Phasing, describes the proposed build-out through the year 1999.

Table 4

Development and Drainage Infrastructure Phasing

Year	Cumulative No. of Lots Built	AMAFCA Outfall Activity
1995	-	-
1996	250	Sandia to design outfall diversion and dam
1997	450	AMAFCA build outfall diversion
1998	640	AMAFCA start dam construction September 1998
1999	890	AMAFCA construction of dam complete by May 1999

The increased runoff from the development of lots will be accommodated in the two existing playas through construction of the first two phases. The two playas have enough volume to store upstream existing flows and flows from individual developments totaling 450 residential units. Before any more than 450 lots can be developed the outfall diversion to the Calabacillas will need to be constructed. With the outfall diversion constructed and the Loop Road Playa removed, a total of 640 residential units can be constructed. Any lot development beyond 640 lots will require

LVDF No. 1 to be under construction. While LVDF No. 1 is under construction an additional 250 lots can be developed. LVDF No. 2 will be built when the basin that drains to it (Basin 320 in northeast Las Ventanas) is developed. Sandia Properties will maintain the two playas prior to the construction of LVDF No. 1 by AMAFCA.

Basin Summary

TRACT I @ VENTANA RANCH

BASIN I.D.	AREA (AC)	UNITS #	% LAND TREATMENT A	B	C	D	DISCHARGE (CFS) 10 YR	100YR
HYRDOLOGICAL VOLUMETRIC & DISCHARGE DATA (EXISTING)								
Tract I	12.60		98.0%	0.0%	2.0%	0.0%	3.5	16.4
HYRDOLOGICAL VOLUMETRIC & DISCHARGE DATA (DEVELOPED)								
A1	0.23	0	0.0%	14.2%	14.2%	71.6%	0.5	0.9
A2	2.58	19	0.0%	21.4%	21.4%	57.1%	5.5	9.1
A3	2.55	18	0.0%	21.4%	21.4%	57.1%	5.4	9.0
A4	2.87	20	0.0%	21.4%	21.4%	57.1%	6.1	10.2
A5	2.58	19	0.0%	21.4%	21.4%	57.1%	5.5	9.1
A6	0.10	0	0.0%	40.0%	40.0%	20.0%	0.1	0.3
SUBTOTAL	10.91	76					23.2	38.7
O1	2.13	0	0.0%	21.0%	21.0%	58.0%	4.6	7.6
SUBTOTAL	2.13	0					4.6	7.6
TOTAL	**13.04**	**76**					**27.8**	**46.2**

NOTES: 1) Impervious percentages were calculated from the DPM equation A-4, with the remaining percentages distributed evenly between land treatment types B and C, except for Basins A1, A6, & O1. Percentage of type D for Basins A1, A6, & O1 were calculated from a cross-section and the rest was distributed evenly between land treatments types B and C.

N=UNITS/ACRES = 6.0
%D= 7*SQRT((N*N)+(5*N)) = 57.1 %

B-1

Shaded cells require user input. Non-shaded cells cannot be edited.*

Las Ventanas Detention Dam - Tract I

***** HYDRAULIC GRADE LINE CALCULATIONS *****

Manning's n = 0.013
for pipe

Structure	Diam. (in.)	Q (cfs)	Area	Vel.	K	Sf	Length (ft.)	MH Dia. (ft.)	BEND Angle	Hf	Hb	Hj	Hmh	Ht	Total Losses	HGL(dn)	HGL(up)	Low Point	HV	EGL(dn)	EGL(up)	JUNCTION LOSSES Dia. 3 (in.)	Junct. Angle	<delta>y	Ht(inc.)	Ht(dec.)
OUTFALL								0	0		0.00	0.00	0.00	0.00	0.00		5401.87	5402.00	0.65	5402.52	5402.52	0	0	0.0000	0.0650	0.0000
	48	81.3	12.57	6.47	1436	0.0032	120.00			0.38					0.38											
MH#1								6	12		0.05	0.00	0.03	0.00	0.08	5402.25	5402.33	5405.20	0.65	5402.90	5402.98	0	0	0.0000	0.0000	0.0000
	48	81.3	12.57	6.47	1436	0.0032	111.06			0.36					0.36											
INLET#1								0	0		0.00	0.14	0.00	0.00	0.14	5402.69	5402.98	5405.53	0.51	5403.34	5403.48	18	90	0.2889	0.00	0.00
	48	71.7	12.57	5.71	1436	0.0025	28.52			0.07					0.07											
INLET#2								0	0		0.00	0.17	0.00	0.00	0.17	5403.05	5403.08	5405.51	0.64	5403.56	5403.72	18	90	0.0268	0.00	0.00
	42	62.0	9.62	6.44	1006	0.0038	19.35			0.07					0.07											
MH#2								6	12		0.05	0.00	0.03	0.00	0.08	5403.15	5403.23	5406.41	0.64	5403.80	5403.88	0	0	0.0000	0.00	0.00
	42	62.0	9.62	6.44	1006	0.0038	219.00			0.83					0.83											
INLET#3								0	0		0.00	0.33	0.00	0.00	0.33	5404.06	5404.73	5405.00	0.31	5404.71	5405.04	18	90	0.6693	0.00	0.00
	42	43.0	9.62	4.47	1006	0.0018	42.00			0.08					0.08											
MH#3								6	0		0.00	0.00	0.02	0.00	0.02	5404.81	5404.82	5406.30	0.31	5405.12	5405.13	0	0	0.0000	0.00	0.00
	42	43.0	9.62	4.47	1006	0.0018	84.50			0.15					0.15											
MH#4								6	0		0.00	0.00	0.02	0.00	0.02	5404.98	5404.99	5408.51	0.31	5405.29	5405.30	0	0	0.0000	0.00	0.00
	42	43.0	9.62	4.47	1006	0.0018	32.81			0.06					0.06											
MH#5								6	0		0.00	0.03	0.00	0.00	0.03	5405.05	5405.05	5407.58	0.34	5405.36	5405.40	18	53	-0.2066	0.00	0.00
	30	23.0	4.91	4.69	410	0.0031	50.00			0.16					0.16											
STUBOUT								6	0		0.00	0.00	0.00	0.07	0.07	5405.21	5405.62	5409.00	0.00	5405.55	5405.62	0	0	0.0000	0.00	0.07

Type "A" Sump - Point 1

ANALYSIS OF AN INLET IN A SUMP CONDITION - **Pt 1 at lowpoint on north side of Paradise Blvd.**

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 opeining
C=3.0
L(single grate)=[(2.67')+2(1.8')]=6.27 ft
Q=3.0(6.27)H^1.5=18.81*H^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	HEIGHT ABOVE INLET	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	Q(100 yr) = 7.6 cfs is provided at this depth
	0.50	0.50	4.24	6.65	13.94	15.14	
	0.60	0.60	5.58	8.74	15.27	19.90	Q(2x100 yr) = 15.2 cfs is provided at this depth
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	
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:

Q(100) = 2*[(runoff of the wing opening) + (the lesser of the weir or orifice amount taken by the double grate)].

THE 100 YR STORM EVENT = 7.6 CFS at the sump condition

THE 2 x 100 YR STORM EVENT = 15.2 CFS at the sump condition

C-6

Type "A" Sump - Point 2

ANALYSIS OF AN INLET IN A SUMP CONDITION - **Pt 2 at lowpoint on north side of Street B**

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 opeining
C=3.0
L(single grate)=[(2.67')+2(1.8')]=6.27 ft
Q=3.0(6.27)H^1.5=18.81*H^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	HEIGHT ABOVE INLET	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	
	0.60	0.60	5.58	8.74	15.27	19.90	Q(100 yr) = 19.1 cfs is provided at this depth
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	
ROW LIMIT	1.00	1.00	12.00	18.81	19.72	42.81	Q(2x100 yr) = 38.1 cfs is provided at this depth

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

Q(100) = 2*[(runoff of the wing opening) + (the lesser of the weir or orifice amount taken by the double grate)].

THE 100 YR STORM EVENT = 19.1 CFS at the sump condition

THE 2 x 100 YR STORM EVENT = 38.1 CFS at the sump condition

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ANALYSIS OF AN INLET IN A SUMP CONDITION - **Pt 3 at lowpoint of Street C (for each inlet)**

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

<u>WEIR:</u> Q=C*L*H^1.5

<u>Wing opening</u>
C= 3.0
L= 4.0 ft
Q=3.0(4.0')H**1.5= 12.0H**1.5

<u>Grate opeining</u>
C=3.0
L(single grate)=[(2.67')+2(1.8')]=6.27 ft
Q=3.0(6.27)H^1.5=18.81*H^1.5

<u>ORIFICE:</u> Q=C*A*(2*G*H)**0.5

<u>Grate opening</u>
C=0.6
A(single grate)=4.09 sf
Q=2.46*(64.4*H)^0.5

<u>Wing opening</u>
C=0.6
A=2.0 sf
Q=1.2*(64.4*H)^0.5

	WS ELEVATION	HEIGHT ABOVE INLET	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	Q(100 yr) = 9.7 cfs is provided at this depth
	0.50	0.50	4.24	6.65	13.94	15.14	
	0.60	0.60	5.58	8.74	15.27	19.90	Q(2x100 yr) = 19.3 cfs is provided at this depth
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	
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:

Q(100) = 2*[(runoff of the wing opening) + (the lesser of the weir or orifice amount taken by the double grate)].

THE 100 YR STORM EVENT = 9.7 CFS at the sump condition

THE 2 x 100 YR STORM EVENT = 19.3 CFS at the sump condition

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