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Volcano Heights Drainage Compilation
Report (revised Dec. 2011)

Wilson & Company, Inc.

Wilson & Company, 2011

VOLCANO HEIGHTS DRAINAGE COMPILATION REPORT

REVISED

DECEMBER 2011

Prepared For

City of Albuquerque
Albuquerque, NM

Prepared By

**WILSON
& COMPANY**

Wilson & Company, Inc., Engineers & Architects
4900 Lang Ave, NE

Albuquerque, NM 87109

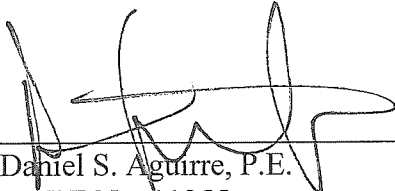
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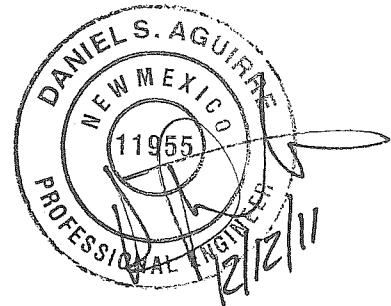
I, Daniel S. Aguirre, P.E., do hereby certify that this report was prepared by me or under my direction and that I am a duly registered Professional Engineer under the laws of the State of New Mexico



Daniel S. Aguirre, P.E.
NMPE No. 11955

12/12/11

Date



SECTION 1 – PURPOSE

The purpose of this drainage report is to provide a compilation of the storm drain infrastructure constructed and proposed to be constructed within the portions of the Lyon storm drain watershed, the Piedras Marcadas Dam watershed and the Mariposa Detention Basin watershed. The report identifies allowable flows from the sub-basins within these watersheds for the 100-year 6-hour event.

1.1 Introduction

This report summarizes proposed hydrologic conditions; provides the design for fully developed peak flows; provides recommendations; and identifies downstream drainage capacities.

1.2 Existing Reports

Existing drainage reports providing information used in this report include:

“Boca Negra – Mariposa Arroyo Drainage Management Plan”, dated April 2005, by Resource Technology, Inc.

“La Cuentista Subdivision Drainage Report”, dated November 2003, by Wilson & Company, Inc.

“Paseo del Norte Drainage Report”, dated August 16, 2004, by Wilson & Company, Inc.

“Amendment to the Trails Unit II Drainage Master Plan”, dated August 2007, by Wilson & Company, Inc.

Guidelines and recommendations from the above reports were incorporated into this drainage report where possible.

SECTION 2 - HYDROLOGIC ANALYSIS

There are three ultimate discharge points affected by the infrastructure described in this report. The first area discharges a portion to the Lyon Boulevard storm drain system with a 100-year 24-hour overflow to Petroglyph National Monument discharging to the Piedras Marcadas Dam. This area is bound by the Trails Unit IV and Unser Boulevard to the south and the Chamisa basin to the north. The allowable discharge for this area is described below and shown on Plate 1.

Discharge Point	Allowable Discharge	Ultimate Discharge Point
Chamisa Storm Drain	45 cfs	Lyon Boulevard Storm Drain
Unser Detention Basin	285 cfs	Low Flows diverted to Lyon Boulevard Storm Drain
	120 cfs	Maximum Overflow to Petroglyph National Monument

The second Area ultimately discharges to the Piedras Marcadas Dam. This area is bound by Paseo del Norte and the Trails Unit IV to the south, the aforementioned basin to the northwest, and the Chamisa basin line to the North. A portion of the watershed is collected in a storm drain system below Unser Blvd. and is directed to the Unser Detention Basin. We recommend the Unser Detention Basin and the Chamisa Detention basins be connected to allow low flows to discharge to the Lyon Storm Drain. This will limit the high frequency erosive discharge to the Petroglyph National Monument. The Unser Detention basin would include an overflow weir that would have a maximum capacity of 120 cfs discharge to the monument and ultimately to the Piedras Marcadas Arroyo. The remainder of the watershed drains to a storm drain system beneath Paseo del Norte and also discharges into the Piedras Marcadas Arroyo.

The third discharge point is the Mariposa Basin. The areas contributing to the Mariposa Basin includes storm water runoff west of Unser Boulevard and south of Paseo del Norte Including Basins N1 and N2 on the east side of Unser. These areas discharge to the Boca Negra Detention Dam through various infrastructures including the Unser storm drain, the Universe storm drain and the Boca Negra channel. Additional areas include La Cuentista Subdivision and SAD 228. The flow from these additional areas discharges at several locations to the Petroglyph National Monument where it is conveyed to the Mariposa basin through overland flow. The southeast portion of SAD 228 is drained by a storm drain in Unser Boulevard to join with the discharge from the Boca Negra Dam and conveyed to the Boca Negra Arroyo in the Atrisco storm drain as shown on Plate 1, in Appendix B. See Figure 1 for Vicinity map.

2.1 Methodology

Hydrologic modeling used for the existing infrastructure designs and calculations shown in this report are performed using the 1997 version of The Arid-Lands Hydrologic Model (AHYMO) in accordance with the City of Albuquerque Development process Manual (DPM), section 22.2, December 1999 for the given 100-year, 6-hour storm event. The AHYMO input, summary and output files for the developed conditions are included in Appendix A. Hydraflow Storm Sewers 2005 software by Intelisolve was used to size the underground storm systems for modeling purposes and are for information only project specific reports and calculations are required for actual design of future infrastructure. See Appendix A for calculations summary.

2.2 Design Storm Precipitation

AHYMO was used to calculate proposed runoff. The rainfall values used were for the 1 and 6 - hour precipitation for a 100-year storm event. Rainfall values were obtained from precipitation frequency data server NOAA Atlas 14.

Table 1: Precipitation Values		
Return Period (yrs)	1 hr Rainfall (in)	6 hr Rainfall (in)
100	1.7	2.2

2.3 Land Treatments

Proposed land treatment percentages used in the AHYMO Computer model are based on the original Paseo del Norte drainage report dated August 2004. See Table 2 below for land treatment percentages.

Table 2: Land Treatment Percentages				
Land Use	Type A	Type B	Type C	Type D
Residential/Town homes	0%	15%	35%	50%
Residential	0%	10%	40%	50%
Commercial	0%	10%	10%	80%
Open Space	100%	0%	0%	0%
Roadway	0%	10%	0%	90%

2.1 Existing and Proposed Conditions

2.4.1 Existing Conditions

The existing topography slopes generally from the northwest to the northeast, east, and southeast. The Chamisa Storm Drain and Chamisa Detention Basin are constructed, the Trails Subdivision west of Universe and portions of the La Cuentista subdivision are constructed, Vista Vieja is constructed and the downstream section of the storm drain system beneath Paseo del Norte is constructed. The remainder of the infrastructure is future although several projects in the area are currently in the design phase.

2.4.2 Proposed Conditions

Each of the ultimate discharge points identified have limited peak flow capacities driving the need to look at the activities in this area as a whole. This planning document recommends ponds located throughout the basin to restrict flows to meet downstream capacities. The analysis points shown on Plate 1 represent allowable flows to meet the infrastructure capacities.

Pond 11 detains flows originating in sub-basins K1, K2, K3, K4, ST11, and E2.1. These flows will be discharged into the Chamisa Basin and are to be limited to 45 cfs.

The Chamisa Detention Basin and the Unser Detention Basin act as a system and their design will be detailed in a future study. The Chamisa Detention Basin accepts flow from sub-basins 1, 2, 3, E1, E2, F, F1, U1, and U2 in addition to storm water originating outside of this report's scope. The Chamisa Detention Basin and Unser Detention Basin will be joined to allow flows in the smaller more frequent events to discharge (5 year event minimum) to the Lyon Boulevard storm drain. Then in larger events a portion of the discharge will overflow a weir structure to the Piedras Marcadas Arroyo in the Petroglyph National Monument with a maximum discharge of 120 cfs during the 100-year 6-hour event.

Basins identified in this report as 4A, 4B and part of Paseo del Norte Blvd located immediately south of Paseo del Norte and east of Unser Blvd discharge to proposed Pond 10. A proposed storm system in Paseo Del Norte Blvd will convey routed flows from Pond 10, runoff from sub-basins north of Paseo Del Norte Blvd and Bain A to the existing 72" storm drain pipe in Paseo Del Norte Blvd.

Pond 2 detains flows from the sub-basins south and east of Unser Blvd. The outlet pipe from this pond and the storm system in Paseo Del Norte Blvd tie into the existing 72" storm drain. The allowable discharge at this point will be 620 cfs. The existing 72" storm drain ultimately discharges into the existing concrete culvert boxes conveying flows to the Piedras Marcadas Dam.

The Universe Boulevard storm drain accepts flows generated from the roadway, the Trails Subdivision pond system and the area contained in basins labeled M1 and M2-B, ultimately discharging to the proposed Boca Negra Dam. The Unser storm drain system shall not receive flows from areas located below elevation 5339.

Flows generated from areas below elevation 5339 including areas a portion of the area designated as SAD 228 discharge to a new 54" storm drain parallel to Unser Boulevard with an 80 cfs capacity. This storm drain discharges to the Atrisco storm drain below at a confluence with the primary principal spillway from the proposed Boca Negra Dam. The storm drain system conveys these flows to the Boca Negra Arroyo with a ultimate discharge to the Mariposa Basin.

Ponds 6, 7, 8 and 9 detain flows before discharging allowable amounts through overland flow to the Mariposa Basin. Refer to Plate 1 in Appendix B for pond locations and allowable discharge rates. Exhibit 1 in Appendix B shows basin boundaries and major discharge points in color. See Table 3 for Basin Summary.

Table 3: Basin Summary								
BASIN	AREA (SQ MI)	AREA (ACRE)	LAND TREATMENT (%)				Q ₁₀₀ (CFS)	VOL ₁₀₀ (AC-FT)
			A	B	C	D		
BASINS DRAINING TO THE CHAMISA BASIN THROUGH POND 11 ¹								
E2.1	0.0124	7.93	0	15	35	50	26	0.91
K1	0.0238	15.23	0	10	10	80	55	2.17
K2	0.0059	3.78	0	10	10	80	14	0.54
K3	0.0148	9.47	0	10	10	80	34	1.35
K4	0.0196	12.54	0	10	10	80	46	1.78
ST11	0.0068	4.33	0	10	0	90	14	0.65
BASINS DRAINING TO THE UNSER DETENTION BASIN								
1	0.0132	8.47	0	10	15	75	27	0.97
2	0.0113	7.23	0	10	15	75	26	1.00
3	0.0151	9.66	0	10	15	75	35	1.33
11A	0.0066	4.20	0	10	10	80	15	0.60
E1	0.0118	7.52	0	15	35	50	24	0.86
E2	0.0453	28.97	0	15	35	50	85	0.94
F	0.0043	2.77	0	15	35	50	9	0.26
PDN1	0.0196	12.51	0	10	0	90	37	1.89
U1	0.0158	10.11	0	10	0	90	38	1.53
U2	0.0259	16.60	0	10	0	90	49	2.34
BASINS DRAINING INTO POND 2								
5	0.0298	19.07	0	10	10	80	69	2.71
6	0.0355	22.70	0	10	10	80	83	3.23
8	0.0198	12.67	0	10	10	80	46	1.80
9	0.0316	20.20	0	10	10	80	74	2.87
10	0.0567	36.29	0	10	10	80	122	5.16
13	0.0626	40.06	0	10	10	80	140	5.70
11B	0.0553	35.37	0	10	0	90	116	5.03
11C	0.0332	21.23	0	10	10	80	77	3.02
12A	0.0308	19.71	0	10	10	80	72	2.80
6A	0.0153	9.77	0	10	10	80	33	1.39
ST1	0.0141	9.04	0	10	0	90	31	1.37
ST2	0.0109	7.00	0	10	0	90	24	1.06
ST3	0.0069	4.39	0	10	0	90	15	0.66
ST4	0.0077	4.94	0	10	0	90	17	0.75

Table 3-Continued: Basin Summary

BASIN	AREA (SQ MI)	AREA (ACRE)	LAND TREATMENT (%)				Q ₁₀₀ (CFS)	VOL ₁₀₀ (AC-FT)
			A	B	C	D		
BASINS DRAINING INTO PASEO DEL NORTE STORM DRIAN SYSTEM								
4A ⁴	0.0388	24.83	0	10	10	80	90	3.53
4B ⁴	0.0080	5.12	0	10	10	80	19	0.73
PDN2 ⁴	0.0126	8.06	0	10	0	90	30	1.22
7	0.0354	22.66	0	10	10	80	77	3.22
12B	0.0144	9.22	0	10	10	80	34	1.31
PDN3	0.0151	9.66	0	10	0	90	30	1.46
PDN4	0.0111	7.13	0	10	0	90	25	1.08
A	0.0275	17.60	0	5	10	85	66	2.60
BASINS DRAINING INTO PIEDRAS MARCADAS								
B	0.0211	13.53	100	0	0	0	16	0.46
F1	0.0204	13.08	0	60	40	0	28	0.78
G	0.1032	66.05	100	0	0	0	80	2.22
H	0.3826	244.84	100	0	0	0	288	8.24
PDN5	0.0198	12.66	0	10	0	90	48	1.91
PDN6	0.0185	11.82	0	10	0	90	45	1.79
BASINS DRAINING INTO BOCA NEGRA DAM								
UNIVERSE BLVD								
P1	0.0313	20.00	25	26	27	22	44	1.52
P2	0.1094	70.02	0	25	25	50	153	7.85
P3	0.0515	32.96	0	25	25	50	63	3.70
UNSER BLVD								
M1	0.1381	88.38	0	10	40	50	234	10.25
M2-B	0.0201	21.79	0	10	40	50	41	1.49
*N1 ²	0.0814	52.10	0	10	40	50	146	6.05
N2	0.0246	15.74	0	10	40	50	51	1.83
T1	0.0890	56.96	0	10	40	50	149	6.61
*U0 ³	0.0319	20.42	0	10	40	50	49	2.37
BASIN DRAINING INTO ATRISCO STORM DRAIN								
M2-A	0.1145	64.35	5	30	35	30	142	6.52
M3	0.1793	114.75	0	10	40	50	303	13.32
BASIN DRAINING INTO POND-6								
M3-1	0.0534	34.17	0	10	40	50	108	3.97
BASIN DRAINING INTO POND-7								
M4	0.0172	11.01	0	10	40	50	36	1.28
BASIN DRAINING INTO POND-8								
M5	0.0707	45.25	0	10	40	50	137	5.25

Table 3-Continued: Basin Summary								
BASIN	AREA (SQ MI)	AREA (ACRE)	LAND TREATMENT (%)				Q ₁₀₀ (CFS)	VOL ₁₀₀ (AC-FT)
			A	B	C	D		
BASIN M6 DRAINING INTO POND-9 AND ESCARPMENT								
M6-1 ⁵	0.0002	0.15	0	10	40	50	3	0.02
M6-2 ⁶	0.0063	4.01	0	10	40	50	11	0.47
NOTES:								
* DIVIDED FLOW								
1 - 45 CFS FROM BASIN E2 DRAINS INTO CHAMISA STORM DRAIN (5 CFS/LOT)								
2- 90 CFS DRAINS INTO LA CUENTISTA SUBDIVISION								
3 - 19 CFS DRAINS INTO THE 48" OUTLET FROM BOCA NEGRA DAM								
4- ROUTED THROUGH POND 10								
5- FREE DISCAHRGE.								
6- DRAINS INTO POND 9.								

SECTION 3 – HYDRAULIC ANALYSIS

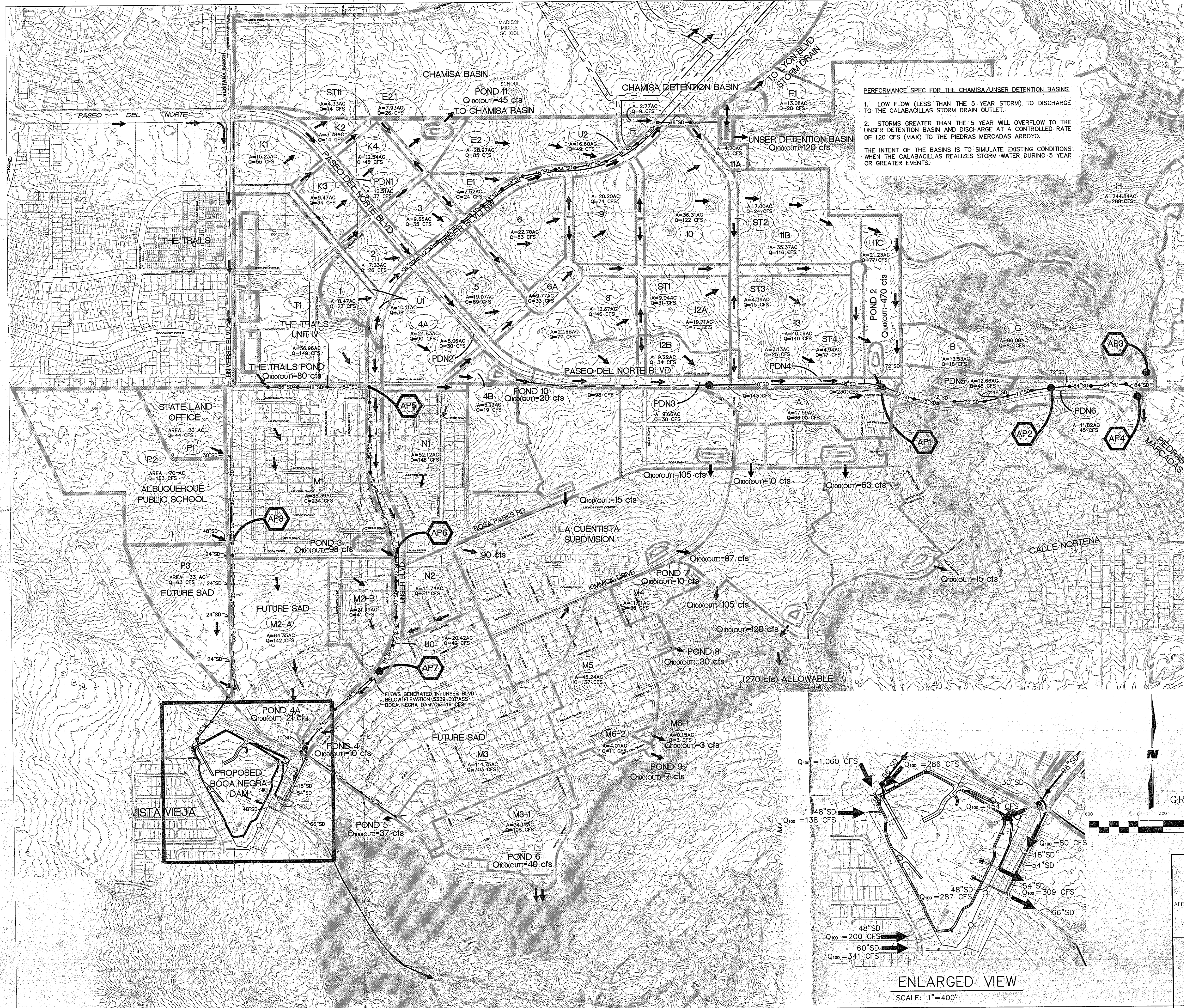
3.1 Storm Drain Analysis

Analyses for these systems were modeled using HydraFlow Storm Sewers 2005 by Intelisolve. The conceptual storm drain systems was modeled for planning and study purposes detailed design calculations are required for final infrastructure design. The proposed system may be found on Plate 1 in Appendix B.

SECTION 4 - CONCLUSION AND RECOMMENDATIONS

Proposed storm drain facilities have been evaluated and modeled to convey the developed runoff from the sub basins identified in this report. Plate 1 summarizes the proposed storm drain system for development of Volcano Heights as delineated in this report. The following table is a summary of the 100 year design flows recommended to be used for the design of infrastructure located within the boundaries identified on Plate 1.

Table 4 - Analysis Point Summary		
Analysis Point	Location	Q ₁₀₀ (cfs)
AP1	PdN at the Petoglyph national Monument	620
AP2	PdN at Sub-Basin B Entry	643
AP3	PdN Xing of Piedras Marcadas	288
AP4	Piedras Marcadas Arroyo below PdN	824
AP5	The Trails at Proposed Unser Blvd	227
AP6	Proposed Unser Blvd at Rosa Parks	330
AP7	Proposed Unser Blvd at SAD 228	439
AP8	Universe Blvd at Albuquerque Public School	176



PERFORMANCE SPEC FOR THE CHAMISA/UNSER DETENTION BASINS

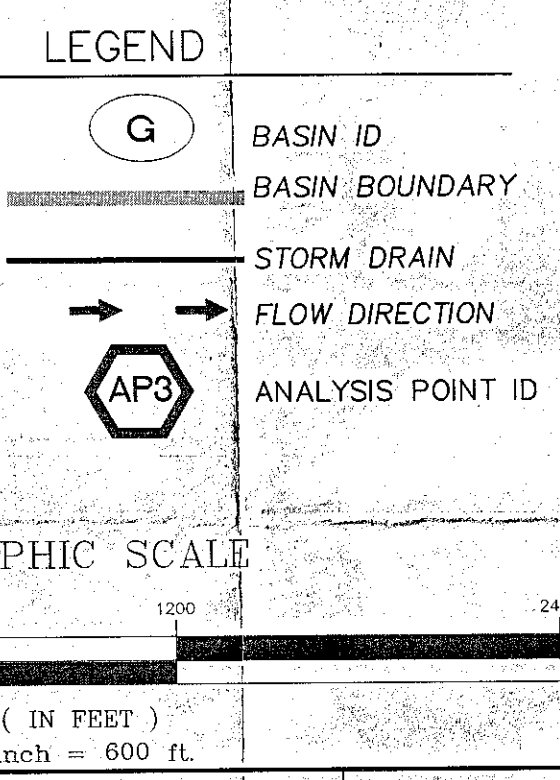
1. LOW FLOW (LESS THAN THE 5 YEAR STORM) TO DISCHARGE TO THE CALABACILLAS STORM DRAIN OUTLET.

2. STORMS GREATER THAN THE 5 YEAR WILL OVERFLOW TO THE UNSER DETENTION BASIN AND DISCHARGE AT A CONTROLLED RATE OF 120 CFS (MAX) TO THE PIEDRAS MERCADAS ARROYO.

THE INTENT OF THE BASINS IS TO SIMULATE EXISTING CONDITIONS WHEN THE CALABACILLAS REALIZES STORM WATER DURING 5 YEAR OR GREATER EVENTS.

Table 1: Basin Summary									
BASIN	AREA (SQ MI)	AREA (ACRE)	LAND TREATMENT (%)				Q100 (CFS)	VOL100 (AC-FT)	
			A	B	C	D			
BASINS DRAINING TO THE CHAMISA BASIN THROUGH POND 11									
E2.1	0.0124	7.93	0	15	35	50	26	0.91	
K1	0.0238	15.23	0	10	10	80	55	2.17	
K2	0.0059	3.78	0	10	10	80	14	0.54	
K3	0.0148	9.47	0	10	10	80	34	1.35	
K4	0.0196	12.54	0	10	10	80	46	1.78	
ST11	0.0068	4.33	0	10	0	90	14	0.65	
BASINS DRAINING TO THE UNSER DETENTION BASIN									
1	0.0132	8.47	0	10	15	75	27	0.97	
2	0.0113	7.23	0	10	15	75	26	1.00	
3	0.0151	9.66	0	10	15	75	35	1.33	
11A	0.0066	4.20	0	10	10	80	15	0.60	
E1	0.0118	7.52	0	15	35	50	24	0.86	
E2	0.0453	28.97	0	15	35	50	85	0.94	
F	0.0043	2.77	0	15	35	50	9	0.26	
PDN1	0.0196	12.51	0	10	0	90	37	1.89	
U1	0.0158	10.11	0	10	0	90	38	1.53	
U2	0.0259	16.60	0	10	0	90	49	2.34	
BASINS DRAINING INTO POND 2									
5	0.0298	19.07	0	10	10	80	69	2.71	
6	0.0355	22.70	0	10	10	80	83	3.23	
8	0.0198	12.67	0	10	10	80	46	1.80	
9	0.0316	20.20	0	10	10	80	74	2.87	
10	0.0567	36.29	0	10	10	80	122	5.16	
13	0.0626	40.06	0	10	10	80	140	5.70	
11B	0.0553	35.37	0	10	0	90	116	5.03	
11C	0.0332	21.23	0	10	10	80	77	3.02	
12A	0.0308	19.71	0	10	10	80	72	2.80	
6A	0.0153	9.77	0	10	10	80	33	1.39	
ST1	0.0141	9.04	0	10	0	90	31	1.37	
ST2	0.0109	7.00	0	10	0	90	24	1.06	
ST3	0.0069	4.39	0	10	0	90	15	0.66	
ST4	0.0077	4.94	0	10	0	90	17	0.75	
BASINS DRAINING INTO PASEO DEL NORTE STORM DRAIN SYSTEM									
4A	0.0388	24.83	0	10	10	80	90	3.53	
4B	0.0080	5.12	0	10	10	80	19	0.73	
PDN2	0.0126	8.06	0	10	0	90	30	1.22	
7	0.0354	22.66	0	10	10	80	77	3.22	
12B	0.0144	9.22	0	10	10	80	34	1.31	
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A	0.0275	17.60	0	5	10	85	66	2.60	
BASINS DRAINING INTO PIEDRAS MERCADAS									
B	0.0211	13.53	100	0	0	0	16	0.46	
F1	0.0204	13.08	0	60	40	0	28	0.78	
G	0.1032	66.05	100	0	0	0	80	2.22	
H	0.3826	244.84	100	0	0	0	288	8.24	
PDN5	0.0198	12.66	0	10	0	90	48	1.91	
PDN6	0.0185	11.82	0	10	0	90	45	1.79	
BASINS DRAINING INTO BOCA NEGRA DAM									
UNIVERSE BLVD									
P1	0.0313	20.00	25	26	27	22	44	1.52	
P2	0.1094	70.02	0	25	25	50	153	7.85	
P3	0.0515	32.96	0	25	25	50	63	3.70	
UNSER BLVD									
M1	0.1381	88.38	0	10	40	50	234	10.25	
M2-B	0.0201	21.79	0	10	40	50	41	1.49	
*N1	0.0814	52.10	0	10	40	50	146	6.05	
N2	0.0246	15.74	0	10	40	50	51	1.83	
T1	0.0890	56.96	0	10	40	50	149	6.61	
*U0	0.0319	20.42	0	10	40	50	49	2.37	
BASIN DRAINING INTO ATRISCO STORM DRAIN									
M2-A	0.1145	64.35	5	30	35	30	142	6.52	
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M5	0.0707	45.25	0	10	40	50	137	5.25	
BASIN M6 DRAINING INTO POND-9 AND ESCARPMENT									
M6-1	0.0002	0.15	0	10	40	50	3	0.02	
M6-2	0.0063	4.01	0	10	40	50	11	0.47	
NOTES:									
* DIVIDED FLOW									
1- 45 CFS FROM BASIN E2 DRAINS INTO CHAMISA STORM DRAIN (5 CFS/LOT)									
2- 90 CFS DRAINS INTO LA CUENTISTA SUBDIVISION									
3- 19 CFS DRAINS INTO THE 48" OUTLET FROM BOCA NEGRA DAM									
4- ROUTED THROUGH POND 10									
5- FREE DISCHARGE									
6- DRAINS INTO POND 9									

ANALYSIS POINT	FLOW (CFS)
AP1	620
AP2	644
AP3	288
AP4	941
AP5	227
AP6	330
AP7	439
AP8	176



WILSON & COMPANY
4900 LANG AVE NE
ALBUQUERQUE, NEW MEXICO 87109
PH (505) 348-4003
FAX (505) 348-4072
www.wilsonco.com

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VOLCANO HEIGHTS
CONCEPTUAL DRAINAGE COMPILATION PLAN

PLATE 1