DRAINAGE REPORT

for

THE AMOLE CHANNEL

from Confluence with Snow Vista Channel

down to the Amole Dam

Prepared for

Albuquerque Metropolitan Arroyo Flood Control Authority
2600 Prospect NE
Albuquerque, NM 87107
(505) 884-2215

Prepared by

Mark Goodwin & Associates, PA
P.O. Box 90606
Albuquerque, NM 87199
(505) 828-2200

July 2004

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DRAINAGE INFORMATION SHEET

(REV. 1/28/2003rd)

PROJECT TITLE: Sundoro South — ZONE MAP/DRG #: J8 & J9

B#: — EPC #: — W.O.#:

LEGAL DESCRIPTION: Tract J-2-A , Westland North Subdivision

CITY ADDRESS: Ladera Drive @ 98th Street

ENGINEERING FIRM:	Mark Goodwin & Associates, PA	CONTACT:	James D. Hughes, PE
ADDRESS:	PO Box 90606	PHONE:	828-2200
CITY, STATE:	Albuquerque, NM	ZIP CODE:	87199
OWNER:	Westland Development Co., Inc	CONTACT:	Leroy Chavez
ADDRESS:	401 Coors NE	PHONE:	831-9600
CITY, STATE:	Albuquerque, NM	ZIP CODE:	87121
ARCHITECT:		CONTACT:	
ADDRESS:		PHONE:	
CITY, STATE:		ZIP CODE:	
SURVEYOR:	Aldrich Land Surveying	CONTACT:	Tim Aldirch
ADDRESS:	P.O. Box 30701	PHONE:	884-1990
CITY, STATE:	Albuquerque, NM	ZIP CODE:	87190-0701
CONTRACTOR:		CONTACT:	
ADDRESS:		PHONE:	
CITY, STATE:		ZIP CODE:	

CHECK TYPE OF SUBMITTAL:

- ✔ DRAINAGE REPORT
- ___ DRAINAGE PLAN 1ST SUBMITTAL, **req. TCL or equal**
- ___ DRAINAGE PLAN RESUBMITTAL
- ___ CONCEPTUAL GRADING & DRAINAGE PLAN
- ✔ GRADING PLAN
- ✔ EROSION CONTROL PLAN
- ___ ENGINEER'S CERTIFICATION (HYDROLOGY)
- ___ CLOMR/LOMR
- ___ TRAFFIC CIRCULATION LAYOUT (TCL)
- ___ ENGINEER'S CERTIFICATION (TCL)
- ___ ENGINEER'S CERTIFICATION (DRB APPR. SITE PLAN)
- ___ OTHER

CHECK TYPE OF APPROVAL SOUGHT:

- ___ SIA / FINANCIAL GUARANTEE RELEASE
- ✔ PRELIMINARY PLAT APPROVAL
- ___ S. DEV. PLAN FOR SUB'D. APPROVAL
- ___ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
- ___ SECTOR PLAN APPROVAL
- ___ FINAL PLAT APPROVAL
- ___ FOUNDATION PERMIT APPROVAL
- ___ BUILDING PERMIT APPROVAL
- ___ CERTIFICATE OF OCCUPANCY (PERM)
- ___ CERTIFICATE OF OCCUPANCY (TEMP)
- ✔ GRADING PERMIT APPROVAL
- ___ PAVING PERMIT APPROVAL
- ___ WORK ORDER APPROVAL
- ___ OTHER (specify) ___

WAS A PRE-DESIGN CONFERENCE ATTENDED?

- ___ YES
- ✔ NO
- ___ COPY PROVIDED

DATE SUBMITTED: ___ BY: ___

Requests for approvals of Site Development Plans and/or Subdivision Plats shall be accompanied by a drainage submittal. The particular nature, location and scope of the proposed development defines the degree of drainage detail. One or more of the following levels of submittal may be required based on the following:

1. **Conceptual Grading and Drainage Plan**: Required for approval of Site Development Plans greater than five (5) acres and Sector Plans.
2. **Drainage Plans**: Required for building permits, grading permits, paving permits and site plans less than five (5) acres.
3. **Drainage Report**: Required for subdivisions containing more than ten (10) lots or constituting five (5) acres or more.

PURPOSE & SCOPE

The purpose of this report is to document the adequacy of the proposed Amole Channel from the confluence of the Snow Vista Channel down to the Amole Dam. It includes Hydrology and Hydraulic calculations together with maps of the drainage basins and plans of the proposed shot-crete channel and bridges proposed at 98th Street and Blake Road. It includes a proposed levee in two locations and a hydraulic model of the existing bridge at Gibson Boulevard, and five (5) major junctions both existing and proposed. Freeboard and super elevation calculations are summarized in the Hydraulic Summary Table. Hydrology analysis is provided for both Existing and Future Developed Conditions. The hydraulic calculations use only the higher Future Developed flows since the lower existing flows will probably be contained if the higher ones are contained.

Chapter I

HYDROLOGY

Purpose & Existing Conditions

The purposes of this re-study is to determine both existing and future developed flows for the reach of the channel being designed by this project, from the confluence of the Snow Vista and Amole channels down to the Amole channel rundown into the Amole Dam. This is necessary because previous studies are either inaccurate or incomplete, or both. The 1999 Amole-Hubble DMP is the approved plan that governs development in the watershed. It's ponding requirements have generally been enforced, but it's drainage patterns have been changed. Typically the change is a shift in the point of discharge for several sub-basins to a different place on the channel, usually to a lower place on the channel, though not always lower (see Drainage Basin Maps in Appendix A). Most of the 15 or so existing ponds have been constructed since the 1999 DMP so the specifics of each pond were not modeled in the 1999 DMP. This re-study attempts to model actual constructed conditions and further differentiates the theoretical (planned but not precisely implemented) from the true field condition. As-Built plans are in Appendix A and each pond was inspected. Engineering judgment was used in determining the extent to which the plans and the as-built plans matched actual field conditions. Further surveys of the pond were beyond the scope of the project so some assumptions were made where field conditions deviated from plans. Generally the permanent ponds accomplish their intended function in accordance with the1999 DMP (see Table 1 for Comparison of Results). But most of the temporary ponds either don't exist at all or don't function as intended. The improperly functioning ponds only impact existing conditions, not future developed conditions, and they do not adversely impact the design or function of the section of the Amole channel that is under consideration in this report.

Existing and future developed conditions for the Westgate Dam and basin remain the same as in the 1999 Amole -Hubble Drainage Management Plan. Westgate Dam is capable of handling the probable maximum flood (PMF), and it only discharges 78 cfs whether the watershed is developed or not.

The Power Line basin discharges 501 cfs under existing conditions and 19 cfs under developed conditions in the 1999 DMP. However, the highest flows in this channel may result from an interim condition where the power line basin remains undeveloped and the lower basins are developed. That condition is modeled in this study as the "Developed Condition".

Existing conditions in the Snow Vista and Amole basins are updated in this report to more accurately reflect significant development since the 1999 DMP. The new basin maps are based on 2004 property lines, 2003 orthophoto and 2001 topography. Fifteen (15) existing ponds were re-analyzed using as-built records and field observation. Several were so poorly constructed that they were not modeled. Several existing split flows were identified and added to the model to more accurately identify the magnitude of the flows at each location where flow enters the channel.

The single most significant flow change is basin 365, where a significant portion of the basin was diverted south into the Amole channel and the new time of concentration is longer than previously modeled. Also, basin 105 is mostly diverted east into the Tierra Bieta basin by a split both in existing and future developed conditions. Basin 310 is served by pond 10E and no further ponding is necessary for development there.

Developed conditions in the Snow Vista watershed are dominated by peak shaving ponds. It is likely that the future ponds will store more of the leading edge of the hydrographs than conservatively modeled here so actual peak future flows will probably be less than this report predicts. Developed conditions in the Amole watershed are based on two current studies; 1) the Gibson Blvd Drainage Plan by Bohannan-Huston, Inc., dated November 21, 2003, and 2) the Drainage Report for Longford Homes by Wilson Engineering, dated June 23, 2004. The sub-basins in those reports were combined into larger basins in this report, and composite estimates of future predictions in those reports. Pipe and channel routings were not used unless they had a significant impact on the timing of the peak. They were not used where peak shaving ponds dominate the shape and timing of the hydrographs, or where timing of the peak can more easily be accounted for by time of concentration calculations for larger basins. Conveyance factors from Table B-1 of the DPM, Section 22.2 were used except that a factor of 7 was used for pipes 48" or smaller and a factor of 11 was used for pipes 48" or larger. Table 3 summarizes time of concentration calculations. Table 2 summarize the Input parameters and resulting flows from AHYMO for both existing and future developed conditions.

Also, considered but not relied on heavily, are the following references:

LOMR for Sunrise Ranch West, January 30, 2002
CLOMR for Amole Arroyo, November 2003.

TABLE 1
COMPARISON OF RESULTS

AP #	Existing Conditions		Developed Conditions	
	2004	1998	2004	1998
Tower Road	149.23	203.91	453.66	419.19
22.0	572.18	407.20	755.65	747.11
22.1	811.58	641.92	989.20	916.28
23	1,287.04	1,864.58	1,474.43	2,058.10
Westgate 5	73.15	73.15	73.47	73.47
Powerline 6	501.27	501.27	501.27	19.34
7	754.22	608.81	1,215.77	693.16
8	1,961.94	1,989.94	2,639.44	
Gibson 9	2,021.45	2,201.53	2,946.65	2,824.84
Blake 10	2,021.45	2,236.63	3,371.00	3,310.59
Bend	2,021.45	2,134.94	3,783.28	3,411.82
12	2,693.17	3,022.36	4,218.55	4,709.47

TABLE 2
SUMMARY OF HYDROLOGY
Input and Resulting Flows for Existing and Future Developed Conditions

Description	Basin ID	Area Acres	Area Sq. Mi.	Land Treatment				Tp (hr)	100-YR Peak Flow		Contributing basins
				A	B	C	D		Inc. (cfs)	Cumm (cfs)	
EXISTING CONDITIONS											
Undeveloped	100	80.9	0.1264	70	0	20	10	0.17	127.97		100
Undeveloped	105	20.1	0.0314	25	0	10	65	0.14	66.19		100 & 105
	split # 105								12.00	139.97	
Undeveloped	110	29.4	0.0459	80	0	10	10	0.13	51.22		110
	pond 1e		0.0000						49.94	189.91	100 - 110
Undeveloped	115	13.4	0.0209	90	0	10	0	0.13	19.29	208.32	100 - 115
Undeveloped	120	32.2	0.0503	78	5	10	7	0.15	48.19	209.48	100 - 120
Undeveloped	125	39.1	0.0611	78	5	10	7	0.15	58.54	260.42	100 - 120
	pond 4e									132.45	100 - 120
Developed	130	4.5	0.0070	0	14	30	56	0.13	16.05	61.58	100 - 130
Developed	180	22.8	0.0356	0	14	30	56	0.13	81.54		180
	pond 6e		0.0000						49.95	110.33	100 - 180
Undeveloped	190	22.8	0.0356	50	0	40	10	0.17	41.14	110.33	100 - 190
Developed	200	12.4	0.0194	0	10	70	20	0.13	38.41	137.09	100 - 200
	pond 7e									62.85	100 - 200
Undeveloped	240	27.5	0.0430	85	0	10	5	0.13	43.84	86.07	240 & Pond 4 spillway
Developed	250	17.4	0.0272	0	14	30	56	0.18	52.96	109.78	240 - 250
Developed	260	30.2	0.0473	0	14	30	56	0.19	89.30	145.83	240 - 260
	channel total	??								149.24	100 - 260
Developed	270	10.8	0.0169	0	14	30	56	0.15	35.75		270
	pond 8e								10.56	146.78	100 - 270
Developed	280	18.5	0.0289	0	14	30	56	0.22	50.11		280
	pond 9e								21.86	162.33	100 - 280
Developed	300	19.7	0.0308	30	0	20	50	0.13	61.04		300
	pond 2e								5.59		300
Developed	305	17.1	0.0267	0	0	20	80	0.13	69.09	70.36	305
	pond 3e									4.01	300 - 305

TABLE 2
SUMMARY OF HYDROLOGY
Input and Resulting Flows for Existing and Future Developed Conditions

Description	Basin ID	Area Acres	Area Sq. Mi.	Land Treatment				Tp (hr)	100-YR Peak Flow		Contributing basins
				A	B	C	D		Inc. (cfs)	Cumm (cfs)	
Developed	310	52.3	0.0817	0	14	30	56	0.18	56.47	59.67	300 - 310
Developed	320	39.0	0.0609	0	14	30	56	0.13	139.48	191.72	300 - 320
	split to pond 10e									35.73	
Developed	330	10.1	0.0158	0	14	30	56	0.13	36.20	72.13	330 & split from 300-320
	pond 10e								10.63	161.26	300-330
Developed	340	71.2	0.1113	0	14	30	56	0.15	235.02	390.44	300 - 340
	add split from 250	238.7								427.48	300-340 & split from 250
	channel total									572.18	100-340
Undeveloped	351	29.5	0.0461	100	0	0	0	0.15	34.40	34.40	351
Developed	352	17.1	0.0267	0	14	30	56	0.13	61.16	94.21	351 - 352
	pond 12e									39.83	351 - 352
Developed	353	67.3	0.1052	0	14	30	56	0.15	222.18	258.58	351 - 353
	pond 13e									188.57	351 - 353
Developed	354	23.8	0.0372	0	20	35	45	0.21	61.06	248.11	351 - 354
	channel total	137.7								811.58	100 - 354
Undeveloped	355	15.8	0.0247	100	0	0	0	0.16	17.55	17.55	355
Developed	356	21.2	0.0331	0	14	30	56	0.19	62.50	80.05	355 - 356
Developed	357	18.0	0.0281	0	14	30	56	0.16	56.89	56.89	357
	pond 15e								8.70	85.90	355 - 357
Undeveloped	358	17.9	0.0280	67	0	20	13	0.16	30.40	102.35	355 - 358
	channel total	210.6								897.28	100-358
Undeveloped	361	12.3	0.0192	100	0	0	0	0.13	16.22		361
	split to 365									11.49	split from 361

TABLE 2
SUMMARY OF HYDROLOGY
Input and Resulting Flows for ~~Existing and~~ Future Developed Conditions

Description	Basin ID	Area Acres	Area Sq. Mi.	Land Treatment				Tp (hr)	100-YR Peak Flow		Contributing basins
				A	B	C	D		Inc. (cfs)	Cumm (cfs)	
Undeveloped	362	23.0	0.0359	100	0	0	0	0.18	22.83	9.60	361 & 362
	split to 365									17.96	split from 361 & 362
Developed	363	11.9	0.0186	0	14	30	56	0.13	42.61	52.21	361 - 363
Undeveloped	364	6.9	0.0108	75	0	25	0	0.13	11.35	63.56	361 - 364
	pond 14e									4.90	361 - 364
	split to 370								0.00	0.00	361 - 364
Developed	365	186.6	0.2916	0	20	30	50	0.34	362.53	381.37	361 - 365
Developed	370	27.9	0.0436	0	20	35	45	0.23	68.52	68.52	370
	split to 365								34.26	410.21	361 - 370
Undeveloped	371	33.4	0.0522	100	0	0	0	0.13	44.09	44.09	370 - 371
Developed	372	57.2	0.0894	0	20	35	45	0.32	113.62	168.26	370 - 372
	split to 365								24.56	433.08	361 - 372
	channel total									1287.04	100 - 372
Developed	373	17.0	0.0266	0	20	35	45	0.13	57.39	181.26	370 - 373
	Westgate								73.15	73.15	10006 - 10018
	power line								501.27	556.61	
Undeveloped	374	76.5	0.1195	75	10	10	5	0.21	88.98	558.89	10006 - 10018 & 374
City Park /Open space	375	31.5	0.0492	60	20	10	10	0.15	52.65	561.99	10006 - 10018 & 374 -375
Developed	376	25.6	0.0400	0	20	35	45	0.17	74.57	74.57	376
Developed	377	14.5	0.0227	0	14	30	56	0.13	52.00	582.00	10006 - 10018 & 374 -377
Developed	378	50.3	0.0787	0	14	30	56	0.13	180.18	754.22	10006 - 10018 & 374 -378
Developed	379	13.2	0.0206	0	14	30	56	0.13	47.19	1961.94	100 - 379 & 10006 - 10018

TABLE 2
SUMMARY OF HYDROLOGY
Input and Resulting Flows for Existing and Future Developed Conditions

Description	Basin ID	Area Acres	Area Sq. Mi.	Land Treatment				Tp (hr)	100-YR Peak Flow		Contributing basins
				A	B	C	D		Inc. (cfs)	Cumm (cfs)	
Undeveloped	380	268.8	0.4200	95	5	0	0	0.30	197.48	2021.45	100 - 380 & 10006 - 10018
Undeveloped	381	668.9	1.0452	90	5	5	0	0.33	472.19		381
Undeveloped	382	147.5	0.2305	95	5	0	0	0.27	114.15	492.18	381 - 382
Undeveloped	383	365.9	0.5717	80	10	10	0	0.50	185.95	671.72	381 - 383
	channel total	1451.1								2693.17	all
FUTURE DEVELOPED CONDITIONS											
Future	100	80.8	0.1263	0	5	10	85	0.17	327.89		100
	pond 100								105.08		100
Future	105	20.1	0.0314	0	5	10	85	0.14	82.11		105
	split # 105								12.00	117.08	100 - 105
Future	110	43.5	0.0680	0	5	10	85	0.13	177.17		110
	pond 110		0.0000						56.55	173.64	100 - 110
Future	120	26.5	0.0414	0	5	10	85	0.15	107.91		120
	pond 120								34.45	208.09	100 - 120
Developed	130	24.2	0.0378	0	5	10	85	0.13	98.79		130
	pond 130								31.46	239.55	100 - 130
Future	140	33.7	0.0527	0	7	14	79	0.13	128.65		140
	pond 140								43.85	283.40	100 - 140
Future	150	16.1	0.0252	0	10	20	70	0.13	61.28		150
	pond 150								20.93	304.33	100 - 150
Future	160	14.2	0.0222	0	10	20	70	0.13	53.96		160

TABLE 2
SUMMARY OF HYDROLOGY
Input and Resulting Flows for Existing and Future Developed Conditions

Description	Basin ID	Area Acres	Area Sq. Mi.	Land Treatment				Tp (hr)	100-YR Peak Flow		Contributing basins
				A	B	C	D		Inc. (cfs)	Cumm (cfs)	
	pond 160								18.46	322.79	100 - 160
Future	170	2.2	0.0034	0	14	30	56	0.13	8.03	330.82	100 - 170
Developed	180	22.8	0.0356	0	14	30	56	0.13	81.54		180
	pond 6e		0.0000						49.95	378.17	100 - 180
Future	190	22.8	0.0356	0	5	10	85	0.17	92.79		100 - 190
	Pond 190								29.64	407.81	190
Developed	200	12.4	0.0194	0	10	70	20	0.13	38.41	434.58	100 - 200
	pond 7e									395.57	100 - 200
Developed	250	17.4	0.0272	0	14	30	56	0.18	52.96		250
Developed	260	30.2	0.0473	0	14	30	56	0.19	89.30	121.08	250 - 260
	channel total	1818.2								453.66	100 - 260
Developed	270	10.8	0.0169	0	14	30	56	0.15	35.76		270
	Pond 8e								10.56	460.25	100 - 270
Developed	280	18.5	0.0289	0	14	30	56	0.22	50.11		280
	Pond 9e								21.86	481.76	100 - 280
Developed	300	19.7	0.0308	30	0	20	50	0.13	61.04		300
	pond 2e								5.59		300
Developed	305	17.1	0.0267	0	0	20	80	0.13	69.09	70.36	300 - 305
	pond 3e									4.01	300 - 305
Developed	310	52.3	0.0817	0	14	30	56	0.18	187.04	189.93	300 - 310
Developed	320	39.0	0.0609	0	14	30	56	0.13	139.48	329.42	300 - 320
	split to pond 10e								154.41		
Developed	330	10.1	0.0158	0	14	30	56	0.13	36.20	190.60	330 & split from 300 - 320
	pond 10e								21.52	190.42	330 & split from 300 - 320
Developed	340	71.2	0.1113	0	14	30	56	0.15	235.02	417.89	300 - 340

TABLE 2
SUMMARY OF HYDROLOGY
Input and Resulting Flows for Existing and Future Developed Conditions

Description	Basin ID	Area Acres	Area Sq. Mi.	Land Treatment				Tp (hr)	100-YR Peak Flow		Contributing basins
				A	B	C	D		Inc. (cfs)	Cumm (cfs)	
	add split from 250									437.73	300 - 340 & split from 250
	channel total									755.65	100 - 340
Undeveloped	351	35.7	0.0558	0	14	30	56	0.13	105.59		351
	Pond 351								38.35		
Developed	352	17.1	0.0267	0	14	30	56	0.13	61.16	99.51	351 - 352
	pond 12e									42.41	351 - 352
Developed	353	67.3	0.1052	0	14	30	56	0.15	222.18	259.93	351 - 353
	pond 13e									189.14	351 - 353
Developed	354	23.8	0.0372	0	20	35	45	0.21	61.06	248.58	351 - 354
	channel total									989.20	100 - 354
Future	355	15.8	0.0247	0	13	26	61	0.16	57.86	1004.14	100 - 355
Developed	356	21.2	0.0331	0	14	30	56	0.19	62.50		
Developed	357	18.0	0.0281	0	14	30	56	0.16	56.89		357
	pond 13e								8.70	68.36	356 - 357
Future	358	17.9	0.0280	0	13	26	61	0.16	65.58	125.41	355 - 358
	channel total									1083.15	100 - 358
Developed	365	186.6	0.2916	0	20	30	50	0.34	362.53		361 - 365
Developed	370	27.9	0.0436	0	20	35	45	0.23	68.52		370
	split to 365								32.79	376.80	365 - 370
Developed	372	57.2	0.0894	0	20	35	45	0.32	113.62	127.90	370 - 372
	split to 365								14.47	391.28	361 - 372 @ 365
	channel total									1474.43	100 - 372 @ 365
Developed	373	17.0	0.0266	0	20	35	45	0.13	57.39	146.95	370 - 373

TABLE 2
SUMMARY OF HYDROLOGY
Input and Resulting Flows for Existing and Future Developed Conditions

Description	Basin ID	Area Acres	Area Sq. Mi.	Land Treatment				Tp (hr)	100-YR Peak Flow		Contributing basins
				A	B	C	D		Inc. (cfs)	Cumm (cfs)	
	power line									501.27	10006 - 10018
Undeveloped	374	156.2	0.2441	0	14	30	56	0.40	287.74	749.07	10006 - 10018 & 374
	380								258.59	935.44	380
City Park / Open space	375	31.5	0.0492	60	20	10	10	0.15	52.65	941.50	10006 - 10018, 374 -375 & 380
Developed	376	25.6	0.0400	0	20	35	45	0.17	74.57		10006 - 10018 & 374 -376
Developed	377	14.5	0.0227	0	14	30	56	0.13	52.00	1146.19	10006 - 10018 & 374 -377
Developed	378	50.3	0.0787	0	14	30	56	0.13	180.18	1215.77	10006 - 10018 & 374 -378
	channel total									2639.44	100 - 378 & 10006 - 10018
Developed	379	13.2	0.0206	0	14	30	56	0.13	47.19	2656.83	100 - 379 & 10006 - 10018
Future	381	147.8	0.2309	0	11	21	68	0.22	423.47	2946.65	100 - 381
Future	382	197.6	0.3088	0	11	21	68	0.22	563.76	3371.00	381 - 382
Future	383	200.3	0.3130	0	14	30	56	0.21	547.32	3783.28	381 - 383
Future	384	153.5	0.2398	0	17	33	50	0.21	420.19	4107.78	
Future	385	14.9	0.0233	0	14	30	56	0.13	55.45	4132.02	
Future	386	61.6	0.0963	0	17	33	50	0.17	192.22	4,218.55	

100 YEAR PRECIPITATION *(From Figures D, E and F, and Eq. 28 of DPM 22.2)*
P_{60} = 1.90", P_{360} = 2.20", P_{1440} = 2.67", P_{10} days = 10.0-[24.9/(2.67")$^{1.4}$] = 3.70"

TABLE 3
TIME OF CONCENTRATION COMPUTATIONS

Basin ID	Length (ft)	Slope %	K	V (fps)	Tc (min)	Tp (hr)
100	400	3.3	0.7	1.27	5.2	
	1600	4.0	2.0	4.00	6.7	
	1100	3.4	3.0	5.53	3.3	
					15.2	0.17
105	400	2.0	1.0	1.41	4.7	
	900	1.6	2.0	2.53	5.9	
	350	3.4	2.0	3.69	1.6	
					12.2	0.14
110 & 115	400	4.0	0.7	1.40	4.8	
	1600	3.8	2.0	3.90	6.8	
					11.6	0.13
120 & 125	400	4.0	0.7	1.40	4.8	
	1600	3.1	2.0	3.52	7.6	
	400	2.5	3.0	4.74	1.4	
					13.7	0.15
130	MINIMUM					0.13
180	MINIMUM					0.13
190	400	4.0	0.7	1.40	4.8	
	700	2.6	2.0	3.22	3.6	
	500	0.4	2.0	1.26	6.6	
					15.0	0.17
200	MINIMUM					0.13
240	400	4.0	0.7	1.40	4.8	
	1600	3.4	2.0	3.69	7.2	
					12.0	0.13
250	100	0.5	0.7	0.50	3.4	
	300	0.5	2.0	1.41	3.5	

TABLE 3
TIME OF CONCENTRATION COMPUTATIONS

Basin ID	Length (ft)	Slope %	K	V (fps)	Tc (min)	Tp (hr)
	1600	2.0	2.0	2.83	9.4	
					16.3	0.18
260	100	0.5	0.7	0.50	3.4	
	300	2.0	1.0	1.41	3.5	
	1600	1.6	2.0	2.53	10.5	
					17.4	0.19
270	100	2.5	0.7	1.11	1.5	
	250	4.0	1.0	2.00	2.1	
	850	0.5	2.0	1.41	10.0	
					13.6	0.15
280	100	0.5	0.7	0.50	3.4	
	200	2.0	2.0	2.83	1.2	
	1300	0.5	2.0	1.41	15.3	
					19.9	0.22
300	MINIMUM					0.13
305	MINIMUM					0.13
310	400	6.0	0.7	1.71	3.9	
	950	4.4	2.0	4.20	3.8	
	900	0.7	2.0	1.67	9.0	
					16.6	0.18
320	MINIMUM					0.13
330	MINIMUM					0.13
340	100	1.0	0.7	0.70	2.4	
	300	2.0	1.0	1.41	3.5	
	600	4.0	2.0	4.00	2.5	
	2400	3.0	5.0	8.66	4.6	
	400	1.5	11.0	13.47	0.5	
					13.5	0.15
351	400	6.0	0.7	1.71	3.9	
	700	4.3	2.0	4.15	2.8	
	600	0.5	2.0	1.41	7.1	
					13.8	0.15

TABLE 3
TIME OF CONCENTRATION COMPUTATIONS

Basin ID	Length (ft)	Slope %	K	V (fps)	Tc (min)	Tp (hr)
352	MINIMUM					0.13
353	100	0.5	0.7	0.50	3.4	
	300	0.5	1.0	0.71	7.1	
	1600	4.0	7.0	14.00	1.9	
	1200	3.0	11.0	19.05	1.1	
					13.4	0.15
354	100	0.5	0.7	0.50	3.4	
	150	0.5	1.0	0.71	3.5	
	1750	4.0	2.0	4.00	7.3	
	1400	3.3	3.0	5.45	4.3	
					18.5	0.21
355	400	3.0	0.7	1.21	5.5	
	1100	1.0	2.0	2.00	9.2	
					14.7	0.16
356	400	3.5	0.7	1.31	5.1	
	800	1.0	2.0	2.00	6.7	
	1500	1.0	5.0	5.00	5.0	
					16.8	0.19
357	100	2.0	0.7	0.99	1.7	
	300	0.7	1.0	0.84	6.0	
	800	1.8	2.0	2.68	5.0	
	400	2.5	2.0	3.16	2.1	
					14.7	0.16
358	400	2.0	0.7	0.99	6.7	
	300	2.0	2.0	2.83	1.8	
	1300	0.5	5.0	3.43	6.3	
					14.8	0.16

TABLE 3
TIME OF CONCENTRATION COMPUTATIONS

Basin ID	Length (ft)	Slope %	K	V (fps)	Tc (min)	Tp (hr)
361	MINIMUM					0.13
362	400	6.0	0.7	1.71	3.9	
	550	3.3	2.0	3.63	2.5	
	800	0.5	2.0	1.41	9.4	
					15.8	0.18
363	MINIMUM					0.13
364	MINIMUM					0.13
365	100	0.5	0.7	0.50	3.4	
	300	4.0	1.0	2.00	2.5	
	600	0.5	2.0	1.41	7.1	
	1000	1.5	2.0	2.45	6.8	
	1850	3.6	3.0	5.69	5.4	
	2250	2.2	5.0	7.42	5.1	
					30.2	0.34
370	100	0.5	0.7	0.50	3.4	
	300	0.5	1.0	0.71	7.1	
	250	0.5	2.0	1.41	2.9	
	1600	3.5	2.0	3.74	7.1	
					20.5	0.23
371	400	4.5	0.7	1.48	4.5	
	600	4.3	2.0	4.15	2.4	
	500	0.7	2.0	1.67	5.0	
					11.9	0.13
372	100	0.5	0.7	0.50	3.4	
	300	0.5	1.0	0.71	7.1	
	900	1.0	2.0	2.00	7.5	
	700	2.3	2.0	3.03	3.8	
	800	3.5	3.0	5.61	2.4	
	1200	1.8	3.0	4.02	5.0	
					29.1	0.32
373	MINIMUM					0.13
374	400	4.5	0.7	1.48	4.5	

TABLE 3
TIME OF CONCENTRATION COMPUTATIONS

Basin ID	Length (ft)	Slope %	K	V (fps)	Tc (min)	Tp (hr)
	1600	3.1	2.0	3.52	7.6	
	2000	3.0	3.0	5.20	6.4	
					18.5	0.21
375	400	3.8	0.7	1.36	4.9	
	1600	3.1	2.0	3.52	7.6	
	800	2.8	11.0	18.41	0.7	
					13.2	0.15
376	100	0.5	0.7	0.50	3.4	
	300	3.1	1.0	1.76	2.8	
	1900	3.1	2.0	3.52	9.0	
					15.2	0.17
377	MINIMUM					0.13
378	MINIMUM					0.13
379	MINIMUM					0.13
380	400	3.4	0.7	1.29	5.2	
	1600	3.3	2.0	3.63	7.3	
	4600	3.2	3.0	5.37	14.3	
					26.8	0.30
381	400	12.0	0.7	2.42	2.7	
	1600	7.0	2.0	5.29	5.0	
	2000	5.5	3.0	7.04	4.7	
	4000	3.7	3.0	5.77	11.6	
	1700	2.9	3.0	5.11	5.5	
					29.6	0.33
382	400	4.0	0.7	1.40	4.8	
	1000	3.0	2.0	3.46	4.8	
	2100	3.5	3.0	5.61	6.2	
	2200	2.0	3.0	4.24	8.6	
					24.5	0.27
383	Use the lag method where L=12900', Lca=7400', and s=3.9%					
DEV 374	100	0.5	0.7	0.50	3.4	

TABLE 3
TIME OF CONCENTRATION COMPUTATIONS

Basin ID	Length (ft)	Slope %	K	V (fps)	Tc (min)	Tp (hr)
	300	0.5	1.0	0.71	7.1	
	1300	0.5	2.0	1.41	15.3	
	2000	0.5	5.0	3.54	9.4	
	800	2.9	11.0	18.73	0.7	
					35.9	0.40
DEV 380	100	0.5	0.7	0.50	3.4	
	300	2.5	1.0	1.58	3.2	
	1600	3.3	2.0	3.63	7.3	
	1800	1.0	5.0	5.00	6.0	
					19.9	0.22
DEV 381-2	100	1.0	0.7	0.70	2.4	
	300	3.0	1.0	1.73	2.9	
	1000	1.0	2.0	2.00	8.3	
	2400	3.3	7.0	12.72	3.1	
	3500	3.0	11.0	19.05	3.1	
					19.8	0.22
DEV 383-4	100	1.0	0.7	0.70	2.4	
	300	0.5	1.0	0.71	7.1	
	500	3.0	2.0	3.46	2.4	
	1000	3.0	7.0	12.12	1.4	
	1600	0.5	11.0	7.78	3.4	
	2600	2.5	11.0	17.39	2.5	
					19.2	0.21
DEV 386	100	1.0	0.7	0.70	2.4	
	300	3.0	1.0	1.73	2.9	
	600	3.0	2.0	3.46	2.9	
	500	1.0	2.0	2.00	4.2	
	1400	0.7	11.0	9.20	2.5	
					14.9	0.17

TABLE #4 HYDRAULIC SUMMARY

River Sta	Q Total (cfs)	Depth (ft)	Vel Chnl (ft/s)	Top Width (ft)	Froude #	Radius (ft)	Super-elev (ft)	Req'd Dpth at curve (ft)	Freeboard Req'd (ft)	Min Dpth w/ Frbd (ft)	Min Dpth w/ Frbd & Super (ft)	Act Dpth LT	Act Dpth RT
6.74	4218.55	4.95	21.43	40.00	1.70	450	0.82	5.77	2.04	6.99		5.5	
7.23714*	4218.55	5.21	20.85	43.37	1.70	450	0.85	6.06	2.03	7.24		5.5	
7.73428*	4218.55	5.33	20.48	46.74	1.72	450	0.88	6.21	2.02	7.35		5.5	
8.23142*	4218.55	5.36	20.23	50.07	1.75	450	0.92	6.28	2.02	7.38		5.5	
8.72857*	4218.55	5.29	20.10	52.87	1.78	450	0.96	6.25	2.01	7.30		5.5	
9.22571*	4218.55	5.15	20.11	54.97	1.81	450	1.00	6.15	2.00	7.15			
9.72285*	4218.55	4.92	20.35	56.59	1.87	450	1.05	5.97	2.00	6.92			
10.22	4218.55	4.61	20.87	57.66	1.96	450	1.13	5.74	2.00	6.61			
10.65	4218.55	5.60	19.59	51.20	1.68	1000	0.40	6.00	2.01	7.61			
10.22	4218.55	5.59	19.61	51.18	1.69	1000	0.40	5.99	2.01	7.60			
10.6925*	4218.55	5.60	19.61	51.18	1.69	1000	0.40	6.00	2.01	7.61			
11.165*	4218.55	5.59	19.66	51.14	1.69	1000	0.40	5.99	2.01	7.60			
11.6375*	4218.55	5.57	19.71	51.09	1.70	1000	0.40	5.97	2.01	7.58			
12.11*	4218.55	5.56	19.78	51.03	1.71	1000	0.40	5.96	2.01	7.57		9.0	
12.5825*	4218.55	5.54	19.86	50.97	1.71	1000	0.41	5.95	2.01	7.55		9.0	
13.055*	4218.55	5.52	19.95	50.89	1.73	1000	0.41	5.93	2.01	7.53		9.0	
13.5275*	4218.55	5.48	20.18	50.71	1.75	1000	0.42	5.90	2.02	7.50		9.0	
14.00	4218.55	5.42	20.48	50.46	1.79	1000	0.43	5.85	2.03	7.45			
14.4875*	4218.55	5.47	20.22	50.67	1.76	1000	0.42	5.89	2.02	7.49			
14.975*	4218.55	5.53	19.90	50.93	1.72	1000	0.41	5.94	2.01	7.54			
15.4625*	4218.55	5.61	19.53	51.25	1.68	1000	0.39	6.00	2.00		8.01	9.0	
15.95*	4218.55	5.71	19.08	51.65	1.63	1000	0.38	6.09	1.99		8.08	9.0	
16.4375*	4218.55	5.86	18.43	52.25	1.55	1000	0.36	6.22	1.98		8.20	9.0	
16.925*	4218.55	6.09	17.52	53.15	1.45	1000	0.33	6.42	1.96	8.05			
17.4125*	4218.55	6.42	16.32	54.46	1.32	1000	0.29	6.71	1.93	8.35			
17.90	4218.55	7.47	13.27	58.67	1.00	1000	0.21	7.68	1.85	9.32			
18.10	3783.28	4.93	20.79	48.52	1.89	1000	0.42	5.35	2.02	6.95		8.2	
18.5869*	3783.28	4.93	20.80	48.51	1.89	1000	0.42	5.35	2.02	6.95		8.2	
19.0739*	3783.28	4.93	20.82	48.50	1.89	1000	0.42	5.35	2.02	6.95		8.2	
19.5609*	3783.28	4.92	20.83	48.50	1.90				2.02		N/A		
20.0479*	3783.28	4.92	20.84	48.49	1.90				2.02		N/A		
20.5349*	3783.28	4.93	20.77	48.53	1.89				2.02		N/A		
21.0219*	3783.28	4.93	20.78	48.53	1.89				2.02		N/A		
21.5089*	3783.28	4.95	20.70	48.59	1.88				2.01		N/A		
21.9959*	3783.28	4.96	20.61	48.66	1.87				2.01		N/A		
22.4829*	3783.28	4.98	20.50	48.74	1.86				2.01		N/A		

TABLE #4 HYDRAULIC SUMMARY

River Sta	Q Total (cfs)	Depth (ft)	Vel Chnl (ft/s)	Top Width (ft)	Froude #	Radius (ft)	Super-elev (ft)	Req'd Dpth at curve (ft)	Freeboard Req'd (ft)	Min Dpth w/ Frbd (ft)	Min Dpth w/ Frbd & Super (ft)	Act Dpth LT	Act Dpth RT
22.9699*	3783.28	5.01	20.36	48.84	1.84				2.01		N/A		
23.457*	3783.28	5.04	20.18	48.97	1.82				2.00		N/A		
23.944*	3783.28	5.08	19.97	49.13	1.79				2.00		N/A		
24.431*	3783.28	5.13	19.72	49.33	1.76				1.99		N/A		
24.918*	3783.28	5.19	19.43	49.56	1.73				1.99		N/A		
25.405*	3783.28	5.26	19.07	49.85	1.68				1.98		N/A		
25.892*	3783.28	5.35	18.65	50.21	1.64	250	1.41	6.76	1.97		8.73	10.6	
26.379*	3783.28	5.49	18.03	50.76	1.56	250	1.33	6.82	1.95		8.78	10.6	
26.866*	3783.28	5.70	17.17	51.59	1.46	250	1.23	6.93	1.93		8.86	10.6	
27.353*	3783.28	6.01	15.97	52.85	1.33	250	1.09	7.10	1.91		9.00	10.6	
27.84	3783.28	7.03	12.93	56.91	1.01	250	0.77	7.80	1.83		9.63	10.6	
28.61	3371.00		22.14	40.22	2.01	250	1.59	6.84	2.07	7.32	8.91	6.9	
29.0942*	3371.00		22.36	40.07	2.03	250	1.62	6.84	2.08	7.30	8.91	6.9	
29.5785*	3371.00		22.67	39.86	2.07	250	1.65	6.81	2.08	7.24	8.90	6.9	
30.0628*	3371.00		23.07	39.60	2.12	250	1.70	6.80	2.09	7.19	8.89	6.9	
30.5471*	3371.00		23.61	39.26	2.18	250	1.77	6.79	2.10	7.12	8.89	6.9	
31.0314*	3371.00		24.26	38.87	2.26	250	1.85	6.77	2.12	7.04	8.89	6.9	
31.5157*	3371.00		25.12	38.38	2.37	250	1.96		2.14	6.93	8.88		
32.00	3371.00		26.17	37.81	2.50	250	2.09		2.16	6.81	8.90		
32.4836*	3371.00	4.66	26.12	37.84	2.49	250	2.08		2.16	6.82	8.90		
32.9673*	3371.00	4.67	26.05	37.88	2.48	250	2.08		2.16	6.83	8.90		
33.4510*	3371.00	4.68	25.96	37.92	2.47	250	2.06		2.16	6.84	8.90	4.8	
33.9347*	3371.00	4.69	25.87	37.97	2.46	250	2.05		2.15	6.84	8.90	4.8	
34.4184*	3371.00	4.71	25.75	38.04	2.45	250	2.04		2.15	6.86	8.90	4.8	
34.9021*	3371.00	4.73	25.62	38.10	2.43	250	2.02		2.15	6.88	8.90	4.8	
35.3857*	3371.00	4.75	25.44	38.20	2.41	250	2.00		2.14	6.89	8.89	4.8	
35.8694*	3371.00	4.78	25.25	38.31	2.38	250	1.97		2.14	6.92	8.89	4.8	
36.3531*	3371.00	4.81	25.02	38.43	2.35	250	1.94		2.14	6.95	8.89		
36.8368*	3371.00	4.85	24.73	38.60	2.32	250	1.91		2.13	6.98	8.88		
37.3205*	3371.00		24.40	38.79	2.28	250	1.86	6.76	2.12	7.02	8.89	6.9	
37.8042*	3371.00		24.01	39.02	2.23	250	1.82	6.78	2.11	7.07	8.89	6.9	
38.2878*	3371.00		23.56	39.29	2.18	250	1.76	6.78	2.10	7.12	8.88	6.9	
38.7715*	3371.00		22.92	39.70	2.10	250	1.68	6.80	2.09	7.21	8.89	6.9	
39.2552*	3371.00		22.14	40.21	2.01	250	1.59	6.84	2.07	7.32	8.91	6.9	
39.7389*	3371.00		21.10	40.96	1.88	250	1.47	6.91	2.05	7.49	8.96	6.9	
40.2226*	3371.00		19.77	42.00	1.73	250	1.33	7.03	2.01	7.71	9.04	6.9	

TABLE #4 HYDRAULIC SUMMARY

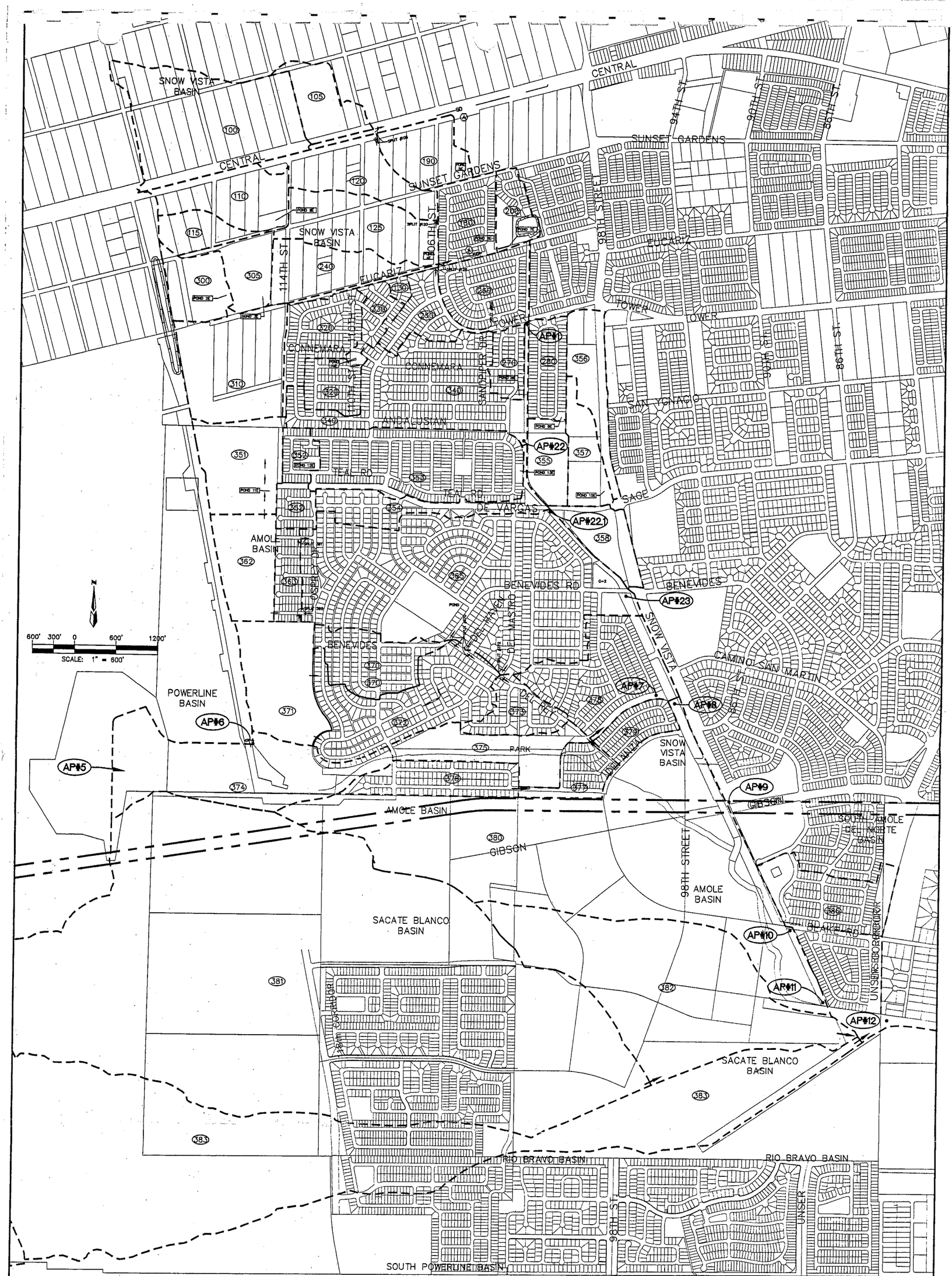
River Sta	Q Total (cfs)	Depth (ft)	Vel Chnl (ft/s)	Top Width (ft)	Froude #	Radius (ft)	Super-elev (ft)	Req'd Dpth at curve (ft)	Freeboard Req'd (ft)	Min Dpth w/ Frbd (ft)	Min Dpth w/ Frbd & Super (ft)	Act Dpth LT	Act Dpth RT
40.7063*	3371.00		17.85	43.70	1.51				1.97	8.10	1.97		
41.19	3371.00		12.97	49.79	1.00				1.84	9.49	1.84		
41.57	3371.00		11.58	40.00	0.76				1.79	9.06	1.79		
41.64	2946.65		20.46	31.17	1.68				1.99	6.61	1.99		
42.00	Bridge								1.40	1.40	1.40		
42.40	2946.65		24.28	31.17	2.17	250	1.48	5.37	2.07	5.96	7.44		
42.86	2946.65	4.61	23.14	37.66	2.22	250	1.63		2.07	6.68	8.31	4.9	
43.26*	2946.65	4.68	22.69	37.93	2.16	250	1.58		2.06	6.74	8.32	4.9	
43.66*	2946.65	4.76	22.06	38.32	2.08	250	1.51		2.05	6.83	8.33	4.9	
44.06	2946.65	4.90	21.29	38.82	1.99	250	1.42		2.03	6.93	8.35	4.9	
44.5241*	2946.65	4.89	21.32	38.79	1.99	250	1.42		2.03	6.92	8.34	4.9	
44.9883*	2946.65	4.90	21.34	38.78	1.99	250	1.43		2.03	6.93	8.36	4.9	
45.4525*	2946.65	4.89	21.39	38.75	2.00	250	1.43		2.03	6.92	8.35	4.9	
45.9166*	2946.65	4.88	21.46	38.70	2.01	250	1.44		2.03	6.91	8.35		
46.3808*	2946.65		21.66	38.57	2.03	250	1.46	6.30	2.04	6.88	8.34	6.3	
46.845*	2946.65		21.89	38.42	2.06	250	1.49	6.30	2.04	6.85	8.34	6.3	
47.3091*	2946.65		22.20	38.22	2.10	250	1.52	6.28	2.05	6.81	8.33	6.3	
47.7733*	2946.65		22.65	37.95	2.16	250	1.57	6.26	2.06	6.75	8.32	6.3	
48.2375*	2946.65		23.21	37.62	2.23	250	1.64	6.24	2.07	6.67	8.31	6.3	
48.7016*	2946.65		23.94	37.20	2.32	250	1.72	6.22	2.09	6.59	8.31	6.3	
49.1658*	2946.65		24.86	36.71	2.44	250	1.83	6.21	2.11	6.49	8.32	6.3	
49.63	2946.65		26.03	36.12	2.59	250	1.98	6.21	2.13	6.36	8.34	6.3	
50.1176*	2946.65		26.08	36.10	2.60	250	1.98	6.20	2.13	6.35	8.34	6.3	
50.6052*	2946.65		26.04	36.12	2.59	250	1.98	6.21	2.13	6.36	8.34	6.3	
51.0928*	2946.65	4.24	25.99	36.14	2.59	500	0.99		2.13	6.37	7.36		
51.5804*	2946.65	4.23	26.04	36.12	2.59	500	0.99		2.13	6.36	7.35		
52.0680*	2946.65	4.24	25.99	36.14	2.59	500	0.99		2.13	6.37	7.36	4.3	
52.5557*	2946.65	4.23	26.03	36.12	2.59	500	0.99		2.13	6.36	7.35	4.3	
53.0433*	2946.65	4.23	26.00	36.14	2.59	500	0.99		2.13	6.36	7.35	4.3	
53.5309*	2946.65	4.24	25.94	36.17	2.58	500	0.98		2.13	6.37	7.35	4.3	
54.0185*	2946.65	4.25	25.89	36.19	2.57	500	0.98		2.13	6.38	7.36	4.3	
54.5061*	2946.65	4.26	25.81	36.23	2.56	500	0.97		2.13	6.39	7.36	4.3	
54.9938*	2946.65	4.27	25.69	36.29	2.55	500	0.97		2.13	6.40	7.36		
55.4814*	2946.65	4.29	25.55	36.36	2.53	1000	0.48		2.12	6.41	6.89		
55.9690*	2946.65		25.40	36.43	2.51	1000	0.47	4.78	2.12	6.43	6.90	4.8	
56.4566*	2946.65		25.19	36.54	2.48	1000	0.47	4.81	2.12	6.46	6.92	4.8	

TABLE #4 HYDRAULIC SUMMARY

River Sta	Q Total (cfs)	Depth (ft)	Vel Chnl (ft/s)	Top Width (ft)	Froude #	Radius (ft)	Super-elev (ft)	Req'd Dpth at curve (ft)	Freeboard Req'd (ft)	Min Dpth w/ Frbd (ft)	Min Dpth w/ Frbd & Super (ft)	Act Dpth LT	Act Dpth RT
56.9442*	2946.65		24.97	36.65	2.45	1000	0.46	4.82	2.11	6.47	6.93	4.8	
57.4319*	2946.65		24.68	36.80	2.41	1000	0.45	4.85	2.10	6.50	6.96	4.8	
57.9195*	2946.65		24.34	36.98	2.37				2.10	6.55	2.10		
58.4071*	2946.65		23.95	37.20	2.32				2.09	6.59	2.09		
58.8947*	2946.65		23.48	37.46	2.26				2.08	6.64	2.08		
59.3823*	2946.65		22.79	37.87	2.17				2.06	6.73	2.06		
59.87	2946.65		21.92	38.40	2.06				2.04	6.84	2.04		
60.42	2656.83		21.97	31.17	1.97				2.00	5.88	2.00		
61.00	Bridge								1.40	1.40	1.40		
61.73	2656.83		19.25	31.17	1.61				1.95	6.38	1.95		
62.01*	2656.83		15.16	37.88	1.24				1.89	8.31	1.89		
62.29	2656.83		16.47	41.11	1.46				1.91	7.39	1.91		
62.7828*	2656.83		16.47	41.11	1.46				1.91	7.39	1.91		
63.2757*	2656.83		16.47	41.10	1.47				1.91	7.39	1.91		
63.7685*	2656.83		16.47	41.11	1.46				1.91	7.39	1.91		
64.2614*	2656.83		16.47	41.11	1.47				1.91	7.39	1.91		
64.7542*	2656.83		16.48	41.10	1.47				1.91	7.39	1.91		
65.2471*	2656.83		16.48	41.10	1.47	500	0.45	5.93	1.91	7.39	7.84	6.0	
65.7399*	2656.83		16.48	41.10	1.47	500	0.45	5.92	1.91	7.38	7.83	6.0	
66.2328*	2656.83		16.47	41.10	1.47	500	0.45	5.93	1.91	7.39	7.84	6.0	
66.7257*	2656.83		16.48	41.10	1.47				1.91	7.39	1.91		
67.2185*	2656.83		16.48	41.10	1.47				1.91	7.38	1.91		
67.7114*	2656.83		16.48	41.09	1.47				1.91	7.38	1.91		
68.2042*	2656.83		16.49	41.09	1.47				1.91	7.38	1.91		
68.6971*	2656.83		16.50	41.08	1.47				1.91	7.38	1.91		
69.19*	2656.83		16.49	41.09	1.47				1.91	7.38	1.91		
69.6828*	2656.83		16.49	41.08	1.47				1.91	7.38	1.91		
70.1757*	2656.83		16.50	41.08	1.47				1.91	7.38	1.91		
70.6685*	2656.83		16.57	41.01	1.48				1.91	7.36	1.91		
71.1614*	2656.83	5.43	16.67	40.92	1.49	500	0.46		1.91	7.34	7.80	5.5	
71.6542*	2656.83	5.43	16.67	40.92	1.49	500	0.46		1.91	7.34	7.80	5.5	
72.1471*	2656.83	5.40	16.80	40.80	1.50	500	0.46		1.91	7.31	7.78	5.5	
72.64	2656.83		17.14	40.49	1.54				1.92	7.24	1.92		
73.00	2656.83		19.22	31.17	1.61				1.95	6.38	1.95		
74.00	Bridge								1.40	1.40	1.40		
76.50	2656.83		19.62	31.17	1.66				1.96	6.30	1.96		

TABLE #4 HYDRAULIC SUMMARY

River Sta	Q Total (cfs)	Depth (ft)	Vel Chnl (ft/s)	Top Width (ft)	Froude #	Radius (ft)	Super-elev (ft)	Req'd Dpth at curve (ft)	Freeboard Req'd (ft)	Min Dpth w/ Frbd (ft)	Min Dpth w/ Frbd & Super (ft)	Act Dpth LT	Act Dpth RT
77.*	2656.83		20.79	38.35	2.01				1.96	5.75	1.96		
77.50	2656.83		21.88	43.24	2.30				1.98	5.59	1.98		
77.92*	2656.83		23.63	42.40	2.56				2.02	5.42	2.02		
78.34*	2656.83		25.80	41.50	2.89				2.06	5.24	2.06		
78.76	2639.44		28.59	40.46	3.34				2.11	5.03	2.11		
79.76	1474.43		15.94	33.82	1.70				1.83	5.51	1.83		
80.26*	1474.43		15.61	34.01	1.65				1.82	5.59	1.82		
80.76	1474.43		10.76	38.67	1.01				1.72	6.69	1.72		

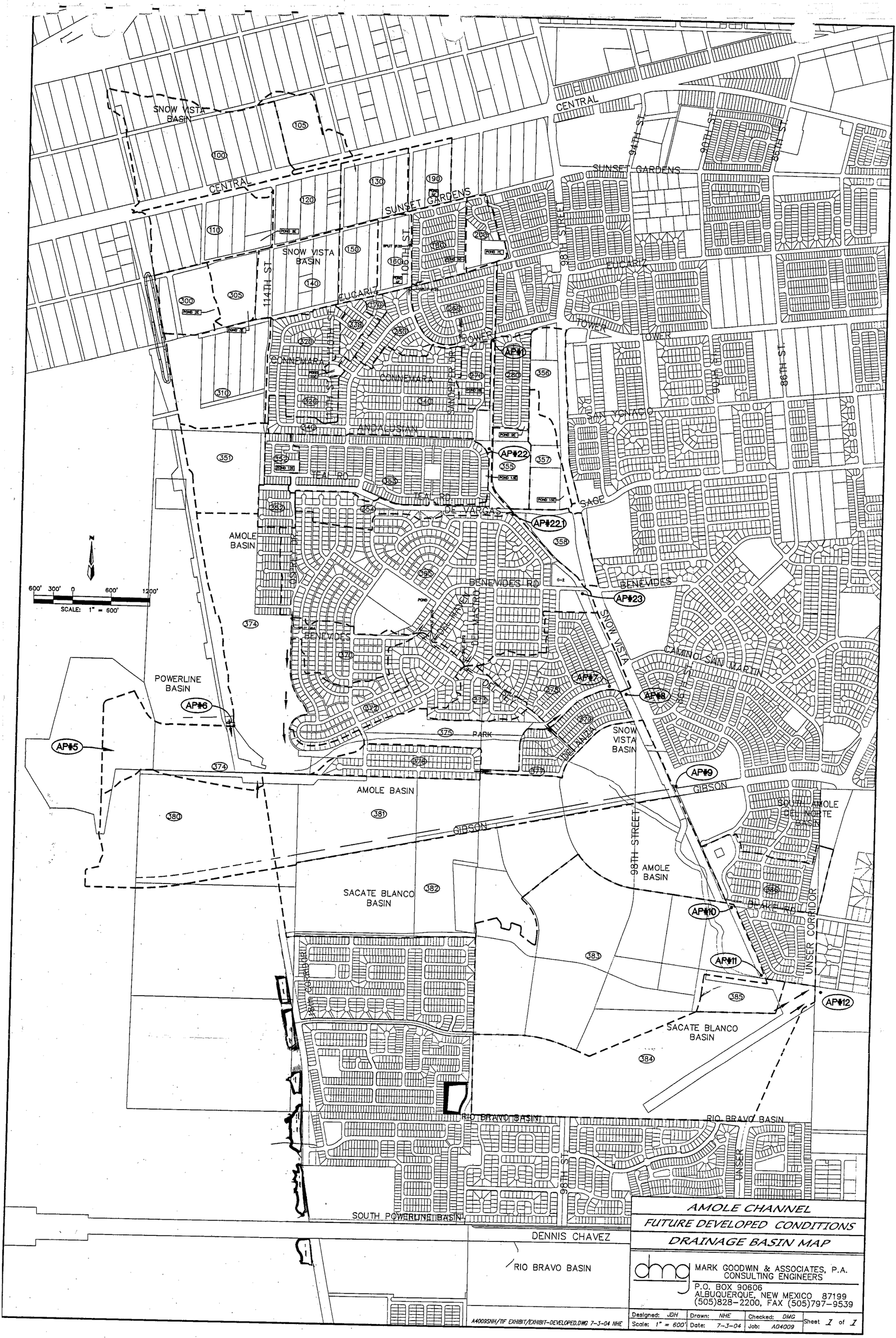


AMOLE CHANNEL
EXISTING CONDITIONS
DRAINAGE BASIN MAP

MARK GOODWIN & ASSOCIATES, P.A.
CONSULTING ENGINEERS
P.O. BOX 90606
ALBUQUERQUE, NEW MEXICO 87199
(505)828-2200, FAX (505)797-9539

Designed: JDH	Drawn: NHE	Checked: DMG	Sheet 1 of 1
Scale: 1" = 600'	Date: 7-3-04	Job: A04009	

A4009SNH/TIF EXHIBIT/EXHIBIT-EXISTING.DWG 8-10-04 NHE



AMOLE CHANNEL
FUTURE DEVELOPED CONDITIONS
DRAINAGE BASIN MAP

MARK GOODWIN & ASSOCIATES, P.A.
CONSULTING ENGINEERS
P.O. BOX 90606
ALBUQUERQUE, NEW MEXICO 87199
(505)828-2200, FAX (505)797-9539

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