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UPPER EAST FORK CAVE CREEK DETENTION AREA SIZING STUDY

PREPARED BY

NBS/LOWRY
ENGINEERS & PLANNERS

FEBRUARY 1989

UPPER EAST FORK CAVE CREEK
DETENTION AREA SIZING STUDY

PREPARED FOR:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

AND

CITY OF PHOENIX

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NBS/LOWRY

EXECUTIVE SUMMARY

ABSTRACT

This report identifies detention area sizing criteria for six proposed detention areas in the Upper East Fork Cave Creek Watershed shown on **Figure 1.1**. For each site, detention basin dimensions and volumes are recommended to enable detention of 100-year runoff with a maximum basin outflow equal to or less than the capacity of existing and proposed Phoenix storm sewers downstream from the detention basins.

These recommendations are made based on an evaluation of expected growth and runoff patterns. Runoff modelling has been performed using the U. S. Soil Conservation Service TR-20 runoff synthesis model.

The recommended facilities and their estimated costs excluding right of way acquisition are as follows:

Basin No.	Location	Estimated Cost
1	Upper East Fork at Beardsley Road	$1,206,450
2	9th Street at Union Hills Drive	$ 784,240
3a	Upper East Fork at Cave Creek Road	$2,232,100
3b	Upper East Fork at 20th Street	$2,204,730
4	Paradise Valley Park	$ 860,110
5	9th Street at Campobello	$1,466,460

Total Estimated Cost of Improvements		$8,734,090

CONCLUSIONS

The recommendations made in this report are based on the following conclusions.

1. **Plate A** shows runoff quantities computed using the TR-20 model for the 100-year storm with the proposed detention basins in place.

2. Comparison of the basin outfall hydrograph for the Upper East Fork Cave Creek Area Drainage Master Study (ADMS) with that obtained using the modifications recommended in this report shows that the peak discharge will be increased from 7700 cfs peak flow to 7800 cfs. This is because one of the detention basins recommended in the ADMS has been deleted, although other basins have been upsized to compensate for this.

RECOMMENDATIONS

The following recommendations are made:

1. It is recommended that each of the detention areas be sized using the guidelines shown in **Table 4.1**.

2. It is recommended that land be acquired for an unlined open channel following the Upper East Fork of Cave Creek from Union Hills Drive upstream to Beardsley Road. Estimated right-of-way requirements are shown on **Figure 4.7**

TABLE OF CONTENTS

EXECUTIVE SUMMARY
- Abstract
- Conclusions
- Recommendations

CHAPTER 1 - BACKGROUND 1
- Objectives 1
- Scope of Work 1
- Study Area 2
- Acknowledgments 3

CHAPTER 2 - HYDROLOGY AND FLOOD ROUTING CRITERIA 5
- Previous Studies 5
- TR-20 Watershed Model 6
- Hydrologic Criteria 8
- Computed Hydrology 9
- Comparison with Previous Studies 9

CHAPTER 3 - DETENTION BASIN DESIGN CRITERIA 11
- Basin Geometry 11
- Storage Routing Computation 12
- Hydraulic Function 12
- Basin Inlets and Outlets 13

CHAPTER 4 - DETENTION BASIN SIZING RECOMMENDATIONS 15
- Introduction 15
- Basin Number 1 - Upper East Fork at Beardsley Road 16
- Basin Number 2 - 9th Street at Union Hills Drive 17
- Basin Number 3a - Upper East Fork at Cave Creek Road 18
- Basin Number 3b - Upper East Fork at 20th Street 19
- Basin Number 4 - Paradise Valley Park 20
- Basin Number 5 - 9th Street at Campobello 21

TABLE OF CONTENTS
(Continued)

Upper East Fork Cave Creek Channel - Union Hills Drive to Beardsley Road 22

Summary 24

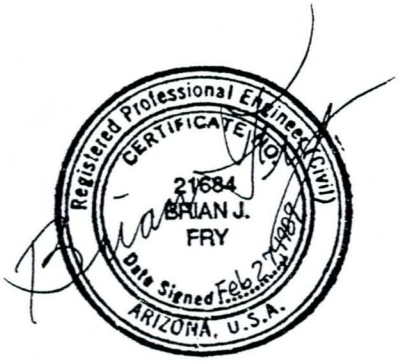
REFERENCES 25

APPENDICES

Preliminary Design & Construction Cost Estimates

Detention Basin Routing Computations

TR-20 computer output



LIST OF ILLUSTRATIONS

FIGURE		Following Page
1.1	Location Map - Study Area & Detention Sites	1
2.1	Comparison of Basin Outflow Hydrographs	10
3.1	Inflow & Outflow Hydrographs for Basin 1	14
3.2	Inflow & Outflow Hydrographs for Basin 2	14
3.3	Inflow & Outflow Hydrographs for Basin 3A	14
3.4	Inflow & Outflow Hydrographs for Basin 3B	14
3.5	Inflow & Outflow Hydrographs for Basin 4	14
3.6	Inflow & Outflow Hydrographs for Basin 5	14
3.7	Typical Inlet Structures	14
3.8	Typical Outlet Structures	14
4.1	Location of Basin 1	16
4.2	Location of Basin 2	17
4.3	Location of Basin 3A	18
4.4	Location of Basin 3B	19
4.5	Location of Basin 4	20
4.6	Location of Basin 5	21
4.7	Typical Channel Cross Sections - Union Hills to Beardsley	23

TABLE		
4.1	Summary of Recommendations	24
4.2	Summary of Estimated Costs	24

CHAPTER 1
BACKGROUND

OBJECTIVES

This Detention Basin Sizing Study has been prepared for the Flood Control District of Maricopa County and the City of Phoenix to identify area and volume requirements for six detention basin sites recommended in the Upper East Fork Cave Creek Area Drainage Master Study. **Figure 1.1** shows the location of each of the six detention basin sites.

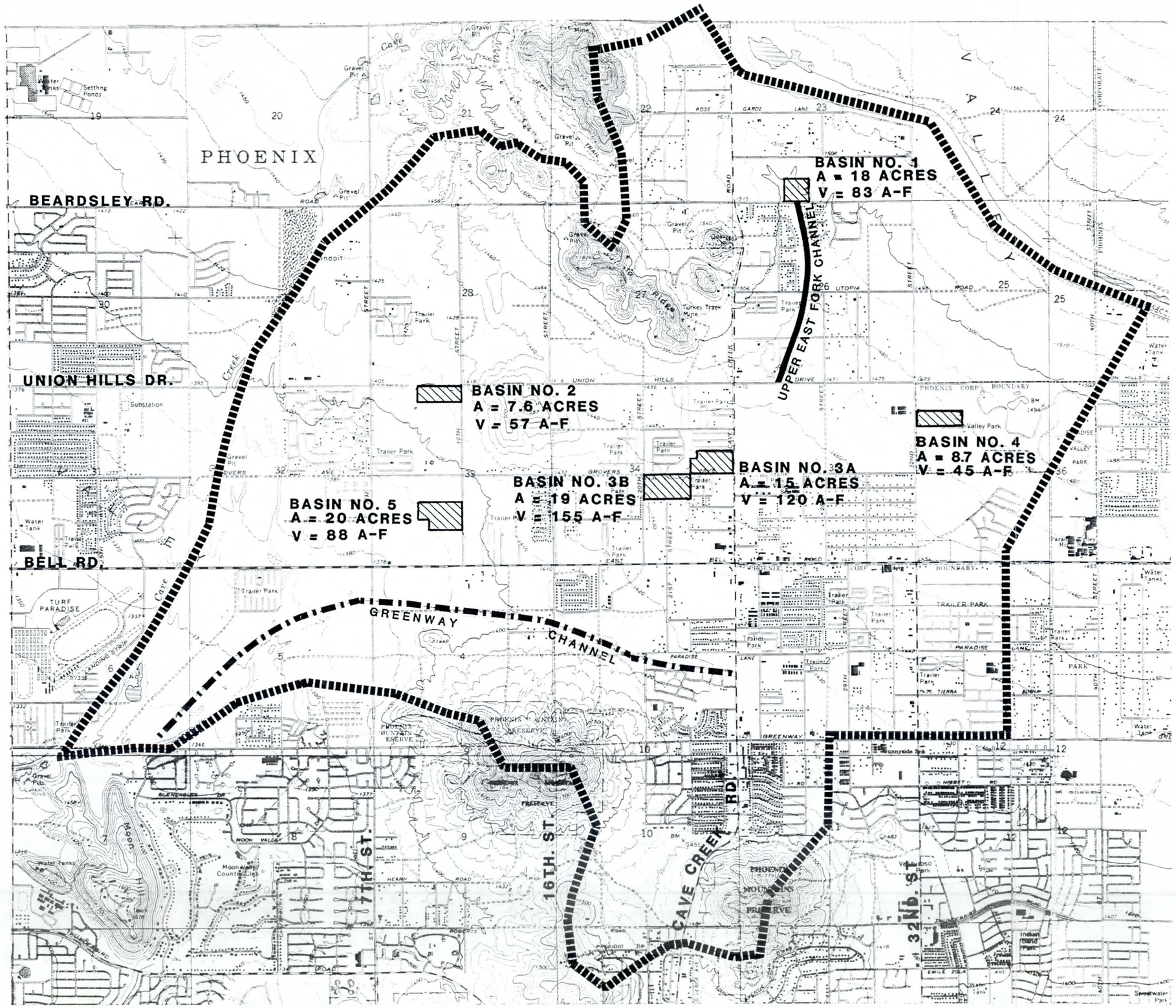
SCOPE OF WORK

Specific work items for this detention area sizing study are outlined in the scope of work for Contract FCD No. 88-45, dated November 2, 1988, and are summarized below:

1. Modify the TR-20 watershed model used to prepare the Upper East Fork Cave Creek ADMS, basing calculations on the 100-year storm at build-out runoff conditions, including the ADMS recommended facilities with minor modifications upstream of the detention basins.

2. Based on the two-year frequency storm drain capacities set by the City of Phoenix, determine the volume and area of detention needed to allow conveyance of a 100-year storm downstream of the detention basins making use of the City of Phoenix two-year frequency storm drains.

3. Visit the six proposed detention sites, take photographs and verify field constraints affecting construction of detention basins at proposed sites.



LEGEND

DETENTION BASIN

STUDY AREA BOUNDARY

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STUDY AREA AND DETENTION BASIN LOCATIONS

FIGURE 1.1

4. Identify strategies for meeting 100-year floodplain management objectives using the detention sites available. Prepare cost estimates for selected alternatives.

5. Determine updated right-of-way requirements for channel upstream of Grovers Avenue Detention Area, and prepare updated map.

6. Prepare a summary Progress Report of detention design criteria, costs, and areas to be acquired for each detention basin site. Prepare presentation of findings for meeting to be attended by Flood Control District, City of Phoenix Engineering Department and City of Phoenix Parks Department Representatives. Attend coordination meeting with County Library Department.

7. Prepare a written report to the Flood Control District of Maricopa County identifying the selected alternative, its costs, and recommended design criteria. The report shall also document the alternative evaluation process.

8. For the recommended alternative, prepare TR-20 calculation showing expected flows for the 100-year storm. Prepare 1" = 2000' scale map showing flows for each design frequency.

STUDY AREA

Watershed Boundaries

The Upper East Fork Cave Creek Watershed is shown on **Figure 1.1**. It includes approximately 16 square miles. The area is bounded on the north by the Granite Reef Aqueduct of the Central Arizona Project. The Paradise Valley Detention Structure prevents runoff from entering the study area from the north. The east and southeast edge of the study area is the Cave Creek - Indian Bend Wash divide. This divide is now expected to be relocated to follow the proposed Squaw Peak corridor

alignment. The watershed is bounded by Lookout Mountain to the south, and by Cave Creek to the west.

Detention Basin Sites

There are six detention basin sites being evaluated. These are as follows:

Basin No.	Location
1	Upper East Fork at Beardsley Road
2	9th Street at Union Hills Drive
3a	Upper East Fork at Cave Creek Road
3b	Upper East Fork at 20th Street
4	Paradise Valley Park
5	9th Street at Campobello

Figure 1.1 shows the locations of each of these basins. Basin numbers have been assigned to match those used in the Upper East Fork Cave Creek ADMS.

ACKNOWLEDGMENTS

The completion of this Engineering Report was made possible by the assistance and data furnished by many individuals whose valuable assistance is gratefully acknowledged.

We especially wish to thank Ms. Teresa Dominguez, Ms. Cora Fernandez, Mr. Nick Karan, and Mr. Amir Motamedi of the Flood Control District of Maricopa County, and Mr. Ross Blakely, Mr. Bob McClure and Mr. Roger Olsen of the City of Phoenix for their close involvement and assistance in the preparation of this report.

Those individuals on the NBS/Lowry staff who contributed to this report are as follows: Mr. Richard Perry, P.E. served as principal in charge.

Mr. Brian Fry, P.E. served as project manager for this study, and Mr. Dennis Phinney, P.E. served as project engineer. Portions of the engineering work were completed by Mr. Paul Cole and Mr. Andrew Spear. Graphics were prepared by Mr. Sam Maccherola. Typing and proofreading were done by Mrs. Debra Thomsen.

CHAPTER 2
HYDROLOGY AND FLOOD ROUTING CRITERIA

PREVIOUS STUDIES

A number of prior studies by the Flood Control District of Maricopa County and the City of Phoenix serve as the foundation for this study. A summary of the studies used follows:

City of Phoenix - North Central Area Master Storm Drainage Study (East Half)

Storm sewers in the study area west of 32nd Street were master planned by the City of Phoenix in 1981. These existing and proposed master planned storm sewers provide two-year flood protection. These sewers are identified in the North Central Area Master Storm Drainage Study.

Northeast Storm Drainage Study

Storm sewers in the study area east of 32nd Street were master planned by the City of Phoenix in 1977. These existing and proposed master planned storm sewers provide two-year flood protection. These sewers are identified in the Northeast Storm Drainage Study.

Upper East Fork Cave Creek Area Drainage Master Study (ADMS)

Flood control facilities in the study area were master planned by the Flood Control District of Maricopa County, the City of Phoenix, and the Maricopa County Highway Department in 1987. The Upper East Fork Cave Creek Area Drainage Master Study recommended a joint use concept of detention basins, open channels, parks and recreational trails to provide 100-year flood protection in the Upper East Fork Cave Creek watershed.

The hydrology of the Upper East Fork Cave Creek watershed for a 100-year flood was previously studied and modeled as part of the Upper East Fork Cave Creek Area Drainage Master Study. Modeling used in preparing the study was based on the U.S. Soil Conservation Service TR-20 Watershed Model.

Integration of Two-Year Storm Sewers into 100-Year ADMS Concept

It is proposed that the two-year frequency storm drains identified in the two City of Phoenix master plans be integrated into the 100-year flood protection concept. This, combined with increased detention volumes, will allow the City of Phoenix and the Flood Control District of Maricopa County to avoid constructing several large and expensive open channels. Implementation of this concept requires the following general changes be made to the 1987 Upper East Fork Cave Creek ADMS 100-year flood protection concept:

1. Detention volumes have been increased as needed to reduce flood peak discharges to levels consistent with identified City of Phoenix storm drain capacities.

2. Open channels downstream from detention basins have been deleted.

3. Facilities recommended in the Upper East Fork ADMS have been included upstream from the detention basins, with minor modifications.

TR-20 WATERSHED MODEL

General Model Description

To be consistent with previous studies, the rainfall runoff relationship for the study area was modeled using the U.S. Soil Conservation Service TR-20 Computer Program. TR-20 is a single rainfall event model which computes direct runoff resulting from any

synthetic or natural rainstorm. It develops flood hydrographs from runoff and routes the flow through stream channels and detention basins. It combines the routed hydrograph with those computed from tributaries and computes the peak discharges and their times of occurrence.

The TR-20 computer program is based on procedures described in SCS National Engineering Handbook, Section 4. Individual subwatershed characteristics that affect runoff are described by variables that have been developed from field measurements taken in numerous watersheds throughout the country.

In preparing the Upper East Fork Cave Creek ADMS, the Upper East Fork watershed was divided into 144 subwatersheds based on existing points of concentration and homogeneity of hydrologic characteristics. A mass curve of runoff is developed for each subwatershed based on the rainfall volume, rainfall distribution, and the runoff curve number (CN). CN's are determined by the user based on soil type, land use and hydrologic condition information.

Runoff hydrographs computed for subwatersheds are combined into composite hydrographs and routed through the watershed in the natural flow sequence as specified by the user. The most recent TR-20 version replaces the convex routing method used in previous versions with a Modified Attenuated-Kinematic (Att-Kin) method which takes into account channel storage and hydrograph attenuation as the hydrograph is routed through the reach. With the Att-Kin method, the discharge-flow area relationship for simple cross sections (rectangular, triangular, trapezoidal) is fit by a power curve function of the form $Q = XA^m$, where Q and A are the discharge and area at any distance and time. The coefficient X and the exponent m are specified by the user for a representative channel cross section within the reach. These coefficients can be taken from nomographs or equations. A representative cross section can be entered for irregular channel shapes in which case the program will compute X and m values.

Allowance for City of Phoenix Storm Sewers

Where the proposed City of Phoenix storm drains follow existing overland drainage patterns, and drain into a proposed 100-year flood control structure, the effect of the proposed storm drain on channel routing has been ignored.

Near Basin number 2 at 9th Street and Union Hills Drive, City of Phoenix storm drains will divert flows to the Cave Creek channel outside of the study area. The effect of this diversion on detention basin sizing was found to be significant, and in this case, the two-year storm drain was included in the TR-20 model.

City of Phoenix storm drains intercept runoff along 16th Street that would naturally reach Basin number 5 at 9th Street and Campobello and diverts it directly to the Greenway Channel reducing the inflow into Basin number 5. This diversion was included in the TR-20 model.

HYDROLOGIC CRITERIA

The development of the TR-20 model of the Upper East Fork Cave Creek watershed is described in detail in the Area Drainage Master Study Report. Parameters used in preparing the TR-20 model for this Detention Area Sizing Study are identical to those used in preparing the Area Drainage Master Study, and may be summarized as follows:

1. **Rainfall Depth** for a 100-year 24-hour storm of 4.04 inches was used to be consistent with the previous studies.

2. **24-hour Rainfall Distribution** was based on the City of Phoenix S-Curve which is somewhat steeper and more conservative than either the Type I or Type II curves normally used by the Soil Conservation Service. This is also consistent with the previous studies.

3. **Curve Numbers** were developed based on a weighted average of computed soil and development types in each drainage subarea at build-out and are identical to those used in the Upper East Fork Cave Creek ADMS.

4. **Time of Concentration for Overland Flow** was estimated using the Upland Method. A minimum time of concentration of 10 minutes was used.

5. **Time of Concentration for Flow in Gutters** was estimated using figures contained in the "City of Phoenix Storm Drain Design Manual."

COMPUTED HYDROLOGY

In preparing this study, the entire Upper East Fork Cave Creek watershed model has been updated to show the effect of the proposed detention basins on the computed downstream flows.

Plate A summarizes computed 100-year runoff throughout the Upper East Fork Cave Creek watershed with the recommended detention basins in place.

The TR-20 model has a limitation of 300 hydrograph ordinates. Hydrographs that extend beyond 300 ordinates are truncated. The outflow hydrographs from some of the basins have been truncated. The detention basin sizing is dependent on the peak inflow to the basin and the volume of runoff generated prior to the peak inflow and is therefore unaffected by hydrograph truncation as long as the truncation is after the peak inflow. However, the 36 hour drain time requirement cannot be verified within TR-20 for those basins with truncated outflow hydrographs. In those cases the drain time has been determined using an in-house stormwater holding pond model.

COMPARISON WITH PREVIOUS STUDIES

Flows computed for the Upper East Fork Cave Creek at the confluence of Cave Creek and the Upper East Fork compare with previous studies as follows:

Study	100-year Runoff
Upper East Fork Cave Creek ADMS (Existing Condition)	9600 cfs
Upper East Fork Cave Creek ADMS (With Improvements)	7700 cfs
Upper East Fork Cave Creek Detention Area Sizing Study (With Improvements)	7800 cfs

Based on the updated TR-20 modeling with the additional detention storage in place, the output hydrograph from the Upper East Fork Cave Creek watershed has been updated from that computed during preparation of the Upper East Fork Cave Creek Area Drainage Master Study. **Figure 2.1** shows the comparison between basin outflow hydrographs for this study and the previous Area Drainage Master Study.

The detention basin recommended in the Upper East Fork Cave Creek ADMS at the upstream end of the Greenway Channel has been deleted. By upsizing the remaining basins, the watershed peak outflow has been maintained relatively near that computed for the original ADMS concept. However, Greenway Channel flows are higher, particularly at the upstream end, than was predicted with the basin in place.

FLOOD CONTROL DISTRICT MARICOPA COUNTY

EAST FORK CAVE CRK. OUTFLOW HYDROGRAPHS

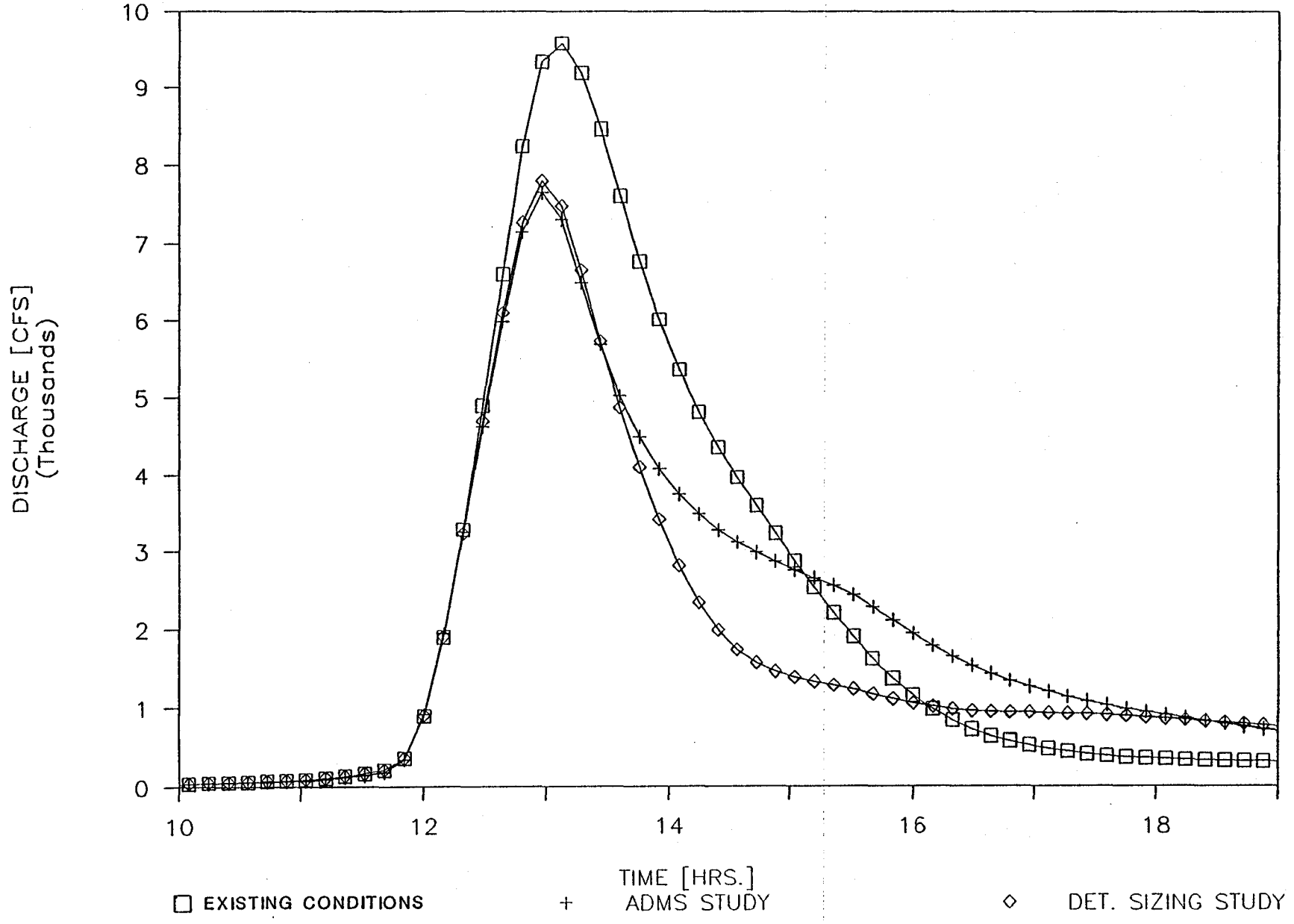

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FIGURE 2.1

CHAPTER 3
DETENTION BASIN DESIGN CRITERIA

BASIN GEOMETRY

It is understood that basins will be used and maintained by the City of Phoenix Parks Department. Consequently, basin geometry must consider the regular use of these basins as parks as well as for stormwater detention. In particular, use of detention areas for ball fields and play areas may require the basin to be terraced to allow for fields to be flat without encouraging ponding.

The following criteria for detention basin design were used:

Maximum Depth:	10 feet
Maximum Sideslopes:	4 feet horizontal to 1 foot vertical
Maximum Drainage Time:	36 hours from peak outflow
Minimum Freeboard:	0.5 feet

The 4 to 1 limitation on sideslopes has been chosen based on the understanding that steeper slopes cannot be maintained using City of Phoenix lawnmowing equipment.

A maximum drainage time of 36 hours is required by the County Health Department to prevent mosquito and midge breeding.

Should a flood exceed the 100-year rating of a detention basin, the basin will overflow. To protect surrounding properties in the event of an overflow, the overflow discharge should be no greater than would occur were there no detention basin in place and should be directed to the natural flowpath with an overflow spillway. Embankments and other dams should therefore not be used except for freeboard and to direct flows in excess of the basin capacity to the overflow spillway. Maximum spillway elevations for each detention basin should be placed

at the lowest existing natural surface elevation along the basin perimeter, to avoid any risk or liability which might be associated with building a dam or embankment.

To avoid damming, it will be necessary to haul most excavated material from detention sites. Earthwork balancing will, in general, not be possible without either creating dams or using up available runoff storage volume.

STORAGE ROUTING COMPUTATION

Storage routing computations for use in detention basin sizing have been done using an in-house Stormwater Holding Pond Model developed by NBS/Lowry. Given an inflow hydrograph (developed with TR-20), the model will compute the outflow hydrographs from a detention basin using the Modified Puls or Storage Indication method of routing. Outflow computations for the Modified Puls routing consider both outlet control and submerged inlet control for culverts. The model allows the user to view the effect on the outflow hydrograph caused by varying detention basin dimensions (basin top and bottom elevations, sideslopes, top length and top width) and outlet culvert parameters (number of culverts, shape, dimensions, inlet and outlet elevations, pipe length, inlet design coefficients and Manning's n). Output from the model includes the complete outflow hydrograph, as well as the computed maximum depth, freeboard at maximum depth, water surface area at maximum depth, and the maximum required storage volume in acre feet. The stage-storage-discharge relation is also computed for entry into the TR-20 model.

HYDRAULIC FUNCTION

Design Outflow Objectives

Detention basins have been designed to ensure that the maximum outflow from the detention basin during a 100-year storm does not exceed the

capacity of the City of Phoenix storm drain immediately downstream. Accordingly, the maximum outflows from each detention basin are as follows:

Basin No.	Location	Max Outflow
1	Upper East Fork at Beardsley Road	483 cfs
2	9th Street at Union Hills Drive	variable
3a	Upper East Fork at Cave Creek Road	variable
3b	Upper East Fork at 20th Street	462 cfs
4	Paradise Valley Park	114 cfs
5	9th Street at Campobello	325 cfs

Computed Outflow Hydrographs

Inflow and outflow hydrographs have been computed for each of the six detention basins. The resultant hydrographs are plotted on **Figure 3.1, 3.2, 3.3, 3.4, 3.5 and 3.6** for each respective basin.

BASIN INLETS AND OUTLETS

Examples of successfully operating regional detention basins can be found at Sereno Park in the City of Phoenix, and at Cactus Park in the City of Scottsdale. **Figure 3.7** shows inlet structures at Cactus Park. **Figure 3.8** shows an outlet structure. Design features found at these parks include the following:

Low flow bypasses allow flows from two-year storms and smaller to bypass the detention basin entirely. The bypass minimizes the number of occasions when the basin is inundated. The bypass also reduces sedimentation to that occurring during large and infrequent storms.

Inlet structures include energy dissipators, and a sediment trap to prevent heavy sediment from entering the basin. A large trash screen with a locked access gate prevents unauthorized access to the sediment trap and bypass structure.

Outlet structures are also screened with large trash racks to prevent debris from clogging culverts. The trash racks also reduce the risk of accidental drowning making it impossible for trespassers to be sucked into outlet culverts at high velocities during storms. Trash rack area will be at least ten times the area of the outlet control orifice.

Surface water inlets are paved, riprapped, or gunited to prevent erosion.

Overflow spillways are also paved, riprapped or gunited.

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DETENTION BASIN SIZING STUDY – BASIN #1

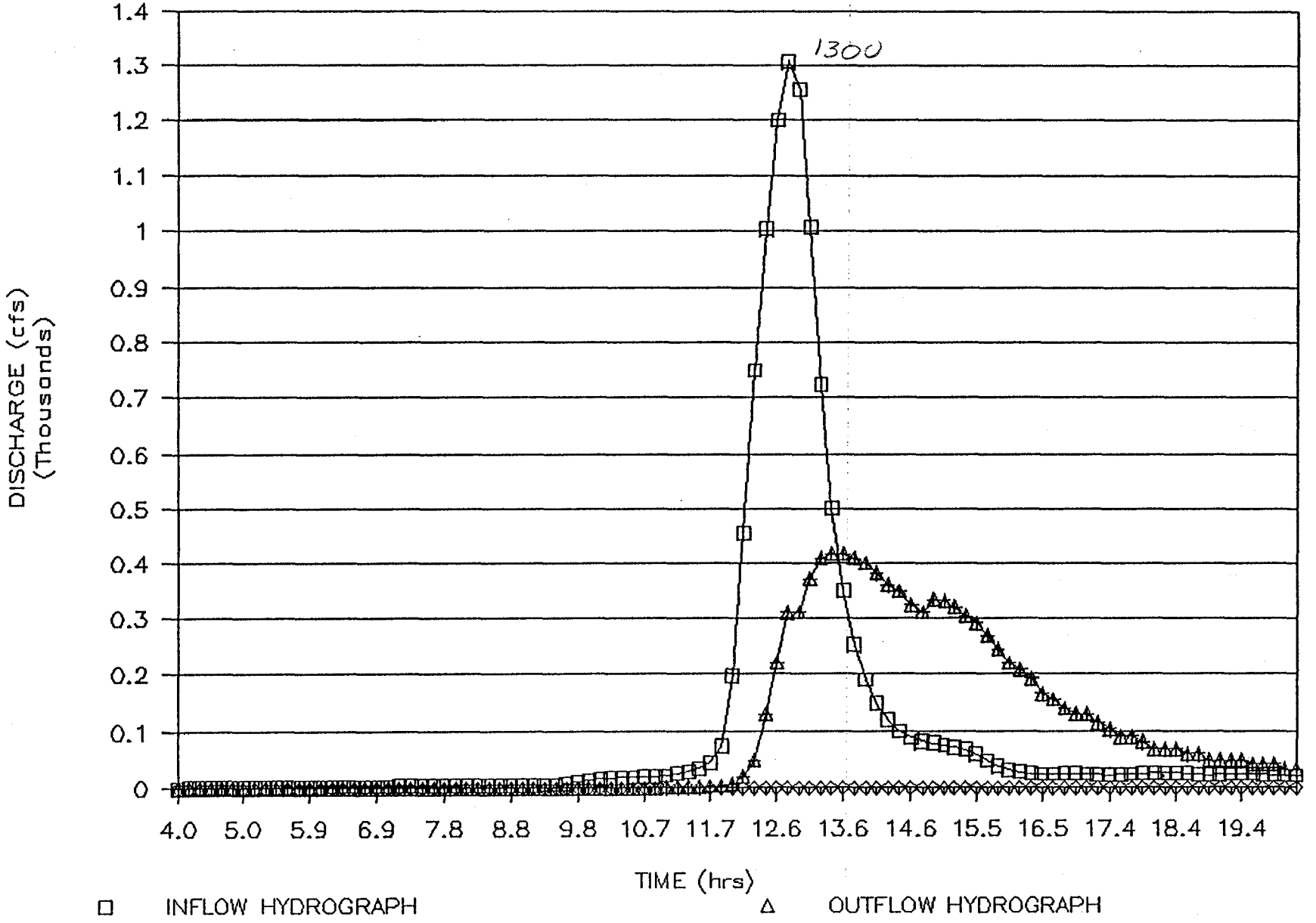

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FIGURE 3.1

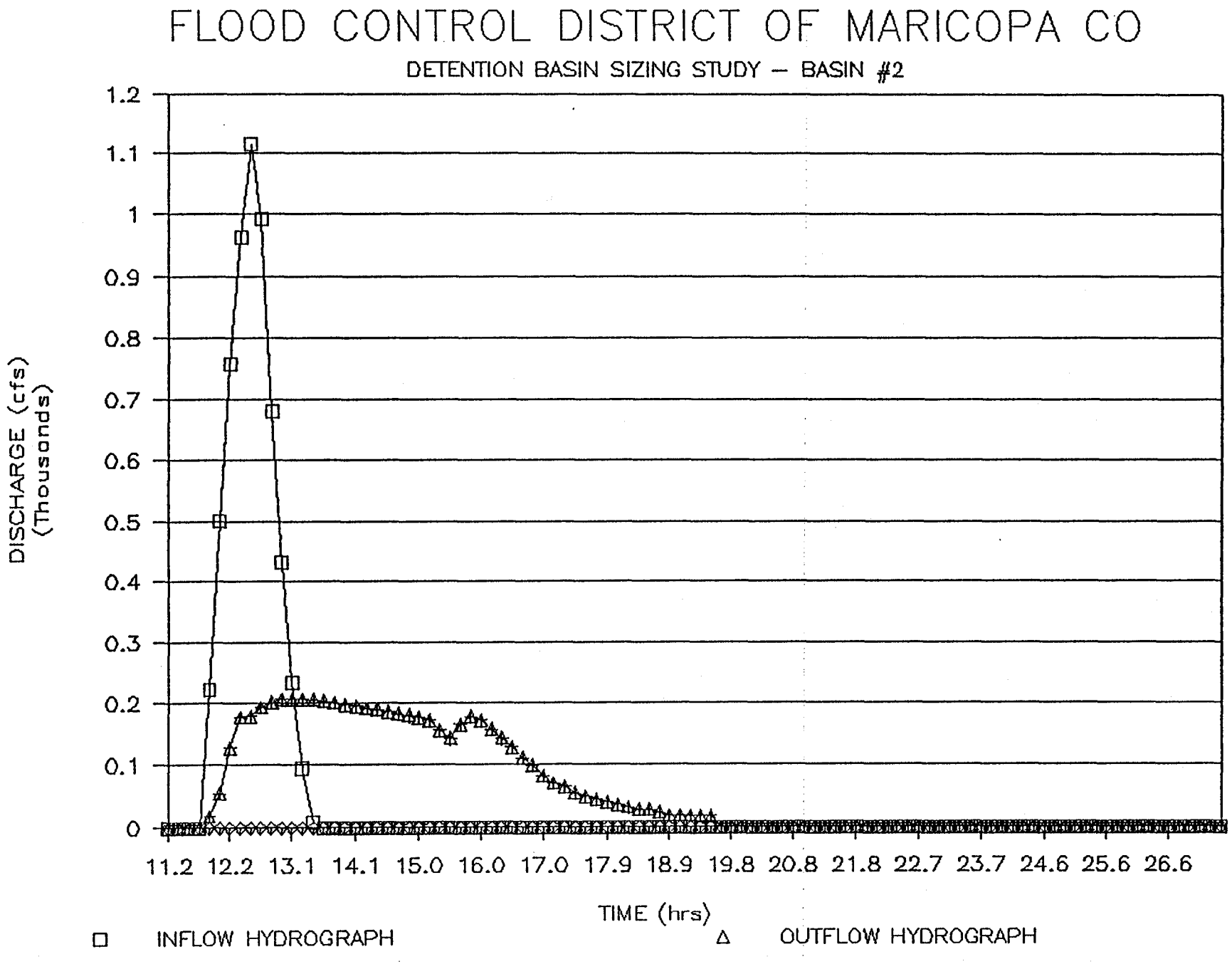

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FIGURE 3.2

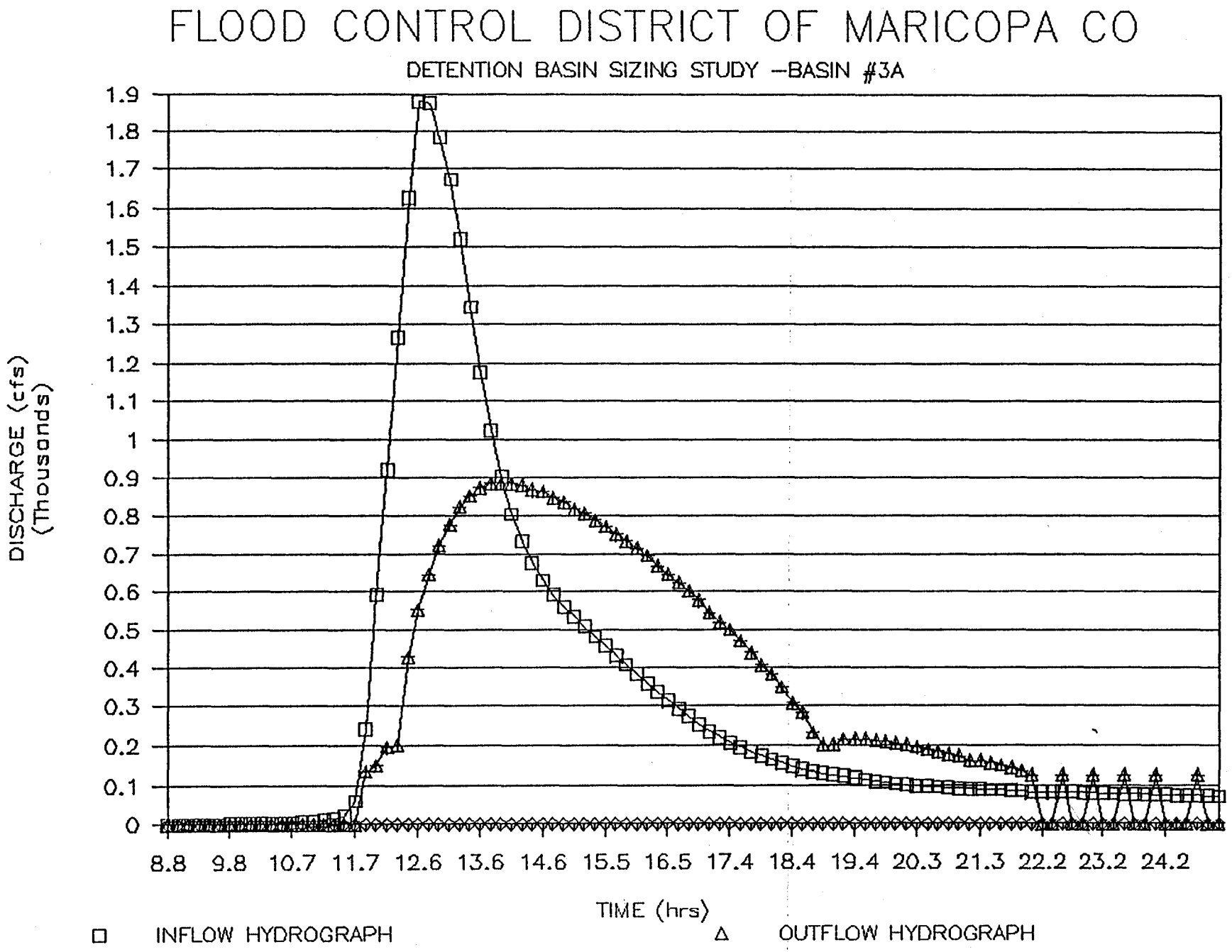

FIGURE 3.3

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DETENTION BASIN SIZING STUDY –BASIN #3B

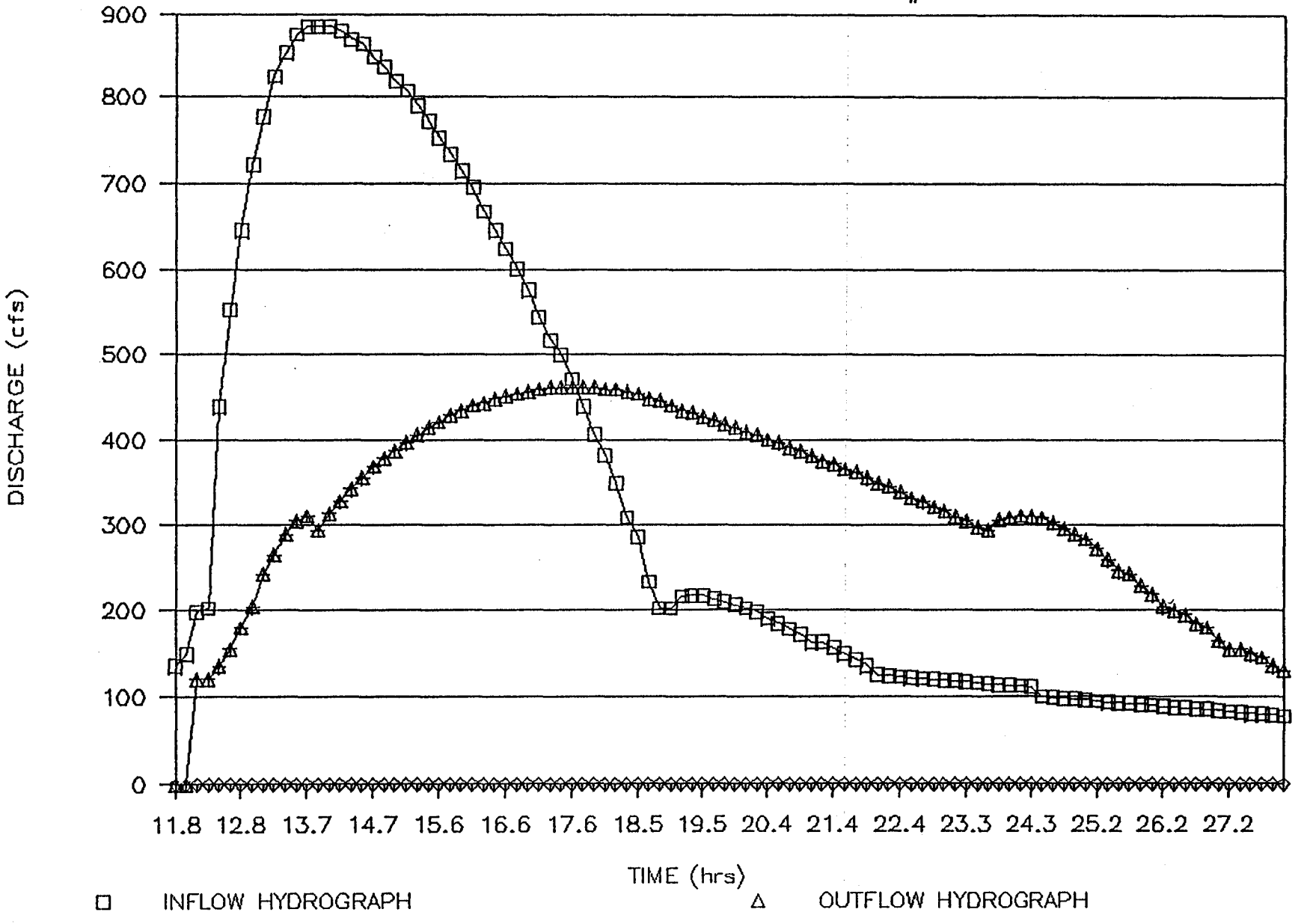

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FIGURE 3.4

FLOOD CONTROL DISTRICT OF MARICOPA CO

DETENTION BASIN SIZING STUDY – BASIN #4

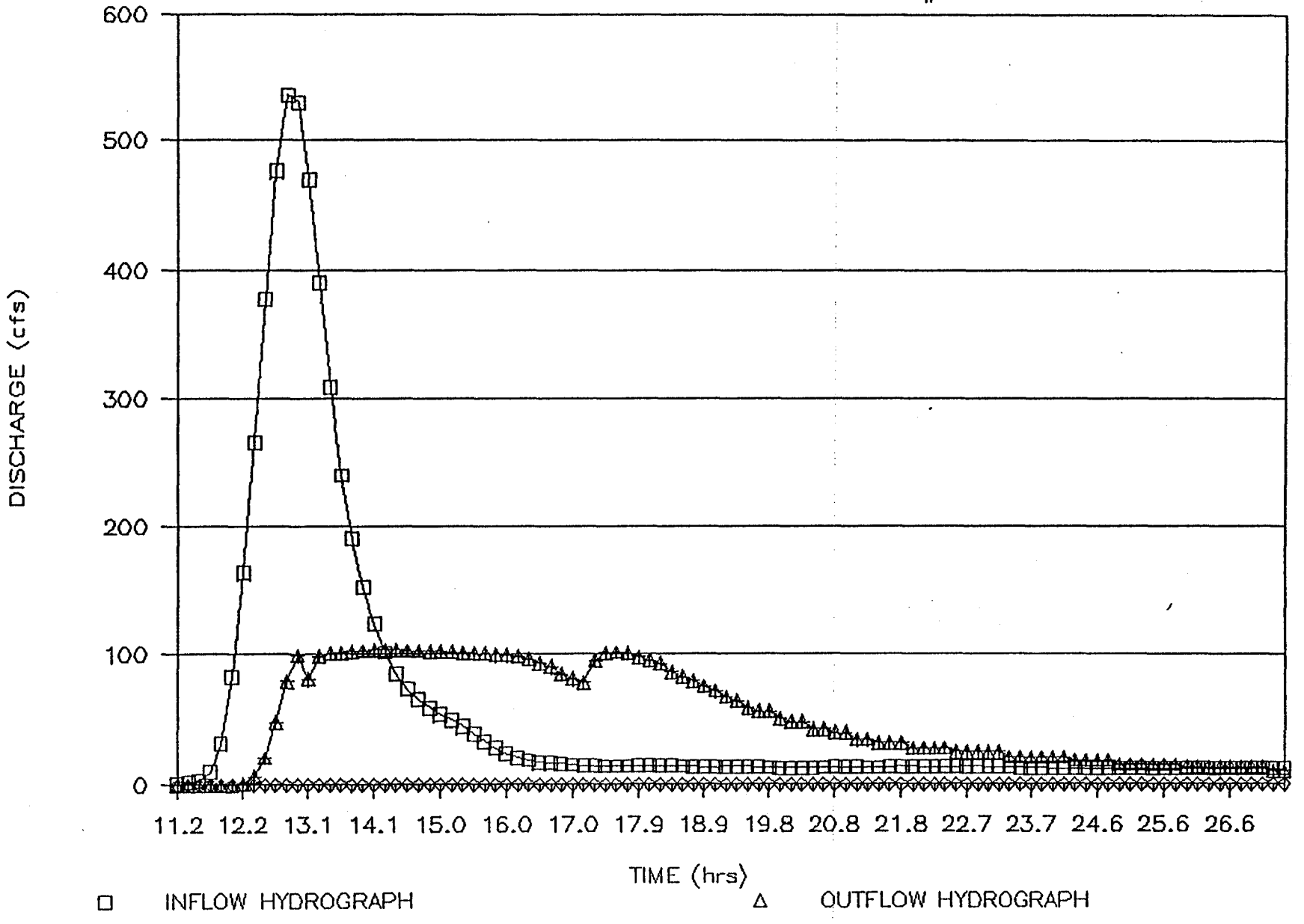

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FIGURE 3.5

FLOOD CONTROL DISTRICT OF MARICOPA CO

DETENTION BASIN SIZING STUDY – BASIN #5

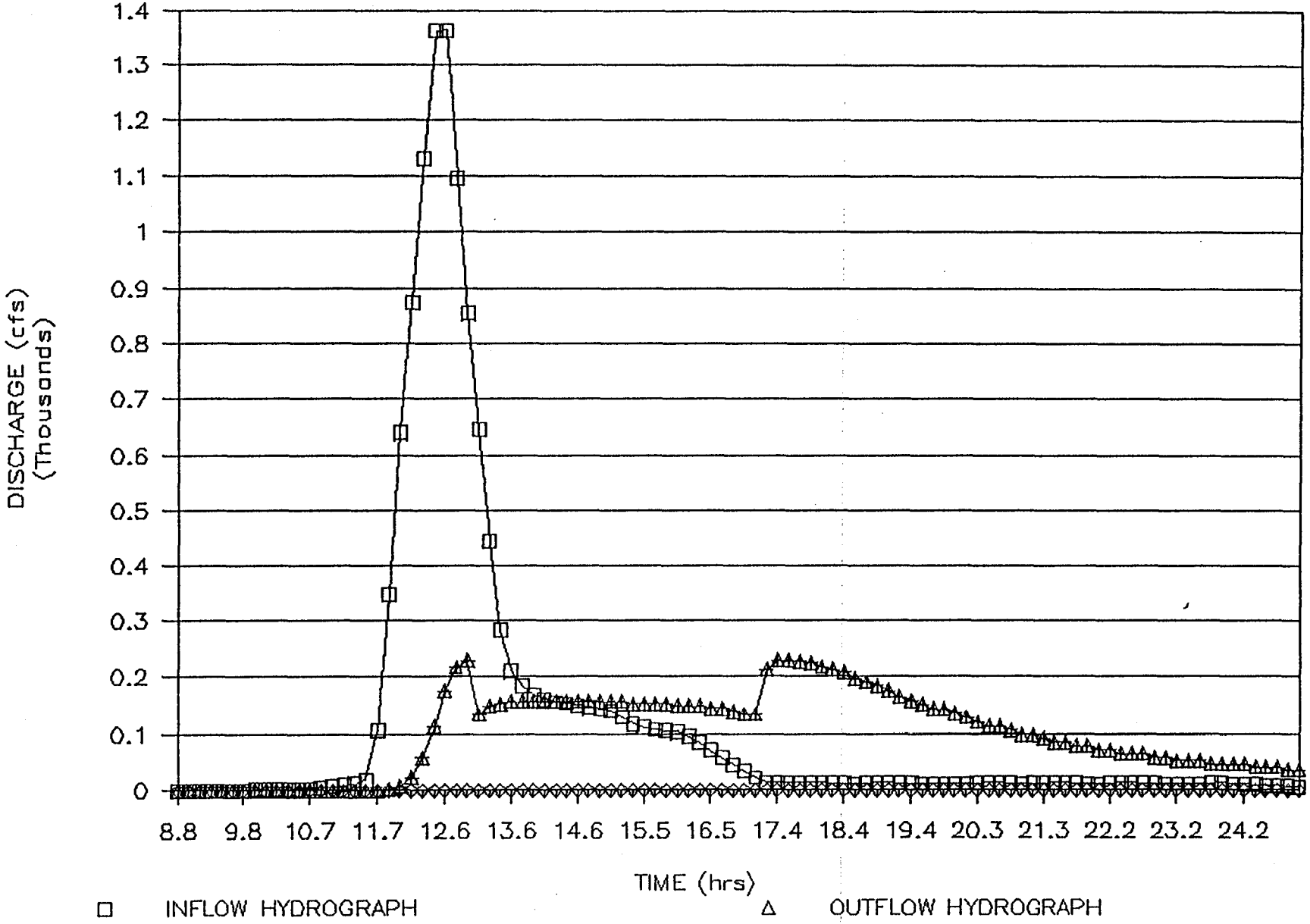

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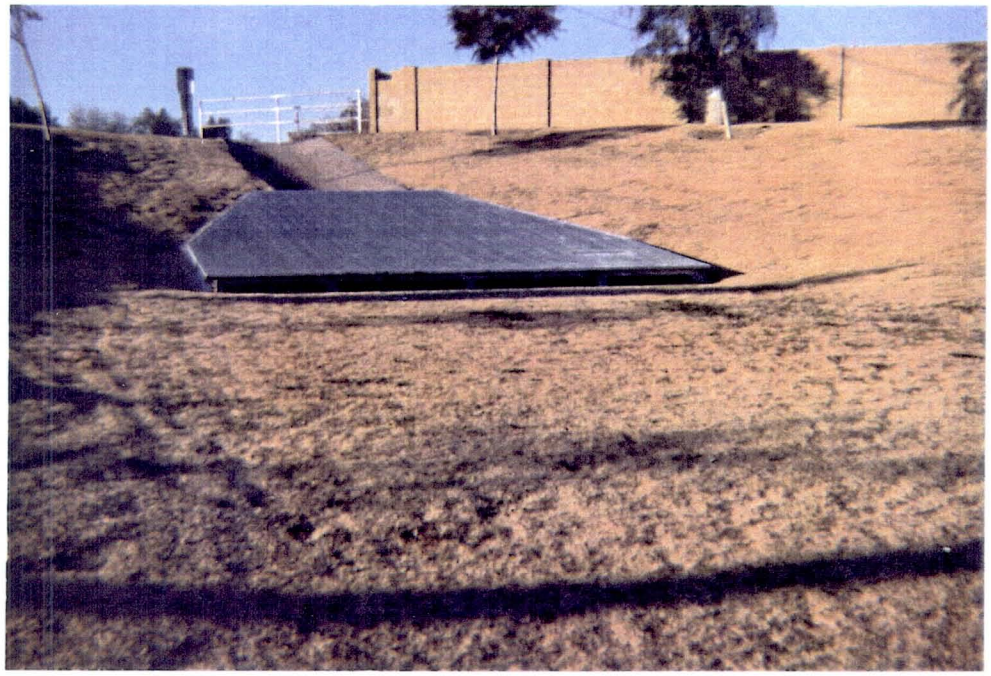
FIGURE 3.6



TYPICAL BASIN INLET STRUCTURES
(FROM CACTUS PARK, SCOTTSDALE, AZ)

FIGURE 3.7

TYPICAL BASIN OUTLET STRUCTURES

(FROM CACTUS PARK, SCOTTSDALE, AZ)

FIGURE 3.8

CHAPTER 4
DETENTION BASIN SIZING RECOMMENDATIONS

INTRODUCTION

Inflow and outflow hydrographs achievable at each detention site are presented in Chapter 3. This chapter summarizes the preliminary detention basin geometry at each site, from which the hydrographs in Chapter 3 were derived.

Design parameters for each basin are summarized in tabular form on a separate page for each basin. A summary of each recommended detention basin follows.

BASIN NUMBER 1 - UPPER EAST FORK AT BEARDSLEY ROAD

Property Location

Figure 4.1 shows the location of Basin Number 1. The property is located along the Upper East Fork of Cave Creek north of Beardsley Road, and west of the 28th Street Alignment. The site is rectangular in shape, being approximately 1100 feet long by 780 feet wide, and comprising approximately 20 acres.

Basin Hydrology

Peak inflow:	1307 cfs at 12.8 hours
Peak outflow:	418 cfs at 13.4 hours
Maximum water depth:	5.1 ft
Inflow/Outflow Hydrographs:	See Figure 3.1
Volume at maximum water depth:	86 acre-feet

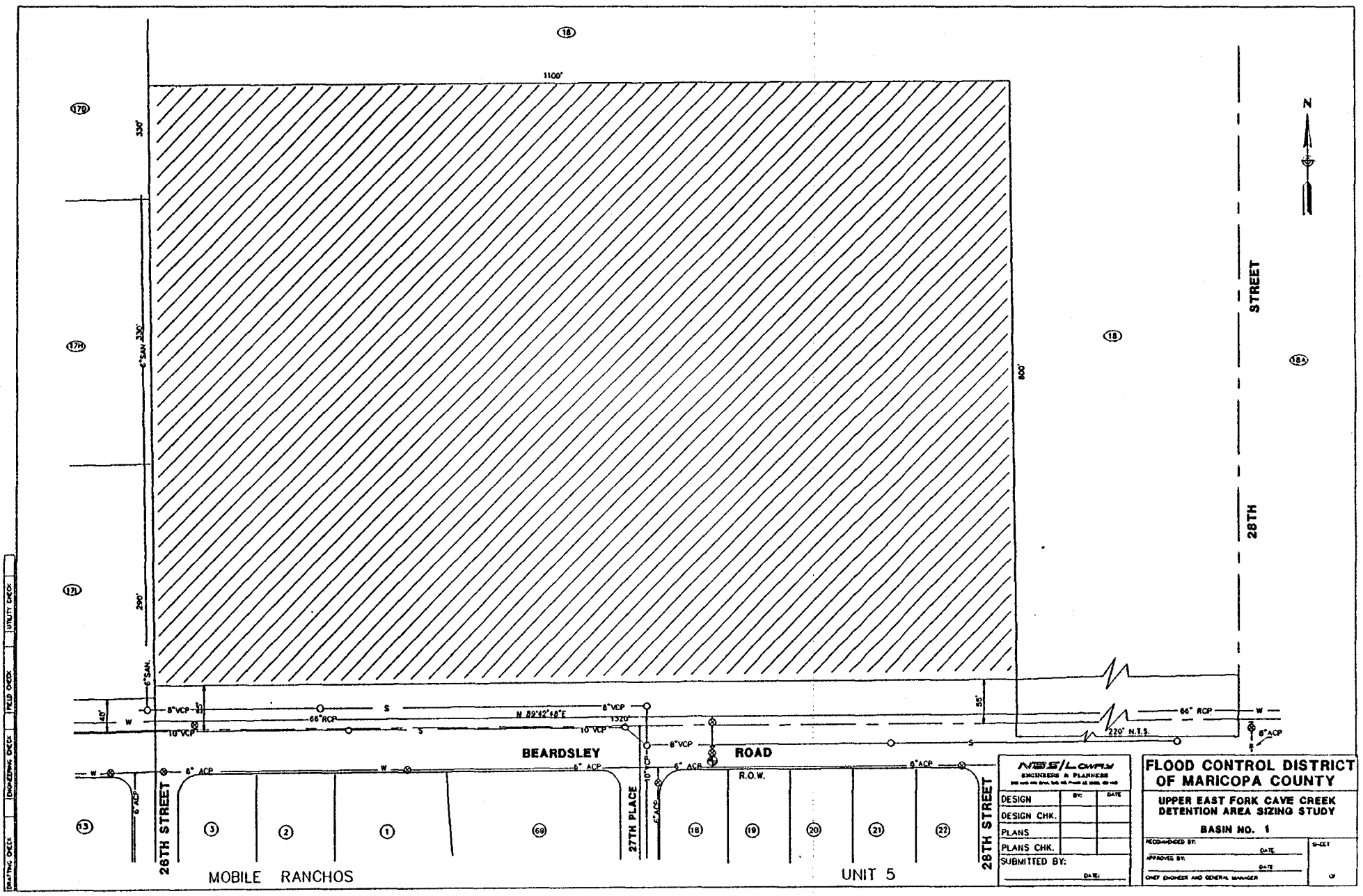
Basin Geometry

Top elevation:	1497 ft
Floor elevation:	1491 ft
Maximum depth:	6 ft (limited by need to clear 60" water line in Beardsley)
Sideslopes:	4:1
Top Dimensions:	1060 ft x 740 ft
Top Area:	18.0 acres

Outlet Structure

Culvert:	4 - 48" concrete pipes
Inlet Invert:	1491 ft
Hydraulic Control:	Outlet Control

Estimated Cost: $1,206,450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6"SAN.
6"SAN.
800'
55'
40'
8"VCP
66"RCP
10"VCP
N 89°42'48"E
1320'
8"VCP
10"VCP
8"VCP
66" RCP
220' N.T.S.
8"ACP
BEARDSLEY
ROAD
R.O.W.
6" ACP
6" ACP
6" ACP
6" ACP
6" ACP
26TH STREET
27TH PLACE
28TH STREET
28TH STREET
MOBILE RANCHOS
UNIT 5
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NISI/LOWRY
ENGINEERS & PLANNERS
DESIGN
DESIGN CHK.
PLANS
PLANS CHK.
SUBMITTED BY:
DATE:
FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
UPPER EAST FORK CAVE CREEK
DETENTION AREA SIZING STUDY
BASIN NO. 1
RECOMMENDED BY:
APPROVED BY:
CHIEF ENGINEER AND GENERAL MANAGER
SHEET
OF

FIGURE NO. 4.1

BASIN NUMBER 2 - 9TH STREET AT UNION HILLS DRIVE

Property Location

Figure 4.2 shows the location of Basin Number 2. The property is fronted on the west by 9th Street, and on the east by 12th Street. It is bounded on the north side by Union Hills Drive. The site is rectangular in shape, being approximately 1250 feet long and 290 feet wide.

Basin Hydrology

Peak inflow:	1115 cfs at 12.5 hours
Peak outflow:	206 cfs at 13.1 hours
Maximum water depth:	9.0 ft
Inflow/Outflow Hydrographs:	See Figure 3.2
Volume at maximum water depth:	57 acre-feet

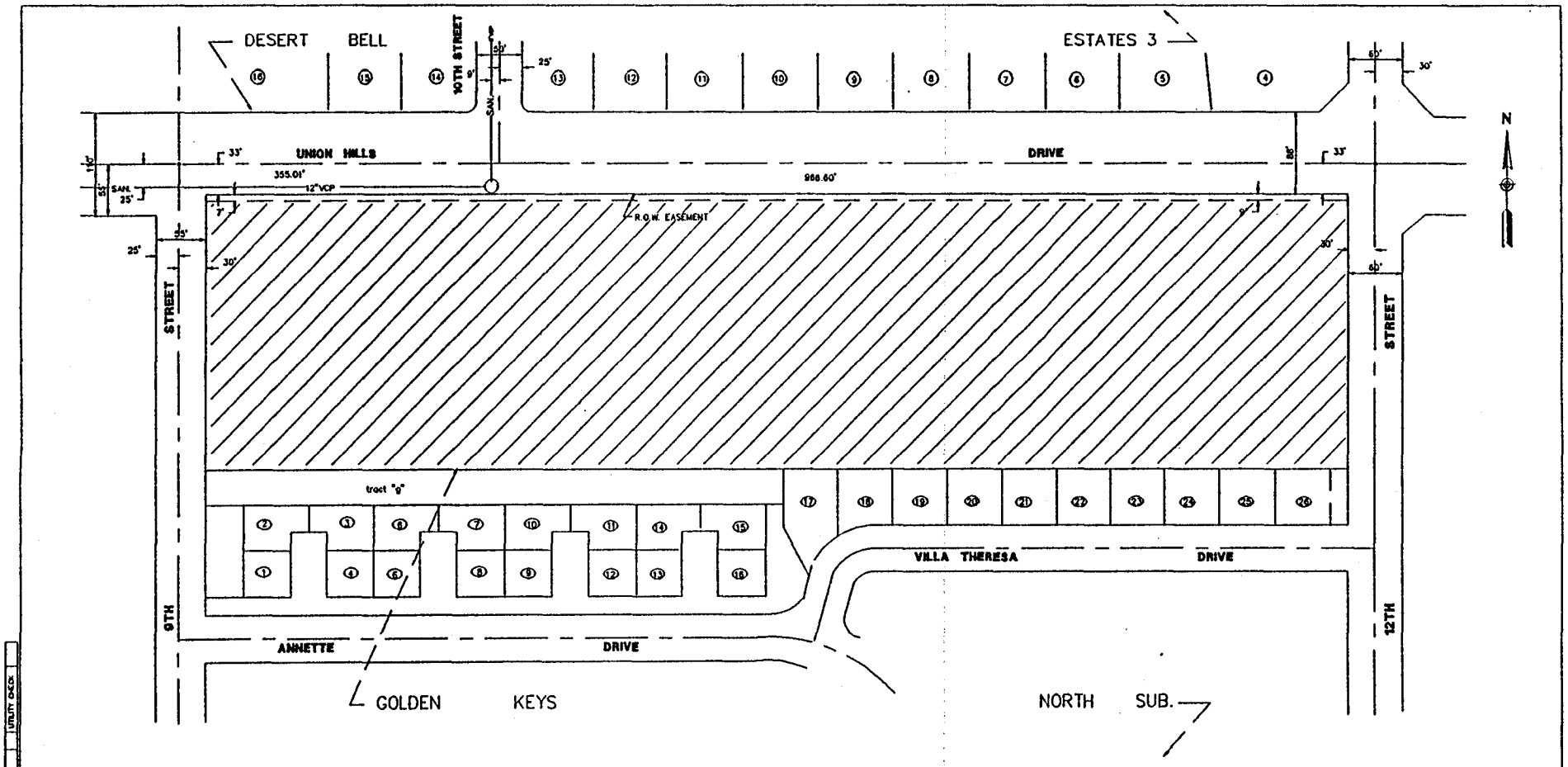
Basin Geometry

Top elevation:	1402 ft
Floor elevation:	1392 ft
Maximum depth:	10 ft
Sideslopes:	4:1
Top Dimensions:	1220 ft x 280 ft
Top Area:	7.6 acres

Outlet Structure

Culvert:	1 - 60" concrete pipe
Inlet Invert:	1391 ft
Hydraulic Control:	Outlet Control

Estimated Cost: $ 784,240



NBS/LOWRY ENGINEERS & PLANNERS		
DESIGN	BY	DATE
DESIGN CHK.		
PLANS		
PLANS CHK.		
SUBMITTED BY: DATE:		

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

UPPER EAST FORK CAVE CREEK DETENTION AREA SIZING STUDY

BASIN NO. 2

RECOMMENDED BY: DATE:
APPROVED BY: DATE:
CHIEF ENGINEER AND GENERAL MANAGER

SHEET OF

DRAFTING CHECK | ENGINEERING CHECK | FIELD CHECK | UTILITY CHECK

FIGURE NO. 4.2

BASIN NUMBER 3A - UPPER EAST FORK AT CAVE CREEK ROAD

Property Location

Figure 4.3 shows the location of Basin 3A. The property is located along the Upper East Fork of Cave Creek. It is bounded on the north by John Cabot Drive, on the south by Grovers Avenue, on the east by Cave Creek Road, and on the West by the 22nd Street Alignment. The site is rectangular in shape, being approximately 1320 feet long by 660 feet wide, and comprising approximately 20 acres. The northwest corner of the 20 acre property is developed, and is therefore excluded.

Basin Hydrology

Peak inflow:	1879 cfs at 12.6 hours
Peak outflow:	885 cfs at 13.8 hours
Maximum water depth:	9.6 ft
Inflow/Outflow Hydrographs:	See Figure 3.3
Volume at maximum water depth:	120 acre-feet

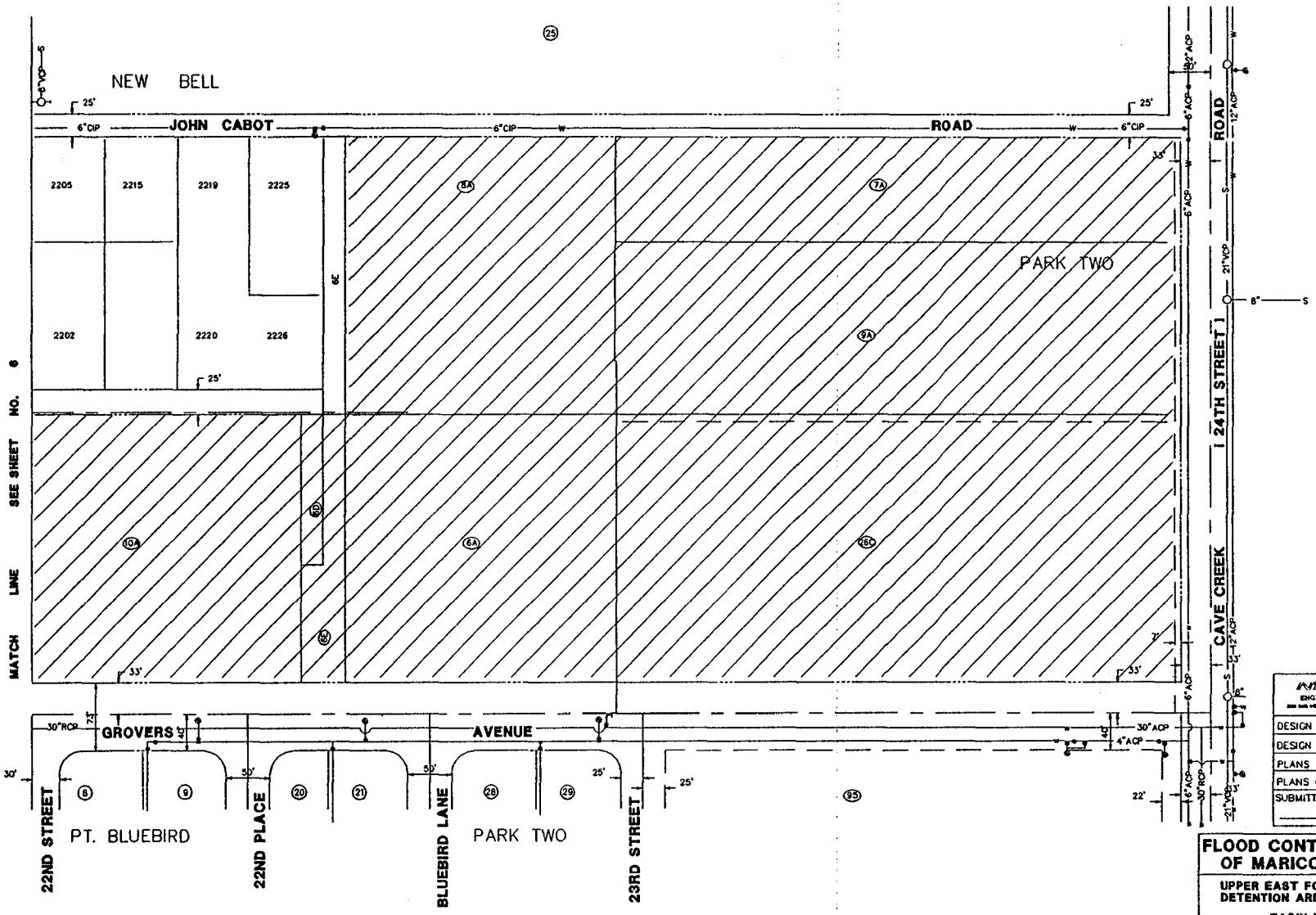
Basin Geometry

Top elevation:	1440 ft
Floor elevation:	1430 ft
Maximum depth:	10 ft
Sideslopes:	4:1
Top Dimensions:	1000 ft x 650 ft
Top Area:	14.9 acres

Outlet Structure

Culvert:	3 - 54" concrete pipe
Inlet Invert:	1427.5 ft
Hydraulic Control:	Inlet Control

Estimated Cost: $2,232,100



	BY:	DATE
DESIGN		
DESIGN CHK.		
PLANS		
PLANS CHK.		
SUBMITTED BY:		

KIESS/LOWRY ENGINEERS & PLANNERS

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

UPPER EAST FORK CAVE CREEK DETENTION AREA SIZING STUDY

BASIN NO. 3A

RECOMMENDED BY: DATE:

APPROVED BY: DATE:

CHIEF ENGINEER AND GENERAL MANAGER

SHEET OF

DRAFTING CHECK | ENGINEERING CHECK | FIELD CHECK | UTILITY CHECK

FIGURE NO. 4.3

BASIN NUMBER 3B - UPPER EAST FORK AT 20TH STREET

Property Location

Figure 4.4 shows the location of Basin 3B. The property is located along the Upper East Fork of Cave Creek, and is immediately downstream from Basin 3A. It is bounded on the south by the Contention Lane Alignment, on the north by Grovers Avenue, on the west by 20th Street, and on the east by the 22nd Street Alignment. The site is rectangular in shape, being approximately 1320 feet long by 660 feet wide, and comprising approximately 20 acres.

Basin Hydrology

Peak inflow:	885 cfs at 13.8 hours
Peak outflow:	462 cfs at 17.2 hours
Maximum water depth:	9.4 ft
Inflow/Outflow Hydrographs:	See Figure 3.4
Volume at maximum water depth:	155 acre-feet

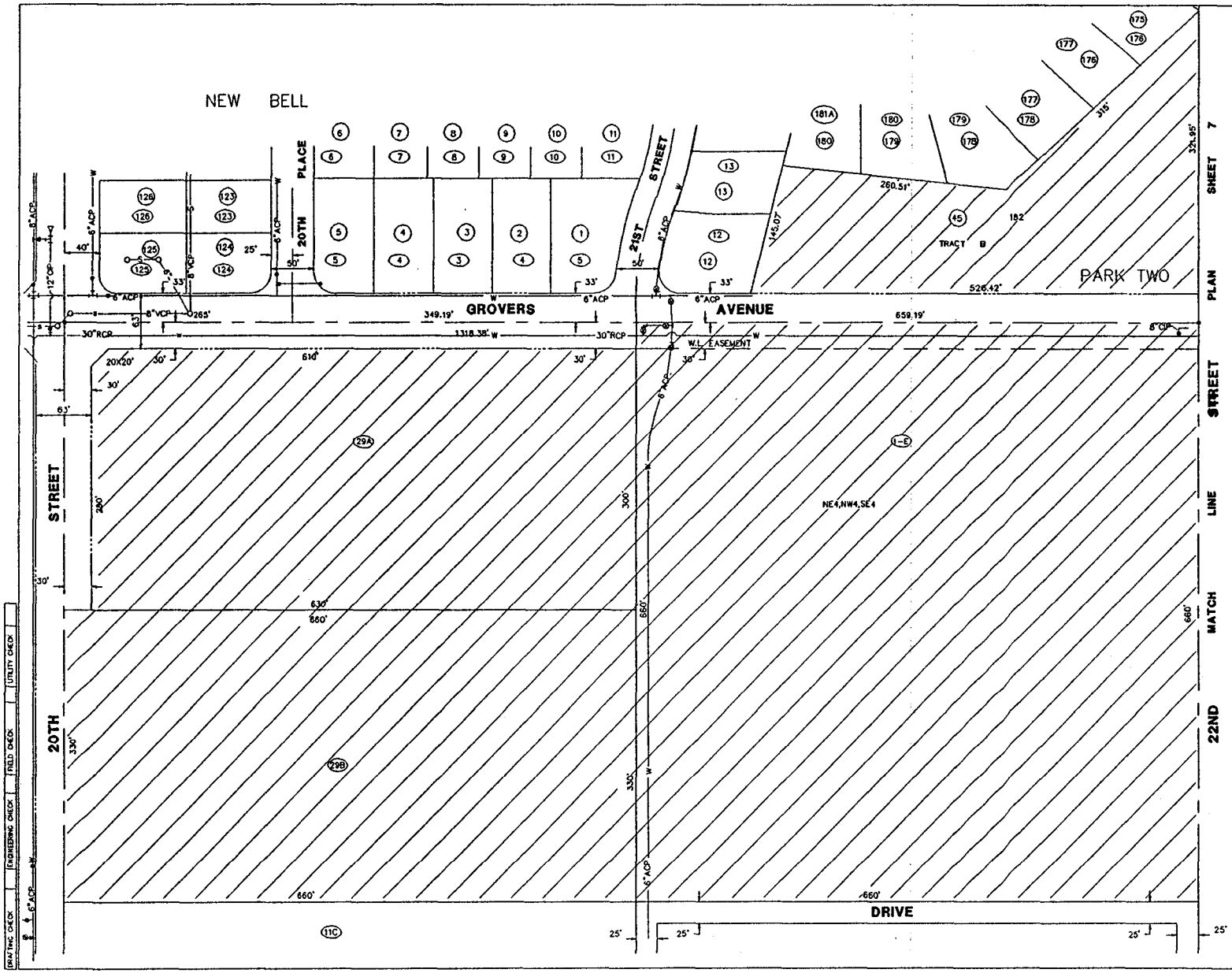
Basin Geometry

Top elevation:	1432 ft
Floor elevation:	1422 ft
Maximum depth:	10 ft
Sideslopes:	4:1
Top Dimensions:	1300 ft x 640 ft
Top Area:	19.1 acres

Outlet Structure

Culvert:	1 - 84" concrete pipe
Inlet Invert:	1419 ft
Hydraulic Control:	Outlet Control

Estimated Cost: $2,204,730



DRAFTING CHECK	ENGINEERING CHECK	FIELD CHECK	UTILITY CHECK

FIGURE NO. 4.4

WESTLOWTY
ENGINEERS & PLANNERS

DESIGN	BY:	DATE
DESIGN CHK.		
PLANS		
PLANS CHK.		
SUBMITTED BY: DATE:		

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

UPPER EAST FORK CAVE CREEK DETENTION AREA SIZING STUDY

BASIN NO. 3B

RECOMMENDED BY: DATE:
APPROVED BY: DATE:
CHIEF ENGINEER AND GENERAL MANAGER

SHEET OF

BASIN NUMBER 4 - PARADISE VALLEY PARK

Property Location

Figure 4.5 shows the location of Basin Number 4. The available property is irregular in shape, and must be shared with the proposed Maricopa County Library. Approximately 9 acres are available. Additional land can be obtained if overflow onto adjacent baseball diamonds is permitted.

Basin Hydrology

Peak inflow:	535 cfs at 12.8 hours
Peak outflow:	103 cfs at 13.9 hours
Maximum water depth:	5.8 ft
Inflow/Outflow Hydrographs:	See Figure 3.5
Volume at maximum water depth:	45 acre-feet

Basin Geometry

Top elevation:	1465 ft
Floor elevation:	1458 ft
Maximum depth:	7 ft
Sideslopes:	4:1
Top Dimensions:	1000 ft x 380 ft
Top Area:	8.7 acres

Outlet Structure

Culvert:	1 - 48" concrete pipe
Inlet Invert:	1448 ft
Hydraulic Control:	Outlet Control

Estimated Cost: $ 860,110

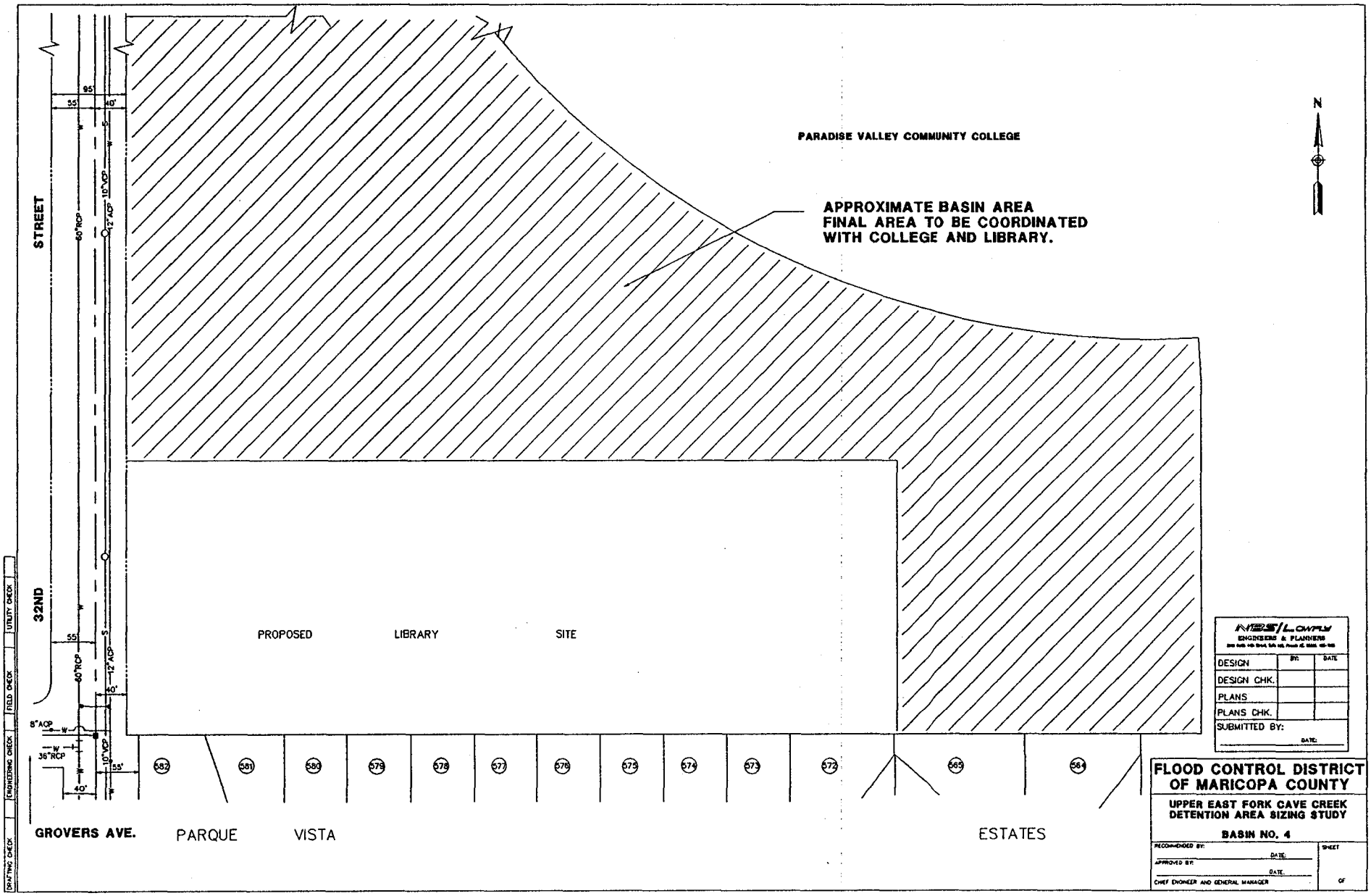

PARADISE VALLEY COMMUNITY COLLEGE
APPROXIMATE BASIN AREA
FINAL AREA TO BE COORDINATED
WITH COLLEGE AND LIBRARY.
N
32ND STREET
95'
55'
40'
60"RCP
10"VCP
12"ACP
8"ACP
36"RCP
PROPOSED LIBRARY SITE
582
581
580
579
578
577
576
575
574
573
572
569
564
GROVERS AVE.
PARQUE VISTA ESTATES
UTILITY CHECK
FIELD CHECK
ENGINEERING CHECK
DRAFTING CHECK
WESTLAKE/LOWRY
ENGINEERS & PLANNERS
DESIGN
DESIGN CHK.
PLANS
PLANS CHK.
SUBMITTED BY:
BY:
DATE
FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
UPPER EAST FORK CAVE CREEK
DETENTION AREA SIZING STUDY
BASIN NO. 4
RECOMMENDED BY:
APPROVED BY:
CHIEF ENGINEER AND GENERAL MANAGER
SHEET
OF

FIGURE NO. 4.5

BASIN NUMBER 5 - 9TH STREET AT CAMPOBELLO

Property Location

Figure 4.6 shows the location of Basin Number 5. The property is fronted on the west by 9th Street, and on the east by 12th Street. It is bounded on the south side by the Campobello Alignment. The site is irregular in shape, being approximately 1250 feet long and varying in width from 840 feet at 9th Street to 980 feet at 12th Street. The site includes approximately 26 acres.

Basin Hydrology

Peak inflow:	1363 cfs at 12.6 hours
Peak outflow:	157 cfs at 13.6 hours
Maximum water depth:	4.7 ft
Inflow/Outflow Hydrographs:	See Figure 3.6
Volume at maximum water depth:	88 acre-feet

Basin Geometry

Top elevation:	1388 ft
Floor elevation:	1382 ft
Maximum depth:	6 ft
Sideslopes:	4:1
Top Dimensions:	950 ft x 910 ft
Top Area:	19.9 acres

Outlet Structure

Culvert:	1 - 60" concrete pipe
Inlet Invert:	1382 ft
Hydraulic Control:	Outlet Control - Unsubmerged

Estimated Cost: $1,466,460

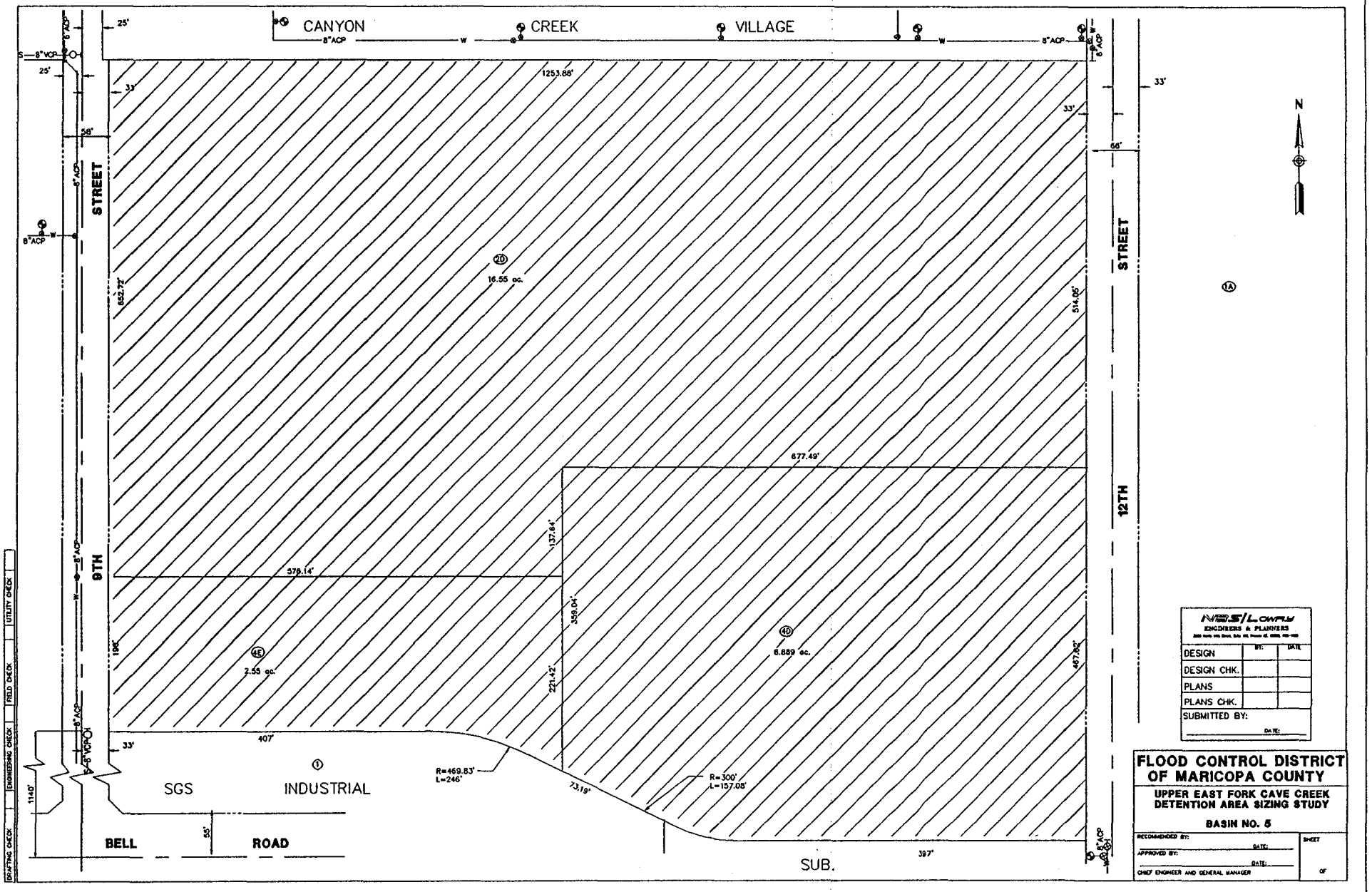

CANYON
CREEK
VILLAGE
8"ACP
8"VCP
25'
33'
58'
66'
8TH
STREET
12TH
STREET
1253.88'
652.72'
514.05'
677.49'
578.14'
137.64'
359.04'
221.42'
467.52'
198'
407'
73.19'
397'
1140'
55'
20
16.55 ac.
4E
2.55 ac.
4D
6.889 ac.
1A
1
R=469.83'
L=246'
R=300'
L=157.08'
SGS
INDUSTRIAL
BELL
ROAD
SUB.
N
NESLOWRY
ENGINEERS & PLANNERS
DESIGN
DESIGN CHK.
PLANS
PLANS CHK.
SUBMITTED BY:
DATE:
FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
UPPER EAST FORK CAVE CREEK
DETENTION AREA SIZING STUDY
BASIN NO. 5
RECOMMENDED BY:
APPROVED BY:
CHIEF ENGINEER AND GENERAL MANAGER
SHEET
OF
DRAFTING CHECK
SCHEDULING CHECK
FIELD CHECK
UTILITY CHECK

FIGURE NO. 4.6

UPPER EAST FORK CAVE CREEK CHANNEL - UNION HILLS DR TO BEARDSLEY RD

Channel Location

The channel is located near its historic route between Union Hills Drive and Beardsley Road. Slight modifications in alignment have been made for improved hydraulics and to facilitate right of way acquisition.

Computed Channel Flows

The existing condition 100 year peak discharge in the East Fork was computed in the ADMS study to be 1315 cfs at Beardsley Road and 1610 cfs at Union Hills Drive. With the proposed Beardsley Road detention basin in place the 100 year peak discharges are reduced to 483 cfs at Beardsley Road and 1310 cfs at Union Hills Drive.

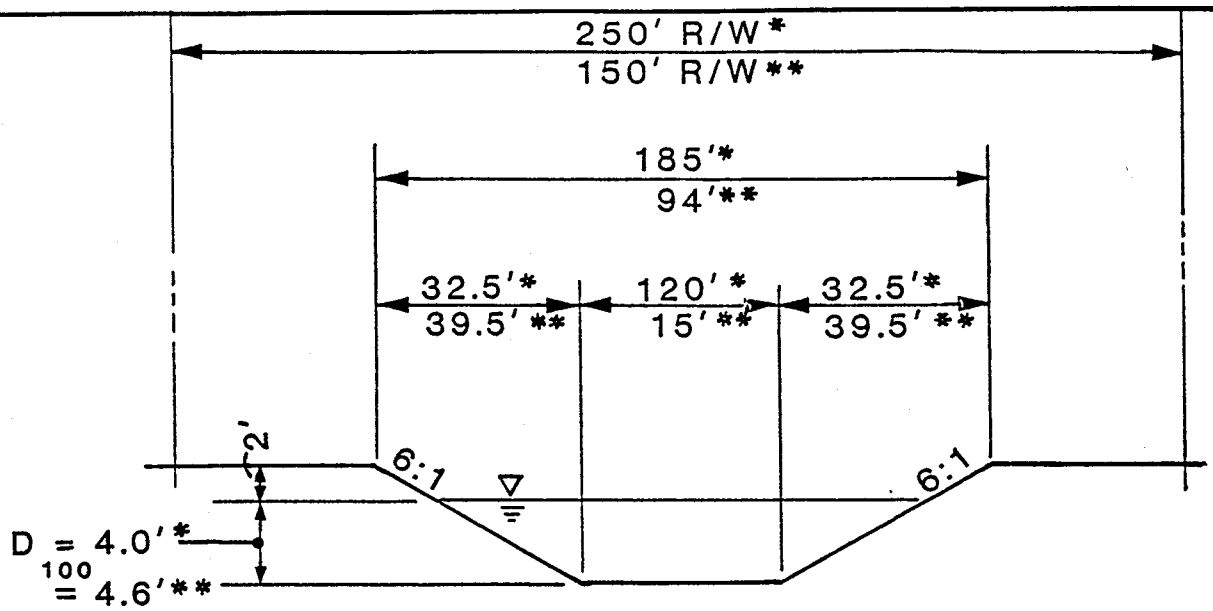
Channel Geometry

An earth lined channel is proposed for this reach of the Upper East Fork Cave Creek with 6 foot horizontal to 1 foot vertical sideslopes. Drop structures will be used to avoid erosive velocities. The reach is divided into two segments each with a different channel bottom width. A 120 foot bottom width is proposed between Union Hills Drive and Utopia Road and a 15 foot bottom width from Utopia Road to Beardsley Road. Typical channel cross sections are shown on **Figure 4.7**.

Land Requirements

Conservative right of way requirements were shown in the ADMS to provide planners with flexibility in developing the linear park concept. A 250 foot right of way was recommended from Union Hills to Utopia and a 150 foot right of way from Utopia to Beardsley. These right of way requirements could be reduced if necessary. If freeboard is reduced to one foot and a 30 foot access is provided on one side of

the channel, the right of way could be reduced to a practical minimum of 210 feet from Union Hills to Utopia and 115 feet from Utopia to Beardsley. Minimum right of way requirements as well as the ADMS recommended right of way are shown on **Figure 4.7**.

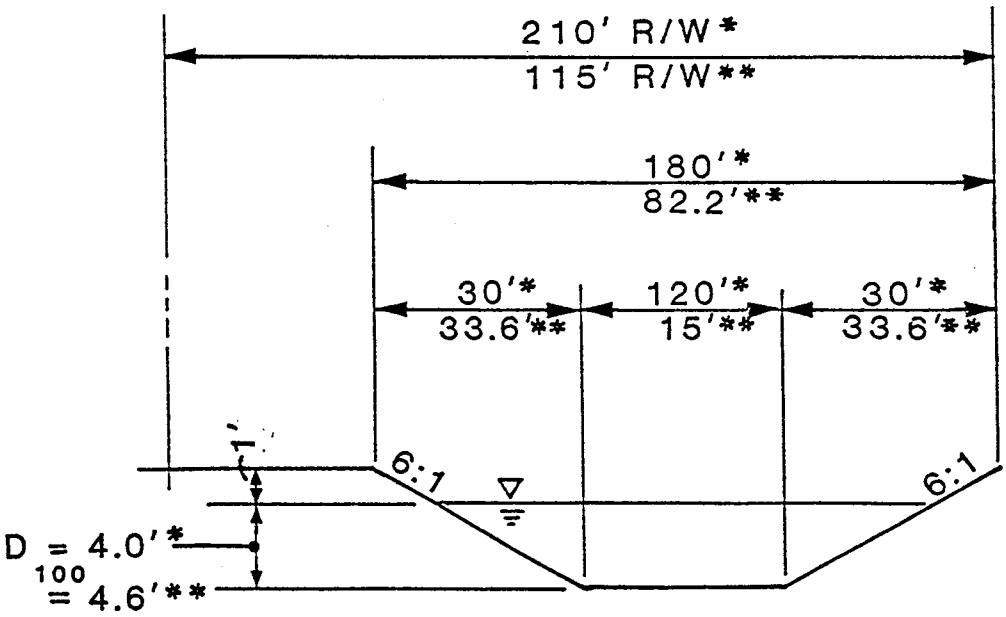


* = UNION HILLS DR. TO UTOPIA RD.
** = UTOPIA RD. TO BEARDSLEY RD.

TYPICAL SECTION

AREA DRAINAGE MASTER STUDY
EARTH LINED DRAINAGE CHANNEL

NOT TO SCALE



* = UNION HILLS DR. TO UTOPIA RD.
** = UTOPIA RD. TO BEARDSLEY RD.

TYPICAL SECTION

REDUCED RIGHT OF WAY
EARTH LINED DRAINAGE CHANNEL

NOT TO SCALE

NBS/LOWRY

FIGURE 4.7

SUMMARY

Proposed Detention Basins

The recommended sizing and design criteria for each detention basin have been presented in tabular form in this chapter for each basin. Table 4.1 summarizes the recommendations made in this report for detention basin sizing for all six basins.

Preliminary Cost Estimate

Table 4.2 summarizes the estimated costs for each of the six recommended detention basins.

TABLE 4.1 - DETENTION BASIN SIZING RECOMMENDATIONS

	BASIN 1	BASIN 2	BASIN 3A	BASIN 3B	BASIN 4	BASIN 5
LOCATION	BEARDSLEY RD @ EAST FORK	UNION HILLS @ 9TH ST.	CAVE CRK. RD @ EAST FORK	20th St. @ EAST FORK	32nd ST. @ P.V. COLLEGE	9th ST NORTH OF BELL RD
CONSTRAINTS	60 IN. W/L IN BEARDSLEY LIMITS DEPTH	10 FT. MAX DEPTH	10 FT. MAX DEPTH	10 FT. MAX DEPTH	6 FT. MAX DEPTH	7 FT. MAX DEPTH
FLEXIBILITY	NO	YES	NO	NO	YES	YES
PEAK DISCHARGE	418 CFS	206 CFS	885 CFS	462 CFS	103 CFS	229 CFS
MAX. WATER DEPTH	5.1 FT	9 FT	9.6 FT	9.4 FT	5.8 FT	4.7 FT
FREEBOARD	0.9 FT	1.0 FT	0.4 FT	0.6 FT	1.2 FT	1.3 FT
VOLUME	86.1 A-F	57 A-F	119.8 A-F	154.8 A-F	44.7 A-F	87.5 A-F
OUTLET	4 - 48" RCP	1 - 60" RCP	3 - 54" RCP	1 - 84" RCP	1 - 48" RCP	1 - 60" RCP
CONTROL	OUTLET	OUTLET	INLET	OUTLET	OUTLET	OUTLET
PEAK INFLOW	1307 CFS	1115 CFS	1879 CFS	885 CFS	535 CFS	1363 CFS
DRAIN TIME	22-35 HRS	7 HRS	10 HRS	14 HRS	26-35 HRS	27 HRS

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
UPPER EAST FORK CAVE CREEK
DETENTION BASIN SIZING STUDY
PRELIMINARY DESIGN CONSTRUCTION COST ESTIMATE SUMMARY

No.	ITEM	BASIN NO. 1 COST	BASIN NO. 2 COST	BASIN NO. 3A COST	BASIN NO. 3B COST	BASIN NO. 4 COST	BASIN NO. 5 COST
1	R/O/W AQUISITION						
2	ENGINEERING						
	EARTHWORK	$651,600	$416,880	$871,200	$993,800	$346,560	$696,960
	OUTLET STRUCTURE	$21,920	$17,040	$25,810	$29,160	$15,810	$22,040
	INLET STRUCTURE	$10,000	$9,800	$20,800	$12,980	$10,250	$30,000
	SEDIMENT BASIN	$26,140	$22,200	$21,600	$17,700	$10,700	$27,260
	LOW FLOW BYPASS	$48,000	$0	$350,000	$400,000	$72,000	$180,000
	OUTLET CULVERT	$36,000	$75,000	$264,000	$79,500	$136,800	
3	LANDSCAPING						
	VEGETATION	$50,000	$20,000	$50,000	$50,000	$22,500	$65,000
	IRRIGATION	$50,000	$20,000	$50,000	$50,000	$22,500	$65,000
	RECREATION						
4	SUBTOTAL	$893,660	$580,920	$1,653,410	$1,633,140	$637,120	$1,086,260
5	CONTINGENCIES						
	MISC CONTINGENCY	$89,370	$58,090	$165,340	$163,310	$63,710	$108,630
	ENGINEERING & ADMIN	$134,050	$87,140	$248,010	$244,970	$95,570	$162,940
	FIELD ENGINEERING	$89,370	$58,090	$165,340	$163,310	$63,710	$108,630
	FINANCING						
6	TOTAL BASIN NO. 1	$1,206,450	$784,240	$2,232,100	$2,204,730	$860,110	$1,466,460

NBS/LOWRY

TABLE 4.2

REFERENCES

American Society of Civil Engineers Task Committee on the Design of Outlet Control Structures. Stormwater Detention Outlet Control Structures, American Society of Civil Engineers, New York, 1985.

Phoenix, City of, Storm Drain Design Manual, Storm Drains with Paving of Major Streets, August 1975.

Flood Control District of Maricopa County and NBS/Lowry. Engineering Services Agreement for Job No. FCD 88-45, approved by Maricopa County Board of Supervisors on 21 November, 1988.

McCuen, Richard H. A Guide to Hydrologic Analysis Using SCS Methods Prentice Hall, Inc., Englewood Cliffs N.J., 1982.

North Central Area Master Storm Drainage Study (East Half). Prepared for City of Phoenix by Cella Barr Associates, Phoenix, AZ, April 1981.

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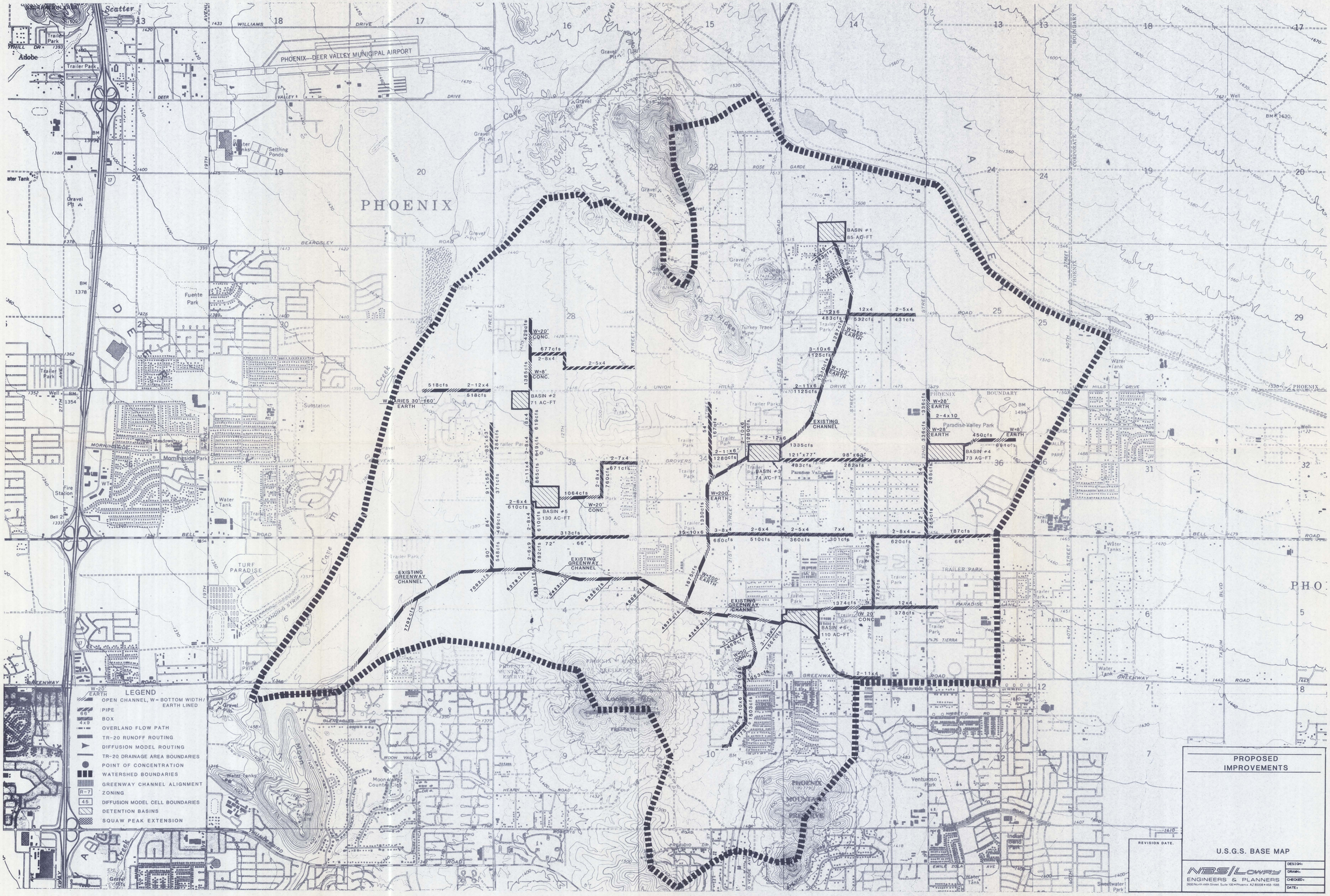
Soil Conservation Service. National Engineering Handbook, Washington D.C., 1972.

Soil Conservation Service. Technical Release Number 20 Users Manual, Washington D.C., 1982

Upper East Fork Cave Creek Area Drainage Master Study. Prepared for Flood Control District of Maricopa County by NBS/Lowry, Phoenix, AZ, October 1987.


PHOENIX
PHOENIX—DEER VALLEY MUNICIPAL AIRPORT
LEGEND
OPEN CHANNEL, W = BOTTOM WIDTH / EARTH LINED
PIPE
BOX
OVERLAND FLOW PATH
TR-20 RUNOFF ROUTING
DIFFUSION MODEL ROUTING
TR-20 DRAINAGE AREA BOUNDARIES
POINT OF CONCENTRATION
WATERSHED BOUNDARIES
GREENWAY CHANNEL ALIGNMENT
ZONING
DIFFUSION MODEL CELL BOUNDARIES
DETENTION BASINS
SQUAW PEAK EXTENSION
BASIN #1 85 AC-FT
BASIN #2 71 AC-FT
BASIN #3 74 AC-FT
BASIN #4 73 AC-FT
BASIN #5 130 AC-FT
BASIN #6 110 AC-FT
EXISTING CHANNEL
EXISTING GREENWAY CHANNEL
PHOENIX MOUNTAINS PRESERVE
PROPOSED IMPROVEMENTS
U.S.G.S. BASE MAP
REVISION DATE.
NBS/LOWRY
ENGINEERS & PLANNERS
2600 North 44th Street, Suite 100 • Phoenix, AZ 85008 • 468-1688
DESIGN:
DRAWN:
CHECKED:
DATE:

PHOENIX
PHOENIX—DEER VALLEY MUNICIPAL AIRPORT
VIA VERDE CHANNEL
LEGEND
OPEN CHANNEL, W = BOTTOM WIDTH / EARTH LINED
PIPE
BOX
OVERLAND FLOW PATH
TR-20 RUNOFF ROUTING
DIFFUSION MODEL ROUTING
TR-20 DRAINAGE AREA BOUNDARIES
POINT OF CONCENTRATION
WATERSHED BOUNDARIES
GREENWAY CHANNEL ALIGNMENT
ZONING
DIFFUSION MODEL CELL BOUNDARIES
DETENTION BASINS
SQUAW PEAK EXTENSION
TR-20 RUNOFF ROUTING
EXISTING CONDITIONS
TR-20 DRAINAGE AREAS
U.S.G.S. BASE MAP
REVISION DATE.
NBS/LOWRY
ENGINEERS & PLANNERS
DESIGN:
DRAWN:
CHECKED:
DATE:

APPENDICES

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
UPPER EAST FORK CAVE CREEK
DETENTION BASIN SIZING STUDY
PRELIMINARY DESIGN CONSTRUCTION COST ESTIMATE

DETENTION BASIN NO. 1
UPPER EAST FORK AT BEARDSLEY ROAD

No.	ITEM	QUANTITY	UNIT	UNIT COST	TOTAL COST
1	R/O/W AQUISITION		NOT INCLUDED		
2	ENGINEERING				
	EARTHWORK	162,900	C.Y	$4.00	$651,600
	OUTLET STRUCTURE	1	L.S.	$21,920	$21,920
	INLET STRUCTURE	1	L.S.	$10,000	$10,000
	SEDIMENT BASIN	1	L.S.	$26,140	$26,140
	LOW FLOW BYPASS	800	L.F.	$60	$48,000
	OUTLET CULVERT	100	L.F.	$360	$36,000
3	LANDSCAPING				
	VEGETATION	20	AC.	$2,500	$50,000
	IRRIGATION	1	L.S.	$50,000	$50,000
	RECREATION		NOT INCLUDED		
4	SUBTOTAL				$893,660
5	CONTINGENCIES				
	MISC CONTINGENCY	10%			$89,370
	ENGINEERING & ADMIN	15%			$134,050
	FIELD ENGINEERING	10%			$89,370
	FINANCING		NOT INCLUDED		
6	TOTAL BASIN NO. 1				$1,206,450

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
UPPER EAST FORK CAVE CREEK
DETENTION BASIN SIZING STUDY
PRELIMINARY DESIGN CONSTRUCTION COST ESTIMATE

DETENTION BASIN NO. 2
9TH STREET AT UNION HILLS DRIVE

No.	ITEM	QUANTITY	UNIT	UNIT COST	TOTAL COST
1	R/O/W AQUISITION		NOT INCLUDED		
2	ENGINEERING				
	EARTHWORK	104,220	C.Y	$4.00	$416,880
	OUTLET STRUCTURE	1	L.S.	$17,040	$17,040
	INLET STRUCTURE	1	L.S.	$9,800	$9,800
	SEDIMENT BASIN	1	L.S.	$22,200	$22,200
	LOW FLOW BYPASS	0	L.F.	$0	$0
	INLET CULVERT	150	L.F.	$500	$75,000
3	LANDSCAPING				
	VEGETATION	8	AC.	$2,500	$20,000
	IRRIGATION	1	L.S.	$20,000	$20,000
	RECREATION		NOT INCLUDED		
4	SUBTOTAL				$580,920
5	CONTINGENCIES				
	MISC CONTINGENCY	10%			$58,090
	ENGINEERING & ADMIN	15%			$87,140
	FIELD ENGINEERING	10%			$58,090
	FINANCING		NOT INCLUDED		
6	TOTAL BASIN NO. 2				$784,240

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
UPPER EAST FORK CAVE CREEK
DETENTION BASIN SIZING STUDY
PRELIMINARY DESIGN CONSTRUCTION COST ESTIMATE

DETENTION BASIN NO. 3A
UPPER EAST FORK AT CAVE CREEK ROAD

No.	ITEM	QUANTITY	UNIT	UNIT COST	TOTAL COST
1	R/O/W AQUISITION		NOT INCLUDED		
2	ENGINEERING				
	EARTHWORK	217,800	C.Y	$4.00	$871,200
	OUTLET STRUCTURE	1	L.S.	$25,810	$25,810
	INLET STRUCTURES	1	L.S.	$20,800	$20,800
	SEDIMENT BASINS	1	L.S.	$21,600	$21,600
	LOW FLOW BYPASS, 60"	2800	L.F.	$125	$350,000
	INLET CULVERT	120	L.F.	$2,200	$264,000
3	LANDSCAPING				
	VEGETATION	20	AC.	$2,500	$50,000
	IRRIGATION	1	L.S.	$50,000	$50,000
	RECREATION		NOT INCLUDED		
4	SUBTOTAL				$1,653,410
5	CONTINGENCIES				
	MISC CONTINGENCY	10%			$165,340
	ENGINEERING & ADMIN	15%			$248,010
	FIELD ENGINEERING	10%			$165,340
	FINANCING		NOT INCLUDED		
6	TOTAL BASIN NO. 3A				$2,232,100

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
UPPER EAST FORK CAVE CREEK
DETENTION BASIN SIZING STUDY
PRELIMINARY DESIGN CONSTRUCTION COST ESTIMATE

DETENTION BASIN NO. 3B
UPPER EAST FORK AT 20TH STREET

No.	ITEM	QUANTITY	UNIT	UNIT COST	TOTAL COST
1	R/O/W AQUISITION		NOT INCLUDED		
2	ENGINEERING				
	EARTHWORK	248,450	C.Y	$4.00	$993,800
	OUTLET STRUCTURE	1	L.S.	$29,160	$29,160
	INLET STRUCTURE	1	L.S.	$12,980	$12,980
	SEDIMENT BASIN	1	L.S.	$17,700	$17,700
	LOW FLOW BYPASS, 60"	3200	L.F.	$125	$400,000
	INLET CULVERT	250	L.F.	$318	$79,500
3	LANDSCAPING				
	VEGETATION	20	AC.	$2,500	$50,000
	IRRIGATION	1	L.S.	$50,000	$50,000
	RECREATION		NOT INCLUDED		
4	SUBTOTAL				$1,633,140
5	CONTINGENCIES				
	MISC CONTINGENCY	10%			$163,310
	ENGINEERING & ADMIN	15%			$244,970
	FIELD ENGINEERING	10%			$163,310
	FINANCING		NOT INCLUDED		
6	TOTAL BASIN NO. 3B				$2,204,730

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
UPPER EAST FORK CAVE CREEK
DETENTION BASIN SIZING STUDY
PRELIMINARY DESIGN CONSTRUCTION COST ESTIMATE

DETENTION BASIN NO. 4
PARADISE VALLEY PARK

No.	ITEM	QUANTITY	UNIT	UNIT COST	TOTAL COST
1	R/O/W AQUISITION		NOT INCLUDED		
2	ENGINEERING				
	EARTHWORK	86,640	C.Y	$4.00	$346,560
	OUTLET STRUCTURE	1	L.S.	$15,810	$15,810
	INLET STRUCTURES	1	L.S.	$10,250	$10,250
	SEDIMENT BASINS	1	L.S.	$10,700	$10,700
	LOW FLOW BYPASS, 36"	1200	L.F.	$60	$72,000
	24"	3800	L.F.	$36	$136,800
3	LANDSCAPING				
	VEGETATION	9	AC.	$2,500	$22,500
	IRRIGATION	1	L.S.	$22,500	$22,500
	RECREATION		NOT INCLUDED		
4	SUBTOTAL				$637,120
5	CONTINGENCIES				
	MISC CONTINGENCY	10%			$63,710
	ENGINEERING & ADMIN	15%			$95,570
	FIELD ENGINEERING	10%			$63,710
	FINANCING		NOT INCLUDED		
6	TOTAL BASIN NO. 4				$860,110

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
UPPER EAST FORK CAVE CREEK
DETENTION BASIN SIZING STUDY
PRELIMINARY DESIGN CONSTRUCTION COST ESTIMATE

DETENTION BASIN NO. 5
9TH STREET AND CAMPOBELLO

No.	ITEM	QUANTITY	UNIT	UNIT COST	TOTAL COST
1	R/O/W AQUISITION		NOT INCLUDED		
2	ENGINEERING				
	EARTHWORK	174,240	C.Y	$4.00	$696,960
	OUTLET STRUCTURE	1	L.S.	$22,040	$22,040
	INLET STRUCTURES	1	L.S.	$30,000	$30,000
	SEDIMENT BASIN	1	L.S.	$27,260	$27,260
	LOW FLOW BYPASS, 48"	2000	L.F.	$90	$180,000
3	LANDSCAPING				
	VEGETATION	26	AC.	$2,500	$65,000
	IRRIGATION	1	L.S.	$65,000	$65,000
	RECREATION		NOT INCLUDED		
4	SUBTOTAL				$1,086,260
5	CONTINGENCIES				
	MISC CONTINGENCY	10%			$108,630
	ENGINEERING & ADMIN	15%			$162,940
	FIELD ENGINEERING	10%			$108,630
	FINANCING		NOT INCLUDED		
6	TOTAL BASIN NO. 5				$1,466,460

NBS/LOWRY ENGINEERS & PLANNERS

DATE 09-Feb-89
JOB NO P81194-013
BY PHINNEY
RCE 15704
CHK'D _____
FILEPATH:C:\LOTUS\02773-1

DETENTION AREA SIZING STUDY
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
BASIN NO. 1

SECTION 02773 STORMWATER HOLDING PONDS

REFERENCES:
1 FHA, Hydraulic Design of Highway Culverts
2 Brater & King, Handbook of Hydraulics
3 Upper East Fork Cave Creek ADMS
4 ASCE, Stormwater Detention Outlet Control Struc
5

INPUT PARAMETERS

DETENTION BASIN

SIDESLOPE	0.25		City of Phoenix Parks Dept
TOP ELEVATION	1497		ADMS Prelim System Map
FLOOR ELEVATION	1491	ft	
MAXIMUM DEPTH	6	ft	
TOP LENGTH	1060	ft	ADMS Prelim System Map
TOP WIDTH	740	ft	ADMS Prelim System Map
TOP AREA	18.01	acres	
BASE LENGTH	1012	ft	
BASE WIDTH	692	ft	
BASE AREA	16.08	acres	

OUTLET CULVERT

NUMBER OF OUTFALL CULVERTS		4		
SHAPE		CIRCULAR		
MATERIAL		CONCRETE		
CULVERT HEIGHT		0	ft	
CULVERT WIDTH		0	ft	
CULVERT DIAMETER		48	in	
		4.0	ft	
CULVERT AREA	A	12.6	ft2	
INT CULVERT BARREL HT	D	4.0	ft	
CULVERT INLET INVERT		1491	ft	
BASIN - CULVERT INVERT	dEL	0	ft	
CULVERT OUTLET INVERT		1489.63	ft	
CULVERT LENGTH		550	ft	
SLOPE	S	0.0025		
INLET EDGE DESCRIPTION		BEVELED RING, 45 DEGREE BEVELS		
DESIGN CONSTANTS	K	0.0018		FHWA p 147,148
	M	2.50		FHWA p 147,148
	c	0.03		FHWA p 147,148
	Y	0.74		FHWA p 147,148
SLOPE CORRECTION FACTOR	SCF	-0.5	*S	FHWA p 146
MANNING'S n	n	0.012		

TIME INCREMENT	dT	0.16	hrs	576 sec

OUTPUT

MAX DISCHARGE	418	cfs
MAX DEPTH	5.1	ft

FREEBOARD 0.9 ft
AREA AT MAX DEPTH 17.71 acres
VOLUME AT MAX DEPTH 86.13 acre-ft

DEPTH (ft)	AREA (ac)	VOLUME (ft3)	HW/D	2S/dT+O (cfs)	SUBMRGD INLET CONTROL (cfs)	OUTLET CONTROL (cfs)	DISCHARGE (cfs)	DEPTH (ft)
0.0	16.08	0	0.00	0	0	0.0	0	0.0
0.1	16.11	70099	0.03	244	ERR	0.2	0	0.1
0.2	16.14	140334	0.05	489	ERR	1.5	2	0.2
0.3	16.17	210705	0.08	735	ERR	3.1	3	0.3
0.4	16.20	281214	0.10	983	ERR	6.5	6	0.4
0.5	16.23	351859	0.13	1231	ERR	9.5	9	0.5
0.6	16.27	422641	0.15	1483	ERR	15.1	15	0.6
0.7	16.30	493560	0.18	1733	ERR	19.5	20	0.7
0.8	16.33	564616	0.20	1988	ERR	27.3	27	0.8
0.9	16.36	635810	0.23	2241	ERR	33.0	33	0.9
1.0	16.39	707141	0.25	2498	ERR	42.7	43	1.0
1.1	16.42	778610	0.28	2753	ERR	49.7	50	1.1
1.2	16.45	850217	0.30	3013	ERR	61.0	61	1.2
1.3	16.49	921961	0.33	3270	ERR	69.0	69	1.3
1.4	16.52	993844	0.35	3533	ERR	81.7	82	1.4
1.5	16.55	1065864	0.38	3792	ERR	90.8	91	1.5
1.6	16.58	1138023	0.40	4056	ERR	104.8	105	1.6
1.7	16.61	1210320	0.43	4317	ERR	114.6	115	1.7
1.8	16.64	1282756	0.45	4584	ERR	129.6	130	1.8
1.9	16.68	1355330	0.48	4846	ERR	139.9	140	1.9
2.0	16.71	1428043	0.50	5114	ERR	155.7	156	2.0
2.1	16.74	1500895	0.53	5378	ERR	166.3	166	2.1
2.2	16.77	1573886	0.55	5647	ERR	182.5	182	2.2
2.3	16.80	1647016	0.58	5912	ERR	192.7	193	2.3
2.4	16.84	1720285	0.60	6182	ERR	209.3	209	2.4
2.5	16.87	1793694	0.63	6448	ERR	219.9	220	2.5
2.6	16.90	1867242	0.65	6719	ERR	235.2	235	2.6
2.7	16.93	1940930	0.68	6985	ERR	245.7	246	2.7
2.8	16.96	2014757	0.70	7256	ERR	260.3	260	2.8
2.9	17.00	2088725	0.73	7523	ERR	270.1	270	2.9
3.0	17.03	2162832	0.75	7794	62	284.1	284	3.0
3.1	17.06	2237080	0.78	8060	111	292.3	292	3.1
3.2	17.09	2311468	0.80	8330	144	304.3	304	3.2
3.3	17.13	2385996	0.83	8596	170	311.0	311	3.3
3.4	17.16	2460665	0.85	8865	194	320.7	321	3.4
3.5	17.19	2535475	0.88	9130	214	325.9	326	3.5
3.6	17.22	2610425	0.90	9396	233	331.9	332	3.6
3.7	17.25	2685517	0.93	9658	250	333.8	334	3.7
3.8	17.29	2760749	0.95	9920	267	334.2	334	3.8
3.9	17.32	2836123	0.98	10180	282	332.1	332	3.9
4.0	17.35	2911638	1.00	10421	297	311.2	311	4.0
4.1	17.38	2987294	1.03	10683	311	322.3	311	4.1
4.2	17.42	3063092	1.05	10960	324	333.1	324	4.2
4.3	17.45	3139032	1.08	11236	337	343.5	337	4.3
4.4	17.48	3215113	1.10	11512	349	353.6	349	4.4
4.5	17.51	3291336	1.13	11789	361	363.4	361	4.5
4.6	17.55	3367702	1.15	12066	372	373.0	372	4.6
4.7	17.58	3444210	1.18	12341	383	382.3	382	4.7
4.8	17.61	3520860	1.20	12617	394	391.4	391	4.8

4.9	17.65	3597652	1.23	12892	405	400.3	400	4.9
5.0	17.68	3674587	1.25	13168	415	409.0	409	5.0
5.1	17.71	3751665	1.28	13444	425	417.6	418	5.1
5.2	17.74	3828886	1.30	13721	435	425.9	426	5.2
5.3	17.78	3906249	1.33	13997	444	434.1	434	5.3
5.4	17.81	3983756	1.35	14275	454	442.1	442	5.4
5.5	17.84	4061406	1.38	14552	463	450.0	450	5.5
5.6	17.88	4139199	1.40	14830	472	457.8	458	5.6
5.7	17.91	4217136	1.43	15108	481	465.4	465	5.7
5.8	17.94	4295216	1.45	15387	489	472.9	473	5.8
5.9	17.97	4373441	1.48	15666	498	480.3	480	5.9
6.0	18.01	4451809	1.50	15945	506	487.6	488	6.0
6.1	18.04	4530321	1.53	16225	515	494.8	495	6.1
6.2	18.07	4608977	1.55	16505	523	501.8	502	6.2
6.3	18.11	4687777	1.58	16786	531	508.8	509	6.3
6.4	18.14	4766722	1.60	17067	539	515.7	516	6.4
6.5	18.17	4845811	1.63	17348	546	522.5	522	6.5
6.6	18.21	4925045	1.65	17630	554	529.2	529	6.6
6.7	18.24	5004424	1.68	17912	562	535.8	536	6.7
6.8	18.27	5083948	1.70	18195	569	542.3	542	6.8
6.9	18.31	5163616	1.73	18478	576	548.8	549	6.9
7.0	18.34	5243430	1.75	18762	584	555.2	555	7.0
7.1	18.37	5323389	1.78	19045	591	561.5	561	7.1
7.2	18.41	5403494	1.80	19330	598	567.7	568	7.2
7.3	18.44	5483744	1.83	19615	605	573.9	574	7.3
7.4	18.47	5564139	1.85	19900	612	580.0	580	7.4
7.5	18.51	5644681	1.88	20186	619	586.0	586	7.5
7.6	18.54	5725368	1.90	20472	625	592.0	592	7.6
7.7	18.57	5806202	1.93	20758	632	597.9	598	7.7
7.8	18.61	5887181	1.95	21045	639	603.8	604	7.8
7.9	18.64	5968307	1.98	21333	645	609.6	610	7.9
8.0	18.67	6049580	2.00	21621	652	615.3	615	8.0
8.1	18.71	6130998	2.03	21909	658	621.0	621	8.1
8.2	18.74	6212564	2.05	22198	665	626.7	627	8.2
8.3	18.78	6294276	2.08	22487	671	632.3	632	8.3
8.4	18.81	6376136	2.10	22777	677	637.8	638	8.4
8.5	18.84	6458142	2.13	23067	683	643.3	643	8.5
8.6	18.88	6540296	2.15	23358	690	648.8	649	8.6
8.7	18.91	6622597	2.18	23649	696	654.2	654	8.7
8.8	18.94	6705045	2.20	23941	702	659.5	660	8.8
8.9	18.98	6787641	2.23	24233	708	664.9	665	8.9
9.0	19.01	6870385	2.25	24526	714	670.1	670	9.0
9.1	19.05	6953277	2.28	24819	719	675.4	675	9.1
9.2	19.08	7036316	2.30	25112	725	680.6	681	9.2
9.3	19.11	7119504	2.33	25406	731	685.7	686	9.3
9.4	19.15	7202839	2.35	25701	737	690.8	691	9.4
9.5	19.18	7286324	2.38	25996	742	695.9	696	9.5
9.6	19.22	7369956	2.40	26291	748	701.0	701	9.6
9.7	19.25	7453738	2.43	26587	754	706.0	706	9.7
9.8	19.28	7537668	2.45	26883	759	710.9	711	9.8
9.9	19.32	7621747	2.48	27180	765	715.9	716	9.9
10.0	19.35	7705974	2.50	27478	770	720.8	721	10.0
10.1	19.39	7790351	2.53	27775	776	725.7	726	10.1
10.2	19.42	7874878	2.55	28074	781	730.5	730	10.2
10.3	19.46	7959553	2.58	28373	787	735.3	735	10.3
10.4	19.49	8044378	2.60	28672	792	740.1	740	10.4
10.5	19.52	8129353	2.63	28972	797	744.8	745	10.5
10.6	19.56	8214478	2.65	29272	802	749.5	750	10.6
10.7	19.59	8299752	2.68	29573	808	754.2	754	10.7
10.8	19.63	8385176	2.70	29874	813	758.9	759	10.8

10.9	19.66	8470751	2.73	30176	818	763.5	764	10.9
11.0	19.70	8556476	2.75	30478	823	768.1	768	11.0
11.1	19.73	8642351	2.78	30781	828	772.7	773	11.1
11.2	19.77	8728377	2.80	31084	833	777.2	777	11.2
11.3	19.80	8814553	2.83	31388	838	781.7	782	11.3
11.4	19.84	8900880	2.85	31692	843	786.2	786	11.4
11.5	19.87	8987359	2.88	31997	848	790.7	791	11.5
11.6	19.90	9073988	2.90	32302	853	795.1	795	11.6
11.7	19.94	9160768	2.93	32608	858	799.6	800	11.7
11.8	19.97	9247700	2.95	32914	863	804.0	804	11.8
11.9	20.01	9334783	2.98	33221	868	808.3	808	11.9
12.0	20.04	9422017	3.00	33528	873	812.7	813	12.0
12.1	20.08	9509404	3.03	33836	878	817.0	817	12.1
12.2	20.11	9596942	3.05	34144	882	821.3	821	12.2
12.3	20.15	9684632	3.08	34453	887	825.6	826	12.3
12.4	20.18	9772474	3.10	34762	892	829.8	830	12.4
12.5	20.22	9860468	3.13	35072	897	834.1	834	12.5

TIME (hr)	n	I (cfs)	I(n)+2S(n)-O(n) (cfs)	2S(n+1) dT (cfs)	dT (cfs)	O(n+1) (cfs)	I2 (cfs)	O(n+1)+ (cfs)
4.0	1	0	1	0		0	0	0
4.2	2	1	1	1	1	0	0	0
4.3	3	1	2	2	2	0	0	0
4.5	4	1	2	4	4	0	0	0
4.6	5	1	2	6	6	0	0	0
4.8	6	1	3	8	8	0	0	0
5.0	7	2	3	11	11	0	0	0
5.1	8	2	4	15	15	0	0	0
5.3	9	2	4	18	18	0	0	0
5.4	10	2	4	22	22	0	0	0
5.6	11	2	4	26	26	0	0	0
5.8	12	2	4	30	30	0	0	0
5.9	13	2	5	34	34	0	0	0
6.1	14	3	5	39	39	0	0	0
6.2	15	3	6	45	45	0	0	0
6.4	16	3	6	51	51	0	0	0
6.6	17	3	6	57	57	0	0	0
6.7	18	3	6	63	63	0	0	0
6.9	19	3	7	70	70	0	0	0
7.0	20	3	7	76	76	0	0	0
7.2	21	4	8	84	84	0	0	0
7.4	22	4	8	91	91	0	0	0
7.5	23	4	8	99	99	0	0	0
7.7	24	4	8	107	107	0	0	0
7.8	25	4	8	115	115	0	0	0
8.0	26	4	8	123	123	0	0	0
8.2	27	4	9	132	132	0	0	0
8.3	28	5	9	141	141	0	0	0
8.5	29	5	10	150	150	0	0	0
8.6	30	5	9	160	160	0	0	0
8.8	31	5	9	169	169	0	0	0
9.0	32	5	10	179	179	0	0	0
9.1	33	5	10	188	188	0	0	0
9.3	34	5	11	198	198	0	0	0
9.4	35	6	14	209	209	0	0	0
9.6	36	8	19	223	223	0	0	0
9.8	37	11	25	243	243	0	0	0

9.9	38	14	29	267	267	0	0	0
10.1	39	16	33	295	296	0	0	0
10.2	40	17	35	328	328	0	0	0
10.4	41	18	37	363	363	0	0	0
10.6	42	19	39	400	400	0	0	0
10.7	43	19	39	438	438	0	0	0
10.9	44	20	42	477	477	0	0	0
11.0	45	22	47	516	519	2	0	2
11.2	46	25	55	560	563	2	0	2
11.4	47	29	63	612	615	2	0	2
11.5	48	34	79	672	675	2	0	2
11.7	49	45	118	745	751	3	0	3
11.8	50	73	270	857	863	3	0	3
12.0	51	196	652	1114	1127	6	0	6
12.2	52	456	1205	1727	1766	20	0	20
12.3	53	749	1755	2833	2932	50	0	50
12.5	54	1005	2205	4328	4588	130	0	130
12.6	55	1200	2507	6094	6534	220	0	220
12.8	56	1307	2563	7979	8601	311	0	311
13.0	57	1256	2265	9919	10542	311	0	311
13.1	58	1009	1732	11440	12184	372	0	372
13.3	59	723	1224	12354	13173	409	0	409
13.4	60	501	851	12743	13578	418	0	418
13.6	61	350	603	12759	13595	418	0	418
13.8	62	253	444	12544	13362	409	0	409
13.9	63	191	339	12187	12988	400	0	400
14.1	64	148	268	11762	12527	382	0	382
14.2	65	119	219	11308	12030	361	0	361
14.4	66	100	189	10830	11527	349	0	349
14.6	67	89	171	10371	11018	324	0	324
14.7	68	82	161	9920	10542	311	0	311
14.9	69	78	154	9412	10080	334	0	334
15.0	70	75	148	8902	9566	332	0	332
15.2	71	72	141	8409	9050	321	0	321
15.4	72	68	128	7941	8549	304	0	304
15.5	73	60	108	7484	8069	292	0	292
15.7	74	48	87	7052	7592	270	0	270
15.8	75	39	70	6647	7139	246	0	246
16.0	76	32	59	6278	6718	220	0	220
16.2	77	28	53	5919	6337	209	0	209
16.3	78	25	50	5586	5972	193	0	193
16.5	79	24	49	5303	5636	166	0	166
16.6	80	25	25	5041	5352	156	0	156
16.8	81	25	25	4786	5065	140	0	140
17.0	82	25	25	4551	4811	130	0	130
17.1	83	24	24	4347	4576	115	0	115
17.3	84	23	23	4142	4371	115	0	115
17.4	85	23	23	3955	4165	105	0	105
17.6	86	24	24	3797	3978	91	0	91
17.8	87	25	25	3639	3820	91	0	91
17.9	88	25	25	3500	3663	82	0	82
18.1	89	26	26	3387	3525	69	0	69
18.2	90	26	26	3275	3413	69	0	69
18.4	91	26	26	3163	3301	69	0	69
18.6	92	25	25	3067	3189	61	0	61
18.7	93	24	24	2970	3091	61	0	61
18.9	94	23	23	2894	2993	50	0	50
19.0	95	23	23	2818	2917	50	0	50
19.2	96	24	24	2742	2841	50	0	50
19.4	97	25	25	2666	2766	50	0	50

19.5	98	24	24	2606	2691	43	0	43
19.7	99	24	24	2545	2630	43	0	43
19.8	100	23	23	2483	2568	43	0	43
20.0	101	22	22	2420	2506	43	0	43
20.2	102	0	0	2377	2443	33	0	33
20.3	103	0	0	2311	2377	33	0	33
20.5	104	0	0	2245	2311	33	0	33
20.6	105	0	0	2179	2245	33	0	33
20.8	106	0	0	2124	2179	27	0	27
21.0	107	0	0	2069	2124	27	0	27
21.1	108	0	0	2015	2069	27	0	27
21.3	109	0	0	1960	2015	27	0	27
21.4	110	0	0	1921	1960	20	0	20
21.6	111	0	0	1882	1921	20	0	20
21.8	112	0	0	1843	1882	20	0	20
21.9	113	0	0	1804	1843	20	0	20
22.1	114	0	0	1765	1804	20	0	20
22.2	115	0	0	1726	1765	20	0	20
22.4	116	0	0	1695	1726	15	0	15
22.6	117	0	0	1665	1695	15	0	15
22.7	118	0	0	1635	1665	15	0	15
22.9	119	0	0	1604	1635	15	0	15
23.0	120	0	0	1574	1604	15	0	15
23.2	121	0	0	1544	1574	15	0	15
23.4	122	0	0	1514	1544	15	0	15
23.5	123	0	0	1483	1514	15	0	15
23.7	124	0	0	1453	1483	15	0	15
23.8	125	0	0	1434	1453	9	0	9
24.0	126	0	0	1415	1434	9	0	9
24.2	127	0	0	1396	1415	9	0	9
24.3	128	0	0	1377	1396	9	0	9
24.5	129	0	0	1358	1377	9	0	9
24.6	130	0	0	1339	1358	9	0	9
24.8	131	0	0	1320	1339	9	0	9
25.0	132	0	0	1301	1320	9	0	9
25.1	133	0	0	1282	1301	9	0	9
25.3	134	0	0	1263	1282	9	0	9
25.4	135	0	0	1244	1263	9	0	9
25.6	136	0	0	1225	1244	9	0	9
25.8	137	0	0	1212	1225	6	0	6
25.9	138	0	0	1200	1212	6	0	6
26.1	139	0	0	1187	1200	6	0	6
26.2	140	0	0	1174	1187	6	0	6
26.4	141	0	0	1161	1174	6	0	6
26.6	142	0	0	1148	1161	6	0	6
26.7	143	0	0	1135	1148	6	0	6
26.9	144	0	0	1122	1135	6	0	6
27.0	145	0	0	1109	1122	6	0	6
27.2	146	0	0	1096	1109	6	0	6
27.4	147	0	0	1083	1096	6	0	6
27.5	148	0	0	1070	1083	6	0	6
27.7	149	0	0	1057	1070	6	0	6
27.8	150	0	0	1044	1057	6	0	6
28.0	151	0	0	1031	1044	6	0	6
28.2	152	0	0	1019	1031	6	0	6
28.3	153	0	0	1006	1019	6	0	6
28.5	154	0	0	993	1006	6	0	6
28.6	155	0	0	980	993	6	0	6
28.8	156	0	0	974	980	3	0	3
29.0	157	0	0	967	974	3	0	3

29.1	158	0	0	961	967	3	0	3
29.3	159	0	0	955	961	3	0	3
29.4	160	0	0	949	955	3	0	3
29.6	161	0	0	943	949	3	0	3
29.8	162	0	0	937	943	3	0	3
29.9	163	0	0	931	937	3	0	3
30.1	164	0	0	925	931	3	0	3
30.2	165	0	0	919	925	3	0	3
30.4	166	0	0	912	919	3	0	3
30.6	167	0	0	906	912	3	0	3
30.7	168	0	0	900	906	3	0	3
30.9	169	0	0	894	900	3	0	3
31.0	170	0	0	888	894	3	0	3
31.2	171	0	0	882	888	3	0	3
31.4	172	0	0	876	882	3	0	3
31.5	173	0	0	870	876	3	0	3
31.7	174	0	0	864	870	3	0	3
31.8	175	0	0	857	864	3	0	3
32.0	176	0	0	851	857	3	0	3
32.2	177	0	0	845	851	3	0	3
32.3	178	0	0	839	845	3	0	3
32.5	179	0	0	833	839	3	0	3
32.6	180	0	0	827	833	3	0	3
32.8	181	0	0	821	827	3	0	3
33.0	182	0	0	815	821	3	0	3
33.1	183	0	0	809	815	3	0	3
33.3	184	0	0	802	809	3	0	3
33.4	185	0	0	796	802	3	0	3
33.6	186	0	0	790	796	3	0	3
33.8	187	0	0	784	790	3	0	3
33.9	188	0	0	778	784	3	0	3
34.1	189	0	0	772	778	3	0	3
34.2	190	0	0	766	772	3	0	3
34.4	191	0	0	760	766	3	0	3
34.6	192	0	0	753	760	3	0	3
34.7	193	0	0	747	753	3	0	3
34.9	194	0	0	741	747	3	0	3
35.0	195	0	0	735	741	3	0	3
35.2	196	0	0	729	735	3	0	3
35.4	197	0	0	726	729	2	0	2
35.5	198	0	0	723	726	2	0	2
35.7	199	0	0	720	723	2	0	2
35.8	200	0	0	717	720	2	0	2
36.0	201	0	0	714	717	2	0	2
36.2	202	0	0	711	714	2	0	2
36.3	203	0	0	708	711	2	0	2
36.5	204	0	0	705	708	2	0	2
36.6	205	0	0	702	705	2	0	2
36.8	206	0	0	699	702	2	0	2
37.0	207	0	0	696	699	2	0	2
37.1	208	0	0	693	696	2	0	2
37.3	209	0	0	690	693	2	0	2
37.4	210	0	0	687	690	2	0	2
37.6	211	0	0	684	687	2	0	2
37.8	212	0	0	681	684	2	0	2
37.9	213	0	0	678	681	2	0	2
38.1	214	0	0	675	678	2	0	2
38.2	215	0	0	672	675	2	0	2
38.4	216	0	0	669	672	2	0	2
38.6	217	0	0	666	669	2	0	2

38.7	218	0	0	663	666	2	0	2
38.9	219	0	0	660	663	2	0	2
39.0	220	0	0	657	660	2	0	2
39.2	221	0	0	654	657	2	0	2
39.4	222	0	0	650	654	2	0	2
39.5	223	0	0	647	650	2	0	2
39.7	224	0	0	644	647	2	0	2
39.8	225	0	0	641	644	2	0	2
40.0	226	0	0	638	641	2	0	2
40.2	227	0	0	635	638	2	0	2
40.3	228	0	0	632	635	2	0	2
40.5	229	0	0	629	632	2	0	2
40.6	230	0	0	626	629	2	0	2
40.8	231	0	0	623	626	2	0	2
41.0	232	0	0	620	623	2	0	2
41.1	233	0	0	617	620	2	0	2
41.3	234	0	0	614	617	2	0	2
41.4	235	0	0	611	614	2	0	2
41.6	236	0	0	608	611	2	0	2
41.8	237	0	0	605	608	2	0	2
41.9	238	0	0	602	605	2	0	2
42.1	239	0	0	599	602	2	0	2
42.2	240	0	0	596	599	2	0	2
42.4	241	0	0	593	596	2	0	2
42.6	242	0	0	590	593	2	0	2
42.7	243	0	0	587	590	2	0	2
42.9	244	0	0	584	587	2	0	2
43.0	245	0	0	581	584	2	0	2
43.2	246	0	0	578	581	2	0	2
43.4	247	0	0	575	578	2	0	2
43.5	248	0	0	572	575	2	0	2
43.7	249	0	0	569	572	2	0	2
43.8	250	0	0	566	569	2	0	2
44.0	251	0	0	563	566	2	0	2
44.2	252	0	0	560	563	2	0	2
44.3	253	0	0	557	560	2	0	2
44.5	254	0	0	554	557	2	0	2
44.6	255	0	0	551	554	2	0	2
44.8	256	0	0	548	551	2	0	2
45.0	257	0	0	545	548	2	0	2
45.1	258	0	0	542	545	2	0	2
45.3	259	0	0	539	542	2	0	2
45.4	260	0	0	536	539	2	0	2
45.6	261	0	0	533	536	2	0	2
45.8	262	0	0	530	533	2	0	2
45.9	263	0	0	527	530	2	0	2
46.1	264	0	0	524	527	2	0	2
46.2	265	0	0	521	524	2	0	2
46.4	266	0	0	518	521	2	0	2
46.6	267	0	0	515	518	2	0	2
46.7	268	0	0	512	515	2	0	2
46.9	269	0	0	509	512	2	0	2
47.0	270	0	0	506	509	2	0	2
47.2	271	0	0	502	506	2	0	2
47.4	272	0	0	499	502	2	0	2
47.5	273	0	0	496	499	2	0	2
47.7	274	0	0	493	496	2	0	2
47.8	275	0	0	490	493	2	0	2
48.0	276	0	0	487	490	2	0	2
48.2	277	0	0	487	487	0	0	0

48.3	278	0	0	487	487	0	0	0
48.5	279	0	0	486	487	0	0	0
48.6	280	0	0	486	486	0	0	0
48.8	281	0	0	485	486	0	0	0
49.0	282	0	0	485	485	0	0	0
49.1	283	0	0	485	485	0	0	0

NBS/LOWRY ENGINEERS & PLANNERS

DETENTION AREA SIZING STUDY
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
BASIN NO. 2

DATE	04-Jan-89
JOB NO	P81194-013
BY	PHINNEY
RCE	15704
CHK'D	_____
FILEPATH:	C:\LOTUS\02773-2

SECTION 02773 STORMWATER HOLDING PONDS

REFERENCES:
1 FHA, Hydraulic Design of Highway Culverts
2 Brater & King, Handbook of Hydraulics
3 Upper East Fork Cave Creek ADMS
4 ASCE, Stormwater Detention Outlet Control Struc
5

INPUT PARAMETERS

DETENTION BASIN

SIDESLOPE		0.25	City of Phoenix Parks Dept
TOP ELEVATION		1402	ADMS Prelim System Map
FLOOR ELEVATION		1392 ft	
MAXIMUM DEPTH		10 ft	
TOP LENGTH		1220 ft	ADMS Prelim System Map
TOP WIDTH		280 ft	ADMS Prelim System Map
TOP AREA		7.84 acres	
BASE LENGTH		200 ft	
BASE WIDTH		1140 ft	
BASE AREA		5.23 acres	

OUTLET CULVERT

NUMBER OF OUTFALL CULVERTS		1	
SHAPE		CIRCULAR	
MATERIAL		CONCRETE	
CULVERT HEIGHT		0 ft	
CULVERT WIDTH		0 ft	
CULVERT DIAMETER		60 in	
		5.0 ft	
CULVERT AREA	A	19.6 ft2	
INT CULVERT BARREL HT	D	5.0 ft	
CULVERT INLET INVERT		1391.00 ft	
CULVERT INLET SOFFIT		1396.00 ft	
BASIN - CULVERT INVERT	dEL	1 ft	
TAILWATER ELEVATION		1387.00 ft	
CULVERT OUTLET INVERT		1382.00 ft	
CULVERT LENGTH		2620 ft	
CULVERT SLOPE		0.003435	
ASSUMED ENERGY SLOPE	S	0.003435	
INLET EDGE DESCRIPTION		BEVELED RING, 45 DEGREE BEVELS	
DESIGN CONSTANTS	K	0.0018	FHWA p 147,148
	M	2.50	FHWA p 147,148
	c	0.03	FHWA p 147,148
	Y	0.74	FHWA p 147,148
SLOPE CORRECTION FACTOR	SCF	-0.5 *S	FHWA p 146
MANNING'S n	n	0.012	

TIME INCREMENT dT 0.16 hrs 576 sec

OUTPUT

MAX DISCHARGE	206	cfs
MAX DEPTH	9	ft
FREEBOARD	1	ft
AREA AT MAX DEPTH	7.57	acres
VOLUME AT MAX DEPTH	57.43	acre-ft

DEPTH (ft)	AREA (ac)	VOLUME (ft3)	HW/D	2S/dT+O (cfs)	SUBMRGD INLET CONTROL (cfs)	OUTLET CONTROL (cfs)	DISCHARGE (cfs)	DEPTH (ft)
0.0	5.23	0	0.20	0	0	0.0	0	0.0
0.1	5.26	22854	0.22	97	ERR	17.5	18	0.1
0.2	5.28	45815	0.24	178	ERR	19.2	19	0.2
0.3	5.31	68883	0.26	264	ERR	24.5	25	0.3
0.4	5.33	92059	0.28	348	ERR	28.3	28	0.4
0.5	5.36	115343	0.30	433	ERR	32.4	32	0.5
0.6	5.38	138734	0.32	518	ERR	36.7	37	0.6
0.7	5.41	162234	0.34	604	ERR	41.1	41	0.7
0.8	5.43	185841	0.36	691	ERR	45.9	46	0.8
0.9	5.46	209557	0.38	778	ERR	50.7	51	0.9
1.0	5.48	233381	0.40	866	ERR	55.7	56	1.0
1.1	5.51	257314	0.42	954	ERR	60.9	61	1.1
1.2	5.53	281355	0.44	1043	ERR	66.1	66	1.2
1.3	5.56	305505	0.46	1132	ERR	71.5	71	1.3
1.4	5.58	329764	0.48	1222	ERR	77.0	77	1.4
1.5	5.61	354132	0.50	1312	ERR	82.7	83	1.5
1.6	5.63	378609	0.52	1403	ERR	88.3	88	1.6
1.7	5.66	403195	0.54	1494	ERR	94.1	94	1.7
1.8	5.68	427891	0.56	1586	ERR	99.9	100	1.8
1.9	5.71	452696	0.58	1677	ERR	105.4	105	1.9
2.0	5.73	477611	0.60	1770	ERR	111.2	111	2.0
2.1	5.76	502635	0.62	1862	ERR	116.8	117	2.1
2.2	5.78	527770	0.64	1955	ERR	122.3	122	2.2
2.3	5.81	553014	0.66	2048	ERR	127.8	128	2.3
2.4	5.83	578369	0.68	2141	ERR	133.2	133	2.4
2.5	5.86	603834	0.70	2233	ERR	135.9	136	2.5
2.6	5.88	629409	0.72	2329	ERR	143.5	144	2.6
2.7	5.91	655095	0.74	2423	11	148.5	148	2.7
2.8	5.93	680891	0.76	2517	37	152.8	153	2.8
2.9	5.96	706798	0.78	2612	52	157.6	158	2.9
3.0	5.99	732816	0.80	2706	63	161.7	162	3.0
3.1	6.01	758945	0.82	2800	72	165.3	165	3.1
3.2	6.04	785186	0.84	2895	81	168.9	169	3.2
3.3	6.06	811537	0.86	2990	88	172.1	172	3.3
3.4	6.09	838000	0.88	3084	95	174.4	174	3.4
3.5	6.11	864575	0.90	3178	102	176.3	176	3.5
3.6	6.14	891261	0.92	3272	108	177.3	177	3.6
3.7	6.16	918059	0.94	3365	114	177.6	178	3.7
3.8	6.19	944969	0.96	3458	119	177.2	177	3.8
3.9	6.22	971991	0.98	3550	125	175.0	175	3.9
4.0	6.24	999126	1.00	3635	130	165.4	165	4.0
4.1	6.27	1026372	1.02	3698	135	166.3	135	4.1
4.2	6.29	1053731	1.04	3798	139	167.2	139	4.2
4.3	6.32	1081203	1.06	3898	144	168.1	144	4.3
4.4	6.35	1108787	1.08	3998	148	169.0	148	4.4
4.5	6.37	1136484	1.10	4099	152	169.9	152	4.5

4.6	6.40	1164295	1.12	4199	157	170.8	157	4.6
4.7	6.42	1192218	1.14	4300	161	171.7	161	4.7
4.8	6.45	1220254	1.16	4402	165	172.6	165	4.8
4.9	6.48	1248404	1.18	4503	168	173.4	168	4.9
5.0	6.50	1276667	1.20	4605	172	174.3	172	5.0
5.1	6.53	1305044	1.22	4707	176	175.2	175	5.1
5.2	6.55	1333535	1.24	4806	180	176.0	176	5.2
5.3	6.58	1362139	1.26	4907	183	176.9	177	5.3
5.4	6.61	1390857	1.28	5007	187	177.8	178	5.4
5.5	6.63	1419690	1.30	5108	190	178.6	179	5.5
5.6	6.66	1448637	1.32	5209	193	179.5	179	5.6
5.7	6.68	1477698	1.34	5311	197	180.3	180	5.7
5.8	6.71	1506873	1.36	5413	200	181.1	181	5.8
5.9	6.74	1536164	1.38	5516	203	182.0	182	5.9
6.0	6.76	1565569	1.40	5619	206	182.8	183	6.0
6.1	6.79	1595089	1.42	5722	209	183.6	184	6.1
6.2	6.82	1624723	1.44	5826	212	184.5	184	6.2
6.3	6.84	1654473	1.46	5930	215	185.3	185	6.3
6.4	6.87	1684339	1.48	6035	218	186.1	186	6.4
6.5	6.90	1714319	1.50	6139	221	186.9	187	6.5
6.6	6.92	1744416	1.52	6245	224	187.7	188	6.6
6.7	6.95	1774627	1.54	6350	227	188.5	189	6.7
6.8	6.98	1804955	1.56	6457	230	189.3	189	6.8
6.9	7.00	1835399	1.58	6563	233	190.2	190	6.9
7.0	7.03	1865958	1.60	6670	235	190.9	191	7.0
7.1	7.06	1896634	1.62	6777	238	191.7	192	7.1
7.2	7.08	1927426	1.64	6885	241	192.5	193	7.2
7.3	7.11	1958334	1.66	6993	243	193.3	193	7.3
7.4	7.14	1989359	1.68	7102	246	194.1	194	7.4
7.5	7.16	2020501	1.70	7211	249	194.9	195	7.5
7.6	7.19	2051759	1.72	7320	251	195.7	196	7.6
7.7	7.22	2083135	1.74	7430	254	196.4	196	7.7
7.8	7.24	2114627	1.76	7540	256	197.2	197	7.8
7.9	7.27	2146237	1.78	7650	259	198.0	198	7.9
8.0	7.30	2177964	1.80	7761	261	198.7	199	8.0
8.1	7.32	2209808	1.82	7872	264	199.5	200	8.1
8.2	7.35	2241770	1.84	7984	266	200.3	200	8.2
8.3	7.38	2273849	1.86	8096	268	201.0	201	8.3
8.4	7.41	2306047	1.88	8209	271	201.8	202	8.4
8.5	7.43	2338362	1.90	8322	273	202.5	203	8.5
8.6	7.46	2370796	1.92	8435	276	203.3	203	8.6
8.7	7.49	2403347	1.94	8549	278	204.0	204	8.7
8.8	7.51	2436017	1.96	8663	280	204.8	205	8.8
8.9	7.54	2468806	1.98	8778	282	205.5	206	8.9
9.0	7.57	2501713	2.00	8893	285	206.2	206	9.0
9.1	7.60	2534739	2.02	9008	287	207.0	207	9.1
9.2	7.62	2567883	2.04	9124	289	207.7	208	9.2
9.3	7.65	2601147	2.06	9240	291	208.4	208	9.3
9.4	7.68	2634530	2.08	9357	294	209.2	209	9.4
9.5	7.70	2668032	2.10	9474	296	209.9	210	9.5
9.6	7.73	2701653	2.12	9591	298	210.6	211	9.6
9.7	7.76	2735394	2.14	9709	300	211.3	211	9.7
9.8	7.79	2769254	2.16	9828	302	212.1	212	9.8
9.9	7.81	2803234	2.18	9946	304	212.8	213	9.9
10.0	7.84	2837334	2.20	10065	306	213.5	213	10.0
10.1	7.87	2871554	2.22	10185	309	214.2	214	10.1
10.2	7.90	2905895	2.24	10305	311	214.9	215	10.2
10.3	7.92	2940355	2.26	10425	313	215.6	216	10.3
10.4	7.95	2974936	2.28	10546	315	216.3	216	10.4
10.5	7.98	3009637	2.30	10667	317	217.0	217	10.5

10.6	8.01	3044459	2.32	10789	319	217.7	218	10.6
10.7	8.04	3079402	2.34	10911	321	218.4	218	10.7
10.8	8.06	3114465	2.36	11033	323	219.1	219	10.8
10.9	8.09	3149650	2.38	11156	325	219.8	220	10.9
11.0	8.12	3184956	2.40	11279	327	220.5	220	11.0
11.1	8.15	3220383	2.42	11403	329	221.2	221	11.1
11.2	8.17	3255931	2.44	11527	331	221.9	222	11.2
11.3	8.20	3291601	2.46	11652	333	222.5	223	11.3
11.4	8.23	3327393	2.48	11777	335	223.2	223	11.4
11.5	8.26	3363307	2.50	11902	336	223.9	224	11.5
11.6	8.29	3399342	2.52	12028	338	224.6	225	11.6
11.7	8.31	3435499	2.54	12154	340	225.3	225	11.7
11.8	8.34	3471779	2.56	12281	342	225.9	226	11.8
11.9	8.37	3508181	2.58	12408	344	226.6	227	11.9
12.0	8.40	3544705	2.60	12535	346	227.3	227	12.0
12.1	8.43	3581352	2.62	12663	348	227.9	228	12.1
12.2	8.46	3618122	2.64	12792	350	228.6	229	12.2
12.3	8.48	3655014	2.66	12920	351	229.3	229	12.3
12.4	8.51	3692030	2.68	13049	353	229.9	230	12.4
12.5	8.54	3729168	2.70	13179	355	230.6	231	12.5

TIME (hr)	n	I (cfs)	I(n)+2S(n)/dT (cfs)	-O(n2S(n+1)/dT (cfs)	O(n+1) (cfs)	I2 (cfs)	O(n+1)+ (cfs)
11.2	1	0	0	0	0	0	0
11.4	2	0	0	0	0	0	0
11.5	3	0	0	0	0	0	0
11.7	4	0	223	0	0	0	0
11.8	5	223	725	185	223	19	0	19
12.0	6	502	1259	798	910	56	0	56
12.2	7	758	1721	1802	2058	128	0	128
12.3	8	964	2078	3169	3523	177	0	177
12.5	9	1115	2108	4888	5247	179	0	179
12.6	10	993	1673	6609	6995	193	0	193
12.8	11	680	1111	7878	8282	202	0	202
13.0	12	431	665	8577	8990	206	0	206
13.1	13	234	329	8830	9243	206	0	206
13.3	14	95	103	8747	9160	206	0	206
13.4	15	8	8	8440	8851	206	0	206
13.6	16	0	0	8041	8448	203	0	203
13.8	17	0	0	7641	8041	200	0	200
13.9	18	0	0	7246	7641	197	0	197
14.1	19	0	0	6856	7246	195	0	195
14.2	20	0	0	6473	6856	192	0	192
14.4	21	0	0	6094	6473	189	0	189
14.6	22	0	0	5722	6094	186	0	186
14.7	23	0	0	5356	5722	183	0	183
14.9	24	0	0	4996	5356	180	0	180
15.0	25	0	0	4642	4996	177	0	177
15.2	26	0	0	4297	4642	172	0	172
15.4	27	0	0	3984	4297	157	0	157
15.5	28	0	0	3697	3984	144	0	144
15.7	29	0	0	3366	3697	165	0	165
15.8	30	0	0	3011	3366	178	0	178
16.0	31	0	0	2666	3011	172	0	172
16.2	32	0	0	2351	2666	158	0	158
16.3	33	0	0	2064	2351	144	0	144
16.5	34	0	0	1809	2064	128	0	128

16.6	35	0	0	1586	1809	111	0	111
16.8	36	0	0	1386	1586	100	0	100
17.0	37	0	0	1221	1386	83	0	83
17.1	38	0	0	1078	1221	71	0	71
17.3	39	0	0	946	1078	66	0	66
17.4	40	0	0	834	946	56	0	56
17.6	41	0	0	733	834	51	0	51
17.8	42	0	0	641	733	46	0	46
17.9	43	0	0	559	641	41	0	41
18.1	44	0	0	486	559	37	0	37
18.2	45	0	0	421	486	32	0	32
18.4	46	0	0	364	421	28	0	28
18.6	47	0	0	308	364	28	0	28
18.7	48	0	0	259	308	25	0	25
18.9	49	0	0	220	259	19	0	19
19.0	50	0	0	182	220	19	0	19
19.2	51	0	0	144	182	19	0	19
19.4	52	0	0	109	144	18	0	18
19.5	53	0	0	74	109	18	0	18
19.7	54	0	0	74	74	0	0	0
19.8	55	0	0	74	74	0	0	0
20.0	56	0	0	74	74	0	0	0
20.2	57	0	0	74	74	0	0	0
20.3	58	0	0	74	74	0	0	0
20.5	59	0	0	74	74	0	0	0
20.6	60	0	0	74	74	0	0	0
20.8	61	0	0	74	74	0	0	0
21.0	62	0	0	74	74	0	0	0
21.1	63	0	0	74	74	0	0	0
21.3	64	0	0	74	74	0	0	0
21.4	65	0	0	74	74	0	0	0
21.6	66	0	0	74	74	0	0	0
21.8	67	0	0	74	74	0	0	0
21.9	68	0	0	74	74	0	0	0
22.1	69	0	0	74	74	0	0	0
22.2	70	0	0	74	74	0	0	0
22.4	71	0	0	74	74	0	0	0
22.6	72	0	0	74	74	0	0	0
22.7	73	0	0	74	74	0	0	0
22.9	74	0	0	74	74	0	0	0
23.0	75	0	0	74	74	0	0	0
23.2	76	0	0	74	74	0	0	0
23.4	77	0	0	74	74	0	0	0
23.5	78	0	0	74	74	0	0	0
23.7	79	0	0	74	74	0	0	0
23.8	80	0	0	74	74	0	0	0
24.0	81	0	0	74	74	0	0	0
24.2	82	0	0	74	74	0	0	0
24.3	83	0	0	74	74	0	0	0
24.5	84	0	0	74	74	0	0	0
24.6	85	0	0	74	74	0	0	0
24.8	86	0	0	74	74	0	0	0
25.0	87	0	0	74	74	0	0	0
25.1	88	0	0	74	74	0	0	0
25.3	89	0	0	74	74	0	0	0
25.4	90	0	0	74	74	0	0	0
25.6	91	0	0	74	74	0	0	0
25.8	92	0	0	74	74	0	0	0
25.9	93	0	0	74	74	0	0	0
26.1	94	0	0	74	74	0	0	0

26.2	95	0	0	74	74	0	0	0
26.4	96	0	0	74	74	0	0	0
26.6	97	0	0	74	74	0	0	0
26.7	98	0	0	74	74	0	0	0
26.9	99	0	0	74	74	0	0	0
27.0	100	0	0	74	74	0	0	0
27.2	101	0	0	74	74	0	0	0
27.4	102	0	0	74	74	0	0	0

NBS/LOWRY ENGINEERS & PLANNERS

DATE 20-Dec-88
JOB NO P81194-013
BY PHINNEY
RCE 15704
CHK'D _____
FILEPATH:C:\LOTUS\02773-3

DETENTION AREA SIZING STUDY
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
BASIN NO. 3A

SECTION 02773 STORMWATER HOLDING PONDS

REFERENCES:

1 FHWA, Hydraulic Design of Highway Culverts
2 Brater & King, Handbook of Hydraulics
3 Upper East Fork Cave Creek ADMS
4 ASCE, Stormwater Detention Outlet Control Struc
5

INPUT PARAMETERS

DETENTION BASIN

SIDESLOPE	0.25		City of Phoenix Parks Dept
TOP ELEVATION	1445		ADMS Prelim System Map
FLOOR ELEVATION	1435	ft	
MAXIMUM DEPTH	10	ft	
TOP LENGTH	1000	ft	ADMS Prelim System Map
TOP WIDTH	650	ft	ADMS Prelim System Map
TOP AREA	14.92	acres	
BASE LENGTH	920	ft	
BASE WIDTH	570	ft	
BASE AREA	12.04	acres	

OUTLET CULVERT

NUMBER OF OUTFALL CULVERTS		3	
SHAPE		CIRCULAR	
MATERIAL		CONCRETE	
CULVERT HEIGHT		0	ft
CULVERT WIDTH		0	ft
CULVERT DIAMETER		54	in
		4.5	ft
CULVERT AREA	A	15.9	ft2
INT CULVERT BARREL HT	D	4.5	ft
CULVERT INLET INVERT		1432.50	ft
CULVERT INLET SOFFIT		1437.00	ft
BASIN - CULVERT INVERT	dEL	2.5	ft
TAILWATER ELEVATION		1436.70	ft
CULVERT OUTLET INVERT		1430.50	ft
CULVERT LENGTH		300	ft
CULVERT SLOPE		0.006666	
ASSUMED ENERGY SLOPE	S	0.001	
INLET EDGE DESCRIPTION		90 DEG HEADWALL W/ 33.7 DEG BEVELS	
DESIGN CONSTANTS	K	0.0018	FHWA p 147,148
	M	2.500	FHWA p 147,148
	c	0.0243	FHWA p 147,148
	Y	0.83	FHWA p 147,148
SLOPE CORRECTION FACTOR	SCF	-0.5 *S	FHWA p 146
MANNING'S n	n	0.012	

TIME INCREMENT dT 0.16 hrs 576 sec

OUTPUT

MAX DISCHARGE	885	cfs
MAX DEPTH	9.6	ft
FREEBOARD	0.4	ft
AREA AT MAX DEPTH	14.62	acres
VOLUME AT MAX DEPTH	119.79	acre-ft

DEPTH (ft)	AREA (ac)	VOLUME (ft3)	HW/D	2S/dT+O (cfs)	SUBMRGD INLET CONTROL (cfs)	OUTLET CONTROL (cfs)	DISCHARGE (cfs)	DEPTH (ft)
0.0	12.04	0	0.56	0	0	0.0	0	0.0
0.1	12.07	52500	0.58	307	ERR	125.1	125	0.1
0.2	12.09	105119	0.60	501	ERR	135.9	136	0.2
0.3	12.12	157857	0.62	691	ERR	142.8	143	0.3
0.4	12.15	210715	0.64	881	ERR	149.5	149	0.4
0.5	12.18	263693	0.67	1072	ERR	156.3	156	0.5
0.6	12.20	316790	0.69	1263	ERR	162.8	163	0.6
0.7	12.23	370008	0.71	1457	ERR	172.4	172	0.7
0.8	12.26	423345	0.73	1648	ERR	178.4	178	0.8
0.9	12.29	476803	0.76	1840	ERR	184.5	184	0.9
1.0	12.31	530381	0.78	2031	ERR	189.8	190	1.0
1.1	12.34	584080	0.80	2226	ERR	197.6	198	1.1
1.2	12.37	637899	0.82	2417	ERR	202.0	202	1.2
1.3	12.40	691839	0.84	2609	79	206.4	206	1.3
1.4	12.42	745900	0.87	2800	125	210.3	210	1.4
1.5	12.45	800082	0.89	2991	158	213.2	213	1.5
1.6	12.48	854385	0.91	3183	185	216.0	216	1.6
1.7	12.51	908809	0.93	3373	209	217.2	217	1.7
1.8	12.54	963355	0.96	3562	231	217.0	217	1.8
1.9	12.56	1018022	0.98	3750	250	215.7	216	1.9
2.0	12.59	1072811	1.00	3927	268	202.1	202	2.0
2.1	12.62	1127721	1.02	4149	285	233.4	233	2.1
2.2	12.65	1182754	1.04	4368	301	260.9	261	2.2
2.3	12.68	1237908	1.07	4584	316	285.8	286	2.3
2.4	12.70	1293185	1.09	4799	331	308.7	309	2.4
2.5	12.73	1348584	1.11	5013	345	330.0	330	2.5
2.6	12.76	1404105	1.13	5225	358	350.1	350	2.6
2.7	12.79	1459749	1.16	5438	371	369.0	369	2.7
2.8	12.82	1515515	1.18	5645	383	387.0	383	2.8
2.9	12.84	1571404	1.20	5851	395	404.2	395	2.9
3.0	12.87	1627416	1.22	6058	407	420.7	407	3.0
3.1	12.90	1683551	1.24	6264	418	436.6	418	3.1
3.2	12.93	1739810	1.27	6470	429	451.9	429	3.2
3.3	12.96	1796191	1.29	6677	440	466.7	440	3.3
3.4	12.99	1852696	1.31	6884	451	481.1	451	3.4
3.5	13.01	1909325	1.33	7090	461	495.1	461	3.5
3.6	13.04	1966077	1.36	7298	471	508.6	471	3.6
3.7	13.07	2022953	1.38	7505	481	521.8	481	3.7
3.8	13.10	2079953	1.40	7712	490	534.7	490	3.8
3.9	13.13	2137077	1.42	7920	500	547.3	500	3.9
4.0	13.16	2194326	1.44	8128	509	559.6	509	4.0
4.1	13.19	2251698	1.47	8337	518	571.6	518	4.1
4.2	13.21	2309195	1.49	8545	527	583.4	527	4.2
4.3	13.24	2366817	1.51	8754	536	595.0	536	4.3
4.4	13.27	2424563	1.53	8963	545	606.3	545	4.4
4.5	13.30	2482434	1.56	9173	553	617.4	553	4.5

4.6	13.33	2540431	1.58	9383	562	628.4	562	4.6
4.7	13.36	2598552	1.60	9593	570	639.1	570	4.7
4.8	13.39	2656798	1.62	9803	578	649.7	578	4.8
4.9	13.41	2715170	1.64	10014	586	660.1	586	4.9
5.0	13.44	2773667	1.67	10225	594	670.3	594	5.0
5.1	13.47	2832290	1.69	10436	602	680.4	602	5.1
5.2	13.50	2891039	1.71	10648	610	690.3	610	5.2
5.3	13.53	2949913	1.73	10860	617	700.1	617	5.3
5.4	13.56	3008913	1.76	11072	625	709.8	625	5.4
5.5	13.59	3068040	1.78	11285	632	719.3	632	5.5
5.6	13.62	3127293	1.80	11498	640	728.7	640	5.6
5.7	13.65	3186672	1.82	11712	647	738.0	647	5.7
5.8	13.68	3246177	1.84	11926	654	747.1	654	5.8
5.9	13.70	3305810	1.87	12140	661	756.2	661	5.9
6.0	13.73	3365569	1.89	12354	668	765.2	668	6.0
6.1	13.76	3425455	1.91	12569	675	774.0	675	6.1
6.2	13.79	3485467	1.93	12784	682	782.7	682	6.2
6.3	13.82	3545607	1.96	13000	689	791.4	689	6.3
6.4	13.85	3605875	1.98	13216	696	800.0	696	6.4
6.5	13.88	3666269	2.00	13433	702	808.4	702	6.5
6.6	13.91	3726792	2.02	13649	709	816.8	709	6.6
6.7	13.94	3787441	2.04	13867	716	825.1	716	6.7
6.8	13.97	3848219	2.07	14084	722	833.3	722	6.8
6.9	14.00	3909125	2.09	14302	729	841.4	729	6.9
7.0	14.03	3970158	2.11	14520	735	849.5	735	7.0
7.1	14.06	4031320	2.13	14739	741	857.5	741	7.1
7.2	14.08	4092610	2.16	14958	748	865.4	748	7.2
7.3	14.11	4154028	2.18	15178	754	873.2	754	7.3
7.4	14.14	4215575	2.20	15398	760	881.0	760	7.4
7.5	14.17	4277251	2.22	15618	766	888.6	766	7.5
7.6	14.20	4339055	2.24	15839	772	896.3	772	7.6
7.7	14.23	4400989	2.27	16060	778	903.8	778	7.7
7.8	14.26	4463051	2.29	16281	784	911.3	784	7.8
7.9	14.29	4525243	2.31	16503	790	918.8	790	7.9
8.0	14.32	4587564	2.33	16725	796	926.2	796	8.0
8.1	14.35	4650014	2.36	16948	802	933.5	802	8.1
8.2	14.38	4712594	2.38	17171	808	940.7	808	8.2
8.3	14.41	4775303	2.40	17395	814	948.0	814	8.3
8.4	14.44	4838143	2.42	17619	819	955.1	819	8.4
8.5	14.47	4901112	2.44	17843	825	962.2	825	8.5
8.6	14.50	4964212	2.47	18068	831	969.3	831	8.6
8.7	14.53	5027441	2.49	18293	836	976.3	836	8.7
8.8	14.56	5090801	2.51	18518	842	983.2	842	8.8
8.9	14.59	5154292	2.53	18744	848	990.1	848	8.9
9.0	14.62	5217913	2.56	18971	853	997.0	853	9.0
9.1	14.65	5281665	2.58	19198	859	1003.8	859	9.1
9.2	14.68	5345547	2.60	19425	864	1010.5	864	9.2
9.3	14.71	5409561	2.62	19653	869	1017.2	869	9.3
9.4	14.74	5473706	2.64	19881	875	1023.9	875	9.4
9.5	14.77	5537982	2.67	20109	880	1030.5	880	9.5
9.6	14.80	5602389	2.69	20338	885	1037.1	885	9.6
9.7	14.83	5666928	2.71	20567	891	1043.7	891	9.7
9.8	14.86	5731598	2.73	20797	896	1050.2	896	9.8
9.9	14.89	5796400	2.76	21027	901	1056.6	901	9.9
10.0	14.92	5861334	2.78	21258	906	1063.1	906	10.0
10.1	14.95	5926400	2.80	21489	911	1069.4	911	10.1
10.2	14.98	5991599	2.82	21721	917	1075.8	917	10.2
10.3	15.01	6056929	2.84	21953	922	1082.1	922	10.3
10.4	15.04	6122392	2.87	22185	927	1088.4	927	10.4
10.5	15.07	6187987	2.89	22418	932	1094.6	932	10.5

10.6	15.10	6253715	2.91	22651	937	1100.8	937	10.6
10.7	15.13	6319576	2.93	22885	942	1107.0	942	10.7
10.8	15.17	6385569	2.96	23119	947	1113.1	947	10.8
10.9	15.20	6451696	2.98	23353	952	1119.2	952	10.9
11.0	15.23	6517956	3.00	23588	957	1125.3	957	11.0
11.1	15.26	6584349	3.02	23824	961	1131.3	961	11.1
11.2	15.29	6650875	3.04	24060	966	1137.3	966	11.2
11.3	15.32	6717535	3.07	24296	971	1143.3	971	11.3
11.4	15.35	6784329	3.09	24533	976	1149.2	976	11.4
11.5	15.38	6851257	3.11	24770	981	1155.1	981	11.5
11.6	15.41	6918318	3.13	25007	986	1161.0	986	11.6
11.7	15.44	6985513	3.16	25246	990	1166.8	990	11.7
11.8	15.47	7052843	3.18	25484	995	1172.7	995	11.8
11.9	15.50	7120307	3.20	25723	1000	1178.5	1000	11.9
12.0	15.53	7187905	3.22	25962	1004	1184.2	1004	12.0
12.1	15.56	7255638	3.24	26202	1009	1190.0	1009	12.1
12.2	15.60	7323506	3.27	26442	1014	1195.7	1014	12.2
12.3	15.63	7391508	3.29	26683	1018	1201.3	1018	12.3
12.4	15.66	7459646	3.31	26924	1023	1207.0	1023	12.4
12.5	15.69	7527918	3.33	27166	1027	1212.6	1027	12.5

TIME (hr)	n	I (cfs)	I(n)+2S(n)-O(n (cfs)	2S(n)/dT (cfs)	2S(n+1)/dT (cfs)	O(n+1) (cfs)	I2 (cfs)	O(n+1)+ (cfs)
8.8	1	0	0	0		0	0	0
9.0	2	0	0	0	0	0	0	0
9.1	3	0	0	0	0	0	0	0
9.3	4	0	0	0	0	0	0	0
9.4	5	0	0	0	0	0	0	0
9.6	6	0	1	1	1	0	0	0
9.8	7	1	2	2	2	0	0	0
9.9	8	1	2	3	3	0	0	0
10.1	9	1	3	5	5	0	0	0
10.2	10	2	5	9	9	0	0	0
10.4	11	3	6	13	13	0	0	0
10.6	12	3	8	19	19	0	0	0
10.7	13	4	10	27	27	0	0	0
10.9	14	6	14	37	37	0	0	0
11.0	15	8	18	51	51	0	0	0
11.2	16	10	25	70	70	0	0	0
11.4	17	14	34	94	94	0	0	0
11.5	18	20	78	128	128	0	0	0
11.7	19	58	301	206	206	0	0	0
11.8	20	243	835	236	507	136	0	136
12.0	21	592	1513	771	1070	149	0	149
12.2	22	921	2187	1889	2284	198	0	198
12.3	23	1266	2894	3671	4075	202	0	202
12.5	24	1628	3507	5706	6565	429	0	429
12.6	25	1879	3754	8106	9213	553	0	553
12.8	26	1875	3658	10566	11860	647	0	647
13.0	27	1783	3456	12780	14224	722	0	722
13.1	28	1673	3194	14679	16236	778	0	778
13.3	29	1521	2866	16223	17873	825	0	825
13.4	30	1345	2518	17383	19089	853	0	853
13.6	31	1174	2197	18151	19901	875	0	875
13.8	32	1023	1923	18577	20348	885	0	885
13.9	33	900	1707	18730	20500	885	0	885
14.1	34	806	1540	18666	20437	885	0	885

14.2	35	734	1410	18446	20206	880	0	880
14.4	36	676	1308	18117	19856	869	0	869
14.6	37	631	1223	17697	19425	864	0	864
14.7	38	592	1153	17225	18921	848	0	848
14.9	39	560	1095	16705	18378	836	0	836
15.0	40	534	1043	16161	17800	819	0	819
15.2	41	508	990	15588	17204	808	0	808
15.4	42	481	938	14997	16578	790	0	790
15.5	43	457	890	14390	15935	772	0	772
15.7	44	433	842	13772	15280	754	0	754
15.8	45	409	793	13144	14614	735	0	735
16.0	46	384	744	12506	13937	716	0	716
16.2	47	360	697	11858	13250	696	0	696
16.3	48	337	653	11218	12555	668	0	668
16.5	49	316	611	10578	11872	647	0	647
16.6	50	295	569	9940	11189	625	0	625
16.8	51	274	528	9305	10509	602	0	602
17.0	52	254	491	8677	9833	578	0	578
17.1	53	236	457	8079	9168	545	0	545
17.3	54	221	428	7499	8536	518	0	518
17.4	55	207	402	6928	7928	500	0	500
17.6	56	195	379	6388	7330	471	0	471
17.8	57	184	357	5887	6767	440	0	440
17.9	58	174	338	5430	6244	407	0	407
18.1	59	165	320	5002	5769	383	0	383
18.2	60	156	303	4622	5322	350	0	350
18.4	61	147	287	4308	4925	309	0	309
18.6	62	140	274	4023	4595	286	0	286
18.7	63	134	263	3831	4297	233	0	233
18.9	64	129	255	3690	4094	202	0	202
19.0	65	126	247	3540	3945	202	0	202
19.2	66	122	239	3357	3788	216	0	216
19.4	67	117	230	3162	3596	217	0	217
19.5	68	113	222	2958	3392	217	0	217
19.7	69	109	215	2754	3180	213	0	213
19.8	70	106	208	2548	2969	210	0	210
20.0	71	102	202	2343	2756	206	0	206
20.2	72	100	197	2141	2545	202	0	202
20.3	73	98	194	1943	2339	198	0	198
20.5	74	97	192	1758	2138	190	0	190
20.6	75	95	188	1581	1950	184	0	184
20.8	76	93	184	1412	1769	178	0	178
21.0	77	91	180	1251	1596	172	0	172
21.1	78	89	178	1106	1431	163	0	163
21.3	79	88	176	958	1284	163	0	163
21.4	80	88	157	822	1134	156	0	156
21.6	81	87	87	680	979	149	0	149
21.8	82	86	86	481	767	143	0	143
21.9	83	84	84	295	567	136	0	136
22.1	84	83	83	129	379	125	0	125
22.2	85	82	82	211	211	0	0	0
22.4	86	82	82	293	293	0	0	0
22.6	87	82	82	125	375	125	0	125
22.7	88	81	81	207	207	0	0	0
22.9	89	80	80	288	288	0	0	0
23.0	90	79	79	117	367	125	0	125
23.2	91	78	78	196	196	0	0	0
23.4	92	77	77	274	274	0	0	0
23.5	93	76	76	100	351	125	0	125
23.7	94	75	75	176	176	0	0	0

23.8	95	76	76	251	251	0	0	0
24.0	96	75	75	77	327	125	0	125
24.2	97	74	74	152	152	0	0	0
24.3	98	73	73	226	226	0	0	0
24.5	99	72	72	299	299	0	0	0
24.6	100	71	71	121	371	125	0	125
24.8	101	70	70	192	192	0	0	0
25.0	102	69	69	262	262	0	0	0

NBS/LOWRY ENGINEERS & PLANNERS

DATE 09-Feb-89
JOB NO P81194-013
BY PHINNEY
RCE 15704
CHK'D
FILEPATH:C:\LOTUS\02773-3A

DETENTION AREA SIZING STUDY
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
BASIN NO. 3B

SECTION 02773 STORMWATER HOLDING PONDS

REFERENCES:
1 FHWA, Hydraulic Design of Highway Culverts
2 Brater & King, Handbook of Hydraulics
3 Upper East Fork Cave Creek ADMS
4 ASCE, Stormwater Detention Outlet Control Struc
5

INPUT PARAMETERS

DETENTION BASIN

SIDESLOPE	0.25		City of Phoenix Parks Dept
TOP ELEVATION	1432		ADMS Prelim System Map
FLOOR ELEVATION	1422	ft	
MAXIMUM DEPTH	10	ft	
TOP LENGTH	1300	ft	ADMS Prelim System Map
TOP WIDTH	640	ft	ADMS Prelim System Map
TOP AREA	19.10	acres	
BASE LENGTH	1220	ft	
BASE WIDTH	560	ft	
BASE AREA	15.68	acres	

OUTLET CULVERT

NUMBER OF OUTFALL CULVERTS		1		
SHAPE		CIRCULAR		
MATERIAL		CONCRETE		
CULVERT HEIGHT		0	ft	
CULVERT WIDTH		0	ft	
CULVERT DIAMETER		84	in	
		7.0	ft	
CULVERT AREA	A	38.5	ft2	
INT CULVERT BARREL HT	D	7.0	ft	
CULVERT INLET INVERT		1419.00	ft	
CULVERT INLET SOFFIT		1426.00	ft	
BASIN - CULVERT INVERT	dEL	3	ft	
TAILWATER ELEVATION		0.00	ft	
CULVERT OUTLET INVERT		1415.50	ft	
CULVERT LENGTH		2000	ft	
CULVERT SLOPE		0.00175		
ASSUMED ENERGY SLOPE	S	0.00175		
INLET EDGE DESCRIPTION		90 DEG HEADWALL W/ 45 DEG BEVELS		
DESIGN CONSTANTS	K	0.0018		FHWA p 147,148
	M	2.500		FHWA p 147,148
	c	0.03		FHWA p 147,148
	Y	0.74		FHWA p 147,148
SLOPE CORRECTION FACTOR	SCF	-0.5	*S	FHWA p 146
MANNING'S n	n	0.012		

TIME INCREMENT dT 0.16 hrs 576 sec

OUTPUT

MAX DISCHARGE	462	cfs
MAX DEPTH	9.4	ft
FREEBOARD	0.6	ft
AREA AT MAX DEPTH	18.75	acres
VOLUME AT MAX DEPTH	154.75	acre-ft

DEPTH (ft)	AREA (ac)	VOLUME (ft3)	HW/D	2S/dT+O (cfs)	SUBMRGD INLET CONTROL (cfs)	OUTLET CONTROL (cfs)	DISCHARGE (cfs)	DEPTH (ft)
0.0	15.68	0	0.43	0	0	0.0	0	0.0
0.1	15.72	68391	0.44	353	ERR	115.7	116	0.1
0.2	15.75	136925	0.46	596	ERR	120.6	121	0.2
0.3	15.78	205601	0.47	844	ERR	130.1	130	0.3
0.4	15.82	274421	0.49	1088	ERR	134.8	135	0.4
0.5	15.85	343383	0.50	1337	ERR	144.9	145	0.5
0.6	15.88	412488	0.51	1582	ERR	149.7	150	0.6
0.7	15.91	481736	0.53	1827	ERR	154.7	155	0.7
0.8	15.95	551128	0.54	2078	ERR	164.7	165	0.8
0.9	15.98	620663	0.56	2325	ERR	169.8	170	0.9
1.0	16.01	690341	0.57	2576	ERR	179.3	179	1.0
1.1	16.05	760164	0.59	2824	ERR	184.5	185	1.1
1.2	16.08	830130	0.60	3077	ERR	194.7	195	1.2
1.3	16.11	900240	0.61	3325	ERR	199.6	200	1.3
1.4	16.14	970494	0.63	3574	ERR	204.5	205	1.4
1.5	16.18	1040892	0.64	3828	ERR	214.1	214	1.5
1.6	16.21	1111435	0.66	4078	ERR	218.7	219	1.6
1.7	16.24	1182122	0.67	4333	ERR	228.5	229	1.7
1.8	16.28	1252953	0.69	4584	ERR	233.2	233	1.8
1.9	16.31	1323930	0.70	4839	ERR	242.2	242	1.9
2.0	16.34	1395051	0.71	5091	ERR	247.0	247	2.0
2.1	16.38	1466317	0.73	5343	ERR	251.3	251	2.1
2.2	16.41	1537728	0.74	5599	36	259.9	260	2.2
2.3	16.44	1609285	0.76	5852	79	264.2	264	2.3
2.4	16.48	1680986	0.77	6109	106	272.0	272	2.4
2.5	16.51	1752834	0.79	6362	127	275.9	276	2.5
2.6	16.54	1824826	0.80	6619	145	283.0	283	2.6
2.7	16.58	1896965	0.81	6873	161	286.0	286	2.7
2.8	16.61	1969249	0.83	7127	176	289.3	289	2.8
2.9	16.64	2041680	0.84	7385	189	295.6	296	2.9
3.0	16.68	2114256	0.86	7640	202	298.4	298	3.0
3.1	16.71	2186979	0.87	7897	214	303.1	303	3.1
3.2	16.75	2259848	0.89	8152	225	305.4	305	3.2
3.3	16.78	2332864	0.90	8409	236	308.7	309	3.3
3.4	16.81	2406026	0.91	8664	246	309.4	309	3.4
3.5	16.85	2479335	0.93	8919	256	310.5	310	3.5
3.6	16.88	2552791	0.94	9175	265	311.0	311	3.6
3.7	16.91	2626394	0.96	9430	274	310.9	311	3.7
3.8	16.95	2700144	0.97	9684	283	309.0	309	3.8
3.9	16.98	2774041	0.99	9939	292	306.4	306	3.9
4.0	17.02	2848086	1.00	10179	300	289.5	290	4.0
4.1	17.05	2922278	1.01	10440	308	293.6	294	4.1
4.2	17.08	2996618	1.03	10703	316	297.7	298	4.2
4.3	17.12	3071105	1.04	10965	324	301.7	302	4.3
4.4	17.15	3145741	1.06	11228	332	305.6	306	4.4
4.5	17.18	3220524	1.07	11492	339	309.5	310	4.5

4.6	17.22	3295456	1.09	11756	346	313.3	313	4.6
4.7	17.25	3370536	1.10	12020	353	317.1	317	4.7
4.8	17.29	3445765	1.11	12285	360	320.9	321	4.8
4.9	17.32	3521142	1.13	12551	367	324.6	325	4.9
5.0	17.36	3596667	1.14	12817	374	328.3	328	5.0
5.1	17.39	3672342	1.16	13083	380	331.9	332	5.1
5.2	17.42	3748165	1.17	13350	387	335.5	335	5.2
5.3	17.46	3824137	1.19	13617	393	339.0	339	5.3
5.4	17.49	3900259	1.20	13885	399	342.6	343	5.4
5.5	17.53	3976530	1.21	14153	405	346.0	346	5.5
5.6	17.56	4052950	1.23	14422	411	349.5	349	5.6
5.7	17.60	4129520	1.24	14691	417	352.9	353	5.7
5.8	17.63	4206240	1.26	14961	423	356.3	356	5.8
5.9	17.66	4283109	1.27	15232	429	359.6	360	5.9
6.0	17.70	4360129	1.29	15502	435	362.9	363	6.0
6.1	17.73	4437298	1.30	15773	440	366.2	366	6.1
6.2	17.77	4514618	1.31	16045	446	369.5	369	6.2
6.3	17.80	4592088	1.33	16317	451	372.7	373	6.3
6.4	17.84	4669708	1.34	16590	457	375.9	376	6.4
6.5	17.87	4747479	1.36	16863	462	379.1	379	6.5
6.6	17.91	4825401	1.37	17137	467	382.2	382	6.6
6.7	17.94	4903474	1.39	17411	473	385.3	385	6.7
6.8	17.98	4981697	1.40	17686	478	388.4	388	6.8
6.9	18.01	5060072	1.41	17961	483	391.5	391	6.9
7.0	18.04	5138598	1.43	18237	488	394.5	395	7.0
7.1	18.08	5217275	1.44	18513	493	397.6	398	7.1
7.2	18.11	5296104	1.46	18790	498	400.6	401	7.2
7.3	18.15	5375085	1.47	19067	503	403.5	404	7.3
7.4	18.18	5454217	1.49	19345	508	406.5	406	7.4
7.5	18.22	5533501	1.50	19623	513	409.4	409	7.5
7.6	18.25	5612937	1.51	19902	518	412.3	412	7.6
7.7	18.29	5692525	1.53	20181	522	415.2	415	7.7
7.8	18.32	5772265	1.54	20461	527	418.1	418	7.8
7.9	18.36	5852158	1.56	20741	532	421.0	421	7.9
8.0	18.39	5932204	1.57	21022	536	423.8	424	8.0
8.1	18.43	6012401	1.59	21303	541	426.6	427	8.1
8.2	18.46	6092752	1.60	21585	545	429.4	429	8.2
8.3	18.50	6173256	1.61	21867	550	432.2	432	8.3
8.4	18.53	6253912	1.63	22150	554	435.0	435	8.4
8.5	18.57	6334722	1.64	22433	559	437.7	438	8.5
8.6	18.60	6415685	1.66	22717	563	440.4	440	8.6
8.7	18.64	6496802	1.67	23001	568	443.1	443	8.7
8.8	18.67	6578072	1.69	23286	572	445.8	446	8.8
8.9	18.71	6659495	1.70	23572	576	448.5	449	8.9
9.0	18.75	6741073	1.71	23858	581	451.2	451	9.0
9.1	18.78	6822804	1.73	24144	585	453.8	454	9.1
9.2	18.82	6904690	1.74	24431	589	456.5	456	9.2
9.3	18.85	6986729	1.76	24719	593	459.1	459	9.3
9.4	18.89	7068923	1.77	25007	597	461.7	462	9.4
9.5	18.92	7151272	1.79	25295	601	464.3	464	9.5
9.6	18.96	7233775	1.80	25584	605	466.8	467	9.6
9.7	18.99	7316432	1.81	25874	610	469.4	469	9.7
9.8	19.03	7399245	1.83	26164	614	471.9	472	9.8
9.9	19.06	7482212	1.84	26454	618	474.5	474	9.9
10.0	19.10	7565334	1.86	26745	622	477.0	477	10.0
10.1	19.14	7648612	1.87	27037	626	479.5	479	10.1
10.2	19.17	7732045	1.89	27329	629	482.0	482	10.2
10.3	19.21	7815633	1.90	27622	633	484.4	484	10.3
10.4	19.24	7899377	1.91	27915	637	486.9	487	10.4
10.5	19.28	7983277	1.93	28209	641	489.4	489	10.5

10.6	19.31	8067333	1.94	28503	645	491.8	492	10.6
10.7	19.35	8151544	1.96	28798	649	494.2	494	10.7
10.8	19.39	8235912	1.97	29094	653	496.7	497	10.8
10.9	19.42	8320436	1.99	29389	656	499.1	499	10.9
11.0	19.46	8405116	2.00	29686	660	501.5	501	11.0
11.1	19.49	8489953	2.01	29983	664	503.8	504	11.1
11.2	19.53	8574946	2.03	30280	668	506.2	506	11.2
11.3	19.57	8660096	2.04	30578	671	508.6	509	11.3
11.4	19.60	8745403	2.06	30877	675	510.9	511	11.4
11.5	19.64	8830867	2.07	31176	679	513.3	513	11.5
11.6	19.67	8916488	2.09	31476	682	515.6	516	11.6
11.7	19.71	9002266	2.10	31776	686	517.9	518	11.7
11.8	19.75	9088201	2.11	32076	689	520.2	520	11.8
11.9	19.78	9174295	2.13	32378	693	522.5	523	11.9
12.0	19.82	9260545	2.14	32679	696	524.8	525	12.0
12.1	19.85	9346954	2.16	32982	700	527.1	527	12.1
12.2	19.89	9433520	2.17	33285	704	529.3	529	12.2
12.3	19.93	9520245	2.19	33588	707	531.6	532	12.3
12.4	19.96	9607127	2.20	33892	711	533.8	534	12.4
12.5	20.00	9694168	2.21	34196	714	536.1	536	12.5

TIME (hr)	n	I (cfs)	I(n)+2S(n)-O(n (cfs)	2S(n)/dT (cfs)	2S(n+1)/dT (cfs)	O(n+1) (cfs)	I2 (cfs)	O(n+1)+ (cfs)
11.8	1	136	285	0		0	0	0
12.0	2	149	347	285	285	0	0	0
12.1	3	198	400	391	632	121	0	121
12.3	4	202	641	550	791	121	0	121
12.4	5	439	992	921	1191	135	0	135
12.6	6	553	1200	1604	1913	155	0	155
12.8	7	647	1369	2445	2804	179	0	179
12.9	8	722	1500	3405	3814	205	0	205
13.1	9	778	1603	4421	4905	242	0	242
13.2	10	825	1678	5495	6024	264	0	264
13.4	11	853	1728	6595	7173	289	0	289
13.6	12	875	1760	7712	8323	305	0	305
13.7	13	885	1770	8850	9472	311	0	311
13.9	14	885	1770	10033	10620	294	0	294
14.0	15	885	1765	11176	11803	313	0	313
14.2	16	880	1749	12285	12941	328	0	328
14.4	17	869	1733	13349	14034	343	0	343
14.5	18	864	1712	14369	15082	356	0	356
14.7	19	848	1684	15342	16081	369	0	369
14.8	20	836	1655	16268	17026	379	0	379
15.0	21	819	1627	17146	17923	388	0	388
15.2	22	808	1598	17978	18773	398	0	398
15.3	23	790	1562	18763	19576	406	0	406
15.5	24	772	1526	19495	20325	415	0	415
15.6	25	754	1489	20179	21021	421	0	421
15.8	26	735	1451	20809	21668	429	0	429
16.0	27	716	1412	21390	22260	435	0	435
16.1	28	696	1364	21921	22802	440	0	440
16.3	29	668	1315	22399	23285	443	0	443
16.4	30	647	1272	22817	23714	449	0	449
16.6	31	625	1227	23186	24089	451	0	451
16.8	32	602	1180	23506	24413	454	0	454
16.9	33	578	1123	23773	24686	456	0	456
17.1	34	545	1063	23978	24896	459	0	459

17.2	35	518	1018	24117	25041	462	0	462
17.4	36	500	971	24212	25135	462	0	462
17.6	37	471	911	24260	25183	462	0	462
17.7	38	440	847	24247	25171	462	0	462
17.9	39	407	790	24171	25094	462	0	462
18.0	40	383	733	24043	24961	459	0	459
18.2	41	350	659	23858	24776	459	0	459
18.4	42	309	595	23604	24517	456	0	456
18.5	43	286	519	23291	24199	454	0	454
18.7	44	233	435	22913	23810	449	0	449
18.8	45	202	404	22457	23348	446	0	446
19.0	46	202	418	21980	22861	440	0	440
19.2	47	216	433	21528	22398	435	0	435
19.3	48	217	434	21096	21961	432	0	432
19.5	49	217	430	20677	21530	427	0	427
19.6	50	213	423	20260	21107	424	0	424
19.8	51	210	416	19846	20683	418	0	418
20.0	52	206	408	19432	20262	415	0	415
20.1	53	202	400	19021	19840	409	0	409
20.3	54	198	388	18608	19421	406	0	406
20.4	55	190	374	18195	18996	401	0	401
20.6	56	184	362	17774	18569	398	0	398
20.8	57	178	350	17353	18136	391	0	391
20.9	58	172	335	16926	17703	388	0	388
21.1	59	163	326	16496	17261	382	0	382
21.2	60	163	319	16071	16822	376	0	376
21.4	61	156	305	15644	16390	373	0	373
21.6	62	149	292	15217	15949	366	0	366
21.7	63	143	279	14783	15509	363	0	363
21.9	64	136	261	14350	15062	356	0	356
22.0	65	125	249	13912	14611	349	0	349
22.2	66	124	247	13468	14161	346	0	346
22.4	67	123	245	13037	13715	339	0	339
22.5	68	122	243	12619	13282	332	0	332
22.7	69	121	241	12205	12862	328	0	328
22.8	70	120	239	11804	12446	321	0	321
23.0	71	119	237	11409	12043	317	0	317
23.2	72	118	235	11027	11646	310	0	310
23.3	73	117	233	10651	11262	306	0	306
23.5	74	116	231	10288	10884	298	0	298
23.6	75	115	229	9932	10519	294	0	294
23.8	76	114	227	9548	10161	306	0	307
24.0	77	113	113	9157	9775	309	0	309
24.1	78	0	0	8648	9270	311	0	311
24.3	79	0	0	8031	8648	309	0	309
24.4	80	0	0	7425	8031	303	0	303
24.6	81	0	0	6833	7425	296	0	296
24.8	82	0	0	6267	6833	283	0	283
24.9	83	0	0	5723	6267	272	0	272
25.1	84	0	0	5204	5723	260	0	260
25.2	85	0	0	4710	5204	247	0	247
25.4	86	0	0	4243	4710	233	0	233
25.6	87	0	0	3806	4243	219	0	219
25.7	88	0	0	3397	3806	205	0	205
25.9	89	0	0	2998	3397	200	0	200
26.0	90	0	0	2629	2998	185	0	185
26.2	91	0	0	2270	2629	179	0	179
26.4	92	0	0	1941	2270	165	0	165
26.5	93	0	0	1631	1941	155	0	155
26.7	94	0	0	1332	1631	150	0	150

26.8	95	0	0	1062	1332	135	0	135
27.0	96	0	0	802	1062	130	0	130
27.2	97	0	0	561	802	121	0	121
27.3	98	0	0	329	561	116	0	116
27.5	99	0	0	329	329	0	0	0
27.6	100	0	0	329	329	0	0	0
27.8	101	0	0	329	329	0	0	0
28.0	102	0	0	329	329	0	0	0

NBS/LOWRY ENGINEERS & PLANNERS

DATE 09-Feb-89
JOB NO P81194-013
BY PHINNEY
RCE 15704
CHK'D _____
FILEPATH:C:\LOTUS\02773-4

DETENTION AREA SIZING STUDY
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
BASIN NO. 4

SECTION 02773 STORMWATER HOLDING PONDS

REFERENCES:
1 FHA, Hydraulic Design of Highway Culverts
2 Brater & King, Handbook of Hydraulics
3 Upper East Fork Cave Creek ADMS
4 ASCE, Stormwater Detention Outlet Control Struc
5

INPUT PARAMETERS

DETENTION BASIN

SIDESLOPE	0.25		City of Phoenix Parks Dept
TOP ELEVATION	1465		ADMS Prelim System Map
FLOOR ELEVATION	1458	ft	
MAXIMUM DEPTH	7	ft	
TOP LENGTH	1000	ft	ADMS Prelim System Map
TOP WIDTH	380	ft	ADMS Prelim System Map
TOP AREA	8.72	acres	
BASE LENGTH	944	ft	
BASE WIDTH	324	ft	
BASE AREA	7.02	acres	

OUTLET CULVERT

NUMBER OF OUTFALL CULVERTS		1		
SHAPE		CIRCULAR		
MATERIAL		CONCRETE		
CULVERT HEIGHT		0	ft	
CULVERT WIDTH		0	ft	
CULVERT DIAMETER		48	in	
		4.0	ft	
CULVERT AREA	A	12.6	ft2	
INT CULVERT BARREL HT	D	4.0	ft	
CULVERT INLET INVERT		1458	ft	
BASIN - CULVERT INVERT	dEL	0	ft	
CULVERT OUTLET INVERT		1448.23	ft	
CULVERT LENGTH		2640	ft	
SLOPE	S	0.0037		
INLET EDGE DESCRIPTION		BEVELED RING, 45 DEGREE BEVELS		
DESIGN CONSTANTS	K	0.0018		FHWA p 147,148
	M	2.50		FHWA p 147,148
	c	0.03		FHWA p 147,148
	Y	0.74		FHWA p 147,148
SLOPE CORRECTION FACTOR	SCF	-0.5	*S	FHWA p 146
MANNING'S n	n	0.012		

TIME INCREMENT	dT	0.16	hrs	576 sec

OUTPUT

MAX DISCHARGE	103	cfs
MAX DEPTH	5.8	ft

FREEBOARD 1.2 ft
AREA AT MAX DEPTH 8.42 acres
VOLUME AT MAX DEPTH 44.74 acre-ft

DEPTH (ft)	AREA (ac)	VOLUME (ft3)	HW/D	2S/dT+O (cfs)	SUBMRGD INLET CONTROL (cfs)	OUTLET CONTROL (cfs)	DISCHARGE (cfs)	DEPTH (ft)
0.0	7.02	0	0.00	0	0	0.0	0	0.0
0.1	7.04	30636	0.03	106	ERR	0.1	0	0.1
0.2	7.07	61374	0.05	214	ERR	0.5	0	0.2
0.3	7.09	92214	0.08	321	ERR	0.9	1	0.3
0.4	7.11	123155	0.10	430	ERR	2.0	2	0.4
0.5	7.14	154199	0.13	538	ERR	2.9	3	0.5
0.6	7.16	185344	0.15	648	ERR	4.6	5	0.6
0.7	7.19	216592	0.18	758	ERR	5.9	6	0.7
0.8	7.21	247942	0.20	869	ERR	8.3	8	0.8
0.9	7.23	279394	0.23	980	ERR	10.0	10	0.9
1.0	7.26	310949	0.25	1093	ERR	13.0	13	1.0
1.1	7.28	342607	0.28	1205	ERR	15.1	15	1.1
1.2	7.30	374368	0.30	1318	ERR	18.5	19	1.2
1.3	7.33	406231	0.33	1432	ERR	21.0	21	1.3
1.4	7.35	438198	0.35	1546	ERR	24.8	25	1.4
1.5	7.37	470268	0.38	1660	ERR	27.6	28	1.5
1.6	7.40	502441	0.40	1776	ERR	31.9	32	1.6
1.7	7.42	534718	0.43	1892	ERR	34.9	35	1.7
1.8	7.45	567099	0.45	2009	ERR	39.4	39	1.8
1.9	7.47	599583	0.48	2124	ERR	42.5	43	1.9
2.0	7.49	632171	0.50	2242	ERR	47.4	47	2.0
2.1	7.52	664863	0.53	2359	ERR	50.6	51	2.1
2.2	7.54	697659	0.55	2478	ERR	55.5	56	2.2
2.3	7.56	730559	0.58	2595	ERR	58.6	59	2.3
2.4	7.59	763564	0.60	2715	ERR	63.6	64	2.4
2.5	7.61	796674	0.63	2833	ERR	66.9	67	2.5
2.6	7.64	829888	0.65	2953	ERR	71.5	72	2.6
2.7	7.66	863206	0.68	3072	ERR	74.7	75	2.7
2.8	7.69	896630	0.70	3192	ERR	79.2	79	2.8
2.9	7.71	930159	0.73	3312	ERR	82.2	82	2.9
3.0	7.73	963792	0.75	3433	16	86.4	86	3.0
3.1	7.76	997531	0.78	3553	28	88.9	89	3.1
3.2	7.78	1031376	0.80	3674	36	92.5	93	3.2
3.3	7.81	1065326	0.83	3794	43	94.6	95	3.3
3.4	7.83	1099382	0.85	3915	49	97.5	98	3.4
3.5	7.85	1133543	0.88	4035	54	99.1	99	3.5
3.6	7.88	1167810	0.90	4156	58	100.9	101	3.6
3.7	7.90	1202184	0.93	4276	63	101.5	102	3.7
3.8	7.93	1236663	0.95	4396	67	101.6	102	3.8
3.9	7.95	1271249	0.98	4515	71	101.0	101	3.9
4.0	7.98	1305942	1.00	4629	74	94.7	95	4.0
4.1	8.00	1340741	1.03	4733	78	95.1	78	4.1
4.2	8.03	1375646	1.05	4858	81	95.6	81	4.2
4.3	8.05	1410659	1.08	4982	84	96.1	84	4.3
4.4	8.07	1445778	1.10	5107	87	96.6	87	4.4
4.5	8.10	1481004	1.13	5233	90	97.0	90	4.5
4.6	8.12	1516338	1.15	5358	93	97.5	93	4.6
4.7	8.15	1551779	1.18	5484	96	98.0	96	4.7
4.8	8.17	1587327	1.20	5610	99	98.5	98	4.8

4.9	8.20	1622983	1.23	5734	101	98.9	99	4.9
5.0	8.22	1658747	1.25	5859	104	99.4	99	5.0
5.1	8.25	1694619	1.28	5984	106	99.8	100	5.1
5.2	8.27	1730598	1.30	6109	109	100.3	100	5.2
5.3	8.30	1766686	1.33	6235	111	100.8	101	5.3
5.4	8.32	1802882	1.35	6361	114	101.2	101	5.4
5.5	8.35	1839186	1.38	6488	116	101.7	102	5.5
5.6	8.37	1875599	1.40	6615	118	102.1	102	5.6
5.7	8.40	1912120	1.43	6742	120	102.6	103	5.7
5.8	8.42	1948750	1.45	6870	122	103.0	103	5.8
5.9	8.45	1985489	1.48	6998	125	103.5	103	5.9
6.0	8.47	2022337	1.50	7126	127	103.9	104	6.0
6.1	8.50	2059294	1.53	7255	129	104.3	104	6.1
6.2	8.52	2096360	1.55	7384	131	104.8	105	6.2
6.3	8.55	2133535	1.58	7513	133	105.2	105	6.3
6.4	8.57	2170821	1.60	7643	135	105.6	106	6.4
6.5	8.60	2208215	1.63	7773	137	106.1	106	6.5
6.6	8.62	2245720	1.65	7904	139	106.5	107	6.6
6.7	8.65	2283334	1.68	8035	140	106.9	107	6.7
6.8	8.67	2321059	1.70	8167	142	107.4	107	6.8
6.9	8.70	2358893	1.73	8298	144	107.8	108	6.9
7.0	8.72	2396838	1.75	8431	146	108.2	108	7.0
7.1	8.75	2434893	1.78	8563	148	108.6	109	7.1
7.2	8.77	2473059	1.80	8696	150	109.1	109	7.2
7.3	8.80	2511335	1.83	8829	151	109.5	109	7.3
7.4	8.83	2549723	1.85	8963	153	109.9	110	7.4
7.5	8.85	2588221	1.88	9097	155	110.3	110	7.5
7.6	8.88	2626830	1.90	9232	156	110.7	111	7.6
7.7	8.90	2665550	1.93	9367	158	111.1	111	7.7
7.8	8.93	2704382	1.95	9502	160	111.6	112	7.8
7.9	8.95	2743325	1.98	9637	161	112.0	112	7.9
8.0	8.98	2782380	2.00	9773	163	112.4	112	8.0
8.1	9.00	2821546	2.03	9910	165	112.8	113	8.1
8.2	9.03	2860824	2.05	10047	166	113.2	113	8.2
8.3	9.06	2900214	2.08	10184	168	113.6	114	8.3
8.4	9.08	2939716	2.10	10321	169	114.0	114	8.4
8.5	9.11	2979330	2.13	10459	171	114.4	114	8.5
8.6	9.13	3019057	2.15	10598	172	114.8	115	8.6
8.7	9.16	3058896	2.18	10736	174	115.2	115	8.7
8.8	9.18	3098847	2.20	10875	175	115.6	116	8.8
8.9	9.21	3138912	2.23	11015	177	116.0	116	8.9
9.0	9.24	3179089	2.25	11155	178	116.4	116	9.0
9.1	9.26	3219379	2.28	11295	180	116.8	117	9.1
9.2	9.29	3259782	2.30	11436	181	117.2	117	9.2
9.3	9.31	3300299	2.33	11577	183	117.6	118	9.3
9.4	9.34	3340928	2.35	11718	184	118.0	118	9.4
9.5	9.37	3381672	2.38	11860	186	118.3	118	9.5
9.6	9.39	3422529	2.40	12003	187	118.7	119	9.6
9.7	9.42	3463499	2.43	12145	188	119.1	119	9.7
9.8	9.44	3504583	2.45	12288	190	119.5	119	9.8
9.9	9.47	3545782	2.48	12432	191	119.9	120	9.9
10.0	9.50	3587094	2.50	12575	193	120.3	120	10.0
10.1	9.52	3628521	2.53	12720	194	120.6	121	10.1
10.2	9.55	3670062	2.55	12864	195	121.0	121	10.2
10.3	9.58	3711718	2.58	13009	197	121.4	121	10.3
10.4	9.60	3753488	2.60	13155	198	121.8	122	10.4
10.5	9.63	3795373	2.63	13301	199	122.2	122	10.5
10.6	9.66	3837373	2.65	13447	201	122.5	123	10.6
10.7	9.68	3879488	2.68	13593	202	122.9	123	10.7
10.8	9.71	3921718	2.70	13740	203	123.3	123	10.8

10.9	9.73	3964063	2.73	13888	205	123.6	124	10.9
11.0	9.76	4006524	2.75	14036	206	124.0	124	11.0
11.1	9.79	4049100	2.78	14184	207	124.4	124	11.1
11.2	9.81	4091792	2.80	14332	208	124.8	125	11.2
11.3	9.84	4134599	2.83	14481	210	125.1	125	11.3
11.4	9.87	4177523	2.85	14631	211	125.5	125	11.4
11.5	9.89	4220563	2.88	14781	212	125.9	126	11.5
11.6	9.92	4263718	2.90	14931	213	126.2	126	11.6
11.7	9.95	4306990	2.93	15081	215	126.6	127	11.7
11.8	9.97	4350379	2.95	15232	216	126.9	127	11.8
11.9	10.00	4393884	2.98	15384	217	127.3	127	11.9
12.0	10.03	4437505	3.00	15536	218	127.7	128	12.0
12.1	10.05	4481244	3.03	15688	219	128.0	128	12.1
12.2	10.08	4525099	3.05	15841	221	128.4	128	12.2
12.3	10.11	4569071	3.08	15994	222	128.7	129	12.3
12.4	10.14	4613161	3.10	16147	223	129.1	129	12.4
12.5	10.16	4657368	3.13	16301	224	129.4	129	12.5

TIME (hr)	n	I (cfs)	I(n)+2S(n)-O(n (cfs)	2S(n)/dT (cfs)	2S(n+1)/dT (cfs)	O(n+1) (cfs)	I2 (cfs)	O(n+1)+ (cfs)
11.2	1	1	2	0		0	0	0
11.4	2	2	5	2	2	0	0	0
11.5	3	3	13	7	7	0	0	0
11.7	4	10	42	20	20	0	0	0
11.8	5	32	114	61	61	0	0	0
12.0	6	83	247	176	176	0	0	0
12.2	7	164	431	421	422	1	0	1
12.3	8	267	645	839	851	6	0	6
12.5	9	378	855	1442	1484	21	0	21
12.6	10	477	1012	2202	2297	47	0	47
12.8	11	535	1064	3056	3214	79	0	79
13.0	12	529	999	3921	4120	99	0	99
13.1	13	470	861	4759	4921	81	0	81
13.3	14	390	699	5422	5619	98	0	98
13.4	15	309	550	5921	6122	100	0	100
13.6	16	241	431	6268	6471	101	0	101
13.8	17	190	343	6495	6699	102	0	102
13.9	18	152	276	6632	6837	103	0	103
14.1	19	123	225	6702	6908	103	0	103
14.2	20	101	186	6721	6927	103	0	103
14.4	21	85	158	6701	6907	103	0	103
14.6	22	73	138	6654	6860	103	0	103
14.7	23	65	123	6587	6792	103	0	103
14.9	24	58	112	6506	6710	102	0	102
15.0	25	53	103	6414	6618	102	0	102
15.2	26	49	93	6313	6516	102	0	102
15.4	27	44	83	6204	6407	101	0	101
15.5	28	39	72	6086	6287	101	0	101
15.7	29	33	61	5957	6158	100	0	100
15.8	30	28	52	5818	6018	100	0	100
16.0	31	24	44	5671	5870	99	0	99
16.2	32	21	39	5519	5716	98	0	98
16.3	33	19	36	5366	5558	96	0	96
16.5	34	17	34	5216	5402	93	0	93
16.6	35	16	32	5069	5249	90	0	90
16.8	36	16	31	4932	5101	84	0	84
17.0	37	15	30	4801	4963	81	0	81

17.1	38	15	29	4676	4831	78	0	78
17.3	39	14	28	4515	4705	95	0	95
17.4	40	14	28	4341	4543	101	0	101
17.6	41	14	28	4166	4369	102	0	102
17.8	42	14	28	3992	4194	101	0	101
17.9	43	14	28	3825	4020	98	0	98
18.1	44	14	29	3664	3853	95	0	95
18.2	45	14	28	3508	3693	93	0	93
18.4	46	14	28	3363	3536	86	0	86
18.6	47	14	27	3227	3391	82	0	82
18.7	48	13	27	3095	3254	79	0	79
18.9	49	13	27	2973	3122	75	0	75
19.0	50	13	27	2856	2999	72	0	72
19.2	51	13	27	2749	2883	67	0	67
19.4	52	13	27	2649	2776	64	0	64
19.5	53	13	26	2558	2676	59	0	59
19.7	54	13	26	2474	2585	56	0	56
19.8	55	13	25	2389	2500	56	0	56
20.0	56	12	25	2313	2414	51	0	51
20.2	57	12	25	2243	2338	47	0	47
20.3	58	12	25	2173	2267	47	0	47
20.5	59	13	25	2113	2198	43	0	43
20.6	60	13	26	2053	2138	43	0	43
20.8	61	13	26	2000	2079	39	0	39
21.0	62	13	26	1948	2026	39	0	39
21.1	63	13	26	1904	1974	35	0	35
21.3	64	13	26	1860	1930	35	0	35
21.4	65	13	26	1822	1886	32	0	32
21.6	66	13	26	1785	1849	32	0	32
21.8	67	13	27	1748	1811	32	0	32
21.9	68	13	27	1719	1774	28	0	28
22.1	69	13	26	1690	1746	28	0	28
22.2	70	13	26	1661	1717	28	0	28
22.4	71	13	26	1632	1687	28	0	28
22.6	72	13	27	1609	1658	25	0	25
22.7	73	13	27	1585	1635	25	0	25
22.9	74	13	27	1563	1612	25	0	25
23.0	75	13	26	1540	1589	25	0	25
23.2	76	13	26	1516	1566	25	0	25
23.4	77	13	25	1500	1542	21	0	21
23.5	78	12	25	1483	1525	21	0	21
23.7	79	12	25	1466	1508	21	0	21
23.8	80	12	12	1449	1491	21	0	21
24.0	81	12	12	1420	1462	21	0	21
24.2	82	0	0	1390	1432	21	0	21
24.3	83	0	0	1353	1390	19	0	19
24.5	84	0	0	1315	1353	19	0	19
24.6	85	0	0	1285	1315	15	0	15
24.8	86	0	0	1255	1285	15	0	15
25.0	87	0	0	1225	1255	15	0	15
25.1	88	0	0	1194	1225	15	0	15
25.3	89	0	0	1168	1194	13	0	13
25.4	90	0	0	1143	1168	13	0	13
25.6	91	0	0	1117	1143	13	0	13
25.8	92	0	0	1091	1117	13	0	13
25.9	93	0	0	1071	1091	10	0	10
26.1	94	0	0	1050	1071	10	0	10
26.2	95	0	0	1030	1050	10	0	10
26.4	96	0	0	1010	1030	10	0	10
26.6	97	0	0	990	1010	10	0	10

26.7	98	0	0	970	990	10	0	10
26.9	99	0	0	954	970	8	0	8
27.0	100	0	0	937	954	8	0	8
27.2	101	0	0	920	937	8	0	8
27.4	102	0	0	904	920	8	0	8
27.5	103	0	0	887	904	8	0	8
27.7	104	0	0	870	887	8	0	8
27.8	105	0	0	854	870	8	0	8
28.0	106	0	0	842	854	6	0	6
28.2	107	0	0	830	842	6	0	6
28.3	108	0	0	818	830	6	0	6
28.5	109	0	0	806	818	6	0	6
28.6	110	0	0	794	806	6	0	6
28.8	111	0	0	783	794	6	0	6
29.0	112	0	0	771	783	6	0	6
29.1	113	0	0	759	771	6	0	6
29.3	114	0	0	747	759	6	0	6
29.4	115	0	0	738	747	5	0	5
29.6	116	0	0	728	738	5	0	5
29.8	117	0	0	719	728	5	0	5
29.9	118	0	0	710	719	5	0	5
30.1	119	0	0	701	710	5	0	5
30.2	120	0	0	692	701	5	0	5
30.4	121	0	0	682	692	5	0	5
30.6	122	0	0	673	682	5	0	5
30.7	123	0	0	664	673	5	0	5
30.9	124	0	0	655	664	5	0	5
31.0	125	0	0	646	655	5	0	5
31.2	126	0	0	640	646	3	0	3
31.4	127	0	0	634	640	3	0	3
31.5	128	0	0	628	634	3	0	3
31.7	129	0	0	622	628	3	0	3
31.8	130	0	0	617	622	3	0	3
32.0	131	0	0	611	617	3	0	3
32.2	132	0	0	605	611	3	0	3
32.3	133	0	0	599	605	3	0	3
32.5	134	0	0	594	599	3	0	3
32.6	135	0	0	588	594	3	0	3
32.8	136	0	0	582	588	3	0	3
33.0	137	0	0	576	582	3	0	3
33.1	138	0	0	571	576	3	0	3
33.3	139	0	0	565	571	3	0	3
33.4	140	0	0	559	565	3	0	3
33.6	141	0	0	553	559	3	0	3
33.8	142	0	0	547	553	3	0	3
33.9	143	0	0	542	547	3	0	3
34.1	144	0	0	536	542	3	0	3
34.2	145	0	0	532	536	2	0	2
34.4	146	0	0	528	532	2	0	2
34.6	147	0	0	524	528	2	0	2
34.7	148	0	0	520	524	2	0	2
34.9	149	0	0	516	520	2	0	2
35.0	150	0	0	512	516	2	0	2
35.2	151	0	0	508	512	2	0	2
35.4	152	0	0	504	508	2	0	2
35.5	153	0	0	501	504	2	0	2
35.7	154	0	0	497	501	2	0	2
35.8	155	0	0	493	497	2	0	2
36.0	156	0	0	489	493	2	0	2
36.2	157	0	0	485	489	2	0	2

36.3	158	0	0	481	485	2	0	2
36.5	159	0	0	477	481	2	0	2
36.6	160	0	0	473	477	2	0	2
36.8	161	0	0	469	473	2	0	2
37.0	162	0	0	465	469	2	0	2
37.1	163	0	0	461	465	2	0	2
37.3	164	0	0	457	461	2	0	2
37.4	165	0	0	453	457	2	0	2
37.6	166	0	0	449	453	2	0	2
37.8	167	0	0	445	449	2	0	2
37.9	168	0	0	442	445	2	0	2
38.1	169	0	0	438	442	2	0	2
38.2	170	0	0	434	438	2	0	2
38.4	171	0	0	430	434	2	0	2
38.6	172	0	0	426	430	2	0	2
38.7	173	0	0	424	426	1	0	1
38.9	174	0	0	422	424	1	0	1
39.0	175	0	0	420	422	1	0	1
39.2	176	0	0	418	420	1	0	1
39.4	177	0	0	417	418	1	0	1
39.5	178	0	0	415	417	1	0	1
39.7	179	0	0	413	415	1	0	1
39.8	180	0	0	411	413	1	0	1
40.0	181	0	0	409	411	1	0	1
40.2	182	0	0	407	409	1	0	1
40.3	183	0	0	405	407	1	0	1
40.5	184	0	0	404	405	1	0	1
40.6	185	0	0	402	404	1	0	1
40.8	186	0	0	400	402	1	0	1
41.0	187	0	0	398	400	1	0	1
41.1	188	0	0	396	398	1	0	1
41.3	189	0	0	394	396	1	0	1
41.4	190	0	0	392	394	1	0	1
41.6	191	0	0	390	392	1	0	1
41.8	192	0	0	389	390	1	0	1
41.9	193	0	0	387	389	1	0	1
42.1	194	0	0	385	387	1	0	1
42.2	195	0	0	383	385	1	0	1
42.4	196	0	0	381	383	1	0	1
42.6	197	0	0	379	381	1	0	1
42.7	198	0	0	377	379	1	0	1
42.9	199	0	0	376	377	1	0	1
43.0	200	0	0	374	376	1	0	1
43.2	201	0	0	372	374	1	0	1
43.4	202	0	0	370	372	1	0	1
43.5	203	0	0	368	370	1	0	1
43.7	204	0	0	366	368	1	0	1
43.8	205	0	0	364	366	1	0	1
44.0	206	0	0	363	364	1	0	1
44.2	207	0	0	361	363	1	0	1
44.3	208	0	0	359	361	1	0	1
44.5	209	0	0	357	359	1	0	1
44.6	210	0	0	355	357	1	0	1
44.8	211	0	0	353	355	1	0	1
45.0	212	0	0	351	353	1	0	1
45.1	213	0	0	350	351	1	0	1
45.3	214	0	0	348	350	1	0	1
45.4	215	0	0	346	348	1	0	1
45.6	216	0	0	344	346	1	0	1
45.8	217	0	0	342	344	1	0	1

45.9	218	0	0	340	342	1	0	1
46.1	219	0	0	338	340	1	0	1
46.2	220	0	0	337	338	1	0	1
46.4	221	0	0	335	337	1	0	1
46.6	222	0	0	333	335	1	0	1
46.7	223	0	0	331	333	1	0	1
46.9	224	0	0	329	331	1	0	1
47.0	225	0	0	327	329	1	0	1
47.2	226	0	0	325	327	1	0	1
47.4	227	0	0	324	325	1	0	1
47.5	228	0	0	322	324	1	0	1
47.7	229	0	0	320	322	1	0	1
47.8	230	0	0	319	320	0	0	0
48.0	231	0	0	318	319	0	0	0
48.2	232	0	0	317	318	0	0	0
48.3	233	0	0	316	317	0	0	0
48.5	234	0	0	315	316	0	0	0
48.6	235	0	0	314	315	0	0	0
48.8	236	0	0	313	314	0	0	0
49.0	237	0	0	312	313	0	0	0
49.1	238	0	0	312	312	0	0	0
49.3	239	0	0	311	312	0	0	0
49.4	240	0	0	310	311	0	0	0
49.6	241	0	0	309	310	0	0	0
49.8	242	0	0	308	309	0	0	0
49.9	243	0	0	307	308	0	0	0
50.1	244	0	0	306	307	0	0	0

NBS/LOWRY ENGINEERS & PLANNERS

DATE 09-Feb-89
JOB NO P81194-013
BY PHINNEY
RCE 15704
CHK'D _____
FILEPATH:C:\LOTUS\02773-5

DETENTION AREA SIZING STUDY
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
BASIN NO. 5

SECTION 02773 STORMWATER HOLDING PONDS

REFERENCES:
1 FHWA, Hydraulic Design of Highway Culverts
2 Brater & King, Handbook of Hydraulics
3 Upper East Fork Cave Creek ADMS
4 ASCE, Stormwater Detention Outlet Control Struc
5

INPUT PARAMETERS

DETENTION BASIN

SIDESLOPE		0.25	City of Phoenix Parks Dept
TOP ELEVATION		1388	ADMS Prelim System Map
FLOOR ELEVATION		1382 ft	
MAXIMUM DEPTH		6 ft	
TOP LENGTH		950 ft	ADMS Prelim System Map
TOP WIDTH		910 ft	ADMS Prelim System Map
TOP AREA		19.85 acres	
BASE LENGTH		902 ft	
BASE WIDTH		862 ft	
BASE AREA		17.85 acres	

OUTLET CULVERT

NUMBER OF OUTFALL CULVERTS		1	
SHAPE		CIRCULAR	
MATERIAL		CONCRETE	
CULVERT HEIGHT		0 ft	
CULVERT WIDTH		0 ft	
CULVERT DIAMETER		60 in	
		5.0 ft	
CULVERT AREA	A	19.6 ft2	
INT CULVERT BARREL HT	D	5.0 ft	
CULVERT INLET INVERT		1381.50 ft	
CULVERT INLET SOFFIT		1386.50 ft	
BASIN - CULVERT INVERT	dEL	0.5 ft	
TAILWATER ELEVATION		0.00 ft	
CULVERT OUTLET INVERT		1374.00 ft	
CULVERT LENGTH		1400 ft	
CULVERT SLOPE		0.005357	
ASSUMED ENERGY SLOPE	S	0.005357	
INLET EDGE DESCRIPTION		90 DEG HEADWALL W/ 45 DEG BEVELS	
DESIGN CONSTANTS	K	0.0018	FHWA p 147,148
	M	2.500	FHWA p 147,148
	c	0.03	FHWA p 147,148
	Y	0.74	FHWA p 147,148
SLOPE CORRECTION FACTOR	SCF	-0.5 *S	FHWA p 146
MANNING'S n	n	0.012	

TIME INCREMENT dT 0.16 hrs 576 sec

OUTPUT

MAX DISCHARGE	222	cfs
MAX DEPTH	4.2	ft
FREEBOARD	1.8	ft
AREA AT MAX DEPTH	19.24	acres
VOLUME AT MAX DEPTH	77.86	acre-ft

DEPTH (ft)	AREA (ac)	VOLUME (ft3)	HW/D	2S/dT+O (cfs)	SUBMRGD INLET CONTROL (cfs)	OUTLET CONTROL (cfs)	DISCHARGE (cfs)	DEPTH (ft)
0.0	17.85	0	0.10	0	0	0.0	0	0.0
0.1	17.88	77823	0.12	276	ERR	5.3	5	0.1
0.2	17.91	155787	0.14	550	ERR	8.7	9	0.2
0.3	17.95	233893	0.16	824	ERR	11.5	11	0.3
0.4	17.98	312140	0.18	1098	ERR	14.6	15	0.4
0.5	18.01	390529	0.20	1374	ERR	18.1	18	0.5
0.6	18.04	469059	0.22	1651	ERR	21.9	22	0.6
0.7	18.08	547732	0.24	1928	ERR	26.1	26	0.7
0.8	18.11	626546	0.26	2206	ERR	30.6	31	0.8
0.9	18.14	705503	0.28	2485	ERR	35.3	35	0.9
1.0	18.17	784601	0.30	2765	ERR	40.5	40	1.0
1.1	18.21	863843	0.32	3045	ERR	45.8	46	1.1
1.2	18.24	943226	0.34	3326	ERR	51.4	51	1.2
1.3	18.27	1022753	0.36	3609	ERR	57.3	57	1.3
1.4	18.31	1102422	0.38	3891	ERR	63.3	63	1.4
1.5	18.34	1182234	0.40	4175	ERR	69.5	70	1.5
1.6	18.37	1262189	0.42	4459	ERR	76.0	76	1.6
1.7	18.40	1342288	0.44	4743	ERR	82.5	83	1.7
1.8	18.44	1422529	0.46	5029	ERR	89.2	89	1.8
1.9	18.47	1502914	0.48	5315	ERR	96.2	96	1.9
2.0	18.50	1583443	0.50	5601	ERR	103.3	103	2.0
2.1	18.54	1664115	0.52	5889	ERR	110.3	110	2.1
2.2	18.57	1744931	0.54	6176	ERR	117.5	117	2.2
2.3	18.60	1825891	0.56	6465	ERR	124.8	125	2.3
2.4	18.64	1906995	0.58	6753	ERR	131.6	132	2.4
2.5	18.67	1988244	0.60	7042	ERR	138.9	139	2.5
2.6	18.70	2069636	0.62	7332	ERR	145.9	146	2.6
2.7	18.73	2151173	0.64	7622	ERR	152.7	153	2.7
2.8	18.77	2232855	0.66	7913	ERR	159.7	160	2.8
2.9	18.80	2314681	0.68	8203	ERR	166.3	166	2.9
3.0	18.83	2396652	0.70	8491	ERR	169.7	170	3.0
3.1	18.87	2478768	0.72	8786	ERR	179.2	179	3.1
3.2	18.90	2561030	0.74	9078	13	185.4	185	3.2
3.3	18.93	2643436	0.76	9369	38	190.9	191	3.3
3.4	18.97	2725988	0.78	9662	52	196.8	197	3.4
3.5	19.00	2808685	0.80	9954	63	201.9	202	3.5
3.6	19.03	2891528	0.82	10246	73	206.4	206	3.6
3.7	19.07	2974516	0.84	10539	81	210.9	211	3.7
3.8	19.10	3057651	0.86	10832	89	214.9	215	3.8
3.9	19.14	3140931	0.88	11124	96	217.8	218	3.9
4.0	19.17	3224358	0.90	11416	102	220.2	220	4.0
4.1	19.20	3307931	0.92	11707	108	221.5	221	4.1
4.2	19.24	3391650	0.94	11998	114	221.8	222	4.2
4.3	19.27	3475515	0.96	12290	120	221.7	222	4.3
4.4	19.30	3559527	0.98	12578	125	218.6	219	4.4
4.5	19.34	3643686	1.00	12858	130	206.5	207	4.5

4.6	19.37	3727992	1.02	13079	135	207.9	135	4.6
4.7	19.40	3812445	1.04	13377	139	209.2	139	4.7
4.8	19.44	3897045	1.06	13675	144	210.6	144	4.8
4.9	19.47	3981793	1.08	13974	148	211.9	148	4.9
5.0	19.51	4066687	1.10	14273	153	213.3	153	5.0
5.1	19.54	4151729	1.12	14573	157	214.6	157	5.1
5.2	19.57	4236919	1.14	14872	161	215.9	161	5.2
5.3	19.61	4322257	1.16	15173	165	217.2	165	5.3
5.4	19.64	4407742	1.18	15473	169	218.5	169	5.4
5.5	19.68	4493376	1.20	15774	172	219.8	172	5.5
5.6	19.71	4579158	1.22	16076	176	221.1	176	5.6
5.7	19.74	4665088	1.24	16378	180	222.4	180	5.7
5.8	19.78	4751166	1.26	16680	183	223.7	183	5.8
5.9	19.81	4837393	1.28	16983	187	225.0	187	5.9
6.0	19.85	4923769	1.30	17287	190	226.2	190	6.0
6.1	19.88	5010293	1.32	17590	193	227.5	193	6.1
6.2	19.91	5096966	1.34	17895	197	228.7	197	6.2
6.3	19.95	5183789	1.36	18199	200	230.0	200	6.3
6.4	19.98	5270760	1.38	18504	203	231.2	203	6.4
6.5	20.02	5357881	1.40	18810	206	232.4	206	6.5
6.6	20.05	5445152	1.42	19116	209	233.6	209	6.6
6.7	20.09	5532572	1.44	19423	212	234.9	212	6.7
6.8	20.12	5620141	1.46	19730	215	236.1	215	6.8
6.9	20.15	5707861	1.48	20037	218	237.3	218	6.9
7.0	20.19	5795730	1.50	20345	221	238.5	221	7.0
7.1	20.22	5883750	1.52	20654	224	239.6	224	7.1
7.2	20.26	5971919	1.54	20963	227	240.8	227	7.2
7.3	20.29	6060239	1.56	21272	230	242.0	230	7.3
7.4	20.33	6148710	1.58	21582	233	243.2	233	7.4
7.5	20.36	6237331	1.60	21893	235	244.3	235	7.5
7.6	20.40	6326103	1.62	22204	238	245.5	238	7.6
7.7	20.43	6415025	1.64	22515	241	246.7	241	7.7
7.8	20.47	6504099	1.66	22827	243	247.8	243	7.8
7.9	20.50	6593324	1.68	23140	246	249.0	246	7.9
8.0	20.54	6682700	1.70	23453	249	250.1	249	8.0
8.1	20.57	6772227	1.72	23766	251	251.2	251	8.1
8.2	20.60	6861906	1.74	24078	254	252.4	252	8.2
8.3	20.64	6951736	1.76	24391	256	253.5	253	8.3
8.4	20.67	7041718	1.78	24705	259	254.6	255	8.4
8.5	20.71	7131852	1.80	25019	261	255.7	256	8.5
8.6	20.74	7222138	1.82	25334	264	256.8	257	8.6
8.7	20.78	7312576	1.84	25649	266	257.9	258	8.7
8.8	20.81	7403167	1.86	25964	269	259.0	259	8.8
8.9	20.85	7493910	1.88	26281	271	260.1	260	8.9
9.0	20.88	7584805	1.90	26597	273	261.2	261	9.0
9.1	20.92	7675853	1.92	26915	276	262.3	262	9.1
9.2	20.95	7767054	1.94	27232	278	263.4	263	9.2
9.3	20.99	7858407	1.96	27551	280	264.5	264	9.3
9.4	21.02	7949914	1.98	27869	283	265.5	266	9.4
9.5	21.06	8041574	2.00	28189	285	266.6	267	9.5
9.6	21.09	8133387	2.02	28509	287	267.7	268	9.6
9.7	21.13	8225353	2.04	28829	289	268.7	269	9.7
9.8	21.17	8317473	2.06	29150	292	269.8	270	9.8
9.9	21.20	8409747	2.08	29471	294	270.8	271	9.9
10.0	21.24	8502174	2.10	29793	296	271.9	272	10.0
10.1	21.27	8594756	2.12	30116	298	272.9	273	10.1
10.2	21.31	8687491	2.14	30439	300	274.0	274	10.2
10.3	21.34	8780381	2.16	30762	302	275.0	275	10.3
10.4	21.38	8873425	2.18	31087	304	276.0	276	10.4
10.5	21.41	8966623	2.20	31411	307	277.1	277	10.5

10.6	21.45	9059976	2.22	31736	309	278.1	278	10.6
10.7	21.48	9153484	2.24	32062	311	279.1	279	10.7
10.8	21.52	9247146	2.26	32388	313	280.1	280	10.8
10.9	21.56	9340963	2.28	32715	315	281.1	281	10.9
11.0	21.59	9434936	2.30	33042	317	282.1	282	11.0
11.1	21.63	9529063	2.32	33370	319	283.2	283	11.1
11.2	21.66	9623346	2.34	33699	321	284.2	284	11.2
11.3	21.70	9717785	2.36	34027	323	285.2	285	11.3
11.4	21.73	9812379	2.38	34357	325	286.1	286	11.4
11.5	21.77	9907129	2.40	34687	327	287.1	287	11.5
11.6	21.81	10002034	2.42	35017	329	288.1	288	11.6
11.7	21.84	10097096	2.44	35348	331	289.1	289	11.7
11.8	21.88	10192313	2.46	35680	333	290.1	290	11.8
11.9	21.91	10287687	2.48	36012	335	291.1	291	11.9
12.0	21.95	10383217	2.50	36345	337	292.0	292	12.0
12.1	21.98	10478904	2.52	36678	338	293.0	293	12.1
12.2	22.02	10574747	2.54	37012	340	294.0	294	12.2
12.3	22.06	10670747	2.56	37346	342	295.0	295	12.3
12.4	22.09	10766904	2.58	37681	344	295.9	296	12.4
12.5	22.13	10863218	2.60	38016	346	296.9	297	12.5

TIME (hr)	n	I (cfs)	I(n)+2S(n)/dT (cfs)	-O(n2S(n+1)/dT (cfs)	O(n+1) (cfs)	I2 (cfs)	O(n+1)+ (cfs)
8.8	1	0	0	0	0	0	0
9.0	2	0	0	0	0	0	0
9.1	3	0	0	0	0	0	0
9.3	4	0	0	0	0	0	0
9.4	5	0	0	0	0	0	0
9.6	6	0	1	1	1	0	0
9.8	7	0	1	1	1	0	0
9.9	8	1	2	2	2	0	0
10.1	9	1	2	4	4	0	0
10.2	10	1	3	6	6	0	0
10.4	11	2	4	9	9	0	0
10.6	12	2	6	13	13	0	0
10.7	13	3	8	18	18	0	0
10.9	14	5	11	26	26	0	0
11.0	15	6	15	37	37	0	0
11.2	16	9	20	52	52	0	0
11.4	17	12	30	72	72	0	0
11.5	18	18	123	102	102	0	0
11.7	19	105	453	225	225	0	0
11.8	20	347	989	661	678	9	0	9
12.0	21	641	1516	1613	1649	18	0	18
12.2	22	874	2007	3037	3128	46	0	46
12.3	23	1132	2495	4865	5044	89	0	89
12.5	24	1362	2726	7068	7360	146	0	146
12.6	25	1363	2461	9400	9794	197	0	197
12.8	26	1097	1952	11418	11861	221	0	221
13.0	27	855	1502	13101	13370	135	0	135
13.1	28	647	1092	14289	14602	157	0	157
13.3	29	445	728	15051	15381	165	0	165
13.4	30	283	494	15434	15779	172	0	172
13.6	31	211	395	15583	15928	172	0	172
13.8	32	184	352	15633	15978	172	0	172
13.9	33	169	329	15641	15985	172	0	172
14.1	34	160	316	15625	15969	172	0	172

14.2	35	156	309	15596	15941	172	0	172
14.4	36	153	304	15560	15905	172	0	172
14.6	37	150	297	15519	15864	172	0	172
14.7	38	147	290	15471	15816	172	0	172
14.9	39	143	283	15424	15761	169	0	169
15.0	40	140	269	15370	15707	169	0	169
15.2	41	129	247	15301	15639	169	0	169
15.4	42	118	229	15211	15548	169	0	169
15.5	43	111	219	15110	15440	165	0	165
15.7	44	108	213	14999	15329	165	0	165
15.8	45	105	209	14883	15212	165	0	165
16.0	46	104	199	14770	15092	161	0	161
16.2	47	95	180	14647	14969	161	0	161
16.3	48	85	155	14513	14827	157	0	157
16.5	49	71	128	14355	14669	157	0	157
16.6	50	57	102	14178	14483	153	0	153
16.8	51	45	77	13975	14280	153	0	153
17.0	52	33	55	13755	14052	148	0	148
17.1	53	22	35	13522	13810	144	0	144
17.3	54	13	26	13279	13557	139	0	139
17.4	55	12	25	13035	13304	135	0	135
17.6	56	13	26	12647	13060	207	0	207
17.8	57	13	26	12236	12673	219	0	219
17.9	58	13	26	11818	12262	222	0	222
18.1	59	13	25	11401	11844	221	0	221
18.2	60	12	24	10986	11426	220	0	220
18.4	61	11	23	10579	11009	215	0	215
18.6	62	11	23	10180	10602	211	0	211
18.7	63	12	24	9800	10203	202	0	202
18.9	64	12	25	9430	9824	197	0	197
19.0	65	13	25	9074	9455	191	0	191
19.2	66	12	24	8727	9098	185	0	185
19.4	67	12	23	8412	8751	170	0	170
19.5	68	11	22	8102	8434	166	0	166
19.7	69	11	22	7804	8124	160	0	160
19.8	70	11	21	7520	7826	153	0	153
20.0	71	11	22	7250	7542	146	0	146
20.2	72	11	23	6994	7272	139	0	139
20.3	73	12	25	6755	7018	132	0	132
20.5	74	13	25	6516	6779	132	0	132
20.6	75	12	24	6292	6541	125	0	125
20.8	76	12	23	6081	6316	117	0	118
21.0	77	11	23	5883	6104	110	0	110
21.1	78	11	24	5685	5906	110	0	110
21.3	79	12	25	5502	5709	103	0	103
21.4	80	13	13	5334	5527	96	0	96
21.6	81	13	13	5155	5347	96	0	96
21.8	82	12	12	4989	5167	89	0	89
21.9	83	11	11	4835	5001	83	0	83
22.1	84	11	11	4682	4847	83	0	83
22.2	85	12	12	4541	4693	76	0	76
22.4	86	13	13	4401	4553	76	0	76
22.6	87	13	13	4274	4414	70	0	70
22.7	88	12	12	4148	4287	70	0	70
22.9	89	12	12	4033	4160	63	0	63
23.0	90	11	11	3918	4045	63	0	63
23.2	91	11	11	3803	3930	63	0	63
23.4	92	11	11	3699	3814	57	0	57
23.5	93	11	11	3595	3710	57	0	57
23.7	94	12	12	3503	3606	51	0	51

23.8	95	12	12	3412	3515	51	0	51
24.0	96	11	11	3322	3425	51	0	51
24.2	97	0	0	3230	3333	51	0	51
24.3	98	0	0	3138	3230	46	0	46
24.5	99	0	0	3047	3138	46	0	46
24.6	100	0	0	2955	3047	46	0	46
24.8	101	0	0	2874	2955	40	0	40
25.0	102	0	0	2794	2874	40	0	40
25.1	103	0	0	2713	2794	40	0	40
25.3	104	0	0	2642	2713	35	0	35
25.4	105	0	0	2571	2642	35	0	35
25.6	106	0	0	2501	2571	35	0	35
25.8	107	0	0	2430	2501	35	0	35
25.9	108	0	0	2369	2430	31	0	31
26.1	109	0	0	2308	2369	31	0	31
26.2	110	0	0	2246	2308	31	0	31
26.4	111	0	0	2185	2246	31	0	31
26.6	112	0	0	2133	2185	26	0	26
26.7	113	0	0	2081	2133	26	0	26
26.9	114	0	0	2028	2081	26	0	26
27.0	115	0	0	1976	2028	26	0	26
27.2	116	0	0	1924	1976	26	0	26
27.4	117	0	0	1880	1924	22	0	22
27.5	118	0	0	1836	1880	22	0	22
27.7	119	0	0	1793	1836	22	0	22
27.8	120	0	0	1749	1793	22	0	22
28.0	121	0	0	1705	1749	22	0	22
28.2	122	0	0	1661	1705	22	0	22
28.3	123	0	0	1617	1661	22	0	22
28.5	124	0	0	1581	1617	18	0	18
28.6	125	0	0	1545	1581	18	0	18
28.8	126	0	0	1509	1545	18	0	18
29.0	127	0	0	1472	1509	18	0	18
29.1	128	0	0	1436	1472	18	0	18
29.3	129	0	0	1400	1436	18	0	18
29.4	130	0	0	1364	1400	18	0	18
29.6	131	0	0	1334	1364	15	0	15
29.8	132	0	0	1305	1334	15	0	15
29.9	133	0	0	1276	1305	15	0	15
30.1	134	0	0	1247	1276	15	0	15
30.2	135	0	0	1218	1247	15	0	15
30.4	136	0	0	1188	1218	15	0	15
30.6	137	0	0	1159	1188	15	0	15
30.7	138	0	0	1130	1159	15	0	15
30.9	139	0	0	1101	1130	15	0	15
31.0	140	0	0	1071	1101	15	0	15
31.2	141	0	0	1048	1071	11	0	11
31.4	142	0	0	1025	1048	11	0	11
31.5	143	0	0	1002	1025	11	0	11
31.7	144	0	0	979	1002	11	0	11
31.8	145	0	0	956	979	11	0	11
32.0	146	0	0	933	956	11	0	11
32.2	147	0	0	910	933	11	0	11
32.3	148	0	0	887	910	11	0	11
32.5	149	0	0	864	887	11	0	11
32.6	150	0	0	841	864	11	0	11
32.8	151	0	0	818	841	11	0	11
33.0	152	0	0	801	818	9	0	9
33.1	153	0	0	784	801	9	0	9
33.3	154	0	0	766	784	9	0	9

33.4	155	0	0	749	766	9	0	9
33.6	156	0	0	731	749	9	0	9
33.8	157	0	0	714	731	9	0	9
33.9	158	0	0	697	714	9	0	9
34.1	159	0	0	679	697	9	0	9
34.2	160	0	0	662	679	9	0	9
34.4	161	0	0	645	662	9	0	9
34.6	162	0	0	627	645	9	0	9
34.7	163	0	0	610	627	9	0	9
34.9	164	0	0	592	610	9	0	9
35.0	165	0	0	575	592	9	0	9
35.2	166	0	0	558	575	9	0	9
35.4	167	0	0	540	558	9	0	9
35.5	168	0	0	530	540	5	0	5
35.7	169	0	0	519	530	5	0	5
35.8	170	0	0	509	519	5	0	5
36.0	171	0	0	498	509	5	0	5
36.2	172	0	0	487	498	5	0	5
36.3	173	0	0	477	487	5	0	5
36.5	174	0	0	466	477	5	0	5
36.6	175	0	0	456	466	5	0	5
36.8	176	0	0	445	456	5	0	5
37.0	177	0	0	435	445	5	0	5
37.1	178	0	0	424	435	5	0	5
37.3	179	0	0	413	424	5	0	5
37.4	180	0	0	403	413	5	0	5
37.6	181	0	0	392	403	5	0	5
37.8	182	0	0	382	392	5	0	5
37.9	183	0	0	371	382	5	0	5
38.1	184	0	0	360	371	5	0	5
38.2	185	0	0	350	360	5	0	5
38.4	186	0	0	339	350	5	0	5
38.6	187	0	0	329	339	5	0	5
38.7	188	0	0	318	329	5	0	5
38.9	189	0	0	308	318	5	0	5
39.0	190	0	0	297	308	5	0	5
39.2	191	0	0	286	297	5	0	5
39.4	192	0	0	276	286	5	0	5
39.5	193	0	0	265	276	5	0	5
39.7	194	0	0	265	265	0	0	0
39.8	195	0	0	265	265	0	0	0
40.0	196	0	0	265	265	0	0	0
40.2	197	0	0	265	265	0	0	0
40.3	198	0	0	265	265	0	0	0
40.5	199	0	0	265	265	0	0	0
40.6	200	0	0	265	265	0	0	0
40.8	201	0	0	265	265	0	0	0
41.0	202	0	0	265	265	0	0	0
41.1	203	0	0	265	265	0	0	0
41.3	204	0	0	265	265	0	0	0
41.4	205	0	0	265	265	0	0	0
41.6	206	0	0	265	265	0	0	0
41.8	207	0	0	265	265	0	0	0
41.9	208	0	0	265	265	0	0	0
42.1	209	0	0	265	265	0	0	0
42.2	210	0	0	265	265	0	0	0
42.4	211	0	0	265	265	0	0	0
42.6	212	0	0	265	265	0	0	0
42.7	213	0	0	265	265	0	0	0
42.9	214	0	0	265	265	0	0	0

43.0	215	0	0	265	265	0	0	0
43.2	216	0	0	265	265	0	0	0
43.4	217	0	0	265	265	0	0	0
43.5	218	0	0	265	265	0	0	0
43.7	219	0	0	265	265	0	0	0
43.8	220	0	0	265	265	0	0	0
44.0	221	0	0	265	265	0	0	0
44.2	222	0	0	265	265	0	0	0
44.3	223	0	0	265	265	0	0	0
44.5	224	0	0	265	265	0	0	0
44.6	225	0	0	265	265	0	0	0
44.8	226	0	0	265	265	0	0	0
45.0	227	0	0	265	265	0	0	0
45.1	228	0	0	265	265	0	0	0
45.3	229	0	0	265	265	0	0	0
45.4	230	0	0	265	265	0	0	0
45.6	231	0	0	265	265	0	0	0
45.8	232	0	0	265	265	0	0	0
45.9	233	0	0	265	265	0	0	0
46.1	234	0	0	265	265	0	0	0
46.2	235	0	0	265	265	0	0	0
46.4	236	0	0	265	265	0	0	0
46.6	237	0	0	265	265	0	0	0
46.7	238	0	0	265	265	0	0	0
46.9	239	0	0	265	265	0	0	0
47.0	240	0	0	265	265	0	0	0
47.2	241	0	0	265	265	0	0	0
47.4	242	0	0	265	265	0	0	0
47.5	243	0	0	265	265	0	0	0
47.7	244	0	0	265	265	0	0	0
47.8	245	0	0	265	265	0	0	0
48.0	246	0	0	265	265	0	0	0
48.2	247	0	0	265	265	0	0	0
48.3	248	0	0	265	265	0	0	0
48.5	249	0	0	265	265	0	0	0
48.6	250	0	0	265	265	0	0	0
48.8	251	0	0	265	265	0	0	0
49.0	252	0	0	265	265	0	0	0
49.1	253	0	0	265	265	0	0	0
49.3	254	0	0	265	265	0	0	0
49.4	255	0	0	265	265	0	0	0
49.6	256	0	0	265	265	0	0	0
49.8	257	0	0	265	265	0	0	0
49.9	258	0	0	265	265	0	0	0
50.1	259	0	0	265	265	0	0	0
50.2	260	0	0	265	265	0	0	0
50.4	261	0	0	265	265	0	0	0
50.6	262	0	0	265	265	0	0	0
50.7	263	0	0	265	265	0	0	0
50.9	264	0	0	265	265	0	0	0
51.0	265	0	0	265	265	0	0	0
51.2	266	0	0	265	265	0	0	0
51.4	267	0	0	265	265	0	0	0
51.5	268	0	0	265	265	0	0	0
51.7	269	0	0	265	265	0	0	0
51.8	270	0	0	265	265	0	0	0
52.0	271	0	0	265	265	0	0	0
52.2	272	0	0	265	265	0	0	0
52.3	273	0	0	265	265	0	0	0
52.5	274	0	0	265	265	0	0	0

52.6	275	0	0	265	265	0	0	0
52.8	276	0	0	265	265	0	0	0
53.0	277	0	0	265	265	0	0	0
53.1	278	0	0	265	265	0	0	0
53.3	279	0	0	265	265	0	0	0
53.4	280	0	0	265	265	0	0	0
53.6	281	0	0	265	265	0	0	0
53.8	282	0	0	265	265	0	0	0
53.9	283	0	0	265	265	0	0	0
54.1	284	0	0	265	265	0	0	0
54.2	285	0	0	265	265	0	0	0

NBS/LOWRY ENGINEERS & PLANNERS

DETENTION AREA SIZING STUDY
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
BASIN NO. 5

DATE 09-Feb-89
JOB NO P81194-013
BY PHINNEY
RCE 15704
CHK'D _____
FILEPATH:C:\LOTUS\02773-5

SECTION 02773 STORMWATER HOLDING PONDS

REFERENCES:
1 FHWA, Hydraulic Design of Highway Culverts
2 Brater & King, Handbook of Hydraulics
3 Upper East Fork Cave Creek ADMS
4 ASCE, Stormwater Detention Outlet Control Struc
5

INPUT PARAMETERS

DETENTION BASIN

SIDESLOPE	0.25		City of Phoenix Parks Dept
TOP ELEVATION	1388		ADMS Prelim System Map
FLOOR ELEVATION	1382	ft	
MAXIMUM DEPTH	6	ft	
TOP LENGTH	950	ft	ADMS Prelim System Map
TOP WIDTH	910	ft	ADMS Prelim System Map
TOP AREA	19.85	acres	
BASE LENGTH	902	ft	
BASE WIDTH	862	ft	
BASE AREA	17.85	acres	

OUTLET CULVERT

NUMBER OF OUTFALL CULVERTS		1	
SHAPE		CIRCULAR	
MATERIAL		CONCRETE	
CULVERT HEIGHT		0	ft
CULVERT WIDTH		0	ft
CULVERT DIAMETER		60	in
		5.0	ft
CULVERT AREA	A	19.6	ft2
INT CULVERT BARREL HT	D	5.0	ft
CULVERT INLET INVERT		1381.50	ft
CULVERT INLET SOFFIT		1386.50	ft
BASIN - CULVERT INVERT	dEL	0.5	ft
TAILWATER ELEVATION		0.00	ft
CULVERT OUTLET INVERT		1374.00	ft
CULVERT LENGTH		1400	ft
CULVERT SLOPE		0.005357	

ASSUMED ENERGY SLOPE	S	0.005357	
INLET EDGE DESCRIPTION		90 DEG HEADWALL W/ 45 DEG BEVELS	
DESIGN CONSTANTS	K	0.0018	FHWA p 147,148
	M	2.500	FHWA p 147,148
	c	0.03	FHWA p 147,148
	Y	0.74	FHWA p 147,148
SLOPE CORRECTION FACTOR	SCF	-0.5 *S	FHWA p 146
MANNING'S n	n	0.012	

TIME INCREMENT dT 0.16 hrs 576 sec

OUTPUT

MAX DISCHARGE	222	cfs
MAX DEPTH	4.2	ft
FREEBOARD	1.8	ft
AREA AT MAX DEPTH	19.24	acres
VOLUME AT MAX DEPTH	77.86	acre-ft

DEPTH (ft)	AREA (ac)	VOLUME (ft3)	HW/D	2S/dT+O (cfs)	SUBMRGD INLET CONTROL (cfs)	OUTLET CONTROL (cfs)	DISCHARGE (cfs)	DEPTH (ft)
0.0	17.85	0	0.10	0	0	0.0	0	0.0
0.1	17.88	77823	0.12	276	ERR	5.3	5	0.1
0.2	17.91	155787	0.14	550	ERR	8.7	9	0.2
0.3	17.95	233893	0.16	824	ERR	11.5	11	0.3
0.4	17.98	312140	0.18	1098	ERR	14.6	15	0.4
0.5	18.01	390529	0.20	1374	ERR	18.1	18	0.5
0.6	18.04	469059	0.22	1651	ERR	21.9	22	0.6
0.7	18.08	547732	0.24	1928	ERR	26.1	26	0.7
0.8	18.11	626546	0.26	2206	ERR	30.6	31	0.8
0.9	18.14	705503	0.28	2485	ERR	35.3	35	0.9
1.0	18.17	784601	0.30	2765	ERR	40.5	40	1.0
1.1	18.21	863843	0.32	3045	ERR	45.8	46	1.1
1.2	18.24	943226	0.34	3326	ERR	51.4	51	1.2
1.3	18.27	1022753	0.36	3609	ERR	57.3	57	1.3
1.4	18.31	1102422	0.38	3891	ERR	63.3	63	1.4
1.5	18.34	1182234	0.40	4175	ERR	69.5	70	1.5
1.6	18.37	1262189	0.42	4459	ERR	76.0	76	1.6
1.7	18.40	1342288	0.44	4743	ERR	82.5	83	1.7
1.8	18.44	1422529	0.46	5029	ERR	89.2	89	1.8
1.9	18.47	1502914	0.48	5315	ERR	96.2	96	1.9
2.0	18.50	1583443	0.50	5601	ERR	103.3	103	2.0
2.1	18.54	1664115	0.52	5889	ERR	110.3	110	2.1
2.2	18.57	1744931	0.54	6176	ERR	117.5	117	2.2
2.3	18.60	1825891	0.56	6465	ERR	124.8	125	2.3
2.4	18.64	1906995	0.58	6753	ERR	131.6	132	2.4
2.5	18.67	1988244	0.60	7042	ERR	138.9	139	2.5
2.6	18.70	2069636	0.62	7332	ERR	145.9	146	2.6
2.7	18.73	2151173	0.64	7622	ERR	152.7	153	2.7
2.8	18.77	2232855	0.66	7913	ERR	159.7	160	2.8
2.9	18.80	2314681	0.68	8203	ERR	166.3	166	2.9
3.0	18.83	2396652	0.70	8491	ERR	169.7	170	3.0
3.1	18.87	2478768	0.72	8786	ERR	179.2	179	3.1
3.2	18.90	2561030	0.74	9078	13	185.4	185	3.2

3.3	18.93	2643436	0.76	9369	38	190.9	191	3.3
3.4	18.97	2725988	0.78	9662	52	196.8	197	3.4
3.5	19.00	2808685	0.80	9954	63	201.9	202	3.5
3.6	19.03	2891528	0.82	10246	73	206.4	206	3.6
3.7	19.07	2974516	0.84	10539	81	210.9	211	3.7
3.8	19.10	3057651	0.86	10832	89	214.9	215	3.8
3.9	19.14	3140931	0.88	11124	96	217.8	218	3.9
4.0	19.17	3224358	0.90	11416	102	220.2	220	4.0
4.1	19.20	3307931	0.92	11707	108	221.5	221	4.1
4.2	19.24	3391650	0.94	11998	114	221.8	222	4.2
4.3	19.27	3475515	0.96	12290	120	221.7	222	4.3
4.4	19.30	3559527	0.98	12578	125	218.6	219	4.4
4.5	19.34	3643686	1.00	12858	130	206.5	207	4.5
4.6	19.37	3727992	1.02	13079	135	207.9	135	4.6
4.7	19.40	3812445	1.04	13377	139	209.2	139	4.7
4.8	19.44	3897045	1.06	13675	144	210.6	144	4.8
4.9	19.47	3981793	1.08	13974	148	211.9	148	4.9
5.0	19.51	4066687	1.10	14273	153	213.3	153	5.0
5.1	19.54	4151729	1.12	14573	157	214.6	157	5.1
5.2	19.57	4236919	1.14	14872	161	215.9	161	5.2
5.3	19.61	4322257	1.16	15173	165	217.2	165	5.3
5.4	19.64	4407742	1.18	15473	169	218.5	169	5.4
5.5	19.68	4493376	1.20	15774	172	219.8	172	5.5
5.6	19.71	4579158	1.22	16076	176	221.1	176	5.6
5.7	19.74	4665088	1.24	16378	180	222.4	180	5.7
5.8	19.78	4751166	1.26	16680	183	223.7	183	5.8
5.9	19.81	4837393	1.28	16983	187	225.0	187	5.9
6.0	19.85	4923769	1.30	17287	190	226.2	190	6.0
6.1	19.88	5010293	1.32	17590	193	227.5	193	6.1
6.2	19.91	5096966	1.34	17895	197	228.7	197	6.2
6.3	19.95	5183789	1.36	18199	200	230.0	200	6.3
6.4	19.98	5270760	1.38	18504	203	231.2	203	6.4
6.5	20.02	5357881	1.40	18810	206	232.4	206	6.5
6.6	20.05	5445152	1.42	19116	209	233.6	209	6.6
6.7	20.09	5532572	1.44	19423	212	234.9	212	6.7
6.8	20.12	5620141	1.46	19730	215	236.1	215	6.8
6.9	20.15	5707861	1.48	20037	218	237.3	218	6.9
7.0	20.19	5795730	1.50	20345	221	238.5	221	7.0
7.1	20.22	5883750	1.52	20654	224	239.6	224	7.1
7.2	20.26	5971919	1.54	20963	227	240.8	227	7.2
7.3	20.29	6060239	1.56	21272	230	242.0	230	7.3
7.4	20.33	6148710	1.58	21582	233	243.2	233	7.4
7.5	20.36	6237331	1.60	21893	235	244.3	235	7.5
7.6	20.40	6326103	1.62	22204	238	245.5	238	7.6
7.7	20.43	6415025	1.64	22515	241	246.7	241	7.7
7.8	20.47	6504099	1.66	22827	243	247.8	243	7.8
7.9	20.50	6593324	1.68	23140	246	249.0	246	7.9
8.0	20.54	6682700	1.70	23453	249	250.1	249	8.0
8.1	20.57	6772227	1.72	23766	251	251.2	251	8.1
8.2	20.60	6861906	1.74	24078	254	252.4	252	8.2
8.3	20.64	6951736	1.76	24391	256	253.5	253	8.3
8.4	20.67	7041718	1.78	24705	259	254.6	255	8.4
8.5	20.71	7131852	1.80	25019	261	255.7	256	8.5
8.6	20.74	7222138	1.82	25334	264	256.8	257	8.6
8.7	20.78	7312576	1.84	25649	266	257.9	258	8.7
8.8	20.81	7403167	1.86	25964	269	259.0	259	8.8
8.9	20.85	7493910	1.88	26281	271	260.1	260	8.9
9.0	20.88	7584805	1.90	26597	273	261.2	261	9.0
9.1	20.92	7675853	1.92	26915	276	262.3	262	9.1
9.2	20.95	7767054	1.94	27232	278	263.4	263	9.2

9.3	20.99	7858407	1.96	27551	280	264.5	264	9.3
9.4	21.02	7949914	1.98	27869	283	265.5	266	9.4
9.5	21.06	8041574	2.00	28189	285	266.6	267	9.5
9.6	21.09	8133387	2.02	28509	287	267.7	268	9.6
9.7	21.13	8225353	2.04	28829	289	268.7	269	9.7
9.8	21.17	8317473	2.06	29150	292	269.8	270	9.8
9.9	21.20	8409747	2.08	29471	294	270.8	271	9.9
10.0	21.24	8502174	2.10	29793	296	271.9	272	10.0
10.1	21.27	8594756	2.12	30116	298	272.9	273	10.1
10.2	21.31	8687491	2.14	30439	300	274.0	274	10.2
10.3	21.34	8780381	2.16	30762	302	275.0	275	10.3
10.4	21.38	8873425	2.18	31087	304	276.0	276	10.4
10.5	21.41	8966623	2.20	31411	307	277.1	277	10.5
10.6	21.45	9059976	2.22	31736	309	278.1	278	10.6
10.7	21.48	9153484	2.24	32062	311	279.1	279	10.7
10.8	21.52	9247146	2.26	32388	313	280.1	280	10.8
10.9	21.56	9340963	2.28	32715	315	281.1	281	10.9
11.0	21.59	9434936	2.30	33042	317	282.1	282	11.0
11.1	21.63	9529063	2.32	33370	319	283.2	283	11.1
11.2	21.66	9623346	2.34	33699	321	284.2	284	11.2
11.3	21.70	9717785	2.36	34027	323	285.2	285	11.3
11.4	21.73	9812379	2.38	34357	325	286.1	286	11.4
11.5	21.77	9907129	2.40	34687	327	287.1	287	11.5
11.6	21.81	10002034	2.42	35017	329	288.1	288	11.6
11.7	21.84	10097096	2.44	35348	331	289.1	289	11.7
11.8	21.88	10192313	2.46	35680	333	290.1	290	11.8
11.9	21.91	10287687	2.48	36012	335	291.1	291	11.9
12.0	21.95	10383217	2.50	36345	337	292.0	292	12.0
12.1	21.98	10478904	2.52	36678	338	293.0	293	12.1
12.2	22.02	10574747	2.54	37012	340	294.0	294	12.2
12.3	22.06	10670747	2.56	37346	342	295.0	295	12.3
12.4	22.09	10766904	2.58	37681	344	295.9	296	12.4
12.5	22.13	10863218	2.60	38016	346	296.9	297	12.5

TIME (hr)	n	I (cfs)	I(n)+2S(n)-O(n (cfs)	2S(n+1) dT (cfs)	dT (cfs)	O(n+1) (cfs)	I2 (cfs)	O(n+1)+ (cfs)
8.8	1	0	0	0		0	0	0
9.0	2	0	0	0	0	0	0	0
9.1	3	0	0	0	0	0	0	0
9.3	4	0	0	0	0	0	0	0
9.4	5	0	0	0	0	0	0	0
9.6	6	0	1	1	1	0	0	0
9.8	7	0	1	1	1	0	0	0
9.9	8	1	2	2	2	0	0	0
10.1	9	1	2	4	4	0	0	0
10.2	10	1	3	6	6	0	0	0
10.4	11	2	4	9	9	0	0	0
10.6	12	2	6	13	13	0	0	0
10.7	13	3	8	18	18	0	0	0
10.9	14	5	11	26	26	0	0	0
11.0	15	6	15	37	37	0	0	0
11.2	16	9	20	52	52	0	0	0
11.4	17	12	30	72	72	0	0	0
11.5	18	18	123	102	102	0	0	0
11.7	19	105	453	225	225	0	0	0
11.8	20	347	989	661	678	9	0	9
12.0	21	641	1516	1613	1649	18	0	18

12.2	22	874	2007	3037	3128	46	0	46
12.3	23	1132	2495	4865	5044	89	0	89
12.5	24	1362	2726	7068	7360	146	0	146
12.6	25	1363	2461	9400	9794	197	0	197
12.8	26	1097	1952	11418	11861	221	0	221
13.0	27	855	1502	13101	13370	135	0	135
13.1	28	647	1092	14289	14602	157	0	157
13.3	29	445	728	15051	15381	165	0	165
13.4	30	283	494	15434	15779	172	0	172
13.6	31	211	395	15583	15928	172	0	172
13.8	32	184	352	15633	15978	172	0	172
13.9	33	169	329	15641	15985	172	0	172
14.1	34	160	316	15625	15969	172	0	172
14.2	35	156	309	15596	15941	172	0	172
14.4	36	153	304	15560	15905	172	0	172
14.6	37	150	297	15519	15864	172	0	172
14.7	38	147	290	15471	15816	172	0	172
14.9	39	143	283	15424	15761	169	0	169
15.0	40	140	269	15370	15707	169	0	169
15.2	41	129	247	15301	15639	169	0	169
15.4	42	118	229	15211	15548	169	0	169
15.5	43	111	219	15110	15440	165	0	165
15.7	44	108	213	14999	15329	165	0	165
15.8	45	105	209	14883	15212	165	0	165
16.0	46	104	199	14770	15092	161	0	161
16.2	47	95	180	14647	14969	161	0	161
16.3	48	85	155	14513	14827	157	0	157
16.5	49	71	128	14355	14669	157	0	157
16.6	50	57	102	14178	14483	153	0	153
16.8	51	45	77	13975	14280	153	0	153
17.0	52	33	55	13755	14052	148	0	148
17.1	53	22	35	13522	13810	144	0	144
17.3	54	13	26	13279	13557	139	0	139
17.4	55	12	25	13035	13304	135	0	135
17.6	56	13	26	12647	13060	207	0	207
17.8	57	13	26	12236	12673	219	0	219
17.9	58	13	26	11818	12262	222	0	222
18.1	59	13	25	11401	11844	221	0	221
18.2	60	12	24	10986	11426	220	0	220
18.4	61	11	23	10579	11009	215	0	215
18.6	62	11	23	10180	10602	211	0	211
18.7	63	12	24	9800	10203	202	0	202
18.9	64	12	25	9430	9824	197	0	197
19.0	65	13	25	9074	9455	191	0	191
19.2	66	12	24	8727	9098	185	0	185
19.4	67	12	23	8412	8751	170	0	170
19.5	68	11	22	8102	8434	166	0	166
19.7	69	11	22	7804	8124	160	0	160
19.8	70	11	21	7520	7826	153	0	153
20.0	71	11	22	7250	7542	146	0	146
20.2	72	11	23	6994	7272	139	0	139
20.3	73	12	25	6755	7018	132	0	132
20.5	74	13	25	6516	6779	132	0	132
20.6	75	12	24	6292	6541	125	0	125
20.8	76	12	23	6081	6316	117	0	118
21.0	77	11	23	5883	6104	110	0	110
21.1	78	11	24	5685	5906	110	0	110
21.3	79	12	25	5502	5709	103	0	103
21.4	80	13	13	5334	5527	96	0	96
21.6	81	13	13	5155	5347	96	0	96

21.8	82	12	12	4989	5167	89	0	89
21.9	83	11	11	4835	5001	83	0	83
22.1	84	11	11	4682	4847	83	0	83
22.2	85	12	12	4541	4693	76	0	76
22.4	86	13	13	4401	4553	76	0	76
22.6	87	13	13	4274	4414	70	0	70
22.7	88	12	12	4148	4287	70	0	70
22.9	89	12	12	4033	4160	63	0	63
23.0	90	11	11	3918	4045	63	0	63
23.2	91	11	11	3803	3930	63	0	63
23.4	92	11	11	3699	3814	57	0	57
23.5	93	11	11	3595	3710	57	0	57
23.7	94	12	12	3503	3606	51	0	51
23.8	95	12	12	3412	3515	51	0	51
24.0	96	11	11	3322	3425	51	0	51
24.2	97	0	0	3230	3333	51	0	51
24.3	98	0	0	3138	3230	46	0	46
24.5	99	0	0	3047	3138	46	0	46
24.6	100	0	0	2955	3047	46	0	46
24.8	101	0	0	2874	2955	40	0	40
25.0	102	0	0	2794	2874	40	0	40
25.1	103	0	0	2713	2794	40	0	40
25.3	104	0	0	2642	2713	35	0	35
25.4	105	0	0	2571	2642	35	0	35
25.6	106	0	0	2501	2571	35	0	35
25.8	107	0	0	2430	2501	35	0	35
25.9	108	0	0	2369	2430	31	0	31
26.1	109	0	0	2308	2369	31	0	31
26.2	110	0	0	2246	2308	31	0	31
26.4	111	0	0	2185	2246	31	0	31
26.6	112	0	0	2133	2185	26	0	26
26.7	113	0	0	2081	2133	26	0	26
26.9	114	0	0	2028	2081	26	0	26
27.0	115	0	0	1976	2028	26	0	26
27.2	116	0	0	1924	1976	26	0	26
27.4	117	0	0	1880	1924	22	0	22
27.5	118	0	0	1836	1880	22	0	22
27.7	119	0	0	1793	1836	22	0	22
27.8	120	0	0	1749	1793	22	0	22
28.0	121	0	0	1705	1749	22	0	22
28.2	122	0	0	1661	1705	22	0	22
28.3	123	0	0	1617	1661	22	0	22
28.5	124	0	0	1581	1617	18	0	18
28.6	125	0	0	1545	1581	18	0	18
28.8	126	0	0	1509	1545	18	0	18
29.0	127	0	0	1472	1509	18	0	18
29.1	128	0	0	1436	1472	18	0	18
29.3	129	0	0	1400	1436	18	0	18
29.4	130	0	0	1364	1400	18	0	18
29.6	131	0	0	1334	1364	15	0	15
29.8	132	0	0	1305	1334	15	0	15
29.9	133	0	0	1276	1305	15	0	15
30.1	134	0	0	1247	1276	15	0	15
30.2	135	0	0	1218	1247	15	0	15
30.4	136	0	0	1188	1218	15	0	15
30.6	137	0	0	1159	1188	15	0	15
30.7	138	0	0	1130	1159	15	0	15
30.9	139	0	0	1101	1130	15	0	15
31.0	140	0	0	1071	1101	15	0	15
31.2	141	0	0	1048	1071	11	0	11

31.4	142	0	0	1025	1048	11	0	11
31.5	143	0	0	1002	1025	11	0	11
31.7	144	0	0	979	1002	11	0	11
31.8	145	0	0	956	979	11	0	11
32.0	146	0	0	933	956	11	0	11
32.2	147	0	0	910	933	11	0	11
32.3	148	0	0	887	910	11	0	11
32.5	149	0	0	864	887	11	0	11
32.6	150	0	0	841	864	11	0	11
32.8	151	0	0	818	841	11	0	11
33.0	152	0	0	801	818	9	0	9
33.1	153	0	0	784	801	9	0	9
33.3	154	0	0	766	784	9	0	9
33.4	155	0	0	749	766	9	0	9
33.6	156	0	0	731	749	9	0	9
33.8	157	0	0	714	731	9	0	9
33.9	158	0	0	697	714	9	0	9
34.1	159	0	0	679	697	9	0	9
34.2	160	0	0	662	679	9	0	9
34.4	161	0	0	645	662	9	0	9
34.6	162	0	0	627	645	9	0	9
34.7	163	0	0	610	627	9	0	9
34.9	164	0	0	592	610	9	0	9
35.0	165	0	0	575	592	9	0	9
35.2	166	0	0	558	575	9	0	9
35.4	167	0	0	540	558	9	0	9
35.5	168	0	0	530	540	5	0	5
35.7	169	0	0	519	530	5	0	5
35.8	170	0	0	509	519	5	0	5
36.0	171	0	0	498	509	5	0	5
36.2	172	0	0	487	498	5	0	5
36.3	173	0	0	477	487	5	0	5
36.5	174	0	0	466	477	5	0	5
36.6	175	0	0	456	466	5	0	5
36.8	176	0	0	445	456	5	0	5
37.0	177	0	0	435	445	5	0	5
37.1	178	0	0	424	435	5	0	5
37.3	179	0	0	413	424	5	0	5
37.4	180	0	0	403	413	5	0	5
37.6	181	0	0	392	403	5	0	5
37.8	182	0	0	382	392	5	0	5
37.9	183	0	0	371	382	5	0	5
38.1	184	0	0	360	371	5	0	5
38.2	185	0	0	350	360	5	0	5
38.4	186	0	0	339	350	5	0	5
38.6	187	0	0	329	339	5	0	5
38.7	188	0	0	318	329	5	0	5
38.9	189	0	0	308	318	5	0	5
39.0	190	0	0	297	308	5	0	5
39.2	191	0	0	286	297	5	0	5
39.4	192	0	0	276	286	5	0	5
39.5	193	0	0	265	276	5	0	5
39.7	194	0	0	265	265	0	0	0
39.8	195	0	0	265	265	0	0	0
40.0	196	0	0	265	265	0	0	0
40.2	197	0	0	265	265	0	0	0
40.3	198	0	0	265	265	0	0	0
40.5	199	0	0	265	265	0	0	0
40.6	200	0	0	265	265	0	0	0
40.8	201	0	0	265	265	0	0	0

41.0	202	0	0	265	265	0	0	0
41.1	203	0	0	265	265	0	0	0
41.3	204	0	0	265	265	0	0	0
41.4	205	0	0	265	265	0	0	0
41.6	206	0	0	265	265	0	0	0
41.8	207	0	0	265	265	0	0	0
41.9	208	0	0	265	265	0	0	0
42.1	209	0	0	265	265	0	0	0
42.2	210	0	0	265	265	0	0	0
42.4	211	0	0	265	265	0	0	0
42.6	212	0	0	265	265	0	0	0
42.7	213	0	0	265	265	0	0	0
42.9	214	0	0	265	265	0	0	0
43.0	215	0	0	265	265	0	0	0
43.2	216	0	0	265	265	0	0	0
43.4	217	0	0	265	265	0	0	0
43.5	218	0	0	265	265	0	0	0
43.7	219	0	0	265	265	0	0	0
43.8	220	0	0	265	265	0	0	0
44.0	221	0	0	265	265	0	0	0
44.2	222	0	0	265	265	0	0	0
44.3	223	0	0	265	265	0	0	0
44.5	224	0	0	265	265	0	0	0
44.6	225	0	0	265	265	0	0	0
44.8	226	0	0	265	265	0	0	0
45.0	227	0	0	265	265	0	0	0
45.1	228	0	0	265	265	0	0	0
45.3	229	0	0	265	265	0	0	0
45.4	230	0	0	265	265	0	0	0
45.6	231	0	0	265	265	0	0	0
45.8	232	0	0	265	265	0	0	0
45.9	233	0	0	265	265	0	0	0
46.1	234	0	0	265	265	0	0	0
46.2	235	0	0	265	265	0	0	0
46.4	236	0	0	265	265	0	0	0
46.6	237	0	0	265	265	0	0	0
46.7	238	0	0	265	265	0	0	0
46.9	239	0	0	265	265	0	0	0
47.0	240	0	0	265	265	0	0	0
47.2	241	0	0	265	265	0	0	0
47.4	242	0	0	265	265	0	0	0
47.5	243	0	0	265	265	0	0	0
47.7	244	0	0	265	265	0	0	0
47.8	245	0	0	265	265	0	0	0
48.0	246	0	0	265	265	0	0	0
48.2	247	0	0	265	265	0	0	0
48.3	248	0	0	265	265	0	0	0
48.5	249	0	0	265	265	0	0	0
48.6	250	0	0	265	265	0	0	0
48.8	251	0	0	265	265	0	0	0
49.0	252	0	0	265	265	0	0	0
49.1	253	0	0	265	265	0	0	0
49.3	254	0	0	265	265	0	0	0
49.4	255	0	0	265	265	0	0	0
49.6	256	0	0	265	265	0	0	0
49.8	257	0	0	265	265	0	0	0
49.9	258	0	0	265	265	0	0	0
50.1	259	0	0	265	265	0	0	0
50.2	260	0	0	265	265	0	0	0
50.4	261	0	0	265	265	0	0	0

50.6	262	0	0	265	265	0	0	0
50.7	263	0	0	265	265	0	0	0
50.9	264	0	0	265	265	0	0	0
51.0	265	0	0	265	265	0	0	0
51.2	266	0	0	265	265	0	0	0
51.4	267	0	0	265	265	0	0	0
51.5	268	0	0	265	265	0	0	0
51.7	269	0	0	265	265	0	0	0
51.8	270	0	0	265	265	0	0	0
52.0	271	0	0	265	265	0	0	0
52.2	272	0	0	265	265	0	0	0
52.3	273	0	0	265	265	0	0	0
52.5	274	0	0	265	265	0	0	0
52.6	275	0	0	265	265	0	0	0
52.8	276	0	0	265	265	0	0	0
53.0	277	0	0	265	265	0	0	0
53.1	278	0	0	265	265	0	0	0
53.3	279	0	0	265	265	0	0	0
53.4	280	0	0	265	265	0	0	0
53.6	281	0	0	265	265	0	0	0
53.8	282	0	0	265	265	0	0	0
53.9	283	0	0	265	265	0	0	0
54.1	284	0	0	265	265	0	0	0
54.2	285	0	0	265	265	0	0	0

```
*******************80-80 LIST OF INPUT DATA FOR TR-20 HYDROLOGY*******************

JOB TR-20                                        SUMMARY   NOPLOTS
TITLE 000 EAST FORK CAVE CREEK - DETENTION AREA SIZING STUDY
TITLE 000 JOB NUMBER:  P81-194-013   FILENAME: DETSIZE.DAT
 5 RAINFL 1            .0208
 8         0.          .004        .008        .0130       .018
 8         .022        .026        .031        .035        .04
 8         .044        .048        .053        .057        .062
 8         .066        .071        .075        .080        .093
 8         .107        .120        .140        .170        .500
 8         .830        .860        .880        .893        .907
 8         .920        .924        .928        .933        .937
 8         .942        .947        .951        .956        .960
 8         .964        .969        .973        .978        .982
 8         .987        .991        .995        1.00        1.00
 9 ENDTBL
 2 XSECTN   006        1.0
 8                     1502.       0.0         0.0
 8                     1502.4      3.7         2.1
 8                     1502.8      13.3        5.1
 8                     1503.2      29.5        9.1
 8                     1503.6      53.4        14.1
 8                     1504.0      85.8        20.0
 8                     1504.4      100.7       30.8
 8                     1504.8      169.0       50.3
 8                     1505.2      289.0       78.5
 8                     1505.6      469.8       115.4
 8                     1506.0      470.9       161.1
 8                     1506.4      952.6       295.5
 8                     1506.8      1764.7      462.7
 8                     1507.2      2878.8      662.8
 8                     1507.6      4328.4      895.6
 8                     1508.0      6145.9      1161.3
 8                     1508.4      8331.5      1460.9
 8                     1508.8      10956.2     1795.8
 9 ENDTBL
 2 XSECTN   008        1.0
 8                     1494.0      0.0         0.0
 8                     1494.3      7.4         5.7
 8                     1494.6      23.9        12.0
 8                     1494.9      47.8        18.8
 8                     1495.2      78.9        26.3
 8                     1495.5      117.0       34.3
 8                     1495.8      162.2       42.9
 8                     1496.1      165.4       53.5
 8                     1496.4      175.4       84.2
 8                     1496.7      302.7       140.5
```

```
8                    1497.0     527.8      222.4
8                    1497.3     868.5      329.9
8                    1497.6    1343.8      463.0
8                    1497.9    1972.3      621.8
8                    1498.2    2837.4      803.3
8                    1498.5    3901.4      998.3
8                    1498.8    5131.8     1206.2
8                    1499.1    6532.4     1426.8
8                    1499.4    8107.5     1660.4
8                    1499.7    9861.7     1906.7
9 ENDTBL
2 XSECTN   014       1.0
8                    1484.0     0.0        0.0
8                    1484.3     4.5        3.5
8                    1484.6    14.6        7.4
8                    1484.9    29.3       11.7
8                    1485.2    48.4       16.4
8                    1485.5    72.0       21.6
8                    1485.8   100.0       27.1
8                    1486.1   132.3       33.0
8                    1486.4   168.7       39.4
8                    1486.7   210.3       46.4
8                    1487.0   257.3       53.8
8                    1487.3   309.9       61.7
8                    1487.6   368.3       70.1
8                    1487.9   432.9       78.9
8                    1488.2   460.0       95.4
8                    1488.5   490.0      142.0
8                    1488.8   520.2      220.5
8                    1489.1   843.7      330.9
8                    1489.4  1318.9      473.3
8                    1489.7  1968.4      647.5
9 ENDTBL
2 XSECTN   037       1.0
8                    1452.0     0.0        0.0
8                    1452.2     8.1        6.5
8                    1452.6    50.6       19.9
8                    1453.0   119.3       34.0
8                    1453.2   162.1       41.3
8                    1453.4   210.4       48.7
8                    1453.6   263.8       56.3
8                    1453.8   322.2       64.1
8                    1454.0   385.5       72.0
8                    1454.2   420.0       86.0
8                    1454.4   456.8      100.3
8                    1454.6   566.6      114.7
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8                    1454.8     685.9      129.2
8                    1455.0     814.4      143.9
8                    1455.2     952.0      158.8
8                    1455.4     1098.3     173.9
8                    1455.6     1183.6     189.8
8                    1455.8     1357.3     206.7
8                    1456.0     1540.3     223.7
8                    1456.2     1740.2     240.7
9 ENDTBL
2 XSECTN   087       1.0
8                    1429.8     0.0        0.0
8                    1429.9     32.7       48.5
8                    1430.      115.8      116.0
8                    1430.1     268.3      193.9
8                    1430.2     469.2      273.6
8                    1430.4     1000.2     438.7
8                    1430.6     1689.0     611.1
8                    1430.8     2526.0     791.0
8                    1431.0     3505.8     978.2
8                    1431.2     4625.3     1172.9
8                    1431.4     5882.7     1374.9
9 ENDTBL
2 XSECTN   083       1.0
8                    0.         0.         0.
8                    .275       1.40       .444
8                    .55        6.08       1.24
8                    .825       14.15      2.23
8                    1.1        25.49      3.38
8                    1.38       39.87      4.65
8                    1.65       57.0       5.99
8                    1.93       76.53      7.41
8                    2.2        98.08      8.87
8                    2.475      121.23     10.37
8                    2.75       145.52     11.88
8                    3.03       170.46     13.39
8                    3.3        195.5      14.88
8                    3.58       220.14     16.35
8                    3.85       243.67     17.76
8                    4.13       265.39     19.11
8                    4.4        284.48     20.38
8                    4.68       299.90     21.52
8                    4.95       310.19     22.52
8                    5.23       312.73     23.31
9 ENDTBL
2 XSECTN   104       1.0
8                    0.         0.         0.
```

**********80-80 LIST OF INPUT DATA (CONTINUED)**********

```
8                    .3          1.43        .53
8                    .6          6.21        1.47
8                    .9          14.46       2.66
8                    1.2         26.04       4.03
8                    1.5         40.73       5.53
8                    1.8         58.23       7.13
8                    2.1         78.19       8.82
8                    2.4         100.20      10.56
8                    2.7         123.86      12.34
8                    3.          148.68      14.14
8                    3.3         174.15      15.93
8                    3.6         199.76      17.71
8                    3.9         224.91      19.45
8                    4.2         248.94      21.14
8                    4.5         271.14      22.75
8                    4.8         290.64      24.25
8                    5.1         305.39      25.61
8                    5.4         316.91      26.80
8                    5.7         319.50      27.75
9 ENDTBL
2 XSECTN   105       1.0
8                    1417.1      0.0         0.0
8                    1417.3      9.7         14.0
8                    1417.5      61.9        55.0
8                    1417.7      182.4       125.9
8                    1417.9      392.9       223.9
8                    1418.1      737.3       347.5
8                    1418.3      1217.8      483.0
8                    1418.5      1805.5      628.1
8                    1418.7      2500.2      782.6
8                    1418.9      3303.3      946.7
9 ENDTBL
3 STRUCT     08
8                    1491.       0.          0.
8                    1491.3      3.          4.84
8                    1491.6      15.         9.70
8                    1491.9      33.         14.60
8                    1492.2      61.         19.52
8                    1492.5      91.         24.47
8                    1492.8      130.        29.45
8                    1493.1      166.        34.46
8                    1493.4      209.        39.49
8                    1493.7      246.        44.56
8                    1494.       284.        49.65
8                    1494.3      311.        54.77
8                    1494.6      332.        59.93
```

```
8                    1494.9     332.1      65.11
8                    1495.2     346.5      70.32
8                    1495.5     361.       75.56
8                    1495.8     391.       80.83
8                    1496.1     418.       86.13
8                    1496.4     442.       91.45
8                    1496.7     465.       96.81
9 ENDTBL
3 STRUCT      33
8                    1458.      0.         0.
8                    1458.4     2.         2.83
8                    1458.8     8.         5.69
8                    1459.2     19.        8.59
8                    1459.6     32.        11.53
8                    1460.      47.        14.51
8                    1460.4     64.        17.53
8                    1460.8     79.        20.58
8                    1461.2     93.        23.68
8                    1461.6     94.        26.81
8                    1462.      95.        29.98
8                    1462.4     96.5       33.19
8                    1462.8     98.        36.44
8                    1463.2     100.       39.73
8                    1463.6     102.       43.06
8                    1464.      104.       46.43
8                    1464.4     106.       49.84
8                    1464.8     107.       53.28
9 ENDTBL
3 STRUCT      37
8                    1446.0     0.0        0.0
8                    1449.0     0.1        2.58
8                    1449.5     110.       3.52
8                    1449.0     320.       4.45
8                    1449.5     580.       5.38
8                    1450.0     900.       6.32
9 ENDTBL
3 STRUCT      39
8                    1413.      0.0        0.0
8                    1413.4     33.58      8.04
8                    1413.8     101.65     16.18
8                    1414.2     191.12     24.39
8                    1414.6     296.09     32.70
8                    1415.0     412.96     41.10
8                    1415.4     539.25     49.59
8                    1415.8     673.17     58.16
8                    1416.2     813.39     66.83
```

```
8                    1416.6     958.87     75.59
8                    1417.0    1108.82     84.43
8                    1417.4    1262.58     93.37
8                    1417.8    1419.63    102.41
8                    1418.2    1579.53    111.53
8                    1418.6    1741.94    120.75
8                    1419.0    1906.54    130.06
9 ENDTBL
3 STRUCT      43
8                    1430.      0.         0.
8                    1430.5     156.       6.05
8                    1431.      190.      12.18
8                    1431.5     213.      18.37
8                    1432.      271.      24.63
8                    1432.5     330.      30.96
8                    1433.      407.      37.36
8                    1433.5     461.      43.83
8                    1434.      509.      50.37
8                    1434.5     553.      56.99
8                    1435.      594.      63.67
8                    1435.5     632.      70.43
8                    1436.      668.      77.26
8                    1436.5     702.      84.17
8                    1437.      735.      91.14
8                    1437.5     766.      98.19
8                    1438.      796.     105.32
8                    1438.5     825.     112.5
8                    1439.      853.     119.79
8                    1439.5     880.     127.13
9 ENDTBL
3 STRUCT      44
8                    1422.      0.         0.
8                    1422.5     145.       7.88
8                    1423.      179.      15.85
8                    1423.5     214.      23.90
8                    1424.      247.      32.03
8                    1424.5     276.      40.24
8                    1425.      298.      48.54
8                    1425.5     310.      56.92
8                    1426.      316.      65.38
8                    1426.5     322.      73.93
8                    1427.      328.      82.57
8                    1427.5     346.      91.29
8                    1428.      363.     100.09
8                    1428.5     379.     108.99
8                    1429.      395.     117.97
```

**********80-80 LIST OF INPUT DATA (CONTINUED)**********

```
8                    1429.5     409.       127.03
8                    1430.      424.       136.18
8                    1430.5     438.       145.43
8                    1431.      451.       154.75
8                    1431.5     464.       164.17
9 ENDTBL
3 STRUCT      59
8                    1393.      0.0        0.0
8                    1393.5     83.        3.35
8                    1394.      111.       6.74
8                    1394.5     136.       10.19
8                    1395.      162.       13.69
8                    1395.5     176.       17.24
8                    1396.      177.       20.84
8                    1396.5     177.5      24.49
8                    1397.      178.       28.19
8                    1397.5     179.       31.95
8                    1398.      183.       35.76
8                    1398.5     187.       39.62
8                    1399.      191.       43.53
8                    1399.5     195.       47.50
8                    1400.      199.       51.52
8                    1400.5     203.       55.60
8                    1401.      206.       59.73
8                    1401.5     210.       63.92
8                    1402.      213.       68.16
9 ENDTBL
3 STRUCT      69
8                    1382.      0.         0.
8                    1382.3     2.         5.37
8                    1382.6     6.         10.77
8                    1382.9     15.        16.20
8                    1383.2     27.        21.65
8                    1383.5     42.        27.14
8                    1383.8     59.        32.66
8                    1384.1     79.        38.20
8                    1384.4     99.        43.78
8                    1384.7     121.       49.38
8                    1385.      143.       55.02
8                    1385.3     165.       60.68
8                    1385.6     185.       66.38
8                    1385.9     203.       72.11
9                    1386.2     218.       77.86
8                    1386.5     227.       83.65
8                    1386.8     229.       89.46
8                    1387.1     230.       95.31
```

**********80-80 LIST OF INPUT DATA (CONTINUED)**********

```
9                          1387.4      231.        101.19
9 ENDTBL
6 RUNOFF 1 001        5 .148           95.         .3
6 RUNOFF 1 002        6 .097           95.         .19
6 REACH  3 003   5    7 1000.          .04         1.66
6 REACH  3 003   6    5 1400.          .04         1.66
6 ADDHYD 4 003   5 7 6
6 RUNOFF 1 003        5 .047           77.         .36
6 ADDHYD 4 003   5 6 7
6 RUNOFF 1 006        5 .109           81.         .82
6 REACH  3 006   7    6 1600.
6 ADDHYD 4 006   5 6 7
6 REACH  3 008   7    1 1600.
6 RUNOFF 1 007        5 .117           77.         .69
6 REACH  3 008   5    2 1400.
6 RUNOFF 1 019        5 .022           95.         .167
6 RUNOFF 1 004        6 .195           95.         .22
6 REACH  3 004   5    7 1800.          .05         1.66
6 ADDHYD 4 004   6 7 5
6 RUNOFF 1 005        6 .125           77.         .56
6 REACH  3 005   5    7 1400.          .05         1.66
6 ADDHYD 4 005   6 7 5
6 REACH  3 008   5    3 2100.
6 ADDHYD 4 008   1 2 4
6 ADDHYD 4 008   3 4 1
6 RUNOFF 1 018        5 .184           78.         .72
6 REACH  3 008   5    2 1900.          .04         1.66
6 ADDHYD 4 008   1 2 3
6 RUNOFF 1 008        5 .131           78.         .75
6 ADDHYD 4 008   3 5 1
6 RESVOR 2    08 1    3 1491.0
6 REACH  3 014   3    5 3000.          .17         1.47
6 RUNOFF 1 009        6 .066           79.         .93
6 REACH  3 014   6    7 2700.
6 ADDHYD 4 014   5 7 6
6 RUNOFF 1 010        4 .095           77.         .56
6 REACH  3 011   4    5 2640.          .44         1.54
6 RUNOFF 1 011        7 .234           79.         .84
6 ADDHYD 4 011   5 7 4
6 REACH  3 013   4    5 1320.          1.98        1.67
6 RUNOFF 1 013        7 .125           82.         .61
6 ADDHYD 4 013   5 7 4
6 RUNOFF 1 144        5 .132           79.         .93
6 REACH  3 014   5    7 2640.          2.1         1.4
6 ADDHYD 4 013   4 7 5
6 REACH  3 014   5    7 1320.          1.64        1.67
```

**********80-80 LIST OF INPUT DATA (CONTINUED)**********

```
6 ADDHYD 4 014   6 7 5
6 RUNOFF 1 016       6 .119        86.         .54
6 REACH  3 015   6   7 1300.       .54         1.54
6 RUNOFF 1 015       6 .073        82.         .89
6 ADDHYD 4 015   6 7 4
6 ADDHYD 4 014   4 5 6
6 RUNOFF 1 014       5 .177        83.         .39
6 ADDHYD 4 014   5 6 4
6 REACH  3 027   4   7 3000.       .04         1.63
6 RUNOFF 1 027       5 .188        82.         1.2
6 ADDHYD 4 027   5 7 6
6 RUNOFF 1 017       5 .059        95.         .17
6 REACH  3 025   5   7 2200.       .05         1.66
6 RUNOFF 1 025       5 .089        83.         .43
6 ADDHYD 4 025   5 7 4
6 REACH  3 027   4   5 1700.       .04         1.63
6 ADDHYD 4 027   5 6 7
6 RUNOFF 1 026       6 .067        85.         .31
6 ADDHYD 4 027   6 7 5
6 REACH  3 037   5   4 3000.
6 RUNOFF 1 037       5 .125        83.         .25
6 ADDHYD 4 037   4 5 6
6 RESVOR 2    37 6   4 1446.0
6 RUNOFF 1 024       5 .198        86.         .46
6 REACH  3 037   5   6 2100.       .41         1.66
6 ADDHYD 4 037   4 6 5
6 RUNOFF 1 028       4 .156        82.         .93
6 REACH  3 036   4   6 3500.       .06         1.66
6 RUNOFF 1 036       4 .125        83.         .49
6 ADDHYD 4 036   4 6 7
6 RUNOFF 1 034       4 .125        84.         .73
6 REACH  3 035   4   6 1320.       .31         1.54
6 RUNOFF 1 035       4 .125        83.         .49
6 ADDHYD 4 035   4 6 3
6 REACH  3 036   3   4 1320.       4.48        1.25
6 ADDHYD 4 036   4 7 6
6 REACH  3 037   6   7 1320.       4.64        1.25
6 ADDHYD 4 037   5 7 4
6 RUNOFF 1 143       5 .0625       85.         .53
6 ADDHYD 4 143   5 4 7
6 RESVOR 2    43 7   5 1430.0
6 RESVOR 2    44 5   6 1422.0
6 REACH  3 085   6   7 1320.       5.4         1.25
6 RUNOFF 1 085       6 .063        84.         .52
6 ADDHYD 4 085   6 7 5
6 REACH  3 084   5   6 1320.       5.4         1.25
```

```
6 RUNOFF 1 084       5 .063        84.        .52
6 ADDHYD 4 084   5 6 1
6 RUNOFF 1 091       6 .125        86.        .47
6 REACH  3 090   6   5 1320.       .22        1.54
6 RUNOFF 1 090       6 .109        85.        .63
6 ADDHYD 4 090   5 6 4
6 REACH  3 088   4   7 1320.       .22        1.54
6 RUNOFF 1 089       4 .047        84.        .39
6 REACH  3 088   4   5 2000.       .22        1.54
6 RUNOFF 1 088       4 .094        87.        .75
6 ADDHYD 4 088   4 5 6
6 ADDHYD 4 088   6 7 5
6 DIVERT 6 088   5 7 2 159.                   101.
6 REACH  3 084   7   6 2640.       4.3        1.25
6 ADDHYD 4 084   1 6 5
6 DIVERT 6 104   5 6 1                        83.
6 REACH  3 105   6   3 1320.       5.9        1.25
6 REACH  3 101   2   5 1050.       .22        1.54
6 RUNOFF 1 101       6 .047        89.        .52
6 ADDHYD 4 101   5 6 7
6 REACH  3 102   7   6 1320.       .02        1.66
6 RUNOFF 1 102       5 .063        82.        .63
6 ADDHYD 4 102   5 6 7
6 REACH  3 105   7   6 1320.
6 RUNOFF 1 105       5 .063        78.        .63
6 ADDHYD 4 105   5 6 2
6 RUNOFF 1 086       5 .063        86.        .27
6 REACH  3 087   5   6 1320.
6 RUNOFF 1 087       5 .063        87.        .52
6 ADDHYD 4 087   5 6 7
6 REACH  3 105   7   6 2000.
6 ADDHYD 4 105   3 6 7
6 ADDHYD 4 105   7 2 5
6 REACH  3 104   5   6 1320.       5.9        1.25
6 RUNOFF 1 104       5 .069        78.        .67
6 ADDHYD 4 104   5 6 3
6 REACH  3 083   1   5 1320.       7.12       1.25
6 RUNOFF 1 083       6 .063        85.        .52
6 ADDHYD 4 083   5 6 7
6 REACH  3 106   7   6 1320.       5.9        1.25
6 RUNOFF 1 106       5 .063        79.        .56
6 ADDHYD 4 106   5 6 7
6 REACH  3 107   7   6 900.        5.9        1.25
6 RUNOFF 1 107       5 .059        82.        .42
6 ADDHYD 4 107   5 6 1
6 RUNOFF 1 012       5 .07         82.        .42
```

**********80-90 LIST OF INPUT DATA (CONTINUED)**********

```
6 REACH  3 029   5   6 3800.       .04        1.66
6 RUNOFF 1 029       5 .25        81.        1.03
6 ADDHYD 4 029   5 6 7
6 REACH  3 033   7   6 2640.       7.53       1.25
6 RUNOFF 1 033       5 .234       80.        1.14
6 ADDHYD 4 033   5 6 7
6 RUNOFF 1 030       5 .125       79.        .83
6 REACH  3 032   5   6 3000.       6.29       1.25
6 ADDHYD 4 033   6 7 5
6 RESVOR 2    33 5   7 1458.
6 REACH  3 093   7   6 2640.       5.24       1.25
6 RUNOFF 1 093       5 .195       84.        .45
6 ADDHYD 4 093   5 6 7
6 DIVERT 6 093   7 5 2 149.                   92.
6 REACH  3 092   2   6 1320.       .08        1.66
6 RUNOFF 1 092       4 .125       86.        .47
6 ADDHYD 4 092   4 6 7
6 REACH  3 098   7   2 2500.       .08        1.66
6 REACH  3 095   5   4 1320.       6.26       1.25
6 RUNOFF 1 032       5 .109       80.        .81
6 REACH  3 094   5   6 3200.       .09        1.66
6 RUNOFF 1 094       5 .139       84.        .34
6 ADDHYD 4 094   5 6 7
6 REACH  3 095   7   6 2400.       .09        1.66
6 RUNOFF 1 095       5 .125       86.        .98
6 ADDHYD 4 095   5 6 7
6 ADDHYD 4 095   4 7 5
6 DIVERT 6 095   5 7 4 165.                   98.
6 REACH  3 098   4   5 3000.       .08        1.66
6 ADDHYD 4 098   2 5 4
6 REACH  3 096   7   6 1320.       6.26       1.25
6 RUNOFF 1 096       5 .125       82.        .51
6 ADDHYD 4 096   5 6 7
6 DIVERT 6 096   7 5 6 185.                   97.
6 REACH  3 097   6   5 2100.       .08        1.66
6 RUNOFF 1 097       6 .188       87.        .53
6 ADDHYD 4 097   5 6 7
6 REACH  3 098   7   5 1000.       .08        1.66
6 ADDHYD 4 098   4 5 7
6 RUNOFF 1 098       5 .094       86.        .37
6 ADDHYD 4 098   5 7 6
6 REACH  3 099   6   7 1250.       .08        1.66
6 RUNOFF 1 099       6 .094       86.        .49
6 ADDHYD 4 099   7 6 5
6 REACH  3 139   5   6 1600.       .05        1.66
6 RUNOFF 1 100       4 .078       86.        .39
```

**********80-80 LIST OF INPUT DATA (CONTINUED)**********

```
6 REACH  3 139   4   5 600.        .05        1.66
6 ADDHYD 4 139   5 6 7
6 RUNOFF 1 142       4 .25         83.        1.39
6 REACH  3 141   4   5 2100.       .08        1.66
6 RUNOFF 1 141       6 .188        87.        .53
6 ADDHYD 4 141   5 6 4
6 REACH  3 140   4   5 1320.       .08        1.66
6 RUNOFF 1 140       6 .125        86.        .44
6 ADDHYD 4 140   5 6 4
6 RUNOFF 1 137       6 .078        79.        .49
6 ADDHYD 4 140   4 6 5
6 REACH  3 139   5   6 2800.       .05        1.66
6 ADDHYD 4 139   6 7 4
6 RUNOFF 1 136       5 .066        95.        .167
6 REACH  3 138   5   6 3000.       .17        1.66
6 RUNOFF 1 138       5 .203        84.        .24
6 ADDHYD 4 138   5 6 7
6 REACH  3 139   7   6 2000.       .05        1.66
6 ADDHYD 4 139   4 6 7
6 RUNOFF 1 139       5 .198        87.        .43
6 ADDHYD 4 139   7 5 4
6 RUNOFF 1 129       5 .108        82.        .167
6 RUNOFF 1 130       6 .031        91.        .167
6 ADDHYD 4 129   5 6 7
6 REACH  3 127   7   6 2500.       .08        1.66
6 RUNOFF 1 128       5 .036        80.        .167
6 REACH  3 127   5   7 2300.       .08        1.66
6 ADDHYD 4 127   7 6 5
6 RUNOFF 1 127       7 .159        82.        .21
6 ADDHYD 4 127   5 7 6
6 RUNOFF 1 132       5 .145        88.        .27
6 REACH  3 131   5   7 2000.       .17        1.66
6 ADDHYD 4 131   6 7 5
6 RUNOFF 1 131       6 .119        86.        .27
6 ADDHYD 4 131   5 6 7
6 REACH  3 126   7   6 1500.       .11        1.66
6 RUNOFF 1 126       5 .158        95.        .28
6 ADDHYD 4 126   5 6 7
6 REACH  3 134   7   6 1500.       .13        1.66
6 RUNOFF 1 135       7 .042        95.        .167
6 REACH  3 134   7   5 3200.       .13        1.66
6 ADDHYD 4 134   5 6 7
6 RUNOFF 1 134       6 .197        85.        .31
6 ADDHYD 4 134   6 7 5
6 RUNOFF 1 125       7 .117        95.        .167
6 ADDHYD 4 125   7 5 6
```

**********80-90 LIST OF INPUT DATA (CONTINUED)**********

```
6 REACH  3 124   6   7 2500.      .09        1.66
6 RUNOFF 1 124       6 .219       84.        .25
6 ADDHYD 4 124   6 7 5
6 REACH  3 124   4   7 900.       .96        1.51
6 ADDHYD 4 124   5 7 6
6 RUNOFF 1 103       5 .081       84.        .26
6 ADDHYD 4 124   5 6 7
6 REACH  3 104   7   6 1320.      .96        1.51
6 ADDHYD 4 104   3 6 4
6 REACH  3 107   4   5 1000.      .85        1.53
6 ADDHYD 4 107   5 1 7
6 RUNOFF 1 123       6 .213       95.        .25
6 ADDHYD 4 107   6 7 5
6 REACH  3 108   5   3 1700.      .85        1.53
6 RUNOFF 1 108       5 .025       83.        .28
6 ADDHYD 4 108   5 3 1
6 RUNOFF 1 049       5 .086       95.        .19
6 REACH  3 048   5   6 1320.      .04        1.66
6 RUNOFF 1 020       5 .064       95.        .17
6 REACH  3 048   5   7 2640.      .04        1.66
6 ADDHYD 4 048   6 7 5
6 RUNOFF 1 048       6 .125       82.        .6
6 ADDHYD 4 048   5 6 7
6 REACH  3 056   7   6 1866.      .12        1.66
6 RUNOFF 1 056       5 .063       82.        .25
6 ADDHYD 4 056   5 6 7
6 REACH  3 057   7   6 1320.      .76        1.58
6 RUNOFF 1 057       5 .063       82.        .25
6 ADDHYD 4 057   5 6 7
6 RUNOFF 1 043       5 .047       90.        .17
6 RUNOFF 1 021       6 .189       87.        .58
6 ADDHYD 4 021   5 6 4
6 REACH  3 046   4   5 2640.      3.10       1.67
6 RUNOFF 1 047       3 .125       82.        .31
6 REACH  3 046   3   4 1320.      .51        1.54
6 RUNOFF 1 046       6 .125       82.        .29
6 ADDHYD 4 046   4 6 3
6 ADDHYD 4 046   3 5 6
6 REACH  3 057   6   5 1320.      1.86       1.67
6 ADDHYD 4 057   5 7 6
6 REACH  3 059   6   4 1320.      .74        1.58
6 RUNOFF 1 045       5 .125       90.        .51
6 REACH  3 059   5   6 1400.      .11        1.66
6 ADDHYD 4 059   4 6 7
6 RUNOFF 1 059       5 .063       82.        .25
6 ADDHYD 4 059   5 7 4
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*********************80-80 LIST OF INPUT DATA (CONTINUED)*********************

 6 DIVERT 6 060   4 7 6 222.                    65.
 6 RESVOR 2    59 6   7 1393.
 6 REACH  3 066   7   6 660.        5.1         1.25
 6 RUNOFF 1 066       5 .063        84.         .46
 6 ADDHYD 4 066   5 6 7
 6 REACH  3 067   7   6 1320.       5.1         1.25
 6 RUNOFF 1 067       5 .063        88.         .25
 6 ADDHYD 4 067   5 6 7
 6 RUNOFF 1 044       5 .125        87.         .3
 6 REACH  3 067   5   6 1320.       .25         1.54
 6 ADDHYD 4 067   6 7 4
 6 DIVERT 6 067   4 2 5 88.                     69.
 6 REACH  3 069   5   6 1320.       5.1         1.25
 6 RUNOFF 1 069       5 .063        81.         .62
 6 ADDHYD 4 069   5 6 4
 6 RUNOFF 1 023       6 .091        95.         .23
 6 REACH  3 040   6   5 2650.       .08         1.66
 6 RUNOFF 1 038       7 .125        79.         .44
 6 REACH  3 040   7   6 1800.       .08         1.66
 6 ADDHYD 4 040   5 6 7
 6 RUNOFF 1 040       5 .094        82.         .51
 6 ADDHYD 4 040   5 7 6
 6 REACH  3 082   6   5 1400.       .1          1.66
 6 RUNOFF 1 082       6 .063        84.         .27
 6 ADDHYD 4 082   5 6 7
 6 RUNOFF 1 039       5 .125        85.         .53
 6 REACH  3 082   5   6 1867.       .1          1.66
 6 ADDHYD 4 082   6 7 5
 6 REACH  3 081   5   6 1320.       .22         1.54
 6 RUNOFF 1 081       5 .063        77.         .52
 6 ADDHYD 4 081   5 6 3
 6 RUNOFF 1 022       5 .153        83.         .47
 6 REACH  3 041   5   6 3100.       .24         1.66
 6 RUNOFF 1 041       5 .172        84.         .38
 6 ADDHYD 4 041   5 6 7
 6 RUNOFF 1 042       5 .078        83.         .22
 6 ADDHYD 4 042   5 7 6
 6 REACH  3 078   6   5 2500.       1.46        1.67
 6 DIVERT 6 081   3 7 6 213.                    78.
 6 REACH  3 078   6   3 1320.       .09         1.66
 6 ADDHYD 4 078   5 3 6
 6 RUNOFF 1 078       3 .063        86.         .27
 6 ADDHYD 4 078   6 3 5
 6 SAVHDV 5 081   7   3
 6 REACH  3 077   5   6 1700.       .76         1.58
 6 RUNOFF 1 077       5 .063        77.         .38
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**********************80-80 LIST OF INPUT DATA (CONTINUED)*********************

 6 ADDHYD 4 077   5 6 7
 6 ADDHYD 4 069   7 4 5
 6 RESVOR 2    69 5   6 1382.
 6 REACH  3 075   6   4 1320.       4.39        1.25
 6 RUNOFF 1 080       5 .063        82.         .45
 6 REACH  3 079   5   6 1320.       .23         1.54
 6 RUNOFF 1 079       5 .063        88.         .25
 6 ADDHYD 4 079   5 6 7
 6 REACH  3 076   7   6 1320.       .23         1.54
 6 RUNOFF 1 076       5 .063        86.         .25
 6 ADDHYD 4 076   5 6 7
 6 REACH  3 075   7   6 1320.       .23         1.54
 6 ADDHYD 4 075   4 6 5
 6 RUNOFF 1 075       6 .063        95.         .52
 6 ADDHYD 4 075   5 6 7
 6 REACH  3 112   7   4 1320.       4.39        1.25
 6 REACH  3 109   3   7 2640.       7.66        1.25
 6 RUNOFF 1 109       5 .063        84.         .29
 6 ADDHYD 4 109   5 7 6
 6 ADDHYD 4 108   1 6 7
 6 REACH  3 110   7   6 1320.       .85         1.53
 6 RUNOFF 1 110       5 .073        78.         .56
 6 ADDHYD 4 110   5 6 7
 6 RUNOFF 1 122       6 .355        85.         .29
 6 ADDHYD 4 110   6 7 5
 6 REACH  3 111   5   6 1320.       1.07        1.53
 6 RUNOFF 1 111       5 .07         77.         .56
 6 ADDHYD 4 111   5 6 7
 6 REACH  3 112   7   6 1320.       .04         1.63
 6 RUNOFF 1 112       5 .061        77.         .46
 6 ADDHYD 4 112   5 6 7
 6 RUNOFF 1 121       5 .25         95.         .17
 6 ADDHYD 4 112   5 7 1
 6 ADDHYD 4 112   1 4 3
 6 REACH  3 113   3   5 1320.       .04         1.63
 6 RUNOFF 1 113       6 .053        91.         .52
 6 ADDHYD 4 113   5 6 7
 6 RUNOFF 1 120       5 .231        87.         .30
 6 ADDHYD 4 113   5 7 1
 6 REACH  3 113   2   3 5280.       5.51        1.25
 6 ADDHYD 4 113   1 3 2
 6 RUNOFF 1 058       5 .063        84.         .25
 6 REACH  3 060   5   6 1320.       .25         1.54
 6 RUNOFF 1 060       5 .063        81.         .49
 6 ADDHYD 4 060   5 6 7
 6 REACH  3 065   7   6 1320.       .28         1.54
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*********************80-80 LIST OF INPUT DATA (CONTINUED)*********************

 6 RUNOFF 1 065      5 .047       82.        .49
 6 ADDHYD 4 065   5 6 7
 6 REACH  3 068   7   6 1320.     .25        1.25
 6 RUNOFF 1 068      5 .063       85.        .25
 6 ADDHYD 4 068   5 6 7
 6 REACH  3 070   7   6 1320.     .18        1.54
 6 RUNOFF 1 070      5 .063       86.        .25
 6 ADDHYD 4 070   5 6 7
 6 REACH  3 074   7   6 1320.     .09        1.66
 6 RUNOFF 1 074      5 .063       90.        .24
 6 ADDHYD 4 074   5 6 7
 6 REACH  3 113   7   6 1320.     5.93       1.25
 6 ADDHYD 4 113   2 6 3
 6 REACH  3 114   3   1 3000.     .04        1.63
 6 RUNOFF 1 064      5 .25        82.        .33
 6 REACH  3 072   5   6 2640.     .18        1.54
 6 RUNOFF 1 072      5 .125       83.        .49
 6 ADDHYD 4 072   5 6 7
 6 REACH  3 114   7   6 2000.     .05        1.66
 6 RUNOFF 1 115      5 .094       82.        .45
 6 ADDHYD 4 114   5 6 7
 6 RUNOFF 1 071      5 .125       83.        .49
 6 REACH  3 114   5   6 2200.     .05        1.66
 6 ADDHYD 4 114   6 7 5
 6 RUNOFF 1 114      6 .128       85.        1.19
 6 ADDHYD 4 114   5 6 7
 6 ADDHYD 4 114   1 7 5
 6 RUNOFF 1 119      6 .231       84.        1.05
 6 ADDHYD 4 114   5 6 7
 6 REACH  3 118   7   6 4000.     .05        1.66
 6 RUNOFF 1 118      5 .231       81.        1.59
 6 ADDHYD 4 118   5 6 7
   ENDATA
 7 INCREM 6            .08
 7 COMPUT 7 001   118            4.04       24.        1 2  01  03
   ENDCMP 1
   ENDJOB 2

*********************************END OF 80-80 LIST*********************************

EXECUTIVE CONTROL OPERATION INCREM    MAIN TIME INCREMENT =   .08 HOURS                                    RECORD ID

EXECUTIVE CONTROL OPERATION COMPUT    FROM XSECTION   1  TO XSECTION 118                                   RECORD ID
      STARTING TIME =   .00    RAIN DEPTH =  4.04    RAIN DURATION= 24.00    RAIN TABLE NO.= 1    ANT. MOIST. COND= 2
      ALTERNATE NO.= 1        STORM NO.= 3    MAIN TIME INCREMENT =   .08 HOURS

    *** WARNING  REACH   8 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***

    *** WARNING  REACH  13 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***

    *** WARNING  REACH  14 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***

    *** WARNING  REACH  14 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***

    *** WARNING  REACH  15 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
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*** WARNING  REACH  37 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING  REACH  36 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING  REACH  37 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING  REACH  85 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING - REACH  85 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT     309.59 CFS,  66.70 % OF PEAK.
*** WARNING  REACH  84 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING - REACH  84 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT     309.94 CFS,  66.79 % OF PEAK.
*** WARNING  REACH  84 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING  REACH 105 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING - REACH 105 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT     149.75 CFS,  65.88 % OF PEAK.
*** WARNING  REACH 101 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING  REACH 104 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING - REACH 104 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT     155.55 CFS,  22.76 % OF PEAK.
*** WARNING  REACH  83 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING - REACH  83 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT     168.91 CFS,  67.60 % OF PEAK.
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*** WARNING  REACH 106 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING - REACH 106 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT     170.28 CFS,  51.71 % OF PEAK.
*** WARNING  REACH 107 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING - REACH 107 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT     171.51 CFS,  43.37 % OF PEAK.
*** WARNING  REACH  29 LENGTH FACTOR (K*) GREATER THAN 1.0, CONSIDER DIVIDING REACH LENGTH  ***
*** WARNING  REACH  33 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING  REACH  32 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING  REACH  93 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING - REACH  93 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT      21.08 CFS,  20.44 % OF PEAK.
*** WARNING  REACH  95 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING - REACH  95 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT      25.67 CFS,  17.23 % OF PEAK.
*** WARNING  REACH  96 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING - REACH  96 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT      33.01 CFS,  20.01 % OF PEAK.
*** WARNING  REACH  98 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING  REACH  99 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING  REACH 126 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING  REACH 134 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING  REACH 124 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING  REACH 104 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING  REACH 107 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING  REACH 108 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING  REACH  57 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING  REACH  46 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING  REACH  46 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
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*** WARNING  REACH  57 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING  REACH  59 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING  REACH  66 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING  REACH  67 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING  REACH  69 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING  REACH  81 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING  REACH  78 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING  REACH  77 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING  REACH  75 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING - REACH  75 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT     38.38 CFS,  16.61 % OF PEAK.
*** WARNING  REACH 112 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING  REACH 109 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING  REACH 110 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING  REACH 111 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING  REACH 112 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING  REACH 113 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
*** WARNING  REACH 113 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***

EXECUTIVE CONTROL OPERATION ENDCMP    COMPUTATIONS COMPLETED FOR PASS  1                    RECORD ID

EXECUTIVE CONTROL OPERATION ENDJOB                                                           RECORD ID
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SUMMARY TABLE 1 - SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL INSTRUCTIONS IN THE ORDER PERFORMED
(A STAR(*) AFTER THE PEAK DISCHARGE TIME AND RATE (CFS) VALUES INDICATES A FLAT TOP HYDROGRAPH
A QUESTION MARK(?) INDICATES A HYDROGRAPH WITH PEAK AS LAST POINT.)

SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RAIN TABLE #	ANTEC MOIST COND	MAIN TIME INCREM (HR)	PRECIPITATION BEGIN (HR)	PRECIPITATION AMOUNT (IN)	PRECIPITATION DURATION (HR)	RUNOFF AMOUNT (IN)	PEAK DISCHARGE ELEVATION (FT)	PEAK DISCHARGE TIME (HR)	PEAK DISCHARGE RATE (CFS)	PEAK DISCHARGE RATE (CSM)
ALTERNATE 1 STORM 3													
XSECTION 1	RUNOFF	.15	1	2	.08	.0	4.04	24.00	3.46	—	12.45	248.49	1679.0
XSECTION 2	RUNOFF	.10	1	2	.08	.0	4.04	24.00	3.46	—	12.44	165.73	1708.6
XSECTION 3	REACH	.15	1	2	.08	.0	4.04	24.00	3.45	—	12.63	244.59	1652.7
XSECTION 3	REACH	.10	1	2	.08	.0	4.04	24.00	3.44	—	12.70	158.51	1634.1
XSECTION 3	ADDHYD	.25	1	2	.08	.0	4.04	24.00	3.45	—	12.65	400.78	1635.9
XSECTION 3	RUNOFF	.05	1	2	.08	.0	4.04	24.00	1.83	—	12.52	51.36	1092.7
XSECTION 3	ADDHYD	.29	1	2	.08	.0	4.04	24.00	3.19	—	12.59	446.92	1530.5
XSECTION 6	RUNOFF	.11	1	2	.08	.0	4.04	24.00	2.13	—	12.71	106.85	980.3
XSECTION 6	REACH	.29	1	2	.08	.0	4.04	24.00	3.18	1505.54	12.71	443.03	1517.2
XSECTION 6	ADDHYD	.40	1	2	.08	.0	4.04	24.00	2.90	1506.07	12.71	549.88	1371.3
XSECTION 8	REACH	.40	1	2	.08	.0	4.04	24.00	2.89	1497.00	12.86	531.54	1325.5
XSECTION 7	RUNOFF	.12	1	2	.08	.0	4.04	24.00	1.83	—	12.65	106.65	911.5
XSECTION 8	REACH	.12	1	2	.08	.0	4.04	24.00	1.82	1495.41	12.77	105.14	898.7
XSECTION 19	RUNOFF	.02	1	2	.08	.0	4.04	24.00	3.47	—	12.44	37.85	1720.5
XSECTION 4	RUNOFF	.19	1	2	.08	.0	4.04	24.00	3.46	—	12.44	330.80	1696.4
XSECTION 4	REACH	.02	1	2	.08	.0	4.04	24.00	3.43	—	12.97	31.76	1443.6
XSECTION 4	ADDHYD	.22	1	2	.08	.0	4.04	24.00	3.46	—	12.45	351.51	1619.9
XSECTION 5	RUNOFF	.13	1	2	.08	.0	4.04	24.00	1.83	—	12.59	122.65	981.2
XSECTION 5	REACH	.22	1	2	.08	.0	4.04	24.00	3.45	—	12.62	342.38	1577.8
XSECTION 5	ADDHYD	.34	1	2	.08	.0	4.04	24.00	2.85	—	12.61	464.83	1359.2
XSECTION 8	REACH	.34	1	2	.08	.0	4.04	24.00	2.84	1496.88	12.85	436.28	1275.7
XSECTION 8	ADDHYD	.52	1	2	.08	.0	4.04	24.00	2.65	1497.09	12.84	633.31	1222.6
XSECTION 8	ADDHYD	.86	1	2	.08	.0	4.04	24.00	2.73	1497.43	12.85	1069.56	1243.7
XSECTION 18	RUNOFF	.18	1	2	.08	.0	4.04	24.00	1.90	—	12.67	171.98	934.7
XSECTION 8	REACH	.18	1	2	.08	.0	4.04	24.00	1.89	1495.70	12.98	146.42	795.7
XSECTION 8	ADDHYD	1.04	1	2	.08	.0	4.04	24.00	2.58	1497.51	12.86	1208.88	1157.9
XSECTION 8	RUNOFF	.13	1	2	.08	.0	4.04	24.00	1.90	—	12.68	119.20	909.9
XSECTION 8	ADDHYD	1.18	1	2	.08	.0	4.04	24.00	2.50	1497.58	12.84	1315.07	1119.2
STRUCTURE 8	RESVOR	1.18	1	2	.08	.0	4.04	24.00	2.29	1496.13	13.52	420.61	358.0
XSECTION 14	REACH	1.18	1	2	.08	.0	4.04	24.00	2.28	1487.77	13.90	405.07	344.7
XSECTION 9	RUNOFF	.07	1	2	.08	.0	4.04	24.00	1.97	—	12.78	56.70	959.0
XSECTION 14	REACH	.07	1	2	.08	.0	4.04	24.00	1.97	1485.27	12.96	53.63	812.6

SUMMARY TABLE 1 - SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL INSTRUCTIONS IN THE ORDER PERFORMED
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A QUESTION MARK(?) INDICATES A HYDROGRAPH WITH PEAK AS LAST POINT.)

SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RAIN TABLE #	ANTEC MOIST COND	MAIN TIME INCREM (HR)	PRECIPITATION BEGIN (HR)	PRECIPITATION AMOUNT (IN)	PRECIPITATION DURATION (HR)	RUNOFF AMOUNT (IN)	PEAK DISCHARGE ELEVATION (FT)	PEAK DISCHARGE TIME (HR)	PEAK DISCHARGE RATE (CFS)	PEAK DISCHARGE RATE (CSM)
ALTERNATE 1 STORM 3													
XSECTION 14	ADDHYD	1.24	1	2	.08	.0	4.04	24.00	2.26	1487.85	13.30	421.26	339.5
XSECTION 10	RUNOFF	.09	1	2	.08	.0	4.04	24.00	1.83	—	12.59	93.22	981.2
XSECTION 11	REACH	.09	1	2	.08	.0	4.04	24.00	1.82	—	12.75	86.58	911.4
XSECTION 11	RUNOFF	.23	1	2	.08	.0	4.04	24.00	1.97	—	12.72	212.10	906.4
XSECTION 11	ADDHYD	.33	1	2	.08	.0	4.04	24.00	1.93	—	12.73	298.55	907.5
XSECTION 13	REACH	.33	1	2	.08	.0	4.04	24.00	1.93	—	12.73	298.55	907.5
XSECTION 13	RUNOFF	.13	1	2	.08	.0	4.04	24.00	2.22	—	12.59	140.57	1124.5
XSECTION 13	ADDHYD	.45	1	2	.08	.0	4.04	24.00	2.01	—	12.68	431.13	949.6
XSECTION 144	RUNOFF	.13	1	2	.08	.0	4.04	24.00	1.97	—	12.78	113.39	859.0
XSECTION 14	REACH	.13	1	2	.08	.0	4.04	24.00	1.97	1485.91	12.89	111.92	847.9
XSECTION 13	ADDHYD	.59	1	2	.08	.0	4.04	24.00	2.00	—	12.71	532.09	908.0
XSECTION 14	REACH	.59	1	2	.08	.0	4.04	24.00	2.00	1488.81	12.71	532.09	908.0
XSECTION 14	ADDHYD	1.83	1	2	.08	.0	4.04	24.00	2.18	1489.00	12.86	735.05	402.3
XSECTION 16	RUNOFF	.12	1	2	.08	.0	4.04	24.00	2.56	—	12.54	155.97	1310.7
XSECTION 15	REACH	.12	1	2	.08	.0	4.04	24.00	2.56	—	12.64	155.01	1302.6
XSECTION 15	RUNOFF	.07	1	2	.08	.0	4.04	24.00	2.21	—	12.74	71.32	977.0
XSECTION 15	ADDHYD	.19	1	2	.08	.0	4.04	24.00	2.43	—	12.66	224.76	1170.6
XSECTION 14	ADDHYD	2.02	1	2	.08	.0	4.04	24.00	2.20	1489.16	12.79	937.44	464.3
XSECTION 14	RUNOFF	.18	1	2	.08	.0	4.04	24.00	2.31	—	12.51	227.94	1287.8
XSECTION 14	ADDHYD	2.20	1	2	.08	.0	4.04	24.00	2.21	1489.25	12.68	1086.19	494.6
XSECTION 27	REACH	2.20	1	2	.08	.0	4.04	24.00	2.20	—	12.95	974.70	443.9
XSECTION 27	RUNOFF	.19	1	2	.08	.0	4.04	24.00	2.20	—	12.91	157.15	835.9
XSECTION 27	ADDHYD	2.38	1	2	.08	.0	4.04	24.00	2.20	—	12.94	1131.44	474.6
XSECTION 17	RUNOFF	.06	1	2	.08	.0	4.04	24.00	3.47	—	12.44	101.41	1718.8
XSECTION 25	REACH	.06	1	2	.08	.0	4.04	24.00	3.43	—	12.88	89.43	1515.7
XSECTION 25	RUNOFF	.09	1	2	.08	.0	4.04	24.00	2.31	—	12.52	113.22	1272.2
XSECTION 25	ADDHYD	.15	1	2	.08	.0	4.04	24.00	2.76	—	12.56	188.52	1273.8
XSECTION 27	REACH	.15	1	2	.08	.0	4.04	24.00	2.74	—	12.87	162.18	1095.8
XSECTION 27	ADDHYD	2.53	1	2	.08	.0	4.04	24.00	2.23	—	12.93	1291.70	510.1
XSECTION 26	RUNOFF	.07	1	2	.08	.0	4.04	24.00	2.48	—	12.47	93.38	1393.7
XSECTION 27	ADDHYD	2.60	1	2	.08	.0	4.04	24.00	2.24	—	12.92	1309.00	503.7
XSECTION 37	REACH	2.60	1	2	.08	.0	4.04	24.00	2.23	1455.73	13.05	1296.31	498.8
XSECTION 37	RUNOFF	.13	1	2	.08	.0	4.04	24.00	2.31	—	12.46	169.10	1352.8
XSECTION 37	ADDHYD	2.72	1	2	.08	.0	4.04	24.00	2.24	1455.75	13.04	1314.06	492.4
STRUCTURE 37	RESVOR	2.72	1	2	.08	.0	4.04	24.00	2.22	1450.64	13.07	1311.54	491.5
XSECTION 24	RUNOFF	.20	1	2	.08	.0	4.04	24.00	2.57	—	12.52	268.81	1357.6

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A QUESTION MARK(?) INDICATES A HYDROGRAPH WITH PEAK AS LAST POINT.)

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ALTERNATE 1 STORM 3													
XSECTION 37	REACH	.20	1	2	.08	.0	4.04	24.00	2.56	1453.61	12.61	266.68	1346.9
XSECTION 37	ADDHYD	2.92	1	2	.08	.0	4.04	24.00	2.24	1455.87	12.93	1418.72	485.5
XSECTION 28	RUNOFF	.16	1	2	.08	.0	4.04	24.00	2.21	—	12.76	149.43	957.9
XSECTION 36	REACH	.16	1	2	.08	.0	4.04	24.00	2.19	—	13.27	117.40	752.6
XSECTION 36	RUNOFF	.13	1	2	.08	.0	4.04	24.00	2.30	—	12.54	155.70	1245.6
XSECTION 36	ADDHYD	.28	1	2	.08	.0	4.04	24.00	2.24	—	12.62	201.90	718.5
XSECTION 34	RUNOFF	.13	1	2	.08	.0	4.04	24.00	2.38	—	12.64	141.66	1133.3
XSECTION 35	REACH	.13	1	2	.08	.0	4.04	24.00	2.38	—	12.76	139.31	1114.5
XSECTION 35	RUNOFF	.13	1	2	.08	.0	4.04	24.00	2.30	—	12.54	154.91	1239.3
XSECTION 35	ADDHYD	.25	1	2	.08	.0	4.04	24.00	2.34	—	12.61	281.50	1126.0
XSECTION 36	REACH	.25	1	2	.08	.0	4.04	24.00	2.34	—	12.61	281.50	1126.0
XSECTION 36	ADDHYD	.53	1	2	.08	.0	4.04	24.00	2.29	—	12.61	483.34	910.2
XSECTION 37	REACH	.53	1	2	.08	.0	4.04	24.00	2.29	1454.45	12.61	483.34	910.2
XSECTION 37	ADDHYD	3.45	1	2	.08	.0	4.04	24.00	2.25	1456.29	12.74	1831.33	530.4
XSECTION 143	RUNOFF	.06	1	2	.08	.0	4.04	24.00	2.48	—	12.55	80.11	1281.8
XSECTION 143	ADDHYD	3.52	1	2	.08	.0	4.04	24.00	2.25	—	12.72	1899.54	540.3
STRUCTURE 43	RESVOR	3.52	1	2	.08	.0	4.04	24.00	2.23	1439.64	13.94	887.54	252.5
STRUCTURE 44	RESVOR	3.52	1	2	.08	.0	4.04	24.00	1.94	1431.45	17.63	462.69	131.6
XSECTION 85	REACH	3.52	1	2	.08	.0	4.04	24.00	1.94	—	17.63	462.69	131.6
XSECTION 85	RUNOFF	.06	1	2	.08	.0	4.04	24.00	2.39	—	12.55	79.29	1258.6
XSECTION 85	ADDHYD	3.58	1	2	.08	.0	4.04	24.00	1.94	—	17.64	464.09	129.7
XSECTION 84	REACH	3.58	1	2	.08	.0	4.04	24.00	1.94	—	17.64	464.09	129.7
XSECTION 84	RUNOFF	.06	1	2	.08	.0	4.04	24.00	2.39	—	12.55	79.29	1258.6
XSECTION 84	ADDHYD	3.64	1	2	.08	.0	4.04	24.00	1.95	—	17.64	465.49	127.8
XSECTION 91	RUNOFF	.13	1	2	.08	.0	4.04	24.00	2.57	—	12.52	169.21	1353.7
XSECTION 90	REACH	.13	1	2	.08	.0	4.04	24.00	2.56	—	12.64	165.02	1320.2
XSECTION 90	RUNOFF	.11	1	2	.08	.0	4.04	24.00	2.47	—	12.58	132.92	1219.5
XSECTION 90	ADDHYD	.23	1	2	.08	.0	4.04	24.00	2.52	—	12.61	297.37	1270.8
XSECTION 88	REACH	.23	1	2	.08	.0	4.04	24.00	2.51	—	12.73	292.64	1250.6
XSECTION 89	RUNOFF	.05	1	2	.08	.0	4.04	24.00	2.39	—	12.50	62.16	1322.6
XSECTION 88	REACH	.05	1	2	.08	.0	4.04	24.00	2.38	—	12.75	56.34	1198.7
XSECTION 88	RUNOFF	.09	1	2	.08	.0	4.04	24.00	2.65	—	12.64	115.03	1223.7
XSECTION 88	ADDHYD	.14	1	2	.08	.0	4.04	24.00	2.56	—	12.68	169.57	1202.6
XSECTION 88	ADDHYD	.38	1	2	.08	.0	4.04	24.00	2.53	—	12.71	461.63	1231.0
XSECTION 88	DIVERT	.00	1	2	.08	.0	4.04	24.00	2.53	—	12.08*	159.00	**********
XSECTION 101	DIVERT	.38	1	2	.08	.0	4.04	24.00	.91	—	12.71	302.63	807.0

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ALTERNATE 1 STORM 3													
XSECTION 84	REACH	.00	1	2	.08	.0	4.04	24.00	.91	—	12.72*	159.00	**********
XSECTION 84	ADDHYD	3.64	1	2	.08	.0	4.04	24.00	2.12	—	12.63	477.24	131.1
XSECTION 104	DIVERT	.00	1	2	.08	.0	4.04	24.00	2.12	3.93	12.63	227.34	**********
XSECTION 83	DIVERT	3.64	1	2	.08	.0	4.04	24.00	1.12	3.93	12.63	249.90	68.6
XSECTION 105	REACH	.00	1	2	.08	.0	4.04	24.00	1.12	1417.74	12.63	227.34	**********
XSECTION 101	REACH	.38	1	2	.08	.0	4.04	24.00	.91	—	12.81	298.71	796.6
XSECTION 101	RUNOFF	.05	1	2	.08	.0	4.04	24.00	2.84	—	12.53	67.37	1433.4
XSECTION 101	ADDHYD	.42	1	2	.08	.0	4.04	24.00	1.13	—	12.76	346.30	820.6
XSECTION 102	REACH	.42	1	2	.08	.0	4.04	24.00	1.13	—	13.05	305.94	725.0
XSECTION 102	RUNOFF	.06	1	2	.08	.0	4.04	24.00	2.22	—	12.60	70.08	1112.4
XSECTION 102	ADDHYD	.48	1	2	.08	.0	4.04	24.00	1.27	—	13.01	338.84	698.6
XSECTION 105	REACH	.48	1	2	.08	.0	4.04	24.00	1.27	1417.83	13.19	321.64	663.2
XSECTION 105	RUNOFF	.06	1	2	.08	.0	4.04	24.00	1.90	—	12.61	61.30	973.0
XSECTION 105	ADDHYD	.55	1	2	.08	.0	4.04	24.00	1.34	1417.85	13.15	341.38	623.0
XSECTION 86	RUNOFF	.06	1	2	.08	.0	4.04	24.00	2.57	—	12.46	90.81	1441.4
XSECTION 87	REACH	.06	1	2	.08	.0	4.04	24.00	2.56	1429.96	12.70	80.99	1285.6
XSECTION 87	RUNOFF	.06	1	2	.08	.0	4.04	24.00	2.65	—	12.54	85.98	1364.8
XSECTION 87	ADDHYD	.13	1	2	.08	.0	4.04	24.00	2.61	1430.03	12.60	162.32	1288.3
XSECTION 105	REACH	.13	1	2	.08	.0	4.04	24.00	2.59	1417.63	12.98	140.33	1113.8
XSECTION 105	ADDHYD	.13	1	2	.08	.0	4.04	24.00	31.59	1417.86	12.93	349.17	2771.2
XSECTION 105	ADDHYD	.67	1	2	.08	.0	4.04	24.00	6.99	1418.07	13.10	683.93	1014.7
XSECTION 104	REACH	.67	1	2	.08	.0	4.04	24.00	6.99	47.91	13.10	683.93	1014.7
XSECTION 104	RUNOFF	.07	1	2	.08	.0	4.04	24.00	1.90	—	12.64	65.89	954.9
XSECTION 104	ADDHYD	.74	1	2	.08	.0	4.04	24.00	6.52	51.62	13.03	715.93	963.6
XSECTION 83	REACH	3.64	1	2	.08	.0	4.04	24.00	1.12	3.93	12.63	249.90	68.6
XSECTION 83	RUNOFF	.06	1	2	.08	.0	4.04	24.00	2.48	—	12.54	81.54	1294.3
XSECTION 83	ADDHYD	3.70	1	2	.08	.0	4.04	24.00	1.14	7.11	12.59	329.79	89.0
XSECTION 106	REACH	3.70	1	2	.08	.0	4.04	24.00	1.14	—	12.59	329.79	89.0
XSECTION 106	RUNOFF	.06	1	2	.08	.0	4.04	24.00	1.98	—	12.58	66.28	1052.0
XSECTION 106	ADDHYD	3.77	1	2	.08	.0	4.04	24.00	1.15	—	12.59	396.05	105.1
XSECTION 107	REACH	3.77	1	2	.08	.0	4.04	24.00	1.15	—	12.59	396.05	105.1
XSECTION 107	RUNOFF	.06	1	2	.08	.0	4.04	24.00	2.22	—	12.52	73.26	1241.7
XSECTION 107	ADDHYD	3.83	1	2	.08	.0	4.04	24.00	1.17	—	12.56	466.03	122.3
XSECTION 12	RUNOFF	.07	1	2	.08	.0	4.04	24.00	2.22	—	12.52	86.92	1241.7
XSECTION 29	REACH	.07	1	2	.08	.0	4.04	24.00	2.18	—	13.39	49.58	708.3
XSECTION 29	RUNOFF	.25	1	2	.08	.0	4.04	24.00	2.13	—	12.82	218.50	874.0

SUMMARY TABLE 1 - SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL INSTRUCTIONS IN THE ORDER PERFORMED
(A STAR(*) AFTER THE PEAK DISCHARGE TIME AND RATE (CFS) VALUES INDICATES A FLAT TOP HYDROGRAPH
A QUESTION MARK(?) INDICATES A HYDROGRAPH WITH PEAK AS LAST POINT.)

SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RAIN TABLE #	ANTEC MOIST COND	MAIN TIME INCREM (HR)	PRECIPITATION BEGIN (HR)	PRECIPITATION AMOUNT (IN)	PRECIPITATION DURATION (HR)	RUNOFF AMOUNT (IN)	PEAK DISCHARGE ELEVATION (FT)	PEAK DISCHARGE TIME (HR)	PEAK DISCHARGE RATE (CFS)	PEAK DISCHARGE RATE (CSM)
ALTERNATE 1 STORM 3													
XSECTION 29	ADDHYD	.32	1	2	.08	.0	4.04	24.00	2.14	—	12.88	243.13	759.8
XSECTION 33	REACH	.32	1	2	.08	.0	4.04	24.00	2.14	—	12.88	243.13	759.8
XSECTION 33	RUNOFF	.23	1	2	.08	.0	4.04	24.00	2.04	—	12.89	185.73	793.7
XSECTION 33	ADDHYD	.55	1	2	.08	.0	4.04	24.00	2.10	—	12.88	428.84	774.1
XSECTION 30	RUNOFF	.13	1	2	.08	.0	4.04	24.00	1.97	—	12.72	113.58	908.6
XSECTION 32	REACH	.13	1	2	.08	.0	4.04	24.00	1.97	—	12.82	112.87	903.0
XSECTION 33	ADDHYD	.68	1	2	.08	.0	4.04	24.00	2.08	—	12.87	540.47	796.0
STRUCTURE 33	RESVOR	.68	1	2	.08	.0	4.04	24.00	1.83	1463.82	14.23	103.09	151.8
XSECTION 93	REACH	.68	1	2	.08	.0	4.04	24.00	1.82	—	14.33	103.08	151.8
XSECTION 93	RUNOFF	.19	1	2	.08	.0	4.04	24.00	2.39	—	12.52	253.10	1297.9
XSECTION 93	ADDHYD	.87	1	2	.08	.0	4.04	24.00	1.95	—	12.57	272.28	311.5
XSECTION 93	DIVERT	.00	1	2	.08	.0	4.04	24.00	1.95	—	12.08*	149.00	**********
XSECTION 92	DIVERT	.87	1	2	.08	.0	4.04	24.00	.12	—	12.57	123.28	141.1
XSECTION 92	REACH	.87	1	2	.08	.0	4.04	24.00	.12	—	12.71	109.78	125.6
XSECTION 92	RUNOFF	.13	1	2	.08	.0	4.04	24.00	2.57	—	12.52	169.21	1353.7
XSECTION 92	ADDHYD	1.00	1	2	.08	.0	4.04	24.00	.43	—	12.61	263.74	264.0
XSECTION 98	REACH	1.00	1	2	.08	.0	4.04	24.00	.43	—	12.87	234.55	234.8
XSECTION 95	REACH	.00	1	2	.08	.0	4.04	24.00	.43	—	12.08*	149.00	**********
XSECTION 32	RUNOFF	.11	1	2	.08	.0	4.04	24.00	2.05	—	12.71	103.71	951.4
XSECTION 94	REACH	.11	1	2	.08	.0	4.04	24.00	2.04	—	13.15	84.52	775.5
XSECTION 94	RUNOFF	.14	1	2	.08	.0	4.04	24.00	2.39	—	12.49	186.62	1342.6
XSECTION 94	ADDHYD	.25	1	2	.08	.0	4.04	24.00	2.24	—	12.53	221.63	893.7
XSECTION 95	REACH	.25	1	2	.08	.0	4.04	24.00	2.23	—	12.76	199.93	806.2
XSECTION 95	RUNOFF	.13	1	2	.08	.0	4.04	24.00	2.55	—	12.77	132.85	1062.8
XSECTION 95	ADDHYD	.37	1	2	.08	.0	4.04	24.00	2.34	—	12.76	332.76	892.1
XSECTION 95	ADDHYD	.37	1	2	.08	.0	4.04	24.00	6.61	—	12.76	481.76	1291.6
XSECTION 95	DIVERT	.00	1	2	.08	.0	4.04	24.00	6.61	—	11.92*	165.00	**********
XSECTION 98	DIVERT	.37	1	2	.08	.0	4.04	24.00	1.52	—	12.76	316.76	849.2
XSECTION 98	REACH	.37	1	2	.08	.0	4.04	24.00	1.52	—	13.06	282.99	758.7
XSECTION 98	ADDHYD	1.37	1	2	.08	.0	4.04	24.00	.72	—	12.95	501.23	365.3
XSECTION 96	REACH	.00	1	2	.08	.0	4.04	24.00	.72	—	11.92*	165.00	**********
XSECTION 96	RUNOFF	.13	1	2	.08	.0	4.04	24.00	2.22	—	12.55	148.27	1186.2
XSECTION 96	ADDHYD	.13	1	2	.08	.0	4.04	24.00	17.42	—	12.55	313.27	2506.2
XSECTION 96	DIVERT	.00	1	2	.08	.0	4.04	24.00	17.42	—	11.92*	185.00	**********
XSECTION 97	DIVERT	.13	1	2	.08	.0	4.04	24.00	1.28	—	12.55	128.27	1026.2
XSECTION 97	REACH	.13	1	2	.08	.0	4.04	24.00	1.28	—	12.82	112.41	899.3

SUMMARY TABLE 1 - SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL INSTRUCTIONS IN THE ORDER PERFORMED
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A QUESTION MARK(?) INDICATES A HYDROGRAPH WITH PEAK AS LAST POINT.)

SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RAIN TABLE #	ANTEC MOIST COND	MAIN TIME INCREM (HR)	PRECIPITATION BEGIN (HR)	PRECIPITATION AMOUNT (IN)	PRECIPITATION DURATION (HR)	RUNOFF AMOUNT (IN)	PEAK DISCHARGE ELEVATION (FT)	PEAK DISCHARGE TIME (HR)	PEAK DISCHARGE RATE (CFS)	PEAK DISCHARGE RATE (CSM)
ALTERNATE 1 STORM 3													
XSECTION 97	RUNOFF	.19	1	2	.08	.0	4.04	24.00	2.66	—	12.54	254.23	1352.3
XSECTION 97	ADDHYD	.31	1	2	.08	.0	4.04	24.00	2.10	—	12.60	345.54	1104.0
XSECTION 98	REACH	.31	1	2	.08	.0	4.04	24.00	2.10	—	12.71	341.12	1089.9
XSECTION 98	ADDHYD	1.68	1	2	.08	.0	4.04	24.00	.98	—	12.84	800.51	475.1
XSECTION 98	RUNOFF	.09	1	2	.08	.0	4.04	24.00	2.57	—	12.49	131.63	1400.3
XSECTION 98	ADDHYD	1.78	1	2	.08	.0	4.04	24.00	1.06	—	12.77	855.07	480.6
XSECTION 99	REACH	1.78	1	2	.08	.0	4.04	24.00	1.06	—	12.88	850.35	478.0
XSECTION 99	RUNOFF	.09	1	2	.08	.0	4.04	24.00	2.56	—	12.53	126.50	1345.7
XSECTION 99	ADDHYD	1.87	1	2	.08	.0	4.04	24.00	1.14	—	12.81	921.27	491.9
XSECTION 139	REACH	1.87	1	2	.08	.0	4.04	24.00	1.14	—	12.96	903.06	482.1
XSECTION 100	RUNOFF	.08	1	2	.08	.0	4.04	24.00	2.57	—	12.50	108.52	1391.3
XSECTION 139	REACH	.08	1	2	.08	.0	4.04	24.00	2.56	—	12.61	107.03	1372.2
XSECTION 139	ADDHYD	1.95	1	2	.08	.0	4.04	24.00	1.19	—	12.89	957.66	490.9
XSECTION 142	RUNOFF	.25	1	2	.08	.0	4.04	24.00	2.28	—	13.03	196.23	784.9
XSECTION 141	REACH	.25	1	2	.08	.0	4.04	24.00	2.28	—	13.26	185.81	743.2
XSECTION 141	RUNOFF	.19	1	2	.08	.0	4.04	24.00	2.66	—	12.54	254.23	1352.3
XSECTION 141	ADDHYD	.44	1	2	.08	.0	4.04	24.00	2.44	—	12.63	341.50	779.7
XSECTION 140	REACH	.44	1	2	.08	.0	4.04	24.00	2.43	—	12.76	333.45	761.3
XSECTION 140	RUNOFF	.13	1	2	.08	.0	4.04	24.00	2.57	—	12.52	170.38	1363.0
XSECTION 140	ADDHYD	.56	1	2	.08	.0	4.04	24.00	2.46	—	12.63	474.94	843.6
XSECTION 137	RUNOFF	.08	1	2	.08	.0	4.04	24.00	1.98	—	12.55	85.47	1095.7
XSECTION 140	ADDHYD	.64	1	2	.08	.0	4.04	24.00	2.40	—	12.61	558.48	871.3
XSECTION 139	REACH	.64	1	2	.08	.0	4.04	24.00	2.39	—	12.90	502.94	784.6
XSECTION 139	ADDHYD	2.59	1	2	.08	.0	4.04	24.00	1.49	—	12.89	1460.59	563.5
XSECTION 136	RUNOFF	.07	1	2	.08	.0	4.04	24.00	3.47	—	12.44	113.55	1720.5
XSECTION 138	REACH	.07	1	2	.08	.0	4.04	24.00	3.44	—	12.69	107.95	1635.6
XSECTION 138	RUNOFF	.20	1	2	.08	.0	4.04	24.00	2.40	—	12.46	283.21	1395.1
XSECTION 138	ADDHYD	.27	1	2	.08	.0	4.04	24.00	2.65	—	12.47	384.43	1429.1
XSECTION 139	REACH	.27	1	2	.08	.0	4.04	24.00	2.65	—	12.61	358.05	1331.0
XSECTION 139	ADDHYD	2.86	1	2	.08	.0	4.04	24.00	1.60	—	12.81	1718.30	600.6
XSECTION 139	RUNOFF	.19	1	2	.08	.0	4.04	24.00	2.66	—	12.51	263.45	1401.3
XSECTION 139	ADDHYD	3.05	1	2	.08	.0	4.04	24.00	1.66	—	12.73	1887.47	619.0
XSECTION 129	RUNOFF	.11	1	2	.08	.0	4.04	24.00	2.23	—	12.45	148.26	1372.8
XSECTION 130	RUNOFF	.03	1	2	.08	.0	4.04	24.00	3.05	—	12.44	50.77	1537.7
XSECTION 129	ADDHYD	.14	1	2	.08	.0	4.04	24.00	2.41	—	12.45	199.00	1431.7
XSECTION 127	REACH	.14	1	2	.08	.0	4.04	24.00	2.40	—	12.72	178.16	1281.8

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A QUESTION MARK(?) INDICATES A HYDROGRAPH WITH PEAK AS LAST POINT.)

SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RAIN TABLE #	ANTEC MOIST COND	MAIN TIME INCREM (HR)	PRECIPITATION BEGIN (HR)	PRECIPITATION AMOUNT (IN)	PRECIPITATION DURATION (HR)	RUNOFF AMOUNT (IN)	PEAK DISCHARGE ELEVATION (FT)	PEAK DISCHARGE TIME (HR)	PEAK DISCHARGE RATE (CFS)	PEAK DISCHARGE RATE (CSM)
ALTERNATE 1 STORM 3													
XSECTION 128	RUNOFF	.04	1	2	.08	.0	4.04	24.00	2.07	—	12.45	47.02	1306.1
XSECTION 127	REACH	.04	1	2	.08	.0	4.04	24.00	2.05	—	12.84	36.51	1014.1
XSECTION 127	ADDHYD	.17	1	2	.08	.0	4.04	24.00	2.32	—	12.73	211.94	1211.1
XSECTION 127	RUNOFF	.16	1	2	.08	.0	4.04	24.00	2.23	—	12.45	213.56	1343.1
XSECTION 127	ADDHYD	.33	1	2	.08	.0	4.04	24.00	2.28	—	12.49	390.23	1168.4
XSECTION 132	RUNOFF	.14	1	2	.08	.0	4.04	24.00	2.76	—	12.46	218.08	1504.0
XSECTION 131	REACH	.14	1	2	.08	.0	4.04	24.00	2.75	—	12.56	212.88	1466.2
XSECTION 131	ADDHYD	.48	1	2	.08	.0	4.04	24.00	2.42	—	12.50	599.46	1251.5
XSECTION 131	RUNOFF	.12	1	2	.08	.0	4.04	24.00	2.57	—	12.46	171.53	1441.4
XSECTION 131	ADDHYD	.60	1	2	.08	.0	4.04	24.00	2.45	—	12.49	769.62	1287.0
XSECTION 126	REACH	.60	1	2	.08	.0	4.04	24.00	2.45	—	12.59	760.64	1272.0
XSECTION 126	RUNOFF	.16	1	2	.08	.0	4.04	24.00	3.46	—	12.44	265.71	1681.7
XSECTION 126	ADDHYD	.76	1	2	.08	.0	4.04	24.00	2.66	—	12.53	1007.74	1333.0
XSECTION 134	REACH	.76	1	2	.08	.0	4.04	24.00	2.66	—	12.62	1002.24	1325.7
XSECTION 135	RUNOFF	.04	1	2	.08	.0	4.04	24.00	3.47	—	12.44	72.26	1720.5
XSECTION 134	REACH	.04	1	2	.08	.0	4.04	24.00	3.44	—	12.79	64.63	1538.8
XSECTION 134	ADDHYD	.80	1	2	.08	.0	4.04	24.00	2.70	—	12.62	1062.83	1331.9
XSECTION 134	RUNOFF	.20	1	2	.08	.0	4.04	24.00	2.48	—	12.47	274.55	1393.7
XSECTION 134	ADDHYD	1.00	1	2	.08	.0	4.04	24.00	2.65	—	12.56	1305.95	1312.5
XSECTION 125	RUNOFF	.12	1	2	.08	.0	4.04	24.00	3.47	—	12.44	201.30	1720.5
XSECTION 125	ADDHYD	1.11	1	2	.08	.0	4.04	24.00	2.74	—	12.51	1473.03	1324.7
XSECTION 124	REACH	1.11	1	2	.08	.0	4.04	24.00	2.73	—	12.62	1443.89	1298.5
XSECTION 124	RUNOFF	.22	1	2	.08	.0	4.04	24.00	2.40	—	12.46	303.53	1386.0
XSECTION 124	ADDHYD	1.33	1	2	.08	.0	4.04	24.00	2.68	—	12.55	1698.17	1275.9
XSECTION 124	REACH	3.05	1	2	.08	.0	4.04	24.00	1.66	—	12.73	1887.47	619.0
XSECTION 124	ADDHYD	4.38	1	2	.08	.0	4.04	24.00	1.97	—	12.62	3488.40	796.4
XSECTION 103	RUNOFF	.08	1	2	.08	.0	4.04	24.00	2.40	—	12.46	112.17	1384.9
XSECTION 124	ADDHYD	4.46	1	2	.08	.0	4.04	24.00	1.98	—	12.61	3571.70	800.7
XSECTION 104	REACH	4.46	1	2	.08	.0	4.04	24.00	1.98	382.40	12.61	3571.70	800.7
XSECTION 104	ADDHYD	5.20	1	2	.08	.0	4.04	24.00	2.63	452.69	12.63	4178.51	802.9
XSECTION 107	REACH	5.20	1	2	.08	.0	4.04	24.00	2.63	—	12.63	4178.51	802.9
XSECTION 107	ADDHYD	9.03	1	2	.08	.0	4.04	24.00	2.01	—	12.62	4640.89	513.9
XSECTION 123	RUNOFF	.21	1	2	.08	.0	4.04	24.00	3.46	—	12.44	359.53	1687.9
XSECTION 107	ADDHYD	9.24	1	2	.08	.0	4.04	24.00	2.04	—	12.59	4919.27	532.2
XSECTION 108	REACH	9.24	1	2	.08	.0	4.04	24.00	2.04	—	12.59	4919.27	532.2
XSECTION 108	RUNOFF	.03	1	2	.08	.0	4.04	24.00	2.31	—	12.47	33.45	1338.1

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SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RAIN TABLE #	ANTEC MOIST COND	MAIN TIME INCREM (HR)	PRECIPITATION BEGIN (HR)	PRECIPITATION AMOUNT (IN)	PRECIPITATION DURATION (HR)	RUNOFF AMOUNT (IN)	PEAK DISCHARGE ELEVATION (FT)	PEAK DISCHARGE TIME (HR)	PEAK DISCHARGE RATE (CFS)	PEAK DISCHARGE RATE (CSM)
ALTERNATE 1 STORM 3													
XSECTION 108	ADDHYD	9.27	1	2	.08	.0	4.04	24.00	2.04	—	12.58	4949.08	534.0
XSECTION 49	RUNOFF	.09	1	2	.08	.0	4.04	24.00	3.46	—	12.44	146.94	1708.6
XSECTION 48	REACH	.09	1	2	.08	.0	4.04	24.00	3.44	—	12.70	140.68	1635.8
XSECTION 20	RUNOFF	.06	1	2	.08	.0	4.04	24.00	3.47	—	12.44	110.00	1718.8
XSECTION 48	REACH	.06	1	2	.08	.0	4.04	24.00	3.43	—	12.99	89.76	1402.5
XSECTION 48	ADDHYD	.15	1	2	.08	.0	4.04	24.00	3.44	—	12.74	218.80	1458.6
XSECTION 48	RUNOFF	.13	1	2	.08	.0	4.04	24.00	2.22	—	12.59	142.93	1143.5
XSECTION 49	ADDHYD	.28	1	2	.08	.0	4.04	24.00	2.88	—	12.66	353.80	1286.5
XSECTION 56	REACH	.28	1	2	.08	.0	4.04	24.00	2.88	—	12.79	346.68	1260.7
XSECTION 56	RUNOFF	.06	1	2	.08	.0	4.04	24.00	2.23	—	12.46	83.11	1319.1
XSECTION 56	ADDHYD	.34	1	2	.08	.0	4.04	24.00	2.76	—	12.59	386.92	1144.7
XSECTION 57	REACH	.34	1	2	.08	.0	4.04	24.00	2.76	—	12.59	386.92	1144.7
XSECTION 57	RUNOFF	.06	1	2	.08	.0	4.04	24.00	2.23	—	12.46	83.11	1319.1
XSECTION 57	ADDHYD	.40	1	2	.08	.0	4.04	24.00	2.67	—	12.55	463.22	1155.2
XSECTION 43	RUNOFF	.05	1	2	.08	.0	4.04	24.00	2.95	—	12.44	75.70	1610.6
XSECTION 21	RUNOFF	.19	1	2	.08	.0	4.04	24.00	2.65	—	12.55	249.78	1321.6
XSECTION 21	ADDHYD	.24	1	2	.08	.0	4.04	24.00	2.71	—	12.48	319.12	1352.2
XSECTION 46	REACH	.24	1	2	.08	.0	4.04	24.00	2.71	—	12.48	319.12	1352.2
XSECTION 47	RUNOFF	.13	1	2	.08	.0	4.04	24.00	2.23	—	12.48	161.49	1291.9
XSECTION 46	REACH	.13	1	2	.08	.0	4.04	24.00	2.22	—	12.58	160.03	1280.2
XSECTION 45	RUNOFF	.13	1	2	.08	.0	4.04	24.00	2.23	—	12.47	162.41	1299.3
XSECTION 46	ADDHYD	.25	1	2	.08	.0	4.04	24.00	2.22	—	12.51	317.51	1270.0
XSECTION 46	ADDHYD	.49	1	2	.08	.0	4.04	24.00	2.46	—	12.49	635.94	1308.5
XSECTION 57	REACH	.49	1	2	.08	.0	4.04	24.00	2.46	—	12.49	635.94	1308.5
XSECTION 57	ADDHYD	.89	1	2	.08	.0	4.04	24.00	2.56	—	12.52	1098.96	1239.0
XSECTION 59	REACH	.89	1	2	.08	.0	4.04	24.00	2.56	—	12.52	1098.96	1239.0
XSECTION 45	RUNOFF	.13	1	2	.08	.0	4.04	24.00	2.94	—	12.52	183.10	1464.8
XSECTION 59	REACH	.13	1	2	.08	.0	4.04	24.00	2.93	—	12.64	178.98	1431.9
XSECTION 59	ADDHYD	1.01	1	2	.08	.0	4.04	24.00	2.60	—	12.53	1271.89	1256.8
XSECTION 59	RUNOFF	.06	1	2	.08	.0	4.04	24.00	2.23	—	12.46	83.11	1319.1
XSECTION 59	ADDHYD	1.07	1	2	.08	.0	4.04	24.00	2.58	—	12.52	1353.71	1259.3
XSECTION 60	DIVERT	.00	1	2	.08	.0	4.04	24.00	2.58	—	11.76*	222.00	**********
XSECTION 65	DIVERT	1.07	1	2	.08	.0	4.04	24.00	1.39	—	12.52	1131.71	1052.8
STRUCTURE 59	RESVOR	1.07	1	2	.08	.0	4.04	24.00	1.39	1400.93	13.15	205.57	191.2
XSECTION 66	REACH	1.07	1	2	.08	.0	4.04	24.00	1.39	—	13.15	205.57	191.2
XSECTION 66	RUNOFF	.06	1	2	.08	.0	4.04	24.00	2.39	—	12.53	81.12	1287.7

SUMMARY TABLE 1 - SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL INSTRUCTIONS IN THE ORDER PERFORMED
(A STAR(*) AFTER THE PEAK DISCHARGE TIME AND RATE (CFS) VALUES INDICATES A FLAT TOP HYDROGRAPH
A QUESTION MARK(?) INDICATES A HYDROGRAPH WITH PEAK AS LAST POINT.)

SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RAIN TABLE #	ANTEC MOIST COND	MAIN TIME INCREM (HR)	PRECIPITATION BEGIN (HR)	PRECIPITATION AMOUNT (IN)	PRECIPITATION DURATION (HR)	RUNOFF AMOUNT (IN)	PEAK DISCHARGE ELEVATION (FT)	PEAK DISCHARGE TIME (HR)	PEAK DISCHARGE RATE (CFS)	PEAK DISCHARGE RATE (CSM)
ALTERNATE 1 STORM 3													
XSECTION 66	ADDHYD	1.14	1	2	.08	.0	4.04	24.00	1.44	—	12.61	268.09	235.6
XSECTION 67	REACH	1.14	1	2	.08	.0	4.04	24.00	1.44	—	12.61	268.09	235.6
XSECTION 67	RUNOFF	.06	1	2	.08	.0	4.04	24.00	2.76	—	12.45	95.29	1512.5
XSECTION 67	ADDHYD	1.20	1	2	.08	.0	4.04	24.00	1.51	—	12.51	354.95	295.5
XSECTION 44	RUNOFF	.13	1	2	.08	.0	4.04	24.00	2.66	—	12.47	182.98	1463.9
XSECTION 67	REACH	.13	1	2	.08	.0	4.04	24.00	2.66	—	12.57	179.72	1437.8
XSECTION 67	ADDHYD	1.33	1	2	.08	.0	4.04	24.00	1.62	—	12.53	535.68	404.0
XSECTION 67	DIVERT	.00	1	2	.08	.0	4.04	24.00	1.62	—	11.76*	88.00	**********
XSECTION 69	DIVERT	1.33	1	2	.08	.0	4.04	24.00	.94	—	12.53	447.68	337.6
XSECTION 69	REACH	1.33	1	2	.08	.0	4.04	24.00	.94	—	12.53	447.68	337.6
XSECTION 69	RUNOFF	.06	1	2	.08	.0	4.04	24.00	2.14	—	12.60	69.10	1096.8
XSECTION 69	ADDHYD	1.39	1	2	.08	.0	4.04	24.00	.99	—	12.54	515.45	371.1
XSECTION 23	RUNOFF	.09	1	2	.08	.0	4.04	24.00	3.46	—	12.44	154.39	1696.6
XSECTION 40	REACH	.09	1	2	.08	.0	4.04	24.00	3.44	—	12.73	143.22	1573.8
XSECTION 38	RUNOFF	.13	1	2	.08	.0	4.04	24.00	1.98	—	12.54	140.54	1124.3
XSECTION 40	REACH	.13	1	2	.08	.0	4.04	24.00	1.97	—	12.69	127.74	1021.9
XSECTION 40	ADDHYD	.22	1	2	.08	.0	4.04	24.00	2.59	—	12.71	270.63	1252.9
XSECTION 40	RUNOFF	.09	1	2	.08	.0	4.04	24.00	2.22	—	12.55	111.50	1186.2
XSECTION 40	ADDHYD	.31	1	2	.08	.0	4.04	24.00	2.48	—	12.64	373.29	1204.2
XSECTION 82	REACH	.31	1	2	.08	.0	4.04	24.00	2.48	—	12.76	367.15	1184.4
XSECTION 82	RUNOFF	.06	1	2	.08	.0	4.04	24.00	2.40	—	12.46	86.69	1376.0
XSECTION 82	ADDHYD	.37	1	2	.08	.0	4.04	24.00	2.46	—	12.60	416.33	1116.2
XSECTION 39	RUNOFF	.13	1	2	.08	.0	4.04	24.00	2.48	—	12.55	160.23	1281.9
XSECTION 82	REACH	.13	1	2	.08	.0	4.04	24.00	2.47	—	12.70	151.27	1210.2
XSECTION 82	ADDHYD	.50	1	2	.08	.0	4.04	24.00	2.46	—	12.63	562.06	1123.6
XSECTION 81	REACH	.50	1	2	.08	.0	4.04	24.00	2.46	—	12.74	557.78	1120.0
XSECTION 81	RUNOFF	.06	1	2	.08	.0	4.04	24.00	1.83	—	12.57	63.49	1007.8
XSECTION 81	ADDHYD	.56	1	2	.08	.0	4.04	24.00	2.39	—	12.71	612.52	1091.8
XSECTION 22	RUNOFF	.15	1	2	.08	.0	4.04	24.00	2.30	—	12.53	190.91	1247.8
XSECTION 41	REACH	.15	1	2	.08	.0	4.04	24.00	2.30	—	12.76	180.52	1179.9
XSECTION 41	RUNOFF	.17	1	2	.08	.0	4.04	24.00	2.39	—	12.50	227.58	1323.2
XSECTION 41	ADDHYD	.32	1	2	.08	.0	4.04	24.00	2.35	—	12.55	386.12	1188.1
XSECTION 42	RUNOFF	.08	1	2	.08	.0	4.04	24.00	2.31	—	12.45	106.80	1355.2
XSECTION 42	ADDHYD	.40	1	2	.08	.0	4.04	24.00	2.34	—	12.52	484.05	1201.1
XSECTION 78	REACH	.40	1	2	.08	.0	4.04	24.00	2.34	—	12.52	484.05	1201.1
XSECTION 81	DIVERT	.00	1	2	.08	.0	4.04	24.00	2.34	—	12.16*	213.00	**********

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A QUESTION MARK(?) INDICATES A HYDROGRAPH WITH PEAK AS LAST POINT.)

SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RAIN TABLE #	ANTEC MOIST COND	MAIN TIME INCREM (HR)	PRECIPITATION BEGIN (HR)	PRECIPITATION AMOUNT (IN)	PRECIPITATION DURATION (HR)	RUNOFF AMOUNT (IN)	PEAK DISCHARGE ELEVATION (FT)	PEAK DISCHARGE TIME (HR)	PEAK DISCHARGE RATE (CFS)	PEAK DISCHARGE RATE (CSM)
ALTERNATE 1 STORM 3													
XSECTION 78	DIVERT	.56	1	2	.08	.0	4.04	24.00	.85	—	12.71	399.52	712.2
XSECTION 78	REACH	.56	1	2	.08	.0	4.04	24.00	.85	—	12.84	389.96	695.1
XSECTION 78	ADDHYD	.96	1	2	.08	.0	4.04	24.00	1.47	—	12.60	763.82	792.3
XSECTION 78	RUNOFF	.06	1	2	.08	.0	4.04	24.00	2.57	—	12.46	90.81	1441.4
XSECTION 78	ADDHYD	1.03	1	2	.08	.0	4.04	24.00	1.54	—	12.58	843.16	821.0
XSECTION 77	REACH	1.03	1	2	.08	.0	4.04	24.00	1.54	—	12.58	843.16	821.0
XSECTION 77	RUNOFF	.06	1	2	.08	.0	4.04	24.00	1.83	—	12.53	68.62	1089.2
XSECTION 77	ADDHYD	1.09	1	2	.08	.0	4.04	24.00	1.56	—	12.57	910.30	835.1
XSECTION 69	ADDHYD	2.49	1	2	.08	.0	4.04	24.00	1.24	—	12.56	1423.36	574.2
STRUCTURE 69	RESVOR	2.48	1	2	.08	.0	4.04	24.00	1.05	1387.42	13.54	231.07	93.2
XSECTION 75	REACH	2.49	1	2	.08	.0	4.04	24.00	1.05	—	13.54	231.07	93.2
XSECTION 80	RUNOFF	.06	1	2	.08	.0	4.04	24.00	2.22	—	12.53	77.30	1226.9
XSECTION 79	REACH	.06	1	2	.08	.0	4.04	24.00	2.21	—	12.74	73.68	1169.6
XSECTION 79	RUNOFF	.06	1	2	.08	.0	4.04	24.00	2.76	—	12.45	95.29	1512.5
XSECTION 79	ADDHYD	.13	1	2	.08	.0	4.04	24.00	2.49	—	12.50	155.94	1237.6
XSECTION 76	REACH	.13	1	2	.08	.0	4.04	24.00	2.48	—	12.61	151.93	1205.8
XSECTION 76	RUNOFF	.06	1	2	.08	.0	4.04	24.00	2.57	—	12.45	91.40	1450.7
XSECTION 76	ADDHYD	.19	1	2	.08	.0	4.04	24.00	2.51	—	12.52	235.15	1244.2
XSECTION 75	REACH	.19	1	2	.08	.0	4.04	24.00	2.51	—	12.63	229.33	1213.4
XSECTION 75	ADDHYD	2.67	1	2	.08	.0	4.04	24.00	1.15	—	12.72	420.71	157.7
XSECTION 75	RUNOFF	.06	1	2	.08	.0	4.04	24.00	3.45	—	12.50	101.37	1609.0
XSECTION 75	ADDHYD	2.73	1	2	.08	.0	4.04	24.00	1.20	—	12.68	507.84	186.0
XSECTION 112	REACH	2.73	1	2	.08	.0	4.04	24.00	1.20	—	12.68	507.84	186.0
XSECTION 109	REACH	.00	1	2	.08	.0	4.04	24.00	1.20	—	12.16*	213.00	**********
XSECTION 109	RUNOFF	.06	1	2	.08	.0	4.04	24.00	2.39	—	12.47	86.13	1367.2
XSECTION 109	ADDHYD	.06	1	2	.08	.0	4.04	24.00	16.10	—	12.47	299.13	4748.1
XSECTION 108	ADDHYD	9.33	1	2	.08	.0	4.04	24.00	2.14	—	12.58	5240.45	561.6
XSECTION 110	REACH	9.33	1	2	.08	.0	4.04	24.00	2.14	—	12.58	5240.45	561.6
XSECTION 110	RUNOFF	.07	1	2	.08	.0	4.04	24.00	1.90	—	12.58	74.20	1016.5
XSECTION 110	ADDHYD	9.40	1	2	.08	.0	4.04	24.00	2.14	—	12.58	5314.66	565.1
XSECTION 122	RUNOFF	.35	1	2	.08	.0	4.04	24.00	2.49	—	12.47	497.17	1400.5
XSECTION 110	ADDHYD	9.76	1	2	.08	.0	4.04	24.00	2.15	—	12.56	5778.58	592.1
XSECTION 111	REACH	9.76	1	2	.08	.0	4.04	24.00	2.15	—	12.56	5778.58	592.1
XSECTION 111	RUNOFF	.07	1	2	.08	.0	4.04	24.00	1.83	—	12.59	68.69	981.2
XSECTION 111	ADDHYD	9.83	1	2	.08	.0	4.04	24.00	2.16	—	12.56	5847.08	594.9
XSECTION 112	REACH	9.83	1	2	.08	.0	4.04	24.00	2.14	—	12.65	5804.10	590.5

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A QUESTION MARK(?) INDICATES A HYDROGRAPH WITH PEAK AS LAST POINT.)

SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RAIN TABLE #	ANTEC MOIST COND	MAIN TIME INCREM (HR)	PRECIPITATION BEGIN (HR)	PRECIPITATION AMOUNT (IN)	PRECIPITATION DURATION (HR)	RUNOFF AMOUNT (IN)	PEAK DISCHARGE ELEVATION (FT)	PEAK DISCHARGE TIME (HR)	PEAK DISCHARGE RATE (CFS)	PEAK DISCHARGE RATE (CSM)
ALTERNATE 1 STORM 3													
XSECTION 112	RUNOFF	.06	1	2	.08	.0	4.04	24.00	1.83	---	12.55	63.36	1038.7
XSECTION 112	ADDHYD	9.89	1	2	.08	.0	4.04	24.00	2.14	---	12.65	5863.11	592.8
XSECTION 121	RUNOFF	.25	1	2	.08	.0	4.04	24.00	3.47	---	12.44	429.70	1718.8
XSECTION 112	ADDHYD	10.14	1	2	.08	.0	4.04	24.00	2.17	---	12.62	6022.64	593.9
XSECTION 112	ADDHYD	12.87	1	2	.08	.0	4.04	24.00	1.97	---	12.62	6522.12	506.7
XSECTION 113	REACH	12.87	1	2	.08	.0	4.04	24.00	1.96	---	12.72	6494.31	504.5
XSECTION 113	RUNOFF	.05	1	2	.08	.0	4.04	24.00	3.04	---	12.52	79.44	1498.9
XSECTION 113	ADDHYD	12.92	1	2	.08	.0	4.04	24.00	1.96	---	12.71	6560.89	507.6
XSECTION 120	RUNOFF	.23	1	2	.08	.0	4.04	24.00	2.66	---	12.47	338.15	1463.9
XSECTION 113	ADDHYD	13.16	1	2	.08	.0	4.04	24.00	1.98	---	12.69	6743.19	512.6
XSECTION 113	REACH	.00	1	2	.08	.0	4.04	24.00	1.98	---	13.04*	88.00	**********
XSECTION 113	ADDHYD	13.16	1	2	.08	.0	4.04	24.00	2.05	---	12.69	6831.17	519.3
XSECTION 58	RUNOFF	.06	1	2	.08	.0	4.04	24.00	2.40	---	12.46	87.32	1386.0
XSECTION 60	REACH	.06	1	2	.08	.0	4.04	24.00	2.39	---	12.65	84.26	1337.4
XSECTION 60	RUNOFF	.06	1	2	.08	.0	4.04	24.00	2.14	---	12.54	73.55	1167.5
XSECTION 60	ADDHYD	.13	1	2	.08	.0	4.04	24.00	2.26	---	12.59	155.41	1233.4
XSECTION 65	REACH	.13	1	2	.08	.0	4.04	24.00	2.26	---	12.70	153.07	1214.8
XSECTION 65	RUNOFF	.05	1	2	.08	.0	4.04	24.00	2.22	---	12.54	56.56	1203.4
XSECTION 65	ADDHYD	.17	1	2	.08	.0	4.04	24.00	2.25	---	12.64	204.43	1181.7
XSECTION 68	REACH	.17	1	2	.08	.0	4.04	24.00	2.24	---	12.96	173.99	1005.7
XSECTION 68	RUNOFF	.06	1	2	.08	.0	4.04	24.00	2.48	---	12.46	89.38	1418.7
XSECTION 68	ADDHYD	.24	1	2	.08	.0	4.04	24.00	2.30	---	12.56	199.92	847.1
XSECTION 70	REACH	.24	1	2	.08	.0	4.04	24.00	2.30	---	12.71	188.84	800.2
XSECTION 70	RUNOFF	.06	1	2	.08	.0	4.04	24.00	2.57	---	12.46	91.40	1450.7
XSECTION 70	ADDHYD	.30	1	2	.08	.0	4.04	24.00	2.35	---	12.56	255.00	852.9
XSECTION 74	REACH	.30	1	2	.08	.0	4.04	24.00	2.35	---	12.69	244.32	817.1
XSECTION 74	RUNOFF	.06	1	2	.08	.0	4.04	24.00	2.95	---	12.45	99.42	1578.1
XSECTION 74	ADDHYD	.36	1	2	.08	.0	4.04	24.00	2.45	---	12.56	315.52	871.6
XSECTION 113	REACH	.36	1	2	.08	.0	4.04	24.00	2.45	---	12.56	315.52	871.6
XSECTION 113	ADDHYD	13.52	1	2	.08	.0	4.04	24.00	2.06	---	12.68	7121.86	526.9
XSECTION 114	REACH	13.52	1	2	.08	.0	4.04	24.00	2.05	---	12.83	6909.98	511.2
XSECTION 64	RUNOFF	.25	1	2	.08	.0	4.04	24.00	2.22	---	12.48	319.51	1278.1
XSECTION 72	REACH	.25	1	2	.08	.0	4.04	24.00	2.22	---	12.63	296.29	1185.2
XSECTION 72	RUNOFF	.13	1	2	.08	.0	4.04	24.00	2.30	---	12.54	154.91	1239.3
XSECTION 72	ADDHYD	.38	1	2	.08	.0	4.04	24.00	2.25	---	12.60	447.05	1192.1
XSECTION 114	REACH	.38	1	2	.08	.0	4.04	24.00	2.24	---	12.84	413.71	1103.2

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A QUESTION MARK(?) INDICATES A HYDROGRAPH WITH PEAK AS LAST POINT.)

SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RAIN TABLE #	ANTEC MOIST COND	MAIN TIME INCREM (HR)	PRECIPITATION BEGIN (HR)	PRECIPITATION AMOUNT (IN)	PRECIPITATION DURATION (HR)	RUNOFF AMOUNT (IN)	PEAK DISCHARGE ELEVATION (FT)	PEAK DISCHARGE TIME (HR)	PEAK DISCHARGE RATE (CFS)	PEAK DISCHARGE RATE (CSM)
ALTERNATE 1 STORM 3													
XSECTION 115	RUNOFF	.09	1	2	.08	.0	4.04	24.00	2.22	---	12.53	115.33	1226.9
XSECTION 114	ADDHYD	.47	1	2	.08	.0	4.04	24.00	2.23	---	12.74	483.72	1031.4
XSECTION 71	RUNOFF	.13	1	2	.08	.0	4.04	24.00	2.30	---	12.54	154.91	1239.3
XSECTION 114	REACH	.13	1	2	.08	.0	4.04	24.00	2.29	---	12.91	131.16	1049.3
XSECTION 114	ADDHYD	.59	1	2	.08	.0	4.04	24.00	2.25	---	12.78	606.24	1020.6
XSECTION 114	RUNOFF	.13	1	2	.08	.0	4.04	24.00	2.46	---	12.90	118.86	928.6
XSECTION 114	ADDHYD	.72	1	2	.08	.0	4.04	24.00	2.28	---	12.80	722.31	1000.4
XSECTION 114	ADDHYD	14.24	1	2	.08	.0	4.04	24.00	2.06	---	12.83	7630.70	535.9
XSECTION 119	RUNOFF	.23	1	2	.08	.0	4.04	24.00	2.38	---	12.82	221.79	960.2
XSECTION 114	ADDHYD	14.47	1	2	.08	.0	4.04	24.00	2.06	---	12.83	7852.47	542.7
XSECTION 118	REACH	14.47	1	2	.08	.0	4.04	24.00	2.06	---	12.97	7656.92	529.1
XSECTION 118	RUNOFF	.23	1	2	.08	.0	4.04	24.00	2.11	---	13.17	153.26	663.5
XSECTION 118	ADDHYD	14.70	1	2	.08	.0	4.04	24.00	2.06	---	12.98	7801.72	530.7

SUMMARY TABLE 2 - SELECTED MODIFIED ATT-KIN REACH ROUTINGS IN ORDER OF STANDARD EXECUTIVE CONTROL INSTRUCTIONS
(A STAR(*) AFTER VOLUME ABOVE BASE(IN) INDICATES A HYDROGRAPH TRUNCATED AT A VALUE EXCEEDING BASE + 10% OF PEAK
A QUESTION MARK(?) AFTER COEFF.(C) INDICATES PARAMETERS OUTSIDE ACCEPTABLE LIMITS, SEE PREVIOUS WARNINGS)

		HYDROGRAPH INFORMATION							ROUTING PARAMETERS									PEAK	
		INFLOW		OUTFLOW		OUTFLOW+ INTERV AREA						Q AND A EQUATION						TRAVEL	TIME
XSEC ID	REACH LENGTH (FT)	PEAK (CFS)	TIME (HR)	PEAK (CFS)	TIME (HR)	PEAK (CFS)	TIME (HR)	BASE-FLOW (CFS)	VOLUME ABOVE BASE (IN)	MAIN TIME INCR (HR)	ITER-ATION #	COEFF (X)	POWER (M)	LENGTH FACTOR (K*)	PEAK RATIO O/I (Q*)	S/Q @PEAK (K) (SEC)	ATT-KIN COEFF (C)	STOR-AGE (HR)	KINE-MATIC (HR)
ALTERNATE	1	STORM	3																
3	1000	247	12.5	244	12.6	—	—	0	3.46	.08	1	.040	1.66	.049	.989	468	.47	.08	.13
3	1400	162	12.5	158	12.7	—	—	0	3.46	.08	1	.040	1.66	.112	.974	775	.31	.08	.22
6	1600	446	12.6	443	12.7	—	—	0	3.19	.08	1	1.53	1.21	.049	.992	329	.61	.16	.09
8	1600	550	12.7	531	12.9	—	—	0	2.90	.08	1	.655	1.24	.085	.967	540	.42	.16	.15
8	1400	107	12.6	105	12.8	—	—	0	1.83	.08	1	.542	1.52	.026	.982	278	.68?	.16	.08
4	1800	37	12.5	32	13.0	348	12.5	0	3.47	.08	1	.050	1.66	.362	.861	1571	.17	.09	.45
5	1400	348	12.5	342	12.6	—	—	0	3.46	.08	1	.050	1.66	.051	.983	500	.45	.08	.14
8	2100	463	12.6	434	12.9	—	—	0	2.85	.08	1	.643	1.24	.123	.938	729	.33	.16	.20
8	1900	172	12.6	146	13.0	—	—	0	1.90	.08	1	.040	1.66	.184	.852	1029	.25	.24	.29
14	3000	421	13.5	405	13.9	—	—	0	2.29	.08	1	.170	1.47	.033	.963	987	.25	.40	.28
14	2700	57	12.8	54	13.0	421	13.8	0	1.97	.08	1	.699	1.51	.065	.948	577	.40	.16	.16
11	2640	93	12.6	86	12.7	298	12.7	0	1.83	.08	1	.440	1.54	.091	.929	596	.39	.16	.17
13	1320	298	12.7	298	12.7	429	12.6	0	1.93	.08	0	1.98	1.67	.001	1.000	53	1.00?	.00	.00
14	2640	113	12.8	112	12.9	—	—	0	1.97	.08	1	2.10	1.40	.027	.988	287	.67?	.08	.08
14	1320	532	12.7	532	12.7	—	—	0	2.00	.08	0	1.64	1.67	.001	1.000	47	1.00?	.00	.00
15	1300	156	12.6	155	12.6	224	12.6	0	2.56	.08	1	.540	1.54	.018	.995	214	.80?	.08	.06
27	3000	1081	12.6	975	13.0	1131	13.0	0	2.21	.08	1	.040	1.63	.040	.902	891	.28	.32	.25
25	2200	99	12.5	89	12.9	189	12.6	0	3.47	.08	1	.050	1.66	.264	.905	1297	.20	.08	.37
27	1700	189	12.6	162	12.9	—	—	0	2.76	.08	1	.040	1.63	.157	.860	992	.25	.24	.28
37	3000	1306	12.9	1296	13.0	1314	13.0	0	2.24	.08	1	.503	1.48	.010	.993	313	.63	.16	.09
37	2100	267	12.6	266	12.6	—	—	0	2.57	.08	1	.410	1.66	.018	.997	235	.76?	.08	.07
36	3500	149	12.8	117	13.3	201	12.6	0	2.21	.08	1	.050	1.66	.300	.789	1571	.17	.32	.46
35	1320	142	12.6	139	12.8	280	12.6	0	2.38	.08	1	.310	1.54	.030	.979	323	.62	.16	.09
36	1320	280	12.6	280	12.6	—	—	0	2.34	.08	0	4.48	1.25	.011	1.000	103	1.00?	.00	.00
37	1320	481	12.6	481	12.6	—	—	0	2.29	.08	0	4.64	1.25	.007	1.000	90	1.00?	.00	.00
85	1320	463	17.6	463	17.6	464	17.6	0	1.94*	.08	0	5.40	1.25	.001	1.000	80	1.00?	.00	.00
84	1320	464	17.6	464	17.6	465	17.7	0	1.94*	.08	0	5.40	1.25	.001	1.000	80	1.00?	.00	.00
90	1320	168	12.6	165	12.6	297	12.6	0	2.57	.08	1	.220	1.54	.044	.982	380	.55	.08	.11
88	1320	297	12.6	293	12.7	—	—	0	2.52	.08	1	.220	1.54	.031	.986	311	.63	.08	.09
88	2000	62	12.5	56	12.7	169	12.6	0	2.39	.08	1	.220	1.54	.156	.906	816	.30	.16	.23
84	2640	159	12.1	159	12.7	—	—	0	.00	.08	1	4.30	1.25	.014	1.000	239	.75?	.64	.07
105	1320	227	12.6	227	12.6	—	—	0	.00*	.08	0	5.90	1.25	.001	1.000	86	1.00?	.00	.00

SUMMARY TABLE 2 - SELECTED MODIFIED ATT-KIN REACH ROUTINGS IN ORDER OF STANDARD EXECUTIVE CONTROL INSTRUCTIONS
(A STAR(*) AFTER VOLUME ABOVE BASE(IN) INDICATES A HYDROGRAPH TRUNCATED AT A VALUE EXCEEDING BASE + 10% OF PEAK
A QUESTION MARK(?) AFTER COEFF.(C) INDICATES PARAMETERS OUTSIDE ACCEPTABLE LIMITS, SEE PREVIOUS WARNINGS)

		HYDROGRAPH INFORMATION							ROUTING PARAMETERS									PEAK	
		INFLOW		OUTFLOW		OUTFLOW+ INTERV.	AREA					Q AND A EQUATION						TRAVEL	TIME
XSEC ID	REACH LENGTH (FT)	PEAK (CFS)	TIME (HR)	PEAK (CFS)	TIME (HR)	PEAK (CFS)	TIME (HR)	BASE-FLOW (CFS)	VOLUME ABOVE BASE (IN)	MAIN TIME INCR (HR)	ITER-ATION #	COEFF (X)	POWER (M)	LENGTH FACTOR (K*)	PEAK RATIO O/I (Q*)	S/Q @PEAK (K) (SEC)	ATT-KIN COEFF (C)	STOR-AGE (HR)	KINE-MATIC (HR)
ALTERNATE	1	STORM	3																
101	1050	302	12.7	299	12.8	344	12.9	0	.91	.08	1	.220	1.54	.051	.987	246	.74?	.08	.07
102	1320	344	12.8	306	13.0	338	13.0	0	1.13	.08	1	.020	1.66	.242	.888	823	.30	.16	.23
105	1320	338	13.0	321	13.2	341	13.1	0	1.27	.08	1	.288	1.33	.105	.952	586	.39	.16	.16
87	1320	91	12.5	81	12.7	161	12.6	0	2.57	.08	1	.118	1.45	.212	.892	984	.26	.16	.29
105	2000	161	12.6	140	13.0	---	---	0	2.61	.08	1	.287	1.34	.201	.869	1066	.24	.16	.30
104	1320	683	13.1	683	13.1	716	13.0	0	6.99*	.08	0	5.90	1.25	.001	1.000	69	1.00?	.00	.00
83	1320	250	12.6	250	12.6	329	12.6	0	1.12*	.08	0	7.12	1.25	.001	1.000	73	1.00?	.00	.00
106	1320	329	12.6	329	12.6	395	12.6	0	1.14*	.08	0	5.90	1.25	.001	1.000	80	1.00?	.00	.00
107	900	395	12.6	395	12.6	468	12.6	0	1.15*	.08	0	5.90	1.25	.001	1.000	53	1.00?	.00	.00
29	3800	86	12.6	49	13.4	243	12.9	0	2.22	.08	1	.040	1.66	1.120	.575	2935	.09?	.24	.83
33	2640	243	12.9	243	12.9	429	12.9	0	2.14	.08	0	7.53	1.25	.011	1.000	140	1.00?	.00	.00
32	3000	114	12.7	113	12.8	---	---	0	1.97	.08	1	6.29	1.25	.025	.993	214	.80?	.08	.06
93	2640	103	14.2	103	14.3	272	12.6	0	1.83*	.08	1	5.24	1.25	.003	1.000	222	.79?	.08	.06
92	1320	123	12.6	110	12.7	262	12.6	0	.12	.08	1	.080	1.66	.254	.890	537	.42	.16	.15
98	2500	262	12.6	234	12.9	---	---	0	.43	.08	1	.080	1.66	.158	.893	753	.32	.16	.21
95	1320	149	12.1	149	12.1	---	---	0	.00*	.08	0	6.26	1.25	.001	1.000	89	1.00?	.00	.00
94	3200	104	12.7	84	13.1	220	12.6	0	2.05	.08	1	.090	1.66	.246	.814	1299	.20	.24	.38
95	2400	220	12.6	199	12.8	331	12.8	0	2.24	.08	1	.090	1.66	.072	.902	722	.33	.16	.20
98	3000	315	12.8	283	13.0	---	---	0	1.52	.08	1	.080	1.66	.162	.897	840	.29	.16	.24
96	1320	165	11.9	165	11.9	313	12.6	0	.00*	.08	0	6.26	1.25	.001	1.000	88	1.00?	.00	.00
97	2100	128	12.6	112	12.8	343	12.6	0	1.28	.08	1	.080	1.66	.298	.876	841	.29	.16	.24
98	1000	343	12.6	341	12.7	---	---	0	2.10	.08	1	.080	1.66	.022	.993	271	.69?	.08	.08
99	1250	854	12.8	850	12.9	921	12.8	0	1.06	.08	1	.080	1.66	.014	.996	236	.76?	.08	.07
139	1500	921	12.8	903	13.0	---	---	0	1.14	.08	1	.050	1.66	.030	.980	388	.54	.16	.11
139	600	108	12.5	106	12.6	957	12.9	0	2.57	.08	1	.050	1.66	.035	.982	341	.59	.16	.10
141	2100	196	13.0	186	13.3	341	12.6	0	2.28	.08	1	.080	1.66	.055	.947	710	.34	.24	.20
140	1320	341	12.6	332	12.7	475	12.6	0	2.44	.08	1	.080	1.66	.016	.972	358	.57	.08	.10
139	2800	557	12.6	503	12.9	---	---	0	2.40	.08	1	.050	1.66	.077	.903	830	.30	.16	.24
138	3000	111	12.5	108	12.7	384	12.5	0	3.47	.08	1	.170	1.66	.120	.973	809	.30	.08	.23
139	2000	384	12.5	356	12.6	---	---	0	2.65	.08	1	.050	1.66	.110	.927	687	.35	.16	.19
127	2500	195	12.5	178	12.7	---	---	0	2.41	.08	1	.080	1.66	.177	.913	847	.29	.08	.24
127	2300	46	12.5	36	12.9	212	12.7	0	2.07	.08	1	.080	1.66	.443	.781	1382	.19	.16	.40

SUMMARY TABLE 2 - SELECTED MODIFIED ATT-KIN REACH ROUTINGS IN ORDER OF STANDARD EXECUTIVE CONTROL INSTRUCTIONS
(A STAR(*) AFTER VOLUME ABOVE BASE(IN) INDICATES A HYDROGRAPH TRUNCATED AT A VALUE EXCEEDING BASE + 10% OF PEAK
A QUESTION MARK(?) AFTER COEFF.(C) INDICATES PARAMETERS OUTSIDE ACCEPTABLE LIMITS, SEE PREVIOUS WARNINGS)

		HYDROGRAPH INFORMATION							ROUTING PARAMETERS									PEAK	
		INFLOW		OUTFLOW		OUTFLOW+ INTERV.AREA						Q AND A EQUATION						TRAVEL TIME	
XSEC ID	REACH LENGTH (FT)	PEAK (CFS)	TIME (HR)	PEAK (CFS)	TIME (HR)	PEAK (CFS)	TIME (HR)	BASE-FLOW (CFS)	VOLUME ABOVE BASE (IN)	MAIN TIME INCR (HR)	ITER-ATION #	COEFF (X)	POWER (M)	LENGTH FACTOR (K*)	PEAK RATIO O/I (Q*)	S/Q @PEAK (K) (SEC)	ATT-KIN COEFF (C)	STOR-AGE (HR)	KINE-MATIC (HR)
ALTERNATE		1	STORM	3															
131	2000	217	12.5	213	12.6	—	—	0	2.76	.08	1	.170	1.66	.048	.980	412	.52	.08	.12
125	1500	769	12.5	758	12.6	1003	12.6	0	2.45	.08	1	.110	1.66	.019	.986	243	.74?	.08	.07
134	1500	1003	12.6	1000	12.6	—	—	0	2.66	.08	1	.130	1.66	.012	.997	198	.84?	.08	.06
134	3200	70	12.5	65	12.8	1061	12.6	0	3.47	.08	1	.130	1.66	.236	.919	1214	.21	.08	.34
124	2500	1468	12.5	1442	12.6	1698	12.6	0	2.74	.08	1	.090	1.66	.030	.982	354	.58	.16	.10
124	900	1887	12.7	1887	12.7	—	—	0	1.66	.08	0	.960	1.51	.001	1.000	48	1.00?	.00	.00
104	1320	3560	12.6	3560	12.6	—	—	0	1.98	.08	0	.960	1.51	.002	1.000	57	1.00?	.00	.00
107	1000	4178	12.6	4178	12.6	—	—	0	2.63	.08	0	.850	1.53	.001	1.000	40	1.00?	.00	.00
108	1700	4905	12.6	4905	12.6	4936	12.6	0	2.04	.08	0	.850	1.53	.001	1.000	65	1.00?	.00	.00
48	1320	144	12.5	140	12.7	—	—	0	3.46	.08	1	.040	1.66	.110	.975	766	.32	.08	.21
48	2640	107	12.5	90	13.0	218	12.7	0	3.47	.08	1	.040	1.66	.423	.835	1724	.15	.08	.50
56	1866	354	12.6	347	12.8	386	12.6	0	2.88	.08	1	.120	1.66	.032	.980	391	.54	.16	.11
57	1320	386	12.6	386	12.6	463	12.6	0	2.76	.08	0	.760	1.58	.004	1.000	112	1.00?	.00	.00
46	2640	319	12.5	319	12.5	—	—	0	2.71	.08	0	3.10	1.67	.003	1.000	79	1.00?	.00	.00
46	1320	161	12.5	160	12.6	316	12.5	0	2.23	.08	1	.510	1.54	.023	.990	223	.78?	.08	.06
57	1320	635	12.5	635	12.5	—	—	0	2.46	.08	0	1.86	1.67	.001	1.000	41	1.00?	.00	.00
59	1320	1086	12.6	1086	12.6	—	—	0	2.56	.08	0	.740	1.58	.003	1.000	78	1.00?	.00	.00
59	1400	182	12.6	179	12.6	1262	12.6	0	2.94	.08	1	.110	1.66	.039	.983	403	.53	.08	.11
66	660	206	13.1	206	13.1	267	12.6	0	1.39	.08	0	5.10	1.25	.001	1.000	49	1.00?	.00	.00
67	1320	267	12.6	267	12.6	354	12.5	0	1.44	.08	0	5.10	1.25	.002	1.000	94	1.00?	.00	.00
67	1320	183	12.5	180	12.6	—	—	0	2.66	.08	1	.250	1.54	.040	.982	339	.60	.08	.09
69	1320	445	12.6	445	12.6	514	12.6	0	.94	.08	0	5.10	1.25	.006	1.000	85	1.00?	.00	.00
40	2650	153	12.5	143	12.7	—	—	0	3.46	.08	1	.080	1.66	.169	.939	991	.25	.08	.28
40	1800	140	12.6	127	12.7	270	12.7	0	1.98	.08	1	.080	1.66	.122	.910	696	.34	.16	.20
82	1400	373	12.6	366	12.7	414	12.6	0	2.48	.08	1	.100	1.66	.026	.980	320	.62	.08	.09
82	1867	160	12.6	151	12.7	—	—	0	2.48	.08	1	.100	1.66	.082	.944	598	.39	.16	.17
81	1320	562	12.6	557	12.7	612	12.7	0	2.46	.08	1	.220	1.54	.019	.991	249	.73?	.08	.07
41	3100	190	12.6	180	12.7	386	12.6	0	2.30	.08	1	.240	1.66	.076	.945	548	.42	.08	.15
78	2500	481	12.5	481	12.5	—	—	0	2.34	.08	0	1.46	1.67	.004	1.000	100	1.00?	.00	.00
78	1320	399	12.7	388	12.8	—	—	0	.85	.08	1	.090	1.66	.062	.971	313	.63	.08	.09
77	1700	842	12.6	842	12.6	910	12.6	0	1.54	.08	0	.760	1.58	.006	1.000	108	1.00?	.00	.00
75	1320	231	13.5	231	13.5	—	—	0	1.05*	.08	0	4.39	1.25	.001	1.000	109	1.00?	.00	.00

SUMMARY TABLE 2 - SELECTED MODIFIED ATT-KIN REACH ROUTINGS IN ORDER OF STANDARD EXECUTIVE CONTROL INSTRUCTIONS
(A STAR(*) AFTER VOLUME ABOVE BASE(IN) INDICATES A HYDROGRAPH TRUNCATED AT A VALUE EXCEEDING BASE + 10% OF PEAK
A QUESTION MARK(?) AFTER COEFF.(C) INDICATES PARAMETERS OUTSIDE ACCEPTABLE LIMITS, SEE PREVIOUS WARNINGS)

		HYDROGRAPH INFORMATION							ROUTING PARAMETERS									PEAK	
		INFLOW		OUTFLOW		OUTFLOW+ INTERV.AREA												TRAVEL TIME	
XSEC ID	REACH LENGTH (FT)	PEAK (CFS)	TIME (HR)	PEAK (CFS)	TIME (HR)	PEAK (CFS)	TIME (HR)	BASE-FLOW (CFS)	VOLUME ABOVE BASE (IN)	MAIN TIME INCR (HR)	ITER-ATION #	Q AND A EQUATION COEFF (X)	POWER (M)	LENGTH FACTOR (K*)	PEAK RATIO O/I (Q*)	S/Q @PEAK (K) (SEC)	ATT-KIN COEFF (C)	STOR-AGE (HR)	KINE-MATIC (HR)
ALTERNATE	1	STORM	3																
79	1320	77	12.6	74	12.7	156	12.5	0	2.22	.08	1	.230	1.54	.069	.957	486	.46	.08	.14
76	1320	156	12.5	151	12.6	233	12.6	0	2.48	.08	1	.230	1.54	.041	.972	379	.55	.16	.11
75	1320	233	12.6	229	12.6	—	—	0	2.51	.08	1	.230	1.54	.032	.985	329	.61	.08	.09
112	1320	504	12.6	504	12.6	—	—	0	1.20	.08	0	4.39	1.25	.002	1.000	93	1.00?	.00	.00
109	2640	213	12.2	213	12.2	299	12.5	0	.00	.08	0	7.66	1.25	.007	1.000	142	1.00?	.00	.00
110	1320	5232	12.6	5232	12.6	5306	12.6	0	2.14	.08	0	.850	1.53	.001	1.000	49	1.00?	.00	.00
111	1320	5779	12.6	5779	12.6	5847	12.6	0	2.15	.08	0	1.07	1.53	.001	1.000	41	1.00?	.00	.00
112	1320	5847	12.6	5799	12.6	5859	12.6	0	2.15	.08	1	.040	1.63	.005	.992	204	.83?	.08	.06
113	1320	6515	12.6	6494	12.7	6560	12.7	0	1.97	.08	1	.040	1.63	.004	.997	196	.85?	.08	.05
113	5280	88	11.8	88	13.0	—	—	0	.00	.08	1	5.51	1.25	.009	1.000	440	.49	1.28	.12
60	1320	87	12.5	84	12.6	155	12.6	0	2.40	.08	1	.250	1.54	.064	.968	440	.49	.08	.12
65	1320	155	12.6	153	12.7	204	12.6	0	2.26	.08	1	.280	1.54	.038	.986	334	.60	.16	.09
68	1320	204	12.6	174	13.0	200	12.6	0	2.25	.08	1	.250	1.25	.234	.851	1105	.23	.24	.31
70	1320	200	12.6	189	12.7	255	12.6	0	2.30	.08	1	.180	1.54	.029	.945	407	.52	.16	.11
74	1320	255	12.6	243	12.7	315	12.6	0	2.35	.08	1	.090	1.66	.021	.954	375	.56	.16	.11
113	1320	315	12.6	315	12.6	—	—	0	2.45	.08	0	5.93	1.25	.005	1.000	80	1.00?	.00	.00
114	3000	7091	12.6	6896	12.8	—	—	0	2.06	.08	1	.040	1.63	.015	.972	431	.50	.16	.12
72	2640	319	12.5	296	12.6	443	12.6	0	2.22	.08	1	.180	1.54	.128	.927	691	.34	.16	.19
114	2000	443	12.6	412	12.8	483	12.7	0	2.25	.08	1	.050	1.66	.096	.929	649	.36	.08	.18
114	2200	155	12.6	131	12.9	—	—	0	2.30	.08	1	.050	1.66	.234	.846	1086	.23	.16	.31
119	4000	7840	12.8	7654	13.0	7797	13.0	0	2.06	.08	1	.050	1.66	.014	.976	414	.52	.16	.12

SUMMARY TABLE 3 - DISCHARGE (CFS) AT XSECTIONS AND STRUCTURES FOR ALL STORMS AND ALTERNATES

XSECTION/ STRUCTURE ID	DRAINAGE AREA (SQ MI)	STORM NUMBERS..... 3
STRUCTURE 69	2.49	
ALTERNATE 1		231.07
STRUCTURE 59	1.07	
ALTERNATE 1		205.57
STRUCTURE 44	3.52	
ALTERNATE 1		452.69
STRUCTURE 43	3.52	
ALTERNATE 1		887.54
STRUCTURE 37	2.72	
ALTERNATE 1		1311.54
STRUCTURE 33	.68	
ALTERNATE 1		103.09
STRUCTURE 8	1.18	
ALTERNATE 1		420.61
XSECTION 1	.15	
ALTERNATE 1		248.49
XSECTION 2	.10	
ALTERNATE 1		165.73
XSECTION 3	.29	
ALTERNATE 1		446.92
XSECTION 4	.22	
ALTERNATE 1		351.51
XSECTION 5	.34	
ALTERNATE 1		464.83
XSECTION 6	.40	
ALTERNATE 1		549.88
XSECTION 7	.12	
ALTERNATE 1		106.65

SUMMARY TABLE 3 - DISCHARGE (CFS) AT XSECTIONS AND STRUCTURES FOR ALL STORMS AND ALTERNATES

XSECTION/ STRUCTURE ID	DRAINAGE AREA (SQ MI)	STORM NUMBERS..... 3
XSECTION 8	1.18	
ALTERNATE 1		1315.07
XSECTION 9	.07	
ALTERNATE 1		56.70
XSECTION 10	.09	
ALTERNATE 1		93.22
XSECTION 11	.33	
ALTERNATE 1		298.55
XSECTION 12	.07	
ALTERNATE 1		86.92
XSECTION 13	.59	
ALTERNATE 1		532.09
XSECTION 14	2.20	
ALTERNATE 1		1086.19
XSECTION 15	.19	
ALTERNATE 1		224.76
XSECTION 16	.12	
ALTERNATE 1		155.97
XSECTION 17	.06	
ALTERNATE 1		101.41
XSECTION 18	.18	
ALTERNATE 1		171.98
XSECTION 19	.02	
ALTERNATE 1		37.85
XSECTION 20	.06	
ALTERNATE 1		110.00
XSECTION 21	.24	
ALTERNATE 1		319.12

SUMMARY TABLE 3 - DISCHARGE (CFS) AT XSECTIONS AND STRUCTURES FOR ALL STORMS AND ALTERNATES

XSECTION/ STRUCTURE ID	DRAINAGE AREA (SQ MI)	STORM NUMBERS..... 3
XSECTION 22	.15	
ALTERNATE 1		190.91
XSECTION 23	.09	
ALTERNATE 1		154.39
XSECTION 24	.20	
ALTERNATE 1		269.81
XSECTION 25	.15	
ALTERNATE 1		188.52
XSECTION 26	.07	
ALTERNATE 1		93.39
XSECTION 27	2.60	
ALTERNATE 1		1309.00
XSECTION 28	.16	
ALTERNATE 1		149.43
XSECTION 29	.32	
ALTERNATE 1		243.13
XSECTION 30	.13	
ALTERNATE 1		113.58
XSECTION 32	.11	
ALTERNATE 1		103.71
XSECTION 33	.68	
ALTERNATE 1		540.47
XSECTION 34	.13	
ALTERNATE 1		141.66
XSECTION 35	.25	
ALTERNATE 1		281.50
XSECTION 36	.53	
ALTERNATE 1		483.34

SUMMARY TABLE 3 - DISCHARGE (CFS) AT XSECTIONS AND STRUCTURES FOR ALL STORMS AND ALTERNATES

XSECTION/ STRUCTURE ID	DRAINAGE AREA (SQ MI)	STORM NUMBERS..... 3
XSECTION 37	3.45	
ALTERNATE 1		1831.33
XSECTION 38	.13	
ALTERNATE 1		140.54
XSECTION 39	.13	
ALTERNATE 1		160.23
XSECTION 40	.31	
ALTERNATE 1		373.29
XSECTION 41	.32	
ALTERNATE 1		386.12
XSECTION 42	.40	
ALTERNATE 1		484.05
XSECTION 43	.05	
ALTERNATE 1		75.70
XSECTION 44	.13	
ALTERNATE 1		182.98
XSECTION 45	.13	
ALTERNATE 1		183.10
XSECTION 46	.49	
ALTERNATE 1		635.94
XSECTION 47	.13	
ALTERNATE 1		161.49
XSECTION 48	.28	
ALTERNATE 1		353.80
XSECTION 49	.09	
ALTERNATE 1		145.94
XSECTION 56	.34	
ALTERNATE 1		386.92

SUMMARY TABLE 3 - DISCHARGE (CFS) AT XSECTIONS AND STRUCTURES FOR ALL STORMS AND ALTERNATES

XSECTION/ STRUCTURE ID	DRAINAGE AREA (SQ MI)	STORM NUMBERS..... 3
XSECTION 57	.99	
ALTERNATE 1		1098.96
XSECTION 58	.05	
ALTERNATE 1		87.32
XSECTION 59	1.07	
ALTERNATE 1		1353.71
XSECTION 60	.13	
ALTERNATE 1		155.41
XSECTION 64	.25	
ALTERNATE 1		319.51
XSECTION 65	.17	
ALTERNATE 1		204.43
XSECTION 66	1.14	
ALTERNATE 1		268.09
XSECTION 67	.00	
ALTERNATE 1		88.00
XSECTION 68	.24	
ALTERNATE 1		199.92
XSECTION 69	2.48	
ALTERNATE 1		1423.36
XSECTION 70	.30	
ALTERNATE 1		255.00
XSECTION 71	.13	
ALTERNATE 1		154.91
XSECTION 72	.39	
ALTERNATE 1		447.05
XSECTION 74	.36	
ALTERNATE 1		315.52

SUMMARY TABLE 3 - DISCHARGE (CFS) AT XSECTIONS AND STRUCTURES FOR ALL STORMS AND ALTERNATES

XSECTION/ STRUCTURE ID	DRAINAGE AREA (SQ MI)	STORM NUMBERS..... 3
XSECTION 75	2.73	
ALTERNATE 1		507.84
XSECTION 76	.19	
ALTERNATE 1		235.15
XSECTION 77	1.09	
ALTERNATE 1		910.30
XSECTION 78	1.03	
ALTERNATE 1		843.16
XSECTION 79	.13	
ALTERNATE 1		155.94
XSECTION 80	.06	
ALTERNATE 1		77.30
XSECTION 81	.00	
ALTERNATE 1		213.00
XSECTION 82	.50	
ALTERNATE 1		562.06
XSECTION 83	3.70	
ALTERNATE 1		329.79
XSECTION 84	3.64	
ALTERNATE 1		477.24
XSECTION 85	3.58	
ALTERNATE 1		454.09
XSECTION 86	.06	
ALTERNATE 1		90.81
XSECTION 87	.13	
ALTERNATE 1		162.32
XSECTION 88	.00	
ALTERNATE 1		159.00

SUMMARY TABLE 3 - DISCHARGE (CFS) AT XSECTIONS AND STRUCTURES FOR ALL STORMS AND ALTERNATES

XSECTION/ STRUCTURE ID	DRAINAGE AREA (SQ MI)	STORM NUMBERS..... 3
XSECTION 89	.05	
ALTERNATE 1		62.16
XSECTION 90	.23	
ALTERNATE 1		297.37
XSECTION 91	.13	
ALTERNATE 1		169.21
XSECTION 92	1.00	
ALTERNATE 1		263.74
XSECTION 93	.00	
ALTERNATE 1		149.00
XSECTION 94	.25	
ALTERNATE 1		221.63
XSECTION 95	.00	
ALTERNATE 1		165.00
XSECTION 96	.00	
ALTERNATE 1		185.00
XSECTION 97	.31	
ALTERNATE 1		345.54
XSECTION 98	1.78	
ALTERNATE 1		855.07
XSECTION 99	1.87	
ALTERNATE 1		921.27
XSECTION 100	.08	
ALTERNATE 1		108.52
XSECTION 101	.42	
ALTERNATE 1		346.30
XSECTION 102	.48	
ALTERNATE 1		338.84

SUMMARY TABLE 3 - DISCHARGE (CFS) AT XSECTIONS AND STRUCTURES FOR ALL STORMS AND ALTERNATES

XSECTION/ STRUCTURE ID	DRAINAGE AREA (SQ MI)	STORM NUMBERS..... 3
XSECTION 103	.08	
ALTERNATE 1		112.17
XSECTION 104	5.20	
ALTERNATE 1		4178.51
XSECTION 105	.67	
ALTERNATE 1		683.93
XSECTION 106	3.77	
ALTERNATE 1		396.05
XSECTION 107	9.24	
ALTERNATE 1		4919.27
XSECTION 108	9.33	
ALTERNATE 1		5240.45
XSECTION 109	.05	
ALTERNATE 1		299.13
XSECTION 110	9.76	
ALTERNATE 1		5778.58
XSECTION 111	9.83	
ALTERNATE 1		5847.08
XSECTION 112	12.87	
ALTERNATE 1		6522.12
XSECTION 113	13.52	
ALTERNATE 1		7121.86
XSECTION 114	14.47	
ALTERNATE 1		7852.47
XSECTION 115	.09	
ALTERNATE 1		115.33
XSECTION 118	14.70	
ALTERNATE 1		7801.72

SUMMARY TABLE 3 - DISCHARGE (CFS) AT XSECTIONS AND STRUCTURES FOR ALL STORMS AND ALTERNATES

XSECTION/ STRUCTURE ID	DRAINAGE AREA (SQ MI)	STORM NUMBERS..... 3
XSECTION 119	.23	
ALTERNATE 1		221.79
XSECTION 120	.23	
ALTERNATE 1		338.15
XSECTION 121	.25	
ALTERNATE 1		429.70
XSECTION 122	.35	
ALTERNATE 1		497.17
XSECTION 123	.21	
ALTERNATE 1		359.53
XSECTION 124	4.46	
ALTERNATE 1		3571.70
XSECTION 125	1.11	
ALTERNATE 1		1473.03
XSECTION 126	.76	
ALTERNATE 1		1007.74
XSECTION 127	.33	
ALTERNATE 1		390.23
XSECTION 128	.04	
ALTERNATE 1		47.02
XSECTION 129	.14	
ALTERNATE 1		199.00
XSECTION 130	.03	
ALTERNATE 1		50.77
XSECTION 131	.60	
ALTERNATE 1		769.62
XSECTION 132	.14	
ALTERNATE 1		218.08

SUMMARY TABLE 3 - DISCHARGE (CFS) AT XSECTIONS AND STRUCTURES FOR ALL STORMS AND ALTERNATES

XSECTION/ STRUCTURE ID	DRAINAGE AREA (SQ MI)	STORM NUMBERS..... 3
XSECTION 134	1.00	
ALTERNATE 1		1305.95
XSECTION 135	.04	
ALTERNATE 1		72.26
XSECTION 136	.07	
ALTERNATE 1		113.55
XSECTION 137	.08	
ALTERNATE 1		85.47
XSECTION 138	.27	
ALTERNATE 1		384.43
XSECTION 139	3.05	
ALTERNATE 1		1887.47
XSECTION 140	.54	
ALTERNATE 1		558.49
XSECTION 141	.44	
ALTERNATE 1		341.50
XSECTION 142	.25	
ALTERNATE 1		196.23
XSECTION 143	3.52	
ALTERNATE 1		1899.54
XSECTION 144	.13	
ALTERNATE 1		113.39