

MEMORANDUM

Floodplain Management Regional Flood Control District



DATE: January 21, 2009

TO:

Suzanne Shields, P.E.

Director and Chief Engineer

FROM: Eric Shepp, P.E. Manager

Floodplain Management Divisio

SUBJECT: Special Study #1: Drainage Report for Arivaca Area Plan

SUMMARY:

Special Study #1: Drainage Report for Arivaca Area Plan (hereafter Report) dated March 1972 covers an area in southeastern Pima County that drains the Arivaca Creek watershed. The purpose of the Report is to estimate peak discharge for the 50 year storm frequency event, utilizing the rational method (Q=CiA). This method pre-dates the method outlined in the Hydrology Manual for Engineering Design and Floodplain Management within Pima County, September 1979, and is considered less accurate.

Watershed delineations were completed using USGS 15 minute quadrangles and Topography Sheets obtained from Cooper Aerial Service dated 12-15-1971. The Topography Sheets are not made part of the Report so it is not possible to determine the quality of those documents.

A search for the source of the rainfall data was unsuccessful, though the data pre-dates the NOAA2 Atlas data, which was published in 1973. The rainfall data apparently comes from a study published in 1956.

The information from this study has not been included in any of our internal GIS data.

RECOMMENDATIONS:

It is recommended that the Drainage Report for Arivaca Area Plan be archived and **discontinued for use** for regulatory purposes for the following reasons.

- 1) The rainfall data cannot be verified and compared to the NOAA14 Atlas that is the current regulatory standard.
- 2) The method for determining peak discharge is out of date.
- 3) The Report does not provide 100 year return frequency peak discharges. Extrapolating 100-year return frequency peak discharges from the existing data, given the limitations of the rainfall and methodology, would lead to highly suspect results.

Further, it is recommended that these watersheds be re-evaluated using the NOAA14 Atlas for the 100-year return frequency. FPM staff is available to provide updated hydrology using PC-Hydro for those watersheds less than 1 sq. mile. The larger watersheds should be completed using HEC-1/HEC HMS

APPROVED:

Suzanne Shields

Date

DRAINAGE REPORT

for

ARIVACA AREA PLAN

prepared for

NATIONWIDE LAND & DEVELOPMENT CO.

Prepared by

BLANTON & CO. ARCHITECTS-ENGINEERS Tucson, Arizona

Project No. 72-009

March 1972

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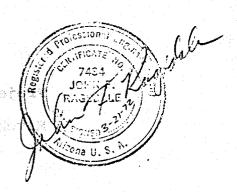
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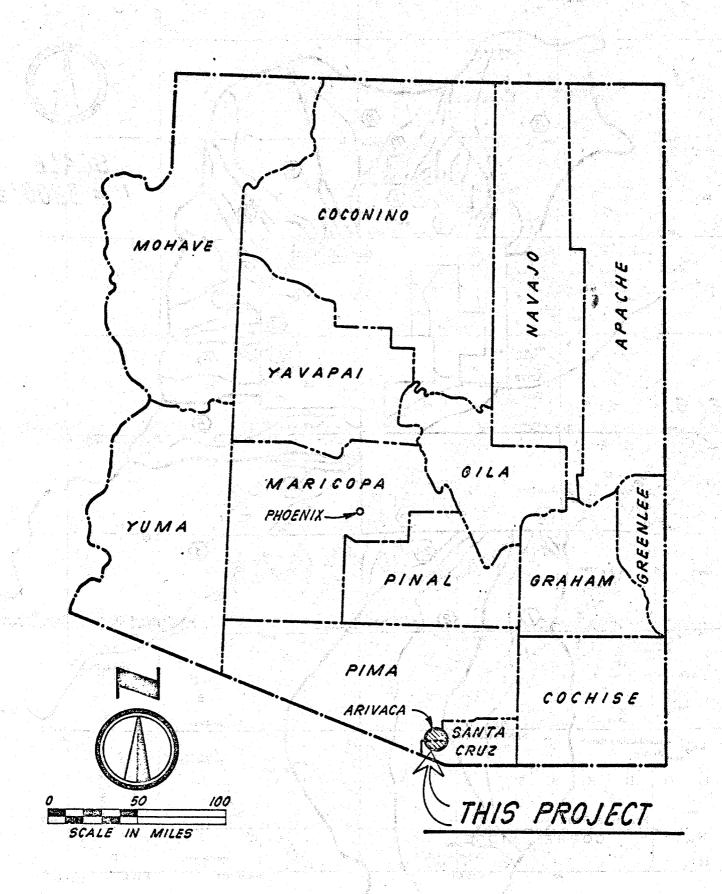
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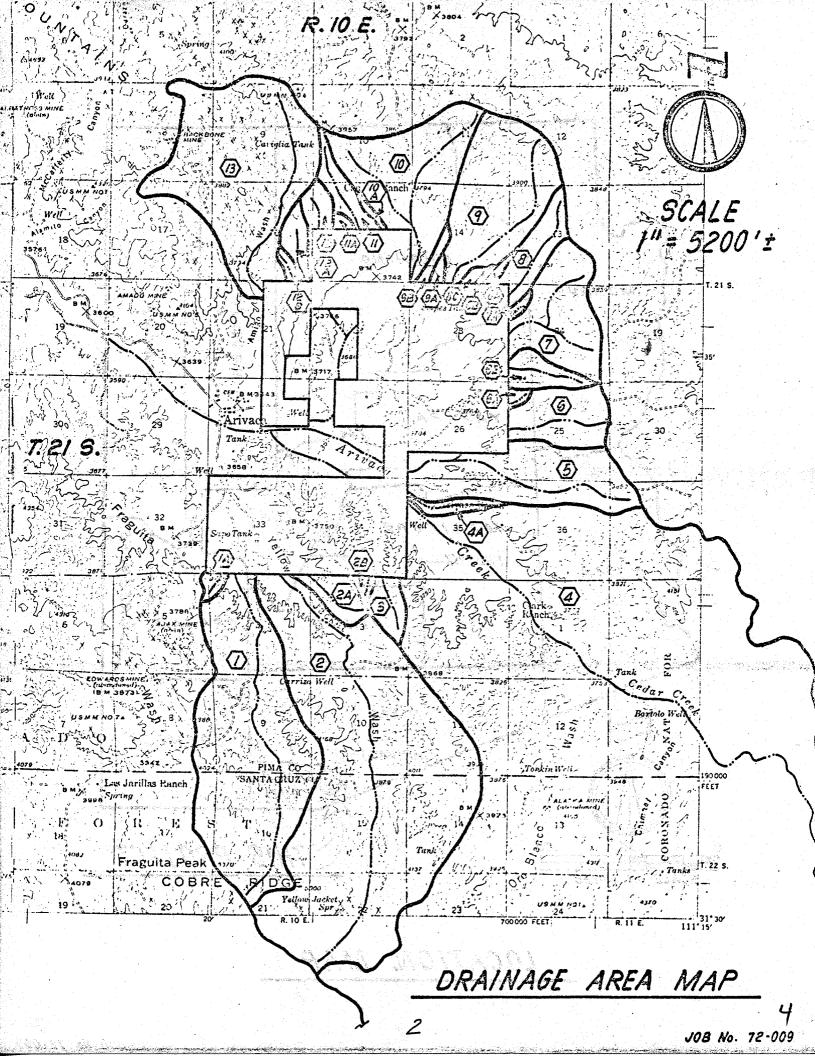
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LOCATION MAP

JOB No. 72-009



I. GENERAL DISCUSSION

The Area included in this study is located within Section 23, 33, and 34 and portions of Sections 15, 21, 22, 26, 27 and 28, T-21-S, R-10-E, Gila & Salt River, Base & Meridian, Pima County, Arizona.

The drainages in this area cross the above referenced land in various directions toward Arivaca Creek. Arivaca Creek generally runs Northwest and just south of the Los Guijas Mountains. There are many small tributaries contributing to Arivaca Creek.

The moisture-laden air masses which cause precipitation are of various types and come from several sources.

Winter storms are usually caused by moisture-laden polar-Pacific air entering from the west or the northwest during the period of October through May. Accumulation of snow in the higher altitudes is usually from this source. There is no significant snow melt runoff for this area.

Tropical air from the Gulf of Mexico, enters from the south and southeast during the summer months of July through September. This air mass is the source of the high intensity convective storms for this area.

Tropical Pacific air masses from the south and southwest during the summer months of July through September are rare but have caused some flooding.

The Arivaca drainage basin is located in the low mountainous area between the Altar and Santa Cruz Valleys in southern Arizona. This area is composed of primarily volcanic materials and clays.

In general, for this watershed, it may be stated that high intensity storms over small areas are the principal cause of flood water. Peak flows in this desert area most generally occur in the summer months from July through September.

II. PURPOSE

The purpose of this report is to estimate by generally accepted methods, the quantity of storm runoff that could be reasonably expected in this area of study. The rational method was used in the computations of this runoff.

III. CRITERIA FOR STUDY

- A. 50 year storm frequency for quantities of water exceeding 1000 cubic feet per second.
- B. 25 year storm frequency for quantities of water less than 1000 cubic feet per second.
- C. Rational formula for runoff water; Q = AiC
- 1. Q = quantity of runoff water in cubic feet
 per second.
- i lides de la companya de la companya de serva de la serva de la companya del companya de la companya de la companya de la companya del companya de la companya del companya de la companya de la companya de la companya del companya de la companya del companya de
- 3. i = intensity of rainfall in inches per hour.
 - 4. C = runoff coefficient
 - Brognigo i din Brow groe Gull galeste Godden (1901) i galeste din Brogni de la Brognia e de Santa de Santa de S Autorio de se de de Liga de Carros de Santa de S Brognis de Santa de S
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 IV. CALCULATIONS

LOCATION DATA			
Project Arivacia drainas	e Styck	Project No.	72-009
Location $\mathcal{D}\mathcal{A}^{\mu}$	V	Co. No. Co-	
County Pina		Station	
Name of Stream			
		·	
DESIGN DATA			
Design Frequency	_	50	_ years
Drainage Area	A ₁ _	1719	acres
	A ₂ _		acres
	Аз _		acres
Drainage Length	_	18533	feet
Elevation			
Top of Drainage Area		4850	feet
At Structure	-	3750	_ feet
Drainage Area.Slope	_		_ % _
Precipitation			
P = 6 hour	_		_ inches
P = 24 hour	• • • • • •	·	inches
DESIGN COMPUTATIONS			
Precipitation $P_1 = 1$ hour			inches
Time of Concentration	Tc	43	_ minutes
Rainfall Intensity	i	3.3	inches/hour
Runoff Coefficient	c_1	0.5	_
	c ₂		-
	C3		_
Weighted Runoff Coefficient	c	0.5	
Peak Discharge Qp = CiA = /7/9	x 0, 5 x 3 3	= 2336	cfs
Computed by		date <u>3-7</u>	2
Checked by SJT		-	72

LOCATION DATA			
Project Arivaca droing	30. 3411	المنطق Project No	72-003
	Location DA W 1-1		0-
County Pima		Station	
Name of Stream			
DESIGN DATA			
Design Frequency		25	years
Drainage Area	A	2 <u>8</u>	years acres
	A ₂		acres
	A3		
Drainage Length	•••3	1100	acres feet
Elevation			reet
Top of Drainage Area		3,500	feet
At Structure		3750	feet
Drainage Area Slope			{e_C
Precipitation			
P = 6 hour			inches
P=24-hour			inches
	•		
DESIGN COMPUTATIONS			
Precipitation $P_1 = 1$ hour			inches
Time of Concentration	Tc .	10	_ minutes
Rainfall Intensity	i	6.9	inches/hour
Runoff Coefficient	c_1	0.5	_ xnones/nodi
	C ₂		
•	C ₃		NAME OF THE OWNER O
Weighted Runoff Coefficient	C C	0.5	.
Peak Discharge Qp = CiA = 28	_		_ cfs
Computed by		date 3-	.72
Checked by			-77

LOCATION DATA			
Project Anivaga dogi	1000,04	er/Project No.	72-009
Location $OA \neq 2$	*	Co. No. Co	
County Pinia		Station	
Name of Stream			
DESIGN DATA			
Design Frequency		50	years
Drainage Area	A ₁	3393	acres
	A ₂		acres
	A3		acres
Drainage Length	•	34 400	feet
Elevation	-	the state of the s	
Top of Drainage Area		400	feet
At Structure	-	7 1 12	_ feet
Drainage Area Slope	•		<u> </u>
Precipitation	-		
P-= 6-hour	•		inches
P==24-hour	-		_ inches
DESIGN COMPUTATIONS			
Precipitation P ₁ = 1 hour			inches
Time of Concentration	Tc	6)	minutes
Rainfall Intensity	i	2.78	inches/hour
Runoff Coefficient	c_1	C. Car	
	C ₂		-
	C ₃		-
Weighted Runoff Coefficient	C C	A STATE OF THE STA	-
Peak Discharge Qp = CiA = 3393	-		- cfs
_	~		•
Computed by		date 😤	. 77.73
hacked by		3-1-	

Project Arivana, dra lagge	-1	Project No.	77-000
Location OS # 25A		Project No. <u>기기-기기의</u> Co. No. Co-	
County And			
Name of Stream		Station	
			-
DESIGN DATA			
Design Frequency		20	years
Drainage Area	A ₁ .	99	acres
·	A ₂		acres
	А3		acres
Drainage Length	_	4500	feet
Elevation			
Top of Drainage Area	_	3000	feet
At Structure		3720	feet
Drainage Area Slope			8
Precipitation	·		
-P-=6-hour		·	inches
P==-24 -hour	•	,	inches
DESIGN COMPUTATIONS			
Precipitation P ₁ = 1 hour			inches
Time of Concentration	Tc	23	minutes
Rainfall Intensity	i	4.2	inches/hour
Runoff Coefficient	c_1	0,5	
	C ₂		
•	C ₃		
Weighted Runoff Coefficient	C	చ.క:	
Peak Discharge Qp = CiA = 99x	4.2×0.5		cfs
Computed by JR	,	date3	-72
Checked by SJ7		date 3	3-72

HYDROLOGIC DESIGN DATA SHEET RATIONAL METHOD

RATION	AL METHOD		
LOCATION DATA			
Project Aprinca drainage	< funition	Project No	· <u>72-009</u>
Location DAM 28		Co. No. C	
County Cin A		Station	
Name of Stream			
DESIGN DATA			
Design Frequency		25	years
Drainage Area	A ₁	27	years
	A ₂		acres
	A3	:	acres
Drainage Length	•	1700	feet
Elevation	•		
Top of Drainage Area		380 0	feet
At Structure	-	3750	feet
Drainage Area Slope	_		
Precipitation	_		•
P 6-hour	_		inches
P==24_hour	_		inches
DESIGN COMPUTATIONS			
Precipitation $P_1 = 1$ hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	6.9	inches/hour
Runoff Coefficient	c_1	೧,5	
	c ₂		·
	C3 _		·
Weighted Runoff Coefficient	c _	∂.5	
Peak Discharge $Qp = CiA = 27x$	6.9×0.5	95	cfs
			· ·

date ____3-72

date <u>3-72</u>

Computed by ____

Checked by SJT

HYDROLOGIC DESIGN DATA SHEET RATIONAL METHOD

LOCATION DATA			
Project Anivaca duain	agn st	Project No.	78-000
Location A.G. 4 E	V ./	Co. No. Co	
County Pine		Station	
Name of Stream			
DESIGN DATA			
Design Frequency		25	_ years
Drainage Area	$\mathtt{A_1}$	137	acres
	A ₂		_ acres
	A3		acres
Drainage Length		<u> 3645 </u>	_ feet
Elevation			
Top of Drainage Area		3300	feet
At Structure		3740	feet
Drainage Area Slope			- 8
Precipitation			
P = 6 hour			inches
P==24-hour			inches
DESIGN COMPUTATIONS			
Precipitation $P_1 = 1$ hour			inches
Time of Concentration	Tc	21	minutes
Rainfall Intensity	i	4.7	inches/hour
Runoff Coefficient	c_1	0.5	
	c ₂		
	C ₃		
Weighted Runoff Coefficient	c	0.5	-
Peak Discharge Qp = CiA = /37	x 4.7x0.5	5 = 322	cfs

date <u>3-72</u>
date <u>3-72</u>

Checked by

SJT

LOCATION DATA			•
Project Arivaca drainance	e studa	Project No.	72-009
Location O2 # 4		Co. No. Co)-
County Pin 2		_ Station	
Name of Stream Arivaca	Creek		
DESIGN DATA			
Design Frequency	_	50	years
Drainage Area	A ₁ _	21,214	acres
	A2 _	· · · · · · · · · · · · · · · · · · ·	acres
	A3		acres
Drainage Length	-	58,329	feet
Elevation			
Top of Drainage Area	_	4750	feet
At Structure	-	3700	feet
Drainage Area Slope			%
Precipitation			
P = 6 hour	-		inches
P = 24 hour	-		inches
DESIGN COMPUTATIONS			
Precipitation $P_1 = 1$ hour	_		inches
Time of Concentration	Tc	168	minutes
Rainfall Intensity	i	1.2	inches/hour
Runoff Coefficient	c_1	0.5	
	C ₂		
	C3 _		
Weighted Runoff Coefficient	c _	0.5	-
Peak Discharge Qp = CiA = 21,2/	4×1.2×0.5	= 12,728	_ cfs
Computed by .//		date 3	-72
Checked by 57		date	3-72

LOCATION	DATA
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LOCATION DATA				
	unca drainage	c. studie	Project No.	12-009
Location DA			_ Co. No. Co	
County	Pina		Station	
Name of Stream	m			
DESIGN DATA				
Design Freque	ncy		25	_ years
Drainage Area		A ₁ .	63	acres
		A ₂		acres
• 10 mm (10 mm)	en e	А3		acres
Drainage Leng	th	,	4500	feet
Elevation				
Top of Drag	inage Area	_	3750	feet
At Structu	re	_	3700	- feet
Drainage Area	Slope	_		<u> </u>
Precipitation	•	_		
P = 6 hou	r		•	inches
T = 24 hour	r	-	•	_ inches
DESIGN COMPUTATION	ONS			
Precipitation	$P_1 = 1 \text{ hour}$			inches
Time of Concer	ntration	Tc	28	minutes
Rainfall Inter	nsity	i	3.7	inches/hour
Runoff Coeffic	cient	c_1	0,5	-
		C ₂		_
		C ₃		
Weighted Runor	ff Coefficient	c	0.5	- .
Peak Discharge	$= Qp = CiA = G3 \times$	3.7×0.5=		cfs
Computed by	JR		date <u>3</u> -	70
Checked by			date 3	
	Co. C. 1		_	- / -

HYDROLOGIC DESIGN DATA SHEET RATIONAL METHOD

10017704	•		
LOCATION DATA			
Project Ariunca drainage	studi	/ Project No	. 12-009
Location DA # 5+6		Co. No. Co	
County Pinga		Station	
Name of Stream	·		
DESIGN DATA			:
Design Frequency		50	years
Drainage Area	$\mathtt{A_1}$	1071	acres
	A ₂		acres
en de la companya de La companya de la co	A3		acres
Drainage Length	.	12499	feet
Elevation			
Top of Drainage Area		3850	feet
At Structure	•	3685	_ feet
Drainage Area Slope	•		100 L
Precipitation	•		
P-=-6-hour-			inches
-P-=-24-hour			_ inches
	•		_ inches
DESIGN COMPUTATIONS			
Precipitation P ₁ = 1 hour			inches
Time of Concentration	Tc	60	minutes
Rainfall Intensity	i	2.85	inches/hour
Runoff Coefficient	c_1	0.5	
	c ₂		-
	c ₃		
Weighted Runoff Coefficient	c	0.5	·
Peak Discharge Qp = $CiA = \frac{107}{x}$	2.85×0.5		- cfs
	-		
Computed by		date 5	3-72

Checked by ______SJT

date ____3-72

LOCATION DATA			
Project Arivaca drainas	e studi	Project No	. 12-009
Location DA # 6 County Pima		_ Co. No. Co	0-
		Station	
Name of Stream		· 	
DESIGN DATA			
Design Frequency	_	25	years
Drainage Area	A ₁ _	342	acres
	A ₂		acres
and the second of the second o	A3	}	acres
Drainage Length		5208	feet
Elevation			
Top of Drainage Area	_	3900	feet
At Structure	_	3 <i>150</i>	feet
Drainage Area Slope	_		· · · · · · · · · · · · · · · · · · ·
Precipitation			
P = 6 hour	_		inches
P = 24 inour	-		inches
DESIGN COMPUTATIONS			
Precipitation $P_1 = 1$ hour			inches
Time of Concentration	Tc	22	minutes
Rainfall Intensity	i	4.55	inches/hour
Runoff Coefficient	c_1	0.5	
	C ₂		
	C3		
Weighted Runoff Coefficient	С	0.5	•
Peak Discharge Qp = CiA = $342x$	4.55×0,5	= 778	cfs
Computed by 1/2		date	3-72
Checked by SJT		date	3-72

HYDROLOGIC DESIGN DATA SHEET RATIONAL METHOD

LOCATION DATA				
Project Arivo	rca draina	ne eli	A. Project No.	72-000
Location O	4 # 64		Co. No. Co	
County	Pina		Station	
Name of Stream				
				:
DESIGN DATA				
Design Frequenc	У		25	years
Drainage Area		\mathtt{A}_1	12	acres
		A ₂		acres
gradient de la company de la c		Аз		acres
Drainage Length			1225	feet
Elevation				_
Top of Drain	aye Area		3850	_ feet
At Structure			38,00	feet
Drainage Area S	lope	•		
Precipitation	•			-
P-6-hour				inches
P== 24-hour				_ inches
DESIGN COMPUTATIONS	<u>5</u>			
Precipitation P	= 1 hour			inches
Time of Concenti		Tc .	10	minutes
Rainfall Intensi	ity	i	6.9	inches/hour
Runoff Coefficie	ent	c_1	0,5	
		c ₂		-
		c ₃		-
Weighted Runoff	Coefficient	c	0.5	<u>.</u>
Peak Discharge Q	$p = ciA = /2 \times c$	6.9 × 0.5	= 41	_ cfs
Computed by	JR		date 3	-72
Checked by			date 3	

-16-

HYDROLOGIC DESIGN DATA SHEET RATIONAL METHOD

Project <u>Arivaca drain</u> Location DA # 6 E	900 mile		
County		Co. No. Co Station	
Name of Stream		Deacton	
			···
DESIGN DATA			
Design Frequency	•	مسيم و م	years
Drainage Area	\mathtt{A}_1	127	acres
	A ₂		acres
	A3		acres
Drainage Length	•	11,27	 feet
Elevation	•		
Top of Drainage Area		3950	feet
At Structure		3460	feet
Drainage Area Slope			
Precipitation			
P6 hour			_ inches
P =-24 hour			inches
DESIGN COMPUTATIONS			
Precipitation $P_1 = 1$ hour			inches
Time of Concentration	Tc	7.8	minutes
Rainfall Intensity	i	57.O	inches/hour
Runoff Coefficient	c_1	.	_
	C ₂		
	С3		
Weighted Runoff Coefficient	С	A Same	
Peak Discharge Qp = CiA = /3	7850089	0.5: 315	cfs

date <u>3-72</u>

Checked by ______ SJT

LOCATION DATA			
Project Arivaca drawage	e studi	Project No.	12-009
Location DA#7	<i>-</i>	Co. No. Co-	
County Pimo		Station	
Name of Stream			
DESIGN DATA			
Design Frequency		50	years
Drainage Area	A ₁ _	517	_ acres
	A ₂		acres
	A3		acres
Drainage Length	_	5728	feet
Elevation	-		
Top of Drainage Area		3900	feet
At Structure	· -	3775	_ feet
Drainage Area Slope	_		
Precipitation	_		-
P = 6 hour			inches
P = 24 hour	-		inches
DESIGN COMPUTATIONS			
Precipitation $P_1 = 1$ hour	_		inches
Time of Concentration	Tc	27	minutes
Rainfall Intensity	i	4.4	inches/hour
Runoff Coefficient	c_1	0.5	_
	C ₂	·	
	C ₃		
Weighted Runoff Coefficient	c	0.5	
Peak Discharge Qp = CiA = 517	× 4.4×0	5: 1137	cfs
Computed by		date ♂	77
Checked by STT		date 3	- 72

Project Arivaca dr	Minage study Project No. 12-009
Location OA # 7A	Co. No. Co-
County Dinis	Station
Name of Stream	
DESIGN DATA	
Design Frequency	25 years
Drainage Area	A ₁ /3 acres
•	A ₂ acres
	A ₃ acres
Draina g e Length	/250 feet
Elevation	
Top of Drainage Area	<i>3850</i> feet
At Structure	38/0 feet
Drainage Area Slope	
Precipitation	
P = 6 hour	inches
P = 24-hour	inches
DESIGN COMPUTATIONS	
Precipitation $P_1 = 1$ hour	inches
Time of Concentration	Tc /O minutes
Rainfall Intensity	i 6.9 inches/hour
Runoff Coefficient	c_1 C_{15}
	C ₂
	C ₃
Weighted Runoff Coefficier	
Peak Discharge Qp = CiA =	
Computed by	date3-72
Checked by SJT	date 3-72

LOCATION DATA				
Project Arivesa drainage study Location DA = 8 County Pino		Project No. <u>72-009</u>		
		Co. No. Co	-	
		Station		
Name of Stream	****			
DESIGN DATA				
Design Frequency		25	years	
Drainage Area	A	230	acres	
	A ₂		_ acres	
	A3		acres	
Drainage Length		6249	_ feet	
Elevation	·	:	_	
Top of Drainage Area		3900	feet	
At Structure	,	3775	feet	
Drainage Area Slope	,		· · · · · · · · · · · · · · · · · · ·	
Precipitation				
P = 6 hour			inches	
P = 24 itour	•		inches	
DESIGN COMPUTATIONS				
Precipitation $P_1 = 1$ hour			inches	
Time of Concentration	TC	29	minutes	
Rainfall Intensity	i	3.7	inches/hour	
Runoff Coefficient	c_1	0.5		
	C ₂		_	
	C ₃			
Weighted Runoff Coefficient	С	0.5		
Peak Discharge Qp = $CiA = 230x$	3.7 × 0.5	= 456	_ cfs	
Computed by J2		date 3	-72	
Checked by		date 5	. >-	

LOCATION DATA			
Project Arivaca during	a studer	_ Project No	· <u>72-009</u>
Location OA # 8A	Ý	Co. No. C	0-
County Pinns		Station	
Name of Stream			
DESIGN DATA			
Design Frequency	***	25	years
Drainage Area	A ₁ _	22	acres
	A ₂ _		acres
	A3		acres
Drainage Length	-	75 50	feet
Elevation			
Top of Drainage Area	-	3850	feet
At Structure	••••	3800	feet
Drainage Area Slope	-		
Precipitation			
-P-=6-hour			inches
-P = 24 hour			inches
DESIGN COMPUTATIONS			
Precipitation $P_1 = 1$ hour	•		inches
Time of Concentration	Tc _	15	minutes
Rainfall Intensity	i _	5.6	inches/hour
Runoff Coefficient	c ₁ _	0.5	
	c ₂ _		
	C3 _		- Outdoors
Weighted Runoff Coefficient	c _	0.5	•
Peak Discharge Qp = $CiA = 22 \times$	5.6×0.5_	= 62	cfs
Computed by JR		date	3-72
Checked by ST		date	5-73

LOCATION DATA			
Project Amusica dissipar	a studer	Project No.	72-009
Location DA # 7. F	7	Co. No. Co.	
County		Station	
Name of Stream			
DESIGN DATA			
Design Frequency			_ years
. Drainage Area	A ₁ _	<i>/⇔</i>	acres
	A ₂		acres
	A3		acres
Drainage Length		1250	- feet
Elevation			-
Top of Drainage Area		3780	feet
At Structure		3750	- feet
Drainage Area Slope			- &
Precipitation			-
P - 6 hour	•		inches
P = 24 hour			_ inches
			·
DESIGN COMPUTATIONS			
Precipitation $P_1 = 1$ hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i _	63	inches/hour
Runoff Coefficient	c ₁	0.5	<u>-</u>
	C ₂		- -
	C3		_
Weighted Runoff Coefficient	c _	0.5	_
Peak Discharge Qp = CiA = 10 x6	19×15=	35	cfs
Computed by		date 🍣	-72
Computed by IR	· · · · · · · · · · · · · · · · · · ·		3-72.

LOCATION DATA			
Project Arivaca drain	1100 50	Project No	. 12-009
Location DA# 8-C	Co. No. Co-		
County Pinia			
Name of Stream			
DESIGN DATA			
Design Frequency		25	years
Drainage Area	A ₁	19	acres
	A ₂		acres
	A3		acres
Drainage Length		1250	feet
Elevation			
Top of Drainage Area		3800	feet
At Structure		3750	feet
Drainage Area Slope			8
Precipitation			
P = 6 hour			inches
P=24 iour	•		inches
DESIGN COMPUTATIONS			
Precipitation $P_1 = 1$ hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	6.9	inches/hour
Runoff Coefficient	c_1	0,5	
	C ₂		
	C ₃		
Weighted Runoff Coefficient	C	0,5	•
Peak Discharge Qp = CiA = $/9 \times 6$	5.9 ×0.5	= 66	cfs
Computed by		date	·
Checked by		date	3-72

LOCATION DATA				
Project Ari	vaca drainage	<4.4u	Project No.	<u> 12-009</u>
	DA# 9	3	Co. No. Co)—
County Pina			Station	
Name of Strea	m			
DESIGN DATA				
Design Freque	ncy		50	_ years
Drainage Area	,	A	91:5	acres
		A ₂		acres
		A3		acres
Drainage Leng	th		·9 <i>825</i>	feet
Elevation				
Top of Dra	inage Area		4050	feet
At Structu	re		3740	feet
Drainage Area	· Slope	•		• • • • • • • • • • • • • • • • • • • •
Precipitation				
P=-6-hou	a r	_		inches
P = 24 hou	r.	•		_ inches
DESIGN COMPUTATI	ONS			
Precipitation	$P_1 = 1$ hour	· •	*	inches
Time of Conce	ntration	Tc	36	minutes
Rainfall Inte	nsity	i	3.74	inches/hour
Runoff Coeffi	cient	c_1	0.5	
		C ₂		
	c ₃		_	
Weighted Runo	ff Coefficient	С	0.5	
	e $Qp = CiA = 915$	•	15= 1711	cfs
Computed by	J.e.		date	3-72
Checked by	الت.		date	

Project Anivaca drainage	Andre	Project No	. 72-009
Location DA = 9A County Pima			0-
		Station	
Name of Stream			
DESIGN DATA			
Design Frequency		25	years
Drainage Area	\mathtt{A}_1	. 17	acres
	A ₂	·	acres
	A3		acres
Drainage Length		1700	feet
Elevation	·		
Top of Drainage Area		3770	feet
At Structure		3730	feet
Drainage Area Slope			
Precipitation			
P = 6-hour			inches
-P = 24 hour	•		inches
DESIGN COMPUTATIONS			
Precipitation $P_1 = 1$ hour		r	inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	6,9	inches/hour
Runoff Coefficient	c_1	0.5	-
	C ₂		
	C ₃		
Weighted Runoff Coefficient	C	0.5	
Peak Discharge Qp = CiA = $/7x6$	5.9 x 0.5		cfs
Computed by		date	12
Checked by		date 3	. 7 =

LOCATION DATA			
Project Arivaca dnainna	e studi	Project No	. 72-009
Location DA# 9-B	Location DA# 9-B)-
County Aires		Station	
Name of Stream			
DESIGN DATA			
Design Frequency		. 25	years
Drainage Area	A ₁		acres
	A ₂		acres
•	A3		acres
Drainage Length		4140	feet
Elevation			
Top of Drainage Area		3 800	feet
At Structure		3730	feet
Drainage Area Slope	•		 %
Precipitation			
-P6-hour			inches
F = 21 inour			inches
DESIGN COMPUTATIONS			
Precipitation $P_1 = 1$ hour			inches
Time of Concentration	Tc	23	minutes
Rainfall Intensity	i	4.2	inches/hour
Runoff Coefficient	c_1	0.5	·
	C ₂		
	C ₃		
Weighted Runoff Coefficient	C	0.5	
Peak Discharge Qp = CiA = 73 x			cfs
Computed by		date 🗦	-72
Checked by SST			?- 7Z

LOCATION DATA			
Project Arivaca Drainas	ne study	Project No	. 23-009
Location DA 710		Co. No. C	:o-
County Dima		Station	
Name of Stream	 		
DESIGN DATA	•		
Design Frequency		<u> </u>	years
Drainage Area	A ₁ .	778	acres
	A2		acres
	Аз .		acres
Drainage Length		10,433	feet
Elevation		•	
Top of Drainage Area	_	Mynna	feet
At Structure		3,730	feet
Drainage Area Slope		-	8
Precipitation			•
P-=6-hour			inches
-P = 24-hour-			inches
DESIGN COMPUTATIONS			
Precipitation $P_1 = 1$ hour			inches
Time of Concentration	Tc	42	minutes
Rainfall Intensity	i	3.4	inches/hour
Runoff Coefficient	c_1	0.5	
	C ₂		
	C ₃		
Weighted Runoff Coefficient	С	0.5	•
Peak Discharge Qp = CiA = 7%	_		cfs
Computed by JR		date 🧷	and the second
Checked by SJT		date 3	3-72

LOCATION DATA			
Project Arivaca Draining - tude		Project No.	12-009
Location DA# 10 A		Co. No. Co	o -
County Pima	· •	Station	
Name of Stream			
DESIGN DATA			
Design Frequency	_	25	years
Drainage Area	A ₁	43	acres
	A ₂		_ acres
•	А3		acres
Drainage Length	•	3210	feet
Elevation			
Top of Drainage Area	•	3 850	feet
At Structure	•	3800	feet
Drainage Area Slope			E.
Precipitation			
P = 6 hour	-		inches
F=24-hour	· -		inches
DESIGN COMPUTATIONS			
Precipitation $P_1 = 1$ hour			inches
Time of Concentration	Tc	20	minutes
Rainfall Intensity	i	4.7	inches/hour
Runoff Coefficient	c_1	0.5	
	c ₂		
	C ₃		·
Weighted Runoff Coefficient	C	0.5	·
Peak Discharge Qp = CiA = $43 \times$	-		cís
Computed by		date	ə. <i>??</i>
Checked bySJT	<u> </u>	date	3-72

LOCATION DATA		/ Dennisate No.		
Project Arivaca drain Location DA# //	<u> </u>	Co. No. Co		
County		Station		
Name of Stream		o cucton		
DESIGN DATA				
Design Frequency		25	years	
Drainage Area	A_1	181	acres	
	A ₂		_ _ acres	
	Аз		acres	
Drainage Length		<i>5820</i>	feet	
Elevation				
Top of Drainage Area		30,00	feet	
At Structure		379O	 feet	
Drainage Area Slope	•		%	
Precipitation				
P=6-hour			inches	
F = 24 inour			inches	
ESIGN COMPUTATIONS				
Precipitation $P_1 = 1$ hour		200	inches	
Time of Concentration	Tc	25	minutes	
Rainfall Intensity	i	4.1	inches/hour	
Runoff Coefficient	. c _l	0.5	_	
	C ₂			
	C ₃			
Weighted Runoff Coefficient	C	0,5		
Peak Discharge Qp = $CiA = /2/x$	•		_ cfs	
computed by		date 3	8-72	
Checked by SDT		date	3-7 <i>2</i> .	

LOCATION DATA			·
Project Arivaca desin	rigo edo	/, Project No.	12-000
Location Off 1/A	su*	Co. No. Co	
County Piper		Station	
Name of Stream			
DESIGN DATA			
Design Frequency		25	years
Drainage Area	A	10	acres
	A ₂		acres
	A3		acres
Drainage Length	-	_ 1150	— feet
Elevation			-
Top of Drainage Area		3870	feet
At Structure	_	3840	 feet
Drainage Area Slope	<u>-</u>		
Precipitation	-		
P = 6 hour	_		inches
P=-24-hour			inches
DESIGN COMPUTATIONS			•
Precipitation $P_1 = 1$ hour	_		inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i _	6.9	inches/hour
Runoff Coefficient	c_1	0.5	
	c ₂		
-	c ₃ _		
Weighted Runoff Coefficient	c	0.5	· · · · · · · · · · · · · · · · · · ·
Peak Discharge Qp = CiA = 10×6 .	9x0.5	35	cfs
Computed by		date Si	-12
Checked by ST		-	- フ <u>ス</u>

Project <u>drivaca drain</u>	11 130 Kalesti		
Location Diff 12		Co. No. Co-	•
County Dim		Station	
Name of Stream			
SIGN DATA			
Design Frequency		سے دے	_ years
Drainage Area	A ₁ _	116	acres
	A ₂ _		acres
	A3		acres
Drainage Length		3620	feet
Elevation			
Top of Drainage Area		3900	feet
At Structure		<u> 3830 - </u>	feet
Drainage Area.Slope			- %
Precipitation			
P= 6-hour	٠ ــــــ	The state of the s	inches
P=-24 hour			inches
SIGN COMPUTATIONS			4
Precipitation P ₁ = 1 hour			inches
Time of Concentration	Tc	70	minutes
Rainfall Intensity	i _		inches/hour
Runoff Coefficient	c ₁	10.15	_
	C ₂		•
	C3		_
Weighted Runoff Coefficient	c	9.3	-
Peak Discharge Qp = CiA = //6 <	4,9,00,57	286	cfs

Project Ariyaca drain	en e mare de	Project No.	70 000
Location DA = 121		Project No. <u>72-222</u> Co. No. Co-	
County		Station	
Name of Stream			
DESIGN DATA			
Design Frequency		25	years
Drainage Area	A ₁	79	acres
	A ₂		acres
	A3		- acres
Drainage Length		3000	- feet
Elevation	•		-
Top of Drainage Area	·	3950	feet
At Structure		5000	_ _ feet
Drainage Area Slope	•		
Precipitation	•	•	
P = 6 hour			inches
F24-hour			inches
ESIGN COMPUTATIONS			
Precipitation $P_1 = 1$ hour			inches
Time of Concentration	Tc	20	minutes
Rainfall Intensity	i	4.7	inches/hour
Runoff Coefficient	c_1	0.5	-
	C ₂		-
	C3 _		-
Weighted Runoff Coefficient	C	6.5	- -
Peak Discharge Qp = CiA = 79,	< 4.7×15=	186	_ cfs
computed by		date	@ . 1717
thecked by SIT		date	

LOCATION DATA			
Project drivana drainan stude		Project No	· 20-009
Location DANIS-B		Co. No. Co	0-
County	County		
Name of Stream			
DESIGN DATA			
Design Frequency		25	years
Drainage Area	A ₁	20	acres
	A ₂		acres
	A ₃		acres
Drainage Length		450	feet
Elevation	·		
Top of Drainage A	rea	3900	feet
At Structure		3780	feet
Drainage Area Slope			 %
Precipitation			
P = 6 hour		.	inches
-P-=-24-hour			inches
DESIGN COMPUTATIONS			
Precipitation $P_1 = 1$	hour		inches
Time of Concentration		10	minutes
Rainfall Intensity	i	14.9	inches/hour
Runoff Coefficient	c_1	10.5	,
	C ₂		-
	C ₃		
Weighted Runoff Coef	-	0.5	•
Peak Discharge Qp = (cfs
Computed by	JR.	date	.3-72

LOCATION DATA			•
Project Arivaca draina	re stud	Project No.	12-003
Location DA#13		Co. No. Co	
County Pina		Station	
Name of Stream			
DESIGN DATA		•	<u>.</u>
Design Frequency	• •	50	years
Drainage Area	'A ₁	1376	acres
•	A ₂		acres
	A3		acres
Drainage Length	-	13020	feet
Elevation	-		
Top of Drainage Area		30,70	feet
At Structure	-	3710	feet
Drainage Area Slope	_	•	•
Precipitation			
P6-hour	•	·	inches
P=-24-hour	· qua		inches
	-		
DESIGN COMPUTATIONS	·		
Precipitation P ₁ = 1 hour	•		
Time of Concentration		٠	_ inches
Rainfall Intensity	Tc _		_ minutes
Runoff Coefficient	i _		_inches/hour
Maiori coerricient	c ₁ -	0,5	• · · · ·
	C ₂ _		-
Weighted Duness Conssisted	C3 _	0 ==	-
Weighted Runoff Coefficient		<u></u>	•
Peak Discharge Qp = CiA = /376	.×3.0× <u>0</u> .	5 = 1061	cfs
Computed by		date	-72
Checked by			72

RESULTS: (refer to drainage area map for locations)

Drainage Area No.	Q in cubic feet per second	Contributing Area in Acres
1	2836*	1719
1A	97	28
2	4959*	3393
2A	208	99
2 B	93	27
3	322	137
4	12728*	21214
4A	117	63
5 & 6	1526*	- 1071
6	778	342
6A	41	12
6E	343	137
7	1137*	517
7A	45	13
8	426	230
8A	62	22
8B	35	10
8C	66	19
_. 9	1711*	915
9A	59	17
9B	153	73
10	1322*	778
10A	101	43
11	371	181
11A	35	10
12	284	116
12A	186	⁻ 79
12B	69	20
13	2064*	1376

* 50 year storm

This area is typical of desert areas having high peak flows of short duration.

VI. REFERENCES

: .·.

- Blanton & Co. Nomographs (U.S. Weather Bureau Tech. Paper #28)
- U.S.G.S. Quadrangle sheets (15 min).
 Oro Blanco Ariz., Ruby, Ariz., Tubac, Ariz., & Arivaca, Ariz.
- 3. Aerial Photographs, by Cooper Aerial Service 12-15-71, 1:6000.
- 4. Topography Sheets, by Cooper Aerial Service 12-15-71, 1" = 200'.
- 5. Geophysical & Hydrological Reconnaissance of the Arivaca Area by Manera & Associates, Inc., Consulting Hydrologists, Phoenix, Arizona
- 6. Magnitude & Frequency of Floods in the U.S. Geological Survey Water Supply No. 1683 (Part 9, Colorado River Basin)