CITY OF SCOTTSDALE

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MASTER DRAINAGE PLAN

PIMA/DOUBLETREE AREA

NOVEMBER 1989

Boyle Engineering Corporation

consulting engineers / architects

A027.302

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Section 1
INTRODUCTION

1.1 Background and Understanding

The City of Scottsdale has experienced sustained economic growth over the last three decades with attendant expansion of the City corporate borders. The sector within the City that has seen the greatest growth in recent years is the tract defined by the study area boundaries: Pima Road to the west, Salt River Indian Reservation (Doubletree Ranch Road) to the south, and the Granite Reef Aqueduct of the Central Arizona Project to the north and east **(Figure 1.1)**.

The original development of the study area was by horse breeders whose farms at one time covered a substantial part of the area. Over a period of time the farms have given way to subdivision development in scattered parcels. During this time, City drainage standards have varied which has resulted in the formation of an uncoordinated and disconnected drainage system incapable of handling runoff from large storms. The situation will not improve unless drainage improvements are implemented.

To provide officials with the necessary tools to manage improvements, the City of Scottsdale contracted with Boyle Engineering Corporation to prepare a master drainage plan of the study area. The plan would provide an understanding of the existing problems and deficiencies, conceptual plans to upgrade the system and would include planning level cost estimates to carry out the improvements. This report titled, "Pima/Doubletree Master Drainage Plan" contains the results of the study.

1.2 Study Approach

The procedure utilized in our analysis was sequential and followed, in order, the basic steps listed below:

1. Collect and review available drainage, storm and development data.
2. Examine existing basin characteristics and identify drainage problem areas.
3. Determine runoff at key locations in the basin.
4. Analyze alternative solutions for the correction of drainage problems.
5. Recommend proposed works.
6. Prepare planning-level cost estimates for the preferred alternative.

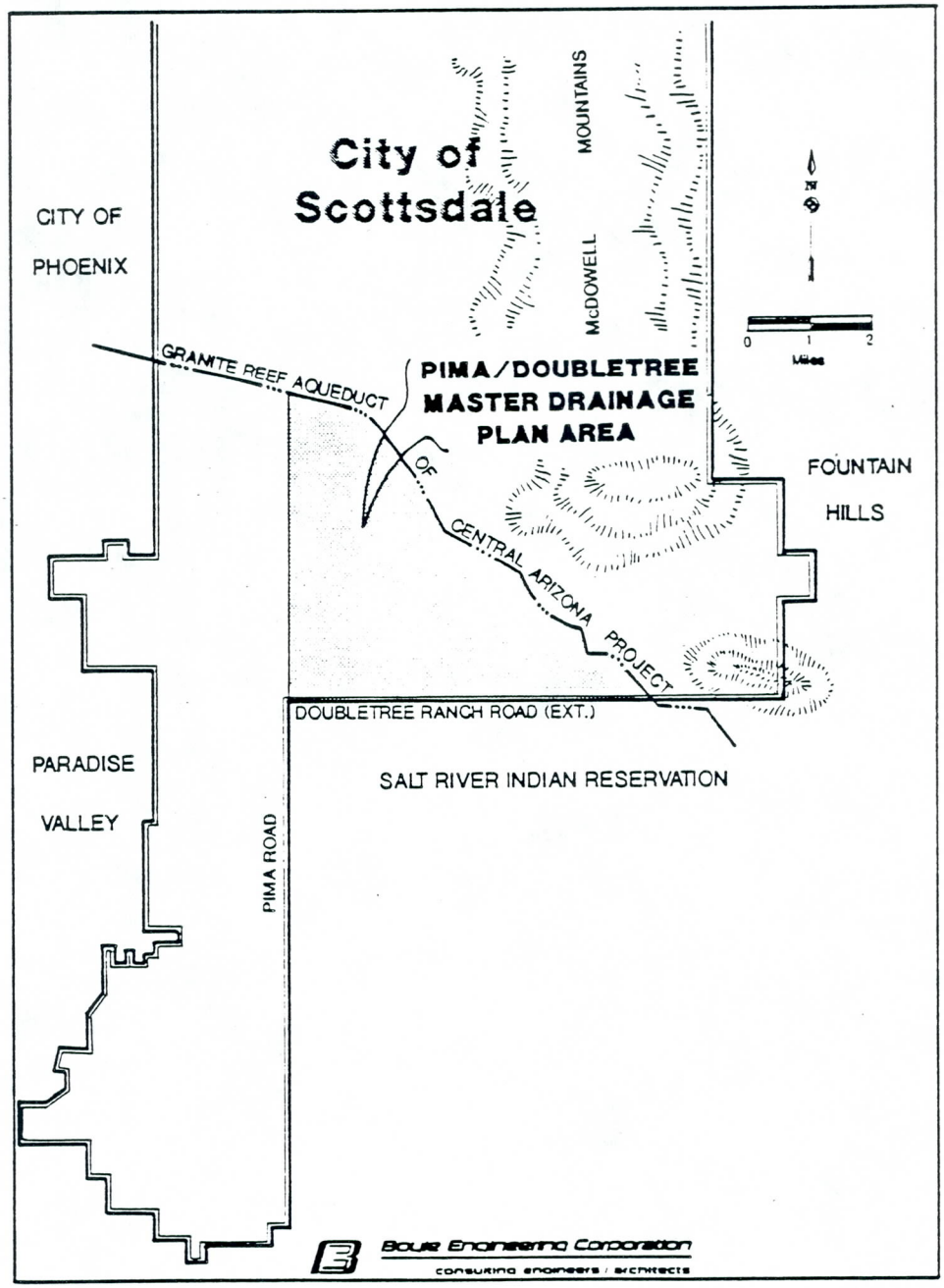

Figure 1.1 Location Map

Section 2
EXISTING CONDITIONS

2.1 General

Existing problems, and primarily those anticipated as a result of future development, have necessitated this Master Drainage Plan. Many of the existing problems are the result of high runoff and inadequately sized, or nonexistent, drainage facilities. These existing problems can be corrected, and future problems averted, only after a thorough understanding of the existing conditions within the study area.

2.2 Study Area

The study area, containing about 12 square miles, is bound on the west by Pima Road, on the south by Doubletree Ranch Road and on the north and east by the CAP canal.

This triangular shaped area has been until this generation entirely in a natural state. The first development was horse farms that did little to alter the natural setting. Individual homes at very low density followed. These homes also had a minimum impact on area drainage patterns. In very recent years, however, large residential developments of high density have been built and some, such as Scottsdale Ranch, have greatly altered natural drainage conditions (Taliesin Wash, for example, no longer flows into Indian Bend Wash but now is channeled into the lakes at Scottsdale Ranch). The extent of basin development can been seen on **Figure 2.1**, an aerial photograph dated September 1988.

Within the study area are seven distinct soil groups identified by the Soil Conservation Service (SCS) and four soil complexes. All but one of these soils fall within the SCS hydrologic group "B". A very small area near 120th Street and the CAP Canal falls into hydrologic group "C"

2.3 Existing Drainage

With the construction of the Granite Reef Aqueduct of the Central Arizona Project, the natural drainage regime of the study area was drastically altered. The Paradise Valley Detention Dike on the upstream side of the canal completely blocks all off-site flows into the study area from Pima Road eastward to near a northern extension of 108th Street. Off-site flows enter the study area at three canal locations; near extensions of Cactus Road and 112th Street, one-quarter of a mile south of the canal crossing of Shea Boulevard, and just west of the canal bridge at 124th Street. These locations are indicated as CAP1, 2 and 3 respectively on **Exhibit 1**.

Historically runoff flowed south west across an alluvial fan. With new street development oriented north/south and east/west, runoff now generally flows south down streets or channels. Some drainageways, particularly from the eastern half of the study area, drain due west. The existing main drainageways are also shown on **Exhibit 1** together with the contributing drainage basins.

Typical flooding in the study area is illustrated by the pictures in **Figure 2.2**. The problems are generally caused by inadequate capacity of existing drains and the scattered and disjointed nature of drainage easements (and hence drains) as shown on **Exhibit 2**.

Typical flooding problems include:

* Cactus Road and 96th Street. Upstream of the intersection is over 3/4 mile of dedicated drainage easement that ends about one block northeast of the street intersection. Flood flows are channeled almost to the intersection and then turned loose.

* 96th Street between Cactus and Cholla and along 103rd Street between Cactus to Cholla. Both these problems are caused by inadequate drain capacity.

* There is some street flooding in the new subdivisions in the northeastern part of the study area. Flooding is caused by desert runoff being intercepted by new subdivision streets. (Many of these problems will be alleviated when the whole area becomes urbanized.)

* Flooding at Shea Boulevard and 116th Street, is caused by incomplete drainage systems. In that particular location there is a drainage channel upstream and a channel at 114th Street but none in between. Between 116th Street and 114th Street the storm flows go down Shea Boulevard.

2.4 Existing Channel and Structure Capacity

To determine problem areas, runoff at key locations for the 10, 50 and 100 year storms were compared with existing channel and structure capacity. Methods used are discussed in Section 3 and the results are summarized in **Table 2.1** (channels) and **Table 2.2** (structures).

Table 2.1 Existing Runoff and Channel Capacity

Basin	Drain		Section	Length	------EXISTING ROW------			Drainage	-----RUNOFF (Q)-----			Channel
			* Street		1'-15'	16'-50'	>50'	Area	10 yr	50 yr	100 yr	Capacity
			Flow	(ft)	(ft)	(ft)	(ft)	(sq mi)	(cfs)	(cfs)	(cfs)	(cfs)
A	A10	-	A20	3,300	-	-	-	.45	132	304	393	3,295
	A20	-						.67	192	450	587	
B	B10	-	B20	2,800	-	-	1,950	.18	121	223	273	360
	B15	-	B17 *	1,200	-	-	-	.04	28	53	65	185
	B17	-	B20	2,100	-	-	-	.04	28	53	65	
	B20	-	B30	2,400	-	-	-	.41	276	516	634	700
	B30	-	B40	2,700	-	620	1,660	.53	361	672	800	390
	B40	-	PIMA	3,700	-	2,800	-	.62	392	751	879	5,060
C	C10	-	C20	2,700	170	470	-	.17	62	141	182	85
	C20	-	C70	5,500	-	720	2,900	.48	186	388	489	175
	C30	-	C35					.04	19	43	54	
	C35	-	C90	1,100	-	750	350	.08	35	83	107	250
	C40	-	C45					.38	115	265	342	
	C45	-	C90	1,100	-	-	1,100	.41	119	272	351	130
	C50	-	C55					.1	44	98	125	
	C55	-	C100	1,300	-	550	750	.17	73	162	212	290
	C60	-	C65					.02	11	24	30	
	C65	-	C100	1,600	-	-	900	.07	35	78	100	445
	C85	-	C130	3,000	-	-	3,000	.8	288	603	770	1,100
	C90	-	C105	1,700	-	250	1,120	.55	155	352	454	110
	C100	-	C105	1,700	-	-	1,700	.32	177	352	447	465
	C105	-	C110	900	-	500	200	.88	320	699	897	690
	C110	-	C140	2,700	-	-	2,700	1.05	409	877	1,108	760
	C120	-	C150	2,600	120	-	1,260	.09	82	140	168	1,375
	C130	-	C145	1,500	-	1,320	-	.94	307	644	821	1,235
	C140	-	C145	2,200	-	1,000	1,200	1.19	457	999	1,229	185
	C145	-	C150	1,300	-	350	950	2.12	684	1,500	1,900	5,470
	C150	-	PIMA	4,700	-	-	4,700	2.53	906	1,858	2,339	9,240
	PIMA	-						3.57	1,442	2,894	3,609	
D	D10	-	D20	1,400	200	800	400	.02	10	22	28	1,510
	D20	-	D30	3,000	440	1,600	-	.06	14	26	32	215
	D20	-	F50	2,500	1,220	450	450	.06	34	62	75	205
	D30	-	D40	2,700	-	670	330	.15	77	145	178	85
	D40	-	D50	2,600	180	600	-	.28	146	280	346	405
	D50	-	E15	1,000	-	-	-	.36	176	354	441	8,405
		-										
E	E10	-	E15					.06	33	64	79	
	E15	-						.42	206	414	517	
F	F10	-	F30 *	1,900	-	-	-	.12	83	157	193	255
	F20	-	F30 *	1,100	-	-	-	.13	136	228	270	270
	F30	-	F40	1,100	350	650	-	.32	280	488	587	385
	F40	-	F50	1,400	-	-	-	.4	2	315	620	
	F50	-	F100	2,800	200	-	1,600	.48	85	354	663	160
	F60	-	F100	2,800	-	-	-	.11				160
	F80	-	F130 *	2,700	-	-	-	.21	13	27	33	210
	F80	-	F90 *	700	-	-	-	.21	120	240	299	170
	F90	-	F120	2,600	-	2,500	-	.31	179	354	438	150
	F100	-	F105	1,500	-	300	-	.71	157	322	668	185
	F105	-	F160	1,500	-	1,500	-	.71	157	322	668	1,080
	F110	-	F155	1,600	-	250	-	.14	88	168	206	
	F120	-	F155	2,500	-	230	-	.42	238	483	602	
	F130	-	F150	1,500	-	1,220	-	.25	117	243	306	845
	F135	-	F145 *	3,700	-	-	-	.09	10	79	115	220

Table 2.1 Existing Runoff and Channel Capacity

Basin	Drain		Section	Length	------EXISTING ROW------			Drainage	-----RUNOFF (Q)-----			Channel
			* Street		1'-15'	16'-50'	>50'	Area	10 yr	50 yr	100 yr	Capacity
			Flow	(ft)	(ft)	(ft)	(ft)	(sq mi)	(cfs)	(cfs)	(cfs)	(cfs)
	CAP1	-	F141	2,000	-	-	800	-	215	215	215	705
	F141	-	F145	1,600	-	-	1,600	-	215	215	215	2,820
	F145	-	F150	3,000	-	-	3,000	.56	381	650	817	7,745
	F150	-	F155	2,200	-	-	2,200	.93	493	936	1,177	7,225
	F155	-	F170	900	-	-	900	1.49	772	1,526	1,905	7,615
	F170	-						2.57	1,104	2,189	2,754	
G	G10	-	G15 *	2,500	-	-	-	.02	23	40	48	145
	G15	-	G20	3,300	-	3,300	-	.02	23	40	48	1,115
	G20	-	I130					.19	152	265	323	
I	I10	-	I20	700	-	-	540	.04	25	52	64	145
	I20	-	I30	1,200	700	500	-	.06	46	84	102	95
	I30	-	I40					.07	54	100	122	
	I40	-	I100	2,300	-	-	-	.08	65	121	147	
	I50	-	I60 *	1,400	-	-	-	.05	60	96	112	305
	I60	-	I65 *	600	-	500	-	.14	73	122	146	275
	I60	-	I70 *	600	-	-	-	.14	73	122	146	340
	I65	-	I80	900	-	-	-	.14	73	122	146	259
	I70	-	I80 *	1,000	-	-	-	.03	112	180	212	225
	I80	-	I90					.22	227	376	445	
	I90	-	I105	1,100	-	-	-	.23	235	391	464	55
	I100	-	I105	1,000	-	-	-	.32	180	362	453	
	I105	-	I120	1,600	-	-	-	.55	404	740	905	345
	I110	-	I115	2,600	-	2,600	-	.06	41	76	93	1,020
	I115	-	I125	900	-	-	-	.17	148	258	312	
	I120	-	I125	3,000	-	-	-	.64	446	829	1,014	4,345
	I125	-	I130					.81	539	1,032	1,266	4,345
	I130	-						1.2	737	1,488	1,850	
J	J10	-						.02	12	24	29	
	J20	-						.05	34	65	80	
	J30	-						.07	44	85	106	
	J40	-						.06	42	83	102	
	J50	-						.06	35	69	85	
	J60	-						.02	14	28	35	
	CAP3	-	J70					-	39	39	39	
	J70	-						.33	220	405	496	
	J80	-						.35	135	302	386	
	CAP2	-	J90					-	1,220	1,220	1,220	
	J90	-						.34	1,388	1,579	1,674	
K	K10	-	K20					.11	62	127	159	4,649
	K20	-						.21	116	251	316	
L	L10	-						.32	231	407	492	
M	M10	-						.24	243	391	461	
N	N10	-	N20					.07	42	85	105	304
	N20	-	N30					.46	203	380	474	415
	N30	-						.62	259	487	606	
O	O10	-	O30					.06	21	47	60	
	O30	-						.44	288	488	585	
P	P10	-						.37	356	540	624	

Table 2.2 Existing Structure Capacity

Basin	Node	Frequency (yrs)	Runoff (cfs)	Size	Capacity (cfs)
A	A10	50	304.0	-	
	A20	50	450.0	2-3'X10' RCBC	420
B	B10	50	223.0	1-3'X10' RCBC	210
	B15	10	28.0	-	
	B20	50	516.0	2-3'X6' RCBC	290
	B30	50	672.0	2-3'X10' RCBC	390
	B40	50	751.0	3-3'X10' RCBC	720
C	C70	50	440.0	3-51"X33" CMP	240
	C80	50	173.0	3-51"X30" CMP	225
	C90	10	155.0	5-24" RCP	115
	C100	10	177.0	2-3'X10' RCBC	480
	C110	50	877.0	6-50"X31" CMP	420
	C120	50	140.0	-	
	C130	50	644.0	2-3'X10' RCBC	440
	C140	50	999.0	3-3'X10' RCBC	900
	C145	50	1,500.0	4-5'X8' RCBC	1,340
	C150	50	1,858.0	8'X16' RCBC	2,600
	PIMA	50	2,894.0	8'X50' RCBC	5,000
D	D20	10	48.0	2.5'X10' RCBC	210
	D30	50	145.0	-	
	D40	50	280.0	2-24" RCP	40
	D50	50	354.0	3-2'X10' RCBC	280
E	E10	50	64.0	2-30" RCP	70
F	F50	50	354.0	2-24" CMP	36
	F80	50	267.0	-	
	F90	50	354.0	-	
	F100	50	322.0	4-36"X24" CMP	92
	F110	50	168.0	-	
	F120	50	483.0	-	
	F130	50	243.0	-	
	F145	50	650.0	2-5'X6' RCBC	625
	F150	50	936.0	2-4'X10' RCBC	600
	F160	50	416.0	3-5.5'X2.5' RCBC	300
	F170	50	2,189.0	10'X50'RCBC	4,500
G	G20	50	265.0	3'X10' RCBC	260
I	I10	50	52.0	2-30" RCP	140
	I25	50	-	-	-
	I30	50	100.0	3-36" RCP	210
	I40	50	22.0	36" RCP	70
	I47	50	-	-	-
	I80	50	376.0	4-42" RCP	340
	I87	50	-	-	-
	I88	50	-	-	-
	I115	50	258.0	3'X10' RCBC	225

Table A4 Drainage Basin Percent Impervious

Rev 1

									Residential - Houses Per Acre											
																			Total	Total
		Apt	Com	Hos	Pks	Und	.2	.3	.4	.6	.8	1.2	2.0	2.5	3.0	4.0	4.5	6.0	Basin	Percent
Basin	Drainage																		Area	Imp
	Area	85%	85%	80%	15%	0%	5%	7%	10%	13%	17%	22%	28%	32%	35%	42%	45%	54%	(acres)	
I	I10	1				24													25	3%
	I20	8																	8	85%
	I30		1			7													8	11%
	I40		3			6													9	28%
	I50	20				11													31	55%
	I60	23				36													59	33%
	I70		15																15	85%
	I80	11				15											3		29	37%
	I90								8										8	10%
	I100						109		41										150	6%
	I110					21											16		37	19%
	I115								1								71		72	45%
	I120								57										57	10%
	I130				21								104						125	26%
J	J10									10									10	13%
	J20									30									30	13%
	J30									41									41	13%
	J40									41									41	13%
	J50									37									37	13%
	J60					7				7									14	7%
	J70					60	4			141									205	9%
	J80					159	38			28									225	2%
	J90					66	148												214	3%
K	K10						49		18										67	6%
	K20												64						64	28%
L	L10								10				107		89				206	30%
M	M10	34	15												105				154	51%
N	N10						2		42				3						47	11%
	N20	5	2		49				73				108		8				245	22%
	N30														102				102	35%
O	O10					36													36	
	O20	19	15			35													69	42%
	O30	3	3			5									163				174	36%
P	P10	55	141			39													235	71%

Table A5 HEC-1 Input Data

File	Description
A58-1510	HEC-1 File: Basin A
A58-1511	HEC-1 File: Basins B and C
A58-1512	HEC-1 File: Basins D,E,and F
A58-1513	HEC-1 File: Basins G and I
A58-1514	HEC-1 File: Basins J,K,L,M,N,O, and P
A58-1515	HEC-1 File: Basin A - Alternative B
A58-1516	HEC-1 File: Basin B - Alternative B
A58-1517	HEC-1 File: Basin C - Alternative A
A58-1518	HEC-1 File: Basin C - Alternative B
A58-1519	HEC-1 File: Basin D - Alternative A
A58-1520	HEC-1 File: Basin F - Alternative A
A58-1521	HEC-1 File: Basin F - Alternative B
A58-1522	HEC-1 File: Basin I - Alternative A
A58-1523	HEC-1 File: Basin A - 100 yr. Retention Volume
A58-1524	HEC-1 File: Basin B - 100 yr. Retention Volume
A58-1525	HEC-1 File: Basin C - 100 yr. Retention Volume

```
ID   SCOTTSDALE - PIMA/DOUBLETREE
ID   MASTER DRAINAGE PLAN
ID   CITY OF SCOTTSDALE, ARIZONA
ID   PROJECT NO. PH-S47-118-00
ID   INPUT FILE: A58_1510
ID*****************************************************************
ID
ID   BASIN A
ID   6 HOUR STORM: 10, 50 & 100 YRS
ID
ID*****************************************************************
IT     2       0       0     300
IN    30
IO     5
JR     3    0.61    0.88     1.0
KK  A10           SUBBASIN A10 RUNOFF
BA0.4478
PB   3.3
PC     0    .014    .030    .082    .758    .860    .897    .926    .946    .963
PC  .976    .988    1.00
LS     0      78       0
UD  0.39
KK   A20          ROUTE CPA10 TO CPA20
RK  3300   .0085    .038       0    TRAP      25       3
KK   A20          SUBBASIN A20 RUNOFF
BA0.2229
LS     0      78      31
UD  0.23
KK CPA20          COMBINE FLOWS AT CPA20
HC     2
ZZ
```

```
ID   SCOTTSDALE - PIMA/DOUBLETREE
ID   MASTER DRAINAGE PLAN
ID   CITY OF SCOTTSDALE, ARIZONA
ID   PROJECT NO. PH-S47-118-00
ID   INPUT FILE: A58_1511
ID*****************************************************************
ID
ID   BASINS B AND C
ID   6 HOUR STORM: 10, 50 & 100 YRS
ID
ID*****************************************************************
IT     2       0       0     300
IN    30
IO     5
JR     3    0.61    0.88     1.0
KK  B10           SUBBASIN B10 RUNOFF
BA0.1777
PB   3.3
PC     0    .014    .030    .082    .758    .860    .897    .926    .946    .963
PC  .976    .988    1.00
LS     0      78      22
UD  0.21
KK   B20          ROUTE CPB10 TO CPB20
RK  2800   .0071     .03       0    TRAP      15     0.5
KK   B15          SUBBASIN B15 RUNOFF
BA0.0400
LS     0      78      20
UD  0.17
KK   B17          ROUTE CPB15 TO CPB17
RK  1200   .0087    .015       0    TRAP      35     0.1
KK   B20          ROUTE CPB17 TO CPB20
RK  2100    .006    .035       0    TRAP      10       5
KK   B20          SUBBASIN B20 RUNOFF
BA0.1946
LS     0      78      29
UD  0.23
KK CPB20          COMBINE FLOWS AT CPB20
HC     3
KK   B30          ROUTE CPB20 TO CPB30
RK  2400   .0071     .03       0    TRAP      12     2.5
KK   B30          SUBBASIN B30 RUNOFF
BA0.1130
LS     0      78      47
UD  0.17
KK CPB30          COMBINE FLOWS AT CPB30
HC     2
KK   B40          ROUTE CPB30 TO CPB40
RK  2700    .007     .03       0    TRAP      12     2.5
KK   B40          SUBBASIN B40 RUNOFF
BA0.0901
LS     0      78      12
UD  0.13
KK CPB40          COMBINE FLOWS AT CPB40
HC     2
KK  PIMA          ROUTE CPB40 TO CPPIMA
RK  3700   .0043    .037       0    TRAP      90       3
KK   B50          SUBBASIN B50 RUNOFF
BA0.1413
LS     0      78       5
UD  0.30
KKCPPIMA          COMBINE FLOWS AT CPPIMA
HC     2
KK  C10            SUBBASIN C10 RUNOFF
BA0.1734
LS     0      78       0
UD  0.29
KK   C20          ROUTE CPC10 TO CPC20
RK  2700   .0093    .035       0    TRAP       5       2
KK   C20          SUBBASIN C20 RUNOFF
```

```
BA0.3027
LS      0      78      15
UD   0.41
KK CPC20          COMBINE FLOWS AT CPC20
HC      2
KK    C70         ROUTE CPC20 TO CPC70
RK   5500   .0073    .035       0    TRAP      10       3
KK    C70         SUBBASIN C70 RUNOFF
BA0.1225
LS      0      78      28
UD   0.27
KK CPC70          COMBINE FLOWS AT CPC70
HC      2
KK    C80         SUBBASIN C80 RUNOFF
BA0.2037
LS      0      78      19
UD   0.43
KK CPC85          COMBINE FLOWS AT CPC85
HC      2
KK   C130         ROUTE CPC85 TO CPC130
RK   3000   .0065    .033       0    TRAP      15       3
KK   C130         SUBBASIN C130 RUNOFF
BA0.1361
LS      0      78      35
UD   0.14
KKCPC130          COMBINE FLOWS AT CPC130
HC      2
KK   C145         ROUTE CPC130 TO CPC145
RK   1500   .0073     .03       0    TRAP      10       3
KK    C30         SUBBASIN C30 RUNOFF
BA0.0394
LS      0      78       0
UD   0.16
KK    C35         ROUTE CPC30 TO CPC35
RK   1500   .0093    .035       0    TRAP      10       5
KK    C35         SUBBASIN C35 RUNOFF
BA0.0402
LS      0      78       0
UD   0.12
KK CPC35          COMBINE FLOWS AT CPC35
HC      2
KK    C90         ROUTE CPC35 TO CPC90
RK   1100    .009     .03       0    TRAP       8       3
KK    C40         SUBBASIN C40 RUNOFF
BA0.3835
LS      0      78       0
UD   0.38
KK    C45         ROUTE CPC40 TO CPC45
RK   1400   .0093    .035       0    TRAP      10       5
KK    C45         SUBBASIN C45 RUNOFF
BA0.0269
LS      0      78       0
UD   0.12
KK CPC45          COMBINE FLOWS AT CPC45
HC      2
KK    C90         ROUTE CPC45 TO CPC90
RK   1100    .009    .035       0    TRAP       6       4
KK    C90         SUBBASIN C90 RUNOFF
BA0.0642
LS      0      78      25
UD   0.15
KK CPC90          COMBINE FLOWS AT CPC90
HC      3
KK   C105         ROUTE CPC90 TO CPC105
RK   1700   .0071    .035       0    TRAP       6     1.5
KK    C50         SUBBASIN C50 RUNOFF
BA0.0993
LS      0      78       0
UD    0.2
```

```
KK   C55        ROUTE CPC50 TO CPC55
RK  1500   0.017    .035       0    TRAP      10       5
KK   C55        SUBBASIN C55 RUNOFF
BA0.0682
LS     0      78       0
UD  0.15
KK CPC55        COMBINE FLOWS AT CPC55
HC     2
KK  C100        ROUTE CPC55 TO CPC100
RK  1300   .0077    .035       0    TRAP       8       3
KK   C60        SUBBASIN C60 RUNOFF
BA0.0190
LS     0      78       0
UD   0.1
KK   C65        ROUTE CPC60 TO CPC65
RK  1700   .0176    .035       0    TRAP      10       5
KK   C65        SUBBASIN C65 RUNOFF
BA0.0523
LS     0      78       0
UD  0.16
KK CPC65        COMBINE FLOWS AT CPC65
HC     2
KK  C100        ROUTE CPC65 TO CPC100
RK  1600     .01    .035       0    TRAP      15       3
KK  C100        SUBBASIN C100 RUNOFF
BA0.0847
LS     0      78      41
UD  0.27
KK CP100        COMBINE FLOWS AT CPC100
HC     3
KK  C105        ROUTE CPC100 TO CPC105
RK  1700   .0071    .035       0    TRAP      15       4
KKCPC105        COMBINE FLOWS AT CPC105
HC     2
KK  C110        ROUTE CP105 TO CPC110
RK   900   .0067    .035       0    TRAP       6       2
KK  C110        SUBBASIN C110 RUNOFF
BA0.1704
LS     0      78      33
UD  0.19
KKCPC110        COMBINE FLOWS AT CPC110
HC     2
KK  C140        ROUTE CPC110 TO CPC140
RK  2700    .007     .03       0    TRAP      10       3
KK  C140        SUBBASIN C140 RUNOFF
BA0.1370
LS     0      78      35
UD  0.15
KKCPC140        COMBINE FLOWS AT CPC140
HC     2
KK  C145        ROUTE CPC140 TO CPC145
RK  2200    .005    .038       0    TRAP       5       1
KKCPC145        COMBINE FLOWS AT CPC145
HC     2
KK  C150        ROUTE CPC145 TO CPC150
RK  1300   .0069     .04       0    TRAP      15     2.5
KK  C120        SUBBASIN C120 RUNOFF
BA0.0923
LS     0      78      35
UD  0.17
KK  C150        ROUTE CPC120 TO CPC150
RK  2600   .0073    .033       0    TRAP      10       3
KK  C150        SUBBASIN C150 RUNOFF
BA0.3115
LS     0      78      31
UD  0.47
KKCPC150        COMBINE FLOWS AT CPC150
HC     3
KK  PIMA        ROUTE CPC150 TO PIMA
```

```
RK  4700   .0043    .028       0    TRAP       45       3
KK  C160        SUBBASIN C160 RUNOFF
BA0.2891
LS     0      78      47
UD  0.29
KKCPPIMA        COMBINE FLOWS AT CPPIMA
HC     3
ZZ
```

```
ID   SCOTTSDALE - PIMA/DOUBLETREE
ID   MASTER DRAINAGE PLAN
ID   CITY OF SCOTTSDALE, ARIZONA
ID   PROJECT NO. PH-S47-118-00
ID   INPUT FILE: A58_1512
ID*************************************************************************
ID
ID   BASINS D, E & F
ID   6 HOUR STORM: 10, 50 & 100 YRS                        REV 1
ID
ID*************************************************************************
IT     2       0       0     300
IN    30
IO     5
JR     3    0.61    0.88     1.0
KK   D10          SUBBASIN D10 RUNOFF
BA0.0184
PB   3.3
PC     0    .014    .030    .082    .758    .860    .897    .926    .946    .963
PC  .976    .988    1.00
LS     0      78       0
UD  0.11
KK   D20          ROUTE CPD10 TO CPD20
RK  1400   .0115     .03       0    TRAP      10       3
KK   D20          SUBBASIN D20 RUNOFF
BA0.0388
LS     0      78      42
UD   0.1
KK CPD20          COMBINE FLOWS AT CPD20
HC     2
KK  D20D          SPLIT FLOW AT CPD20
DT  D20F
DI    10     100     200     300     400     500
DQ     7      70     140     210     280     350
KK   D30          ROUTE CPD20D TO CPD30
RK  3000     .01    .028       0    TRAP      10       3
KK   D30          SUBBASIN D30 RUNOFF
BA0.0882
LS     0      78      21
UD  0.13
KK CPD30          COMBINE FLOWS AT CPD30
HC     2
KK   D40          ROUTE CPD30 TO CPD40
RK  2700   .0057    .033       0    TRAP       5       3
KK   D40          SUBBASIN D40 RUNOFF
BA0.1331
LS     0      78      18
UD  0.29
KK CPD40          COMBINE FLOWS AT CPD40
HC     2
KK   D50          ROUTE CPD40 TO CPD50
RK  2600   .0057    .025       0    TRAP       8     3.5
KK   D50          SUBBASIN D50 RUNOFF
BA0.0838
LS     0      78      13
UD  0.17
KK CPD50          COMBINE FLOWS AT CPD50
HC     2
KK   E15          ROUTE CPD50 TO CPE15
RK  1000    .005    .035       0    TRAP      60       3
KK   E10          SUBBASIN E10 RUNOFF
BA0.0611
LS     0      78      17
UD  0.28
KK CPE15          COMBINE FLOWS AT CPE15
HC     2
KK   F10          SUBBASIN F10 RUNOFF
BA0.1215
LS     0      78      18
UD  0.17
KK   F30          ROUTE CPF10 TO CPF30
RK  1900   .0165    .015       0    TRAP      35     0.1
KK   F20          SUBBASIN F20 RUNOFF
BA0.1335
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LS      0      78      42
UD   0.13
KK    F30         ROUTE CPF20 TO CPF30
RK   1100   .0182    .015       0    TRAP      35     0.1
KK    F30         SUBBASIN F30 RUNOFF
BA0.0665
LS      0      78      42
UD   0.13
KK  CPF30         COMBINE FLOWS AT CPF30
HC      3
KK    F40         ROUTE CPF30 TO CPF40
RK   1100   .0135    .035       0    TRAP       9     2.5
KK    F40         SUBBASIN F40 RUNOFF
BA0.0795
LS      0      78      31
UD    0.1
KK  CPF40         COMBINE FLOWS AT CPF40
HC      2
KK   RF40         RETENTION BASIN AT CPF40
RS      1    STOR       0
SV      0     3.1     8.0    15.3    21.1    21.3    21.5    21.7    21.9    22.1
SE      0       5      10      15      18    18.1    18.2    18.3    18.4    18.5
SQ      0       0       0       0       0      90     250     460     720    1000
KK    F50         ROUTE RF40 TO CPF50
RK   1400    .006    .035       0    TRAP       6       2
KK   D20F         RETRIEVE SPLIT FLOW AT CPD20F
DR   D20F
KK    F50         ROUTE CPD20F TO CPF50
RK   2500   .0092    .028       0    TRAP      10       3
KK    F50         SUBBASIN F50 RUNOFF
BA0.0747
LS      0      78      20
UD   0.14
KK  CPF50         COMBINE FLOWS AT CPF50
HC      3
KK   F100         ROUTE CPF50 TO CPF100
RK   2800   .0071    .034       0    TRAP       6     3.5
KK    F60         SUBBASIN F60 RUNOFF
BA0.1073
LS      0      78      27
UD   0.17
KK   RF60         RETENTION BASIN AT CPF60
RS      1    STOR       0
SV      0     1.2     3.7     8.1    11.3    11.4
SE      0       5      10      15    17.5    18.5
SQ      0       0       0       0       0     500
KK   F100         ROUTE RF60 TO CPF100
RK   2800    .007    .034       0    TRAP       6     3.5
KK   F100         SUBBASIN F100 RUNOFF
BA0.1281
LS      0      78      17
UD   0.21
KKCPF100          COMBINE FLOWS AT CPF100
HC      3
KK   F160         ROUTE CPF100 TO CPF160
RK   3000    .006    .029       0    TRAP       7     3.5
KK   F160         SUBBASIN F160 RUNOFF
BA0.1209
LS      0      78      17
UD   0.19
KKCPF160          COMBINE FLOWS AT CPF160
HC      2
KK   F110         SUBBASIN F110 RUNOFF
BA0.1384
LS      0      78      17
UD    0.2
KK   F155         ROUTE CPF110 TO CPF155
RK   1600   .0075    .035       0    TRAP      10       5
KK    F80         SUBBASIN F80 RUNOFF
BA0.2084
LS      0      78      10
UD   0.13
KK   F80W         SPLIT FLOW AT CPF80
DT   F80S
DI     10      50     100     200     400     600
DQ      1       5      10      20      40      60
KK    F90         ROUTE CPF80W TO CPF90
RK    700   .0071    .018       0    TRAP      40     0.1
KK    F90         SUBBASIN F90 RUNOFF
BA0.1035
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LS      0      78      17
UD   0.23
KK CPF90          COMBINE FLOWS AT CPF90
HC      2
KK  F120          ROUTE CPF90 TO CPF120
RK  2600     .01    .038       0    TRAP       9       3
KK  F120          SUBBASIN F120 RUNOFF
BA0.1113
LS      0      78      17
UD   0.16
KKCPF120          COMBINE FLOWS AT CPF120
HC      2
KK  F155          ROUTE CPF120 TO CPF155
RK  2500   .0052    .035       0    TRAP      10       5
KK  F80S          RETRIEVE SPLIT FLOW AT CPF80S
DR  F80S
KK  F130          ROUTE CPF80S TO CPF130
RK  2700    .011    .018       0    TRAP      20     0.1
KK  F130          SUBBASIN F130 RUNOFF
BA0.2480
LS      0      78       7
UD    0.3
KKCPF130          COMBINE FLOWS AT CPF130
HC      2
KK  F150          ROUTE CPF130 TO CPF150
RK  1500    .004    .032       0    TRAP      12       3
KK  CAP1          INFLOW HYDROGRAPH FROM CAP CULVERT #1
BA      0
QI      0       0       0       0      99     193     206     211     213     214
QI    215     215     215     215     215     214     213     213     212     211
QI    210
KK  F141          ROUTE CPCAP1 TO CPF141
RK  2000   .0115    .035       0    TRAP      12       2
KK  F145          ROUTE CPF141 TO CPF145
RK  1600    .010    .035       0    TRAP      15       3
KK  F135          SUBBASIN F135 RUNOFF
BA0.0880
LS      0      78      49
UD    0.1
KK RF135          RETENTION BASIN AT CPF135
RS      1    STOR       0
SV      0     0.7       2     3.3     4.7       7       9
SE      0       1       2       3       4       5       6
SQ      0       0       0       0      13     200     500
KK  F145          ROUTE RF135 TO CPF145
RK  3700    .012    .018       0    TRAP      40     0.1
KK  F140          SUBBASIN F140 RUNOFF
BA0.1859
LS      0      78       5
UD   0.19
KK  F145          SUBBASIN F145 RUNOFF
BA0.2889
LS      0      78      22
UD   0.23
KKCPF145          COMBINE FLOWS AT CPF145
HC      4
KK  F150          ROUTE CPF145 TO CPF150
RK  3000   .0045    .033       0    TRAP      70       3
KK  F150          SUBBASIN F150 RUNOFF
BA0.1207
LS      0      78      28
UD   0.12
KKCPF150          COMBINE FLOWS AT CPF150
HC      3
KK  F155          ROUTE CPF150 TO CPF155
RK  2200   .0045    .025       0    TRAP      20     3.5
KKCPF155          COMBINE FLOWS AT CPF155
HC      3
KK  F170          ROUTE CPF155 TO CPF170
RK   900    .005    .025       0    TRAP      20     3.5
KK  F170          SUBBASIN F170 RUNOFF
BA0.2481
LS      0      78      23
UD   0.30
KKCPF170          COMBINE FLOWS AT CPF170
HC      3
ZZ
```

```
ID   SCOTTSDALE - PIMA/DOUBLETREE
ID   MASTER DRAINAGE PLAN
ID   CITY OF SCOTTSDALE, ARIZONA
ID   PROJECT NO. PH-S47-118-00
ID   INPUT FILE: A58_1513
ID*************************************************************
ID
ID   BASINS G & I
ID   6 HOUR STORM: 10, 50 & 100 YRS
ID
ID*************************************************************
IT     2       0       0     300
IN    30
IO     5
JR     3    0.61    0.88     1.0
KK   G10          SUBBASIN G10 RUNOFF
BA0.0247
PB   3.3
PC     0    .014    .030    .082    .758    .860    .897    .926    .946    .963
PC  .976    .988    1.00
LS     0      78      30
UD  0.10
KK   G15          ROUTE CPG10 TO CPG15
RK  2500   .0072    .015       0    TRAP      35     0.1
KK   G20          ROUTE CPG15 TO CPG20
RK  3300   .0058    .032       0    TRAP      14       3
KK   G20          SUBBASIN G20 RUNOFF
BA0.1700
LS     0      78      40
UD  0.21
KK CPG20          COMBINE FLOWS AT CPG20
HC     2
KK   I10          SUBBASIN I10 RUNOFF
BA0.0405
LS     0      78       3
UD   0.1
KK   I20          ROUTE CPI10 TO CPI20
RK   700    .044    .035       0    TRAP      10       3
KK   I20          SUBBASIN I20 RUNOFF
BA0.0147
LS     0      78      85
UD   0.1
KK CPI20          COMBINE FLOWS AT CP120
HC     2
KK   I30          ROUTE CPI20 TO CPI30
RK  1200   .0175    .035       0    TRAP      15       4
KK   I30          SUBBASIN I30 RUNOFF
BA0.0136
LS     0      78      11
UD   0.1
KK CPI30          COMBINE FLOWS AT CPI30
HC     2
KK   I40          SUBBASIN I40 RUNOFF
BA0.0141
LS     0      78      28
UD   0.1
KK CPI40          COMBINE FLOWS AT CPI40
HC     2
KK  I100          ROUTE CPI40 TO CPI100
RK  2300   .0157    .038       0    TRAP      20       5
KK  I100          SUBBASIN I100 RUNOFF
BA0.2351
LS     0      78       6
UD  0.21
KKCPI100          COMBINE FLOWS AT CPI100
HC     2
KK  I105          ROUTE CPI100 TO CPI105
RK  1000    .009    .038       0    TRAP      20       5
KK   I50          SUBBASIN I50 RUNOFF
```

```
BA0.0496
LS      0      78      55
UD    0.1
KK    I60        ROUTE CPI50 TO CPI60
RK   1400     .02    .015       0    TRAP      40     0.1
KK    I60        SUBBASIN I60 RUNOFF
BA0.0941
LS      0      78      33
UD   0.13
KK  CPI60        COMBINE FLOWS AT CPI60
HC      2
KK   I60W        SPLIT FLOW AT CPI60
DT   I60S
DI      0      10      50     100     200     500
DQ      0       5      25      50     100     250
KK    I65        ROUTE CPI60W TO CPI65
RK    600   .0167    .015       0    TRAP      40     0.1
KK    I80        ROUTE CPI65 TO CPI80
RK    900   .0167    .035       0    TRAP      10       2
KK    I80        SUBBASIN I80 RUNOFF
BA0.0466
LS      0      78      37
UD   0.11
KK  CPI80        COMBINE FLOWS AT CPI80
HC      2
KK   I60S        RETRIEVE SPLIT FLOW AT CPI60S
DR   I60S
KK    I70        ROUTE CPI60S TO CPI70
RK    600    .016    .015       0    TRAP      50     0.1
KK    I70        SUBBASIN I70 RUNOFF
BA0.0258
LS      0      78      85
UD   0.12
KK  CPI70        COMBINE FLOWS AT CPI70
HC      2
KK    I80        ROUTE CPI70 TO CPI80
RK   1000   .0148    .015       0    TRAP      35     0.1
KK  CPI80        COMBINE FLOWS AT CPI80
HC      2
KK    I90        ROUTE CPI80 TO CPI90
RK    500    .006    .035       0    TRAP      20       5
KK    I90        SUBBASIN I90 RUNOFF
BA0.0130
LS      0      78      10
UD   0.14
KK  CPI90        COMBINE FLOWS AT CPI90
HC      2
KK   I105        ROUTE CPI90 TO CPI105
RK   1100   .0082    .038       0    TRAP      20       5
KKCPI105         COMBINE FLOWS AT CPI105
HC      2
KK   I120        ROUTE CPI105 TO CPI120
RK   1600    .008     .03       0    TRAP       8       3
KK   I120        SUBBASIN I120 RUNOFF
BA0.0891
LS      0      78      10
UD   0.23
KKCPI120         COMBINE FLOWS AT CPI120
HC      2
KK   I125        ROUTE CPI120 TO CPI125
RK    900   .0035    .027       0    TRAP      60       3
KK   I110        SUBBASIN I110 RUNOFF
BA0.0572
LS      0      78      19
UD   0.16
KK   I115        ROUTE CPI110 TO CPI115
RK   2600   .0081    .025       0    TRAP      10       3
KK   I115        SUBBASIN I115 RUNOFF
BA0.1123
```

```
LS      0      78      45
UD   0.13
KKCPI115         COMBINE FLOWS AT CPI115
HC      2
KKCPI125         COMBINE FLOWS AT CPI125
HC      2
KK   I130        ROUTE CPI125 TO CPI130
RK   3000   .0035     .027       0    TRAP      60       3
KK   I130        SUBBASIN I130 RUNOFF
BA0.2010
LS      0      78      26
UD   0.18
KKCPI130         COMBINE FLOWS AT CPI130
HC      3
ZZ
```

```
LS      0       78      45
UD   0.13
KKCPI115        COMBINE FLOWS AT CPI115
HC      2
KKCPI125        COMBINE FLOWS AT CPI125
HC      2
KK   I130       ROUTE CPI125 TO CPI130
RK   3000   .0035    .027       0    TRAP      60       3
KK   I130       SUBBASIN I130 RUNOFF
BA0.2010
LS      0       78      26
UD   0.18
KKCPI130        COMBINE FLOWS AT CPI130
HC      3
ZZ
```

```
ID   SCOTTSDALE - PIMA/DOUBLETREE
ID   MASTER DRAINAGE PLAN
ID   CITY OF SCOTTSDALE, ARIZONA
ID   PROJECT NO. PH-S47-118-00
ID   INPUT FILE: A58_1514
ID*************************************************************
ID
ID   BASINS J, K, L, M, N, O & P
ID   6 HOUR STORM: 10, 50 & 100 YRS
ID
ID*************************************************************
IT     2       0       0     300
IN    30
IO     5
JR     3    0.61    0.88     1.0
KK   J10        SUBBASIN J10 RUNOFF
BA0.0171
PB   3.3
PC     0    .014    .030    .082    .758    .860    .897    .926    .946    .963
PC  .976    .988    1.00
LS     0      78      13
UD  0.10
KK   J20        SUBBASIN J20 RUNOFF
BA0.0474
LS     0      78      13
UD  0.11
KK   J30        SUBBASIN J30 RUNOFF
BA0.0661
LS     0      78      13
UD  0.14
KK   J40        SUBBASIN J40 RUNOFF
BA0.0648
LS     0      78      13
UD  0.15
KK   J50        SUBBASIN J50 RUNOFF
BA0.0573
LS     0      78      13
UD  0.18
KK   DUM        DUMMY HYDROGRAPH COMBINATION
HC     5
KK   J60        SUBBASIN J60 RUNOFF
BA0.0216
LS     0      78       7
UD  0.11
KK  CAP3        INFLOW HYDROGRAPH FROM CAP CULVERT #3
BA     0
QI    39      39      39      39      39      39      39      39      39      39
QI    39      39      39      39      39      39      39      39      39      39
QI    39
KK   J70        ROUTE CPCAP3 TO CPJ70
RK  4400   .0143     .04       0    TRAP       8       4
KK   J70        SUBBASIN J70 RUNOFF
BA0.3255
LS     0      78       9
UD  0.19
KK CPJ70        COMBINE FLOWS AT CPJ70
HC     2
KK   J80        SUBBASIN J80 RUNOFF
BA0.3515
LS     0      78       2
UD  0.28
KK  CAP2        INFLOW HYDROGRAPH FROM CAP CULVERT #2
BA     0
QI  1220    1220    1220    1220    1220    1220    1220    1220    1220    1220
QI  1220    1220    1220    1220    1220    1220    1220    1220    1220    1220
QI  1220
KK   J85        ROUTE CPCAP2 TO CPJ85
RK  3100   .0113    .035       0    TRAP      20       3
KK   J90        ROUTE CPJ85 TO CPJ90
```

Section 3
BASIS OF DESIGN

3.1 General

This section presents the approaches adopted during the development of the Master Drainage Plan and identifies general assumptions made during the course of the study. The Plan has been prepared in accordance with City of Scottsdale standards.

3.2 Available Data

Numerous documents and data have been collected and reviewed during the development of the plan. Many general references were also used. The following list contains some site specific documents used in this study:

* Aerial Mapping (9/8/88)
* USGS 71/2 Minute Quadrangle Maps (the only topographic data available)
* General Drainage Plan for North Scottsdale
* City of Scottsdale General Plan
* City of Scottsdale Codes and Ordinances
* City of Scottsdale right of way Quarter Section maps
* Granite Reef Aqueduct drawings
* Shea Boulevard construction drawings and drainage report
* Soil Survey of Aguila-Carefree Area
* Master Drainage Plan, Stonegate
* Hydrology report, Outer Loop Freeway
* Master Drainage and Concept Report for Adobe Ranch
* Mountainview Ranch Units I and III, drainage report
* Mountainview Ranch Unit II, grading and drainage plans
* Scottsdale Ranch Master drainage and flood control plan
* Final Drainage report for Cabo Del Rey
* Sweetwater Ranch Estates, grading and drainage plans.
* Estates at Scottsdale Ranch Unit 2, grading plans
* Larkspur Drive and 100th Street retention basin improvement plans plans
* Casa Norte, grading and drainage plans

3.3 Hydrologic Analysis

The hydrologic evaluation of the Pima/Doubltree Area was performed using the SCS Method within the U.S. Army Corps of Engineers (COE) Flood Hydrograph Package (HEC-1). Hydrographs were generated for the 10, 50 and 100-year storms. Critical parameters in the hydrological analysis include:

1. Basin Areas
2. Precipitation
3. Rainfall losses
4. Lag (time of concentration)
5. Channel routing

3.3.1 Basin Areas

The delineation of subbasins shown in **Exhibit 1** and the development of basin characteristics were obtained from available USGS quadrangle topography maps, 1,000' and 400' scale aerial photos and detailed site visits. The basins were delineated so that concentration points were located at major road crossings, storage basins and any other critical locations where flooding may occur.

3.3.2 Precipitation

The rainfall distribution chosen for this study was a 6-hour distribution provided by the City of Scottsdale. Point precipitation values of 2.00 inches (10 year), 2.90 inches (50 year) and 3.30 inches (100 year) were derived from NOAA Atlas II. No areal reduction factors were applied to point rainfall values. The cumulative rainfall in 30 minute increments is shown in **Table 3.1.**

Table 3.1 Cumulative Rainfall

Time (min)	Amount of Total	10-Year (inches)	50-Year (inches)	100-Year (inches)
0 - 30	.014	.028	.041	.046
30 - 60	.030	.060	.087	.099
60 - 90	.082	.164	.238	.271
90 - 120	.758	1.516	2.198	2.501
120 - 150	.860	1.720	2.494	2.838
150 - 180	.897	1.794	2.601	2.960
180 - 210	.926	1.852	2.685	3.056
210 - 240	.946	1.892	2.743	3.122
240 - 270	.963	1.926	2.793	3.178
270 - 300	.976	1.952	2.830	3.221
300 - 330	.988	1.976	2.865	3.260
330 - 360	1.000	2.000	2.900	3.300

3.3.3 Rainfall Losses

The SCS Curve Number Loss Rate option was chosen to calculate rainfall losses. A CN of 78 was adopted for the entire basin which is appropriate for the study soil characteristics. Basin development was accounted for by modifying the percent impervious factor within the model as follows:

* For each subbasin the area land use class was measured to calculate a weighted percent impervious. Land use (**Exhibit 3**) was determined by aerial photos and site visits.

* The percent of impervious area for residential areas was taken from the graph of Percent of Impervious Area vs. Dwelling Units/Acre found in the General Drainage Plan for North Scottsdale.

* Apartments and commercial land uses were assigned 85% impervious, hospitals 80% impervious and parks were assigned 15% impervious.

3.3.4 Lag (Time of Concentration)

The lag parameter used in the model was determined by multiplying the time of concentration (Tc) by 0.6. Times of concentration were found utilizing two separate methods:

* For undeveloped basins, the Kirpich equation was used.

* For developed basins travel time was calculated and a 5 minute wetting time was added.

Channel velocities were calculated using Manning's equation. Overland flow velocities, street flow velocities and the Kirpich equation were based on information in the City of Scottsdale Drainage Report Preparation Manual. A minimum time of concentration of 10 minutes was adopted.

3.3.5 Channel Routing

The Kinematic wave procedure was used to route flows. The method requires length, slope, Mannings n and cross-sectional geometry. Channel lengths and slopes were measured from aerial photos and USGS topographical maps. Cross-sectional geometry of each channel was measured in the field and a Mannings n value was assigned to each channel during field inspection.

3.4 Storage Basins

Three storage basins that were included in the model because their sizes are large enough to have a substantial effect on the peak flows generated downstream. The model assumes the basins are empty at the beginning of the storm. Local or on-site storage that may exist in some developments was not modeled due to uncertainty of their location and reliability to retain runoff. In the planning for storage, the basins were sized to retain the runoff from our design 6 hour 100 year storm. The basins were sized assuming an average depth of 10 feet.The

3.5 Hydraulic Analysis

Existing channels and culverts in the study area were analyzed to determine where drainage problems exist. Existing channel capacities were calculated using Mannings normal depth equation. The relevant parameters were measured as described above. Proposed channels were sized assuming a maximum depth of 4 feet, 3 to 1 side slopes and a maximum velocity of 5 feet per second.

Culvert capacities were calculated using the HEC-5 manual. Culvert dimensions and allowable headwater depth were measured in the field and inlet control was assumed for analysis.

3.6 CAP Flows

There are three locations where flows enter the study area from culverts along the CAP canal (see **Exhibit 1**). These flows were used as input in the downstream flow model. The hydrograph for CAP1 resulting from a 6-hour 100 year storm is from a HEC-1 simulation for the General Drainage Plan for North Scottsdale. This hydrograph was used for the 10, 50 and 100 year storm simulations for Basin F.

The peak flows for CAP2 and CAP3 resulting from a 6-hour 100 year storm is from a HEC-1 simulation for the Master Drainage Plan for Stonegate. The peak flows for each culvert were used as a constant flow rate for the 10, 50 and 100 year storm simulations for Basin J. The implications of these and other assumptions are discussed in **Table 3.2**.

Table 3-2 Other Assumptions/Implications

Assumption	Implication
* Adopt existing percent impervious area for future conditions. Any future development will not increase flows because of storage requirements.	* *Conservative on future peak flow estimates because runoff from new development is retained.*
* Runoff is contained in channel banks during design storm.	* *Conservative on peak flow estimates since storage in overbank flows is not considered.*
* Storage assumed in dedicated major storage basins only.	* *Conservative on peak flow estimates since smaller basins and on-site storage is not considered.*
* Storage basins are empty at the start of the design storm.	* *Liberal on storage basins effect on reducing flows.*
* Culvert capacities are based on inlet control.	* *Liberal on culvert ability to pass design flow. However, due to short culvert lengths and no tailwater effect, it is probable that most culverts will perform under inlet control.*
* The hydrologic model for Basin F used the 100 year CAP culvert inflow hydrograph for downstream 10, 50 and 100 year simulations.	* *Conservative on CAP culvert's affect on downstream flows.*
* The hydrologic model for Basin J used a constant 100 year peak flow value for the two CAP culvert locations.	* *Conservative on CAP culvert's affect on downstream flows.*
* The peak flow at Pima Road south of Mountain View from Basins B and C for the two alternatives was estimated by adding the respective peak flows.	* *Conservative on combined peak flow however the existing structure has more than enough capacity for the design peak.*

Section 4
ALTERNATIVE PLANS

4.1 General

Drainage alternatives have been formulated with the intent of utilizing the existing structures and channels to the fullest possible extent. The capacity required for channels and culverts has been summarized in **Table 2.1** and **Table 2.2** and meaningful available right of way is shown on **Exhibit 3.** It should be noted that many of the channels and structures do not have sufficient capacity to convey design flows and therefore require upgrading. This section of the report discusses alternative measures to upgrade deficient sections and provides preliminary cost estimates to assist in establishing the preferred alternative.

4.2 Alternative Improvements

Two separate alternatives have been provided, where meaningful, for each of the basins. In some cases the same improvement is recommended for both alternatives. Alternative A improvements are shown on **Exhibit 4** and Alternative B improvements are shown on **Exhibit 5.** Only basins requiring improvements have been discussed.

Basin A Alternatives

Alternative A * Construct a culvert at Pima and Raintree (A10) to convey design runoff.

Alternative B * Construct a storage basin just upstream of A10 to retain runoff.

Basin B Alternatives

Alternative A * Upgrade the culvert at Pima Road and Cactus (B20) and upgrade the channel along Pima from Cholla to Shea (B30-B40).

Alternative B * Construct a storage basin just north of cactus and east of Pima B20).

Basin C Alternatives

Alternative A & B * Construct a culvert at 91st Street and Cholla (C120). Eliminate split flow that occurs just south of Sweetwater and 99th Street (D20) and convey flow to 95th and Cactus (D20-D30-C110).

Alternative A * Upgrade the channels from 92nd and Thunderbird to 92nd and Cactus (C20-C70) and from 95th and Sutton to 92nd and Desert Cove (C45-C145). Upgrade culvert at 92nd and Cholla (C130).

Alternative B * Construct a storage basin at 95th and Sutton (C35) and channel upstream flows to basin (C20-C35 and D10-C35). Upgrade channel from 95th and Cholla to 92nd and Desert Cove (C140-C145).

Basin D Alternatives

Alternative A & B * Because the drainage improvements for Basin C route runoff from subbasins D10, D20 and D30 into Basin C, the only drainage improvement needed for Basin D is to upgrade the culvet capacity at 96th Street and Cholla (D40).

Basin F Alternatives

Alternative A & B * Upgrade channel from 100th and Sweetwater to storage basin (F30-F40) and from the storage basin to 100th and Desert Cove (F40-F105). A 60" dia RCP from the storage basin (F40) to F50 will be required to drain and prevent overtopping of the basin. Upgrade culverts at 100th and Shea (F160), 104th and Desert Cove (F150) and 104th and Cholla (F130).

Alternative A * Eliminate split flow at 104th and Cactus (F80) and convey runoff in a new/upgraded channel to the existing channel at 101st and Desert Cove (F80-F155).

Alternative B * Eliminate split flow at 104th and Cactus (F80) and convey runoff in an upgraded channel to 104th and Cholla (F80-F130). Construct a new (adverse grade) channel from 103rd and Cholla to 104th and Cholla (F120-F130). Construct a new channel from 101st and Cholla to 99th and Cholla (F110-F100).

Basin I Alternatives

Alternative A & B * Construct a channel on the north side of Shea from 117th to 1/2 block west of 116th (I20-I40), another channel on the north side of Shea from Frank Lloyd Wright to 112th (I70-I80), and a channel on the south side of Shea from 1/2 block west of 116th to 108th (I45-I125).

4.3 Alternative Plan Runoff Estimates

The study area was modeled for Alternative A and B using the same methods as for the existing conditions. A summary of the design discharges is given in **Table 4.1**.

4.4 Alternative Plan Cost Estimates

Planning cost estimates have been prepared for the alternatives and are summarized in **Table 4.2** (Alternative A) and **Table 4.3** (Alternative B). The estimates are preliminary and do not address site specific details. The costs include estimates of excavation, channel linings, structures, right of way and a 20% contingency factor. Unit costs used in the estimates are as folows:

Culverts	Varied based on size.
Earthworks and landscaping	$5.75 per cubic yard
Right of way	$5.63 per square foot (includes $0.13/square foot for appraisal costs)

Table 4.1 Alternative Plan Runoff Estimates

Basin	Drain Section			ALTERNATIVE A				ALTERNATIVE B			
				Area	10 yr	50 yr	100 yr	Area	10 yr	50 yr	100 yr
				(sq mi)	(cfs)	(cfs)	(cfs)	(sq mi)	(cfs)	(cfs)	(cfs)
A	A10	-	A20	.45	132	304	393				
	A20	-		.67	192	450	587	.22	170	298	360
B	B10	-	B20	.18	121	223	273				
	B15	-	B20	.04	28	53	65				
	B20	-	B30	.41	276	516	634				
	B30	-	B40	.53	361	672	800	.11	116	190	225
	B40	-	PIMA	.62	392	751	879	.2	168	299	361
C	C10	-	C20	.17	62	141	182				
	C20	-	C70	.48	186	388	489				
	C30	-	C35	.04	19	43	54				
	C35	-	C90	.08	35	83	107				
	C40	-	C45	.38	115	265	342				
	C45	-	C90	.41	119	272	351				
	C50	-	C55	.1	44	98	125				
	C55	-	C100	.17	73	162	212				
	C60	-	C65	.02	11	24	30				
	C65	-	C100	.07	35	78	100				
	C85	-	C130	.8	288	603	770	.33	165	304	372
	C90	-	C105	.55	155	352	454	.06	51	92	111
	C100	-	C105	.32	177	352	447	.08	70	118	140
	C105	-	C110	.88	320	699	897	.15	115	201	242
	C110	-	C140	1.19	481	1029	1284	.45	349	620	751
	C120	-	C150	.09	82	140	168	.09	82	140	168
	C130	-	C145	.94	307	644	821	.46	216	404	500
	C140	-	C145	1.33	553	1145	1441	.58	452	814	987
	C145	-	C150	2.27	773	1602	2042	1.05	664	1211	1481
	C150	-	PIMA	2.67	1002	1989	2505	1.45	887	1603	1944
D	D10	-	D20	.02	10	22	28				
	D20	-	D30	.06	48	88	107	.04	41	68	81
	D20	-	F50								
	D30	-	D40								
	D30	-	C110	.15	109	206	250	.13	105	189	229
	D40	-	D50	.13	73	139	172				
	D50	-	E15	.22	105	212	265				
		-									
E	E10	-	E15	.06	33	64	79				
F	F10	-	F30	.12	83	157	193	.12	83	157	193
	F20	-	F30	.13	136	228	270	.13	136	228	270
	F30	-	F40	.32	280	488	587	.32	280	488	587
	F40	-	F50	.4	130	170	184	.4	130	170	184
	F50	-	F100	.48	153	232	267	.48	153	232	267
	F60	-	F100	.11	0	0	0	.11	0	0	0
	F80	-	F130					.21	134	267	332
	F80	-	F90	.21	134	267	332				
	F90	-	F120	.31	192	380	471	.1	62	118	146
	F100	-	F160	.71	214	369	440	.85	298	536	645
	F110	-	F100					.14	88	168	206
	F110	-	F155	.56	336	673	841				
	F120	-	F110	.42	257	518	642				
	F120	-	F130					.21	119	237	294
	F120	-	F155								
	F130	-	F150	.25	105	220	278	.67	344	698	891
	F135	-	F145	.09	10	79	115	.09	10	79	115
	CAP1	-	F145		215	215	215		215	215	215
	F145	-	F150	.56	381	650	817	.56	381	650	817
	F150	-	F155	.93	481	912	1146	1.35	714	1376	1755
	F155	-	F170	1.49	788	1523	1928				
	F170	-		2.57	1179	2272	2830	2.57	1163	2263	2833

Table 4.1 Alternative Plan Runoff Estimates

Basin	Drain Section					ALTERNATIVE A					ALTERNATIVE B
				Area	10 yr	50 yr	100 yr	Area	10 yr	50 yr	100 yr
				(sq mi)	(cfs)	(cfs)	(cfs)	(sq mi)	(cfs)	(cfs)	(cfs)
G	G10	-	G20	.02	23	40	48				
	G20	-	I130	.19	152	265	323				
I	I10	-	I20	.04	25	52	64				
	I20	-	I30	.06	46	84	102				
	I30	-	I40	.07	54	100	122				
	I40	-	I100								
	I45	-	I85	.08	65	121	147				
	I50	-	I60	.05	60	96	112				
	I60	-	I65	.14	73	122	146				
	I60	-	I70	.14	73	122	146				
	I65	-	I80								
	I70	-	I80	.03	112	180	212				
	I80	-	I85	.22	227	376	445				
	I80	-	I90								
	I85	-	I125	.3	288	491	588				
	I90	-	I105	.01	8	16	20				
	I100	-	I105	.24	116	246	310				
	I105	-	I120	.25	124	260	327				
	I110	-	I115	.06	41	76	93				
	I115	-	I125	.17	148	258	312				
	I120	-	I125	.34	165	346	437				
	I125	-	I130	.81	535	1002	1255				
	I130	-		1.01	629	1211	1526				
J	J10	-									
	J20	-									
	J30	-									
	J40	-									
	J50	-									
	J60	-									
	CAP3	-	J70								
	J70	-									
	J80	-									
	CAP2	-	J90								
	J90	-									
K	K10	-	K20								
	K20	-									
L	L10	-									
M	M10	-									
N	N10	-	N20								
	N20	-	N30								
	N30	-									
O	O10	-	O30								
	O30	-									
P	P10	-									

Table 4.2 Alternative A - Planning Cost Estimate

Basin	Alt	Channel or Structure	Improvement	Structure Cost ($)	Channel Cost ($)	ROW Cost ($)	Contingcy @ 20% ($)	Total Section ($)	Total Basin ($)
A	A	A10	2-3'X8' RCBC		No cost estimate due to ADOT				
B	A	B20	3'X10' RCBC		No cost estimate due to ADOT				
B	A	B30	2-3'X6' RCBC		No cost estimate due to ADOT				
B	A	B30-B40	CHANNEL		No cost estimate due to ADOT				
C	A	C120	3'X6' RCBC	11,700			2,340	14,040	
C	A	D20-D30	CHANNEL		17,370	296,980	62,870	377,220	
C	A	D30-C110	CHANNEL		7,150	101,340	21,698	130,188	
C	A	D30	3'X10' RCBC	18,300			3,660	21,960	
C	A	C70	3'X10' RCBC	18,300			3,660	21,960	
C	A	C90	36" CMP	3,780			756	4,536	
C	A	C110	4-3'X8' RCBC	51,060			10,212	61,272	
C	A	C130	3'X10' RCBC	18,300			3,660	21,960	
C	A	C140	2-3'X6' RCBC	19,320			3,864	23,184	
C	A	C145	2-3'X6' RCBC	19,320			3,864	23,184	
C	A	C20-C70	CHANNEL		131,140	261,800	78,588	471,528	
C	A	C45-C90	CHANNEL		19,670		3,934	23,604	
C	A	C90-C110	CHANNEL		77,330	309,650	77,396	464,376	
C	A	C110-C140	CHANNEL		80,830		16,166	96,996	
C	A	C140-C145	CHANNEL		136,790	399,730	107,304	643,824	2,399,832
D	A	D40	48" CMP	4,860			972	5,832	5,832
F	A	F50	3'X8' RCBC	14,820			2,964	17,784	
F	A	F30-F40	CHANNEL		26,230	246,310	54,508	327,048	
F	A	F40-F50	60" dia RCP		675,000	175,000	170,000	1,020,000	
F	A	F50-F100	CHANNEL		50,070	287,130	67,440	404,640	
F	A	F80	2-3'X6' RCBC	19,320			3,864	23,184	
F	A	F90	2-3'X8' RCBC	25,500			5,100	30,600	
F	A	F100	2-3'X6' RCBC	19,320			3,864	23,184	
F	A	F110	4-3'X8' RCBC	51,060			10,212	61,272	
F	A	F130	3'X10' RCBC	18,300			3,660	21,960	
F	A	F150	2-3'X8' RCBC	25,500			5,100	30,600	
F	A	F160	3'X8' RCBC	14,820			2,964	17,784	
F	A	F80-F90	CHANNEL		2,180	177,350	35,906	215,436	
F	A	F90-F120	CHANNEL		61,990	512,330	114,864	689,184	
F	A	F100-F105	CHANNEL		26,825	380,025	81,370	488,220	
F	A	F110-F155	CHANNEL		65,410	647,450	142,572	855,432	
F	A	F120-F110	CHANNEL		48,560	548,930	119,498	716,988	4,943,316
I	A	I25	48" CMP	4,860			972	5,832	
I	A	I47	3'X6' RCBC	11,700			2,340	14,040	
I	A	I85	3-3'X8' RCBC	34,530			6,906	41,436	
I	A	I87	3-3'X8' RCBC	34,530			6,906	41,436	
I	A	I20-I40	CHANNEL		6,140	59,120	13,052	78,312	
I	A	I70-I80	CHANNEL		10,220	197,050	41,454	248,724	
I	A	I45-I85	CHANNEL		22,470	135,120	31,518	189,108	
I	A	I85-I125	CHANNEL		71,530	633,380	140,982	845,892	1,464,780
								TOTAL	8,813,760

Table 4.3 Alternative B - Planning Cost Estimate

Basin	Alt	Channel or Structure	Improvement	Structure Cost ($)	Channel Cost ($)	ROW Cost ($)	Contingcy @ 20% ($)	Total Section ($)	Total Basin ($)
A	B	A10	RETENTION BASIN						
B	B	B20	RETENTION BASIN						
C	B	C120	3'X6' RCBC	11,700			2,340	14,040	
C	B	D20-D30	CHANNEL		17,370	296,980	62,870	377,220	
C	B	D30-C110	CHANNEL		7,150	101,340	21,698	130,188	
C	B	C35	RETENTION BASIN	853,450		2,561,650	683,020	4,098,120	
C	B	D30	3'X8' RCBC	14,820			2,964	17,784	
C	B	C110	3'X10' RCBC	18,300			3,660	21,960	
C	B	D10-C35	CHANNEL		30,650	760,050	158,140	948,840	
C	B	C20-C35	CHANNEL		47,690	619,300	133,398	800,388	
C	B	C140-C145	CHANNEL		89,940	304,020	78,792	472,752	6,881,292
D	B	D40	48" CMP	4,860			972	5,832	5,832
F	B	F30-F40	CHANNEL		26,230	246,310	54,508	327,048	
F	B	F50	3'X8' RCBC	14,820			2,964	17,784	
F	B	F40-F50	60" dia RCP		675,000	175,000	170,000	1,020,000	
F	B	F50-F100	CHANNEL		50,070	287,130	67,440	404,640	
F	B	F80	2-3'X6' RCBC	19,320			3,864	23,184	
F	B	F90	3'X6' RCBC	11,700			2,340	14,040	
F	B	F100	2-3'X10' RCBC	30,000			6,000	36,000	
F	B	F110	4-3'X8' RCBC	51,060			10,212	61,272	
F	B	F130	3'X10' RCBC	18,300			3,660	21,960	
F	B	F130	4-3'X8' RCBC	51,060			10,212	61,272	
F	B	F150	4-3'X10' RCBC	66,930			13,386	80,316	
F	B	F160	2-3'X8' RCBC	25,500			5,100	30,600	
F	B	F80-F130	CHANNEL		48,280	684,045	146,465	878,790	
F	B	F100-F105	CHANNEL		48,560	548,930	119,498	716,988	
F	B	F110-F100	CHANNEL		14,300	275,870	58,034	348,204	
F	B	F120-F130	CHANNEL		12,520	157,640	34,032	204,192	4,246,290
I	B	I25	48" CMP	4,860			972	5,832	
I	B	I47	3'X6' RCBC	11,700			2,340	14,040	
I	B	I85	3-3'X8' RCBC	34,530			6,906	41,436	
I	B	I87	3-3'X8' RCBC	34,530			6,906	41,436	
I	B	I20-I40	CHANNEL		6,140	59,120	13,052	78,312	
I	B	I70-I80	CHANNEL		10,220	197,050	41,454	248,724	
I	B	I45-I85	CHANNEL		22,470	135,120	31,518	189,108	
I	B	I85-I125	CHANNEL		71,530	633,380	140,982	845,892	1,464,780
									12,598,194

Section 5
PROPOSED IMPROVEMENTS

5.1 General

The high cost of land makes the use of land intensive alternatives (ie storage basins) more expensive than traditional conveyance solutions. It is therefore recommended that, unless there can be an alternative, multiple use of storage basin land that can offset the difference in cost, the preferred, less expensive solution is to upgrade deficient channel and structure sections to relieve drainage problems. The preferred alternative solution for each basin is shown on **Exhibit 6** and the costs are summarized in **Table 5.1**.

5.2 Lined Channels

This study has adopted unlined channels as the preferred conveyance system. However because of the high cost of right of way it may be desirable to reduce channel right of way requirements by lining. A comparison cost for section F100-F105 (1500' long for 668 cfs) was performed to establish a general difference in cost. The right of way cost for an unlined section is $549,000. The right of way cost plus the lining cost for a lined section is $328,000. Therefore the difference in cost is $221,000 or about $147 per foot.

5.3 Implementation

The implementation of the proposed improvements must be properly planned and executed to avoid exposing the pubiic to increased hazard. Since the likelihood of simultaneous construction of all facilities is small, a phased approach should be adopted. A phasing plan must address many issues including drainage problems and funding.

The first step in implementing a plan for the construction of improvements is the adoption of this Master Plan. This establishes the location of the drainage corridors and channel sections. The acquisition of right of way should begin as quickly as possible as this establishes a permanent public corridor for future drainage improvements; thereby removing the property from development pressures. Prior to right of way acquisition a detailed boundary survey of the channels should be conducted and since right of way acquisiton will not be possible all at once, the City should develop a method of prohibiting construction within the proposed right of way.

The simultaneous construction of drainage improvements within the study area is impractical and unlikely. However, improvements are needed and should proceed in the following general manner:

1. Adopt Pima/Doubletree Master Drainage Plan
2. Identify actual alignment, and conduct field surveys
3. Prepare legal descriptions and map properties to be affected
4. Implement a method of prohibiting construction within proposed right of way
5. Acquire right of way as it becomes available
6. Coordinate new development with the drainage study
7. Encourage the construction of improvements with new developments

Table 5.1 Proposed Improvements Planning Cost Estimate

Basin	Alt	Channel or Structure	Improvement	Structure Cost ($)	Channel Cost ($)	ROW Cost ($)	Contingcy @ 20% ($)	Total Section ($)	Total Basin ($)
A	A	A10	2-3'X8' RCBC		No cost estimate due to ADOT				
B	A	B20	3'X10' RCBC		No cost estimate due to ADOT				
B	A	B30	2-3'X6' RCBC		No cost estimate due to ADOT				
B	A	B30-B40	CHANNEL		No cost estimate due to ADOT				
C	A	C120	3'X6' RCBC	11,700			2,340	14,040	
C	A	D20-D30	CHANNEL		17,370	296,980	62,870	377,220	
C	A	D30-C110	CHANNEL		7,150	101,340	21,698	130,188	
C	A	D30	3'X10' RCBC	18,300			3,660	21,960	
C	A	C70	3'X10' RCBC	18,300			3,660	21,960	
C	A	C90	36" CMP	3,780			756	4,536	
C	A	C110	4-3'X8' RCBC	51,060			10,212	61,272	
C	A	C130	3'X10' RCBC	18,300			3,660	21,960	
C	A	C140	2-3'X6' RCBC	19,320			3,864	23,184	
C	A	C145	2-3'X6' RCBC	19,320			3,864	23,184	
C	A	C20-C70	CHANNEL		131,140	261,800	78,588	471,528	
C	A	C45-C90	CHANNEL		19,670		3,934	23,604	
C	A	C90-C110	CHANNEL		77,330	309,650	77,396	464,376	
C	A	C110-C140	CHANNEL		80,830		16,166	96,996	
C	A	C140-C145	CHANNEL		136,790	399,730	107,304	643,824	2,399,832
D	A	D40	48" CMP	4,860			972	5,832	5,832
F	B	F30-F40	CHANNEL		26,230	246,310	54,508	327,048	
F	B	F50	3'X8' RCBC	14,820			2,964	17,784	
F	B	F40-F50	60" dia RCP		675,000	175,000	170,000	1,020,000	
F	B	F50-F100	CHANNEL		50,070	287,130	67,440	404,640	
F	B	F80	2-3'X6' RCBC	19,320			3,864	23,184	
F	B	F90	3'X6' RCBC	11,700			2,340	14,040	
F	B	F100	2-3'X10' RCBC	30,000			6,000	36,000	
F	B	F110	4-3'X8' RCBC	51,060			10,212	61,272	
F	B	F130	3'X10' RCBC	18,300			3,660	21,960	
F	B	F130	4-3'X8' RCBC	51,060			10,212	61,272	
F	B	F150	4-3'X10' RCBC	66,930			13,386	80,316	
F	B	F160	2-3'X8' RCBC	25,500			5,100	30,600	
F	B	F80-F130	CHANNEL		48,280	684,045	146,465	878,790	
F	B	F100-F105	CHANNEL		48,560	548,930	119,498	716,988	
F	B	F110-F100	CHANNEL		14,300	275,870	58,034	348,204	
F	B	F120-F130	CHANNEL		12,520	157,640	34,032	204,192	4,246,290
I	A	I25	48" CMP	4,860			972	5,832	
I	A	I47	3'X6' RCBC	11,700			2,340	14,040	
I	A	I85	3-3'X8' RCBC	34,530			6,906	41,436	
I	A	I87	3-3'X8' RCBC	34,530			6,906	41,436	
I	A	I20-I140	CHANNEL		6,140	59,120	13,052	78,312	
I	A	I70-I80	CHANNEL		10,220	197,050	41,454	248,724	
I	A	I45-I85	CHANNEL		22,470	135,120	31,518	189,108	
I	A	I85-I125	CHANNEL		71,530	633,380	140,982	845,892	1,464,780
								TOTAL	8,116,734

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Table A1 Hydrology Input Parameters

Basin	Drainage Area	Area (acres)	Percent Impervious (%)	SCS Curve Number	Basin Lag (hrs)
A	A10	287	0	78	.39
	A20	143	31	78	.23
B	B10	114	22	78	.21
	B15	26	20	78	.17
	B20	125	29	78	.23
	B30	72	47	78	.17
	B40	58	12	78	.13
	B50	90	5	78	.3
C	C10	111	0	78	.29
	C20	194	15	78	.41
	C30	25	0	78	.16
	C35	26	0	78	.12
	C40	245	0	78	.38
	C45	17	0	78	.12
	C50	64	0	78	.2
	C55	44	0	78	.15
	C60	12	0	78	.1
	C65	33	0	78	.16
	C70	78	28	78	.27
	C80	130	19	78	.43
	C90	41	25	78	.15
	C100	54	41	78	.27
	C110	109	33	78	.19
	C120	59	35	78	.17
	C130	87	35	78	.14
	C140	88	35	78	.15
	C150	199	31	78	.47
	C160	183	47	78	.29
D	D10	12	0	78	.11
	D20	25	42	78	.1
	D30	56	21	78	.13
	D40	85	18	78	.29
	D50	54	13	78	.17
E	E10	39	17	78	.28
F	F10	78	18	78	.17
	F20	85	42	78	.13
	F30	43	42	78	.13
	F40	51	31	78	.1
	F50	48	20	78	.14
	F60	69	27	78	.17
	F80	133	10	78	.13
	F90	66	17	78	.23
	F100	82	17	78	.21
	F110	89	17	78	.2
	F120	71	17	78	.16
	F130	159	7	78	.3
	F135	56	49	78	.1
	F140	119	5	78	.19
	F145	185	22	78	.23
	F150	77	28	78	.12
	F160	77	17	78	.19
	F170	159	23	78	.3
G	G10	16	30	78	.1

Table A1 Hydrology Input Parameters

Basin	Drainage Area	Area (acres)	Percent Impervious (%)	SCS Curve Number	Basin Lag (hrs)
	G20	109	40	78	.21
I	I10	26	3	78	.1
	I20	9	85	78	.1
	I30	9	11	78	.1
	I40	9	28	78	.1
	I50	32	55	78	.1
	I60	60	33	78	.13
	I70	16	85	78	.12
	I80	30	37	78	.11
	I90	8	10	78	.14
	I100	150	6	78	.21
	I110	37	19	78	.16
	I115	72	45	78	.13
	I120	57	10	78	.23
	I130	129	26	78	.18
J	J10	11	13	78	.1
	J20	30	13	78	.11
	J30	42	13	78	.14
	J40	41	13	78	.15
	J50	37	13	78	.18
	J60	14	7	78	.11
	J70	208	9	78	.19
	J80	225	2	78	.28
	J90	215	3	78	.18
K	K10	68	6	78	.14
	K20	64	28	78	.17
L	L10	207	30	78	.26
M	M10	155	51	78	.23
N	N10	48	11	78	.2
	N20	245	22	78	.36
	N30	104	35	78	.19
O	O10	36	0	78	.28
	O20	69	42	78	.32
	O30	176	36	78	.3
P	P10	235	71	78	.43

Table A2 Routing Parameters

Rev 1

Basin	Channel (CP-CP)	Length (ft)	Slope (f/f)	Manning's n	Bottom Width (ft)	Side Slopes (h/v)
A	A10 - A20	3,300	.0085	.038	25	3.0
B	B10 - B20	2,800	.0071	.030	15	.5
	B15 - B17	1,200	.0087	.015	35	.1
	B17 - B20	2,100	.0060	.035	10	5.0
	B20 - B30	2,400	.0071	.030	12	2.5
	B30 - B40	2,700	.0070	.030	12	2.5
	B40 -PIMA	3,700	.0043	.037	90	3.0
C	C10 - C20	2,700	.0093	.035	5	2.0
	C20 - C70	5,500	.0073	.035	10	3.0
	C30 - C35	1,500	.0093	.035	10	5.0
	C35 - C90	1,100	.0090	.030	8	3.0
	C40 - C45	1,400	.0093	.035	10	5.0
	C45 - C90	1,100	.0090	.035	6	4.0
	C50 - C55	1,500	.0170	.035	10	5.0
	C55 - C100	1,300	.0077	.035	8	3.0
	C60 - C65	1,700	.0176	.035	10	5.0
	C65 - C100	1,600	.0100	.035	15	3.0
	C85 - C130	3,000	.0065	.033	15	3.0
	C90 - C105	1,700	.0071	.035	6	1.5
	C100 - C105	1,700	.0071	.035	15	4.0
	C105 - C110	900	.0067	.035	6	2.0
	C110 - C140	2,700	.0070	.030	10	3.0
	C120 - C150	2,600	.0073	.033	10	3.0
	C130 - C145	1,500	.0073	.030	10	3.0
	C140 - C145	2,200	.0050	.038	5	1.0
	C145 - C150	1,300	.0069	.040	15	2.5
	C150 - PIMA	4,700	.0043	.028	45	3.0
D	D10 - D20	1,400	.0115	.030	10	3.0
	D20 - D30	3,000	.0100	.028	10	3.0
	D20 - F50	2,500	.0092	.028	10	3.0
	D30 - D40	2,700	.0057	.033	5	3.0
	D40 - D50	2,600	.0057	.025	8	3.5
	D50 - E15	1,000	.0050	.035	60	3.0
F	F10 - F30	1,900	.0165	.015	35	.1
	F20 - F30	1,100	.0182	.015	35	.1
	F30 - F40	1,100	.0135	.035	9	2.5
	F40 - F50	1,400	.0060	.035	6	2.0
	F50 - F100	2,800	.0071	.034	6	3.5
	F60 - F100	2,800	.0070	.034	6	3.5
	F80 - F130	2,700	.0110	.018	20	.1
	F80 - F90	700	.0071	.018	40	.1
	F90 - F120	2,600	.0100	.038	9	3.0
	F100 - F160	3,000	.0060	.029	7	3.5
	F110 - F155	1,600	.0075	.035	10	5.0
	F120 - F155	2,500	.0052	.035	10	5.0
	F130 - F150	1,500	.0040	.032	12	3.0
	F135 - F145	3,700	.0120	.018	40	.1
	CAP1 - F141	2,000	.0115	.035	12	2.0
	F141 - F145	1,600	.0100	.035	15	3.0
	F145 - F150	3,000	.0045	.033	70	3.0
	F150 - F155	2,200	.0045	.025	20	3.5
	F155 - F170	900	.0050	.025	20	3.5
G	G10 - G15	2,500	.0072	.015	35	.1
	G15 - G20	3,300	.0058	.032	14	3.0

Table A2 Routing Parameters

Rev 1

Basin	Channel (CP-CP)	Length (ft)	Slope (f/f)	Manning's n	Bottom Width (ft)	Side Slopes (h/v)
I	I10 - I20	700	.0440	.035	10	3.0
	I20 - I30	1,200	.0175	.035	15	4.0
	I40 - I100	2,300	.0157	.038	20	5.0
	I50 - I60	1,400	.0200	.015	40	.1
	I60 - I65	600	.0167	.015	40	.1
	I60 - I70	600	.0160	.015	50	.1
	I65 - I80	900	.0167	.035	10	2.0
	I70 - I80	1,000	.0148	.015	35	.1
	I80 - I90	500	.0060	.035	20	5.0
	I90 - I105	1,100	.0082	.038	20	5.0
	I100 - I105	1,000	.0090	.038	20	5.0
	I105 - I120	1,600	.0080	.030	8	3.0
	I110 - I115	2,600	.0081	.025	10	3.0
	I120 - I125	900	.0035	.027	60	3.0
	I125 - I130	3,000	.0035	.027	60	3.0
J	CAP3 - J70	4,400	.0143	.040	8	4.0
	CAP2 - J85	3,100	.0113	.035	20	3.0
	J85 - J90	5,400	.0120	.032	60	3.0
K	K10 - K20	2,100	.0086	.035	75	3.0
N	N10 - N20	7,400	.0070	.035	12	3.0
	N20 - N30	3,400	.0045	.030	20	3.0
O	O10 - O20	5,400	.0060	.030	8	3.0

Table A3 Existing Channel Capacity

Basin	Channel	B	D	Z	n	S	V	Q
	* Street	(ft)	(ft)	h:v		ft/ft	fps	cfs
A	A10-A20	25	7.0	3.0	.038	.0085	10.2	3,293
B	B10-B20	15	3.0	.5	.030	.0071	7.3	359
	B15-B17 *	40	.7	.1	.015	.0087	6.9	186
	B20-B30	12	4.0	2.5	.030	.0071	8.0	701
	B30-B40	12	3.0	3.0	.033	.0070	6.2	388
	B40-PIMA	90	6.0	3.0	.037	.0043	7.8	5,060
C	C10-C20	5	2.0	2.0	.035	.0093	4.9	87
	C20-C70	13	3.5	2.5	.033	.0073	7.0	533
	C20-C70	5	3.0	2.0	.035	.0073	5.4	177
	C20-C70	10	3.0	3.0	.030	.0073	6.7	380
	C35-C90	8	2.5	3.0	.030	.0090	6.5	252
	C45-C90	6	2.0	4.0	.035	.0090	4.7	131
	C55-C100	8	3.0	3.0	.035	.0077	5.7	291
	C65-C100	13	3.0	3.0	.035	.0100	6.9	443
	C85-C130	15	6.0	3.0	.033	.0065	8.8	1,739
	C85-C130	16	4.5	3.0	.030	.0065	8.3	1,103
	C90-C105	6	6.0	1.5	.035	.0071	7.9	710
	C90-C105	6	2.0	3.0	.033	.0071	4.5	108
	C100-C105	15	3.0	4.0	.035	.0071	5.8	467
	C105-C110	6	6.0	1.5	.035	.0067	7.7	690
	C110-C140	10	8.0	3.0	.030	.0070	11.3	3,083
	C110-C140	15	4.0	2.0	.030	.0070	8.3	760
	C120-C150	10	6.0	3.0	.036	.0073	8.2	1,373
	C130-C145	9	6.0	3.0	.032	.0073	9.1	1,474
	C130-C145	13	5.0	3.0	.031	.0073	8.8	1,234
	C140-C145	5	4.0	1.0	.035	.0050	5.1	184
	C140-C145	9	4.0	2.0	.035	.0050	5.6	380
	C145-C150	20	10.0	3.0	.038	.0069	10.9	5,471
	C150-PIMA	43	10.0	3.0	.028	.0043	12.7	9,241
D	D10-D20	10	5.0	3.5	.030	.0115	11.0	1,512
	D20-D30	10	2.0	3.0	.028	.0100	6.7	214
	D20-F50	10	2.0	3.0	.028	.0092	6.4	205
	D30-D40	5	2.0	3.0	.033	.0057	3.9	87
	D40-D50	8	3.5	3.0	.025	.0057	7.5	485
	D40-D50	8	3.0	4.0	.025	.0057	6.7	404
	D50-E15	60	9.0	3.0	.035	.0050	10.7	8,405
F	F10-F30 *	40	.7	.1	.015	.0165	9.5	256
	F20-F30 *	40	.7	.1	.015	.0182	10.0	269
	F30-F40	9	3.0	2.5	.035	.0135	7.8	384
	F50-F100	6	2.5	3.0	.035	.0071	4.8	162
	F50-F100	6	2.5	4.0	.033	.0071	5.0	199
	F50-F100	6	7.0	2.0	.037	.0071	8.2	1,149
	F60-F100	6	2.5	4.0	.033	.0070	4.9	198
	F60-F100	6	2.5	3.0	.035	.0070	4.8	161
	F80-F130 *	40	.7	.1	.015	.0110	7.8	209
	F80-F90 *	40	.7	.1	.015	.0071	6.2	168
	F90-F120	9	2.0	3.0	.037	.0100	5.0	150
	F100-F105	6	2.5	4.0	.033	.0060	4.6	183
	F105-F160	8	5.0	3.0	.025	.0060	9.4	1,081
	F130-F150	12	5.0	3.0	.032	.0040	6.3	845
	F135-F145 *	40	.7	.1	.015	.0120	8.1	218
	CAP1-F141	12	4.0	2.0	.035	.0115	8.8	704
	F141-F145	15	7.0	3.0	.035	.0100	11.2	2,822
	F145-F150	70	8.0	3.0	.033	.0045	10.3	7,743
	F150-F155	20	10.0	3.5	.025	.0045	13.1	7,225
	F155-F170	20	10.0	3.5	.025	.0050	13.8	7,616

Table A3 Existing Channel Capacity

Basin	Channel * Street	B (ft)	D (ft)	Z h:v	n	S ft/ft	V fps	Q cfs
G	G10-G15 *	35	.7	.1	.015	.0072	6.3	147
	G15-G20	14	5.0	3.0	.032	.0058	7.7	1,113
I	I10-I20	10	1.0	4.0	.025	.0440	10.4	146
	I10-I20	6	2.0	3.0	.035	.0440	10.5	253
	I20-I30	15	1.0	4.0	.035	.0175	4.9	93
	I50-I60 *	40	.7	.1	.015	.0200	10.8	303
	I60-I65 *	40	.7	.1	.015	.0167	9.9	277
	I60-I70 *	50	.7	.1	.015	.0160	9.7	340
	I65-I80	11	2.0	4.0	.035	.0167	6.8	259
	I70-I80 *	35	.7	.1	.015	.0148	9.3	227
	I90-I105	3	2.0	2.0	.038	.0082	3.9	55
	I105-I120	8	3.0	3.0	.030	.0080	6.8	346
	I110-I115	11	4.5	3.0	.028	.0081	9.5	1,021
	I120-I125	60	6.0	3.0	.027	.0035	9.3	4,345
	I125-I130	60	6.0	3.0	.027	.0035	9.3	4,345
J	J85-J90	60	10.0	3.0	.032	.0070	14.7	13,249
K	K10-K20	75	5.0	3.0	.035	.0086	10.3	4,649
N	N10-N20	8	3.0	3.0	.032	.0070	6.0	304
	N10-N20	15	4.0	3.0	.037	.0070	6.5	702
	N20-N30	16	3.0	3.0	.030	.0045	5.5	415
	N20-N30	22	5.0	3.0	.030	.0045	7.6	1,409
O	O10-O20	8	4.0	3.0	.030	.0060	6.9	552

Table A4 Drainage Basin Percent Impervious

Rev 1

										Residential - Houses Per Acre										
																			Total	Total
		Apt	Com	Hos	Pks	Und	.2	.3	.4	.6	.8	1.2	2.0	2.5	3.0	4.0	4.5	6.0	Basin	Percent
Basin	Drainage																		Area	Imp
	Area	85%	85%	80%	15%	0%	5%	7%	10%	13%	17%	22%	28%	32%	35%	42%	45%	54%	(acres)	
A	A10					286													286	
	A20				8	13									120				141	31%
B	B10					41									71	1			113	22%
	B15					11									15				26	20%
	B20					25							23		29	47			124	29%
	B30	18				2									52				72	47%
	B40		7			39			11										57	12%
	B50		1	4		78													83	5%
C	C10					111													111	
	C20	28			1	152									12				193	15%
	C30					25													25	
	C35					26													26	
	C40					245													245	
	C45					17													17	
	C50					64													64	
	C55					44													44	
	C60					12													12	
	C65					33													33	
	C70					11							29		39				79	28%
	C80					54							32		45				131	19%
	C90					17										24			41	25%
	C100					1										53			54	41%
	C110										3		39		51	15			108	33%
	C120														58				58	35%
	C130														86				86	35%
	C140														87				87	35%
	C150	34	35		13	105			11										198	31%
	C160		45	60		78													183	47%
D	D10					12													12	
	D20															24			24	42%
	D30										44				12				56	21%
	D40										81				4				85	18%
	D50					13					41								54	13%
E	E10										39								39	17%
F	F10					44										33			77	18%
	F20															85			85	42%
	F30															42			42	42%
	F40										7			35	7	2			51	31%
	F50										41				7				48	20%
	F60										25			44					69	27%
	F80					56		4			73								133	10%
	F90										65					1			66	17%
	F100										82								82	17%
	F110										88								88	17%
	F120										71								71	17%
	F130							155			3								158	7%
	F135	2				6												48	56	49%
	F140					77		20				22							119	5%
	F145	10				85						9			64		17		185	22%
	F150							5			2		54		16				77	28%
	F160										77								77	17%
	F170										109				49				158	23%
G	G10					15													15	
	G20												1		55		53		109	40%

```
RK  5400    .012    .032       0    TRAP      60       3
KK   J90        SUBBASIN J90 RUNOFF
BA0.3364
LS     0      78       3
UD  0.18
KK CPJ90        COMBINE FLOWS AT CPJ90
HC     2
KK   DUM        DUMMY HYDROGRAPH COMBINATION
HC     4
KK   K10        SUBBASIN K10 RUNOFF
BA0.1056
LS     0      78       6
UD  0.14
KK   K20        ROUTE CPK10 TO CPK20
RK  2100   .0086    .035       0    TRAP      75       3
KK   K20        SUBBASIN K20 RUNOFF
BA0.1001
LS     0      78      28
UD  0.17
KK CPK20        COMBINE FLOWS AT CPK20
HC     2
KK   L10        SUBBASIN L10 RUNOFF
BA0.3227
LS     0      78      30
UD  0.26
KK   M10        SUBBASIN M10 RUNOFF
BA0.2429
LS     0      78      51
UD  0.23
KK   N10        SUBBASIN N10 RUNOFF
BA0.0748
LS     0      78      11
UD   0.2
KK   N20        ROUTE CPN10 TO CPN20
RK  7400    .007    .035       0    TRAP      12       3
KK   N20        SUBBASIN N20 RUNOFF
BA0.3825
LS     0      78      22
UD  0.36
KK CPN20        COMBINE FLOWS AT CPN20
HC     2
KK   N30        ROUTE CPN20 TO CPN30
RK  3400   .0045     .03       0    TRAP      20       3
KK   N30        SUBBASIN N30 RUNOFF
BA0.1621
LS     0      78      35
UD  0.19
KK CPN30        COMBINE FLOWS AT CPN30
HC     2
KK   DUM        DUMMY HYDROGRAPH COMBINATION
HC     4
KK   O10        SUBBASIN O10 RUNOFF
BA0.0563
LS     0      78       0
UD  0.28
KK   O20        ROUTE CPO10 TO CPO20
RK  5400    .006     .03       0    TRAP       8       3
KK   O20        SUBBASIN O20 RUNOFF
BA0.1078
LS     0      78      42
UD  0.32
KK   O30        SUBBASIN O30 RUNOFF
BA0.2750
LS     0      78      36
UD  0.30
KK CPO30        COMBINE FLOWS AT CPO30
HC     3
KK   P10        SUBBASIN P10 RUNOFF
BA0.3672
```

```
LS     0      78      71
UD  0.43
ZZ
```

```
ID   SCOTTSDALE - PIMA/DOUBLETREE
ID   MASTER DRAINAGE PLAN
ID   CITY OF SCOTTSDALE, ARIZONA
ID   PROJECT NO. PH-S47-118-00
ID   INPUT FILE: A58_1515
ID*****************************************************************
ID
ID   BASIN A - ALTERNATIVE B
ID   6 HOUR STORM: 10, 50 & 100 YRS
ID
ID*****************************************************************
IT     2       0       0     300
IN    30
IO     5
JR     3    0.61    0.88     1.0
KK   A20        SUBBASIN A20 RUNOFF
BA0.2229
PB   3.3
PC     0    .014    .030    .082    .758    .860    .897    .926    .946    .963
PC  .976    .988    1.00
LS     0      78      31
UD  0.23
ZZ
```

```
ID   SCOTTSDALE - PIMA/DOUBLETREE
ID   MASTER DRAINAGE PLAN
ID   CITY OF SCOTTSDALE, ARIZONA
ID   PROJECT NO. PH-S47-118-00
ID   INPUT FILE: A58_1516
ID*****************************************************************
ID
ID   BASIN B - ALTERNATIVE B
ID   6 HOUR STORM: 10, 50 & 100 YRS
ID
ID*****************************************************************
IT     2       0       0     300
IN    30
IO     5
JR     3    0.61    0.88     1.0
KK   B30          SUBBASIN B30 RUNOFF
BA0.1130
PB   3.3
PC     0    .014    .030    .082    .758    .860    .897    .926    .946    .963
PC  .976    .988    1.00
LS     0      78      47
UD  0.17
KK   B40         ROUTE CPB30 TO CPB40
RK  2700    .007     .03       0    TRAP      12     2.5
KK   B40         SUBBASIN B40 RUNOFF
BA0.0901
LS     0      78      12
UD  0.13
KK CPB40         COMBINE FLOWS AT CPB40
HC     2
KK  PIMA         ROUTE CPB40 TO CPPIMA
RK  3700   .0043    .037       0    TRAP      90       3
KK   B50         SUBBASIN B50 RUNOFF
BA0.1413
LS     0      78       5
UD  0.30
KKCPPIMA         COMBINE FLOWS AT CPPIMA
HC     2
ZZ
```

```
ID   SCOTTSDALE - PIMA/DOUBLETREE
ID   MASTER DRAINAGE PLAN
ID   CITY OF SCOTTSDALE, ARIZONA
ID   PROJECT NO. PH-S47-118-00
ID   INPUT FILE: A58_1517
ID*****************************************************************
ID
ID   BASIN C - ALTERNATIVE A
ID   6 HOUR STORM: 10, 50 & 100 YRS
ID
ID*****************************************************************
IT     2       0       0     300
IN    30
IO     5
JR     3    0.61    0.88     1.0
KK   C10         SUBBASIN C10 RUNOFF
BA0.1734
PB   3.3
PC     0    .014    .030    .082    .758    .860    .897    .926    .946    .963
PC  .976    .988    1.00
LS     0      78       0
UD  0.29
KK   C20         ROUTE CPC10 TO CPC20
RK  2700   .0093    .035       0    TRAP       5       2
KK   C20         SUBBASIN C20 RUNOFF
BA0.3027
LS     0      78      15
UD  0.41
KK CPC20         COMBINE FLOWS AT CPC20
HC     2
KK   C70         ROUTE CPC20 TO CPC70
RK  5500   .0073    .035       0    TRAP      10       3
KK   C70         SUBBASIN C70 RUNOFF
BA0.1225
LS     0      78      28
UD  0.27
KK CPC70         COMBINE FLOWS AT CPC70
HC     2
KK   C80         SUBBASIN C80 RUNOFF.
BA0.2037
LS     0      78      19
UD  0.43
KK CPC85         COMBINE FLOWS AT CPC85
HC     2
KK  C130         ROUTE CPC85 TO CPC130
RK  3000   .0065    .033       0    TRAP      15       3
KK  C130         SUBBASIN C130 RUNOFF
BA0.1361
LS     0      78      35
UD  0.14
KKCPC130         COMBINE FLOWS AT CPC130
HC     2
KK  C145         ROUTE CPC130 TO CPC145
RK  1500   .0073     .03       0    TRAP      10       3
KK   C30         SUBBASIN C30 RUNOFF
BA0.0394
LS     0      78       0
UD  0.16
KK   C35         ROUTE CPC30 TO CPC35
RK  1500   .0093    .035       0    TRAP      10       5
KK   C35         SUBBASIN C35 RUNOFF
BA0.0402
LS     0      78       0
UD  0.12
KK CPC35         COMBINE FLOWS AT CPC35
HC     2
KK   C90         ROUTE CPC35 TO CPC90
RK  1100    .009     .03       0    TRAP       8       3
KK   C40         SUBBASIN C40 RUNOFF
```

```
BA0.3835
LS     0      78       0
UD  0.38
KK   C45        ROUTE CPC40 TO CPC45
RK  1400   .0093    .035       0    TRAP      10       5
KK   C45        SUBBASIN C45 RUNOFF
BA0.0269
LS     0      78       0
UD  0.12
KK CPC45        COMBINE FLOWS AT CPC45
HC     2
KK   C90        ROUTE CPC45 TO CPC90
RK  1100    .009    .035       0    TRAP       6       4
KK   C90        SUBBASIN C90 RUNOFF
BA0.0642
LS     0      78      25
UD  0.15
KK CPC90        COMBINE FLOWS AT CPC90
HC     3
KK  C105        ROUTE CPC90 TO CPC105
RK  1700   .0071    .035       0    TRAP       6     1.5
KK   C50        SUBBASIN C50 RUNOFF
BA0.0993
LS     0      78       0
UD   0.2
KK   C55        ROUTE CPC50 TO CPC55
RK  1500   0.017    .035       0    TRAP      10       5
KK   C55        SUBBASIN C55 RUNOFF
BA0.0682
LS     0      78       0
UD  0.15
KK CPC55        COMBINE FLOWS AT CPC55
HC     2
KK  C100        ROUTE CPC55 TO CPC100
RK  1300   .0077    .035       0    TRAP       8       3
KK   C60        SUBBASIN C60 RUNOFF
BA0.0190
LS     0      78       0
UD   0.1
KK   C65        ROUTE CPC60 TO CPC65
RK  1700   .0176    .035       0    TRAP      10       5
KK   C65        SUBBASIN C65 RUNOFF
BA0.0523
LS     0      78       0
UD  0.16
KK CPC65        COMBINE FLOWS AT CPC65
HC     2
KK  C100        ROUTE CPC65 TO CPC100
RK  1600     .01    .035       0    TRAP      15       3
KK  C100        SUBBASIN C100 RUNOFF
BA0.0847
LS     0      78      41
UD  0.27
KK CP100        COMBINE FLOWS AT CPC100
HC     3
KK  C105        ROUTE CPC100 TO CPC105
RK  1700   .0071    .035       0    TRAP      15       4
KKCPC105        COMBINE FLOWS AT CPC105
HC     2
KK  C110        ROUTE CPC105 TO CPC110
RK   900   .0067    .035       0    TRAP       6       2
KK  C110        SUBBASIN C110 RUNOFF
BA0.1704
LS     0      78      33
UD  0.19
KK   D10        SUBBASIN D10 RUNOFF
BA0.0184
LS     0      78       0
UD  0.11
```

```
KK   D20        ROUTE CPD10 TO CPD20
RK  1400   .0115     .03       0    TRAP      10       3
KK   D20        SUBBASIN D20 RUNOFF
BA0.0388
LS     0      78      42
UD  0.10
KK CPD20        COMBINE FLOWS AT CPD20
HC     2
KK   D30        ROUTE CPD20 TO CPD30
RK  3000    .01    .028       0    TRAP      10       3
KK   D30        SUBBASIN D30 RUNOFF
BA0.0882
LS     0      78      21
UD  0.13
KK CPD30        COMBINE FLOWS AT CPD30
HC     2
KKCPC110        COMBINE FLOWS AT CPC110
HC     3
KK  C140        ROUTE CPC110 TO CPC140
RK  2700   .007     .03       0    TRAP      10       3
KK  C140        SUBBASIN C140 RUNOFF
BA0.1370
LS     0      78      35
UD  0.15
KKCPC140        COMBINE FLOWS AT CPC140
HC     2
KK  C145        ROUTE CPC140 TO CPC145
RK  2200   .005     .03       0    TRAP      10       3
KKCPC145        COMBINE FLOWS AT CPC145
HC     2
KK  C150        ROUTE CPC145 TO CPC150
RK  1300   .0069    .04       0    TRAP      15     2.5
KK  C120        SUBBASIN C120 RUNOFF
BA0.0923
LS     0      78      35
UD  0.17
KK  C150        ROUTE CPC120 TO CPC150
RK  2600   .0073    .033      0    TRAP      10       3
KK  C150        SUBBASIN C150 RUNOFF
BA0.3115
LS     0      78      31
UD  0.47
KKCPC150        COMBINE FLOWS AT CPC150
HC     3
KK  PIMA        ROUTE CPC150 TO CPPIMA
RK  4700   .0043    .028      0    TRAP      45       3
KK  C160        SUBBASIN C160 RUNOFF
BA0.2891
LS     0      78      47
UD  0.29
KKCPPIMA        COMBINE FLOWS AT CPPIMA
HC     2
ZZ
```

```
ID   SCOTTSDALE - PIMA/DOUBLETREE
ID   MASTER DRAINAGE PLAN
ID   CITY OF SCOTTSDALE, ARIZONA
ID   PROJECT NO. PH-S47-118-00
ID   INPUT FILE: A58_1518
ID*****************************************************************
ID
ID   BASIN C - ALTRENATIVE B
ID   6 HOUR STORM: 10, 50 & 100 YRS
ID
ID*****************************************************************
IT     2       0       0     300
IN    30
IO     5
JR     3    0.61    0.88     1.0
KK   C70         SUBBASIN C70 RUNOFF
BA0.1225
PB   3.3
PC     0    .014    .030    .082    .758    .860    .897    .926    .946    .963
PC  .976    .988    1.00
LS     0      78      28
UD  0.27
KK   C80         SUBBASIN C80 RUNOFF
BA0.2037
LS     0      78      19
UD  0.43
KK CPC85         COMBINE FLOWS AT CPC85
HC     2
KK  C130         ROUTE CPC85 TO CPC130
RK  3000   .0065    .033       0    TRAP      15       3
KK  C130         SUBBASIN C130 RUNOFF
BA0.1361
LS     0      78      35
UD  0.14
KKCPC130         COMBINE FLOWS AT CPC130
HC     2
KK  C145         ROUTE CPC130 TO CPC145
RK  1500   .0073     .03       0    TRAP      10       3
KK   C90         SUBBASIN C90 RUNOFF
BA0.0642
LS     0      78      25
UD  0.15
KK  C105         ROUTE CPC90 TO CPC105
RK  1700   .0071    .035       0    TRAP       6     1.5
KK  C100         SUBBASIN C100 RUNOFF
BA0.0847
LS     0      78      41
UD  0.27
KK  C105         ROUTE CPC100 TO CPC105
RK  1700   .0071    .035       0    TRAP      15       4
KKCPC105         COMBINE FLOWS AT CPC105
HC     2
KK  C110         ROUTE CPC105 TO CPC110
RK   900   .0067    .035       0    TRAP       6       2
KK  C110         SUBBASIN C110 RUNOFF
BA0.1704
LS     0      78      33
UD  0.19
KK   D20         SUBBASIN D20 RUNOFF
BA0.0388
LS     0      78      42
UD  0.10
KK   D30         ROUTE CPD20 TO CPD30
RK  3000     .01    .028       0    TRAP      10       3
KK   D30         SUBBASIN D30 RUNOFF
BA0.0882
LS     0      78      21
UD  0.13
KK CPD30         COMBINE FLOWS AT CPD30
```

```
HC      2
KKCPC110        COMBINE FLOWS AT CPC110
HC      3
KK  C140        ROUTE CPC110 TO CPC140
RK  2700    .007     .03       0    TRAP      10       3
KK  C140        SUBBASIN C140 RUNOFF
BA0.1370
LS      0      78      35
UD  0.15
KKCPC140        COMBINE FLOWS AT CPC140
HC      2
KK  C145        ROUTE CPC140 TO CPC145
RK  2200    .005     .03       0    TRAP      10       3
KKCPC145        COMBINE FLOWS AT CPC145
HC      2
KK  C150        ROUTE CPC145 TO CPC150
RK  1300   .0069     .04       0    TRAP      15     2.5
KK  C120        SUBBASIN C120 RUNOFF
BA0.0923
LS      0      78      35
UD  0.17
KK  C150        ROUTE CPC120 TO CPC150
RK  2600   .0073    .033       0    TRAP      10       3
KK  C150        SUBBASIN C150 RUNOFF
BA0.3115
LS      0      78      31
UD  0.47
KKCPC150        COMBINE FLOWS AT CPC150
HC      3
KK  PIMA        ROUTE CPC150 TO CPPIMA
RK  4700   .0043    .028       0    TRAP      45       3
KK  C160        SUBBASIN C160 RUNOFF
BA0.2891
LS      0      78      47
UD  0.29
KKCPPIMA        COMBINE FLOWS AT CPPIMA
HC      2
ZZ
```

```
ID   SCOTTSDALE - PIMA/DOUBLETREE
ID   MASTER DRAINAGE PLAN
ID   CITY OF SCOTTSDALE, ARIZONA
ID   PROJECT NO. PH-S47-118-00
ID   INPUT FILE: A58_1519
ID*************************************************************************
ID
ID   BASIN D - ALTERNATIVE A
ID   6 HOUR STORM: 10, 50 & 100 YRS
ID
ID*************************************************************************
IT     2       0       0     300
IN    30
IO     5
JR     3    0.61    0.88     1.0
KK   D40          SUBBASIN D40 RUNOFF
BA0.1331
PB   3.3
PC     0    .014    .030    .082    .758    .860    .897    .926    .946    .963
PC  .976    .988    1.00
LS     0      78      18
UD  0.29
KK   D50          ROUTE CPD40 TO CPD50
RK  2600   .0057    .025       0    TRAP       8     3.5
KK   D50          SUBBASIN D50 RUNOFF
BA0.0838
LS     0      78      13
UD  0.17
KK CPD50          COMBINE FLOWS AT CPD50
HC     2
ZZ
```

```
ID   SCOTTSDALE - PIMA/DOUBLETREE
ID   MASTER DRAINAGE PLAN
ID   CITY OF SCOTTSDALE, ARIZONA
ID   PROJECT NO. PH-S47-118-00
ID   INPUT FILE: A58_1520
ID*************************************************************************
ID
ID   BASIN F - ALTERNATIVE A
ID   6 HOUR STORM: 10, 50 & 100 YRS              REV 1
ID
ID*************************************************************************
IT     2       0       0     300
IN    30
IO     5
JR     3    0.61    0.88     1.0
KK   F10          SUBBASIN F10 RUNOFF
BA0.1215
PB   3.3
PC     0    .014    .030    .082    .758    .860    .897    .926    .946    .963
PC  .976    .988    1.00
LS     0      78      18
UD  0.17
KK   F30          ROUTE CPF10 TO CPF30
RK  1900   .0165    .015       0    TRAP      35     0.1
KK   F20          SUBBASIN F20 RUNOFF
BA0.1335
LS     0      78      42
UD  0.13
KK   F30          ROUTE CPF20 TO CPF30
RK  1100   .0182    .015       0    TRAP      35     0.1
KK   F30          SUBBASIN F30 RUNOFF
BA0.0665
LS     0      78      42
UD  0.13
KK CPF30          COMBINE FLOWS AT CPF30
HC     3
KK   F40          ROUTE CPF30 TO CPF40
RK  1100   .0135    .035       0    TRAP       9     2.5
KK   F40          SUBBASIN F40 RUNOFF
BA0.0795
LS     0      78      31
UD   0.1
KK CPF40          COMBINE FLOWS AT CPF40
HC     2
KK  RF40          RETENTION BASIN AT CPF40
RS     1    STOR       0
SV     0     3.1     8.0    15.3    21.1    21.3    21.5    21.7    21.9    22.1
SE     0       5      10      15      18    18.1    18.2    18.3    18.4    18.5
SQ     0      67     126     165     184     280     435     650     910    1200
KK   F50          ROUTE RF40 TO CPF50
RK  1400    .006    .035       0    TRAP       6       2
KK   F50          SUBBASIN F50 RUNOFF
BA0.0747
LS     0      78      20
UD  0.14
KK CPF50          COMBINE FLOWS AT CPF50
HC     2
KK  F100          ROUTE CPF50 TO CPF100
RK  2800   .0071    .034       0    TRAP       6     3.5
KK   F60          SUBBASIN F60 RUNOFF
BA0.1073
LS     0      78      27
UD  0.17
KK  RF60          RETENTION BASIN AT CPF60
RS     1    STOR       0
SV     0     1.2     3.7     8.1    11.3    11.4
SE     0       5      10      15    17.5    18.5
SQ     0       0       0       0       0     500
KK  F100          ROUTE RF60 TO CPF100
RK  2800    .007    .034       0    TRAP       6     3.5
KK  F100          SUBBASIN F100 RUNOFF
BA0.1281
LS     0      78      17
UD  0.21
KKCPF100          COMBINE FLOWS AT CPF100
HC     3
KK  F160          ROUTE CPF100 TO CPF160
RK  3000    .006    .029       0    TRAP       7     3.5
KK  F160          SUBBASIN F160 RUNOFF
BA0.1209
```

```
LS      0       78       17
UD   0.19
KKCPF160         COMBINE FLOWS AT CPF160
HC      2
KK    F80        SUBBASIN F80 RUNOFF
BA0.2084
LS      0       78       10
UD   0.13
KK    F90        ROUTE CPF80 TO CPF90
RK    700    .0071    .018       0    TRAP       40      0.1
KK    F90        SUBBASIN F90 RUNOFF
BA0.1035
LS      0       78       17
UD   0.23
KK CPF90         COMBINE FLOWS AT CPF90
HC      2
KK   F120        ROUTE CPF90 TO CPF120
RK   2600     .01     .03       0    TRAP       10       3
KK   F120        SUBBASIN F120 RUNOFF
BA0.1113
LS      0       78       17
UD   0.16
KKCPF120         COMBINE FLOWS AT CPF120
HC      2
KK   F110        ROUTE CPF120 TO CPF110
RK   1500    .005     .03       0    TRAP       10       3
KK   F110        SUBBASIN F110 RUNOFF
BA0.1384
LS      0       78       17
UD    0.2
KKCPF110         COMBINE FLOWS AT CPF110
HC      2
KK   F155        ROUTE CPF110 TO CPF155
RK   1600    .005     .03       0    TRAP       12       3
KK   F130        SUBBASIN F130 RUNOFF
BA0.2480
LS      0       78        7
UD    0.3
KK   F150        ROUTE CPF130 TO CPF150
RK   1500    .004    .032       0    TRAP       12       3
KK   CAP1        INFLOW HYDROGRAPH FROM CAP CULVERT #1
BA      0
QI      0       0        0       0      99     193     206     211     213     214
QI    215     215      215     215     215     214     213     213     212     211
QI    210
KK   F141        ROUTE CPCAP1 TO CPF141
RK   2000   .0115    .035       0    TRAP       12       2
KK   F145        ROUTE CPF141 TO CPF145
RK   1600    .010    .035       0    TRAP       15       3
KK   F135        SUBBASIN F135 RUNOFF
BA0.0880
LS      0       78       49
UD    0.1
KK RF135         RETENTION BASIN AT CPF135
RS      1     STOR        0
SV      0      0.7        2     3.3     4.7       7       9
SE      0        1        2       3       4       5       6
SQ      0        0        0       0      13     200     500
KK   F145        ROUTE RF135 TO CPF145
RK   3700    .012    .018       0    TRAP       40      0.1
KK   F140        SUBBASIN F140 RUNOFF
BA0.1859
LS      0       78        5
UD   0.19
KK   F145        SUBBASIN F145 RUNOFF
BA0.2889
LS      0       78       22
UD   0.23
KKCPF145         COMBINE FLOWS AT CPF145
HC      4
KK   F150        ROUTE CPF145 TO CPF150
RK   3000   .0045    .033       0    TRAP       70       3
KK   F150        SUBBASIN F150 RUNOFF
BA0.1207
LS      0       78       28
UD   0.12
KKCPF150         COMBINE FLOWS AT CPF150
HC      3
KK   F155        ROUTE CPF150 TO CPF155
RK   2200   .0045    .025       0    TRAP       20     3.5
```

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KKCPF155        COMBINE FLOWS AT CPF155
HC     2
KK  F170        ROUTE CPF155 TO CPF170
RK   900    .005    .025       0    TRAP       20      3.5
KK  F170        SUBBASIN F170 RUNOFF
BA0.2481
LS     0       78      23
UD  0.30
KKCPF170        COMBINE FLOWS AT CPF170
HC     3
ZZ
```

```
ID   SCOTTSDALE - PIMA/DOUBLETREE
ID   MASTER DRAINAGE PLAN
ID   CITY OF SCOTTSDALE, ARIZONA
ID   PROJECT NO. PH-S47-118-00
ID   INPUT FILE: A58_1521
ID*************************************************************************
ID
ID   BASIN F - ALTERNATIVE B
ID   6 HOUR STORM: 10, 50 & 100 YRS
ID
ID*************************************************************************
IT     2       0       0     300
IN    30
IO     5
JR     3    0.61    0.88     1.0
KK   F10         SUBBASIN F10 RUNOFF
BA0.1215
PB   3.3
PC     0    .014    .030    .082    .758    .860    .897    .926    .946    .963
PC  .976    .988    1.00
LS     0      78      18
UD  0.17
KK   F30         ROUTE CPF10 TO CPF30
RK  1900   .0165    .015       0    TRAP      35     0.1
KK   F20         SUBBASIN F20 RUNOFF
BA0.1335
LS     0      78      42
UD  0.13
KK   F30         ROUTE CPF20 TO CPF30
RK  1100   .0182    .015       0    TRAP      35     0.1
KK   F30         SUBBASIN F30 RUNOFF
BA0.0665
LS     0      78      42
UD  0.13
KK CPF30         COMBINE FLOWS AT CPF30
HC     3
KK   F40         ROUTE CPF30 TO CPF40
RK  1100   .0135    .035       0    TRAP       9     2.5
KK   F40         SUBBASIN F40 RUNOFF
BA0.0795
LS     0      78      31
UD   0.1
KK CPF40         COMBINE FLOWS AT CPF40
HC     2
KK  RF40         RETENTION BASIN AT CPF40
RS     1    STOR       0
SV     0     3.1     8.0    15.3    21.1    21.3    21.5    21.7    21.9    22.1
SE     0       5      10      15      18    18.1    18.2    18.3    18.4    18.5
SQ     0      67     126     165     184     280     435     650     910    1200
KK   F50         ROUTE RF40 TO CPF50
RK  1400    .006    .035       0    TRAP       6       2
KK   F50         SUBBASIN F50 RUNOFF
BA0.0747
LS     0      78      20
UD  0.14
KK CPF50         COMBINE FLOWS AT CPF50
HC     2
KK  F100         ROUTE CPF50 TO CPF100
RK  2800   .0071    .034       0    TRAP       6     3.5
KK   F60         SUBBASIN F60 RUNOFF
BA0.1073
LS     0      78      27
UD  0.17
KK  RF60         RETENTION BASIN AT CPF60
RS     1    STOR       0
SV     0     1.2     3.7     8.1    11.3    11.4
SE     0       5      10      15    17.5    18.5
SQ     0       0       0       0       0     500
KK  F100         ROUTE RF60 TO CPF100
RK  2800    .007    .034       0    TRAP       6     3.5
KK  F100         SUBBASIN F100 RUNOFF
BA0.1281
LS     0      78      17
UD  0.21
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KK  F110        SUBBASIN F110 RUNOFF
BA0.1384
LS     0      78      17
UD   0.2
KK  F100        ROUTE CPF110 TO CPF100
RK  1400    .005     .03       0    TRAP      10       3
KKCPF100        COMBINE FLOWS AT CPF100
HC     4
KK  F160        ROUTE CPF100 TO CPF160
RK  3000    .006    .029       0    TRAP       7     3.5
KK  F160        SUBBASIN F160 RUNOFF
BA0.1209
LS     0      78      17
UD  0.19
KKCPF160        COMBINE FLOWS AT CPF160
HC     2
KK   F90        SUBBASIN F90 RUNOFF
BA0.1035
LS     0      78      17
UD  0.23
KK  F120        ROUTE CPF90 TO CPF120
RK  2600     .01    .038       0    TRAP       9       3
KK  F120        SUBBASIN F120 RUNOFF
BA0.1113
LS     0      78      17
UD  0.16
KKCPF120        COMBINE FLOWS AT CPF120
HC     2
KK  F130        ROUTE CPF120 TO CPF130
RK   700    .003     .02       0    TRAP       8       3
KK   F80        SUBBASIN F80 RUNOFF
BA0.2084
LS     0      78      10
UD  0.13
KK  F130        ROUTE CPF80 TO CPF130
RK  2700    .011    .025       0    TRAP      10       3
KK  F130        SUBBASIN F130 RUNOFF
BA0.2480
LS     0      78       7
UD   0.3
KKCPF130        COMBINE FLOWS AT CPF130
HC     3
KK  F150        ROUTE CPF130 TO CPF150
RK  1500    .004    .032       0    TRAP      12       3
KK  CAP1        INFLOW HYDROGRAPH FROM CAP CULVERT #1
BA     0
QI     0       0       0       0      99     193     206     211     213     214
QI   215     215     215     215     215     214     213     213     212     211
QI   210
KK  F141        ROUTE CPCAP1 TO CPF141
RK  2000   .0115    .035       0    TRAP      12       2
KK  F145        ROUTE CPF141 TO CPF145
RK  1600    .010    .035       0    TRAP      15       3
KK  F135        SUBBASIN F135 RUNOFF
BA0.0880
LS     0      78      49
UD   0.1
KK RF135        RETENTION BASIN AT CPF135
RS     1    STOR       0
SV     0     0.7       2     3.3     4.7       7       9
SE     0       1       2       3       4       5       6
SQ     0       0       0       0      13     200     500
KK  F145        ROUTE RF135 TO CPF145
RK  3700    .012    .018       0    TRAP      40     0.1
KK  F140        SUBBASIN F140 RUNOFF
BA0.1859
LS     0      78       5
UD  0.19
KK  F145        SUBBASIN F145 RUNOFF
BA0.2889
LS     0      78      22
UD  0.23
KKCPF145        COMBINE FLOWS AT CPF145
HC     4
KK  F150        ROUTE CPF145 TO CPF150
RK  3000   .0045    .033       0    TRAP      70       3
KK  F150        SUBBASIN F150 RUNOFF
BA0.1207
LS     0      78      28
UD  0.12
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KKCPF150        COMBINE FLOWS AT CPF150
HC     3
KK  F170        ROUTE CPF150 TO CPF170
RK  3100   .0045    .025       0    TRAP      20     3.5
KK  F170        SUBBASIN F170 RUNOFF
BA0.2481
LS     0      78      23
UD  0.30
KKCPF170        COMBINE FLOWS AT CPF170
HC     3
ZZ
```

```
ID   SCOTTSDALE - PIMA/DOUBLETREE
ID   MASTER DRAINAGE PLAN
ID   CITY OF SCOTTSDALE, ARIZONA
ID   PROJECT NO. PH-S47-118-00
ID   INPUT FILE: A58_1522
ID*****************************************************************
ID
ID   BASIN I - ALTERNATIVE A
ID   6 HOUR STORM: 10, 50 & 100 YRS
ID
ID*****************************************************************
IT     2       0       0     300
IN    30
IO     5
JR     3    0.61    0.88     1.0
KK   I10          SUBBASIN I10 RUNOFF
BA0.0405
PB   3.3
PC     0    .014    .030    .082    .758    .860    .897    .926    .946    .963
PC  .976    .988    1.00
LS     0      78       3
UD   0.1
KK   I20          ROUTE CPI10 TO CPI20
RK   700    .044    .035       0    TRAP      10       3
KK   I20          SUBBASIN I20 RUNOFF
BA0.0147
LS     0      78      85
UD   0.1
KK CPI20          COMBINE FLOWS AT CPI20
HC     2
KK   I30          ROUTE CPI20 TO CPI30
RK  1200   .0175    .035       0    TRAP      15       4
KK   I30          SUBBASIN I30 RUNOFF
BA0.0136
LS     0      78      11
UD   0.1
KK CPI30          COMBINE FLOWS AT CPI30
HC     2
KK   I40          SUBBASIN I40 RUNOFF
BA0.0141
LS     0      78      28
UD   0.1
KK CPI45          COMBINE FLOWS AT CPI45
HC     2
KK   I85          ROUTE CPI45 TO CPI85
RK  2200    .015     .03       0    TRAP      10       3
KK   I50          SUBBASIN I50 RUNOFF
BA0.0496
LS     0      78      55
UD   0.1
KK   I60          ROUTE CPI50 TO CPI60
RK  1400     .02    .015       0    TRAP      40     0.1
KK   I60          SUBBASIN I60 RUNOFF
BA0.0941
LS     0      78      33
UD  0.13
KK CPI60          COMBINE FLOWS AT CPI60
HC     2
KK  I60W          SPLIT FLOW AT CPI60
DT  I60S
DI     0      10      50     100     200     500
DQ     0       5      25      50     100     250
KK   I65          ROUTE CPI60W TO CPI65
RK   600   .0167    .015       0    TRAP      40     0.1
KK   I80          ROUTE CPI65 TO CPI80
RK   900   .0167    .035       0    TRAP      10       2
KK   I80          SUBBASIN I80 RUNOFF
BA0.0466
LS     0      78      37
```

```
UD  0.11
KK CPI80        COMBINE FLOWS AT CPI80
HC     2
KK  I60S        RETRIEVE SPLIT FLOW AT CPI60S
DR  I60S
KK   I70        ROUTE CPI60S TO CPI70
RK   600    .016    .015       0    TRAP      50      0.1
KK   I70        SUBBASIN I70 RUNOFF
BA0.0258
LS     0      78      85
UD  0.12
KK CPI70        COMBINE FLOWS AT CPI70
HC     2
KK   I80        ROUTE CPI70 TO CPI80
RK  1000   .0148    .015       0    TRAP      35      0.1
KK CPI80        COMBINE FLOWS AT CPI80
HC     2
KK CPI85        COMBINE FLOWS AT CPI85
HC     2
KK  I125        ROUTE CPI85 TO CPI125
RK  3000     .01     .03       0    TRAP      15       3
KK  I100        SUBBASIN I100 RUNOFF
BA0.2351
LS     0      78       6
UD  0.21
KK  I105        ROUTE CPI100 TO  CPI105
RK  1000    .009    .038       0    TRAP      20       5
KK   I90        SUBBASIN I90 RUNOFF
BA0.0130
LS     0      78      10
UD  0.14
KKCPI105        ROUTE CPI90 TO CPI105
RK  1100   .0082    .038       0    TRAP      20       5
KKCPI105        COMBINE FLOWS AT CPI105
HC     2
KK  I120        ROUTE CPI105 TO CPI120
RK  1600    .008     .03       0    TRAP       8       3
KK  I120        SUBBASIN I120 RUNOFF
BA0.0891
LS     0      78      10
UD  0.23
KKCPI120        COMBINE FLOWS AT CPI120
HC     2
KK  I125        ROUTE CPI120 TO CPI125
RK   900   .0035    .027       0    TRAP      60       3
KK  I110        SUBBASIN I110 RUNOFF
BA0.0572
LS     0      78      19
UD  0.16
KK  I115        ROUTE CPI110 TO CPI115
RK  2600   .0081    .025       0    TRAP      10       3
KK  I115        SUBBASIN I115 RUNOFF
BA0.1123
LS     0      78      45
UD  0.13
KKCPI115        COMBINE FLOWS AT CPI115
HC     2
KKCPI125        COMBINE FLOWS AT CPI125
HC     3
KK  I130        ROUTE CPI125 TO CPI130
RK  3000   .0035    .027       0    TRAP      60       3
KK  I130        SUBBASIN I130 RUNOFF
BA0.2010
LS     0      78      26
UD  0.18
KKCPI130        COMBINE FLOWS AT CPI130
HC     2
ZZ
```

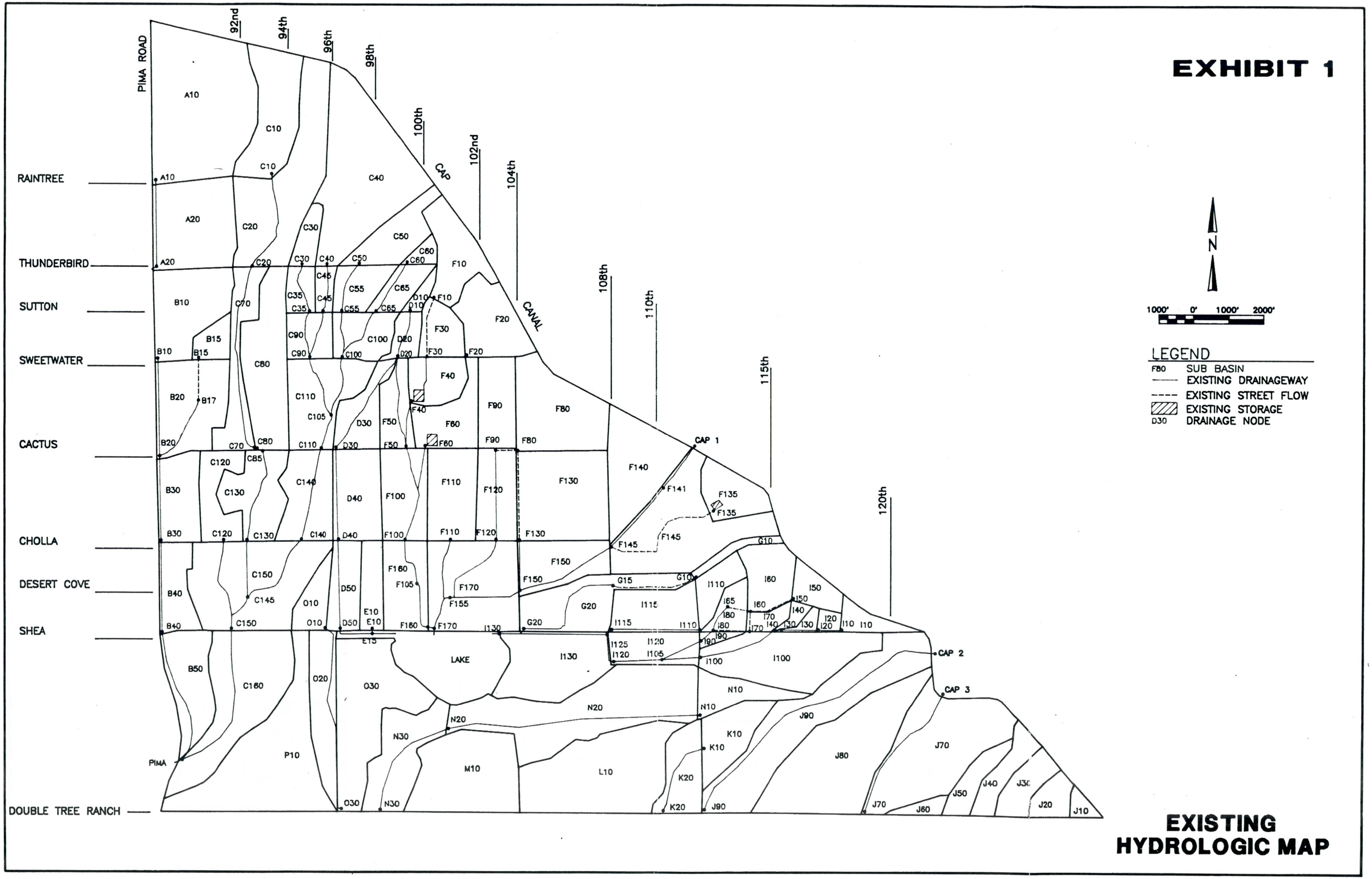
```
ID   SCOTTSDALE - PIMA/DOUBLETREE
ID   MASTER DRAINAGE PLAN
ID   CITY OF SCOTTSDALE, ARIZONA
ID   PROJECT NO. PH-S47-118-00
ID   INPUT FILE: A58_1523
ID*****************************************************************
ID
ID   BASIN A - RETENTION BASIN VOLUME
ID   6 HOUR - 100 YEAR STORM
ID
ID*****************************************************************
IT     2       0       0     300
IN    30
IO     3
KK  A10          SUBBASIN A10 RUNOFF
BA0.4478
PB   3.3
PC     0    .014    .030    .082    .758    .860    .897    .926    .946    .963
PC  .976    .988    1.00
LS     0      78       0
UD  0.39
KK   A20        ROUTE CPA10 TO CPA20
RK  3300   .0085    .038       0    TRAP      25       3
KK   A20        SUBBASIN A20 RUNOFF
BA0.2229
LS     0      78      31
UD  0.23
KK CPA20        COMBINE FLOWS AT CPA20
HC     2
ZZ
```

```
ID   SCOTTSDALE - PIMA/DOUBLETREE
ID   MASTER DRAINAGE PLAN
ID   CITY OF SCOTTSDALE, ARIZONA
ID   PROJECT NO. PH-S47-118-00
ID   INPUT FILE: A58_1524
ID*****************************************************************
ID
ID   BASIN B - RETENTION BASIN VOLUME
ID   6 HOUR - 100 YEAR STORM
ID
ID*****************************************************************
IT     2       0       0     300
IN    30
IO     3
KK  B10          SUBBASIN B10 RUNOFF
BA0.1777
PB   3.3
PC     0    .014    .030    .082    .758    .860    .897    .926    .946    .963
PC  .976    .988    1.00
LS     0      78      22
UD  0.21
KK   B20        ROUTE CPB10 TO CPB20
RK  2800   .0071     .03       0    TRAP      15     0.5
KK   B15        SUBBASIN B15 RUNOFF
BA0.0400
LS     0      78      20
UD  0.17
KK  B20A        ROUTE CPB15 TO CPB20A
RK  1200   .0087    .015       0    TRAP      35     0.1
KK   B20        ROUTE CPB20A TO CPB20
RK  2100    .006    .035       0    TRAP      10       5
KK   B20        SUBBASIN B20 RUNOFF
BA0.1946
LS     0      78      29
UD  0.23
KK CPB20        COMBINE FLOWS AT CPB20
HC     3
ZZ
```

```
ID   SCOTTSDALE - PIMA/DOUBLETREE
ID   MASTER DRAINAGE PLAN
ID   CITY OF SCOTTSDALE, ARIZONA
ID   PROJECT NO. PH-S47-118-00
ID   INPUT FILE: A58_1525
ID*****************************************************************
ID
ID   BASIN C - RETENTION BASIN VOLUME
ID   6 HOUR - 100 YEAR STORM
ID
ID*****************************************************************
IT     2       0       0     300
IN    30
IO     3
KK   C10         SUBBASIN C10 RUNOFF
BA0.1734
PB   3.3
PC     0    .014    .030    .082    .758    .860    .897    .926    .946    .963
PC  .976    .988    1.00
LS     0      78       0
UD  0.29
KK   C20         ROUTE CPC10 TO CPC20
RK  2700   .0093    .035       0    TRAP       5       2
KK   C20         SUBBASIN C20 RUNOFF
BA0.3027
LS     0      78      15
UD  0.41
KK CPC20         COMBINE FLOWS AT CPC20
HC     2
KK   C30         SUBBASIN C30 RUNOFF
BA0.0394
LS     0      78       0
UD  0.16
KK   C35         ROUTE CPC30 TO CPC35
RK  1500   .0093    .035       0    TRAP      10       5
KK   C35         SUBBASIN C35 RUNOFF
BA0.0402
LS     0      78       0
UD  0.12
KK CPC35         COMBINE FLOWS AT CPC35
HC     2
KK   C40         SUBBASIN C40 RUNOFF
BA0.3835
LS     0      78       0
UD  0.38
KK   C45         ROUTE CPC40 TO CPC45
RK  1400   .0093    .035       0    TRAP      10       5
KK   C45         SUBBASIN C45 RUNOFF
BA0.0269
LS     0      78       0
UD  0.12
KK CPC45         COMBINE FLOWS AT CPC45
HC     2
KK   C50         SUBBASIN C50 RUNOFF
BA0.0993
LS     0      78       0
UD   0.2
KK   C55         ROUTE CPC50 TO CPC55
RK  1500   0.017    .035       0    TRAP      10       5
KK   C55         SUBBASIN C55 RUNOFF
BA0.0682
LS     0      78       0
UD  0.15
KK CPC55         COMBINE FLOWS AT CPC55
HC     2
KK   C60         SUBBASIN C60 RUNOFF
BA0.0190
LS     0      78       0
UD   0.1
```

```
KK   C65        ROUTE CPC60 TO CPC65
RK  1700   .0176    .035       0    TRAP      10       5
KK   C65        SUBBASIN C65 RUNOFF
BA0.0523
LS     0      78       0
UD  0.16
KK CPC65        COMBINE FLOWS AT CPC65
HC     2
KK   D10        SUBBASIN D10 RUNOFF
BA0.0184
LS     0      78       0
UD  0.11
KKCPBASIN       COMBINE FLOWS AT CPBASIN
HC     6
ZZ
```

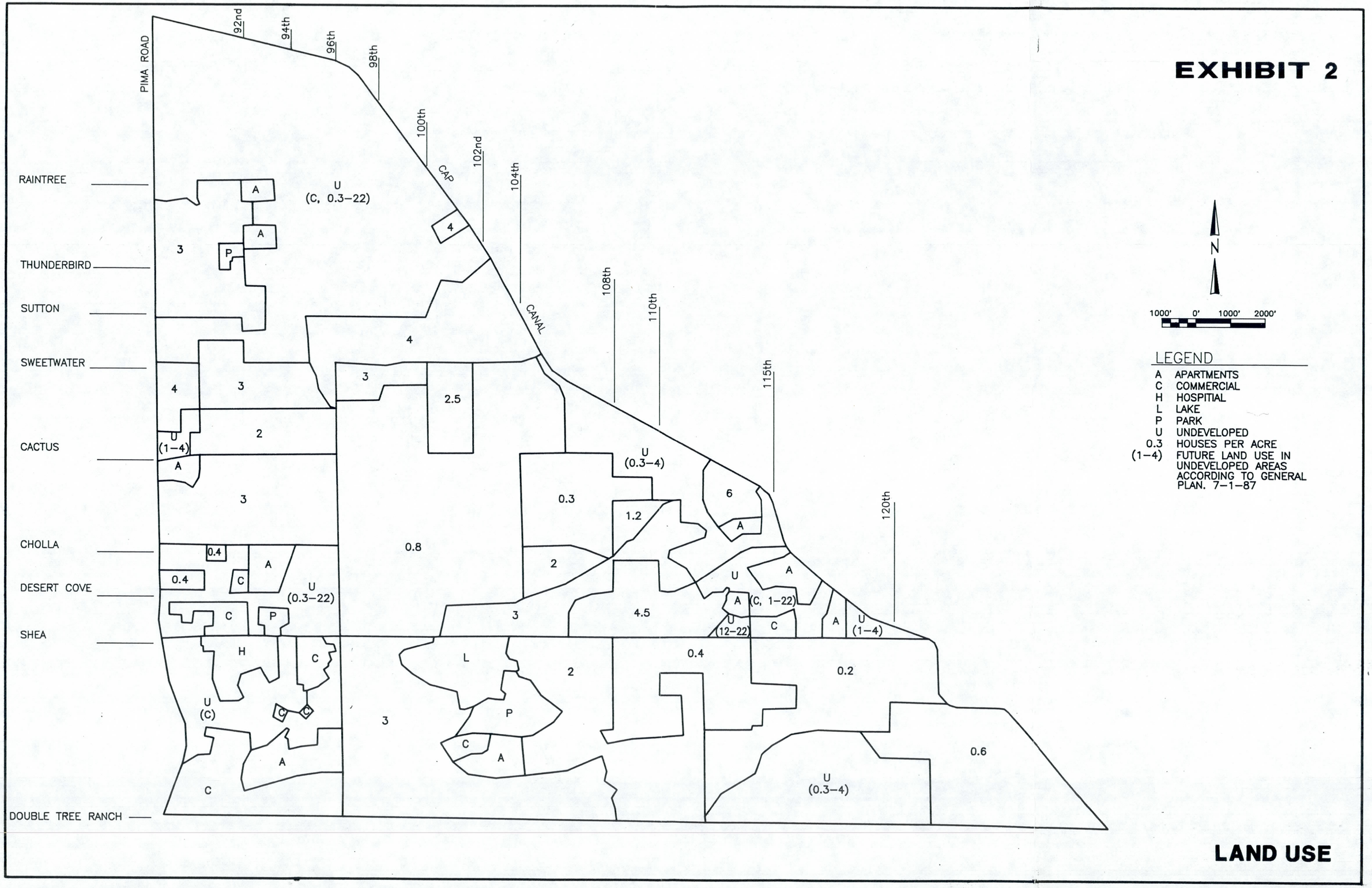
EXHIBIT 1



EXISTING HYDROLOGIC MAP

Boyle Engineering Corporation

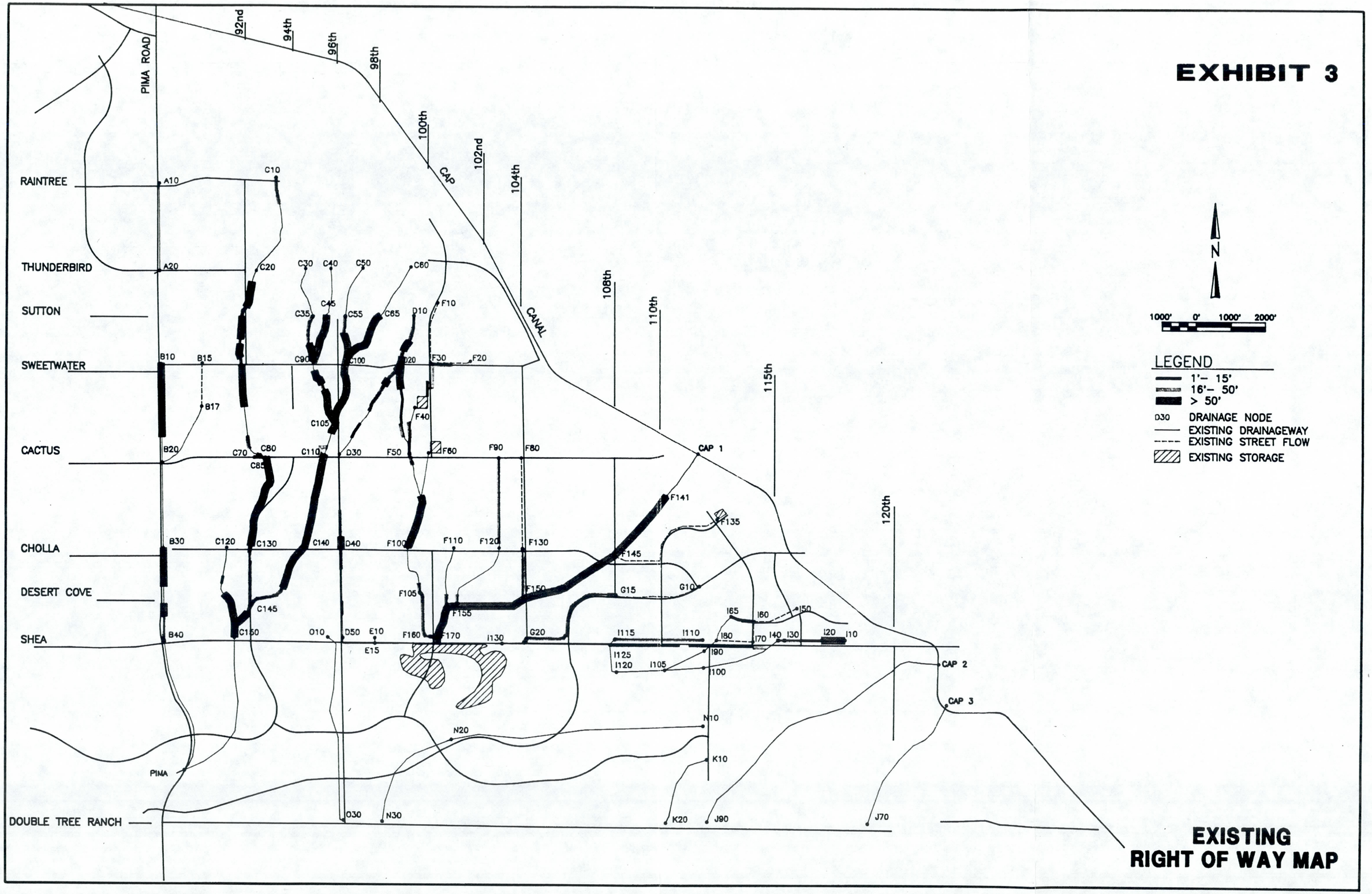
EXHIBIT 2



LAND USE

Boyle Engineering Corporation

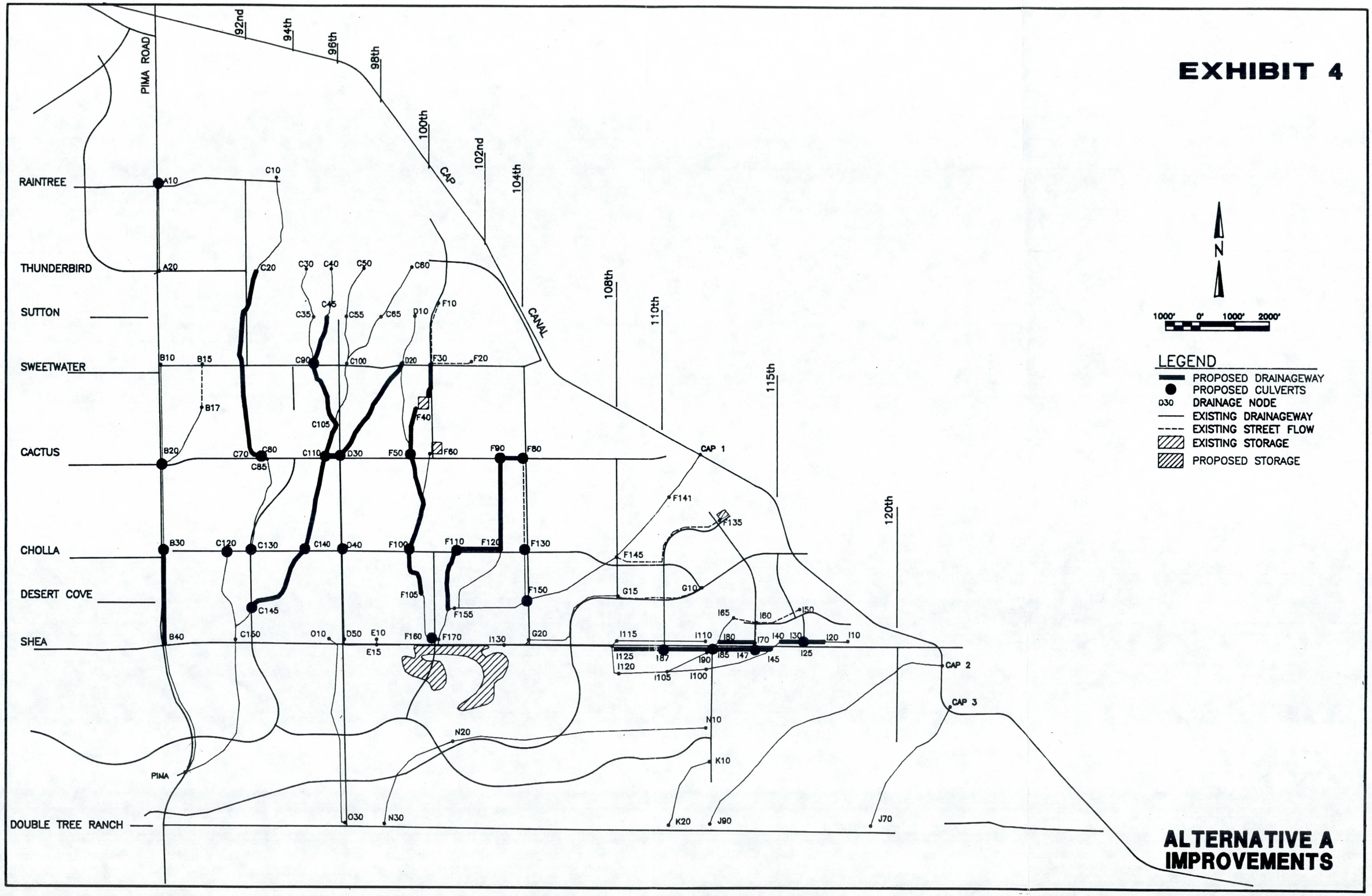
EXHIBIT 3



EXISTING RIGHT OF WAY MAP

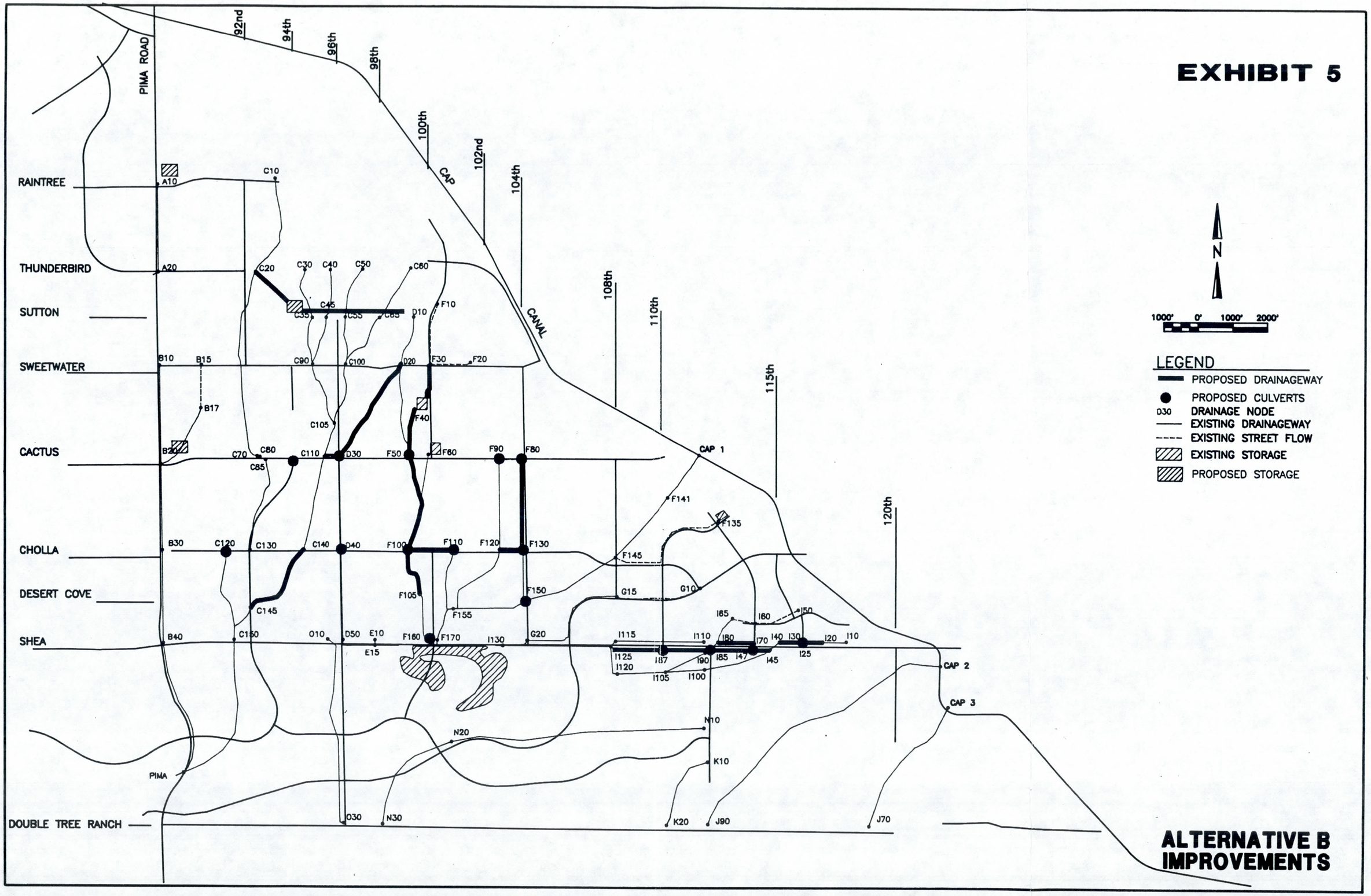
Boyle Engineering Corporation

EXHIBIT 4



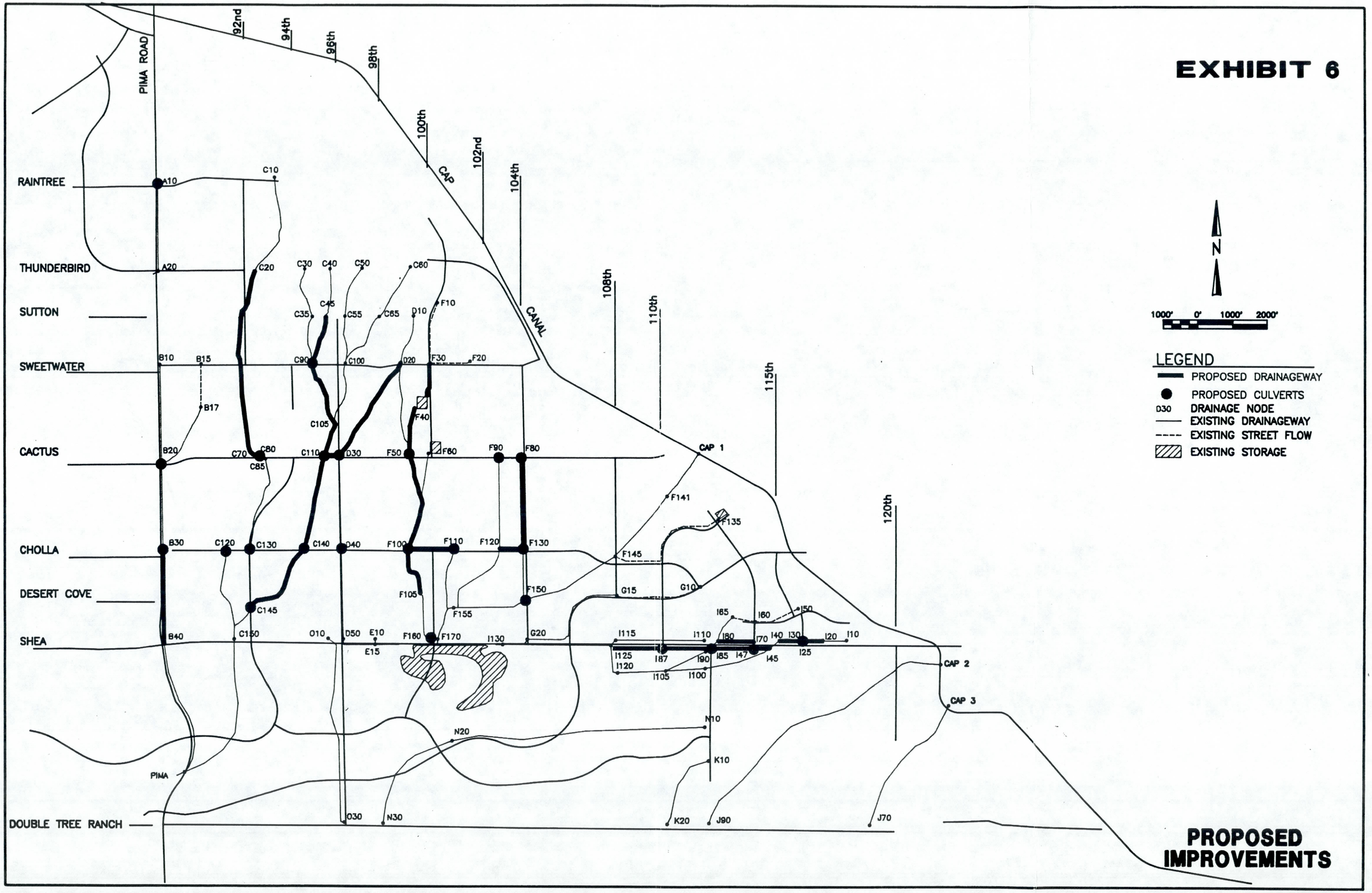
Boyle Engineering Corporation

EXHIBIT 5



Boyle Engineering Corporation

EXHIBIT 6



Boyle Engineering Corporation