City of Scottsdale

PIMA/DOUBLETREE AREA

MASTER DRAINAGE PLAN

Property of
Flood Control District of Maricopa County
Please Return to
2801 W. Durango
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ADDENDUM NO. 2

HAYDEN/SHEA AREA

MASTER DRAINAGE PLAN

JANUARY 25, 1991

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Section 1
INTRODUCTION

This report is an addendum to the "Master Drainage Plan for the Pima/Doubletree Area" submitted to the City of Scottsdale in November 1989. Most of the methodology for study approach, existing conditions, and basis of design for this study are the same as those for the Pima/Doubletree study. Therefore, the general documentation in the Pima/Doubletree report applies to this study, and only additional documentation needed for this study is presented here.

Exhibits included in this study are:

Exhibit 1	Existing Hydrologic Map
Exhibit 2	Details
Exhibit 3	Land Use
Exhibit 4	Existing Right-Of-Way
Exhibit 5	Proposed Improvements

Section 2
EXISTING CONDITIONS

2.1 Study Area

The study area, containing about five square miles, is bound on the north by the CAP Canal, on the south by Shea Boulevard, on the east by Pima Road (except for Drainage Areas A10 and A20), and on the west by Hayden Road (except for Drainage Areas A110, A120, A260, A290 and A300). As in the Pima/Doubletree study area, all of the soil groups in this study area fall within the Soil Conservation Service (SCS) hydrologic group "B."

2.2 Flooding Problems

The channel on the east side of Hayden Road from Thunderbird to Cactus has a capacity greater than the 100-year flows. However, the capacity of the five culverts along this channel are typically less than the 10-year flows. This combined with debris further lowering culvert capacities results in flooding along Hayden.

Presently, there is a major flooding problem that occurs at the southwestern corner of the Scottsdale Country Club Second Nine. The lake at this location, Lake Number 2, has two culvert outlets, one under Cholla Road and one under Hayden Road. When a 10-year storm occurs on the watershed, water begins to spill out of Lake 2 onto Cholla and Hayden. Most of the water drains south on Hayden and some is captured by catch basins along Hayden. In a 100-year storm, over 2,000 cfs spills over onto Hayden and Cholla.

All calculations for storage volumes and culvert outflows at Scottsdale County Club Second Nine were based on data taken from the "Grading and Drainage Plan for Scottsdale Country Club Second Nine" and from site visits which revealed an additional culvert under Hayden not shown in the plans.

During field visits to the site, the fish screen that covers the culvert entrances was observed to be matted with grass. This situation drastically reduces culvert capacity and could result in even greater flooding than just described. It is strongly recommended that the culvert entrances remain uncovered by anything that may reduce capacity.

Flooding conditions also occur at residences in the vicinity of 82nd and Clinton. Upon a field visit just after flooding, trash and sediment deposits were observed at the culvert entrance at 82nd and Shea (R50), Figure 2.1. This along with heavy vegetative growth in the channels, also illustrated in the pictures in Figure 2.1, reduce capacities of structures and channels contributing to the flooding problems.

The channel on the east side of Pima Road (which was analyzed in the Pima/Doubletree Study) has culvert capacities slightly larger than the 10-year flows at Cholla Road and at Cactus Road. The flooding that occurs at these locations may result in stormwater flowing west across Pima Road and exacerbating flooding in the Hayden/Shea Study Area.

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Figure 2.1 - Typical Culvert and Channel

2.3 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 described in Section 3 of the "Pima/Doubletree" report and the results are summarized in Table 2.1 (channels) and Table 2.2 (structures).

It should be noted that estimates of channel capacities took into consideration the observed channel conditions with respect to vegetative growth, channel lining and cross section. However, the capacities of channels, as well as structures, can be reduced by trash and sediment deposits.

Table 2.1 Existing Runoff and Channel Capacity

Basin	Drain Section			Length	------EXISTING ROW------			Drainage	-----RUNOFF (Q)-----			Channel
					1'-15'	16'-50'	>50'	Area	10 yr	50 yr	100 yr	Capacity
				(ft)	(ft)	(ft)	(ft)	(sq mi)	(cfs)	(cfs)	(cfs)	(cfs)
A	A10	-	A20	3,300	-	-	-	.45	132	304	393	3,295
	A20	-	A33					.67	192	450	587	
	A31	-	A33					.4	11	22	26	
	A32	-	A35	1,700	640	-	680	.4	14	44	54	153
	A33	-	A35	1,800	70	330	-	1.07	202	466	606	373
	A35	-	A190	1,000	260	500	-	1.14	222	522	681	112
	A50	-	A60	1,600	-	-	420	.25	160	298	365	106
	A90	-	A140	2,700	-	2,670	-	.32	323	519	611	1,491
	A100	-	A115					.01	5	8	10	
	A110	-	A115					.43	384	600	701	
	A115	-	A130	2,600	-	2,650	-	.43	386	603	705	1,764
	A120	-	A130					.05	34	63	77	
	A130	-	A250	2,700	-	-	-	.53	420	670	788	1,723
	A140	-	A240	2,700	-	2,350	-	.5	433	726	865	593
	A155	-	A160	1,500	-	1,310	-	.45	239	359	408	1,357
	A160	-	A165					.47	242	360	410	
	A165	-	A175	800	850	-	-	.49	246	364	414	1,006
	A170	-	A175					.1	62	117	144	
	A175	-	A180	500	-	470	-	.59	279	402	461	1,006
	A180	-	A230	3,500	-	3,420	-	.64	303	460	534	2,371
	A190	-	A200	3,100	-	-	2,980	1.18	231	546	715	391
	A200	-	A210					1.33	311	622	849	
	A210	-	A220	1,100	-	-	1,100	1.47	392	805	1,018	3,452
	A220	-	A225	1,100	-	-	1,100	1.49	396	814	1,027	3,770
	A225	-	A270	900	-	-	900	1.52	290	746	956	4,049
	A230	-	A235	1,400	-	-	1,400	.77	345	600	699	2,952
	A240	-	A245	1,300	-	-	1,300	.62	498	859	1,033	3,198
	A245	-	A270	1,200	-	-	1,200	1.47	537	1,040	1,229	4,159
	A250	-	A263					.55	424	680	801	
	A260	-	A263					.19	145	258	313	
	A263	-	A265					.74	536	859	1,068	
	A265	-	A270	1,400	-	-	1,400	.75	475	788	997	2,636
	A272	-	A300	3,400	-	-	3,400	3.84	625	700	716	1,500
	A275	-	A280	1,700	-	480	210	3.85	463	1,828	2,394	564
	A280	-	A290	1,300	-	-	1,300	3.87	463	1,831	2,400	5,335
	A290	-						3.91	469	1,847	2,428	
	A300	-						4.06	685	862	924	
Q	Q10	-						.13	82	148	179	
R	R10	-	R25					.14	84	158	194	
	R20	-	R25					.02	15	29	35	
	R25	-	R50	3,200	190	470	-	.16	98	184	226	139
	R30	-	R40	1,000	-	-	-	.03	27	51	62	* 26
	R40	-	R50	1,000	220	-	-	.15	106	198	242	* 60
	R50	-						.41	242	472	572	
S	S10	-	S20	2,600	-	-	-	.06	44	82	100	331
	S20	-						.17	96	198	248	
T	T10	-	T20	2,500	-	-	-	.04	31	55	66	210
	T20	-						.05	35	65	80	

* Drain capacity is for storm drain

Table 2.2 Existing Structure Capacity

Basin	Node	Frequency (yrs)	Runoff (cfs)	Size	Capacity (cfs)
A	A10	50	304	-	-
	A20	50	450	2-3'x10' RCBC	420
	A31	50	22	24" RCP	33
	A32	50	44	4-18" RCP	70
	A50	50	298	2-2'X3' ARCH CMP	50
	A80	50	357	2-2'x10' RCBC	440
	A90	50	519	-	-
	A100	50	8	42" RCP	110
	A110	50	600	4'x10' RCBC	420
	A115	50	603	4'x10' RCBC	370
	A120	50	63	30" RCP	47
	A130	50	670	2-3'X8' RCBC	496
	A160	50	360	-	-
	A170	50	117	-	-
	A190	10	231	-	-
	A200	50	662	2-2'x10' RCBC	330
	A230	50	600	3'x10' RCBC	290
	A240	50	859	2-4'x12' RCBC	780
	A250	50	680	6'X6' RCBC	390
	A272	50	700	2-3'x10' RCBC	660
	A275	50	497	2-3'x10' RCBC	520
	A280	50	501	3-4'x10' RCBC	1,200
	A290	50	522	6-4'X6' RCBC	1,188
	A300	50	862	2-3.5'x12' RCBC	696
Q	Q10	50	148	2'X8' RCBC	104
R	R10	50	158	-	-
	R20	50	29	-	-
	R40	50	198	34"X53" STORM DRAIN	60
	R50	50	472	2-3'x12' RCBC	576
S	S10	50	82	-	-
	S20	50	198	3'x12' RCBC	276
T	T10	50	55	-	-
	T20	50	65	18" RCP	16

Section 3
BASIS OF DESIGN

3.1 Available Data

Documents used in this study in addition to those used in the Pima/Doubletree Study are listed below:

* Drainage Structure Plan for Northsight
* Grading and Drainage Plan for Scottsdale Country Club Second Nine
* Hayden Road Channel System As-Builts
* Hydrology Report to Accompany Master Drainage Plan for Northsight
* Master Drainage Plan for Northsight
* Scottsdale Country Club Hydrology Reports.
* Scottsdale Country Club Second Nine Final Drainage Report.

3.2 Assumptions/Implications

Further assumptions and their implications used in addition to those used in the Pima/Doubletree Study are listed below:

Assumption	Implication
Drainage Areas A30 and A40 were modeled as a single basin and not routed through the storm drains in 86th Street, 87th Street and Raintree Drive in Northsight.	Will have negligible effect on downstream flows. Capacities of storm drains should be adequate since they were designed assuming full development within Northsight and undeveloped conditions for areas to the north. Future flows from the development of areas to the north will be required to be maintained at or below historic flows due to Scottsdale Ordinances.
Bleed-off flows from future on-site detention of Drainage Areas A10, A30 and A40 were modeled as a constant flow rate equivalent to that required to drain the 100-year runoff volume in 36 hours.	Conservative on bleed-off flows. The 10 and 50-year bleed-off would be lower.

Assumption	Implication
In Lake 5 in Scottsdale Country Club Second Nine and Basin 2 in Northsight Park, the allowable maximum water surface elevation without spillage was assumed to be higher than presently exists.	Will have negligible effect on downstream flows since both have another detention facility immediately downstream of them. Also, the additional storage assumed in the model for the lake and basin actually exists in the surrounding areas where the water will flow.

Section 4
PROPOSED IMPROVEMENTS

4.1 General

Drainage alternatives were formulated and discussed with the City Drainage Engineer. During these discussions several site specific flooding problems that require consideration in the proposed improvements were pointed out by the City. Impractical alternatives were eliminated and a set of proposed works deemed necessary were decided upon.

4.2 Future Detention of Undeveloped Areas

Drainage Areas A10, A30 and A40 are presently undeveloped. Present Scottsdale Ordinance requires future developments to detain the volume from a storm depth of three inches, and achieve a total bleed-off in 36 hours.

The effect of this detention on required improvements was analyzed to help in determining a cost factor for implementing the detention policy in these basins. Detention of these areas has no effect on the flooding that occurs at the Scottsdale Country Club. It does, however, reduce required upgrades of three culverts and three channel sections, thus reducing cost of required improvements by approximately $1,000,000.

4.3 Scottsdale Country Club

The proposed improvements for the Scottsdale Country Club Second Nine are based on data taken from the "Grading and Drainage Plan for Scottsdale Country Club Second Nine." Further design of the proposed improvements would require more accurate data of the site.

To minimize possibility of excess spill down Hayden Road and to make use of existing culvert capacity where practical, the proposed improvements at Scottsdale Country Club require both increasing lake storage, capacity and increasing culvert outlet capacity.

There are only three ways to increase storage capacity of Lake 2: 1) Excavation (this is not practical because of existing culvert inverts and possible lining); 2) Increase slopes of sides of the lake (this is not practical because of the residences near the lake); and 3) Increase water surface elevation (this is limited by elevations of surrounding pads and Kali Drive).

The most practical elevation for stored water is 75.0. This would require regrading of hills surrounding Lake 2 to prevent spillover up to this elevation. This increased storage combined with construction of additional outlet culverts would result in keeping the 100-year flows from spilling onto Hayden or Cholla Roads.

The culvert at 77th Place and Shea (A300) is undersized but is not recommended for an upgrade in the proposed improvements. The culvert can act as a "throttle" to limit peak flows under Shea at this point and cause flows to back up on the golf course creating temporary storage. Further survey data would be needed to assess storage capacity on the golf course.

4.4 Proposed Works

The following is a list of culverts and channels which require construction or upgrading for the proposed improvements. The three culverts and three channels which are affected by future detention of undeveloped Drainage Areas A10, A30 and A40 are noted.

Basin A Improvements

* Construct a culvert at Pima and Raintree (A10) to convey flows under Raintree. (Detention of Drainage Area A10 drastically reduces required culvert size).
* Upgrade the channel from Pima and Thunderbird to 87th and Sutton (A33-A35). (Detention of Drainage Areas A10 and A30 eliminates need to upgrade this channel.)
* Upgrade the channel from 87th and Sutton to 87th and Sweetwater (A35-A190). (Detention of Drainage Areas A10 and A30 reduces required upgrade.)
* Upgrade the culvert at 84th and Raintree (A50).
* Upgrade the channel from 84th and Raintree to 84th and Gelding (A50-A60).
* Construct a culvert at 81st and Thunderbird (A90) to convey flows under Thunderbird.
* Construct a channel approximately 250 feet south of Gelding from 82nd to Hayden, then south along the east side of Hayden to Thunderbird (A90-A100). This channel is a site specific solution to alleviate flooding at residences in the vicinity of 80th and Gray.
* Upgrade the culverts at Thunderbird and Hayden (A100 and A110).
* Upgrade the culverts at Voltaire and Hayden and at Sutton and Hayden (A115-A130).
* Upgrade the culvert at Sweetwater and Hayden (A120).
* Upgrade the culvert at Larkspur and Hayden (A130-A250).
* Construct culverts at 84th Street north and south of Sutton (A160 and A170) to convey flows under 84th. (Detention of Drainage Area A40 reduces required culvert size at A160.)
* Construct a culvert at 87th and Sweetwater (A190) to convey flows under Sweetwater.
* Upgrade the channel from 87th and Sweetwater to 84th and Cactus (A190-A200). (Detention of Drainage Areas A10 and A30 reduces required upgrade.)
* Upgrade both sets of culverts at 84th and Cactus (A200-A210). (Detention of Drainage Areas A10 and A30 reduces required upgrades.)
* Upgrade culverts at 82nd and Cactus and Hayden and Cactus (A230 and A250).
* Upgrade culverts out of Lake 2 at Scottsdale Country Club Second Nine (A272 and A275). Increase storage capacity of Lake 2 by regrading to allow the water surface elevation to reach 1375.0 without spillage.
* Upgrade channel from 80th and Cholla to Desert Cove and Hayden (A275-A280).

Basin Q Improvements

* Upgrade the culvert at 80th and Shea (Q10).

Basin R Improvements

* Construct a storm drain in Cholla from 85th to 84th (R10-R20). This drain is to alleviate nuisance flows that can cross Cholla and flow south during large flow events.
* Construct a culvert at 84th and Cholla to convey flows under Cholla (R20).
* Upgrade the channel from 84th and Cholla to 82nd and Clinton (R25-R50).
* Construct a channel from 85th and Shea to 82nd and Shea (R30-R50) and construct a culvert at 84th and Shea (R40) to convey flows under 84th.

Basin S Improvements

* Construct a culvert at 86th and Cholla (S10) to convey flows under Cholla.

Basin T Improvements

* Construct a culvert at Pima and Cholla (T10) to convey flows under Cholla.
* Construct a channel from Pima and Shea to 86th and Shea (T20-S20).

4.5 Proposed Improvements Runoff Estimates

The study area was modeled for the proposed improvements with and without detention of Drainage Areas A10, A30 and A40. A summary of the design discharges is given in Table 4.1.

4.6 Proposed Improvements Cost Estimates

Planning cost estimates have been prepared for the proposed improvements and are summarized in Table 4.2 (without detention of Drainage Areas A10, A30 and A40) and Table 4.3 (with detention of Drainage Areas A10, A30 and A40).

The methodology and unit costs used are the same as those used and documented in the Pima/Doubletree report.

Costs of culverts at three locations (A90, R10 and S10) included the cost of 150 feet of roadside channel and the cost of regrading the road to drain into the channel. These costs are for planning purposes only and these locations would be better served by construction of catch basins and storm drains.

Table 4.1 Proposed Improvements Runoff Estimates

Basin	Drain Section				NO DETENTION OF A10,A30,A40			DETENTION OF A10,A30,A40		
				Area	10 yr	50 yr	100 yr	10 yr	50 yr	100 yr
				(sq mi)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
A	A10	-	A20	.45	132	304	393	24	24	24
	A20	-	A33	.67	192	450	587	194	322	384
	A31	-	A33	.4	11	22	26	1	1	1
	A32	-	A35	.4	14	44	54	0	0	0
	A33	-	A35	1.07	202	466	606	195	323	385
	A35	-	A190	1.14	222	522	681	225	387	466
	A50	-	A60	.25	160	298	365	160	298	365
	A90	-	A140	.1	78	144	176	78	144	176
	A100	-	A115	.23	280	427	494	280	427	494
	A115	-	A130	.65	644	994	1157	644	994	1157
	A120	-	A130	.05	34	63	77	34	63	77
	A130	-	A250	.75	687	1078	1261	687	1078	1261
	A140	-	A240	.28	189	353	432	189	353	432
	A155	-	A160	.45	239	359	408	192	276	312
	A160	-	A165	.47	242	360	410	195	280	316
	A165	-	A175	.49	246	364	414	202	287	324
	A170	-	A175	.1	62	117	144	62	117	144
	A175	-	A180	.59	279	402	461	264	386	443
	A180	-	A230	.64	303	460	534	288	450	520
	A190	-	A200	1.18	231	546	715	248	436	528
	A200	-	A210	1.33	311	662	849	332	600	731
	A210	-	A220	1.47	392	805	1018	413	746	908
	A220	-	A225	1.49	396	814	1027	419	758	922
	A225	-	A270	1.52	290	746	956	281	660	822
	A230	-	A235	.77	345	600	699	338	591	700
	A240	-	A245	.4	267	498	613	267	498	613
	A245	-	A270	1.25	324	698	876	347	746	939
	A250	-	A263	.77	692	1094	1281	692	1094	1281
	A260	-	A263	.19	145	258	313	145	258	313
	A263	-	A265	.96	820	1329	1569	820	1329	1569
	A265	-	A270	.97	687	1291	1537	687	1291	1537
	A272	-	A300	3.84	734	1328	1560	786	1339	1564
	A275	-	A280	3.85	460	932	1138	498	944	1141
	A280	-	A290	3.87	461	936	1143	499	948	1146
	A290	-		3.91	469	951	1164	508	965	1169
	A300	-		4.06	803	1469	1735	864	1489	1751
Q	Q10	-		.13	82	148	179			
R	R10	-	R25	.14	84	158	194			
	R20	-	R25	.02	15	29	35			
	R25	-	R50	.16	98	184	226			
	R30	-	R40	.03	27	51	62			
	R40	-	R50	.15	106	198	242			
	R50	-		.41	242	472	572			
S	S10	-	S20	.06	44	82	100			
	S20	-		.22	131	262	328			
T	T10	-	T20	.04	31	55	66			
	T20	-	S20	.05	35	65	80			

Table 4.2 Proposed Improvements Planning Cost Estimate (Without Detention of A10, A30 & A40)

Basin	Channel or Structure	Improvement	Structure Cost ($)	Channel Cost ($)	ROW Cost ($)	Contingcy @ 20% ($)	Total Section ($)	Total Basin ($)
A	A10	2-3'X8' RCBC		No cost estimate due to ADOT				
A	A33-A35	CHANNEL		58,270	608,320	133,318	799,908	
A	A35-A190	CHANNEL		32,370	270,920	60,658	363,948	
A	A50	2-3'X6' RCBC	19,320			3,864	23,184	
A	A50-A60	CHANNEL		28,610	298,950	65,512	393,072	
A	A90	3'X6' RCBC	* 53,700			10,740	64,440	
A	A90-A100	CHANNEL		59,610	758,360	163,594	981,564	
A	A100	2-3'X10' RCBC	30,000			6,000	36,000	
A	A110	3'X8' RCBC	14,820			2,964	17,784	
A	A115-A130	*** 6-3'X10' RCBC	104,190			20,838	125,028	
A	A120	24" RCP	2,400			480	2,880	
A	A130-A250	3-3'X10' RCBC	52,095			10,419	62,514	
A	A160	2-3'X8' RCBC	25,500			5,100	30,600	
A	A170	3'X6' RCBC	11,700			2,340	14,040	
A	A190	3'X10' RCBC	18,300			3,660	21,960	
A	A190-A200	CHANNEL		100,350	81,640	36,398	218,388	
A	A200-A210	*** 4-3'X8' RCBC	51,000			10,200	61,200	
A	A230	2-3'X8' RCBC	25,500			5,100	30,600	
A	A250	4-3'X8' RCBC	51,060			10,212	61,272	
A	A272	2-3'X10' RCBC	** 42,800			8,560	51,360	
A	A275	2-3'X8' RCBC	** 38,300			7,660	45,960	
A	A275-A280	CHANNEL		105,700	793,270	179,794	1,078,764	4,484,466
Q	Q10	36" RCP	3,780			756	4,536	4,536
R	R10-R20	24" STORM DRAIN	61,000			12,200	73,200	
R	R20	42" RCP	4,140			828	4,968	
R	R25-R50	CHANNEL		26,570	476,300	100,574	603,444	
R	R30-R40	CHANNEL		1,725	84,450	17,235	103,410	
R	R40	3'X6' RCBC	11,700			2,340	14,040	
R	R40-R50	CHANNEL		10,218	197,050	41,454	248,722	1,047,784
S	S10	48" RCP	* 36,860			7,372	44,232	44,232
T	T10	36" RCP	3,780			756	4,536	
T	T20-S20	CHANNEL		9,210	84,450	18,732	112,392	116,928
		TOTAL	661,945	432,633	3,653,710	949,658	5,697,946	5,697,946

* Additional cost included for roadside channel and regrading road to drain to channel
** Additional cost included for regrading Lake 2 in Scottsdale Country Club Second Nine
*** There are 2 culvert locations along these reaches (total culverts needed are shown)

Table 4.3 Proposed Improvements Planning Cost Estimate (With Detention of A10, A30 & A40)

Basin	Channel or Structure	Improvement	Structure Cost ($)	Channel Cost ($)	ROW Cost ($)	Contingcy @ 20% ($)	Total Section ($)	Total Basin ($)
A	A10	24" RCP		No cost estimate due to ADOT				
A	A35-A190	CHANNEL		23,840	214,620	47,692	286,152	
A	A50	2-3'X6' RCBC	19,320			3,864	23,184	
A	A50-A60	CHANNEL		28,610	298,950	65,512	393,072	
A	A90	3'X6' RCBC	* 53,700			10,740	64,440	
A	A90-A100	CHANNEL		59,610	758,360	163,594	981,564	
A	A100	2-3'X10' RCBC	30,000			6,000	36,000	
A	A110	3'X8' RCBC	14,820			2,964	17,784	
A	A115-A130	*** 6-3'X10' RCBC	104,190			20,838	125,028	
A	A120	24" RCP	2,400			480	2,880	
A	A130-A250	3-3'X10' RCBC	52,095			10,419	62,514	
A	A160	2-3'X6' RCBC	19,320			3,864	23,184	
A	A170	3'X6' RCBC	11,700			2,340	14,040	
A	A190	3'X10' RCBC	18,300			3,660	21,960	
A	A190-A200	CHANNEL		73,910	21,960	19,174	115,044	
A	A200-A210	*** 4-3'X6' RCBC	38,640			7,728	46,368	
A	A230	2-3'X8' RCBC	25,500			5,100	30,600	
A	A250	4-3'X8' RCBC	51,060			10,212	61,272	
A	A272	2-3'X10' RCBC	** 42,800			8,560	51,360	
A	A275	2-3'X8' RCBC	** 38,300			7,660	45,960	
A	A275-A280	CHANNEL		105,700	793,270	179,794	1,078,764	3,481,170
Q	Q10	36" RCP	3,780			756	4,536	4,536
R	R10-R20	24" STORM DRAIN	61,000			12,200	73,200	
R	R20	42" RCP	4,140			828	4,968	
R	R25-R50	CHANNEL		26,570	476,300	100,574	603,444	
R	R30-R40	CHANNEL		1,725	84,450	17,235	103,410	
R	R40	3'X6' RCBC	11,700			2,340	14,040	
R	R40-R50	CHANNEL		10,218	197,050	41,454	248,722	1,047,784
S	S10	48" RCP	* 36,860			7,372	44,232	44,232
T	T10	36" RCP	3,780			756	4,536	
T	T20-S20	CHANNEL		9,210	84,450	18,732	112,392	116,928
		TOTAL	643,405	339,393	2,929,410	782,442	4,694,650	4,694,650

* Additional cost included for roadside channel and regrading road to drain to channel

** Additional cost included for regrading Lake 2 in Scottsdale Country Club Second Nine

*** There are 2 culvert locations along these reaches (total culverts needed are shown)

REFERENCES
(In addition to those listed in the Pima/Doubletree Report)

Drainage Design Report for Shea Boulevard-Scottsdale Road to Pima Road, A-N West, Inc., October 1987, Revised March 1988.

Drainage Structure Plan for Northsight, Gilbertson Associates, Inc., November 1986.

Grading and Drainage Plan for Scottsdale Country Club Second Nine, Collar, Williams and White Engineering, Inc., January 7, 1985, Revised August 13, 1985, November 1, 1985, June 16, 1986, and August 1, 1980.

Hayden Road Channel System As-Builts, City of Scottsdale, Arizona, Project No. FC-7837, April 29, 1980.

Hydrology Report to Accompany Master Drainage Plan for Northsight, Gilbertson Associates, Inc., April 1986, Revised May 12, 1986.

Master Drainage Plan for Northsight, Gilbertson Associates, Inc., June 16, 1986.

Plan and Profile of Proposed Shea Boulevard Improvements - Scottsdale Road to Pima Road, Arizona Department of Transportation, December 1989.

Scottsdale Country Club Hydrology Report, Willdan Associates, October 1982, Revised November 23, 1982, and December 30, 1982.

Scottsdale Country Club Hydrology Report, Carter Associates, March 1983, Revised June 1983, and July 1983.

Scottsdale Country Club Second Nine Final Drainage Report, Collar, Williams and White Engineering, Inc., May 1985.

APPENDICES

TABLE A5
HEC-1 INPUT DATA

File	Description
A58-2010	HEC-1 File: Basin A
A58-2011	HEC-1 File: Basins Q, R, S and T
A58-2012	HEC-1 File: Basins S and T - Proposed Improvements
A58-2018	HEC-1 File: Basin A - Proposed Improvements Without Detention of A10, A30 and A40
A58-2019	HEC-1 File: Basin A - Proposed Improvements With Detention of A10, A30 and A40

Table A1 Hydrology Input Parameters

Basin	Drainage Area	Area (acres)	Percent Impervious (%)	SCS Curve Number	Basin Lag (hrs)
A	A10	286	0	78	.39
	A20	141	31	78	.23
	A30	258	11	78	.47
	A35	41	5	78	.19
	A37	3	0	78	.1
	A40	73	10	78	.25
	A50	162	21	78	.24
	A60	34	37	78	.16
	A70	3	15	78	.1
	A75	3	15	78	.1
	A80	4	10	78	.1
	A90	207	52	78	.24
	A100	3	42	78	.11
	A110	272	59	78	.38
	A120	34	20	78	.23
	A130	28	20	78	.1
	A140	113	20	78	.22
	A150	7	22	78	.1
	A160	10	20	78	.1
	A165	17	20	78	.12
	A170	62	20	78	.22
	A180	33	20	78	.11
	A190	29	12	78	.2
	A200	94	22	78	.24
	A210	87	26	78	.33
	A220	17	15	78	.1
	A225	19	23	78	.1
	A230	80	20	78	.13
	A235	35	21	78	.18
	A240	77	20	78	.14
	A245	18	24	78	.1
	A250	14	20	78	.14
	A260	122	28	78	.2
	A265	7	7	78	.1
	A270	62	28	78	.15
	A275	6	5	78	.23
	A280	12	18	78	.1
	A290	29	9	78	.28
	A300	141	19	78	.46
Q	Q10	80	27	78	.28
R	R10	88	20	78	.25
	R20	14	18	78	.16
	R30	22	19	78	.1
	R40	76	21	78	.21
	R50	61	17	78	.13
S	S10	39	20	78	.16
	S20	73	5	78	.19
T	T10	24	27	78	.15
	T20	7	6	78	.11

Table A2 Routing Parameters

Basin	Channel (CP-CP)	Length (ft)	Slope (f/f)	Manning's n	Bottom Width (ft)	Side Slopes (h/v)
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
	A33 - A35	1,800	.0078	.028	2	1.4
	A32 - A35	1,700	.0081	.025	7	2.3
	A35 - A190	1,000	.0080	.040	3	1.7
	A50 - A60	1,600	.0106	.027	3	1.2
	A90 - A140	2,700	.0085	.022	8	2.0
	A115 - A130	2,600	.0087	.022	10	3.4
	A130 - A250	2,700	.0083	.022	10	3.4
	A140 - A240	2,700	.0093	.023	9	1.3
	A155 - A160	1,500	.0063	.020	8	2.9
	A165 - A175	800	.0063	.022	10	1.5
	A175 - A180	500	.0063	.022	10	1.5
	A180 - A230	3,500	.0069	.025	8	2.8
	A190 - A200	3,100	.0065	.028	8	1.7
	A210 - A220	1,100	.0057	.027	30	4.0
	A220 - A225	1,100	.0068	.027	30	4.0
	A225 - A270	900	.0042	.027	30	.1
	A230 - A235	1,400	.0069	.027	20	4.0
	A240 - A245	1,300	.0081	.027	20	4.0
	A245 - A270	1,200	.0055	.027	40	4.0
	A265 - A270	1,400	.0055	.027	20	4.0
	A272 - A300	3,400	.0060	.027	10	3.5
	A275 - A280	1,700	.0060	.040	10	1.2
	A280 - A290	1,300	.0038	.027	60	6.5
R	R25 - R50	3,200	.0066	.028	2	1.9
	R30 - R40	1,000	.0020	.025	15	10.0
	R40 - R50	1,000	.0020	.025	15	10.0
S	S10 - S20	2,600	.0062	.033	2	3.1
T	T10 - T20	2,500	.0072	.023	2.5	1.9

Table A3 Existing Channel Capacity

Basin	Channel	B (ft)	D (ft)	Z h:v	n	S ft/ft	V fps	Q cfs
A	A10-A20	25.0	7.0	3.0	.038	.0085	10.2	3,293
	A33-A35	2.0	5.0	1.4	.028	.0078	8.3	373
	A32-A35	7.0	2.0	2.3	.025	.0081	6.6	153
	A35-A190	3.0	3.0	1.7	.040	.0080	4.6	112
	A50-A60	3.0	2.5	1.2	.027	.0106	7.1	106
	A90-A140	9.0	6.0	2.3	.023	.0085	13.8	1,886
	A90-A140	8.0	6.0	1.7	.023	.0085	13.7	1,491
	A115-A130	10.0	5.0	3.4	.022	.0087	13.1	1,764
	A130-A250	10.0	5.0	3.4	.022	.0083	12.8	1,723
	A140-A240	10.0	4.5	1.7	.023	.0093	12.6	1,001
	A140-A240	9.0	4.0	.8	.022	.0093	12.2	593
	A155-A160	8.0	5.0	2.9	.020	.0063	12.1	1,357
	A165-A175	10.0	5.0	1.5	.022	.0063	11.5	1,006
	A175-A180	10.0	5.0	1.5	.022	.0063	11.5	1,006
	A180-A230	8.0	7.0	2.8	.025	.0069	12.3	2,371
	A180-A230	8.0	8.0	2.0	.023	.0069	14.5	2,775
	A190-A200	8.0	5.5	1.5	.022	.0065	11.9	1,064
	A190-A200	8.0	4.0	1.7	.025	.0065	8.8	523
	A190-A200	8.0	3.5	2.1	.028	.0065	7.3	391
	A210-A220	30.0	6.0	4.0	.027	.0057	10.7	3,452
	A220-A225	30.0	6.0	4.0	.027	.0068	11.6	3,770
	A225-A270	30.0	10.0	.1	.025	.0042	13.1	4,049
	A230-A235	20.0	6.0	4.0	.027	.0069	11.2	2,952
	A240-A245	20.0	6.0	4.0	.027	.0081	12.1	3,198
	A245-A270	40.0	6.0	4.0	.027	.0055	10.8	4,159
	A265-A270	20.0	6.0	4.0	.027	.0055	10.0	2,636
	A272-A300	10.0	5.5	3.5	.027	.0060	9.3	1,500
	A275-A280	10.0	5.0	1.2	.035	.0060	7.1	564
	A275-A280	10.0	7.0	1.2	.045	.0060	6.5	840
	A280-A290	60.0	6.0	6.5	.027	.0038	9.0	5,335
R	R25-R50	9.0	4.0	1.7	.035	.0066	6.5	408
	R25-R50	2.0	3.0	1.9	.027	.0066	6.0	139
	R25-R50	3.5	3.0	2.8	.025	.0066	6.8	243
	R30-R40 *	-	2.8	-	.013	.0025	4.4	26
	R40-R50 *	4.4	2.8	-	.013	.0025	5.7	60
S	S10-S20	2.0	4.0	3.1	.033	.0062	5.7	331
T	T10-T20	2.5	3.5	1.9	.025	.0072	7.6	242
	T10-T20	2.0	3.5	1.5	.022	.0072	8.3	210

* Capacity is for storm drain

Table A4 Drainage Basin Percent Impervious

Basin	Drainage Area	Comm	Golf	Park	Undev	Undev w/Rds	1.0	1.2	2.0	3.0	4.0	4.5	8.0	Total Basin Area (acres)	Total Percent Imperv
		85%	5%	15%	0%	10%	20%	22%	28%	35%	42%	45%	65%		
A	A10				286									286	0%
	A20			8	13					120				141	31%
	A30	2				256								258	11%
	A35				30	2	9							41	5%
	A37				3									3	0%
	A40			1		72								73	10%
	A50	23				139								162	21%
	A60	11		1		13	9							34	37%
	A70			3										3	15%
	A75			3										3	15%
	A80					4								4	10%
	A90	106				24	72	5						207	52%
	A100	1					2							3	42%
	A110	179				93								272	59%
	A120						34							34	20%
	A130						28							28	20%
	A140						112	1						113	20%
	A150						1	6						7	22%
	A160						10							10	20%
	A165						16	1						17	20%
	A170					2	60							62	20%
	A180						33							33	20%
	A190				12		17							29	12%
	A200						74		20					94	22%
	A210						25		62					87	26%
	A220		6				11							17	15%
	A225		10								9			19	23%
	A230						80							80	20%
	A235		19				1				15			35	21%
	A240						77							77	20%
	A245		9								9			18	24%
	A250						14							14	20%
	A260						58			64				122	28%
	A265		6				1							7	7%
	A270		24								38			62	28%
	A275		6											6	5%
	A280				1		11							12	18%
	A290	1	25			1	2							29	9%
	A300	10	69			24	26						12	141	19%
Q	Q10	14	1		16		49							80	27%
R	R10						87		1					88	20%
	R20		2				12							14	18%
	R30				1		21							22	19%
	R40				10		56					10		76	21%
	R50				9		52							61	17%
S	S10						39							39	20%
	S20				56		16		1					73	5%
T	T10						4		20					24	27%
	T20				5		2							7	6%

TABLE A5
HEC-1 INPUT DATA

File	Description
A58-2010	HEC-1 File: Basin A
A58-2011	HEC-1 File: Basins Q, R, S and T
A58-2012	HEC-1 File: Basins S and T - Proposed Improvements
A58-2018	HEC-1 File: Basin A - Proposed Improvements Without Detention of A10, A30 and A40
A58-2019	HEC-1 File: Basin A - Proposed Improvements With Detention of A10, A30 and A40

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ID   SCOTTSDALE - HAYDEN/SHEA
ID   MASTER DRAINAGE PLAN
ID   CITY OF SCOTTSDALE, ARIZONA
ID   PROJECT NO. PH-S47-118-20
ID   INPUT FILE: A58_2010
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
KK   A30          SUBBASIN A30 RUNOFF
BA0.4031
LS     0      78      11
UD  0.47
KK  DA30          DETENTION BASIN AT CPA30
RS     1    STOR       0
SV     0    0.20    0.55    1.17    1.87    2.64    3.49    4.42    5.42    6.49
SE   9.0    10.0    10.5    11.0    11.5    12.0    12.5    13.0    13.5    14.0
SQ     0      41      75     112     152     188     217     244     269     287
KK   A31          SPLIT FLOW AT DETENTION BASIN DA30
DT   A32
DI     0      41      75     112     152     188     217     244     269     287
DI   310     326
DQ     0      39      69     102     138     170     197     220     243     259
DQ   279     293
KK CPA33          COMBINE FLOWS AT CPA33
HC     2
KK   A35          ROUTE CPA33 TO CPA35
RK  1800  0.0078   0.028       0    TRAP     2.0     1.4
KK   A32          RETRIEVE SPLIT FLOW AT A32
DR   A32
KK   A32          SPLIT FLOW AT DETENTION BASIN DA30
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DT   A36
DI     0      39      69     102     138     170     197     220     243     259
DI   279     293
DQ     0      39      65      92     117     138     157     172     190     200
DQ   215     225
KK   A35        ROUTE CPA32 TO CPA35
RK  1700  0.0081   0.025       0    TRAP     7.0     2.3
KK   A35        SUBBASIN A35 RUNOFF
BA0.0641
LS     0      78       5
UD  0.19
KK CPA35        COMBINE FLOWS AT CPA35
HC     3
KK  A190        ROUTE CPA35 TO CPA190
RK  1000  0.0080    0.04       0    TRAP     3.0     1.7
KK  A190        SUBBASIN A190 RUNOFF
BA0.0453
LS     0      78      12
UD  0.20
KKCPA190        COMBINE FLOWS AT CPA190
HC     2
KK  A200        ROUTE CPA190 TO CPA200
RK  3100  0.0065   0.028       0    TRAP     8.0     1.7
KK  A200        SUBBASIN A200 RUNOFF
BA0.1469
LS     0      78      22
UD  0.24
KKCPA200        COMBINE FLOWS AT CPA200
HC     2
KK  A210        SUBBASIN A210 RUNOFF
BA0.1359
LS     0      78      26
UD  0.33
KKCPA210        COMBINE FLOWS AT CPA210
HC     2
KK  A220        ROUTE CPA210 TO CPA220
RK  1100  0.0057   0.027       0    TRAP      30       4
KK  A220        SUBBASIN A220 RUNOFF
BA0.0266
LS     0      78      15
UD  0.10
KKCPA220        COMBINE FLOWS AT CPA220
HC     2
KK  A225        ROUTE CPA220 TO CPA225
RK  1100  0.0068   0.027       0    TRAP      30       4
KK  A225        SUBBASIN A225 RUNOFF
BA0.0297
LS     0      78      23
UD  0.10
KKCPA225        COMBINE FLOWS AT CPA225
HC     2
KK DA225        DETENTION BASIN AT CPA225
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RS      1    STOR        0
SV      0    1.65     4.37     7.42    10.93    14.69    18.45    22.21
SE  73.35    74.0     75.0     76.0     77.0     78.0     79.0     80.0
SQ      0       0        0        0       58      318      741     1155
KK   A270         ROUTE CPA225 TO CPA270
RK    900  0.0042    0.027        0     TRAP       30      0.1
KK    A36         RETRIEVE SPLIT FLOW AT A36
DR    A36
KK    A37         SUBBASIN A37 RUNOFF
BA0.0047
LS      0      78        0
UD   0.10
KK  CPA37         COMBINE FLOWS AT CPA37
HC      2
KK   DA37         DETENTION BASIN AT CPA37
RS      1    STOR        0
SV      0     0.2      0.3     0.71     1.49     2.32     3.22     4.18     5.20     6.29
SV   6.74
SE      0     1.0      1.5      2.0      2.5      3.0      3.5      4.0      4.5      5.0
SE    5.2
SQ      0      18       34       51       70       91      110      123      143      157
SQ    164
KK    A40         SUBBASIN A40 RUNOFF
BA0.1141
LS      0      78       10
UD   0.25
KK   DA40         DETENTION BASIN AT CPA40
RS      1    STOR        0
SV      0    0.25     0.53     0.86     1.22     1.63     1.97
SE      0     0.5      1.0      1.5      2.0      2.6      3.0
SQ      0      20       35       54       73       97      111
KK    A50         SUBBASIN A50 RUNOFF
BA0.2531
LS      0      78       21
UD   0.24
KK    A60         ROUTE CPA50 TO CPA60
RK   1600  0.0106    0.027        0     TRAP        3      1.2
KK    A60         SUBBASIN A60 RUNOFF
BA0.0531
LS      0      78       37
UD   0.16
KK  CPA60         COMBINE FLOWS AT CPA60
HC      2
KK   DA60         DETENTION BASIN AT CPA60
RS      1    STOR        0
SV      0    0.23     0.37     0.60     0.66     0.95     1.91     3.03     4.29     5.71
SE   36.7    37.5     38.0    38.85     39.0     40.0     41.0     42.0     43.0     44.0
SQ      0      44       88      180      196      284      350      404      456      500
KK    A70         SUBBASIN A70 RUNOFF
BA0.0047
LS      0      78       15
UD   0.10
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KK CPA70        COMBINE FLOWS AT CPA70
HC     3
KK  DA70        DETENTION BASIN AT CPA70
RS     1    STOR       0
SV     0    0.04    0.08    0.12    0.13    0.15    0.33    0.54    0.78    1.05
SE     0     1.0     2.0     3.0     3.3     3.8     4.3     4.8     5.3     5.6
SQ     0      74     202     360     408     480     552     605     672     696
KK   A75        SUBBASIN A75 RUNOFF
BA0.0047
LS     0      78      15
UD  0.10
KK CPA75        COMBINE FLOWS AT CPA75
HC     2
KK  DA75        DETENTION BASIN AT CPA75
RS     1    STOR       0
SV     0     0.4     0.8    1.16    2.36    3.60    4.87    6.17    7.52    8.89
SV 10.31   11.76   11.87
SE     0     1.0     1.3     1.8     2.3     2.8     3.3     3.8     4.3     4.8
SE   5.3     5.8     6.3
SQ     0      36      93     141     189     237     286     334     382     430
SQ   478     526     575
KK   A80        SUBBASIN A80 RUNOFF
BA0.0063
LS     0      78      10
UD  0.10
KK CPA80        COMBINE FLOWS AT CPA80
HC     3
KK  DA80        DETENTION BASIN AT CPA80
RS     1    STOR       0
SV     0     0.2     0.4    0.86    1.77    2.74    3.79    4.91    6.09    7.34
SV  7.86
SE     0     1.0     2.2     2.7     3.2     3.7     4.2     4.7     5.2     5.7
SE   5.9
SQ     0      60     186     234     276     314     344     376     400     426
SQ   440
KK  A150        SUBBASIN A150 RUNOFF
BA0.0109
LS     0      78      22
UD  0.10
KKCPA155        COMBINE FLOWS AT CPA155
HC     2
KK  A160        ROUTE CPA155 TO CPA160
RK  1500  0.0063   0.020       0    TRAP       8     2.9
KK  A160        SUBBASIN A160 RUNOFF
BA0.0156
LS     0      78      20
UD  0.10
KKCPA160        COMBINE FLOWS AT CPA160
HC     2
KK  A165        SUBBASIN A165 RUNOFF
BA0.0266
LS     0      78      20
```

```
UD  0.12
KKCPA165        COMBINE FLOWS AT CPA165
HC      2
KK  A175        ROUTE CPA165 TO CPA175
RK   800  0.0063   0.022       0    TRAP      10      1.5
KK  A170        SUBBASIN A170 RUNOFF
BA0.0969
LS      0      78      20
UD  0.22
KKCPA175        COMBINE FLOWS AT CPA175
HC      2
KK  A180        ROUTE CPA175 TO CPA180
RK   500  0.0063   0.022       0    TRAP      10      1.5
KK  A180        SUBBASIN A180 RUNOFF
BA0.0516
LS      0      78      20
UD  0.11
KKCPA180        COMBINE FLOWS AT CPA180
HC      2
KK  A230        ROUTE CPA180 TO CPA230
RK  3500  0.0069   0.025       0    TRAP       8      2.8
KK  A230        SUBBASIN A230 RUNOFF
BA0.1250
LS      0      78      20
UD  0.13
KKCPA230        COMBINE FLOWS AT CPA230
HC      2
KK  A235        ROUTE CPA230 TO CPA235
RK  1400  0.0069   0.027       0    TRAP      20       4
KK  A235        SUBBASIN A235 RUNOFF
BA0.0547
LS      0      78      21
UD  0.18
KKCPA235        COMBINE FLOWS AT CPA235
HC      2
KK DA235        DETENTION BASIN AT CPA235
RS      1    STOR       0
SV      0    0.92    2.83    4.85    7.01    9.51   12.65   16.32   20.16
SE  73.50    74.0    75.0    76.0    77.0    78.0    79.0    80.0    81.0
SQ      0       0       0       0      21     110     237     393     567
KK   A90        SUBBASIN A90 RUN
BA0.3234
LS      0      78      52
UD  0.24
KK  A140        ROUTE CPA90 TO CPA140
RK  2700  0.0085   0.022       0    TRAP       8       2
KK  A140        SUBBASIN A140 RUNOFF
BA0.1766
LS      0      78      20
UD  0.22
KKCPA140        COMBINE FLOWS AT CPA140
HC      2
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```
KK  A240        ROUTE CPA140 TO CPA240
RK  2700  0.0093   0.023       0    TRAP       9      1.3
KK  A240        SUBBASIN A240 RUNOFF
BA0.1203
LS     0      78      20
UD  0.14
KKCPA240        COMBINE FLOWS AT CPA240
HC     2
KK  A245        ROUTE CPA240 TO CPA245
RK  1300  0.0081   0.027       0    TRAP      20       4
KK  A245        SUBBASIN A245 RUNOFF
BA0.0281
LS     0      78      24
UD  0.10
KKCPA245        COMBINE FLOWS AT CPA245
HC     3
KK DA245        DETENTION BASIN AT CPA245
RS     1    STOR       0
SV     0    0.57    1.83    3.28    5.36    8.28   11.88   16.32
SE 71.50    72.0    73.0    74.0    75.0    76.0    77.0    78.0
SQ     0       0       0       0      43     334     942    1251
KK  A270        ROUTE CPA245 TO CPA270
RK  1200  0.0055   0.027       0    TRAP      40       4
KK  A100        SUBBASIN A100 RUNOFF
BA0.0047
LS     0      78      42
UD  0.11
KK  A110        SUBBASIN A110 RUNOFF
BA0.4250
LS     0      78      59
UD  0.38
KKCPA115        COMBINE FLOWS AT CPA115
HC     2
KK  A130        ROUTE CPA115 TO CPA130
RK  2600  0.0087   0.022       0    TRAP      10     3.4
KK  A120        SUBBASIN A120 RUNOFF
BA0.0531
LS     0      78      20
UD  0.23
KK  A130        SUBBASIN A130 RUNOFF
BA0.0438
LS     0      78      20
UD  0.10
KKCPA130        COMBINE FLOWS AT CPA130
HC     3
KK  A250        ROUTE CPA130 TO CPA250
RK  2700  0.0083   0.022       0    TRAP      10     3.4
KK  A250        SUBBASIN A250 RUNOFF
BA0.0219
LS     0      78      20
UD  0.14
KKCPA250        COMBINE FLOWS AT CPA250
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HC      2
KK  A260          SUBBASIN A260 RUNOFF
BA0.1906
LS      0       78       28
UD  0.20
KKCPA263          COMBINE FLOWS AT CPA263
HC      2
KK  A265          SUBBASIN A265 RUNOFF
BA0.0109
LS      0       78        7
UD  0.10
KKCPA265          COMBINE FLOWS AT CPA265
HC      2
KK DA265          DETENTION BASIN AT CPA265
RS      1     STOR        0
SV      0     0.55     1.48     2.50     3.63     4.91     6.40     8.12    10.11    12.41
SV  13.64    14.87    16.10
SE  73.35     74.0     75.0     76.0     77.0     78.0     79.0     80.0     81.0     82.0
SE   82.5     83.0     83.5
SQ      0        0        0        0       31      122      243      387      550      633
SQ    749      992     1313
KK  A270          ROUTE CPA265 TO CPA270
RK  1400   0.0055    0.027        0     TRAP       20        4
KK  A270          SUBBASIN A270 RUNOFF
BA0.0969
LS      0       78       28
UD  0.15
KKCPA270          COMBINE FLOWS AT CPA270
HC      4
KK DA270          DETENITON BASIN AT CPA270
RS      1     STOR        0
SV      0     1.58     4.19     7.15    10.96    16.02    19.07    20.77    22.59    24.46
SV  26.33    28.20
SE  67.34     68.0     69.0     70.0     71.0     72.0     72.5    72.75     73.0    73.25
SE   73.5    73.75
SQ      0        0        0        0      273      914     1006     1128     1433     1994
SQ   2768     3725
KK  A271          SPLIT FLOW AT DETENTION BASIN DA270
DT  A272
DI      0      273      914     1006     1128     1433     1994     2768     3725
DQ      0      201      547      608      634      659      684      708      731
KK  A275          SUBBASIN A275 RUNOFF
BA0.0094
LS      0       78        5
UD  0.23
KKCPA275          COMBINE FLOWS AT CPA275
HC      2
KK  A280          ROUTE CPA275 TO CPA280
RK  1700   0.0060     0.04        0     TRAP       10      1.2
KK  A280          SUBBASIN A280 RUNOFF
BA0.0188
LS      0       78       18
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UD  0.10
KKCPA280        COMBINE FLOWS AT CPA280
HC      2
KK  A290        ROUTE CPA280 TO CPA290
RK  1300  0.0038   0.027       0    TRAP      60     6.5
KK  A290        SUBBASIN A290 RUNOFF
BA0.0453
LS      0      78       9
UD  0.28
KKCPA290        COMBINE FLOWS AT CPA290
HC      2
KK  A272        RETRIEVE SPLIT FLOW AT A272
DR  A272
KK  A300        ROUTE CPA272 TO CPA300
RK  3400  0.0060   0.027       0    TRAP      10     3.5
KK  A300        SUBBASIN A300 RUNOFF
BA0.2203
LS      0      78      19
UD  0.46
KKCPA300        COMBINE FLOWS AT CPA300
HC      2
ZZ
```

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ID   SCOTTSDALE - HAYDEN/SHEA
ID   MASTER DRAINAGE PLAN
ID   CITY OF SCOTTSDALE, ARIZONA
ID   PROJECT NO. PH-S47-118-20
ID   INPUT FILE: A58_2011
ID*************************************************************
ID
ID   BASINS Q,R,S,&T
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   Q10          SUBBASIN Q10 RUNOFF
BA0.1251
PB   3.3
PC     0    .014    .030    .082    .758    .860    .897    .926    .946    .963
PC  .976    .988    1.00
LS     0      78      27
UD  0.28
KK   R10          SUBBASIN R10 RUNOFF
BA0.1375
LS     0      78      20
UD  0.25
KK   R20          SUBBASIN R20 RUNOFF
BA0.0219
LS     0      78      18
UD  0.16
KK CPR25          COMBINE FLOWS AT CPR25
HC     2
KK   R50          ROUTE CPR25 TO CPR50
RK  3200  0.0066   0.028       0    TRAP       2     1.9
KK   R30          SUBBASIN R30 RUNOFF
BA0.0344
LS     0      78      19
UD  0.10
KK   R40          ROUTE CPR30 TO CPR40
RK  1000  0.0020   0.025       0    TRAP      15      10
KK   R40          SUBBASIN R40 RUNOFF
BA0.1188
LS     0      78      21
UD  0.21
KK CPR40          COMBINE FLOWS AT CPR40
HC     2
KK   R50          ROUTE CPR40 TO CPR50
RK  1000  0.0020   0.025       0    TRAP      15      10
KK   R50          SUBBASIN R50 RUNOFF
BA0.0953
LS     0      78      17
UD  0.13
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KK CPR50        COMBINE FLOWS AT CPR50
HC     3
KK   S10        SUBBASIN S10 RUNOFF
BA0.0609
LS     0      78      20
UD  0.16
KK   S20        ROUTE CPS10 TO CPS20
RK  2600  0.0062   0.033       0    TRAP       2     3.1
KK   S20        SUBBASIN S20 RUNOFF
BA0.1141
LS     0      78       5
UD  0.19
KK CPS20        COMBINE FLOW AT CPS20
HC     2
KK   T10        SUBBASIN T10 RUNOFF
BA0.0375
LS     0      78      27
UD  0.15
KK   T20        ROUTE CPT10 TO CPT20
RK  2500  0.0072   0.023       0    TRAP     2.5     1.9
KK   T20        SUBBASIN T20 RUNOFF
BA0.0109
LS     0      78       6
UD  0.11
KK CPT20        COMBINE FLOWS AT CPT20
HC     2
ZZ
```

```
ID   SCOTTSDALE - HAYDEN/SHEA
ID   MASTER DRAINAGE PLAN
ID   CITY OF SCOTTSDALE, ARIZONA
ID   PROJECT NO. PH-S47-118-20
ID   INPUT FILE: A58_2012
ID*************************************************************
ID
ID   BASINS S & T - PROPOSED IMPROVEMENTS
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   S10         SUBBASIN S10 RUNOFF
BA0.0609
PB   3.3
PC     0    .014    .030    .082    .758    .860    .897    .926    .946    .963
PC  .976    .988    1.00
LS     0      78      20
UD  0.16
KK   S20         ROUTE CPS10 TO CPS20
RK  2600  0.0062   0.033       0    TRAP       2     3.1
KK   S20         SUBBASIN S20 RUNOFF
BA0.1141
LS     0      78       5
UD  0.19
KK CPS20         COMBINE FLOW AT CPS20
HC     2
KK   T10         SUBBASIN T10 RUNOFF
BA0.0375
LS     0      78      27
UD  0.15
KK   T20         ROUTE CPT10 TO CPT20
RK  2500  0.0072   0.023       0    TRAP     2.5     1.9
KK   T20         SUBBASIN T20 RUNOFF
BA0.0109
LS     0      78       6
UD  0.11
KK CPT20         COMBINE FLOWS AT CPT20
HC     2
KK   S20         ROUTE CPT20 TO CPS20
RK   650  0.0020   0.025       0    TRAP     5.0     4.0
KK CPS20         COMBINE FLOWS AT CPS20
HC     2
ZZ
```

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ID   SCOTTSDALE - HAYDEN/SHEA
ID   MASTER DRAINAGE PLAN
ID   CITY OF SCOTTSDALE, ARIZONA
ID   PROJECT NO. PH-S47-118-20
ID   INPUT FILE: A58_2018
ID*************************************************************
ID
ID   BASIN A - PROPOSED IMPROVEMENTS (without retention of A10, A30 & A40)
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
KK   A30         SUBBASIN A30 RUNOFF
BA0.4031
LS     0      78      11
UD  0.47
KK  DA30         DETENTION BASIN AT CPA30
RS     1    STOR       0
SV     0    0.20    0.55    1.17    1.87    2.64    3.49    4.42    5.42    6.49
SE   9.0    10.0    10.5    11.0    11.5    12.0    12.5    13.0    13.5    14.0
SQ     0      41      75     112     152     188     217     244     269     287
KK   A31         SPLIT FLOW AT DETENTION BASIN DA30
DT   A32
DI     0      41      75     112     152     188     217     244     269     287
DI   310     326
DQ     0      39      69     102     138     170     197     220     243     259
DQ   279     293
KK CPA33         COMBINE FLOWS AT CPA33
HC     2
KK   A35         ROUTE CPA33 TO CPA35
RK  1800  0.0078   0.028       0    TRAP     2.0     1.4
KK   A32         RETRIEVE SPLIT FLOW AT A32
DR   A32
KK   A32         SPLIT FLOW AT DETENTION BASIN DA30
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DT   A36
DI     0      39      69     102     138     170     197     220     243     259
DI   279     293
DQ     0      39      65      92     117     138     157     172     190     200
DQ   215     225
KK   A35         ROUTE CPA32 TO CPA35
RK  1700  0.0081   0.025       0    TRAP     7.0     2.3
KK   A35         SUBBASIN A35 RUNOFF
BA0.0641
LS     0      78       5
UD  0.19
KK CPA35         COMBINE FLOWS AT CPA35
HC     3
KK  A190         ROUTE CPA35 TO CPA190
RK  1000  0.0080    0.04       0    TRAP     3.0     1.7
KK  A190         SUBBASIN A190 RUNOFF
BA0.0453
LS     0      78      12
UD  0.20
KKCPA190         COMBINE FLOWS AT CPA190
HC     2
KK  A200         ROUTE CPA190 TO CPA200
RK  3100  0.0065   0.028       0    TRAP     8.0     1.7
KK  A200         SUBBASIN A200 RUNOFF
BA0.1469
LS     0      78      22
UD  0.24
KKCPA200         COMBINE FLOWS AT CPA200
HC     2
KK  A210         SUBBASIN A210 RUNOFF
BA0.1359
LS     0      78      26
UD  0.33
KKCPA210         COMBINE FLOWS AT CPA210
HC     2
KK  A220         ROUTE CPA210 TO CPA220
RK  1100  0.0057   0.027       0    TRAP      30       4
KK  A220         SUBBASIN A220 RUNOFF
BA0.0266
LS     0      78      15
UD  0.10
KKCPA220         COMBINE FLOWS AT CPA220
HC     2
KK  A225         ROUTE CPA220 TO CPA225
RK  1100  0.0068   0.027       0    TRAP      30       4
KK  A225         SUBBASIN A225 RUNOFF
BA0.0297
LS     0      78      23
UD  0.10
KKCPA225         COMBINE FLOWS AT CPA225
HC     2
KK DA225         DETENTION BASIN AT CPA225
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RS      1    STOR       0
SV      0    1.65    4.37    7.42   10.93   14.69   18.45   22.21
SE  73.35    74.0    75.0    76.0    77.0    78.0    79.0    80.0
SQ      0       0       0       0      58     318     741    1155
KK   A270        ROUTE CPA225 TO CPA270
RK    900  0.0042   0.027       0    TRAP      30     0.1
KK    A36        RETRIEVE SPLIT FLOW AT A36
DR    A36
KK    A37        SUBBASIN A37 RUNOFF
BA0.0047
LS      0      78       0
UD   0.10
KK  CPA37        COMBINE FLOWS AT CPA37
HC      2
KK   DA37        DETENTION BASIN AT CPA37
RS      1    STOR       0
SV      0     0.2     0.3    0.71    1.49    2.32    3.22    4.18    5.20    6.29
SV   6.74
SE      0     1.0     1.5     2.0     2.5     3.0     3.5     4.0     4.5     5.0
SE    5.2
SQ      0      18      34      51      70      91     110     123     143     157
SQ    164
KK    A40        SUBBASIN A40 RUNOFF
BA0.1141
LS      0      78      10
UD   0.25
KK   DA40        DETENTION BASIN AT CPA40
RS      1    STOR       0
SV      0    0.25    0.53    0.86    1.22    1.63    1.97
SE      0     0.5     1.0     1.5     2.0     2.6     3.0
SQ      0      20      35      54      73      97     111
KK    A50        SUBBASIN A50 RUNOFF
BA0.2531
LS      0      78      21
UD   0.24
KK    A60        ROUTE CPA50 TO CPA60
RK   1600  0.0106   0.027       0    TRAP       3     1.2
KK    A60        SUBBASIN A60 RUNOFF
BA0.0531
LS      0      78      37
UD   0.16
KK  CPA60        COMBINE FLOWS AT CPA60
HC      2
KK   DA60        DETENTION BASIN AT CPA60
RS      1    STOR       0
SV      0    0.23    0.37    0.60    0.66    0.95    1.91    3.03    4.29    5.71
SE   36.7    37.5    38.0   38.85    39.0    40.0    41.0    42.0    43.0    44.0
SQ      0      44      88     180     196     284     350     404     456     500
KK    A70        SUBBASIN A70 RUNOFF
BA0.0047
LS      0      78      15
UD   0.10
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KK CPA70        COMBINE FLOWS AT CPA70
HC     3
KK  DA70        DETENTION BASIN AT CPA70
RS     1    STOR      0
SV     0    0.04    0.08    0.12    0.13    0.15    0.33    0.54    0.78    1.05
SE     0    1.0     2.0     3.0     3.3     3.8     4.3     4.8     5.3     5.6
SQ     0    74      202     360     408     480     552     605     672     696
KK   A75        SUBBASIN A75 RUNOFF
BA0.0047
LS     0    78      15
UD  0.10
KK CPA75        COMBINE FLOWS AT CPA75
HC     2
KK  DA75        DETENTION BASIN AT CPA75
RS     1    STOR      0
SV     0    0.4     0.8     1.16    2.36    3.60    4.87    6.17    7.52    8.89
SV 10.31    11.76   11.87
SE     0    1.0     1.3     1.8     2.3     2.8     3.3     3.8     4.3     4.8
SE   5.3    5.8     6.3
SQ     0    36      93      141     189     237     286     334     382     430
SQ   478    526     575
KK   A80        SUBBASIN A80 RUNOFF
BA0.0063
LS     0    78      10
UD  0.10
KK CPA80        COMBINE FLOWS AT CPA80
HC     3
KK  DA80        DETENTION BASIN AT CPA80
RS     1    STOR      0
SV     0    0.2     0.4     0.86    1.77    2.74    3.79    4.91    6.09    7.34
SV  7.86
SE     0    1.0     2.2     2.7     3.2     3.7     4.2     4.7     5.2     5.7
SE   5.9
SQ     0    60      186     234     276     314     344     376     400     426
SQ   440
KK  A150        SUBBASIN A150 RUNOFF
BA0.0109
LS     0    78      22
UD  0.10
KKCPA155        COMBINE FLOWS AT CPA155
HC     2
KK  A160        ROUTE CPA155 TO CPA160
RK  1500 0.0063  0.020     0    TRAP     8     2.9
KK  A160        SUBBASIN A160 RUNOFF
BA0.0156
LS     0    78      20
UD  0.10
KKCPA160        COMBINE FLOWS AT CPA160
HC     2
KK  A165        SUBBASIN A165 RUNOFF
BA0.0266
LS     0    78      20
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```
UD  0.12
KKCPA165        COMBINE FLOWS AT CPA165
HC      2
KK  A175        ROUTE CPA165 TO CPA175
RK   800  0.0063   0.022       0    TRAP      10      1.5
KK  A170        SUBBASIN A170 RUNOFF
BA0.0969
LS      0      78      20
UD  0.22
KKCPA175        COMBINE FLOWS AT CPA175
HC      2
KK  A180        ROUTE CPA175 TO CPA180
RK   500  0.0063   0.022       0    TRAP      10      1.5
KK  A180        SUBBASIN A180 RUNOFF
BA0.0516
LS      0      78      20
UD  0.11
KKCPA180        COMBINE FLOWS AT CPA180
HC      2
KK  A230        ROUTE CPA180 TO CPA230
RK  3500  0.0069   0.025       0    TRAP       8      2.8
KK  A230        SUBBASIN A230 RUNOFF
BA0.1250
LS      0      78      20
UD  0.13
KKCPA230        COMBINE FLOWS AT CPA230
HC      2
KK  A235        ROUTE CPA230 TO CPA235
RK  1400  0.0069   0.027       0    TRAP      20       4
KK  A235        SUBBASIN A235 RUNOFF
BA0.0547
LS      0      78      21
UD  0.18
KKCPA235        COMBINE FLOWS AT CPA235
HC      2
KK DA235        DETENTION BASIN AT CPA235
RS      1    STOR       0
SV      0    0.92    2.83    4.85    7.01    9.51   12.65   16.32   20.16
SE  73.50    74.0    75.0    76.0    77.0    78.0    79.0    80.0    81.0
SQ      0       0       0       0      21     110     237     393     567
KK   A90        SUBBASIN A90 RUN
BA0.1000
LS      0      78      20
UD  0.12
KK  A140        ROUTE CPA90 TO CPA140
RK  2700  0.0085   0.022       0    TRAP       8       2
KK  A140        SUBBASIN A140 RUNOFF
BA0.1766
LS      0      78      20
UD  0.22
KKCPA140        COMBINE FLOWS AT CPA140
HC      2
```

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KK  A240        ROUTE CPA140 TO CPA240
RK  2700  0.0093   0.023       0    TRAP       9     1.3
KK  A240        SUBBASIN A240 RUNOFF
BA0.1203
LS     0      78      20
UD  0.14
KKCPA240        COMBINE FLOWS AT CPA240
HC     2
KK  A245        ROUTE CPA240 TO CPA245
RK  1300  0.0081   0.027       0    TRAP      20       4
KK  A245        SUBBASIN A245 RUNOFF
BA0.0281
LS     0      78      24
UD  0.10
KKCPA245        COMBINE FLOWS AT CPA245
HC     3
KK DA245        DETENTION BASIN AT CPA245
RS     1    STOR       0
SV     0    0.57    1.83    3.28    5.36    8.28   11.88   16.32
SE 71.50    72.0    73.0    74.0    75.0    76.0    77.0    78.0
SQ     0       0       0       0      43     334     942    1251
KK  A270        ROUTE CPA245 TO CPA270
RK  1200  0.0055   0.027       0    TRAP      40       4
KK  A100        SUBBASIN A100 RUNOFF
BA0.2281
LS     0      78      71
UD  0.24
KK  A110        SUBBASIN A110 RUNOFF
BA0.4250
LS     0      78      59
UD  0.38
KKCPA115        COMBINE FLOWS AT CPA115
HC     2
KK  A130        ROUTE CPA115 TO CPA130
RK  2600  0.0087   0.022       0    TRAP      10     3.4
KK  A120        SUBBASIN A120 RUNOFF
BA0.0531
LS     0      78      20
UD  0.23
KK  A130        SUBBASIN A130 RUNOFF
BA0.0438
LS     0      78      20
UD  0.10
KKCPA130        COMBINE FLOWS AT CPA130
HC     3
KK  A250        ROUTE CPA130 TO CPA250
RK  2700  0.0083   0.022       0    TRAP      10     3.4
KK  A250        SUBBASIN A250 RUNOFF
BA0.0219
LS     0      78      20
UD  0.14
KKCPA250        COMBINE FLOWS AT CPA250
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HC      2
KK  A260        SUBBASIN A260 RUNOFF
BA0.1906
LS      0      78       28
UD  0.20
KKCPA263        COMBINE FLOWS AT CPA263
HC      2
KK  A265        SUBBASIN A265 RUNOFF
BA0.0109
LS      0      78        7
UD  0.10
KKCPA265        COMBINE FLOWS AT CPA265
HC      2
KK DA265        DETENTION BASIN AT CPA265
RS      1    STOR        0
SV      0    0.55     1.48     2.50     3.63     4.91     6.40     8.12    10.11    12.41
SV  13.64   14.87    16.10
SE  73.35    74.0     75.0     76.0     77.0     78.0     79.0     80.0     81.0     82.0
SE   82.5    83.0     83.5
SQ      0       0        0        0       31      122      243      387      550      633
SQ    749     992     1313
KK  A270        ROUTE CPA265 TO CPA270
RK   1400  0.0055    0.027        0     TRAP       20        4
KK  A270        SUBBASIN A270 RUNOFF
BA0.0969
LS      0      78       28
UD  0.15
KKCPA270        COMBINE FLOWS AT CPA270
HC      4
KK DA270        DETENITON BASIN AT CPA270
RS      1    STOR        0
SV      0    1.58     4.19     7.15    10.96    16.02    22.59    30.08    37.57    45.06
SE  67.34    68.0     69.0     70.0     71.0     72.0     73.0     74.0     75.0     76.0
SQ      0       0        0        0      273     1675     2025     2481     2780     3087
KK  A271        SPLIT FLOW AT DETENTION BASIN DA270
DT  A272
DI      0     273     1675     2025     2481     2780     3087
DQ      0     201     1014     1215     1437     1610     1755
KK  A275        SUBBASIN A275 RUNOFF
BA0.0094
LS      0      78        5
UD  0.23
KKCPA275        COMBINE FLOWS AT CPA275
HC      2
KK  A280        ROUTE CPA275 TO CPA280
RK   1700  0.0060     0.04        0     TRAP       10      1.2
KK  A280        SUBBASIN A280 RUNOFF
BA0.0188
LS      0      78       18
UD  0.10
KKCPA280        COMBINE FLOWS AT CPA280
HC      2
```

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KK  A290          ROUTE CPA280 TO CPA290
RK  1300  0.0038   0.027       0    TRAP      60     6.5
KK  A290          SUBBASIN A290 RUNOFF
BA0.0453
LS     0      78       9
UD  0.28
KKCPA290          COMBINE FLOWS AT CPA290
HC     2
KK  A272          RETRIEVE SPLIT FLOW AT A272
DR  A272
KK  A300          ROUTE CPA272 TO CPA300
RK  3400  0.0060   0.027       0    TRAP      10     3.5
KK  A300          SUBBASIN A300 RUNOFF
BA0.2203
LS     0      78      19
UD  0.46
KKCPA300          COMBINE FLOWS AT CPA300
HC     2
ZZ
```

```
ID   SCOTTSDALE - HAYDEN/SHEA
ID   MASTER DRAINAGE PLAN
ID   CITY OF SCOTTSDALE, ARIZONA
ID   PROJECT NO. PH-S47-118-20
ID   INPUT FILE: A58_2019
ID*************************************************************
ID
ID   BASIN A - PROPOSED IMPROVEMENTS (with retention of A10, A30 & A40)
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 BLEEDOFF FROM DETENTION
QI     0      24      24      24      24      24      24      24      24      24
QI    24      24      24
KK   A20          ROUTE CPA10 TO CPA20
RK  3300   .0085    .038       0    TRAP      25       3
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
KK CPA20          COMBINE FLOWS AT CPA20
HC     2
KK   A30          SUBBASIN A30 BLEEDOFF FROM DETENTION
QI     0      22      22      22      22      22      22      22      22      22
QI    22      22      22
KK  DA30          DETENTION BASIN AT CPA30
RS     1    STOR       0
SV     0    0.20    0.55    1.17    1.87    2.64    3.49    4.42    5.42    6.49
SE   9.0    10.0    10.5    11.0    11.5    12.0    12.5    13.0    13.5    14.0
SQ     0      41      75     112     152     188     217     244     269     287
KK   A31          SPLIT FLOW AT DETENTION BASIN DA30
DT   A32
DI     0      41      75     112     152     188     217     244     269     287
DI   310     326
DQ     0      39      69     102     138     170     197     220     243     259
DQ   279     293
KK CPA33          COMBINE FLOWS AT CPA33
HC     2
KK   A35          ROUTE CPA33 TO CPA35
RK  1800  0.0078   0.028       0    TRAP     2.0     1.4
KK   A32          RETRIEVE SPLIT FLOW AT A32
DR   A32
KK   A32          SPLIT FLOW AT DETENTION BASIN DA30
DT   A36
DI     0      39      69     102     138     170     197     220     243     259
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DI   279     293
DQ     0      39      65      92     117     138     157     172     190     200
DQ   215     225
KK   A35         ROUTE CPA32 TO CPA35
RK  1700  0.0081   0.025       0    TRAP     7.0     2.3
KK   A35         SUBBASIN A35 RUNOFF
BA0.0641
LS     0      78       5
UD  0.19
KK CPA35         COMBINE FLOWS AT CPA35
HC     3
KK  A190         ROUTE CPA35 TO CPA190
RK  1000  0.0080    0.04       0    TRAP     3.0     1.7
KK  A190         SUBBASIN A190 RUNOFF
BA0.0453
LS     0      78      12
UD  0.20
KKCPA190         COMBINE FLOWS AT CPA190
HC     2
KK  A200         ROUTE CPA190 TO CPA200
RK  3100  0.0065   0.028       0    TRAP     8.0     1.7
KK  A200         SUBBASIN A200 RUNOFF
BA0.1469
LS     0      78      22
UD  0.24
KKCPA200         COMBINE FLOWS AT CPA200
HC     2
KK  A210         SUBBASIN A210 RUNOFF
BA0.1359
LS     0      78      26
UD  0.33
KKCPA210         COMBINE FLOWS AT CPA210
HC     2
KK  A220         ROUTE CPA210 TO CPA220
RK  1100  0.0057   0.027       0    TRAP      30       4
KK  A220         SUBBASIN A220 RUNOFF
BA0.0266
LS     0      78      15
UD  0.10
KKCPA220         COMBINE FLOWS AT CPA220
HC     2
KK  A225         ROUTE CPA220 TO CPA225
RK  1100  0.0068   0.027       0    TRAP      30       4
KK  A225         SUBBASIN A225 RUNOFF
BA0.0297
LS     0      78      23
UD  0.10
KKCPA225         COMBINE FLOWS AT CPA225
HC     2
KK DA225         DETENTION BASIN AT CPA225
RS     1    STOR       0
SV     0    1.65    4.37    7.42   10.93   14.69   18.45   22.21
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SE 73.35    74.0    75.0    76.0    77.0    78.0    79.0    80.0
SQ     0       0       0       0      58     318     741    1155
KK  A270        ROUTE CPA225 TO CPA270
RK   900  0.0042   0.027       0    TRAP      30     0.1
KK   A36        RETRIEVE SPLIT FLOW AT A36
DR   A36
KK   A37        SUBBASIN A37 RUNOFF
BA0.0047
LS     0      78       0
UD  0.10
KK CPA37        COMBINE FLOWS AT CPA37
HC     2
KK  DA37        DETENTION BASIN AT CPA37
RS     1    STOR       0
SV     0     0.2     0.3    0.71    1.49    2.32    3.22    4.18    5.20    6.29
SV  6.74
SE     0     1.0     1.5     2.0     2.5     3.0     3.5     4.0     4.5     5.0
SE   5.2
SQ     0      18      34      51      70      91     110     123     143     157
SQ   164
KK   A40        SUBBASIN A40 BLEEDOFF FROM DETENTION
QI     0       6       6       6       6       6       6       6       6       6
QI     6       6       6
KK  DA40        DETENTION BASIN AT CPA40
RS     1    STOR       0
SV     0    0.25    0.53    0.86    1.22    1.63    1.97
SE     0     0.5     1.0     1.5     2.0     2.6     3.0
SQ     0      20      35      54      73      97     111
KK   A50        SUBBASIN A50 RUNOFF
BA0.2531
LS     0      78      21
UD  0.24
KK   A60        ROUTE CPA50 TO CPA60
RK  1600  0.0106   0.027       0    TRAP       3     1.2
KK   A60        SUBBASIN A60 RUNOFF
BA0.0531
LS     0      78      37
UD  0.16
KK CPA60        COMBINE FLOWS AT CPA60
HC     2
KK  DA60        DETENTION BASIN AT CPA60
RS     1    STOR       0
SV     0    0.23    0.37    0.60    0.66    0.95    1.91    3.03    4.29    5.71
SE  36.7    37.5    38.0   38.85    39.0    40.0    41.0    42.0    43.0    44.0
SQ     0      44      88     180     196     284     350     404     456     500
KK   A70        SUBBASIN A70 RUNOFF
BA0.0047
LS     0      78      15
UD  0.10
KK CPA70        COMBINE FLOWS AT CPA70
HC     3
KK  DA70        DETENTION BASIN AT CPA70
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RS      1    STOR       0
SV      0    0.04    0.08    0.12    0.13    0.15    0.33    0.54    0.78    1.05
SE      0     1.0     2.0     3.0     3.3     3.8     4.3     4.8     5.3     5.6
SQ      0      74     202     360     408     480     552     605     672     696
KK    A75          SUBBASIN A75 RUNOFF
BA0.0047
LS      0      78      15
UD   0.10
KK  CPA75          COMBINE FLOWS AT CPA75
HC      2
KK   DA75          DETENTION BASIN AT CPA75
RS      1    STOR       0
SV      0     0.4     0.8    1.16    2.36    3.60    4.87    6.17    7.52    8.89
SV  10.31   11.76   11.87
SE      0     1.0     1.3     1.8     2.3     2.8     3.3     3.8     4.3     4.8
SE    5.3     5.8     6.3     .
SQ      0      36      93     141     189     237     286     334     382     430
SQ    478     526     575
KK    A80          SUBBASIN A80 RUNOFF
BA0.0063
LS      0      78      10
UD   0.10
KK  CPA80          COMBINE FLOWS AT CPA80
HC      3
KK   DA80          DETENTION BASIN AT CPA80
RS      1    STOR       0
SV      0     0.2     0.4    0.86    1.77    2.74    3.79    4.91    6.09    7.34
SV   7.86
SE      0     1.0     2.2     2.7     3.2     3.7     4.2     4.7     5.2     5.7
SE    5.9
SQ      0      60     186     234     276     314     344     376     400     426
SQ    440
KK   A150          SUBBASIN A150 RUNOFF
BA0.0109
LS      0      78      22
UD   0.10
KKCPA155           COMBINE FLOWS AT CPA155
HC      2
KK   A160          ROUTE CPA155 TO CPA160
RK   1500  0.0063   0.020       0    TRAP       8     2.9
KK   A160          SUBBASIN A160 RUNOFF
BA0.0156
LS      0      78      20
UD   0.10
KKCPA160           COMBINE FLOWS AT CPA160
HC      2
KK   A165          SUBBASIN A165 RUNOFF
BA0.0266
LS      0      78      20
UD   0.12
KKCPA165           COMBINE FLOWS AT CPA165
HC      2
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KK  A175          ROUTE CPA165 TO CPA175
RK   800  0.0063   0.022       0    TRAP      10      1.5
KK  A170          SUBBASIN A170 RUNOFF
BA0.0969
LS     0      78      20
UD  0.22
KKCPA175          COMBINE FLOWS AT CPA175
HC     2
KK  A180          ROUTE CPA175 TO CPA180
RK   500  0.0063   0.022       0    TRAP      10      1.5
KK  A180          SUBBASIN A180 RUNOFF
BA0.0516
LS     0      78      20
UD  0.11
KKCPA180          COMBINE FLOWS AT CPA180
HC     2
KK  A230          ROUTE CPA180 TO CPA230
RK  3500  0.0069   0.025       0    TRAP       8      2.8
KK  A230          SUBBASIN A230 RUNOFF
BA0.1250
LS     0      78      20
UD  0.13
KKCPA230          COMBINE FLOWS AT CPA230
HC     2
KK  A235          ROUTE CPA230 TO CPA235
RK  1400  0.0069   0.027       0    TRAP      20       4
KK  A235          SUBBASIN A235 RUNOFF
BA0.0547
LS     0      78      21
UD  0.18
KKCPA235          COMBINE FLOWS AT CPA235
HC     2
KK DA235          DETENTION BASIN AT CPA235
RS     1    STOR       0
SV     0    0.92    2.83    4.85    7.01    9.51   12.65   16.32   20.16
SE 73.50    74.0    75.0    76.0    77.0    78.0    79.0    80.0    81.0
SQ     0       0       0       0      21     110     237     393     567
KK   A90          SUBBASIN A90 RUN
BA0.1000
LS     0      78      20
UD  0.12
KK  A140          ROUTE CPA90 TO CPA140
RK  2700  0.0085   0.022       0    TRAP       8       2
KK  A140          SUBBASIN A140 RUNOFF
BA0.1766
LS     0      78      20
UD  0.22
KKCPA140          COMBINE FLOWS AT CPA140
HC     2
KK  A240          ROUTE CPA140 TO CPA240
RK  2700  0.0093   0.023       0    TRAP       9      1.3
KK  A240          SUBBASIN A240 RUNOFF
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BA0.1203
LS      0       78       20
UD  0.14
KKCPA240          COMBINE FLOWS AT CPA240
HC      2
KK  A245          ROUTE CPA240 TO CPA245
RK  1300  0.0081   0.027        0    TRAP      20        4
KK  A245          SUBBASIN A245 RUNOFF
BA0.0281
LS      0       78       24
UD  0.10
KKCPA245          COMBINE FLOWS AT CPA245
HC      3
KK DA245          DETENTION BASIN AT CPA245
RS      1    STOR        0
SV      0    0.57     1.83     3.28     5.36     8.28    11.88    16.32
SE 71.50     72.0     73.0     74.0     75.0     76.0     77.0     78.0
SQ      0       0        0        0       43      334      942     1251
KK  A270          ROUTE CPA245 TO CPA270
RK  1200  0.0055   0.027        0    TRAP      40        4
KK  A100          SUBBASIN A100 RUNOFF
BA0.2281
LS      0       78       71
UD  0.24
KK  A110          SUBBASIN A110 RUNOFF
BA0.4250
LS      0       78       59
UD  0.38
KKCPA115          COMBINE FLOWS AT CPA115
HC      2
KK  A130          ROUTE CPA115 TO CPA130
RK  2600  0.0087   0.022        0    TRAP      10      3.4
KK  A120          SUBBASIN A120 RUNOFF
BA0.0531
LS      0       78       20
UD  0.23
KK  A130          SUBBASIN A130 RUNOFF
BA0.0438
LS      0       78       20
UD  0.10
KKCPA130          COMBINE FLOWS AT CPA130
HC      3
KK  A250          ROUTE CPA130 TO CPA250
RK  2700  0.0083   0.022        0    TRAP      10      3.4
KK  A250          SUBBASIN A250 RUNOFF
BA0.0219
LS      0       78       20
UD  0.14
KKCPA250          COMBINE FLOWS AT CPA250
HC      2
KK  A260          SUBBASIN A260 RUNOFF
BA0.1906
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LS      0       78       28
UD   0.20
KKCPA263         COMBINE FLOWS AT CPA263
HC      2
KK   A265        SUBBASIN A265 RUNOFF
BA0.0109
LS      0       78        7
UD   0.10
KKCPA265         COMBINE FLOWS AT CPA265
HC      2
KK DA265         DETENTION BASIN AT CPA265
RS      1     STOR        0
SV      0     0.55     1.48     2.50     3.63     4.91     6.40     8.12    10.11    12.41
SV  13.64    14.87    16.10
SE  73.35     74.0     75.0     76.0     77.0     78.0     79.0     80.0     81.0     82.0
SE   82.5     83.0     83.5
SQ      0        0        0        0       31      122      243      387      550      633
SQ    749      992     1313
KK   A270        ROUTE CPA265 TO CPA270
RK   1400   0.0055    0.027        0     TRAP       20        4
KK   A270        SUBBASIN A270 RUNOFF
BA0.0969
LS      0       78       28
UD   0.15
KKCPA270         COMBINE FLOWS AT CPA270
HC      4
KK DA270         DETENITON BASIN AT CPA270
RS      1     STOR        0
SV      0     1.58     4.19     7.15    10.96    16.02    22.59    30.08    37.57    45.06
SE  67.34     68.0     69.0     70.0     71.0     72.0     73.0     74.0     75.0     76.0
SQ      0        0        0        0      273     1675     2025     2481     2780     3087
KK   A271        SPLIT FLOW AT DETENTION BASIN DA270
DT   A272
DI      0      273     1675     2025     2481     2780     3087
DQ      0      201     1014     1215     1437     1610     1755
KK   A275        SUBBASIN A275 RUNOFF
BA0.0094
LS      0       78        5
UD   0.23
KKCPA275         COMBINE FLOWS AT CPA275
HC      2
KK   A280        ROUTE CPA275 TO CPA280
RK   1700   0.0060     0.04        0     TRAP       10      1.2
KK   A280        SUBBASIN A280 RUNOFF
BA0.0188
LS      0       78       18
UD   0.10
KKCPA280         COMBINE FLOWS AT CPA280
HC      2
KK   A290        ROUTE CPA280 TO CPA290
RK   1300   0.0038    0.027        0     TRAP       60      6.5
KK   A290        SUBBASIN A290 RUNOFF
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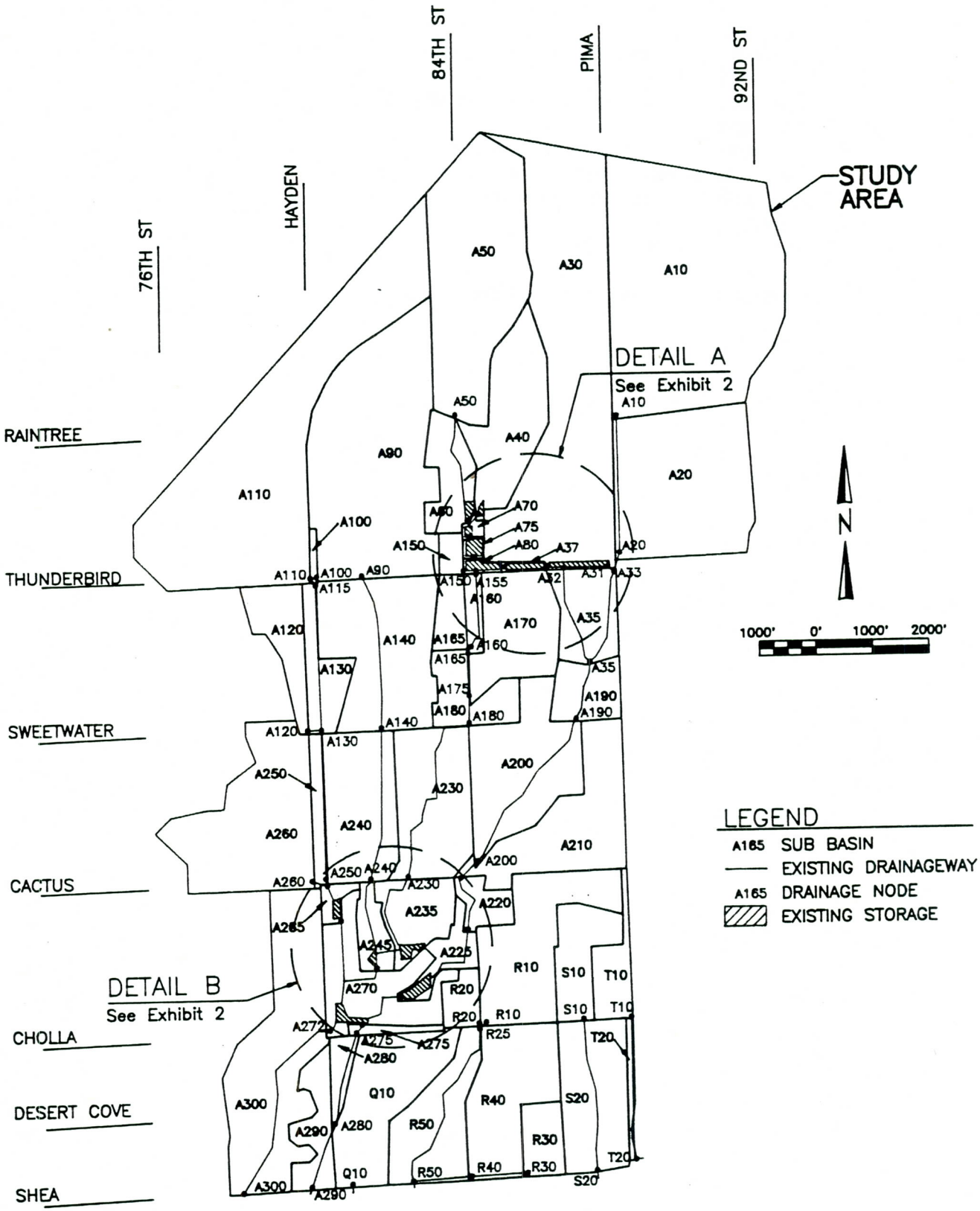
```
BA0.0453
LS     0      78       9
UD  0.28
KKCPA290        COMBINE FLOWS AT CPA290
HC     2
KK  A272        RETRIEVE SPLIT FLOW AT A272
DR  A272
KK  A300        ROUTE CPA272 TO CPA300
RK  3400  0.0060   0.027       0    TRAP      10      3.5
KK  A300        SUBBASIN A300 RUNOFF
BA0.2203
LS     0      78      19
UD  0.46
KKCPA300        COMBINE FLOWS AT CPA300
HC     2
ZZ
```

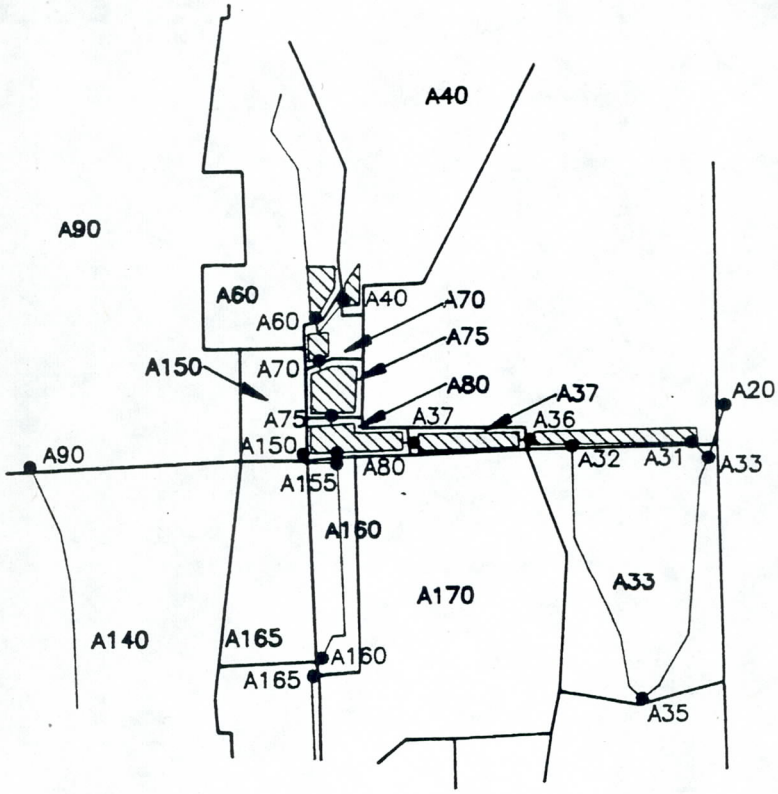
EXHIBIT 1



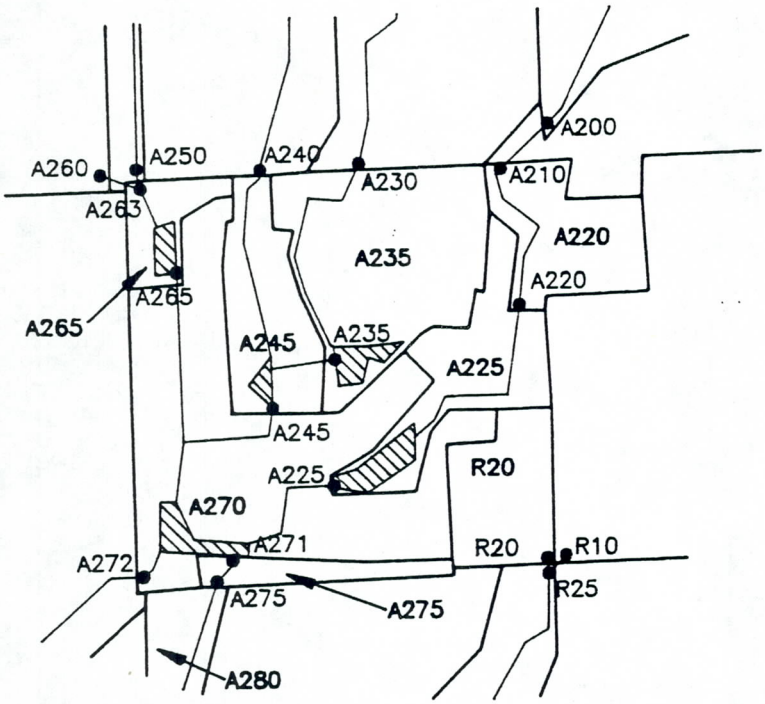
EXISTING HYDROLOGIC MAP

Boyle Engineering Corporation

EXHIBIT 2



DETAIL A



DETAIL B

0' 500' 1000' 2000'

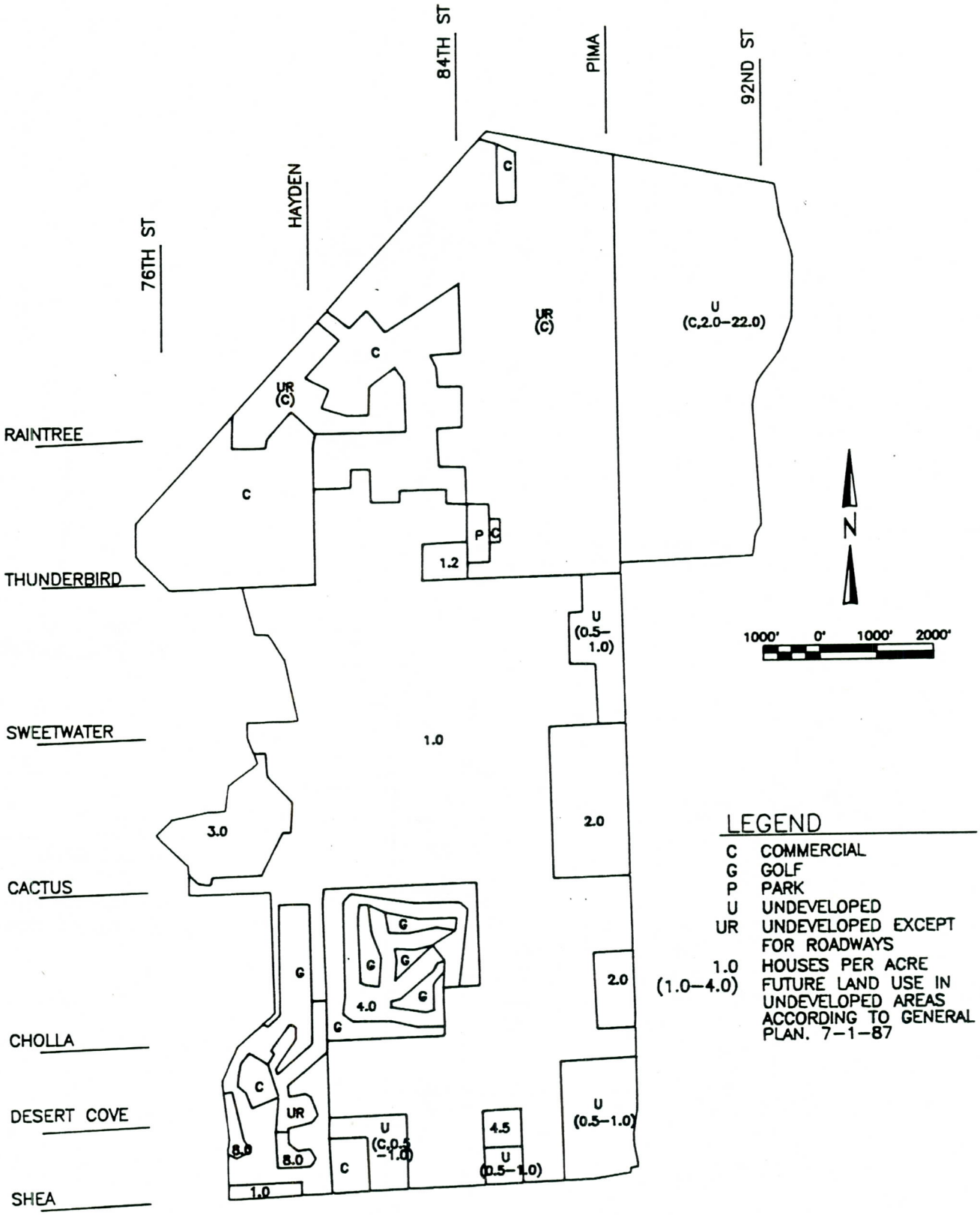
LEGEND

- A165 SUB BASIN
- EXISTING DRAINAGEWAY
- A165 DRAINAGE NODE
- EXISTING STORAGE

DETAILS

Boyle Engineering Corporation

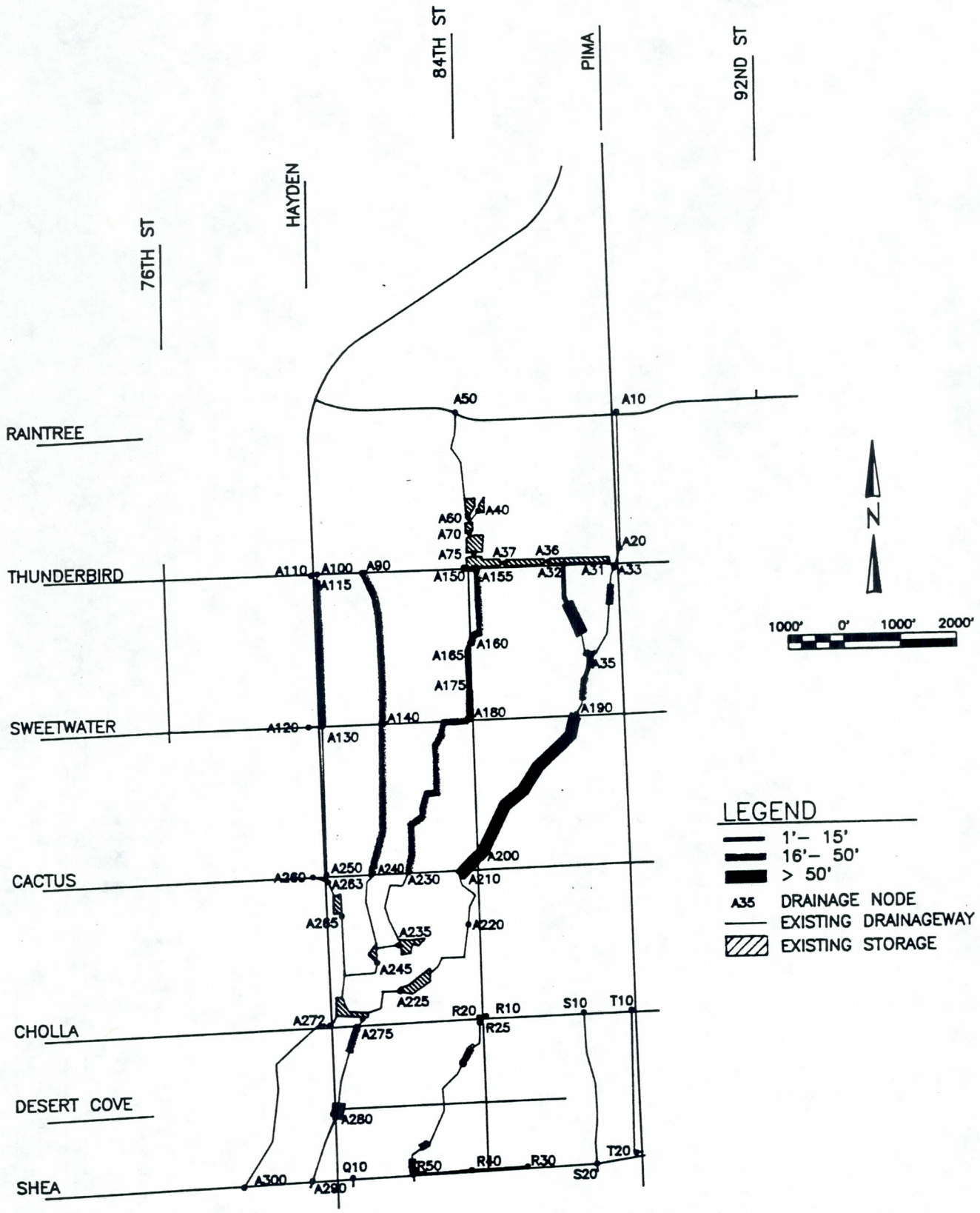
EXHIBIT 3



LAND USE

Boyle Engineering Corporation

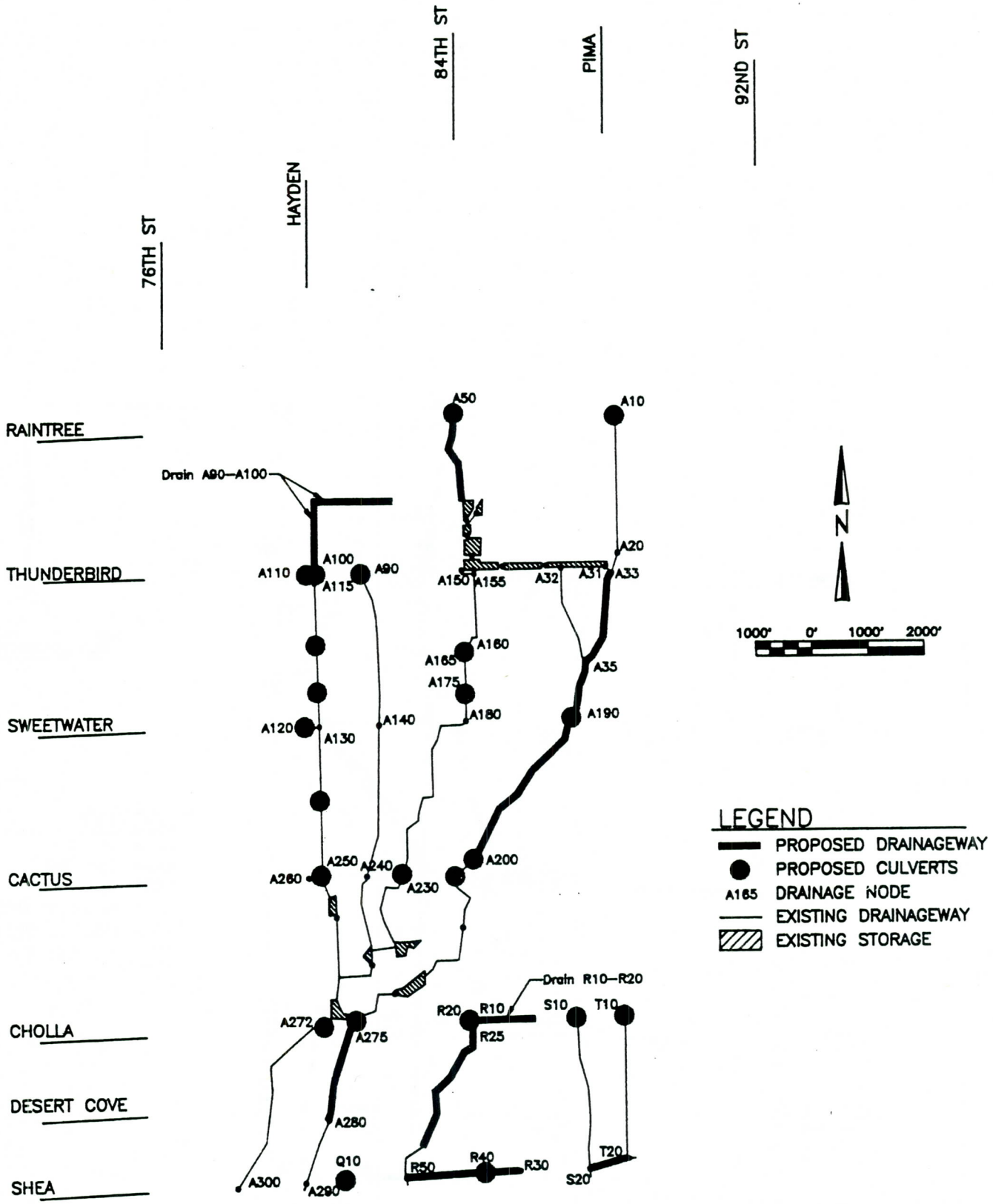
EXHIBIT 4



EXISTING RIGHT OF WAY MAP

Boyle Engineering Corporation

EXHIBIT 5



PROPOSED IMPROVEMENTS

Boyle Engineering Corporation