5062 North 19th Avenue
Phoenix, Arizona 85015
(602) 242-2999

CELLA BARR
ASSOCIATES

JAN 9 1989

January 4, 1989

DRL JRM WCJ
NJN
D K
AMB CDC
FILE

Mr. Jim Morris, P.E., Supervisor
Flood Management Section
Arizona Department of Water Resources
15 South 15th Avenue
Phoenix, Arizona 85007

Re: Flood Insurance Re-Study
Hydrologic Analysis - Cave Creek Wash
CBA File No. 04856-05-74

Dear Mr. Morris:

Cella Barr Associates submitted a Hydrologic Analysis report for Cave Creek Wash to you and selected other governmental agencies on October 13, 1988 and solicited your comments and input. We have reviewed all comments received regarding the submitted report and have made a number of revisions to the hydrologic information presented therein. Revisions resulting from significant comments and/or suggestions are described below:

1. Information gained from field observations made by hydrologists from the Flood Control District of Maricopa County during the October 14, 1988 storm that impacted the Cave Creek Wash drainage area has resulted in minor refinements to sub-drainage areas and flow paths in the northern portion of the study area (between Glendale Avenue and Dunlap Avenue).

2. A canal along the 23rd Avenue alignment south of the Arizona Canal, that contributed flow to 23rd Avenue during the October 14, 1988 storm, has been incorporated into the HEC-1 hydrologic model. A flow rate of 15 cfs was estimated to overtop the canal at 23rd Avenue (based on a discharge estimated from a 3 foot head above the crown of the inlet structure at the upstream junction box less the discharge estimated from a 2 foot head above the crown of the inlet structure at 23rd Avenue). Fifteen cfs was incorporated into the model for the affected sub-drainage area as base flow.

3. A field survey was performed at the Durango exit of the I-10 Freeway along the access road to more closely tie down effective weir crest elevations in this area. This field survey determined the average weir crest elevation to be 1057.5 feet. An elevation of 1058.5 feet was previously used in the HEC-1 program, based on an interpretation of available topography, to model outflow from the I-10 impondment. Input data has been corrected to reflect the lower, more accurate elevation.

4. A survey of the 19th Avenue underpass at the I-10 Freeway was conducted to more accurately determine if 19th Avenue acts as a spillover outfall from the I-10 impondment. Based on the new HEC-1 routing using a revised weir crest elevation of 1057.5 feet at the Durango curve, a water surface elevation of 1059.05 feet was obtained for the I-10 impondment. CBA's field survey determined that a lowest elevation of 1058.9 feet exists at the east gutter of the 19th Avenue underpass. Given the negligible amount of spillover outfall that 0.15 feet of flow in the east gutter of 19th Avenue would represent, it was not included in the HEC-1 model.

5. Two pumping stations (not previously modeled) exist in the depressed portion of the I-10 Freeway (at Van Buren Street and at Buckeye Road) and have a pump capacity of 24,000 gpm (or 53.5 cfs) each, according to the Arizona Department of Transportation report entitled, "Pump House Study Black Canyon Freeway (I-17), Buckeye Road to Deer Valley Road", 1975. The pump stations service an area of the freeway that is below the elevation of the Durango exit, and thus, their outflow from the system has been included in the updated HEC-1 model.

6. HEC-1 input on the RS records was changed so that the value in field one was set equal to (reach length/average velocity)/time interval.

7. Table 6 of the report was revised to show corrected values for the 1974 estimates of the 100-year discharge for Cave Creek Wash developed by the U.S. Army Corps of Engineers.

8. Minor nomenclature and title adjustments were made to specific figures and tables in the report for added clarity.

The results of the above revisions have been incorporated into the tables and figures included within the revised attached Hydrologic Analysis report. The revised 100-year discharges represented on the updated version of Figure 4 will be used as a basis for hydraulic analyses of Cave Creek Wash and selected tributary flow paths.

Thank you for your review of the submitted Hydrologic Analysis for Cave Creek Wash. If you have any questions reqarding any aspect of the Cave Creek Wash Re-Study, please do not hesitate to contact our office.

Sincerely,

CELLA BARR ASSOCIATES

James H. Nelson, P.E.
Project Manager

cc: Mr. Ray Lenaburg, Project Officer, FEMA
Mr. John Wise, CBA
Mr. Pat Ellison, CBA

JHN00213.74L\ef

Registered Professional Engineer
CERTIFICATE NO.
20327
JAMES H. NELSON
Date Signed 1.4.89
ARIZONA, U.S.A.

ASSIGNMENT SHEET	1 / 10 / 89 ~~88~~
TO	

☐ PROJECT	☐ PRIORITY
☐ COORDINATION	☐ IMPORTANT
☐ FOLLOW-UP	☑ LOW PRIORITY
☑ REVIEW LEVEL ☑1 ☐2 ☐3	☐ IF POSSIBLE

TARGET DATE 1 / 27 / 88

ASSIGNMENT STATEMENT

Review as necessary

1. How Valid is the Reduction of drainage area on flood irrigated areas to store 100% of 100 year precip. (Page 10) & 4.6

2. Routing Reaches - width and "n" values are problems in industrial areas - & State Capitol area - Supporting Documentation is needed to support "n" by reaches.

2/4/88 Memo Prepared -

2/21/88 Copy to Amir & George

G

MANAGEMENT STYLE				COMPLETED
☐ DIRECTING	☐ COACHING	☐ SUPPORTING	☑ DELEGATING	___ / ___ / ___

MAR

DEPARTMENT OF WATER RESOURCES
ENGINEERING DIVISION
FLOOD MANAGEMENT SECTION

MEMORANDUM

TO: James R. Morris, P.E.

FROM: David E. Creighton, Jr.

DATE: February 15, 1989

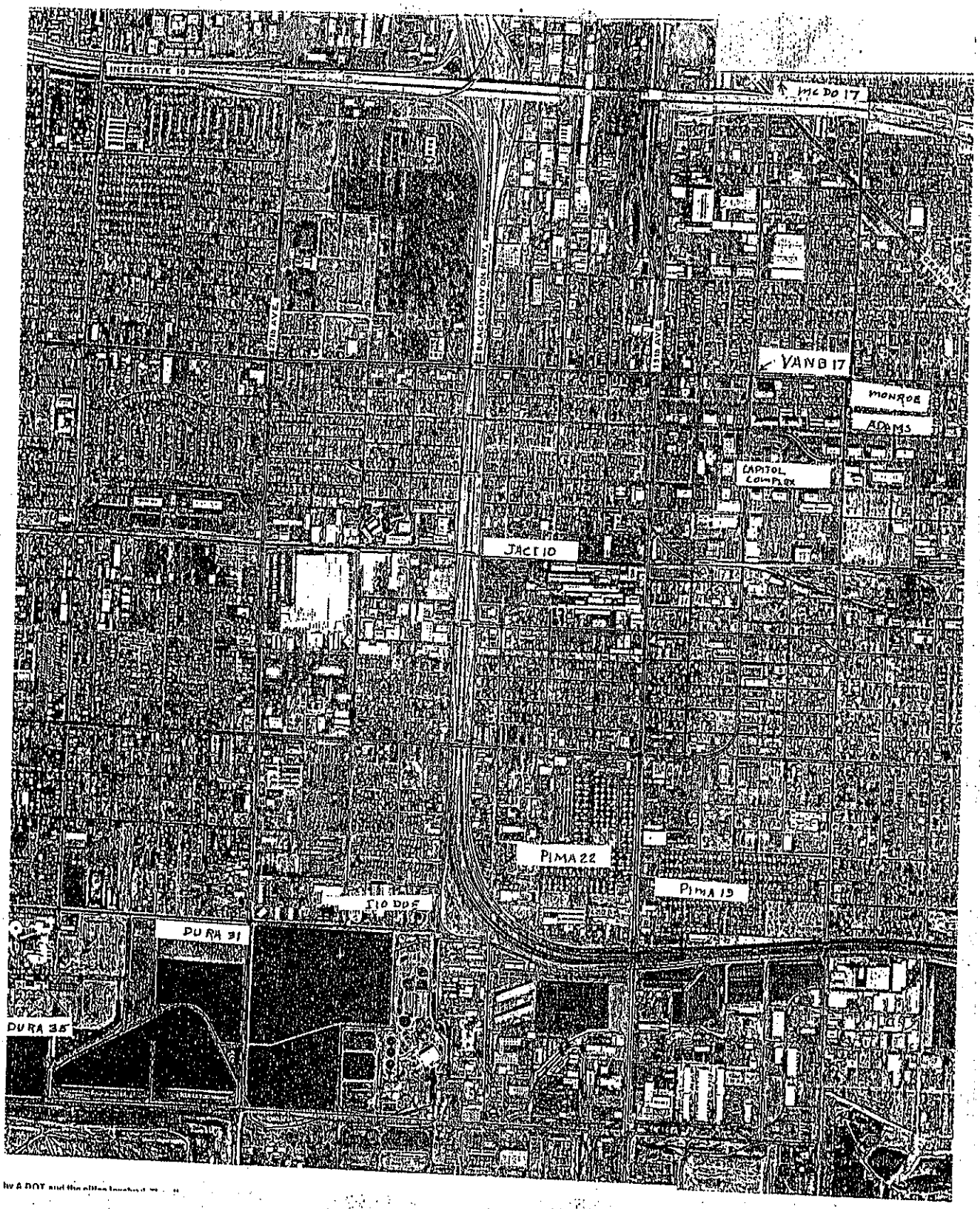
SUBJECT: Review of CBA January 4, 1989 Flood Insurance Re-study Hydrologic Analysis - Cave Creek Wash.

The following segments should be more adequately documented or revised.

Section 2.0 Watershed description should clearly indicate the gross watershed area (252 square miles at the Dunlap USGS gaging station site instead of in excess of 150 sm), the downstream area (30± sm) and the discounted drainage area attributed to the assumed 100-year storage on irrigated lot subdivisions (Sections 9.3 Drainage area and 4.6 Detention/Retention, pp-8, 10 and 11). The burying of the discounting methodology carried through this report is easily lost from the review process. It is a basic assumption and should be documented clearly early in the text. With the continuing conversion of interior metropolitan area residential zones into commercial or multi-housing units, and the water reduction goals of ground water management, the validity of 100-year on lot retention needs to be presented and documented in order for the paper trail to be adequate for the indeterminate future next Re-study.

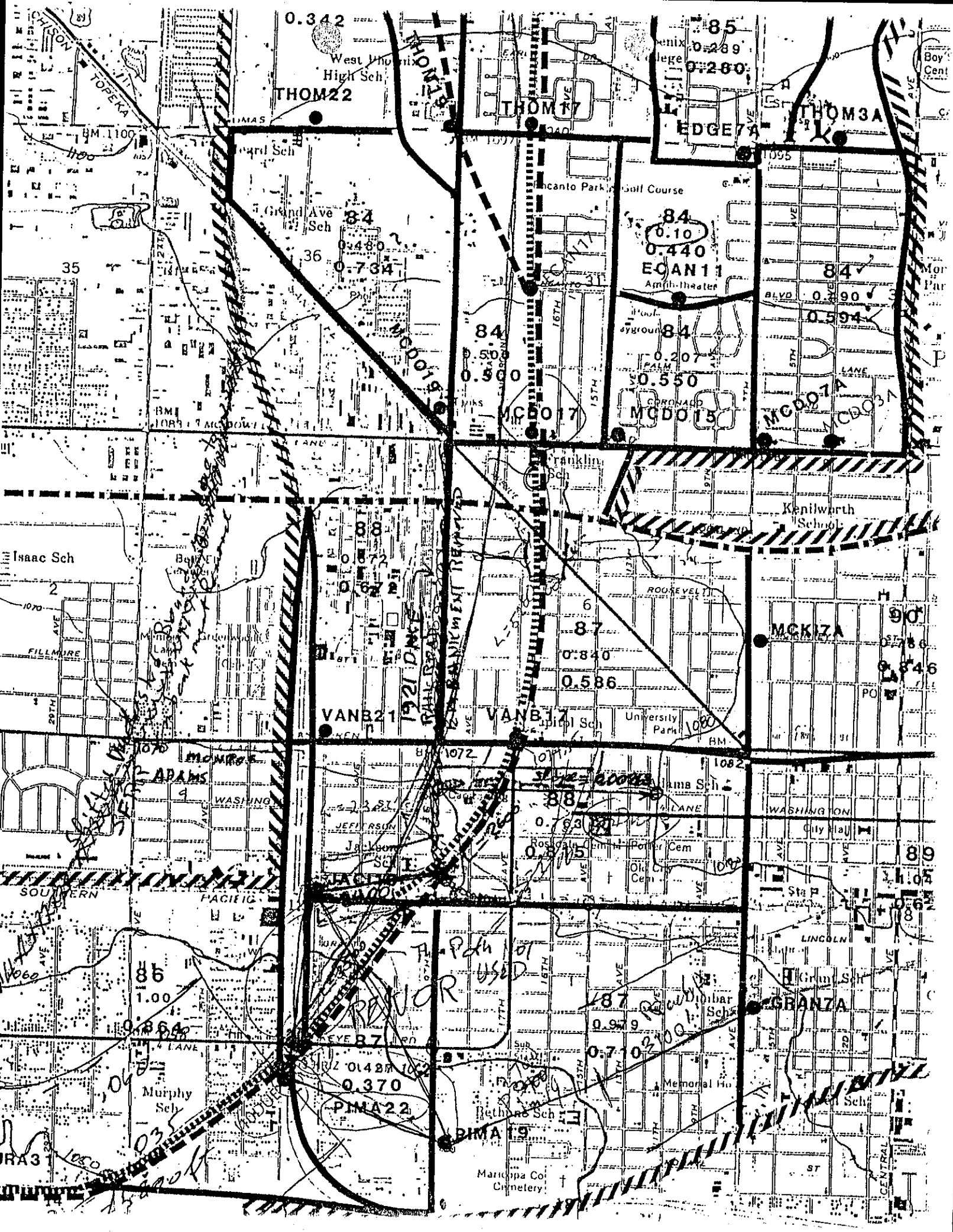
The January 4, 1989 letter comment No. 6 about RS cards, field one, shows that there is apparent adequate length to more properly configure the Reach cross-sections and "n" values.

The routing from VANB17 to JACI10 and then the translation to a reservoir routing at PIMA22 and I10DUE has several problems with apparent logic, flow path geometry, and friction factor components. This 5000' model length flow path needs to be configured as 5-1000' subreach elements in order to appropriately recognize the restricted flow prisms created by large building complexes, occupied parking lots, and landscaping topographic modification of elements known to exist by common knowledge, specially when not shown on obsolete quad sheets. A marked copy of the quad sheet and a recent (1988) aerial photograph show the complexity involved in model simulation. All reaches need to be properly evaluated - such as THOM17 to MCDO17, MCDO17 to VANB17, VANB17 to PIMA22, I10DUE to DURA31, DURA31 to DURA35. The 3500 ft. wide MCDO17 - VANB17 reach has a particularly large and numerous building impedance factor on the overbank areas beyond the 60 ft. wide main channel.



by ADOT and the other [illegible]

Scale: Approximately 1:24,000


THOM22
THOM17
EDGE7A
THOM3A
ECAN11
MCD017
MCD015
MCD07A
MCD03A
MCK17A
VANB21
VANB17
GRANZA
PIMA22
PIMA19
0.342
0.280
0.480
0.734
0.500
0.550
0.594
0.586
0.840
0.622
0.364
0.370
0.710
0.979
West Phoenix High Sch
Grand Ave Sch
Encanto Park Golf Course
Amph-theater
Franklin Sch
Kenilworth School
Isaac Sch
Roosevelt Sch
University Park
Capitol Sch
Adams Sch
Jackson Sch
Lincoln Sch
Grant Sch
Dunbar Sch
Memorial Ho
Bethune Sch
Murphy Sch
Maricopa Co Cemetery
Southern Pacific
Fillmore
Washington
Jefferson
Lincoln
Central
Thomas
Van Buren
Monroe
Adams
Roosevelt
Path not USED
RENOR

Documentation is needed to display the "n" values and in reconciling the gross channel width to a net channel area prism and "n". The indicated depth of flow may be increased under net area conditions.

The flow path (model width 2850' for Reach A) from Van Buren - 17th Avenue down and across the Capitol Complex and then to JACI10 and PIMA22 as illustrated on Figure 3 and 4 and modeled through Reach A (First Reach) and 2nd Reach is about as divorced from reality or reasonable approximation as possible. The broad 2850' wide by 3.5' maximum depth dished section with n=0.035 for channel (w=1170') and overbank also completely ignores the significant solid barrier effects of the 4' above street level solid parking lot screening wall on Monroe from about 16th to 19th Avenues. (2000' long less about 400 ft. of openings), the numerous and lengthy accumulative office buildings barrier on Adams, the Bolin Plaza elevated parking and landscaping, the House, Senate, Capitol and Capitol Annex Buildings, and the landscaping barrier walls and enclosures. To further complicate reality, the East-West slope of 0.00263 as occurs on Van Buren, Adams, Monroe and Washington is dominant over the North-South slope of 0.00135 along 17th Avenue, or 0.0016 along 15th Avenue. Documentation is needed to support the Reach cross-section.

With lowering of the Santa Fe Railroad tracks along 19th Avenue from 6-Points (McDowell Road, 19th and Grand Avenues) the barrier is no longer present which historically trained the Cave Creek flood into the Capitol basement. The westerly shift from 17th Avenue of the primary (Figure 3) flow channel will be influenced by the large industrial-warehouse complexes between 16th and 19th Avenues north of Roosevelt. Documentation for the Figure 3 alinement rather than the topographic depression is needed.

The solid barrier impedances of multiple buildings within the modeled flow path will be particularly critical when properly modeled for HEC-2 using detailed topography. Critical review of the HEC-2 output needs to be made and recycled back through the HEC-1 model with a possible westerly channel shift and revised "n" factors.

The attached sketch sheet depicts at the top the Reach A cross-section of 2850' width, and below are approximate profiles of impeding structures along the south side of Monroe, and the north side of Adams streets from 15th to 19th Avenues. As the Reach A cross-section is assumed to have equal elevations at the left and right ends, so the Adams and Monroe sketches are drawn. A supplemental line for the elevation grade between 15th and 19th Avenues is drawn below the Adams Street profile. This 7.5' difference applicable to the northern part of Reach A illustrates the dominant grade which will apparently relocate the trough of the flow path about ¼ mile to the west of that depicted on Figure No. 3.

For the 2nd Reach to JACI10 (CBA assumed at SPRR crossing of I-10) the large block of warehouses between 19th and 21st Avenues will further reinforce the westward shift from the historic 1921 flood flow path which had been constrained by the then existing SFRR track embankment.

The reservoir routing assumed appropriate for the flows combined from JACI10, PIMA19, and PIMA22 by trans-location rather then routing contains some undocumented data for reservoir area and elevation. The spillway discharge

Corr Creek FIS Rt Study
Review of.

CAVE CREEK

2/14/89

Scale: H = 1" = 500'
V = 1" = 5'

VANB17 to JACI10

Reach A

First Reach to Jackson/I 10

RC, RX & RY CARDS

Lines 1410-1412

ANL 0.035 — ANCH 0.035 Assumed — ANR 0.035

17th Ave. ℄ Floodpath

RY Card

East — RX. Card — West.

Monroe

15th Ave. — 16th Ave. — 17th Ave. — 18th Ave. — 19th Ave.

Church — Parking Lot Cars — Wall — Parking Wall — Lot Wall

Adams Street ℄ — Grade ±

Adams

office Bldg — office Bldg — Church Bldg — office Bldg — 350± office Bldg — office Bldg — Wall — Bldg — Parking Lot w/ cars — Service Bldg — Fenced Parking Lot w/ cars

Adams Slope
E - W = 0.00263
W 2850 * S = 7.5 ft
Elevation Difference = 7.5 ft.

Grade of Adams Street
S = 0.00263

Reach A with Slope Correction

Grade Adjustment -2.05

-1.73 — -3.08 — -3.23 — -4.08 — -4.01 — -4.08 — -4.00 — -5.26 — -6.58 — -7.50

780 — 1230 — 1550 — 2000 — 2500 — 2850

weir data showing SPWID=500 appears improper due to the configuration of the Durango Exit off ramp. There appears from scaled aerial photographs that it is not possible to locate a 500' wide discharge crest normal to the indicated flow path. The HEC-2 model results using detailed topographic data needs to be checked and the HEC-1 model revised. Supporting discussion and further documentation is needed for spillway width, skew angle, and crest coefficient.

The routing from I10DUE to DURA31, then to DURA35 needs to be reviewed for adequacy of "n" values for the area through Murphy School, adjoining subdivision housing, automobile junk yards areas, and especially the Maricopa County complex of the Maricopa County Flood Control District, Highway Department, Juvenile Court and other detention facilities.

State of Arizona

DEPARTMENT OF WATER RESOURCES

15 South 15th Avenue, Phoenix, AZ 85007

. Governor
. Director

LETTER OF TRANSMITTAL

To: Amir Motamedi
3335 W. Durango St.
~~Maricopa County Flood Control District~~
Phoenix AZ 85009

Date: 2-21-89

File Name:

Attention:

Greetings:
We are sending you the following items by:

___ Drawings ___ Prints ___ Plans ___ Samples
X Copy of Letter ___ Change Order ___ Specifications
X Other

Copies	Date	Description
1	2-15-89	Review of CBA 1-4-89 Cave Creek Wash - Re-Study -
1		Percolation Loss Rates in Channels - Reference Chart

These are transmitted as checked below:

___ For approval ___ Approved as submitted ___ For instruction
X For your use ___ Approved as noted ___ Resubmit ___ copies for approval
___ As requested ___ Returned for corrections ___ Return ___ corrected prints
___ For review & comment

Remarks from the Percolation Data and reference, the USCE 0.2"/hr appears too low when applied to short duration storm type studies - such as 24 hr. Centennial Wash.

Copy To: George Goitom
BAKER ENGRS
1420 KING ST. 6th Floor
Alexandria, VA 22314

Signed: [illegible]
Engineering Division
Flood Management Section
(602) 542-1541

Think Conservation!

Office of Director 255-1554
Administration 255-1550, Water Resources and Flood Control Planning 255-1566, Dam Safety 255-1541,
Water Rights Administration 255-1581, Hydrology 255-1586.

HYDROLOGIC ANALYSIS OF CAVE CREEK WASH IN THE CITY OF PHOENIX, MARICOPA COUNTY, ARIZONA

FOR

FEDERAL EMERGENCY MANAGEMENT AGENCY

October 13, 1988
Revised January 5, 1989

CELLA BARR ASSOCIATES

HYDROLOGIC ANALYSIS OF CAVE CREEK WASH IN THE CITY OF PHOENIX, MARICOPA COUNTY, ARIZONA

FOR

FEDERAL EMERGENCY MANAGEMENT AGENCY

October 13, 1988
Revised January 5, 1989

RECEIVED
JAN 9 1989
ENGINEERING DIV.

Prepared by:
Patrick J. Ellison
James H. Nelson

Cella Barr Associates
5062 North 19th Avenue
Phoenix, Arizona 85015
(602) 242-2999

Registered Professional Engineer
CERTIFICATE NO.
20327
JAMES H. NELSON
Date Signed 1-5-89
ARIZONA, U.S.A.

CBA File No. 04856-05-74

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2. SCHEMATIC DIAGRAM OF DRAINAGE MODEL

3. SUBDRAINAGE AREA MAP

4. LOCATION MAP OF PROPOSED DISCHARGES

APPENDIX

HEC1 INPUT/OUTPUT DATA

HYDROLOGIC ANALYSIS OF CAVE CREEK WASH

IN THE CITY OF PHOENIX, MARICOPA COUNTY, ARIZONA

1.0 INTRODUCTION

Cella Barr Associates (CBA) has been contracted by the Federal Emergency Management Agency (FEMA) to perform a detailed Flood Insurance Re-Study of Cave Creek Wash and selected local tributaries within portions of the City of Phoenix, Arizona. The study reaches comprise a total of roughly 23.5 stream miles commencing downstream (or south) of the Arizona Canal Diversion Channel (ACDC) and continuing downstream to the confluence with the Salt River (Figure 1). The purpose of the overall re-study is to delineate flood zones associated with the 100-year storm event along the study reaches, taking into consideration the effects of the ACDC and I-10 Inner Loop construction. It is presently proposed that a floodway be delineated for the downstream reach of the primary flow path in the area below the Grand Canal due to the fact that significant consolidation of local flow paths occurs below this location.

This report provides estimates of 100-year peak discharges at key points of concentration along the stream reaches under investigation. The reported discharges are proposed to be utilized for subsequent hydraulic analyses that will determine water surface elevations and flood zones.

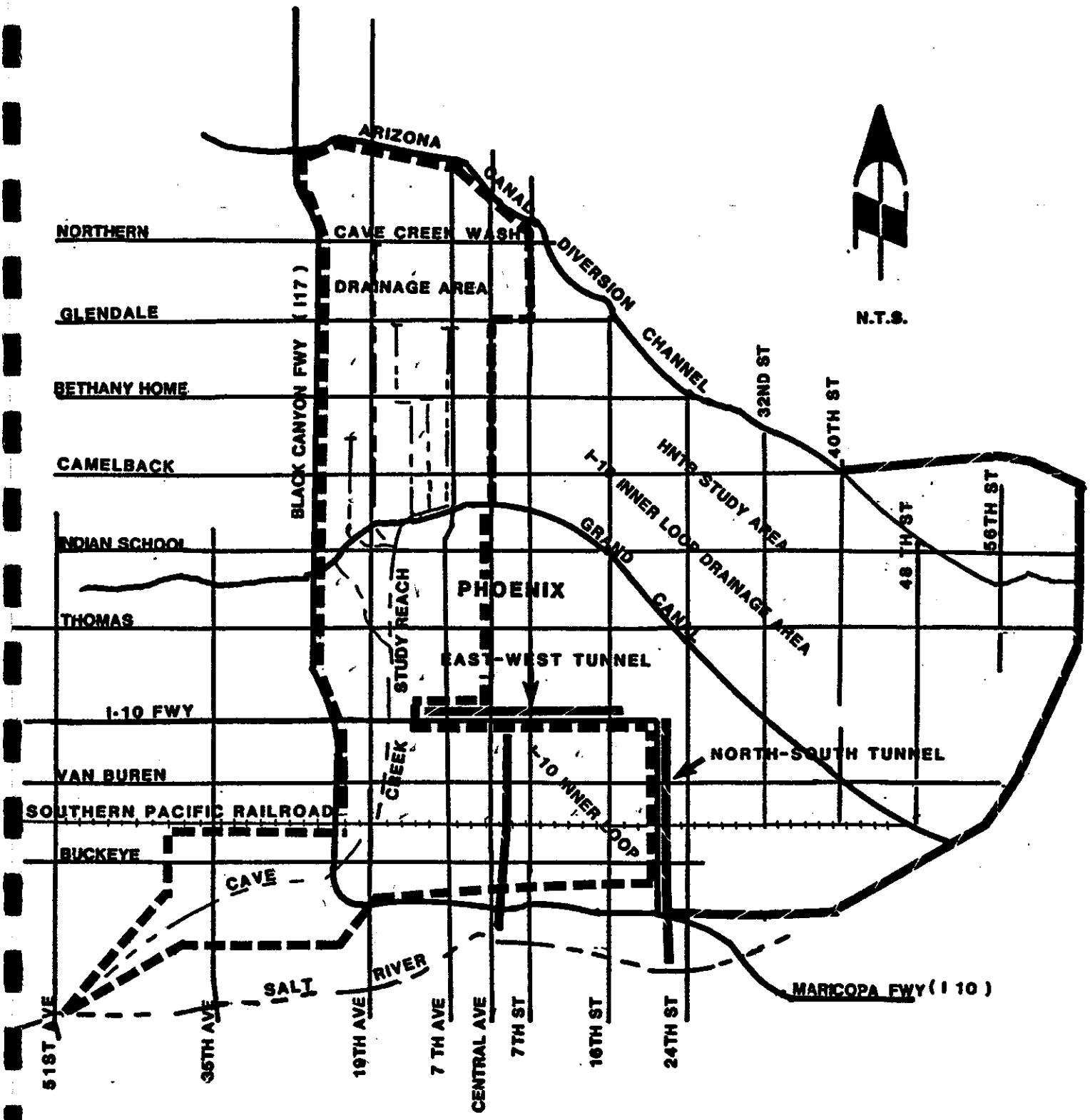

FIGURE 1: LOCATION MAP

2.0 WATERSHED DESCRIPTION

The overall drainage area for the study reach of Cave Creek Wash and its local tributaries (Figure 1) extends south from the ACDC near Dunlap Avenue to the Salt River near 51st Avenue. The western boundary in part is defined by the Black Canyon Freeway (I-17). Eastern and northeastern boundaries are defined by the I-10 Inner Loop and Central Avenue. Some spillover into the primary Cave Creek Wash watershed also occurs along Central Avenue north of the I-10 Inner Loop and is derived from urban watersheds to the east. From I-17 to the Salt River, the drainage boundaries are defined by topographic highs and the Southern Pacific Railroad. The overall drainage area (excluding spillovers from adjacent easterly watersheds) encompasses approximately 30 square miles at the Salt River.

Cave Creek Wash has historically existed as a regional flooding source having a significant impact on large urbanized areas in the City of Phoenix. The ACDC flood control project, currently under construction, will eliminate runoff contributions from the entire watershed upstream of Dunlap Avenue. (The upstream watershed incorporates an area in excess of 150 252 square miles.) The ACDC flood control project is designed to intercept and convey surface flow from the Phoenix Mountains and Cave Creek Wash northwesterly to New River. The channel is designed for the 100-year flood event (Reference 1 and 10). The current planned schedule for completion of the ACDC calls for all reaches to be constructed by September of 1991 (Reference 2). The northern limits of the study drainage area are based on the ACDC being in place. Thus, Cave Creek Wash essentially becomes a local flooding source as opposed to a regional flooding source downstream of the ACDC project.

@ Dunlap Gage Station is 252 sm

The I-10 Inner Loop, presently under construction, passes through the current Cave Creek study area. Several years ago, the Arizona Department of Transportation (ADOT) contracted Howard Needles Tammen and Bergendoff (HNTB) to develop a hydrological model for the drainage area that would affect the I-10 Inner Loop and to establish the drainage design for this freeway. HNTB

incorporated two (2) major drainage tunnels to intercept drainage flow from the I-10 Inner Loop drainage area represented on Figure 1 and convey it to the Salt River (References 3, 4 and 5). The drainage tunnels have a 50-year capacity, extend along the upstream side of the freeway, and are presently in place. The western boundary of the HNTB watershed contributing to the drainage tunnels corresponds for the most part with the eastern boundary of the drainage area currently being studied in detail by CBA for Cave Creek Wash. Surface flow along the western boundary of the HNTB study area that is not conveyed to and collected by the drainage tunnels or the depressed freeway itself spills into the Cave Creek Wash watershed. The I-10 Inner Loop Freeway is elevated on support columns between the west limit of the depressed segment and I-17 to allow the primary flow derived from the Cave Creek Wash watershed to pass unimpeded under the freeway as surface flow. The effect of the I-10 Inner Loop and its drainage design on the Cave Creek Wash discharges is discussed in greater detail in a subsequent section of this report.

The Cave Creek Wash drainage area is characterized by gentle topographic relief, with urban development being prominent north of the I-17 curve at Durango Street (Durango Curve) and a mixture of urban development and agricultural land use being prominent downstream to the southwest of the Durango curve. Topographic relief ranges from land slopes of 0.45% in the northern portion of the drainage area to 0.10% in the southern portion. Residential development characterizes approximately 70% of the urbanized area with commercial and industrial development comprising approximately 30%. The land use in the southernmost portion of the drainage area is predominantly agriculture.

Cave Creek Wash below the ACDC is ill defined. The natural or historic flow path has been altered and/or obstructed by urban development. Canals, major streets, freeways, buildings, irrigated areas, fences and railroads effect surface runoff and play a major role in the present characterization of the watershed and conveyance of surface flows.

3.0 PREVIOUS STUDIES

Previous studies pertaining to Cave Creek Wash have been prepared for floodplain information, drainage design purposes and flood control projects by the U.S. Army Corps of Engineers, Arizona Department of Transportation, HNTB and the Federal Emergency Management Agency. These studies are listed in the Reference section of this report. Other studies have been prepared relevant to local development and for the purpose of documenting the occurrence of certain historical flooding events. The majority of previous hydrologic studies are now irrelevant to the post ACDC study reach as the ACDC has completely altered the characteristics of the downstream watersheds receiving its flood control benefits. Accordingly, 100-year discharges proposed per this study have been appreciably lowered, when compared to earlier studies that did not account for the ACDC project construction.

Flood control projects that have affected the discharges along Cave Creek Wash are Cave Buttes Dam and the ACDC. The I-10 Inner Loop has also significantly affected these discharges. A summary of previously determined discharges for concurrent reaches along Cave Creek Wash are listed in Table 6 for comparison with the results of this study.

4.0 HYDROLOGIC ANALYSIS

4.1 *Introduction*

A hydrologic model has been developed as a basis for this study using the U.S. Army Corps of Engineers' HEC-1 Flood Hydrograph Package (Reference 13) for the purpose of determining 100-year discharges at selected locations. The model defines a series of subdrainage areas that are connected by common flow paths. Flow paths are controlled by topography and/or urban improvements (roads, canals, freeways, railroads, etc.) that alter the normal topographic flow path. Incorporated in the model are characteristics of urban development such as storm drains, detention basins and irrigated areas that would influence the estimated peak runoff and hydrograph characteristics. A schematic diagram of the drainage model is presented on Figure 2.

See Square mile figures on Fig 3

Input components required for the HEC-1 program to model the hydrology of the Cave Creek Wash drainage area are precipitation time distribution, drainage area, curve numbers that reflect drainage area characteristics, time of concentration, flow path characteristics for routing flow (geometry and slope of flow path), Mannings roughness coefficients, and rating curves for storm drains and flow diversions.

4.2 *Precipitation Time Distribution*

Gauged natural rainfall or discharge data is not available for the study reach. A synthetic precipitation time distribution for the area was obtained from the City of Phoenix Storm Drain Design Manual, Subdivision Drainage Design (Reference 14). The 100-year 24-hour storm was used to estimate discharges for Cave Creek Wash (Table 1). It is assumed that this precipitation time distribution occurs simultaneously over the entire drainage area.

TABLE 1

RAINFALL TABLE
(Percent total rainfall/100 by 0.5 hour increments for 24 hour storm)

.000	.004	.008	.013	.018
.022	.026	.031	.035	.040
.044	.048	.053	.057	.062
.066	.071	.075	.080	.093
.107	.120	.14	.17	.50
.83	.86	.88	.893	.907
.92	.924	.928	.933	.937
.942	.947	.951	.956	.96
.964	.969	.973	.978	.982
.987	.991	.995	1.00	1.00

PHOENIX WBO RECORDS*
(24-hour duration storm)

Return Periods, Years	Precipitation, Inches
1	1.02
2	1.44
5	2.10
10	2.53
25	3.12
50	3.57
100	4.04

* Technical Memorandum WBTM WR-44

Source: City of Phoenix, "Storm Drain Design Manual, Subdivision Drainage Design, 1985.

4.3 *Drainage Area*

To estimate discharges at concentration points along the study reaches and along tributary flow paths that contribute surface runoff to the study reaches, the overall drainage area was divided into 52 subdrainage areas (Figure 3). Boundaries of subdrainage areas are defined by topography, major streets, the Grand Canal, Interstate Freeways and railroads. Subdrainage area boundaries were estimated based on field investigation, reviews of plans and studies for specific street and drainage systems, and a review of available topographic mapping.

3 sheets

4.4 *Curve Numbers*

The City of Phoenix has determined SCS curve numbers (CN) for various hydrologic soil groups for urban areas based on zoning classifications (Reference 14). Table 2 lists curve numbers with associated zoning classifications and soil types used in this study. Type B soil occurs throughout the study area (Reference 15). For subdrainage areas in which more than one zoning classification occurs, a weighted CN was calculated. Subdrainage areas and associated curve numbers are displayed on Figure 3.

4.5 *Time of Concentration*

Time of concentration is defined by the SCS to be the time required for runoff to travel from the hydraulically most distant point of the drainage area to the collection point.

For subdrainage areas in which surface flow is conveyed by roads, velocities were determined by using the City of Phoenix gutter flow graph (Reference 14). The estimated street flow velocity was obtained by using the velocity determined from the graph for full gutter flow.

TABLE 2

CURVE NUMBERS BY ZONING FOR USE WITH SCS OR TR-20 METHODS OF DETERMINING RUNOFF IN THE CITY OF PHOENIX

ZONING	Hydrologic Soil GROUP B	GROUP C	GROUP D
RE-43) S-1)	77	83	86
RE-35	79	84	87
RE-25	79	84	87
E1-18	80	84	87
R1-14	80	85	88
R1-10	81	85	89
R1-8	82	87	90
R1-6	84	88	90
R-3	85	88	90
R-4) R-40) R-5)	86	89	91
A-1) A-2)	85	91	93
C-1) C-2) C-3)	92	94	95
CO	88	91	93
PSC	95	95	95
HR	95	95	95
R4A	87	90	92
Hillside (over 10%) sloping.	98	98	98

Source: City of Phoenix, "Storm Drain Design Manual Subdivision Drainage Design, 1985.

For subdrainage areas in which surface flow is not conveyed by roads, velocities were estimated by the SCS method for shallow concentrated flow (Reference 16 and 17).

The HEC-1 program utilizes lag time as one of the components to generate an SCS synthetic unit hydrograph. Lag time may be estimated as a percentage of time of concentration for watersheds with an approximated uniform distribution of runoff using the following relationship (Reference 16):

$$L = 0.6\ Tc$$

L = Lag time
Tc = Time of concentration

4.6 *Detention/Retention*

Some of the subdrainage areas include various forms of stormwater detention/retention that further attenuate the discharge derived from them. These features include irrigated residential lots and formal stormwater detention/retention basins. Typically, a four to six inch high berm surrounds the outer boundary of an irrigated residential lot. It has been assumed that the bermed area will retain a 100-year precipitation event, and therefore will not contribute to surface runoff (Reference 5 and 6). Irrigated lots were identified by field investigation and mapped on aerial photographs. In some residential areas the berms have not been maintained or have been destroyed, and these areas were not included in the groups having the ability to retain a 100-year precipitation event. Areas that were identified as being capable of containing a 100-year precipitation event were simply deleted from the total area of a given subdrainage area. The remaining contributing peripheral area within these irrigated residential lots consists of sidewalks, streets, driveways and portions of roof tops. The percentage of contributing area per zoning classification for flood irrigated lots was estimated by HNTB in their study of the I-10 Inner Loop drainage (Reference 4 and 5) and is presented in Table 3 along with associated curve numbers. These values were used in this study.

TABLE 3

CURVE NUMBERS AND NON-RETENTION PERCENTAGES FOR FLOOD IRRIGATED LOTS[2]

Zoning Class	Regular CN	Flood Irrigated Lots Un-retained %[1]	CN for Unretained Areas[1]
RE-43	77	10.7	95
RE-35	79	12.2	95
RE-24	79	14.9	95
R1-18	80	18.1	95
R1-14	80	21.2	95
R1-10	81	23.3	95
R1-8	82	25.3	95
R1-6	84	29.6	95

[1]*Sidewalks, driveways, rooftops, etc.*

[2]*Howard Needles Tammen Bergendoff, "Inner Loop Storm Drain Summary Report, Interstate 10, Phoenix - Casa Grande Highway, 15th Avenue to Maricopa T.I."*

4.7 Flow Path Characteristics

Surface runoff within the Cave Creek Wash drainage area north of the Grand Canal was determined to generally follow major streets, not the historical flow path of Cave Creek Wash. This is due to the effective elimination of upstream watershed flows via construction of the ACDC. Streets that convey flow within primary subdrainage areas are 7th Avenue, 11th Avenue, 15th Avenue, 17th Avenue, 19th Avenue, 21st Avenue, 23rd Avenue and Central Avenue. A portion of the surface flow being conveyed along north - south streets often spills into adjacent areas at residential and major street intersections. The spillover flow is primarily conveyed along major east-west streets to adjacent primary flow paths.

Below the Grand Canal, runoff generally concentrates within the topographic low area that defines the historic centerline of Cave Creek Wash. At 19th Avenue and the Southern Pacific Railroad (roughly 1/2 mile south of Van Buren Street) flow is diverted and conveyed westerly along the railroad, spilling into the depressed portion of I-17. Runoff is ponded within and upstream of I-17 at the Durango Curve. Ponded outflow to the west occurs as weir flow at the southbound Durango Street exit of I-17. The Southern Pacific Railroad lacks sufficient freeboard to be considered as a flood control stucture by FEMA, and thus, the worst case between a with/without railroad condition must also be evaluated. Under the without railroad condition, primary watershed flow continues south for an additional roughly 1/2 mile and spills into the same depressed segment of I-17. After sufficient filling of the I-17 freeway, flow will spill to the west as weir flow at the same location as for the with railroad condition.

Below the Durango curve, the runoff spilling to the west from the depressed segment of I-17 follows topographic lows through predominantly agricultural and light industrial land use areas to the Salt River.

Was it?

4.8 *Flow Routing Methods*

Normal depth storage routing and reservoir routing methods were used to route flows through the overall watershed. Flow path cross-section data for the HEC-1 routing component was obtained from aerial photographs, detailed topography, as-built plans of roadways, field observations and field surveys. Storage capacities of detention basins (i.e., ponding behind the Durango curve and within the adjacent depressed segment of I-17) were determined from topographic maps.

Mannings roughness coefficients for routing reaches were estimated from field observations and adjusted for urban areas. A method developed by H.R. Hejl (Reference 18) was used to adjust roughness coefficients. Roughness coefficients for streets were adjusted upward to 0.020 per the instruction of FEMA's Project Officer to account for the likelihood of traffic and/or parked cars impeding the conveyance of runoff during the 100-year flood.

4.9 Diversion Methods

The diversion component of the HEC-1 program was used to model split flow at major intersections and the effect of storm drain capacities on discharges from subdrainage areas. Input data required for the diversion component of the program include rating curves that relate the diverted outflow to upstream inflow. Rating curves for split flow were determined using Mannings equation to estimate the depth of the upstream inflow for a given discharge and the weir equation ($Q=CLH^{3/2}$) to estimate diverted outflow for a given inflow. Storm drain base maps were obtained from the City of Phoenix to identify the storm drainage network that would affect the surface runoff from a particular drainage area. Only major storm drain lines (trunk lines) were taken into consideration (lines greater than 36"). Full flow storm drain capacities were estimated from the pipe diameter and average reach slope obtained from as-built plans. The capacity of the trunk line intercepting surface flows via an upstream gathering

system for a subdrainage area or flow path was diverted from surface flow at collection points or diversion points. For each storm drain diversion, a rating curve was determined to relate surface inflow to diverted storm drain outflow.

4.10 Spillover From I-10 Inner Loop Drainage Area

A simplified, approximate procedure was utilized to model spillover from the I-10 Inner Loop drainage area into the Cave Creek Wash drainage area between Northern and Camelback Roads along Central Avenue. One hundred year input hydrographs were estimated from HNTB 50-year peak discharges depicted in Reference 4 (appropriate hydrographs were not available for the HNTB study area). At a few selected concentration points within the I-10 Inner Loop drainage area, the HNTB study depicts both 50- and 100-year peak discharges as shown on Table 4. These identified HNTB discharges for the HNTB 50-year event range between 76 to 82 percent of the HNTB 100-year event. Hence, at spillover points where only 50-year discharges are provided in the HNTB study, the HNTB 50-year peak discharges were increased 1.2 times as a means of estimating the applicable magnitude of the 100-year discharges. Simplified hydrographs were then generated for the spillover discharges into the Cave Creek Wash drainage area using peak times previously derived for immediately adjacent subdrainage areas. Through a series of diversion and routing routines, input hydrographs for each spillover discharge were incorporated into the Cave Creek Wash drainage model.

TABLE 4

OFFSITE DISCHARGES FOR EAST-WEST LEG OF I-10 INNER LOOP*

Concentration Point	50-year' Discharge cfs	100-year' Discharge cfs	Percent of 100-Year Discharges For the 50-year Event
20th Street	232	283	82
16th Street	257	318	81
12th Street	277	358	77
7th Street	637	708	81
Central Avenue	549	678	81
7th Avenue	954	1,231	77
15th Avenue	597	779	76
Total	3,503	4,435	

* From Reference 4

4.11 *Effects of I-10 Inner Loop Drainage System*

Two major drainage collection and conveyance networks (Figure 1) have been constructed for the I-10 Inner Loop drainage system. These networks are designed to collect surface runoff for the 50-year storm (References 3, 4 and 5).

The east-west drainage tunnel network collects surface runoff north of the Inner Loop between 20th Street and 15th Avenue and conveys the flow to the Salt River via a 21 foot diameter conduit. In order to mitigate the potential for backwater impacting areas north of the I-10 loop for events greater than the 50-year storm, emergency overflow routes were designed. Surface runoff in excess of the 50-year storm spills into the depressed segment of the freeway by flowing into grated overflow structures, down access ramps, and through openings in the retaining/noise barrier wall (Reference 3). During a 100-year storm, the actual discharge will exceed the capacity of the designed drainage network by approximately 932 cfs, under a conservative assumption that discharges are addative (Table 4). The estimated storage capacity of the depressed portion of the Inner Loop is 59,200,000 cubic feet (Table 5). At a rate of 932 cfs it would take 17.6 hours (assuming a constant rate of inflow) to exceed the estimated storage capacity of the depressed segment of the Inner Loop. Pump stations servicing the depressed portion of the Inner Loop at Third Avenue, Third Street and Sixteenth Street are designed to accommodate a 50-year onsite peak inflow, and collectively the pumps have the capacity to deliver 533 cfs to the drainage tunnel network (Reference 5). The time required for flow to exceed the storage capacity of the Inner Loop during a 100-year event, considering that the pump stations remain in operation and that 533 cfs may enter the system downstream of the main inlets is 41.2 hours (assuming a constant rate of inflow). In our professional opinion, with or without the mitigative impact of the pump

Bad Logic!

stations, the 100 year event would need to have an unrealistically excessive duration and peak to exceed the overall capacity of the system, including storage. Thus, the east-west portion of the Inner Loop drainage system acts as a drainage boundary to the Cave Creek Wash drainage area.

TABLE 5

ESTIMATED STORAGE CAPACITY OF
DEPRESSED PORTION OF I-10 INNER LOOP FREEWAY
BETWEEN 11TH AVE. AND 20TH ST.

Length in feet	Width in feet	Depth in feet	Volume in cubic feet
14,800[1]	200[2]	20[3]	59,200,000

1 Measured from U.S.G.S. Topo Base.
2 Edge of pavement to edge of pavement.
3 Estimated in field.

The north-south tunnel network collects surface flow east of the Inner Loop alignment between Bellview Street and the Maricopa Freeway and conveys the flow to the Salt River. The north-south alignment of the loop is raised with overpasses at Van Buren Street, Washington Street, Jefferson Street, the Southern Pacific railroad tracks, Buckeye Road and Mohave Street. For storm events greater than the 50-year designed storm event, surface flow will pass under the overpasses into a portion of the Cave Creek Wash drainage area at HNTB collection points located at Van Buren Street and Washington Street. The 50-year HNTB peak discharges at Van Buren and Washington Streets are a product of approximately 40 subdrainage basins encompassing approximately 10 square miles. Fifty-year discharges of 1061 cfs and 935 cfs are reported for collection points at Van Buren Street and Washington Street, respectively. One hundred-year discharges for these collection points were not determined by HNTB, however, we have estimated

(based on the data presented in Table 4) that the 50-year discharge is approximately 81% of the 100-year discharge. Thus, the difference between the 100-year and 50-year discharges at Van Buren and Washington Streets are 246 cfs and 219 cfs, respectively. These flows would pass into the Cave Creek Wash drainage area and follow a flow path predominately along the Southern Pacific Railroad tracks to CBA collection point LINC7S. The time to peak for the 100-year discharges at Van Buren and Washington Streets (for an overall drainage area of greater than 10 miles) would be significantly longer than the time to peak for subdrainage area LINC7S (drainage area of 1.8 square miles). Also, the entire portion of the hydrographs having discharges less than the 50-year event would be non-contributory to the Cave Creek Wash drainage area as they will be collected in the north-south tunnel. Hence, it is our opinion that the combined peak overflow at Van Buren Street and Washington Street will sufficiently lag behind the peak flow at LINC7S and Cave Creek Wash downstream such that it will not contribute to the peak flow determined for Cave Creek Wash.

5.0 RESULTS

Results of the HEC-1 hydrologic modelling for the Cave Creek Wash drainage area are presented in the runoff summary portion of the HEC-1 computer program output located in the Appendix. Proposed discharges for the study reaches are shown on Figure 4.

For comparative purposes, the results of preceding studies and the results from this study are presented in Table 6 for discharges along Cave Creek Wash at the Arizona Canal (same location as ACDC), Grand Canal, Buckeye Road, and the confluence with the Salt River. Obviously, there are significant differences between previously established discharges and values currently proposed due to the flood control benefits associated with the ACDC.

The U.S. Army Corps of Engineers 1977 report (Reference 8) is the only previous study that reports discharges for Cave Creek Wash below the ACDC with the effect of the ACDC construction being considered. The 1977 report estimates 100-year discharges at the Grand Canal and at Buckeye Road of 6,300 cfs and 14,000 cfs, respectively. The current study has estimated 100-year discharges of 1,185 cfs and 2,796 cfs at approximately these respective locations. The gross discrepancies between these sets of values are explained as follows:

1. The U.S. Army Corps of Engineers used a single linear reservoir model for sheet flow to perform cursory estimates of discharges at selected concentration points. The model relates basin storage to outflow and a proportionality factor. The proportionality factor relates time of concentration to rainfall intensity and basin slope, length and roughness. At any time, basin storage is equal to the summation of rainfall excess less the volume of outflow. The model assumes a uniform distribution of basin characteristics and that sheet flow is characteristic of surface runoff in

the drainage area. This is not the case in the Cave Creek drainage area due to urban development that has altered the natural topography. Surface runoff is typically concentrated and conveyed within streets to street intersections and topographic low areas. Hence, uniform sheet flow throughout the drainage area does not occur.

2. The drainage area for the U.S. Army Corps of Engineers' 1977 study is approximately twice the area determined in this study. The difference in drainage areas is due to boundary locations (effect of I-10 Inner Loop and associated drainage design that was not conceived at the time of the 1977 study) and the reduction of drainage area in this study induced by taking into consideration the effect of irrigated lots.

The discharges represented on Figure 4 are proposed to be utilized for subsequent hydraulic evaluations of the study reaches and the determination of floodplain limits, floodway limits, and flood zones.

TABLE 6
COMPARISON OF REPORTED
100-YEAR PEAK DISCHARGE VALUES
FOR CAVE CREEK WASH

Location	Study Report	Reported Discharge cfs	Remarks
Cave Creek Wash at Arizona Canal and ACDC	U.S. Army COE 1974	39,000	1
	U.S. Army COE 1982	16,000	2
	FEMA 1984	13,000	3
Cave Creek Wash at Grand Canal	U.S. Army COE 1974	38,000	1
	U.S. Army COE 1977	6,300	4
	FEMA 1984	12,400	3
	FEMA (This Study)	1,237+	5
Cave Creek Wash at Buckeye Road	U.S. Army COE 1974	35,000	1
	U.S. Army COE 1977	14,000	4
	FEMA (This Study)	(2,219 D)* (2,523 U)*	5
Cave Creek Wash at Salt River	FEMA 1984	10,900	3
	FEMA (This Study)	2,257	5

1. Future urbanized conditions without flood control projects.
2. Revised (1982), future urbanized conditions with Cave Buttes Dam in place.
3. With Cave Buttes Dam in place. ACDC not constructed.
4. Future urbanized conditions with flood control projects in place, including ACDC, excluding I-10 Inner Loop.
5. Present conditions with flood control projects in place, including ACDC and I-10 Inner Loop.

\+ Cave Creek Wash at Indian School Road.

* D = Downstream of Durango Exit (I-10 Freeway Southbound)
U = Upstream of Durango Exit (I-10 Freeway Southbound)

JHN00132.74T\ef

REFERENCES

1) U.S. Army Corps of Engineers, "Gila River Basin, Phoenix, Arizona and Vicinity (including New River), Arizona Canal Diversion Channel, 40th Street to Cactus Road (including Cudia City Wash Sediment Basin, Cave Creek Sediment Basin and Cave Creek Channel), Design Memorandum No. 12", April, 1986.

2) U.S. Army Corps of Engineers, "Written Communication with Carl F. Enson (Chief of Engineering Division)," April 4, 1988.

3) Arizona Department of Transportation, Highways Section, "Final Drainage Design Report, Phoenix-Casa Grande Highway, Maricopa County, Project No. I-10-3 (158) P.E.," October 1987.

4) Howard Needles Tammen & Bergendoff, "Final Drainage Concept Report, Phoenix I-10 Inner Loop, 15th Avenue to 21st Street, 21st Street to Maricopa Freeway," 1983.

5) Howard Needles Tammen & Bergendoff, "Inner Loop Storm Drain Summary Report, Interstate 10, Phoenix-Casa Grande Highway, 15th Avenue to Maricopa T.I.".

6) U.S. Army Corps of Engineers, "Gila River Basin, New River and Phoenix City Stream, Arizona Design Memorandum No. 2 Hydrology Part I, 1974.

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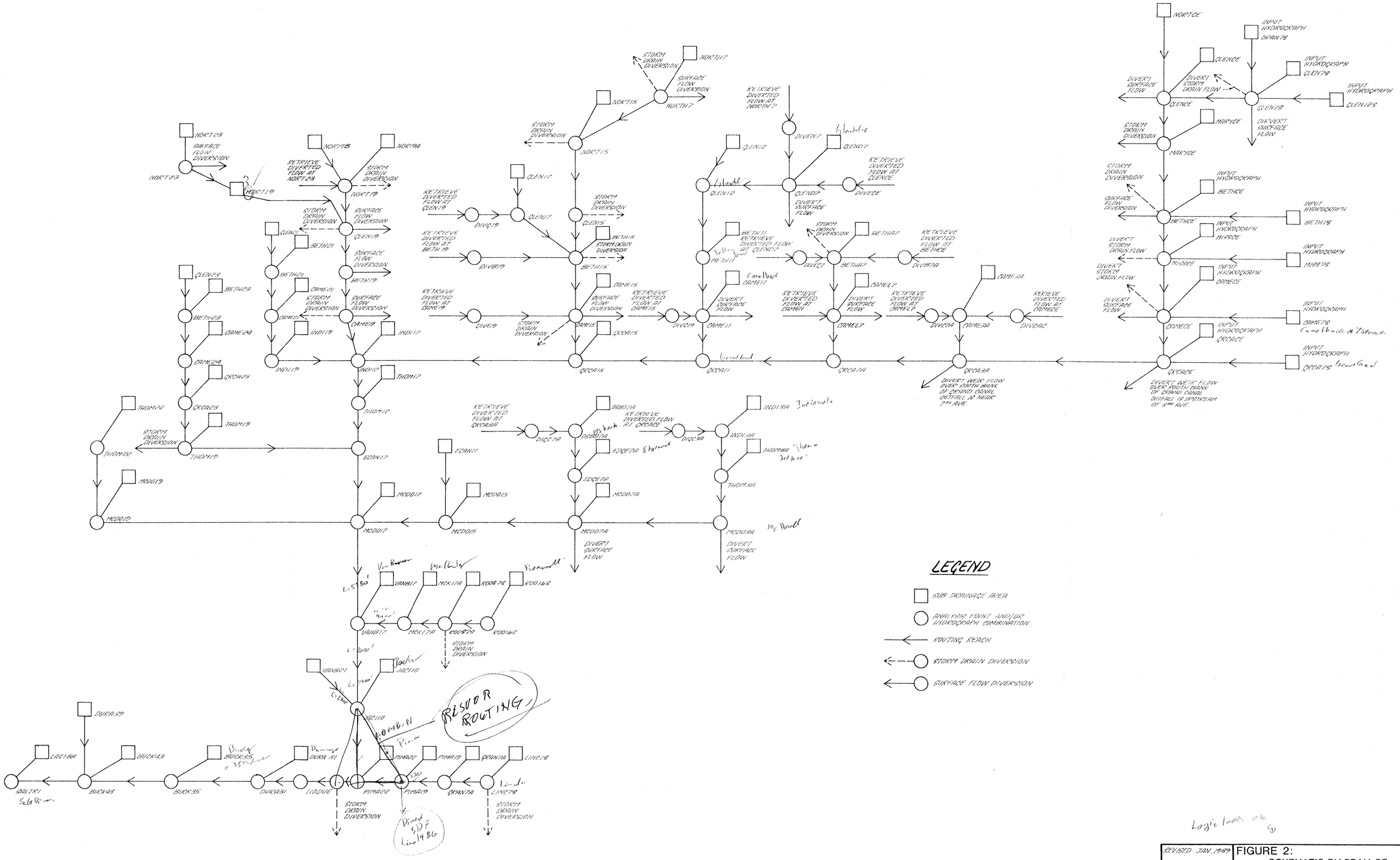

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FIGURE 2:
SCHEMATIC DIAGRAM OF DRAINAGE MODEL CAVE CREEK WASH

JOB NO. 04856-05

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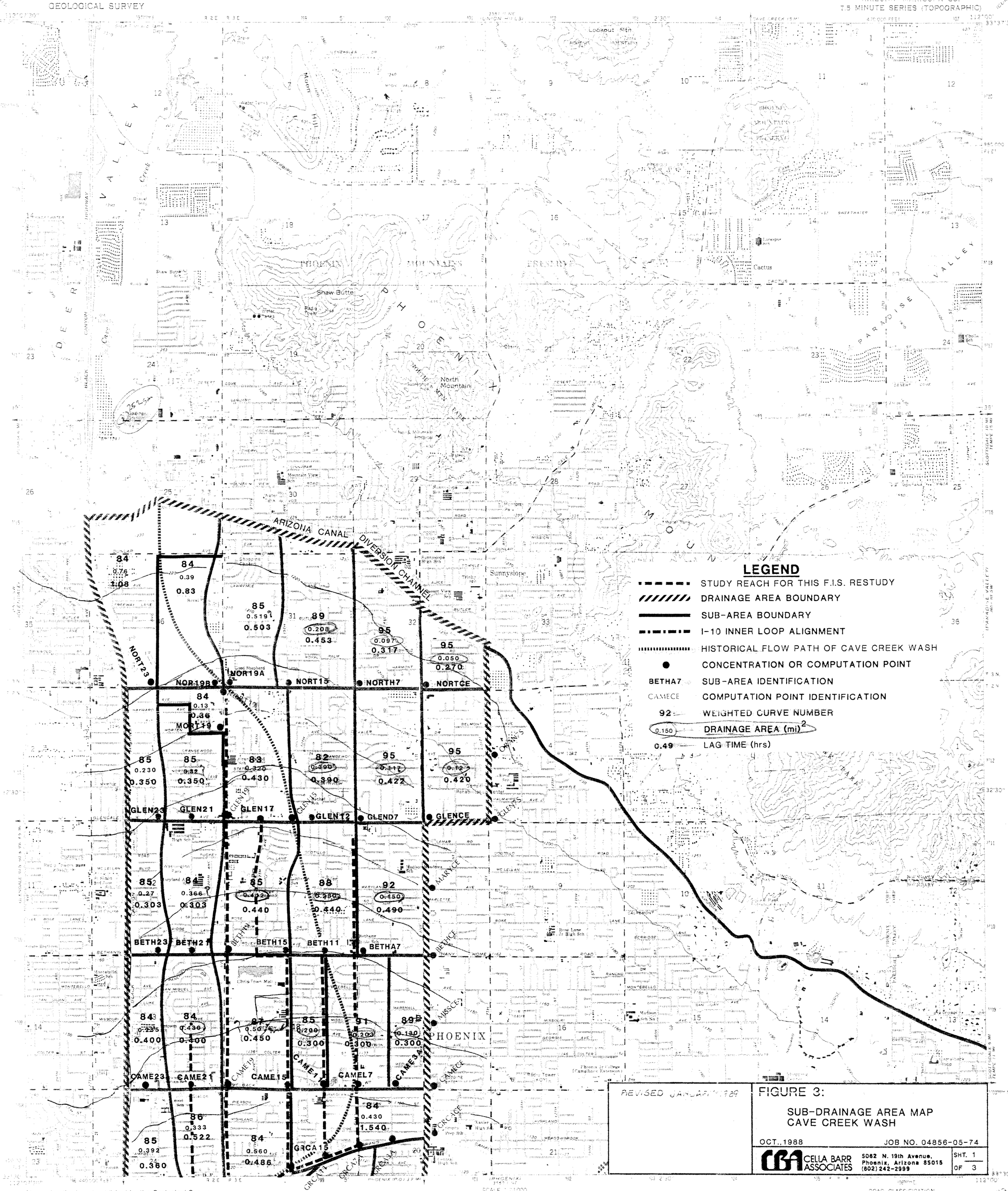

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FIGURE 3:
SUB-DRAINAGE AREA MAP
CAVE CREEK WASH

OCT., 1988 JOB NO. 04856-05-74

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ROAD CLASSIFICATION

Primary highway, all weather, hard surface — Light duty road, all weather, improved surface

Secondary highway, all weather, hard surface — Unimproved road, fair or dry weather

Interstate Route — U. S. Route — State Route

SUNNYSLOPE, ARIZ.
N3530—W11200/7.5

1965

DMA 3551 II SE SERIES V892

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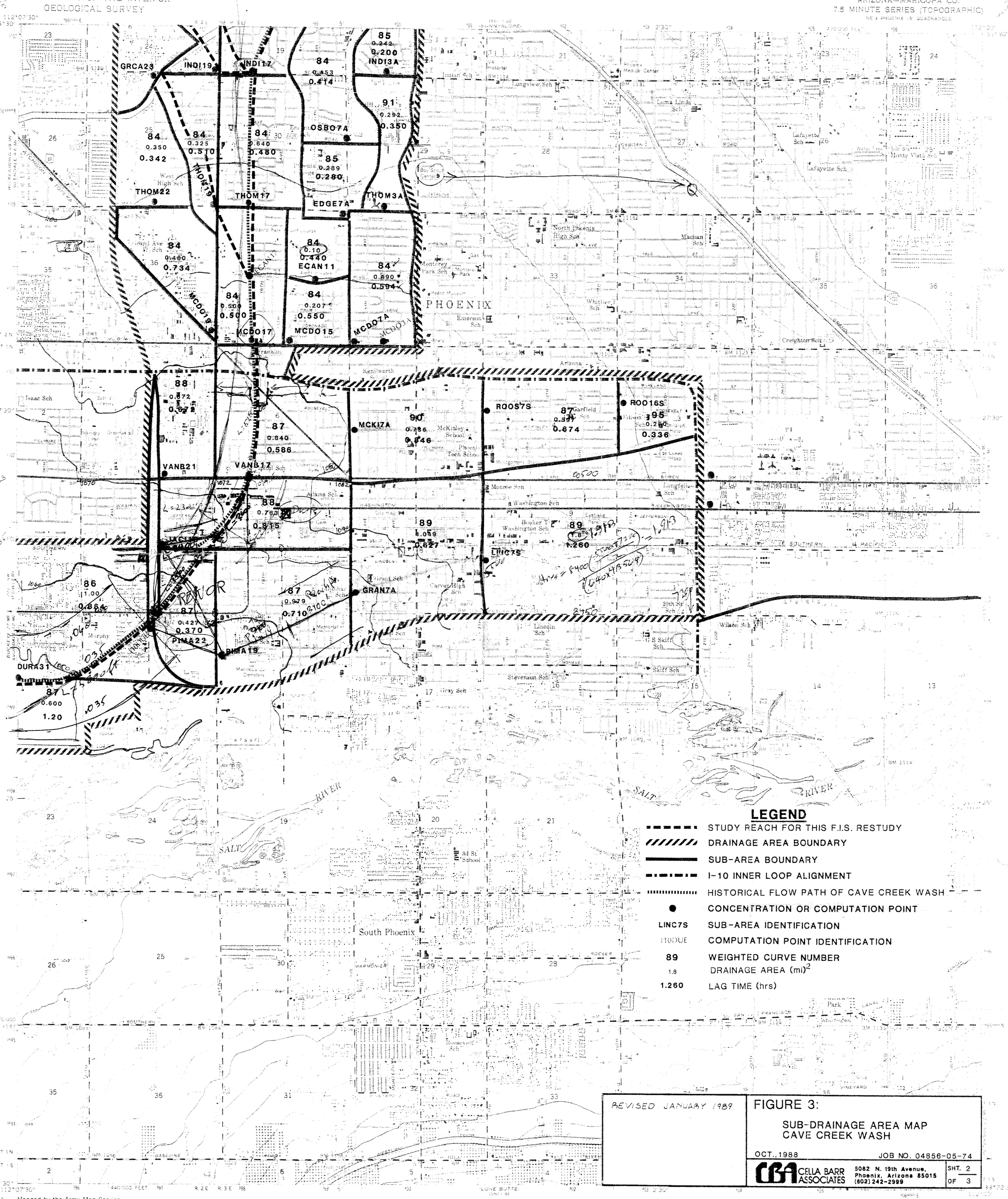

LEGEND

- STUDY REACH FOR THIS F.I.S. RESTUDY
- DRAINAGE AREA BOUNDARY
- SUB-AREA BOUNDARY
- I-10 INNER LOOP ALIGNMENT
- HISTORICAL FLOW PATH OF CAVE CREEK WASH
- ● CONCENTRATION OR COMPUTATION POINT
- LINC7S — SUB-AREA IDENTIFICATION
- I10DUE — COMPUTATION POINT IDENTIFICATION
- 89 — WEIGHTED CURVE NUMBER
- 1.8 — DRAINAGE AREA $(mi)^2$
- 1.260 — LAG TIME (hrs)

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FIGURE 3:

SUB-DRAINAGE AREA MAP
CAVE CREEK WASH

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QUADRANGLE LOCATION

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ROAD CLASSIFICATION
Heavy-duty — Light-duty
Medium-duty — Unimproved dirt
Interstate Route — U. S. Route — State Route

PHOENIX, ARIZ.
NE/4 PHOENIX 15' QUADRANGLE
N3322.5—W11200/7.5

1952

DMA 3550 I NE-SERIES V898

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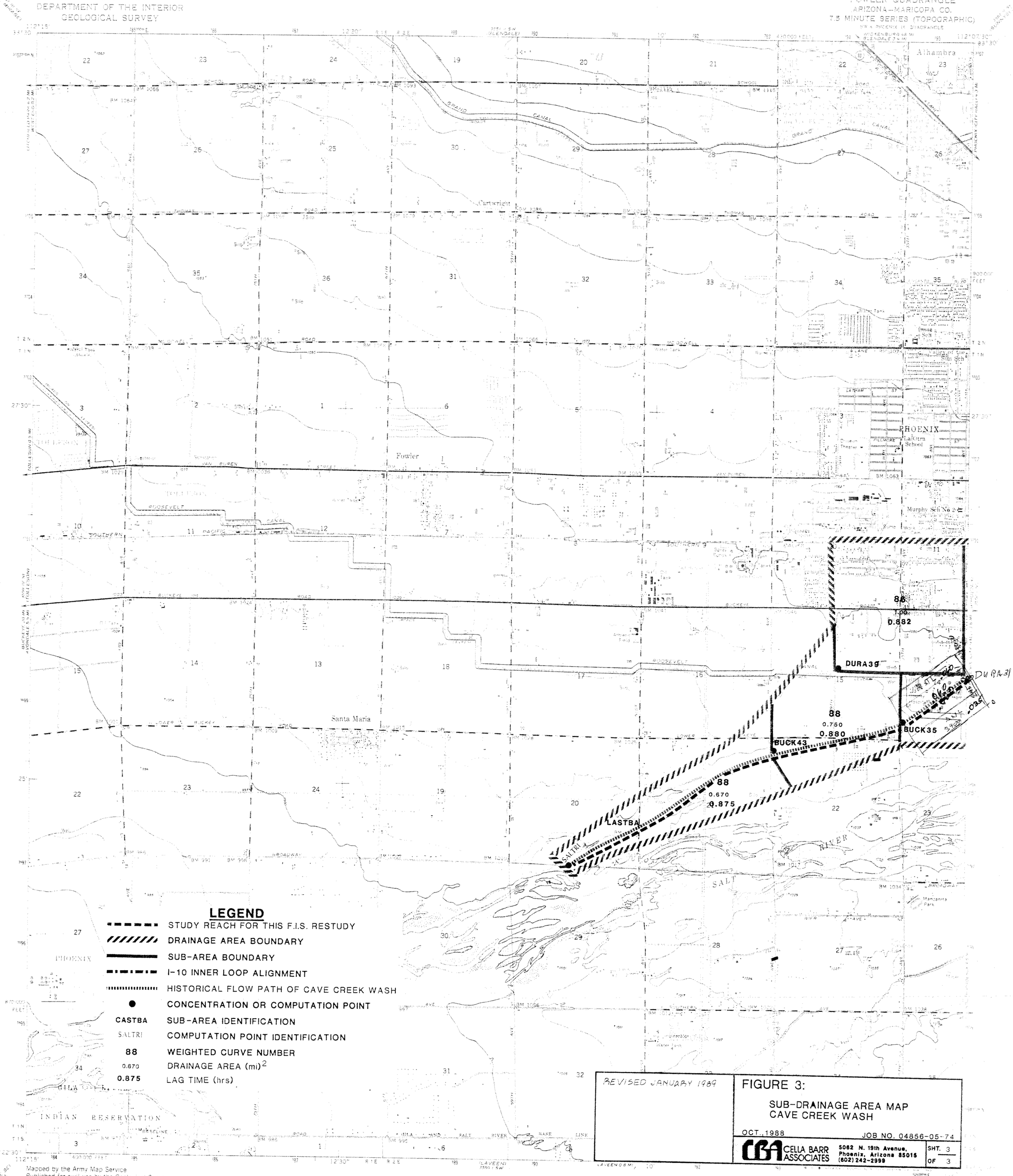

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FIGURE 3:
SUB-DRAINAGE AREA MAP
CAVE CREEK WASH

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QUADRANGLE LOCATION

ROAD CLASSIFICATION
Heavy-duty — Light-duty
Medium-duty — Unimproved dirt
U.S. Route — State Route

FOWLER, ARIZ.
NW/4 PHOENIX 15' QUADRANGLE
N3322.5—W11207.5/7.5

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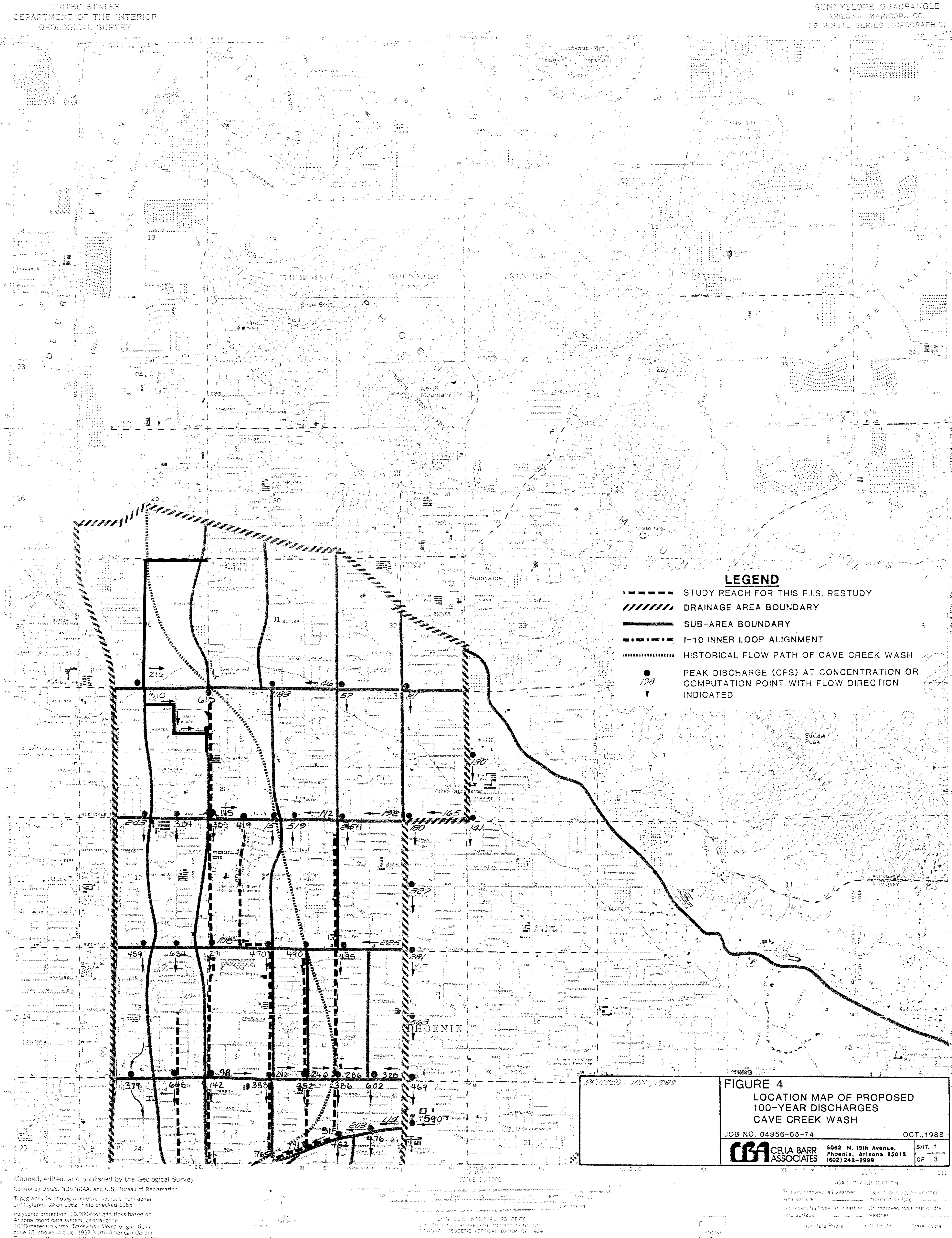
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LEGEND
STUDY REACH FOR THIS F.I.S. RESTUDY
DRAINAGE AREA BOUNDARY
SUB-AREA BOUNDARY
I-10 INNER LOOP ALIGNMENT
HISTORICAL FLOW PATH OF CAVE CREEK WASH
PEAK DISCHARGE (CFS) AT CONCENTRATION OR COMPUTATION POINT WITH FLOW DIRECTION INDICATED
198
REVISED JAN., 1989
FIGURE 4:
LOCATION MAP OF PROPOSED
100-YEAR DISCHARGES
CAVE CREEK WASH
JOB NO. 04856-05-74
OCT., 1988
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5062 N. 19th Avenue,
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OF 3
Shaw Butte
North Mountain
Squaw Peak
Sunnyslope
PHOENIX
Lookout Mtn
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CONTOUR INTERVAL 20 FEET
SUNNYSLOPE, ARIZ.
1965

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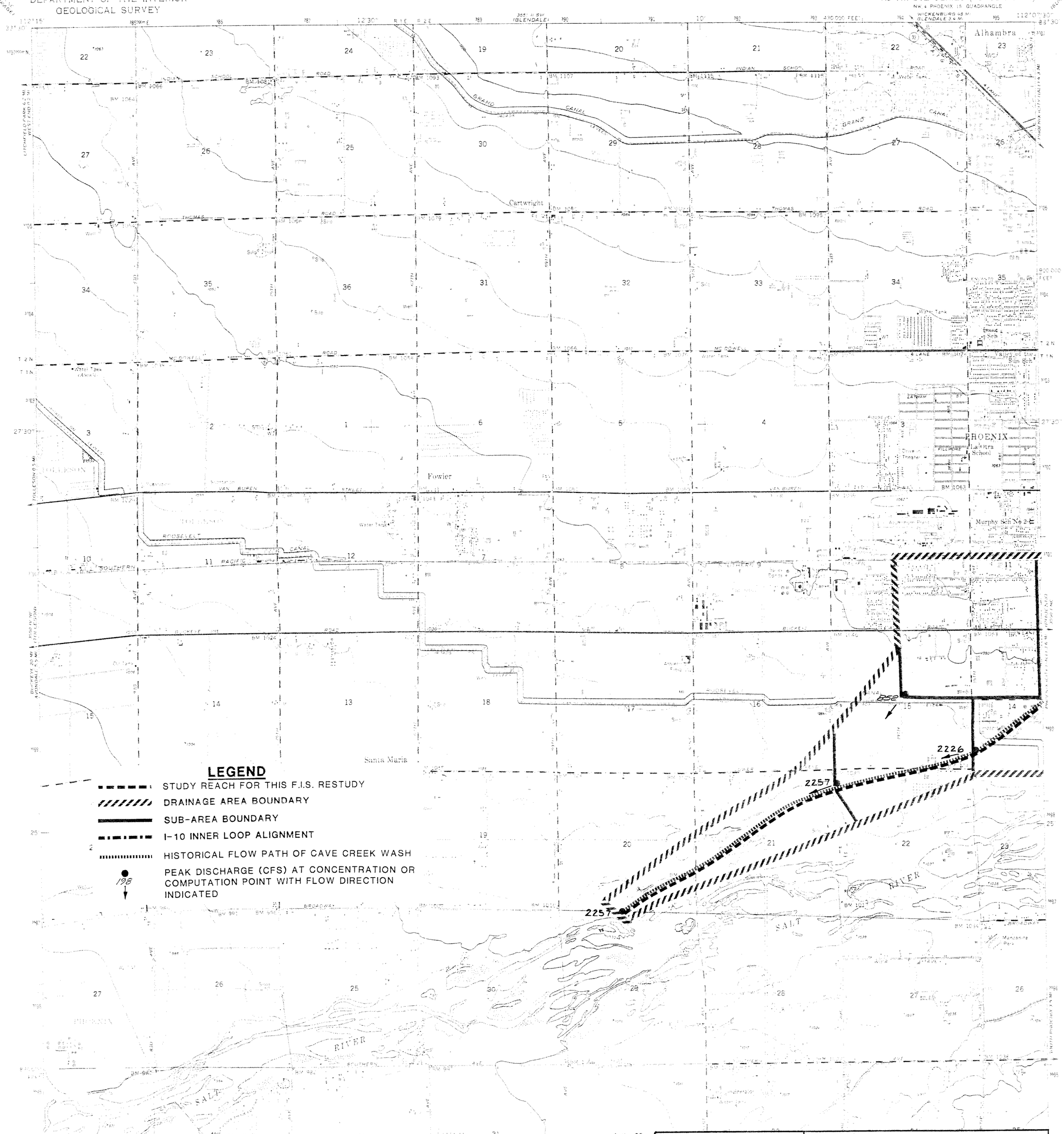

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FIGURE 4:
LOCATION MAP OF PROPOSED
100-YEAR DISCHARGES
CAVE CREEK WASH

JOB NO. 04856-05-74 OCT., 1988

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UTM GRID AND 1983 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

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NATIONAL GEODETIC VERTICAL DATUM OF 1929

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

QUADRANGLE LOCATION

ROAD CLASSIFICATION
Heavy duty — Light duty
Medium duty — Unimproved dirt
U. S. Route — State Route

FOWLER, ARIZ.
NW 4 PHOENIX 15' QUADRANGLE
N3322.5—W11207.5/7.5.

1952
PROVISIONAL EDITION 1962
DMA 3550 I NW—SERIES V899

APPENDIX

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************************************
*                                  *
*   FLOOD HYDROGRAPH PACKAGE (HEC-1)  *
*          FEBRUARY 1981           *
*         REVISED 01 APR 88        *
*                                  *
* RUN DATE 01/04/1989  TIME 13:37:01 *
*                                  *
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*                                  *
*    U.S. ARMY CORPS OF ENGINEERS  *
*  THE HYDROLOGIC ENGINEERING CENTER *
*         609 SECOND STREET        *
*      DAVIS, CALIFORNIA 95616     *
*         (916) 551-1748           *
*                                  *
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X     X  XXXXXXX   XXXXX          X
X     X  X       X     X        XX
X     X  X       X              X
XXXXXXX  XXXX     X       XXXXX  X
X     X  X       X              X
X     X  X       X     X        X
X     X  XXXXXXX   XXXXX        XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  1           ID        FEMA FLOOD INSURANCE        CAVE CREEK WASH      MODIFIED PULS
  2           ID        RE-STUDY FOR MARICOPA       JOB NO. 04856-05-74
  3           ID        COUNTY ARIZONA 1988         100- YEAR PEAK
              *DIAGRAM
  4           IT      10 16MAR88    1200     300
  5           IN      30 16MAR88    1200
  6           IO       5       0       0

  7           KK  NORTCE   BASIN COMPUTATION
  8           KM           SCS METHOD
  9           BA    0.05
 10           PB    4.04
 11           PC     0.0   0.004   0.008   0.013   0.018   0.022   0.026   0.031   0.035   0.040
 12           PC   0.044   0.048   0.053   0.057   0.062   0.066   0.071   0.075   0.080   0.093
 13           PC   0.107   0.120   0.140   0.170   0.500   0.830   0.860   0.880   0.893   0.907
 14           PC   0.920   0.924   0.928   0.933   0.937   0.942   0.947   0.951   0.956   0.960
 15           PC   0.964   0.969   0.973   0.978   0.982   0.987   0.991   0.995   1.000   1.000
 16           LS   0.105    95.0    00.0
 17           UD    0.27

 18           KK  GLENCE
 19           KM           ROUTING SURFACE FLOW FROM CENTRAL/NORTHERN TO CENTRAL/GLENDAL
 20           RS       1    ELEV       1       0
 21           RC   0.150   0.020   0.150  5280.0   0.005
 22           RX     0.0    0.01   100.0  100.01   140.0  140.01  239.99   240.0
 23           RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

 24           KK  GLENCE   BASIN COMPUTATION
 25           KM           SCS METHOD
 26           BA    0.12
 27           LS   0.105    95.0       0
 28           UD    0.42

 29           KK  GLENCE
 30           KM           COMBINE ROUTED FLOW WITH BASIN COMPUTATION
 31           HC       2

 32           KK  ORAN7S
 33           KM           INPUT HYDROGRAPH
 34           BA       0
 35           IN      10 16MAR88    1200
 36           OI       0       0       0       0       0       0       0       0       0       0
 37           OI       0       0       0       0       0       0       0       0       0       0
 38           OI       0       0       0       0       0       0       0       0       0       0
 39           OI       0       0       0       0       0       0       0       0       0       0
 40           OI       0       0       0       0       0       0       0       0     2.1     2.1
 41           OI     2.1     2.1     2.1     2.1     2.1     2.1     2.1     2.1     4.1     4.1
 42           OI     4.1     4.1     4.1     4.1     4.1     6.2     6.2     8.3     8.3    10.4
 43           OI    24.9    66.5   108.0   135.1   149.6   160.0   147.5   103.0    62.3    39.5
 44           OI    24.9    18.7    14.5     8.3     8.3     8.3     8.3     8.3     8.3     6.2
 45           OI     6.2     6.2     4.1     4.1     2.1     2.1     2.1     2.1     2.1     2.1
 46           OI     2.1     2.1     2.1     2.1     2.1     2.1     2.1     2.1     2.1     2.1
 47           OI     2.1     2.1     2.1     2.1     2.1     2.1     2.1     2.1     2.1     2.1
 48           OI     2.1     2.1     2.1     2.1     2.1     2.1     2.1     2.1     2.1     2.1
 49           OI     2.1     2.1     2.1     2.1     2.1     2.1     2.1     2.1     2.1     2.1
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 50           OI     2.1     2.1     2.1     2.1     2.1     2.1     2.1     2.1       0       0

 51           KK  ORAN7S
 52           KM           DIVERT STORM DRAIN FLOW
 53           OT  SDFO7S
 54           OI      30     100    1500
 55           OO      30      30      30

 56           KK  GLEN7S
 57           KM           ROUTING SURFACE FLOW FROM ORANGEWOOD/7ST. TO GLENDALE/7ST.
 58           RS       1    ELEV       1       0
 59           RC   0.150   0.020   0.150  2640.0   0.005
 60           RX     0.0    0.01   100.0  100.01   164.0  164.01  263.99  264.00
 61           RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

 62           KK  GLEN7S
 63           KM           INPUT HYDROGRAPH
 64           BA       0
 65           OI       0       0       0       0       0       0       0       0       0       0
 66           OI       0       0       0       0       0       0       0       0       0       0
 67           OI       0       0       0       0       0       0       0       0       0       0
 68           OI       0       0       0       0       0       0       0       0       0       0
 69           OI       0       0       0       0       0       0       0       0     1.6     1.6
 70           OI     1.6     1.6     1.6     1.6     1.6     1.6     1.6     1.6     3.3     3.3
 71           OI     3.3     3.3     3.3     3.3     5.1     5.1     5.1     6.8     8.5     8.5
 72           OI    16.9    44.5    83.2   122.2   154.5   174.9   180.0   161.3   122.2    84.9
 73           OI    57.7    40.7    30.5    23.7    18.7    15.3    13.6    11.8    11.8    11.8
 74           OI    10.2    10.2     8.4     8.4     6.7     6.7     5.9     3.3     3.3     3.3
 75           OI     3.3     3.3     3.3     3.3     3.3     3.3     3.3     3.3     3.3     3.3
 76           OI     3.3     1.6     1.6     1.6     1.6     1.6     1.6     1.6     1.6     1.6
 77           OI     1.6     1.6     1.6     1.6     1.6     1.6     1.6     1.6     1.6     1.6
 78           OI     1.6     1.6     1.6     1.6     1.6     1.6     1.6     1.6     1.6     1.6
 79           OI     1.6     1.6     1.6     1.6     1.6     1.6     1.6     1.6     1.6     1.6

 80           KK  GLEN7S
 81           KM           COMBINE ROUTED FLOW WITH INPUT HYDROGRAPH
 82           HC       2

 83           KK  GLEN12
 84           KM           INPUT HYDROGRAPH AT GLENDALE/12ST.
 85           BA       0
 86           OI       0       0       0       0       0       0       0       0       0       0
 87           OI       0       0       0       0       0       0       0       0       0       0
 88           OI       0       0       0       0       0       0       0       0       0       0
 89           OI       0       0       0       0       0       0       0       0       0       0
 90           OI       0       0       0       0       0       0       0       0       0       0
 91           OI       0       0       0       0       0       0       0       0       0       0
 92           OI       0       0       0       0       0       0       0       1       1       1
 93           OI     3.1     8.3    13.5    17.0    19.0    20.0    18.0    13.0       8       5
 94           OI       3     2.3     1.8     1.0       0       0       0       0       0       0
 95           OI       0       0       0       0       0       0       0       0       0       0
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 96           KK  GLEN7S
 97           KM          ROUTING INPUT HYDROGRAPH TO GLENDALE/7TH. STREET
 98           RS      1    ELEV      1       0
 99           RC  0.150   0.020   0.150  2640.0   0.004
100           RX    0.0    0.01   100.0  100.01   164.0  164.01  263.99   264.0
101           RY    4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

102           KK  GLEN7S
103           KM          COMBINE ROUTED FLOW
104           HC      2

105           KK  GLEN7S
106           KM          DIVERT STORM DRAIN FLOW
107           DT  SDFG7S
108           DI      5     100    1500
109           DO      5       5       5

110           KK  GLEN7S
111           KM          DIVERT SURFACE FLOW
112           DT  SFG7SS
113           DI  180.0   299.0   629.0  1071.0
114           DO   75.0   137.0   331.0   613.8

115           KK  GLENCE
116           KM          ROUTING FLOW FROM GLENDALE/7ST. TO GLENDALE/CENTRAL
117           RS      1    ELEV      1       0
118           RC  0.150   0.020   0.150  2640.0   0.004
119           RX    0.0    0.01   100.0  100.01   164.0  164.01  263.99   264.0
120           RY    4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

121           KK  GLENCE
122           KM          COMBINE ROUTED FLOW
123           HC      2

124           KK  GLENCE
125           KM          DIVERT SURFACE FLOW
126           DT  SFGLCW
127           DI     28     189     299     629    1071
128           DO     20     105     162     297     459

129           KK  MARYCE
130           KM          ROUTING FLOW FROM GLENDALE/CENTRAL TO MARYLAND/CENTRAL
131           RS      1    ELEV      1       0
132           RC  0.150   0.020   0.150  2640.0   0.005
133           RX    0.0    0.01   100.0  100.01   140.0  140.01  239.99   240.0
134           RY    4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

135           KK  MARYCE
136           KM          INPUT HYDROGRAPH
137           BA      0
138           OI      0       0       0       0       0       0       0       0       0       0
139           OI      0       0       0       0       0       0       0       0       0       0
140           OI      0       0       0       0       0       0       0       0       0       0
141           OI      0       0       0       0       0       0       0       0       0       0
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 142          OI       0       0       0       0       0       0       0       0       0       0
 143          OI       0       0       0       0       0     3.1     3.1     3.1     3.1     3.1
 144          OI     3.1     6.2     6.2     6.2     6.2     6.2     6.2     9.3     9.3    11.7
 145          OI    20.2    42.8    87.1   136.1   180.0   216.0   233.0   227.0   199.0   161.7
 146          OI   131.4   105.7    87.1    68.4    55.9    46.6    37.3    31.1    28.8    24.9
 147          OI    21.8    21.8    18.7    12.4    12.4    12.5     9.3     9.3     9.3     9.3
 148          OI     9.3     9.3     6.2     6.2     6.2     6.2     6.2     6.2     6.2     6.2
 149          OI     6.2     6.2     6.2     6.2     6.2     6.2     6.2     6.2     6.2     6.2
 150          OI     6.2     6.2     6.2     6.2     6.2     6.2     6.2     6.2     6.2     6.2
 151          OI     6.2     6.2     6.2     6.2     6.2     6.2     6.2     6.2     6.2     6.2
 152          OI     3.1     3.1     3.1     3.1     3.1     3.1     3.1     3.1     3.1     3.1

 153          KK  MARYCE
 154          KM           COMPINE INPUT HYDROGRAPH WITH ROUTED FLOW
 155          HC       2

 156          KK  MARYCE
 157          KM           DIVERT STORM DRAIN FLOW
 158          DT  SDFMAC
 159          DI      50     100    1500
 160          DO      50      50      50

 161          KK  BETHCE
 162          KM           ROUTING SURFACE FLOW FROM MARYLAND/CENTRAL TO BETHANY/CENTRAL
 163          RS       1    ELEV       1       0
 164          RC   0.150   0.020   0.150  2640.0   0.005
 165          RX     0.0    0.01   100.0  100.01   140.0  140.01  239.99   240.0
 166          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

 167          KK  BETHCE
 168          KM           INPUT HYDROGRAPH
 169          BA       0
 170          OI       0       0       0       0       0       0       0       0       0       0
 171          OI       0       0       0       0       0       0       0       0       0       0
 172          OI       0       0       0       0       0       0       0       0       0       0
 173          OI       0       0       0       0       0       0       0       0       0       0
 174          OI       0       0       0       0       0       0       0       0     1.6     1.6
 175          OI     1.6     1.6     1.6     1.6     1.6     1.6     1.6     1.6     3.1     3.1
 176          OI     3.1     3.1     3.1     3.1     3.1     4.7     4.7     6.3     6.3     7.8
 177          OI    18.8    50.3    81.7   102.0   113.0   121.0   111.6    78.6    47.1    29.9
 178          OI    18.8    14.1    11.0     6.3     6.3     6.3     6.3     6.3     6.3     4.7
 179          OI     4.7     4.7     3.1     3.1     1.6     1.6     1.6     1.6     1.6     1.6
 180          OI     1.6     1.6     1.6     1.6     1.6     1.6     1.6     1.6     1.6     1.6
 181          OI     1.6     1.6     1.6     1.6     1.6     1.6     1.6     1.6     1.6     1.6
 182          OI     1.6     1.6     1.6     1.6     1.6     1.6     1.6     1.6     1.6     1.6
 183          OI     1.6     1.6     1.6     1.6     1.6     1.6     1.6     1.6     1.6     1.6
 184          OI     1.6     1.6     1.6     1.6     1.6     1.6     1.6       0       0       0

 185          KK  BETHCE
 186          KM           COMBINE INPUT HYDROGRAPH WITH ROUTED FLOW
 187          HC       2
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 188          KK  BETHTS
 189          KM            INPUT HYDROGRAPH AT BETHANY/7TH. STREET
 190          BA       0
 191          OI       0       0       0       0       0       0       0       0       0       0
 192          OI       0       0       0       0       0       0       0       0       0       0
 193          OI       0       0       0       0       0       0       0       0       0       0
 194          OI       0       0       0       0       0       0       0       0       0       0
 195          OI       0       0       0     1.9     1.9     1.9     1.9     1.9     1.9     1.9
 196          OI     1.9     1.9     1.9     1.9     1.9     1.9     1.9     1.9     3.8     3.8
 197          OI     3.8     3.8     3.8     3.8     5.8     5.8     5.8     7.7     9.7     9.7
 198          OI    19.4    50.5    95.2   139.9   176.8   200.1   206.0   184.6   139.9    97.2
 199          OI    66.1    46.6    35.0    27.2    21.3    17.5    15.5    13.6    13.6    11.6
 200          OI    11.6     9.7     9.7     7.7     7.7     5.8     3.8     3.8     3.8     3.8
 201          OI     3.8     3.8     3.8     3.8     3.8     3.8     3.8     3.8     3.8     3.8
 202          OI     3.8     1.9     1.9     1.9     1.9     1.9     1.9     1.9     1.9     1.9
 203          OI     1.9     1.9     1.9     1.9     1.9     1.9     1.9     1.9     1.9     1.9
 204          OI     1.9     1.9     1.9     1.9     1.9     1.9     1.9     1.9     1.9     1.9
 205          OI     1.9     1.9     1.9     1.9     1.9     1.9     1.9     1.9       0       0

 206          KK  BETHCE
 207          KM            ROUTING INPUT HYDROGRAPH TO BETHANY/CENTRAL
 208          RS       1    ELEV       1       0
 209          RC   0.150   0.020   0.150  2640.0   0.004
 210          RX     0.0    0.01   100.0  100.01   164.0  164.01  253.99   264.0
 211          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

 212          KK  BETHCE
 213          KM           COMBINE ROUTED FLOW
 214          HC       2

 215          KK  BETHCE
 216          KM            DIVERT STORM DRAIN FLOW
 217          DT  SDFBEC
 218          DI      15     100    1500
 219          DO      15      15      15

 220          KK  BETHCE
 221          KM            DIVERT SURFACE FLOW
 222          DT  SFBECW
 223          DI     201     334     703    1198
 224          DQ     105     162     297     458

 225          KK  MISSCE
 226          KM            ROUTING FLOW FROM BETHANY/CENTRAL TO MISS/CENTRAL
 227          RS       1    ELEV       1       0
 228          RC   0.150   0.020   0.150  2640.0   0.005
 229          RX     0.0    0.01   100.0  100.01   140.0  140.01  239.99   240.0
 230          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 231          KK  MISSCE
 232          KM          INPUT HYDROGRAPH
 233          BA       0
 234          OI       0       0       0       0       0       0       0       0       0       0
 235          OI       0       0       0       0       0       0       0       0       0       0
 236          OI       0       0       0       0       0       0       0       0       0       0
 237          OI       0       0       0       0       0       0       0       0       0       0
 238          OI       0       0       0       0       0       0       0       0     1.8     1.8
 239          OI     1.8     1.8     1.8     1.8     1.8     1.8     1.8     1.8     3.7     3.7
 240          OI     3.7     3.7     3.7     3.7     5.5     5.5     5.5     7.4     9.3     9.3
 241          OI    18.5    48.4    91.3   134.1   169.5   192.0   197.5   177.7   134.1    93.3
 242          OI    63.3    44.7    33.5    26.1    20.4    16.7    14.9    13.0    13.0    11.1
 243          OI    11.1     9.3     9.3     7.4     7.4     5.5     3.7     3.7     3.7     3.7
 244          OI     3.7     3.7     3.7     3.7     3.7     3.7     3.7     3.7     3.7     3.7
 245          OI     3.7     1.8     1.8     1.8     1.8     1.8     1.8     1.8     1.8     1.8
 246          OI     1.8     1.8     1.8     1.8     1.8     1.8     1.8     1.8     1.8     1.8
 247          OI     1.8     1.8     1.8     1.8     1.8     1.8     1.8     1.8     1.8     1.8
 248          OI     1.8     1.8     1.8     1.8     1.8     1.8     1.8     1.8       0       0

 249          KK  MISSCE
 250          KM          COMBINE INPUT HYDROGRAPH WITH ROUTED FLOW
 251          HC       2

 252          KK  MISS7S
 253          KM          INPUT HYDROGRAPH AT MISSIOURI/7TH. STREET
 254          BA       0
 255          OI       0       0       0       0       0       0       0       0       0       0
 256          OI       0       0       0       0       0       0       0       0       0       0
 257          OI       0       0       0       0       0       0       0       0       0       0
 258          OI       0       0       0       0       0       0       0       0       0       0
 259          OI       0       0       0       0       0       0       0       0       0       0
 260          OI       0       0       0       0       0     3.4     3.4     3.4     3.4     3.4
 261          OI     3.4     6.8     6.8     6.8     6.8     6.8     6.8    10.3    10.3    12.9
 262          OI    22.3    47.3    96.3   150.5   199.5   239.1   256.0   251.1   220.6   178.9
 263          OI   145.3   116.9    96.3    75.7    61.9    51.6    41.3    34.4    31.8    27.5
 264          OI    24.1    24.1    20.6    13.7    13.7    13.7    10.3    10.3    10.3    10.3
 265          OI    10.3    10.3     6.8     6.8     6.8     6.8     6.8     6.8     6.8     6.8
 266          OI     6.8     6.8     6.8     6.8     6.8     6.8     6.8     6.8     6.8     6.8
 267          OI     6.8     6.8     6.8     6.8     6.8     6.8     6.8     6.8     6.8     6.8
 268          OI     6.8     6.8     6.8     6.8     6.8     6.8     6.8     6.8     3.4     3.4
 269          OI     3.4     3.4     3.4     3.4     3.4     3.4     3.4     3.4     3.4     3.4

 270          KK  MISSCE
 271          KM          ROUTING INPUT HYDROGRAPH TO MISS/CENTRAL
 272          RS       1    ELEV       1       0
 273          RC   0.150   0.020   0.150  2640.0   0.002
 274          RX     0.0    0.01   100.0  100.01   164.0  164.01  263.99   264.0
 275          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 276          KK  MISSCE
 277          KM          COMBINE ROUTED FLOW
 278          HC       2

 279          KK  MISSCE
 280          KM          DIVERT STORM DRAIN FLOW
 281          DT  SDFMIC
 282          DI      40     100    1500
 283          DO      40      40      40

 284          KK  CAMECE
 285          KM          ROUTING FLOW FROM MISS/CENTRAL TO CAMELBACK/CENTRAL
 286          RS       1    ELEV       1       0
 287          RC   0.150   0.020   0.150  2640.0   0.005
 288          RX     0.0    0.01   200.0  200.01   264.0  264.01  463.99   464.0
 289          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

 290          KK  CAMECE
 291          KM          INPUT HYDROGRAPH
 292          BA       0
 293          OI       0       0       0       0       0       0       0       0       0       0
 294          OI       0       0       0       0       0       0       0       0       0       0
 295          OI       0       0       0       0       0       0       0       0       0       0
 296          OI       0       0       0       0       0       0       0       0       0       0
 297          OI       0       0       0       0       0       0       0       0     1.8     1.8
 298          OI     1.8     1.8     1.8     1.8     1.8     1.8     1.8     1.8     3.7     3.7
 299          OI     3.7     3.7     3.7     3.7     5.5     5.5     5.5     7.4     9.3     9.3
 300          OI    18.6    48.4    91.3   134.1   169.5   192.0   197.5   177.7   134.1    93.3
 301          OI    63.3    44.7    33.5    26.1    20.4    16.7    14.9    13.0    13.0    11.1
 302          OI    11.1     9.3     9.3     7.4     7.4     5.5     3.7     3.7     3.7     3.7
 303          OI     3.7     3.7     3.7     3.7     3.7     3.7     3.7     3.7     3.7     3.7
 304          OI     3.7     1.8     1.8     1.8     1.8     1.8     1.8     1.8     1.8     1.8
 305          OI     1.8     1.8     1.8     1.8     1.8     1.8     1.8     1.8     1.8     1.8
 306          OI     1.8     1.8     1.8     1.8     1.8     1.8     1.8     1.8     1.8     1.8
 307          OI     1.8     1.8     1.8     1.8     1.8     1.8     1.8     1.8       0       0

 308          KK  CAMECE
 309          KM          COMBINE INPUT HYDROGRAPH WITH ROUTED FLOW
 310          HC       2

 311          KK  CAME7S
 312          KM          INPUT HYDROGRAPH
 313          BA       0
 314          OI       0       0       0       0       0       0       0       0       0       0
 315          OI       0       0       0       0       0       0       0       0       0       0
 316          OI       0       0       0       0       0       0       0       0       0       0
 317          OI       0       0       0       0       0       0       0       0       0       0
 318          OI       0       0       0       0       0       0       0       0       0       0
 319          OI       0       0       0       0       0     4.6     4.6     4.6     4.6     4.6
 320          OI     4.6     9.2     9.2     9.2     9.2     9.2     9.2    13.5    13.5    17.3
 321          OI    17.3    29.9    63.4   129.2   201.8   267.5   320.6   346.0   336.7   295.2
 322          OI   239.8   194.9   156.8   129.2   101.5    83.0    69.2    55.4    46.1    42.7
 323          OI    36.9    32.2    32.2    27.7    18.4    18.4    13.8    13.8    13.8    13.8
 324          OI    13.8    13.8     9.2     9.2     9.2     9.2     9.2     9.2     9.2     9.2
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9.......10

 325          OI     9.2     9.2     9.2     9.2     9.2     9.2     9.2     9.2     9.2     9.2
 326          OI     9.2     9.2     9.2     9.2     9.2     9.2     9.2     9.2     9.2     9.2
 327          OI     9.2     9.2     9.2     9.2     9.2     9.2     9.2     9.2     9.2     4.6
 328          OI     4.6     4.6     4.6     4.6     4.6     4.6     4.6     4.6     4.6     4.6

 329          KK  CAMECE
 330          KM          ROUTING INPUT HYDROGRAPH TO CAMELBACK/CENTRAL
 331          RS       2   ELEV       1       0
 332          RC   0.150   0.020   0.150  2640.0   0.002
 333          RX     0.0    0.01   200.0  200.01   264.0  264.01  463.99   464.0
 334          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

 335          KK  CAMECE
 336          KM          COMBINE ROUTED HYDROGRAPH
 337          HC       2

 338          KK  CAMECE
 339          KM          DIVERT STROM DRAIN FLOW
 340          DT  SDFCAC
 341          DI      45     100    1500
 342          DQ      45      45      45

 343          KK  CAMECE
 344          KM          DIVERT SURFACE FLOW
 345          DT  SFCACW
 346          DI     201     334     703    1198
 347          DQ     105     162     297     458

 348          KK  GRCACE
 349          KM          ROUTING FLOW FROM CAMELBACK/CENTRAL TO GRAND CANAL/CENTRAL
 350          RS       1   ELEV       1       0
 351          RC   0.150   0.020   0.150  1800.0   0.003
 352          RX     0.0    0.01   200.0  200.01   284.0  284.01  483.99   484.0
 353          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

 354          KK  GRCACE
 355          KM          INPUT HYDROGRAPH
 356          BA       0
 357          OI       0       0       0       0       0       0       0       0       0       0
 358          OI       0       0       0       0       0       0       0       0       0       0
 359          OI       0       0       0       0       0       0       0       0       0       0
 360          OI       0       0       0       0       0       0       0       0       0       0
 361          OI       0       0       0       0       0       0       0       0     2.1     2.1
 362          OI     2.1     2.1     2.1     2.1     2.1     2.1     2.1     2.1     4.1     4.1
 363          OI     4.1     4.1     4.1     4.1     4.1     6.2     6.2     8.3     8.3    10.4
 364          OI    24.9    66.5   108.0   135.1   149.6   160.0   147.5   103.0    62.3    39.5
 365          OI    24.9    18.7    14.5     8.3     8.3     8.3     8.3     8.3     8.3     6.2
 366          OI     6.2     6.2     4.1     4.1     2.1     2.1     2.1     2.1     2.1     2.1
 367          OI     2.1     2.1     2.1     2.1     2.1     2.1     2.1     2.1     2.1     2.1
 368          OI     2.1     2.1     2.1     2.1     2.1     2.1     2.1     2.1     2.1     2.1
 369          OI     2.1     2.1     2.1     2.1     2.1     2.1     2.1     2.1     2.1     2.1
 370          OI     2.1     2.1     2.1     2.1     2.1     2.1     2.1     2.1     2.1     2.1
 371          OI     2.1     2.1     2.1     2.1     2.1     2.1     2.1     2.1       0       0
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 372          KK  GRCACE
 373          KM          COMBINE INPUT HYDROGRAPH WITH ROUTED FLOW
 374          HC       2

 375          KK  GRCACE
 376          KM          DIVERT STORM DRAIN FLOW
 377          DT  SDGRCE
 378          DI      20     100    1500
 379          DO      50      50      50

 380          KK  GRCA7S
 381          KM          INPUT HYDROGRAPH
 382          BA       0
 383          OI       0       0       0       0       0       0       0       0       0       0
 384          OI       0       0       0       0       0       0     4.5     4.5     4.5     4.5
 385          OI     4.5     4.5     4.5     4.5     4.5     4.5     4.5     4.5     4.5     4.5
 386          OI     4.5     4.5     4.5     4.5     4.5     4.5     4.5     4.5     4.5     4.5
 387          OI     4.5     4.5     4.5     4.5     4.5     4.5     4.5     4.5     4.5     4.5
 388          OI     4.5     4.5     4.5     4.5     4.5     4.5     4.5     4.5     4.5     4.5
 389          OI     4.5     4.5     4.5     4.5     4.5     8.9     8.9     8.9     8.9    13.5
 390          OI    18.0    44.9    80.9   121.4   166.2   215.6   256.0   274.0   283.0   296.0
 391          OI   310.0   314.0   319.0   314.0   310.0   301.0   292.0   278.0   259.0   256.0
 392          OI   247.0   233.0   224.0   211.0   197.0   188.7   175.2   161.7   148.3   134.0
 393          OI   125.8   112.3   103.0    94.0    85.0    80.0    76.0    67.0    63.0    58.0
 394          OI    54.0    49.4    49.4    44.9    40.4    40.4    35.9    35.9    31.4    31.4
 395          OI    27.0    27.0    27.0    27.0    22.4    22.4    22.4    22.4    17.9    17.9
 396          OI    17.9    17.9    17.9    17.9    17.9    17.9    13.4    13.4    13.4    13.4
 397          OI    13.4    13.4    13.4    13.4    13.4    13.4    13.4     8.9     8.9     8.9

 398          KK  GRCACE
 399          KM          ROUT INPUT HYDROGRAPH TO GRAND CANAL/ CENTRAL
 400          RS       4    ELEV       1       0
 401          RC   0.045   0.045   0.045  2640.0  0.0002
 402          RX     0.0    15.0    95.0   205.0   390.0   460.0   500.0   610.0
 403          RY    25.0    24.0    23.5    23.5    24.0    26.0    26.0    26.0

 404          KK  GRCACE
 405          KM          COMBINE ROUTED FLOW
 406          HC       2

 407          KK  GRCACE
 408          KM          DIVERT TOTAL HYDROGRAPH TO BE RECALLED LATTER
 409          DT   TOTAL
 410          DI     100     500    1000    1500    2000
 411          DO     100     500    1000    1500    2000

 412          KK  GLEN23  BASIN COMPUTATION
 413          KM          SCS METHOD
 414          BA   0.203
 415          LS   0.353    85.0       0
 416          UD    0.35
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 417          KK  BETH23
 418          KM            ROUTING FROM GLEN/23 TO BETH/23
 419          RS       2    ELEV       1       0
 420          RC   0.150   0.020   0.150  5280.0  0.0044
 421          RX     0.0    0.01   100.0  100.01  139.99  140.00  239.99   240.0
 422          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

 423          KK  BETH23   BASIN COMPUTATION
 424          KM            SCS METHOD
 425          BA    0.27
 426          LS   0.353    85.0       0
 427          UD   0.303

 428          KK  BETH23
 429          KM            COMBINING ROUTED FLOW TO BETH23
 430          HC       2

 431          KK  CAME24
 432          KM            ROUTING FROM BETH/23 TO CAME/24
 433          RS       4    ELEV       1       0
 434          RC   0.150   0.020   0.150  5600.0   0.004
 435          RX     0.0    0.01   200.0  200.01  239.99  240.00  439.99   440.0
 436          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

 437          KK  CAME24   BASIN COMPUTTION
 438          KM            SCS METHOD
 439          BA   0.235
 440          LS   0.381    84.0       0
 441          UD    0.40

 442          KK  CAME24
 443          KM            COMBINING ROUTED FLOW TO CAME/24
 444          HC       2

 445          KK  GRCA23
 446          KM            ROUTING FROM CAMELBACK/24 AVE. TO GRAND CANAL/23 AVE.
 447          RS       4    ELEV       1       0
 448          RC   0.150   0.020   0.150  3000.0  0.0032
 449          RX     0.0    0.01   200.0  200.01  239.99  240.00  439.99   440.0
 450          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

 451          KK  GRCA23   BASIN COMPUTATION
 452          KM            SCS METHOD
 453          BA   0.392
 454          LS   0.353    85.0       0
 455          UD    0.36

 456          KK  GRCA23
 457          KM            COMBINING ROUTED FLOW TO GRAND CANAL/23 AVE.
 458          HC       2
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

459           KK  OSBORN
460           KM            ROUTING FROM GRAND CANAL/23 AVE. TO OSBORN
461           RS       4     ELEV       1       0
462           RC   0.060   0.060   0.060  3100.0  0.0021
463           RX     0.0    0.01   200.0   310.0   510.0   620.0   920.0  920.01
464           RY     2.5     2.5     1.0     1.0     1.0     1.0     2.5     2.5

465           KK  THOM19
466           KM            ROUTING FROM OSBORN TO THOMAS/19 AVE.
467           RS       4     ELEV       1       0
468           RC   0.060   0.060   0.060  3000.0  0.0033
469           RX     0.0    0.01   280.0   570.0  1000.0  1120.0  1250.0 1250.01
470           RY     3.0     3.0     2.5     2.0     1.0     2.0     3.0     3.0

471           KK  THOM19   BASIN COMPUTATION
472           KM            SCS METHOD
473           BA   0.325
474           LS   0.381    84.0       0
475           UD    0.51

476           KK  THOM19
477           KM            COMBINING ROUTED FLOW TO THOMAS/19 AVE.
478           HC       2

479           KK  THOM19
480           KM            DIVERT STROM DRAIN FLOW
481           DT  SDFT19       0      60
482           DI      60     100    3000
483           DO      50      50      60

484           KK  ECAN17
485           KM            ROUTING FROM THOMAS /19 AVE. THROUGH ENCANTO PARK
486           RS       1     ELEV       1       0
487           RC   0.035   0.035   0.035  3000.0  0.0036
488           RX     0.0    0.01   400.0   401.0   600.0   601.0  799.99   800.0
489           RY     2.5     2.5     2.0     1.0     1.0     2.0     2.5     2.6

490           KK  GLEN21   BASIN COMPUTATION
491           KM            SCS METHOD
492           BA   0.320
493           LS   0.353    85.0       0
494           UD    0.35

495           KK  BETH21
496           KM            ROUTING FROM GLEN/21 TO BETH/21
497           RS       2     ELEV       1       0
498           RC   0.150   0.020   0.150  5280.0  0.0044
499           RX     0.0    0.01   100.0  100.01  139.99   140.0  239.99  240.00
500           RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 501          KK  BETH21   BASIN COMPUTATION
 502          KM           SCS METHOD
 503          BA   0.366
 504          LS   0.381    84.0       0
 505          UD   0.303

 506          KK  BETH21
 507          KM            COMBINING ROUTED FLOW TO BETH/21
 508          HC       2

 509          KK  CAME21
 510          KM           ROUTING BETH/21 TO CAME/21
 511          RS       3    ELEV       1       0
 512          RC   0.150   0.020   0.150  5280.0  0.0035
 513          RX     0.0    0.01   200.0  200.01  239.99  240.00  439.99   440.0
 514          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

 515          KK  CAME21   BASIN COMPUTATION
 516          KM           SCS METHOD
 517          BA    0.43
 518          LS   0.381    84.0       0
 519          UD    0.40

 520          KK  CAME21
 521          KM           COMBINING ROUTED FLOW TO CAME/21
 522          HC       2

 523          KK  INDI19
 524          KM           ROUTING FROM CAMELBACK/21 AVE. TO INDIAN SCHOOL/19 AVE.
 525          RS       4    ELEV       1       0
 526          RC   0.100   0.020   0.150  2600.0  0.0024
 527          RX     0.0    0.01   300.0  300.01  339.99   340.0  639.99  640.00
 528          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

 529          KK  INDI19
 530          KM           ROUTING 2ND. REACH TO INDIAN SCHOOL/19 AVE.
 531          RS       7    ELEV       1       0
 532          RC   0.130   0.130   0.130  2900.0  0.0033
 533          RX     0.0    0.01   600.0  650.01  675.99  700.00 1200.00 1200.01
 534          RY     4.0     3.0     1.0     1.0     1.0     1.0     3.0     4.0

 535          KK  INDI19
 536          KM           BASIN COMPUTATION
 537          BA   0.333
 538          LS   0.326    86.0       0
 539          UD   0.522

 540          KK  INDI19
 541          KM           COMBINING ROUTED FLOW TO INDIAN SCHOOL/ 19 AVE.
 542          HC       2
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 543          KK  INDI17
 544          KM          ROUTING TO INDIAN SCHOOL/ 17 AVE.
 545          RS       2    ELEV       1       0
 546          RC   0.060   0.020   0.060  1340.0  0.0037
 547          RX     0.0    0.01   200.0  200.01  263.99   264.0  463.99   464.0
 548          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

 549          KK  NOR19A   BASIN COMPUTATION
 550          KM          SCS METHOD
 551          BA   0.519
 552          LS   0.353    85.0       0
 553          UD   0.620

 554          KK  NORT23
 555          KM          BASIN COMPUTATION
 556          BA    0.76
 557          BF      15       1     100
 558          LS    0.38    84.0       0
 559          UD    1.08

 560          KK  NORT23
 561          KM          SURFACE FLOW DIVERSION
 562          DT  SFN23S
 563          DI      46     150     305     512     863
 564          DO      38     108     198     305     426

 565          KK  NORT19
 566          KM          ROUT TO NORTHERN/19TH
 567          RS       2    ELEV       1
 568          RC   0.060   0.020   0.060  2640.0  0.0024
 569          RX     0.0    0.01   200.0  200.01  263.99   264.0  463.99   464.0
 570          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

 571          KK  NOR19B   BASIN COMPUTATION
 572          KM          SCS METHOD
 573          BA    0.39
 574          BF       0       0       1
 575          LS   0.381    84.0       0
 576          UD    0.83

 577          KK  NORTDE
 578          KM          ROUT FLOW FROM NOR19B THROUGH DETENTION BASIN
 579          RS       1    ELEV  1190.5       0
 580          SA     1.8     9.7    26.9
 581          SE  1190.5  1196.0  1200.0
 582          SS  1196.0  1200.0     2.3     1.5

 583          KK  NORT19
 584          KM          ROUT TO NORTHERN/19TH
 585          RS       2    ELEV       1
 586          RC   0.060   0.020   0.060  1400.0  0.0024
 587          RX     0.0    0.01   200.0  200.01  263.99   264.0  463.99   464.0
 588          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 589          KK  NORT19
 590          KM          COMBINING NORTHERN AND 19TH AVE. (A) TO (B)
 591          HC       3

 592          KK  NORT19
 593          KM          DIVERT STORM DRAIN FLOW
 594          DT  SDFN19       0      68
 595          DI      68     100    3000
 596          DO      68      68      68

 597          KK  GLEN19
 598          KM          ROUTING FROM NORTHERN/19TH AVE. TO GLENDALE/19TH
 599          RS       3    ELEV       1       0
 600          RC   0.130   0.020   0.130  5280.0  0.0034
 601          RX     0.0    0.01   200.0  200.01  263.99   264.0  463.99   464.0
 602          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

 603          KK  DIVN23
 604          KM          RETRIEVE DIVERTED FLOW AT NORTHERN/23RD. AVE
 605          DR  SFN23S

 606          KK  MORT19
 607          KM         ROUT DIVERTED FLOW TO  MORTEN /19 AVE. 1ST REACH
 608          RS       2    ELEV       1
 609          RC   0.130    0.02   0.130   550.0  0.0044
 610          RX       0    0.01   200.0  200.01   240.0  240.01   440.0  440.01
 611          RY       3    2.25    1.25     1.0     1.0    1.25    2.25     3.0

 612          KK  GLEN19
 613          KM         ROUT DIVERTED FLOW TO  MORTEN /19 AVE. 2ND REACH
 614          RS       2    ELEV       1
 615          RC   0.130    0.02   0.130  1240.0   0.002
 616          RX       0    0.01   200.0  200.01   240.0  240.01   440.0  440.01
 617          RY       3    2.25    1.25     1.0     1.0    1.25    2.25     3.0

 618          KK  MORT19
 619          KM         ROUT DIVERTED FLOW TO  MORTEN /19 AVE. 3RD REACH
 620          RS       2    ELEV       1
 621          RC   0.130    0.02   0.130  1200.0  0.0044
 622          RX       0    0.01   200.0  200.01   240.0  240.01   440.0  440.01
 623          RY       3    2.25    1.25     1.0     1.0    1.25    2.25     3.0

 624          KK  MORT19
 625          KM         ROUT DIVERTED FLOW TO  MORTEN /19 AVE. 4TH REACH
 626          RS       2    ELEV       1
 627          RC   0.130    0.02   0.130  1340.0   0.002
 628          RX       0    0.01   200.0  200.01   240.0  240.01   440.0  440.01
 629          RY       3    2.25    1.25     1.0     1.0    1.25    2.25     3.0
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 630          KK  MORT16
 631          KM          BASIN COMPUTATION
 632          BA    0.13
 633          LS   0.381    84.0       0
 634          UD     .36

 635          KK  MORT19
 636          KM          COMBINE FLOWS
 637          HC       2

 638          KK  GLEN19
 639          KM           ROUTING FROM  MORTEN /19TH AVE. TO GLENDALE/19TH
 640          RS       2    ELEV       1       0
 641          RC   0.130   0.020   0.130  4000.0  0.0034
 642          RX     0.0    0.01   200.0  200.01  263.99   264.0  463.99   464.0
 643          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

 644          KK  GLEN19
 645          KM          COMBINE ROUTED FLOW
 646          HC       2

 647          KK  GLEN19
 648          KM          DIVERT STORM DRAIN FLOW
 649          DT  SDFG19       0      29
 650          DI      29     100    3000
 651          DO      29      29      29

 652          KK  GLEN19
 653          KM          DIVERT SURFACE FLOW
 654          DT  SFG19E
 655          DI     364     864    1140    1771
 656          DO     105     226     274     375

 657          KK  BETH19
 658          KM           ROUTING FROM GLENDALE/19 AVE. TO BETHANY/19 AVE.
 659          RS       4    ELEV       1       0
 660          RC   0.130   0.020   0.130  5280.0  0.0044
 661          RX     0.0    0.01   200.0  200.01  263.99   264.0  463.99   464.0
 662          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

 663          KK  BETH19
 664          KM          DIVERT SURFACE FLOW
 665          DT  SFB19E
 666          DI     364     860     983    2015
 667          DO     105     205     226     375

 668          KK  CAME19
 669          KM          ROUTING FROM BETHANY/19 AVE. TO CAMELBACK/19 AVE.
 670          RS       4    ELEV       1       0
 671          RC   0.060   0.020   0.130  5280.0  0.0035
 672          RX     0.0    0.01   200.0  200.01  263.99   264.0  363.99   364.0
 673          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 719          KK  NORT15
 720          KM          ROUTING FROM NOTHERN AND 7TH AVE. TO NORTHERN AND 15TH AVE.
 721          RS      1   ELEV       1       0
 722          RC  0.100   0.020   0.100  2640.0  0.0023
 723          RX    0.0    0.01   100.0  100.01  163.99  164.00  263.99  264.00
 724          RY    4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

 725          KK  NORT15  BASIN COMPUTATION
 726          BA  0.208
 727          LS  0.247   89.0       0
 728          UD  0.453

 729          KK  NORT15
 730          KM          COMBINING NORTHERN AND 7TH AVE TO NORTHERN AND 15 AVE.
 731          HC      2

 732          KK  NORT15
 733          KM          DIVERT STORM DRAIN FLOW
 734          DT  SDFN15      0     110
 735          DI    110     200    3000
 736          DO    110     110     110

 737          KK  GLEN15
 738          KM          ROUTING FROM NORTHERN AND 15TH AVE TO GLENDALE AND 15 AVE.
 739          RS      2   ELEV       1       0
 740          RC  0.100   0.020   0.100  5280.0  0.0044
 741          RX    0.0    0.01   100.0  100.01  139.99  140.00  239.99  240.00
 742          RY    4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

 743          KK  GLEN15
 744          KM          DIVERT STROM DRAIN FLOW
 745          DT  SDFG15      0      90
 746          DI     90     200    3000
 747          DO     90      90      90

 748          KK  BETH15
 749          KM          ROUTING FROM GLENDALE/15 AVE. TO BETH/15 AVE.
 750          RS      1   ELEV       1       0
 751          RC  0.060   0.020   0.060  5280.0  0.0042
 752          RX    0.0    0.01   200.0  200.01  263.99   264.0  463.99   464.0
 753          RY    4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

 754          KK  DIVG19
 755          KM          RETRIEVE DIVERTED FLOW AT GLENDALE/19 AVE.
 756          DR  SFG19E

 757          KK  GLEN17
 758          KM          ROUT DIVERTED FLOW TO GLENDALE/17 AVE.
 759          RS      1   ELEV       1       0
 760          RC  0.035   0.020   0.035  1320.0   0.001
 761          RX    0.0    0.01   200.0  200.01  263.59   264.0  463.99   464.0
 762          RY    4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 763          KK  GLEN17  BASIN COMPUTATION
 764          KM          SCS METHOD
 765          BA    0.32
 766          LS   0.410    83.0       0
 767          UD    0.43

 768          KK  GLEN17
 769          KM           COMBINE ROUTED FLOW WITH GLENDALE/7TH AVE.
 770          HC       2

 771          KK  BETH15
 772          KM           ROUT FIRST REACH TO BETH/ 15 AVE.
 773          RS       1    ELEV       1       0
 774          RC   0.150   0.020   0.150  2640.0  0.0038
 775          RX     0.0    0.01   100.0  100.01  199.99   200.0  299.99   300.0
 776          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

 777          KK  BETH15
 778          KM           ROUT SECOND REACH TO BETH / 15 AVE.
 779          RS       3    ELEV       1       0
 780          RC    0.15   0.020   0.150  2640.0  0.0038
 781          RX     0.0    0.01   200.0  200.01  229.99   230.0  429.99   430.0
 782          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

 783          KK  BETH15
 784          KM           ROUT LAST REACH TO BETH 15
 785          RS       2    ELEV       1       0
 786          RC    0.15   0.020   0.013  1320.0  0.0009
 787          RX     0.0    0.01   200.0  200.01  289.99   290.0  439.99   499.0
 788          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

 789          KK  BETH15  BASIN COMPUTATION
 790          KM          SCS METHOD
 791          BA   0.412
 792          LS   0.353    85.0       0
 793          UD    0.44

 794          KK  BETH15
 795          KM          COMBINE ROUTED FLOW BETH /15 AVE.
 796          HC       3

 797          KK  DIVB19
 798          KM           RETRIEVE DIVERTED FLOW AT BETHANY /19 AVE.
 799          DR  SPB19E

 800          KK  BETH15
 801          KM           ROUT RETRIEVED FLOW
 802          RS       3    ELEV       1       0
 803          RC   0.150   0.020    0.15  2640.0  0.0009
 804          RX     0.0    0.01   200.0  200.01  289.99   290.0  489.99   499.0
 805          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 806          KK  BETH15
 807          KM            COMBINE ROUTED FLOW WITH BETH /15 AVE.
 808          HC       2

 809          KK  BETH15
 810          KM            DIVERT STORM DRAIN FLOW
 811          DT  SDFB15       0      55
 812          DI      55    1000    2000
 813          DO      55      55      55

 814          KK  CAME15
 815          KM            ROUTING FLOW FROM BETHANY/15 AVE TO CAMELBACK/15 AVE.
 816          RS       3    ELEV       1       0
 817          RC   0.150   0.020   0.035  5280.0  0.0038
 818          RX     0.0    0.01   200.0  200.01  239.99   240.0  439.99   440.0
 819          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

 820          KK  DIVE19
 821          KM            RETRIEVE DIVERTED FLOW
 822          DR  SFC19E

 823          KK  CAME15
 824          KM            ROUT DIVERTED FLOW TO CAME / 15 AVE.
 825          RS       2    ELEV       1       0
 826          RC    0.06   0.020    0.60  1320.0  0.0006
 827          RX     0.0    0.01   200.0  200.01  263.99   264.0  463.99   464.0
 828          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

 829          KK  CAME15   BASIN COMPUTATION
 830          KM            SCS METHOD
 831          BA     .50
 832          LS   0.299    87.0       0
 833          UD    0.45

 834          KK  CAME15
 835          KM            COMBINE ROUTED FLOW TO CAMELBACK/15 AVE.
 836          HC       3

 837          KK  CAME15
 838          KM            DIVERT STROM DRAIN FLOW
 839          DT  SDFC15       0     135
 840          DI      95     150    3000
 841          DO     135     135     135

 842          KK  CAME15
 843          KM            DIVERT SURFACE FLOW
 844          DT  SFC15E
 845          DI      73     263     605
 846          DO    57.3     162     243
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 847          KK  GRCA15
 848          KM          ROUTING FROM CAMELBACK/15 AVE. TO GRAND CANAL/15 AVE.
 849          RS      2    ELEV       1       0
 850          RC  0.060   0.020   0.060  3200.0  0.0047
 851          RX    0.0    0.01   200.0  200.01  239.99   240.0  439.99   440.0
 852          RY    4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

 853          KK  DIVEN7
 854          KM          RETRIVE DIVERTED FLOW AT NORTHERN AND 7TH AVE.
 855          DR  SFNO7S

 856          KK  GLEND7
 857          KM          ROUTING DIVERTED FLOW FROM NOTHERN/7TH AVE. TO GLEN/7TH AVE.
 858          RS      4    ELEV       1       0
 859          RC  0.100   0.020   0.100  5280.0  0.004
 860          RX    0.0    0.01   100.0  100.01  163.99  164.00  263.99  264.00
 861          RY    4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

 862          KK  GLEND7  BASIN COMPUTATION
 863          KM          SCS METHOD
 864          BA  0.117
 865          LS  0.105    95.0       0
 866          UD  0.422

 867          KK  GLEND7
 868          KM          COMBINE ROUTED FLOW TO GLENDALE/7 AVE.
 869          HC      2

 870          KK  DIVG7A
 871          KM          RETRIEVE DIVERTED FLOW AT GLENDALE/CENTRAL
 872          DR  SFGLCW

 873          KK  GLEND7
 874          KM         ROUTING DIVERTED FLOW FROM GLENDALE/CENTRAL TO GLENDALE/7 AVE.
 875          RS      1    ELEV       1       0
 876          RC  0.150   0.020   0.150  2640.0  0.003
 877          RX    0.0    0.01   100.0  100.01   164.0  164.01  263.99   264.0
 878          RY    4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

 879          KK  GLEND7
 880          KM          COMBINE ROUTED FLOW TO GLENDALE/7 AVE.
 881          HC      2

 882          KK  GLEND7
 883          KM          DIVERT SURFACE FLOW
 884          DT  SFGL7S
 885          DI    153     559    1293
 886          DQ   95.7     397    1050
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 887          KK  GLEN12
 888          KM          ROUTING FROM GLENDAL/7 AVE. TO GLENDAL/12 AVE.
 889          RS      3    ELEV       1       0
 890          RC   0.035   0.020   0.035  1830.0   0.003
 891          RX     0.0    0.01   100.0  100.01  163.99   164.0  263.99   264.0
 892          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

 893          KK  GLEN12   BASIN COMPUTATION
 894          KM           SCS METHOD
 895          BA   0.390
 896          LS   0.439    82.0       0
 897          UD   0.390

 898          KK  GLEN12
 899          KM           COMBINE ROUTED FLOW GLENDALE/ 12 AVE.
 900          HC       2

 901          KK  BETH11
 902          KM           ROUT TO BETHANY / 11 AVE.
 903          RS       3    ELEV       1       0
 904          RC    0.06   0.020    0.06  5600.0  0.0037
 905          RX     0.0    0.01   200.0  200.01  229.99   230.0  429.99   430.0
 906          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

 907          KK  BETH11  BASIN COMPUTATION
 908          KM          SCS METHOD
 909          BA    0.28
 910          LS   0.273    88.0       0
 911          UD    0.44

 912          KK  BETH11
 913          KM           COMBINE ROUTED FLOW WITH BETHANY /11 AVE.
 914          HC       2

 915          KK  CAME11
 916          KM           ROUT FLOW TO CAMELBACK / 11 AVE.
 917          RS       4    ELEV       1       0
 918          RC    0.15   0.020    0.15  5280.0  0.0044
 919          RX     0.0    0.01   200.0  200.01  229.99   230.0  429.99   430.0
 920          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

 921          KK  CAME11   BASIN COMPUTATION
 922          KM           SCS METHOD
 923          BA    0.20
 924          LS   0.353    85.0       0
 925          UD   0.300

 926          KK  DIVC15
 927          KM           RETRIEVE DIVERTED FLOW AT CAMELBACK / 15 AVE.
 928          DR  SFC15E
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

929           KK  CAME11
930           KM          ROUTING DIVERTED FLOW TO CAMELBACK /11 AVE.
931           RS      2    ELEV       1       0
932           RC  0.035   0.020   0.035  1340.0  0.0009
933           RX    0.0    0.01   200.0  200.01  263.99   264.0  463.99   464.0
934           RY    4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

935           KK  CAME11
936           KM          COMBINE FLOWS
937           HC      3

938           KK  CAME11
939           KM           DIVERT SURFACE FLOW
940           DT  SFC11E
941           DI     73     263     605
942           DC   57.3     162     243

943           KK  GRCA11
944           KM           ROUT TO GRAND CANAL /11 AVE.
945           RS      3    ELEV       1       0
946           RC   0.13   0.020    0.13  2700.0  0.0031
947           RX    0.0    0.01   200.0  200.01  229.99   230.0  429.99  430.99
948           RY    4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

949           KK  DIVEG7
950           KM           RETRIEVE DIVERTED SURFACE FLOW AT GLENDALE/7 AVE.
951           DR  SFGL7S

952           KK  BETHA7
953           KM          ROUTING DIVERTED SURFACE FLOW TO BETHANY/7 AVE.
954           RS      2    ELEV       1       0
955           RC  0.120   0.020   0.120  5280.0  0.0048
956           RX    0.0    0.01   100.0  100.01  163.99   164.0  263.99   264.0
957           RY    4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

958           KK  BETHA7   BASIN COMPUTATION
959           KM          SCS METHOD
960           BA  0.150
961           LS  0.174    92.0       0
962           UD   0.49

963           KK  BETHA7
964           KM          COMBINE ROUTED FLOW TO BETHANY/7 AVE.
965           HC      2

966           KK  DIVB7A
967           KM          RETRIEVE DIVERTED FLOW AT BETHANY/CENTRAL
968           DR  SFBECW
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 969          KK  BETHA7
 970          KM           ROUT RETRIEVED FLOW TO BETHANY/7 AVE.
 971          RS       2    ELEV       1       0
 972          RC   0.015   0.020   0.015  2640.0   0.002
 973          RX     0.0    0.01   100.0  100.01   164.0  164.01  263.99   264.0
 974          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

 975          KK  BETHA7
 976          KM          COMBINE ROUTED FLOW
 977          HC       2

 978          KK  BETHA7
 979          KM           DIVERT STORM DRAIN FLOW
 980          DT  SDFBE7       0      74
 981          DI      74    1000    2000
 982          DO      74      74      74

 983          KK  CAMEL7
 984          KM           ROUTING FLOW TO CAMELBACK /7 AVE.
 985          RS       4    ELEV       1       0
 986          RC   0.120   0.020   0.120  5280.0  0.0044
 987          RX     0.0    0.01   200.0  200.01  263.99   264.0  463.99   464.0
 988          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

 989          KK  CAMEL7   BASIN COMPUTATION
 990          KM           SCS METHOD
 991          BA   0.203
 992          LS   0.198    91.0       0
 993          UD   0.300

 994          KK  CAMEL7
 995          KM           COMBINE ROUTED FLOW TO CAMELBACK/ 7 AVE.
 996          HC       2

 997          KK  DIVE11
 998          KM          RETRIEVE DIVERTED FLOW AT CAMBELBACK /11 AVE
 999          DR  SFC11E

1000          KK  CAMEL7
1001          KM           ROUTING DIVERETED FLOW TO CAMELBACK / 7 AVE.
1002          RS       3    ELEV       1       0
1003          RC   0.035   0.020   0.035  1320.0  0.0009
1004          RX     0.0    0.01   200.0  200.01  263.99   264.0  463.99   464.0
1005          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

1006          KK  CAMEL7
1007          KM          COMBINE ROUTED FLOW CAMELBACK / 7 AVE.
1008          HC       2
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1009          KK  CAMEL7
1010          KM          DIVERT SURFACE FLOW FROM CAMELBACK/7AVE. TO CAMELBACK/ 3RD. AVE.
1011          DT  SFCA7A
1012          DI     201     334     703    1198
1013          DO     105     162     297     458

1014          KK  GRCA7A
1015          KM            ROUTING TO GRAND CANAL/7 AVE.
1016          RS       2    ELEV       1       0
1017          RC   0.050   0.020   0.060  2100.0  0.0031
1018          RX     0.0    0.01   300.0  300.01  363.99   364.0  663.99   664.0
1019          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

1020          KK  DIVCAC
1021          KM          RETRIEVE DIVERTED FLOW AT CAMELBACK/CENTRAL
1022          DR  SFCACW

1023          KK  CAME3A
1024          KM          ROUT RETRIEVED FLOW FROM CAMELBACK/CENTRAL TO CAMELBACK/ 3RD. AVE.
1025          RS       1    ELEV       1       0
1026          RC   0.150   0.020   0.150  1320.0  0.0018
1027          RX     0.0    0.01   100.0  100.01   164.0  164.01  263.99   264.0
1028          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

1029          KK  CAME3A  BASIN COMPUTATION
1030          KM          SCS METHOD
1031          BA   0.130
1032          LS   0.247    89.0       0
1033          UD    0.30

1034          KK  CAME3A
1035          KM          COMBINE ROUTED FLOW WITH COMPUTED FLOW
1036          HC       2

1037          KK  DIVC7A
1038          KM          RETRIEVE DIVERTED FLOW AT CAMELBACK/7TH. AVE.
1039          DR  SFCA7A

1040          KK  CAME3A
1041          KM          ROUT RETRIEVED FLOW FROM CAMELBACK/7TH. AVE. TO CAMELBACK/3RD. AVE.
1042          RS       4    ELEV       1       0
1043          RC   0.150   0.020   0.150  1320.0  0.0015
1044          RX     0.0    0.01   200.0  200.01   264.0  264.01  463.99   464.0
1045          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

1046          KK  CAME3A
1047          KM          COMBINE ROUTED FLOW TO CAMELBACK/3RD. AVE.
1048          HC       2
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1049          KK  GRCA3A
1050          KM          ROUT FLOW TO GRAND CANAL/3RD. AVE.
1051          RS       5    ELEV       1       0
1052          RC   0.150   0.020   0.150  2000.0  0.0034
1053          RX     0.0    0.01   300.0  300.01   340.0  340.01  539.99   540.00
1054          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

1055          KK  DIVGCC
1056          KM          RETRIEVE DIVERTED FLOW AT GRAND CANAL/CENTRAL
1057          DR   TOTAL

1058          KK  GRCA3A
1059          KM          DIVERT SURFACE FLOW OVER GRAND CANAL
1060          DT  SFGC3A
1061          DI     114     300     400     500
1062          DO       0     186     286     386

1063          KK  GRCA3A
1064          KM          ROUT DIVERTED FLOW FROM GRAND CANAL/CENTRAL TO GRAND CANAL/3RD. AVE.
1065          RS       2    ELEV    22.8       0
1066          RC   0.130   0.020   0.130  1370.0  0.0001
1067          RX     0.0    85.0   380.0  380.01   420.0  420.01   560.0   710.0
1068          RY    24.0    22.0    23.3    22.8    22.8    23.3    23.4    24.0

1069          KK  GRCA3A
1070          KM          COMBINE ROUTED FLOWS
1071          HC       2

1072          KK  GRCA3A
1073          KM          DIVERT SURFACE FLOW OVER GRAND CANAL
1074          DT  SFGC7A
1075          DI     203     300     500     700     900
1076          DO       0      97     297     497     697

1077          KK  GRCA7A
1078          KM          ROUT FLOW FROM GRAND CANAL/3RD. TO GRAND CANAL/ 7TH AVE.
1079          RS       2    ELEV    21.5       0
1080          RC    0.13   0.020   0.130  1320.0  0.0001
1081          RX     0.0    80.0   270.0  270.01   300.0  300.01   860.0  1100.0
1082          RY    24.0    23.6    21.5    21.5    21.5    21.5    24.1    24.9

1083          KK  GRCA7A
1084          KM          COMBINE ROUTED FLOWS
1085          HC       2

1086          KK  GRCA11
1087          KM          ROUTING FLOW TO GRAND CANAL /11 AVE.
1088          RS       1    ELEV    22.5       0
1089          RC   0.130   0.020   0.130  1450.0  0.0006
1090          RX     0.0    70.0   150.0  150.01   180.0  180.01  1150.0 1300.00
1091          RY    24.5    23.0    22.5    22.5    22.5    22.5    24.5   25.0
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1092          KK  GRCA11
1093          KM            COMBINE ROUTED FLOWS
1094          HC       2

1095          KK  GRCA15
1096          KM            ROUTING FLOW TO GRAND CANAL /15 AVE.
1097          RS       1    ELEV    22.5       0
1098          RC   0.130   0.020   0.130  1450.0  0.0006
1099          RX     0.0    70.0   150.0  150.01   180.0  180.01  1150.0 1300.00
1100          RY    24.5    23.0    22.5    22.5    22.5    22.5    24.5    25.0

1101          KK  GRCA15
1102          KM            COMBINING ROUTED FLOWS
1103          HC       2

1104          KK  GRCA15    BASIN COMPUTATION
1105          KM            SCS METHOD
1106          BA    0.43
1107          LS   0.381    84.0       0
1108          UD   0.340

1109          KK  GRCA15
1110          KM            COMBINE ROUTED FLOW WITH GRAND CANAL/15 AVE
1111          HC       2

1112          KK  GRCA15
1113          KM            DIVERT STORM DRAIN FLOW
1114          DT  SDFG15       0      75
1115          DI               75    1000    2000
1116          DO               75      75      75

1117          KK  INDI17
1118          KM            ROUTING TO INDIAN SCHOOL 17/AVE
1119          RS       4    ELEV       1       0
1120          RC   0.160   0.160   0.160  2430.0  0.0040
1121          RX     0.0   400.0   990.0  1200.0  1400.0  1550.0  1900.0  2030.0
1122          RY     3.5     2.5     1.0     1.0     1.0     1.0     2.5     3.5

1123          KK  INDI17
1124          KM            COMBINE WITH INDIAN SCHOOL/17 AVE.
1125          HC       2

1126          KK  THOM17
1127          KM            ROUTING FLOW FROM INDIAN SCHOOL/17 AVE. TO THOMAS/17.AVE
1128          RS       4    ELEV       1       0
1129          RC   0.130   0.020   0.130  5280.0   0.006
1130          RX     0.0  1240.0  1780.0  1780.1  1900.0  1900.1  2500.0  3600.0
1131          RY     2.5     2.0     1.0     1.0     1.0     1.0     1.0     2.5
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1132          KK  THOM17   BASIN COMPUTATION
1133          KM           SCS METHOD
1134          BA    0.64
1135          LS   0.381    84.0       0
1136          UD   0.500

1137          KK  THOM17
1138          KM           COMBINE ROUTED FLOW WITH THOMAS/17 AVE.
1139          HC       2

1140          KK  ECAN17
1141          KM           ROUTING FROM THOMAS/17 AVE. TO ECANTO/17 AVE.
1142          RS       2    ELEV       1       0
1143          RC   0.130   0.035   0.035  2640.0  0.0032
1144          RX     0.0   600.0  1200.0  1600.0  2000.0  2300.0  2500.0  2600.0
1145          RY     4.0     2.5     1.5     1.5    1.25     1.0     3.0     4.0

1146          KK  ECAN17
1147          KM           COMBINE ROUTED FLOWS  THOMAS/19 AVE + THOMAS/17 AVE.
1148          HC       2

1149          KK  MCDO17
1150          KM           ROUTING FROM ECANTO RD. TO MCDOWELL/17 AVE.
1151          RS       3    ELEV       1       0
1152          RC   0.130   0.020   0.020  2640.0  0.0011
1153          RX     0.0   480.0  1600.0  1970.0  2420.0  3000.0  3150.0  3290.0
1154          RY     2.0     1.5     1.5     1.5     1.0     1.0     1.5     2.0

1155          KK  MCDO17   BASIN COMPUTATION
1156          KM           SCS METHOD
1157          BA    0.64
1158          LS    .381    84.0       0
1159          UD     0.5

1160          KK  MCDO17
1161          KM           COMBINING ROUTED FLOW WITH MCDOWELL/17 AVE
1162          HC       2

1163          KK  THOM22   BASIN COMPUTATION
1164          KM           SCS METHOD
1165          BA    0.35
1166          LS   0.381    84.0       0
1167          UD   0.342

1168          KK  REACHA
1169          KM           ROUTING REACH A TO MCDOWELL/ 19 AVE.
1170          RS       2    ELEV       1       0
1171          RC   0.060   0.020   0.060  2100.0  0.0037
1172          RX     0.0    0.01   200.0  200.01  229.99   230.0  429.99   430.0
1173          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1174          KK  REACHB
1175          KM          ROUTING REACH B TO MCDOWELL/19 AVE.
1176          RS       1   ELEV       1       0
1177          RC   0.035  0.035   0.060  1000.0  0.0035
1178          RX     0.0  400.0   570.0   650.0   800.0  1000.0  1200.0  1430.0
1179          RY     1.5    1.0     1.0     1.0     1.0     1.0     1.0     1.5

1180          KK  MCDO19
1181          KM          ROUTING LAST REACH TO MCDOWELL/19 AVE.
1182          RS       2   ELEV       1       0
1183          RC   0.035  0.020   0.130  2750.0  0.0023
1184          RX     0.0  140.0   350.0   410.0   500.0   630.0  1130.0 1130.01
1185          RY     2.5    1.5     1.0     1.0     1.5     2.0     3.0     3.0

1186          KK  MCDO19  BASIN COMPUTATION
1187          KM          SCS METHOD
1188          BA    0.48
1189          LS   0.381   84.0       0
1190          UD   0.734

1191          KK  MCDO19
1192          KM          COMBINE ROUTED FLOW WITH MCDOWELL/19 AVE. AND MCDOWELL/17 AVE.
1193          HC       2

1194          KK  MCDO17
1195          KM          COMBINE FLOW AT MCDOWELL/19TH WITH FLOW AT MCDOWELL/17TH. AVE.
1196          HC       2

1197          KK  DIGC3A
1198          KM          RETRIEVE DIVERTED FLOW
1199          DR  SFGC3A

1200          KK  INDI3A
1201          KM          ROUT FLOW TO INDIAN SCHOOL/ 3RD. AVE.
1202          RS       1   ELEV       1       0
1203          RC    0.13   0.02    0.13  3100.0  0.0032
1204          RX       0   0.01   200.0  200.01   260.0  260.01  459.99   460.0
1205          RY       4   2.25    1.25       1       1    1.25    2.25       4

1206          KK  INDI3A  BASIN COMPUTATION
1207          KM          SCS METHOD
1208          BA   0.242
1209          LS   0.353   85.0       1
1210          UD   0.200

1211          KK  INDI3A
1212          KM          COMBINE ROUTED FLOW WITH INDI3A
1213          HC       2
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1214          KK  THOM3A
1215          KM            ROUT FLOW TO THOMAS/3RD. AVE.
1216          RS       4    ELEV       1
1217          RC   0.035    0.02   0.060  5280.0  0.0032
1218          RX       0    0.01   300.0  300.01   360.0  360.01  659.99   660.0
1219          RY       4    2.25    1.25       1       1    1.25    2.25       4

1220          KK  THOM3A   BASIN COMPUTATION
1221          KM            SCS METHOD
1222          BA   0.292
1223          LS   0.198    91.0       0
1224          UD   0.350

1225          KK  THOM3A
1226          KM            COMBINE ROUTED FLOW WITH THOMAS/3A
1227          HC       2

1228          KK  MCDO3A
1229          KM            ROUT FLOW TO MCDOWELL/ 3RD. AVE
1230          RS       3    ELEV       1
1231          RC    0.13    0.02    0.13  5280.0  0.0018
1232          RX       0    0.01   400.0  400.01   440.0  440.01  839.99   840.0
1233          RY       4    2.25    1.25       1       1    1.25    2.25       4

1234          KK  MCDO3A
1235          KM            DIVERT SURFACE FLOW
1236          DT  SFMC3A
1237          DI      41     154     242     315
1238          DO       0       0      46     105

1239          KK  MCDO7A
1240          KM            ROUT FLOW TO MCDOWELL/ 7TH. AVE.
1241          RS       4    ELEV       1
1242          RC    0.13    0.02    0.13  1320.0  0.0007
1243          RX       0    0.01   300.0  300.01   360.0  360.01  659.99   660.0
1244          RY       4    2.25    1.25       1       1    1.25    2.25       4

1245          KK  MCDO7A   BASIN COMPUTATION
1246          KM            SCS METHOD
1247          BA   0.490
1248          LS   0.381    84.0
1249          UD   0.594

1250          KK  MCDO7A
1251          KM            COMBINE ROUTED FLOW WITH MCDOWELL/7TH. AVE.
1252          HC       2

1253          KK  DIGC7A
1254          KM           RETRIEVE DIVERTED FLOW AT GRAND CANAL /7TH. AVE.
1255          DR  SFGC7A
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


1255          KK  OSBO7A
1257          KM          ROUT DIVERTED FLOW TO OSBORN/7TH. AVE
1258          RS      5    ELEV       1
1259          RC    0.13   0.02    0.13  5280.0  0.0037
1260          RX       0   0.01   200.0  200.01   260.0  260.01  459.99   460.0
1261          RY       4   2.25    1.25       1       1    1.25    2.25       4

1262          KK  OSBO7A  BASIN COMPUTATION
1263          KM          SCS METHOD
1264          BA   0.453
1265          LS   0.381   84.0       0
1266          UD   0.414

1267          KK  OSBO7A
1268          KM          COMBINE ROUTED FLOW WITH OSBORN/7TH. AVE
1269          HC       2

1270          KK  EDGE7A
1271          KM          ROUT FLOW TO EDGEMOUNT/7TH. AVE.
1272          RS       2   ELEV       1
1273          RC    0.13   0.02    0.13  2640.0  0.0030
1274          RX       0   0.01   200.0  200.01   260.0  260.01  459.99   460.0
1275          RY       4   2.25    1.25       1       1    1.25    2.25       4

1276          KK  EDGE7A  BASIN COMPUTATION
1277          KM          SCS METHOD
1278          BA   0.289
1279          LS   0.353   85.0       0
1280          UD    0.28

1281          KK  EDGE7A
1282          KM          COMBINE ROUTED FLOW WITH EDGEMOUNT/7 AVE.
1283          HC       2

1284          KK  MCDO7A
1285          KM          ROUT FLOW TO MCDOWELL/7TH. AVE.
1286          RS       1   ELEV       1
1287          RC    0.13   0.02    0.13  5280.0  0.0030
1288          RX       0   0.01   300.0  300.01   360.0  360.01  659.99   660.0
1289          RY       4   2.25    1.25       1       1    1.25    2.25       4

1290          KK  MCDO7A
1291          KM          COMBINE ROUTED FLOW
1292          HC       2

1293          KK  MCDO7A
1294          KM          DIVERT SURFACE FLOW
1295          DT  SFMC7A
1296          DI      64     229     353
1297          DO       7      67     127
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1298          KK  MCDO15
1299          KM          ROUT FLOW TO MCDOWELL/ 15TH. AVE.
1300          RS      2    ELEV       1
1301          RC   0.13    0.02    0.13  2640.0   0.001
1302          RX      0    0.01   500.0  500.01   550.0  560.01 1059.99  1060.0
1303          RY      4    2.25    1.25       1       1    1.25    2.25       4

1304          KK  ECAN11   BASIN COMPUTATION
1305          KM          SCS METHOD
1306          BA   0.10
1307          LS  0.381    84.0       0
1308          UD   0.44

1309          KK  MCDO15
1310          KM         ROUT FLOW TO MCDOWELL 15TH FIRST REACH
1311          RS      3    ELEV       1       0
1312          RC   0.13    0.02    0.13  2450.0  0.0004
1313          RX      0     0.1   200.0  200.01   240.0  240.01  439.99   440.0
1314          RY      4    2.25    1.25     1.0     1.0    1.25    2.25       4

1315          KK  MCDO15
1316          KM          ROUT FLOW TO MCDOWELL / 15TH AVE.
1317          RS      3    ELEV       1
1318          RC   0.13    0.02    0.13  1320.0   0.001
1319          RX      0    0.01   400.0  400.01   460.0  460.01  859.99   860.0
1320          RY      4    2.25    1.25       1       1    1.25    2.25       4

1321          KK  MCDO15
1322          KM          COMBINE ROUTED FLOW
1323          HC      2

1324          KK  MCDO15   BASIN COMPUTATION
1325          KM          SCS METHOD
1326          BA   0.207
1327          LS  0.381    84.0       0
1328          UD   0.55

1329          KK  MCDO15
1330          KM          COMBINE ROUTED FLOW WITH MCDOWELL/ 15TH. AVE.
1331          HC      2

1332          KK  MCDO17
1333          KM          ROUT FLOW TO MCDOWELL/ 17TH. AVE.
1334          RS      3    ELEV       1
1335          RC   0.13    0.02    0.13  1320.0  0.0016
1336          RX      0    0.01   400.0  400.01   460.0  460.01  859.99   860.0
1337          RY      4    2.25    1.25       1       1    1.25    2.25       4

1338          KK  MCDO17
1339          KM          COMBINE ROUTED FLOW
1340          HC      2
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1341          KK  VANB17
1342          KM            ROUTING TO VAN BUREN/17 AVE.
1343          RS       2    ELEV       1       0
1344          RC   0.130    0.020   0.130  5280.0   0.002
1345          RX     0.0    270.0   600.0   600.1   960.0   660.1  1240.0  3500.0
1346          RY     3.0      2.0     1.0     1.0     1.0     1.0     2.0     3.0

1347          KK  VANB17    BASIN COMPUTATION
1348          KM            SCS METHOD
1349          BA    0.84
1350          LS   0.299     87.0       0
1351          UD   0.586

1352          KK  VANB17
1353          KM            COMBINE ROUTED FLOW WITH VAN BUREN/19 AVE.
1354          HC       2

1355          KK  ROO16S     BASIN COMPUTATION
1356          KM             SCS METHOD
1357          BA   0.260
1358          LS   0.353     85.0       0
1359          UD   0.336

1360          KK  ROOS7S
1361          KM             ROUTING FLOW TO ROOSEVELT/7 ST.
1362          RS       2    ELEV       1       0
1363          RC   0.060    0.020   0.060  5280.0   0.002
1364          RX     0.0     0.01   100.0  100.01  129.99   130.0  229.99   230.0
1365          RY     4.0     2.25    1.25     1.0     1.0    1.25    2.25     4.0

1366          KK  ROOS7S    BASIN COMPUTATION
1367          KM            SCS METHOD
1368          BA   0.597
1369          LS   0.299     87.0       0
1370          UD   0.674

1371          KK  ROOS7S
1372          KM             COMBINE ROUTED FLOW WITH ROOSEVELT/7 ST.
1373          HC       2

1374          KK  ROOS7S
1375          KM             DIVERT STORM DRAIN FLOW
1376          DT  SDFR7S       0      60
1377          DI      60    1000    3000
1378          DO      60      60      60

1379          KK  MCKI7A
1380          KM             ROUTING FLOW TO MCKINLEY/7 AVE.
1381          RS       3    ELEV       1       0
1382          RC   0.060    0.020   0.060  5280.0  0.0015
1383          RX     0.0     0.01   900.0   900.1   960.0   960.1  1500.0  1850.0
1384          RY     2.0      2.0     1.0     1.0     1.0     1.0     1.0     2.0
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1385          KK  MCKI7A     BASIN COMPUTATION
1386          KM             SCS METHOD
1387          BA   0.736
1388          LS   0.223    90.0       0
1389          UD   0.846

1390          KK  MCKI7A
1391          KM             COMBINE ROUTED FLOW WITH MCKINLEY/7 AVE.
1392          HC       2

1393          KK  MCK17A
1394          KM             DIVERT SURFACE FLOW
1395          DT  SDFMI7       0      52
1396          DI      52    1000    3000
1397          DO      52      52      52

1398          KK  VANB17
1399          KM             ROUTING FLOW TO VAN BUREN/ 17 AVE.
1400          RS       2    ELEV       1       0
1401          RC   0.130   0.020   0.130  4400.0  0.0015
1402          RX     0.0   350.0   650.0   700.0   750.0   780.0  1800.0  2850.0
1403          RY     2.0     1.5     1.0     1.0     1.0     1.0     1.0     2.0

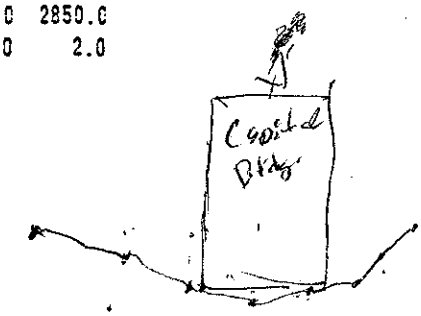
1404          KK  VANB17
1405          KM             COMBINE ROUTED FLOW WITH VAN BUREN/17 AVE.
1406          HC       2

1407          KK  REACHA
1408          KM           ROUTING FIRST REACH TO JACKSON/I10
1409          RS       2    ELEV       1       0
1410          RC   0.035   0.035   0.035  2600.0  0.0025
1411          RX     0.0   780.0  1230.0  1550.0  2000.0  2400.0  2610.0  2850.0
1412          RY     3.5     2.5     1.5     1.0    1.25     1.5     2.5     3.5

1413          KK  JACI10
1414          KM           ROUTING 2ND REACH TO JACKSON /I10
1415          RS       3    ELEV       1       0
1416          RC   0.130   0.020   0.130  2400.0  0.0009
1417          RX     0.0     5.0  319.99   320.0   410.0  410.01   800.0  1200.0
1418          RY   4.175     2.0    1.25    1.00    1.00    1.25    3.75   4.175

1419          KK  JACI10     BASIN COMPUTATION
1420          KM             SCS METHOD
1421          BA   0.753
1422          LS   0.299    87.0       0
1423          UD   0.815

1424          KK  JACI10
1425          KM           COMBINE ROUTED FLOW WITH BASIN
1426          HC       2
```



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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1427          KK  VAN621   BASIN COMPUTTION
1428          KM           SCS METHOD
1429          BA   0.672
1430          LS   0.273    88.0       0
1431          UD   0.672

1432          KK  JACI10
1433          KM           ROUTING FLOW JACKSON / I10
1434          RS       2    ELEV       1       0
1435          RC   0.130   0.020   0.130  2300.0  0.0017
1436          RX     0.0    0.01   200.0  200.01  229.99   230.0  429.99   430.0
1437          RY     4.0    2.25    1.25     1.0     1.0    1.25    2.25     4.0

1438          KK  JACI10
1439          KM           COMBINE TO JACKSON /I10
1440          HC       2

1441          KK  LINC7S    BASIN COMPUTATION
1442          KM            SCS METHOD
1443          BA     1.8
1444          LS   0.273    88.0       0
1445          UD   1.260

1446          KK  LINC7S
1447          KM           DIVERT SURFACE FLOW
1448          DT  SDFL7S      0     120
1449          DI     120   1000    2000
1450          DO     120    120     120

1451          KK  GRAN7A
1452          KM           ROUTING TO LINCON /7 AVE.
1453          RS       4   ELEV       1       0
1454          RC   0.060   0.060   0.060  5280.0  0.003
1455          RX     0.0    0.01   200.0   360.0  480.0   600.0   840.0  1000.0
1456          RY     3.0     3.0     2.0     1.5    1.0     1.5     2.0     2.5

1457          KK  GRAN7A    BASIN COMPUTATION
1458          KM           SCS METHOD
1459          BA   1.049
1460          LS   0.247    89.0       0
1461          UD   0.527

1462          KK  GRAN7A
1463          KM           COMBINING ROUTED FLOW TO LINCON /7 AVE.
1464          HC       2

1465          KK  REACHA
1466          KM           ROUTING TO PIMA/19 AVE. 1ST. REACH
1467          RS       4   ELEV       1       0
1468          RC   0.060   0.060   0.060  3100.0  0.0021
1469          RX     0.0   700.0  1000.0  1360.0  1680.0  2180.0  2290.0  2800.0
1470          RY     4.0     1.5     1.0     1.0     1.0     1.5     2.0     4.0
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1471          KK  PIMA19
1472          KM            ROUTING TO PIMA/19 AVE. LAST REACH
1473          RS      3     ELEV      1      0
1474          RC  0.060   0.060   0.060  2700.0  0.0012
1475          RX    0.0    0.01   470.0  1240.0  1500.0  1845.0  2160.0 2160.01
1476          RY    4.0     3.0     1.0     1.0     1.0     1.0     3.0     4.0

1477          KK  PIMA19    BASIN COMPUTATION
1478          KM            SCS METHOD
1479          BA  0.979
1480          LS  0.299     87.0      0
1481          UD  0.710

1482          KK  PIMA19
1483          KM            COMBINE ROUTED FLOWS TO BUCKEYE/19 AVE.
1484          HC      2

1485          KK  PIMA19
1486          KM            DIVERT STORM DRAIN FLOW
1487          DT  SDFP19      0     110
1488          DI     110    1000    2000
1489          DO     110     110     110

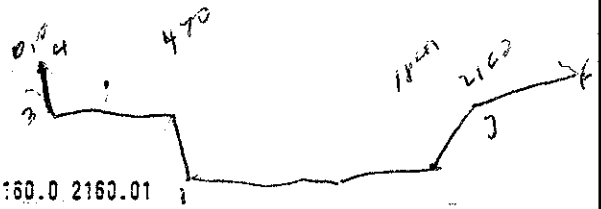
1490          KK  PIMA22    BASIN COMPUTATION
1491          KM            SCS METHOD
1492          BA  0.427
1493          LS  0.299     87.0      0
1494          UD  0.370

1495          KK  PIMA22
1496          KM            COMBINE PIMA/19TH. AVE., PIMA/22 AVE., JACKSON/I10
1497          HC      3

1498          KK  PIMA22
1499          KM            DIVERT STROM DRAIN FLOW
1500          DT  SDI10F      0     107
1501          DI       0     117    1000    2000    3000
1502          DO       0     107     107     107     107

1503          KK  I10DUE
1504          KM
1505          RS       1    ELEV    1041       0
1506          SA     4.4    12.2   21.46   38.31     241
1507          SE    1044    1048    1052    1056    1062
1508          SS  1057.5     500     2.3     1.5

1509          KK  DURA31
1510          KM            ROUTING FLOW TO DURANGO/ 31 AVE.
1511          RS       5    ELEV       1       0
1512          RC   0.035   0.035   0.060  3800.0  0.0017
1513          RX     0.0   450.0  1120.0  1600.0  2100.0  2650.0  3800.0  3801.0
1514          RY     3.0     1.5     1.0     1.5     2.0     2.0     3.0     4.0
```



(1) No Routing of JACI10 to Pima22 (Reach 2600)

(2) Non Routing Pima 19 to Pima 22 L = 3000'

Lin 1435-1440

Risvor.

Grc Curved Length

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 674          KK  CAME19
 675          KM          DIVERT STROM DRAIN FLOW
 676          DT  SDFC19      0      23
 677          DI      23    100    3000
 678          DQ      23     23      23

 679          KK  CAME19
 680          KM          DIVERT SURFACE FLOW
 681          DT  SFC19E
 682          DI     167    317     780     830    1651
 683          DQ      93    105     215     226     375

 684          KK  INDI17
 685          KM          ROUTING FROM CAMELBACK/19 AVE TO INDIAN SCHOOL/17 AVE.
 686          RS       2   ELEV       1       0
 687          RC   0.060  0.020   0.060  2650.0  0.0041
 688          RX     0.0   0.01  200.00  200.01  263.99  264.00  463.99   464.0
 689          RY     4.0   2.25    1.25     1.0     1.0    1.25    2.25     4.0

 690          KK  INDI17
 691          KM          ROUTING 2ND. REACH TO INDIAN SCHOOL/17 AVE.
 692          RS       3   ELEV       1       0
 693          RC   0.130  0.020   0.130  2850.0  0.0039
 694          RX     0.0   0.01   200.0  200.01  229.99   230.0  429.99   430.0
 695          RY     4.0   2.25    1.25     1.0     1.0    1.25    2.25     4.0

 696          KK  INDI17  BASIN COMPUTATION
 697          KM          SCS METHOD
 698          BA     .56
 699          LS   0.381   84.0       0
 700          UD   0.486

 701          KK  INID17
 702          KM          COMBINE ROUTED FLOW TO INDIAN SCHOOL/17 AVE.
 703          HC       3

 704          KK  NORTH7  BASIN COMPUTATION
 705          KM          SCS METHOD
 706          BA   0.097
 707          LS   0.105   95.0       0
 708          UD   0.317

 709          KK  NORTH7
 710          KM          DIVERT STRORM DRAIN FLOW
 711          DT  SDFN07      0      50
 712          DI      50    100    3000
 713          DQ      50     50      50

 714          KK  NORTH7
 715          KM          DIVERT SURFACE FLOW
 716          DT  SFN07S
 717          DI     140    510    1180
 718          DQ    57.3    162     243
```

GAP in Road B

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 1515         KK  DURA31   BASIN COMPUTATION
 1516         KM           SCS METHOD
 1517         BA     1.0
 1518         LS   0.326    86.0       0
 1519         UD   0.864

 1520         KK  DURA31
 1521         KM           COMBINE ROUTED FLOW WITH BUCKEYE/ 31 AVE.
 1522         HC       2

 1523         KK  BUCK35
 1524         KM           ROUTING TO BUCKEYE/35 AVE.
 1525         RS       5    ELEV       1       0
 1526         RC   0.035   0.060   0.060  3400.0   0.002
 1527         RX       0    0.01   750.0  1250.0  1570.0  1800.0  2450.0 2450.01
 1528         RY     4.0     3.0     1.5     1.5     1.0     2.5     3.0     4.0

 1529         KK  BUCK35  BASIN COMPUTATION
 1530         KM          SCS METHOD
 1531         BA     0.6
 1532         LS   0.299    87.0       0
 1533         UD     1.2

 1534         KK  BUCK35
 1535         KM           COMBINE ROUTED FLOW WITH BUCKEYE/35 AVE.
 1536         HC       2

 1537         KK  BUCK43
 1538         KM           ROUTING TO BUCKEYE/43 AVE.
 1539         RS       5    ELEV       1       0
 1540         RC   0.035   0.035   0.035  5280.0  0.0021
 1541         RX     0.0    0.01   800.0  800.01 1199.99  1200.0 1999.99  2040.0
 1542         RY     4.0     2.0     1.0     1.0     1.0     1.0     2.0     4.0

 1543         KK  BUCK43   BASIN COMPUTATION
 1544         KM           SCS
 1545         BA    0.75
 1546         LS   0.273    88.0       0
 1547         UD    0.88

 1548         KK  BUCK43
 1549         KM           COMBINE ROUTED FLOW WITH BUCKEYE/43 AVE.
 1550         HC       2

 1551         KK  DURA39   BASIN COMPUTATION
 1552         KM           SCS METHOD
 1553         BA     1.0
 1554         LS   0.326    86.0       0
 1555         UD   0.882
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1556          KK  BUCK43
1557          KM            ROUT FLOW TO BUCKEYE/43 AVE.
1558          RS      3    ELEV       1       0
1559          RC   0.035   0.035   0.035  3070.0   0.003
1560          RX     0.0    0.01   200.0   300.0   400.0   600.0  799.99  800.00
1561          RY     4.0     2.0     1.0     1.0     1.0     1.0     2.0     4.0

1562          KK  BUCK43
1563          KM          COMBINE ROUTED FLOW
1564          HC      2

1565          KK  LASTBA
1566          KM          ROUTING TO SALT RIVER
1567          RS      9    ELEV       1       0
1568          RC   0.035   0.035   0.035   10500  0.0025
1569          RX     0.0    0.01   400.0  400.01   800.0  800.01 1200.01 1200.02
1570          RY       4       2       2       1       1       2       2       4

1571          KK  LASTBA   BASIN COMPUTATION
1572          KM           SCS METHOD
1573          BA    0.67
1574          LS   0.273    88.0       0
1575          UD   0.875

1576          KK  SALTRI
1577          KM           COMBINE ROUTED FLOW WITH LASTBASIN OUTFALL SALT RIVER
1578          HC      2
1579          ZZ
```

```
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   7       NORTOE
                V
                V
  18       GLENOE
                .
                .
  24            .      GLENOE
                .           .
                .           .
  29       GLENOE............
                .
                .
  32            .      ORAN7S
                .           .
                .           .
  53            .           .-------> SDFO7S
  51            .      ORAN7S
                .           V
                .           V
  56            .      GLEN7S
                .           .
                .           .
  62            .           .     GLEN7S
                .           .          .
                .           .          .
  80            .      GLEN7S............
                .           .
                .           .
  83            .           .     GLEN12
                .           .          V
                .           .          V
  96            .           .     GLEN7S
                .           .          .
                .           .          .
 102            .      GLEN7S............
                .           .
                .           .
 107            .           .-------> SDFG7S
 105            .      GLEN7S
                .           .
                .           .
 112            .           .-------> SFG7SS
 110            .      GLEN7S
                .           V
                .           V
 115            .      GLENOE
                .           .
                .           .
 121       GLENOE............
                .
                .
 126            .-------> SFGLOW
 124       GLENOE
                V
                V
 129       MARYOE
```

```
                .
135             .      MARYCE
                .           .
                .           .
153      MARYCE............
                .
                .
158             .-------> SDFMAC
156      MARYCE
             V
             V
161      BETHCE
                .
                .
167             .      BETHCE
                .           .
                .           .
185      BETHCE............
                .
                .
188             .      BETH7S
                .           V
                .           V
206             .      BETHCE
                .           .
                .           .
212      BETHCE............
                .
                .
217             .-------> SDFBEC
215      BETHCE
                .
                .
222             .-------> SFBEOW
220      BETHCE
             V
             V
225      MISSCE
                .
                .
231             .      MISSCE
                .           .
                .           .
249      MISSCE............
                .
                .
252             .      MISS7S
                .           V
                .           V
270             .      MISSCE
                .           .
                .           .
276      MISSCE............
                .
                .
281             .-------> SDFMIC
279      MISSCE
             V
             V
284      CAMECE
                .
                .
290             .      CAMECE
                .           .
                .           .
```

```
                .
                .
 311            .      CAME7S
                .          V
                .          V
 329            .      CAMECE
                .          .
                .          .
 335      CAMECE............
                .
                .
 340            .-------> SDFCAC
 338      CAMECE
                .
                .
 345            .-------> SFCACW
 343      CAMECE
                V
                V
 348      GRCACE
                .
                .
 354            .      GRCACE
                .          .
                .          .
 372      GRCACE............
                .
                .
 377            .-------> SDGRCE
 375      GRCACE
                .
                .
 380            .      GRCA7S
                .          V
                .          V
 398            .      GRCACE
                .          .
                .          .
 404      GRCACE............
                .
                .
 409            .------->  TOTAL
 407      GRCACE
                .
                .
 412            .      GLEN23
                .          V
                .          V
 417            .      BETH23
                .          .
                .          .
 423            .          .      BETH23
                .          .          .
                .          .          .
 428            .      BETH23............
                .          V
                .          V
 431            .      CAME24
                .          .
                .          .
 437            .          .      CAME24
                .          .          .
                .          .          .
 442            .      CAME24............
                .          V
```

```
445   .   GRCA23
      .       .
      .       .
451   .       .     GRCA23
      .       .         .
      .       .         .
456   .   GRCA23............
      .       V
      .       V
459   .   OSBORN
      .       V
      .       V
465   .   THOM19
      .       .
      .       .
471   .       .     THOM19
      .       .         .
      .       .         .
476   .   THOM19............
      .       .
      .       .
481   .       .-------> SDFT19
479   .   THOM19
      .       V
      .       V
484   .   ECAN17
      .       .
      .       .
490   .       .     GLEN21
      .       .         V
      .       .         V
495   .       .     BETH21
      .       .         .
      .       .         .
501   .       .         .     BETH21
      .       .         .         .
      .       .         .         .
506   .       .     BETH21............
      .       .         V
      .       .         V
509   .       .     CAME21
      .       .         .
      .       .         .
515   .       .         .     CAME21
      .       .         .         .
      .       .         .         .
520   .       .     CAME21............
      .       .         V
      .       .         V
523   .       .     INDI19
      .       .         V
      .       .         V
529   .       .     INDI19
      .       .         .
      .       .         .
535   .       .         .     INDI19
      .       .         .         .
      .       .         .         .
540   .       .     INDI19............
      .       .         V
      .       .         V
543   .       .     INDI17
      .       .         .
      .       .         .
545   .       .         .     NOR19A
```

```
554                                  NOR723
                                        .
                                        .
562                                     .-------> SFN23S
560                                  NOR723
                                        V
                                        V
565                                  NOR719
                                        .
                                        .
571                                     .     NOR19B
                                        .        V
                                        .        V
577                                     .     NOR7DE
                                        .        V
                                        .        V
583                                     .     NOR719
                                        .        .
                                        .        .
589                             NOR719.......................
                                     .
                                     .
594                                  .-------> SDFN19
592                             NOR719
                                     V
                                     V
597                             GLEN19
                                     .
                                     .
605                                  .<------- SFN23S
603                                  DIVN23
                                        V
                                        V
606                                  MOR719
                                        V
                                        V
612                                  GLEN19
                                        V
                                        V
618                                  MOR719
                                        V
                                        V
624                                  MOR719
                                        .
                                        .
630                                     .     MOR719
                                        .        .
                                        .        .
635                                  MOR719............
                                        V
                                        V
636                                  GLEN19
                                        .
                                        .
644                             GLEN19............
                                     .
                                     .
649                                  .-------> SDFG19
647                             GLEN19
                                     .
                                     .
654                                  .-------> SFG19E
652                             GLEN19
                                     V
```

```
557                 .           .           .       BETH19
                    .           .           .           .
                    .           .           .           .
565                 .           .           .           .-------> SFB19E
563                 .           .           .       BETH19
                    .           .           .           V
                    .           .           .           V
568                 .           .           .       CAME19
                    .           .           .           .
                    .           .           .           .
576                 .           .           .           .-------> SDFC19
574                 .           .           .       CAME19
                    .           .           .           .
                    .           .           .           .
581                 .           .           .           .-------> SFC19E
579                 .           .           .       CAME19
                    .           .           .           V
                    .           .           .           V
584                 .           .           .       INDI17
                    .           .           .           V
                    .           .           .           V
590                 .           .           .       INDI17
                    .           .           .           .
                    .           .           .           .
596                 .           .           .           .     INDI17
                    .           .           .           .          .
                    .           .           .           .          .
701                 .           .       INID17.......................
                    .           .           .
                    .           .           .
704                 .           .           .       NORTH7
                    .           .           .           .
                    .           .           .           .
711                 .           .           .           .-------> SDFNO7
709                 .           .           .       NORTH7
                    .           .           .           .
                    .           .           .           .
716                 .           .           .           .-------> SFNO7S
714                 .           .           .       NORTH7
                    .           .           .           V
                    .           .           .           V
719                 .           .           .       NORT15
                    .           .           .           .
                    .           .           .           .
725                 .           .           .           .     NORT15
                    .           .           .           .          .
                    .           .           .           .          .
729                 .           .           .       NORT15............
                    .           .           .           .
                    .           .           .           .
734                 .           .           .           .-------> SDFN15
732                 .           .           .       NORT15
                    .           .           .           V
                    .           .           .           V
737                 .           .           .       GLEN15
                    .           .           .           .
                    .           .           .           .
745                 .           .           .           .-------> SDFG15
743                 .           .           .       GLEN15
                    .           .           .           V
                    .           .           .           V
748                 .           .           .       BETH15
                    .           .           .           .
                    .           .           .           .
756                 .           .           .           .       .<------- SFG19E
```

```
                .         .         .         .         V
                .         .         .         .         V
757             .         .         .         .     GLEN17
                .         .         .         .         .
                .         .         .         .         .
763             .         .         .         .         .     GLEN17
                .         .         .         .         .         .
                .         .         .         .         .         .
766             .         .         .         .     GLEN17............
                .         .         .         .         V
                .         .         .         .         V
771             .         .         .         .     BETH15
                .         .         .         .         V
                .         .         .         .         V
777             .         .         .         .     BETH15
                .         .         .         .         V
                .         .         .         .         V
783             .         .         .         .     BETH15
                .         .         .         .         .
                .         .         .         .         .
789             .         .         .         .         .     BETH15
                .         .         .         .         .         .
                .         .         .         .         .         .
794             .         .         .     BETH15........................
                .         .         .         .
                .         .         .         .
799             .         .         .         .         .<-------  SFB19E
797             .         .         .         .     DIVB19
                .         .         .         .         V
                .         .         .         .         V
800             .         .         .         .     BETH15
                .         .         .         .         .
                .         .         .         .         .
805             .         .         .     BETH15............
                .         .         .         .
                .         .         .         .
811             .         .         .         .-------> SDFB15
809             .         .         .     BETH15
                .         .         .         V
                .         .         .         V
814             .         .         .     CAME15
                .         .         .         .
                .         .         .         .
822             .         .         .         .         .<-------  SFC19E
820             .         .         .         .     DIVE19
                .         .         .         .         V
                .         .         .         .         V
823             .         .         .         .     CAME15
                .         .         .         .         .
                .         .         .         .         .
829             .         .         .         .         .     CAME15
                .         .         .         .         .         .
                .         .         .         .         .         .
834             .         .         .     CAME15........................
                .         .         .         .
                .         .         .         .
839             .         .         .         .-------> SDFC15
837             .         .         .     CAME15
                .         .         .         .
                .         .         .         .
844             .         .         .         .-------> SFC15E
842             .         .         .     CAME15
                .         .         .         V
                .         .         .         V
847             .         .         .     GRCA15
```

```
855                                  .<-------  SFNO7S
853                            DIVEN7
                                  V
                                  V
856                            GLEND7
                                  .
                                  .
862                                  .     GLEND7
                                  .          .
                                  .          .
867                            GLEND7............
                                  .
                                  .
872                                  .          .<-------  SFGLOW
870                                  .     DIVG7A
                                  .          V
                                  .          V
873                                  .     GLEND7
                                  .          .
                                  .          .
879                            GLEND7............
                                  .
                                  .
884                                  .-------->  SFGL7S
882                            GLEND7
                                  V
                                  V
887                            GLEN12
                                  .
                                  .
893                                  .     GLEN12
                                  .          .
                                  .          .
898                            GLEN12............
                                  V
                                  V
901                            BETH11
                                  .
                                  .
907                                  .     BETH11
                                  .          .
                                  .          .
912                            BETH11............
                                  V
                                  V
915                            CAME11
                                  .
                                  .
921                                  .     CAME11
                                  .          .
                                  .          .
928                                  .          .          .<-------  SFC15E
926                                  .          .     DIVC15
                                  .          .          V
                                  .          .          V
929                                  .          .     CAME11
                                  .          .          .
                                  .          .          .
935                            CAME11........................
                                  .
                                  .
940                                  .-------->  SFC11E
938                            CAME11
                                  V
```

```
 943                                  GRCA7I
                                        .
                                        .
 951                                    .<-------  SFGL7S
 949                                 DIVEG7
                                        V
                                        V
 952                                 BETHA7
                                        .
                                        .
 958                                    .      BETHA7
                                        .          .
                                        .          .
 963                                 BETHA7............
                                        .
                                        .
 968                                    .          .<-------  SFBECW
 966                                    .      DIVB7A
                                        .          V
                                        .          V
 969                                    .      BETHA7
                                        .          .
                                        .          .
 975                                 BETHA7............
                                        .
                                        .
 980                                    .-------> SDFBE7
 978                                 BETHA7
                                        V
                                        V
 983                                 CAMEL7
                                        .
                                        .
 989                                    .      CAMEL7
                                        .          .
                                        .          .
 994                                 CAMEL7............
                                        .
                                        .
 999                                    .          .<-------  SFC11E
 997                                    .      DIVE11
                                        .          V
                                        .          V
1000                                    .      CAMEL7
                                        .          .
                                        .          .
1006                                 CAMEL7............
                                        .
                                        .
1011                                    .-------> SFCA7A
1009                                 CAMEL7
                                        V
                                        V
1014                                 GRCA7A
                                        .
                                        .
1022                                    .          .<-------  SFCACW
1020                                    .      DIVCAC
                                        .          V
                                        .          V
1023                                    .      CAME3A
                                        .          .
                                        .          .
1029                                    .          .      CAME3A
                                        .          .          .
```

```
1034                                                    CAME3A............
                                                          .
                                                          .
1039                                                      .<-------  SFCA7A
1037                                                      .     DIVC7A
                                                          .        V
                                                          .        V
1040                                                      .     CAME3A
                                                          .        .
                                                          .        .
1046                                                      .  CAME3A............
                                                          .     V
                                                          .     V
1049                                                      .  GRCA3A
                                                          .        .
                                                          .        .
1057                                                      .        .<-------  TOTAL
1055                                                      .     DIVGCC
                                                          .        .
                                                          .        .
1060                                                      .        .-------> SFGC3A
1058                                                      .     GRCA3A
                                                          .        V
                                                          .        V
1063                                                      .     GRCA3A
                                                          .        .
                                                          .        .
1059                                                      .  GRCA3A............
                                                          .        .
                                                          .        .
1074                                                      .        .-------> SFGC7A
1072                                                      .  GRCA3A
                                                          .     V
                                                          .     V
1077                                                      .  GRCA7A
                                                          .        .
                                                          .        .
1083                                                      .  GRCA7A............
                                                          .     V
                                                          .     V
1086                                                      .  GRCA11
                                                          .        .
                                                          .        .
1092                                                      .  GRCA11............
                                                          .     V
                                                          .     V
1095                                                      .  GRCA15
                                                          .        .
                                                          .        .
1101                                                      .  GRCA15............
                                                          .        .
                                                          .        .
1104                                                      .  GRCA15
                                                          .        .
                                                          .        .
1109                                                      .  GRCA15............
                                                          .        .
                                                          .        .
1114                                                      .        .-------> SDFG15
1112                                                      .  GRCA15
                                                          .     V
                                                          .     V
1117                                                      .  INDI17
                                                          .        .
                                                          .        .
```

```
                .         .         V
                .         .         V
1126            .         .     THOM17
                .         .         .
                .         .         .
1132            .         .         .     THOM17
                .         .         .         .
                .         .         .         .
1137            .         .     THOM17............
                .         .         V
                .         .         V
1140            .         .     ECAN17
                .         .         .
                .         .         .
1146            .     ECAN17............
                .         V
                .         V
1149            .     MCDO17 ✓
                .         .
                .         .
1155            .         .     MCDO17
                .         .         .
                .         .✓        .
1160            .     MCDO17............
                .         .
                .         .
1163            .         .     THOM22
                .         .         V
                .         .         V
1168            .         .     REACHA
                .         .         V
                .         .         V
1174            .         .     REACHB
                .         .         V
                .         .         V
1180            .         .     MCDO19
                .         .         .
                .         .         .
1186            .         .         .     MCDO19
                .         .         .         .
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1191            .         .     MCDO19............
                .         .         .
                .         .✓        .
1194            .     MCDO17............
                .         .
                .         .
1199            .         .         .<-------  SFGC3A
1197            .         .     DIGC3A
                .         .         V
                .         .         V
1200            .         .     INDI3A
                .         .         .
                .         .         .
1206            .         .         .     INDI3A
                .         .         .         .
                .         .         .         .
1211            .         .     INDI3A............
                .         .         V
                .         .         V
1214            .         .     THOM3A
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1220            .         .         .     THOM3A
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1225          .          .      ...V...............
              .          .          V
              .          .          V
1228          .          .      MCDC3A
              .          .          .
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1236          .          .          .-------> SFMC3A
1234          .          .      MCDC3A
              .          .          V
              .          .          V
1239          .          .      MCDC7A
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1245          .          .          .      MCDC7A
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1250          .          .      MCDC7A............
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1255          .          .          .          .<------- SFGC7A
1253          .          .          .      DIGC7A
              .          .          .          V
              .          .          .          V
1256          .          .          .      OSBC7A
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1262          .          .          .          .      OSBC7A
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              .          .          .          .          .
1267          .          .          .      OSBC7A............
              .          .          .          V
              .          .          .          V
1270          .          .          .      EDGE7A
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1276          .          .          .          .      EDGE7A
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              .          .          .          .          .
1281          .          .          .      EDGE7A............
              .          .          .          V
              .          .          .          V
1284          .          .          .      MCDC7A
              .          .          .          .
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1290          .          .      MCDC7A............
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              .          .          .
1295          .          .          .-------> SFMC7A
1293          .          .      MCDC7A
              .          .          V
              .          .          V
1298          .          .      MCDC15
              .          .          .
              .          .          .
1304          .          .          .      ECAN11
              .          .          .          V
              .          .          .          V
1309          .          .          .      MCDC15
              .          .          .          V
              .          .          .          V
1315          .          .          .      MCDC15
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1321          .          .      MCDC15............
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1329                    MCDO15............
                           V
                           V
1332                    MCDO17
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1338          MCDO17............
                 V
                 V
1341          VANB17
                 .
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1347                    VANB17
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                           .
1352          VANB17............
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1355                    ROO16S
                           V
                           V
1360                    ROOS7S
                           .
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1366                           .     ROOS7S
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1371                    ROOS7S............
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1376                           .-------> SDFR7S
1374                    ROOS7S
                           V
                           V
1379                    MCKI7A
                           .
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1385                           .     MCKI7A
                           .          .
                           .          .
1390                    MCKI7A............
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1395                           .-------> SDFMI7
1393                    MCKI7A
                           V
                           V
1398                    VANB17
                           .
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1404          VANB17............
                 V
                 V
1407          REACHA
                 V
                 V
1413          JACI10
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1419                    JACI10
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L=5280 ok.

L=2400 ok

L=2400

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1427                VANS21
                       V
                       V
1432                JACI10
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1438          JACI10.......
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1441                LINC7S
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                       .
1448                       .-------> SDFL7S
1446                LINC7S
                       V
                       V
1451                GRAN7A
                       .
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1457                       .     GRAN7A
                       .          .
                       .          .
1462                GRAN7A.......
                       V
                       V
1455                REACHA
                       V
                       V
1471                PIMA19
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1477                       .     PIMA19
                       .          .
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1482                PIMA19.......
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1487                       .-------> SDFP19
1485                PIMA19
                       .
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1490                       .     PIMA22
                       .          .
                       .          .
1495          PIMA22.......................
                       .
                       .
1500                   .-------> SDI10F
1498          PIMA22
                       V
                       V
1503          I10DUE
                       V
                       V
1509          DURA31
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1515                DURA31
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1520          DURA31.......
                       V
                       V
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1529            .          .      BUCK35
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1534            .     BUCK35............
                .          V
                .          V
1537            .     BUCK43
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1543            .          .      BUCK43
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1548            .     BUCK43............
                .          .
                .          .
1551            .          .      DURA39
                .          .          V
                .          .          V
1556            .          .      BUCK43
                .          .          .
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1562            .     BUCK43............
                .          V
                .          V
1565            .     LASTBA
                .          .
                .          .
1571            .          .      LASTBA
                .          .          .
                .          .          .
1576            .     SALTRI............
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(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	NORTCE	91.	12.50	17.	5.	2.	.05		
ROUTED TO	GLENCE	60.	12.67	16.	5.	2.	.05	1.47	12.67
HYDROGRAPH AT	GLENCE	176.	12.50	40.	11.	5.	.12		
2 COMBINED AT	GLENCE	236.	12.67	56.	16.	8.	.17		
HYDROGRAPH AT	GRAN7S	160.	12.50	33.	10.	5.	.00		
DIVERSION TO	SDFG7S	30.	12.50	14.	5.	3.	.00		
HYDROGRAPH AT	GRAN7S	130.	12.50	19.	5.	2.	.00		
ROUTED TO	GLEN7S	116.	12.67	19.	5.	2.	.00	1.52	12.67
HYDROGRAPH AT	GLEN7S	180.	12.67	41.	12.	5.	.00		
2 COMBINED AT	GLEN7S	296.	12.67	61.	17.	9.	.00		
HYDROGRAPH AT	GLEN12	20.	12.50	4.	1.	0.	.00		
ROUTED TO	GLEN7S	15.	12.83	4.	1.	0.	.00	1.16	12.83
2 COMBINED AT	GLEN7S	311.	12.67	65.	18.	9.	.00		
DIVERSION TO	SDFG7S	5.	12.67	5.	3.	2.	.00		
HYDROGRAPH AT	GLEN7S	306.	12.67	60.	15.	7.	.00		
DIVERSION TO	SFG7SS	141.	12.67	33.	8.	4.	.00		
HYDROGRAPH AT	GLEN7S	165.	12.67	26.	7.	3.	.00		
ROUTED TO	GLENCE	146.	12.83	25.	7.	3.	.00	1.54	12.83
2 COMBINED AT	GLENCE	372.	12.67	82.	22.	11.	.17		
DIVERSION TO	SFGLOW	192.	12.67	48.	14.	7.	.17		
HYDROGRAPH AT	GLENCE	180.	12.67	34.	9.	4.	.17		
ROUTED TO	MARYCE	152.	13.00	34.	9.	4.	.17	1.80	13.00
HYDROGRAPH AT	MARYCE	233.	12.67	64.	19.	10.	.00		
2 COMBINED AT	MARYCE	377.	12.83	98.	28.	14.	.17		
DIVERSION TO	SDFMAC	50.	12.83	31.	11.	6.	.17		
HYDROGRAPH AT	MARYCE	327.	12.83	67.	17.	8.	.17		
ROUTED TO	BETHCE	280.	13.00	67.	17.	9.	.17	2.11	13.00
HYDROGRAPH AT	BETHCE	121.	12.50	25.	8.	4.	.00		

2 COMBINED AT	BETHCE	338	12.83	92	24	12	.17		
HYDROGRAPH AT	BETHTS	206.	12.67	47.	13.	7.	.00		
ROUTED TO	BETHCE	195.	12.83	47.	13.	7.	.00	1.73	12.83
2 COMBINED AT	BETHCE	521.	12.83	139.	35.	19.	.17		
DIVERSION TO	BDFEEC	15.	12.83	13.	6.	4.	.17		
HYDROGRAPH AT	BETHCE	505.	12.83	125.	31.	15.	.17		
DIVERSION TO	BFEECW	225.	12.83	66.	16.	8.	.17		
HYDROGRAPH AT	BETHCE	281.	12.83	60.	15.	7.	.17		
ROUTED TO	MISSCE	246.	13.17	60.	15.	7.	.17	2.04	13.17
HYDROGRAPH AT	MISSCE	198.	12.67	45.	13.	7.	.00		
2 COMBINED AT	MISSCE	395.	12.83	105.	28.	14.	.17		
HYDROGRAPH AT	MISSTS	255.	12.67	71.	21.	11.	.00		
ROUTED TO	MISSCE	218.	13.00	71.	21.	11.	.00	1.98	13.00
2 COMBINED AT	MISSCE	603.	12.83	175.	49.	25.	.17		
DIVERSION TO	BDFMIC	40.	12.83	32.	13.	8.	.17		
HYDROGRAPH AT	MISSCE	563.	12.83	143.	36.	17.	.17		
ROUTED TO	CAMECE	484.	13.17	143.	36.	17.	.17	2.14	13.17
HYDROGRAPH AT	CAMECE	198.	12.67	45.	13.	7.	.00		
2 COMBINED AT	CAMECE	552.	13.00	188.	49.	24.	.17		
HYDROGRAPH AT	CAMETS	346.	12.83	95.	29.	15.	.00		
ROUTED TO	CAMECE	279.	13.33	95.	29.	15.	.00	2.09	13.33
2 COMBINED AT	CAMECE	842.	13.17	283.	77.	39.	.17		
DIVERSION TO	BDFCAC	45.	13.17	38.	16.	10.	.17		
HYDROGRAPH AT	CAMECE	797.	13.17	245.	61.	29.	.17		
DIVERSION TO	BFCACW	328.	13.17	113.	28.	14.	.17		
HYDROGRAPH AT	CAMECE	469.	13.17	132.	33.	16.	.17		
ROUTED TO	GRCACE	439.	13.50	132.	33.	16.	.17	2.09	13.50
HYDROGRAPH AT	GRCACE	160.	12.50	33.	10.	6.	.00		
2 COMBINED AT	GRCACE	460.	13.33	165.	43.	21.	.17		
DIVERSION TO	BDGRCE	50.	13.33	32.	10.	5.	.17		
HYDROGRAPH AT	GRCACE	410.	13.33	133.	33.	16.	.17		
HYDROGRAPH AT	GRCATS	319.	13.67	203.	53.	34.	.00		
ROUTED TO	GRCACE	[illegible]	14.67	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	14.67

2 COMBINED AT	GROAGE	590.	13.33	310.	95.	49.	.17		
	GROAGE	590	13.33	310	95.	49	.17		
DIVERSION TO	TOTAL	590.	.17	310.	95.	49.	.17		
HYDROGRAPH AT	GROAGE	0.	.17	0.	0.	0.	.17		
HYDROGRAPH AT	GLEN23	243.	12.50	49.	14.	7.	.20		
ROUTED TO	BETH23	175.	13.00	49.	14.	7.	.20	1.89	13.00
HYDROGRAPH AT	BETH23	339.	12.50	65.	18.	9.	.27		
2 COMBINED AT	BETH23	459.	12.67	114.	32.	15.	.47		
ROUTED TO	CAME24	301.	13.67	113.	32.	15.	.47	2.16	13.67
HYDROGRAPH AT	CAME24	268.	12.67	55.	15.	7.	.23		-
2 COMBINED AT	CAME24	579.	12.67	167.	47.	23.	.71		
ROUTED TO	GROA23	343.	13.67	167.	47.	23.	.71	2.30	13.67
HYDROGRAPH AT	GROA23	439.	12.67	95.	26.	13.	.39		
2 COMBINED AT	GROA23	514.	12.67	251.	73.	35.	1.10		
ROUTED TO	OSBORN	508.	13.33	254.	73.	35.	1.10	1.92	13.33
ROUTED TO	THOM19	456.	14.17	246.	73.	35.	1.10	2.25	14.17
HYDROGRAPH AT	THOM19	340.	12.67	76.	21.	10.	.32		
2 COMBINED AT	THOM19	491.	14.17	307.	94.	45.	1.42		
DIVERSION TO	SDFT19	60.	14.17	60.	31.	15.	1.42		
HYDROGRAPH AT	THOM19	431.	14.17	247.	63.	30.	1.42		
ROUTED TO	ECAN17	415.	14.50	242.	63.	30.	1.42	1.88	14.50
HYDROGRAPH AT	GLEN21	384.	12.50	77.	21.	10.	.32		
ROUTED TO	BETH21	270.	13.00	77.	21.	10.	.32	2.13	13.00
HYDROGRAPH AT	BETH21	446.	12.50	85.	24.	11.	.37		
2 COMBINED AT	BETH21	534.	12.67	162.	45.	22.	.69		
ROUTED TO	CAME21	403.	13.67	161.	45.	22.	.69	2.37	13.67
HYDROGRAPH AT	CAME21	491.	12.67	100.	28.	13.	.43		
2 COMBINED AT	CAME21	645.	12.67	261.	73.	35.	1.12		
ROUTED TO	INDI19	561.	13.33	260.	73.	35.	1.12	2.56	13.33
ROUTED TO	INDI19	504.	14.67	254.	73.	35.	1.12	2.55	14.67
HYDROGRAPH AT	INDI19	358.	12.67	83.	23.	11.	.33		
2 COMBINED AT	INDI19	530.	14.67	317.	96.	46.	1.45		
ROUTED TO	INDI19	526.	14.83	316.	96.	46.	1.45	2.17	14.83
HYDROGRAPH AT	NOR19A	515.	12.83	125.	35.	17.	.52		

HYDROGRAPH A	NOR723	320.	13.17	19.	49.	24.	.76		
	NOR723	598	13.17	176	49	24	.76		
DIVERSION TO	SFN23S	310.	13.17	115.	34.	17.	.76		
HYDROGRAPH AT	NOR723	215.	13.17	60.	15.	7.	.75		
ROUTED TO	NOR719	198.	13.67	60.	15.	7.	.75	1.80	13.67
HYDROGRAPH AT	NOR19B	322.	13.00	90.	25.	12.	.39		
ROUTED TO	NOR19E	198.	13.67	35.	11.	5.	.39	1196.16	13.67
ROUTED TO	NOR719	146.	14.00	35.	11.	5.	.39	1.69	14.00
3 COMBINED AT	NOR719	595.	12.83	217.	60.	29.	1.67		
DIVERSION TO	SDFN19	58.	12.83	57.	20.	10.	1.67		
HYDROGRAPH AT	NOR719	527.	12.83	160.	40.	19.	1.67		
ROUTED TO	GLEN19	396.	13.83	160.	40.	19.	1.67	2.12	13.83
HYDROGRAPH AT	DIVN23	310.	13.17	116.	34.	17.	.00		
ROUTED TO	MOR719	310.	13.33	116.	34.	17.	.00	2.13	13.33
ROUTED TO	GLEN19	295.	13.67	116.	34.	17.	.00	2.33	13.67
ROUTED TO	MOR719	297.	14.00	116.	34.	17.	.00	2.09	14.00
ROUTED TO	MOR719	274.	14.33	116.	34.	17.	.00	2.29	14.33
HYDROGRAPH AT	MOR719	151.	12.67	30.	8.	4.	.13		
2 COMBINED AT	MOR719	282.	14.33	144.	43.	21.	.13		
ROUTED TO	GLEN19	254.	14.83	143.	43.	21.	.13	1.99	14.83
2 COMBINED AT	GLEN19	592.	14.33	303.	83.	40.	1.80		
DIVERSION TO	SDFG19	29.	14.33	29.	14.	7.	1.80		
HYDROGRAPH AT	GLEN19	563.	14.33	274.	68.	33.	1.80		
DIVERSION TO	SFG19E	153.	14.33	97.	24.	12.	1.80		
HYDROGRAPH AT	GLEN19	410.	14.33	177.	44.	21.	1.80		
ROUTED TO	BETH19	396.	15.17	177.	44.	21.	1.80	2.05	15.17
DIVERSION TO	SFB19E	111.	15.17	69.	17.	8.	1.80		
HYDROGRAPH AT	BETH19	284.	15.17	108.	27.	13.	1.80		
ROUTED TO	CAME19	275.	15.67	108.	27.	13.	1.80	1.90	15.67
DIVERSION TO	SDFC19	23.	15.67	16.	4.	2.	1.80		
HYDROGRAPH AT	CAME19	253.	15.67	92.	23.	11.	1.80		
DIVERSION TO	SFC19E	100.	15.67	48.	12.	5.	1.80		
HYDROGRAPH AT	CAME19	153.	15.67	44.	11.	5.	1.80		
ROUTED TO	INDI19	143.	16.00	44.	11.	5.	1.80	1.61	16.00

ROUTED TO	INDI17	136.	13.67	44.	11.	5.	1.60	1.67	13.67
HYDROGRAPH AT	INDI17	600.	12.67	130.	35.	17.	.55		
3 COMBINED AT	INID17	923.	12.67	484.	143.	69.	3.81		
HYDROGRAPH AT	NORTH7	153.	12.50	32.	9.	4.	.10		
DIVERSION TO	SDFN07	50.	12.50	18.	6.	3.	.10		
HYDROGRAPH AT	NORTH7	103.	12.50	14.	3.	2.	.10		
DIVERSION TO	SFN07S	57.	12.50	10.	2.	1.	.10		
HYDROGRAPH AT	NORTH7	46.	12.50	4.	1.	0.	.10		
ROUTED TO	NORT15	28.	12.67	4.	1.	0.	.10	1.28	12.67
HYDROGRAPH AT	NORT15	265.	12.67	57.	16.	8.	.21		
2 COMBINED AT	NORT15	293.	12.67	61.	17.	8.	.31		
DIVERSION TO	SDFN15	110.	12.67	40.	12.	6.	.31		
HYDROGRAPH AT	NORT15	183.	12.67	21.	5.	3.	.31		
ROUTED TO	GLEN15	113.	13.17	21.	5.	3.	.31	1.69	13.17
DIVERSION TO	SDFG15	90.	13.17	20.	5.	2.	.31		
HYDROGRAPH AT	GLEN15	23.	13.17	2.	0.	0.	.31		
ROUTED TO	BETH15	7.	13.33	2.	0.	0.	.31	1.08	13.33
HYDROGRAPH AT	DIVG19	153.	14.33	97.	24.	12.	.00		
ROUTED TO	GLEN17	151.	14.67	96.	24.	12.	.00	1.83	14.67
HYDROGRAPH AT	GLEN17	347.	12.67	72.	20.	10.	.32		
2 COMBINED AT	GLEN17	413.	12.67	166.	44.	21.	.32		
ROUTED TO	BETH15	367.	12.83	164.	44.	21.	.32	1.86	12.83
ROUTED TO	BETH15	301.	13.50	163.	44.	21.	.32	2.30	13.50
ROUTED TO	BETH15	292.	13.83	162.	44.	21.	.32	2.01	13.83
HYDROGRAPH AT	BETH15	472.	12.67	99.	28.	13.	.41		
3 COMBINED AT	BETH15	525.	12.67	254.	72.	35.	1.04		
HYDROGRAPH AT	DIVB19	111.	15.17	69.	17.	8.	.00		
ROUTED TO	BETH15	109.	15.67	69.	17.	8.	.00	1.68	15.67
2 COMBINED AT	BETH15	525.	12.67	320.	90.	43.	1.04		
DIVERSION TO	SDFB15	55.	12.67	55.	22.	10.	1.04		
HYDROGRAPH AT	BETH15	470.	12.67	265.	68.	33.	1.04		
ROUTED TO	CAME15	361.	13.67	259.	68.	33.	1.04	2.12	13.67
HYDROGRAPH AT	DIVE19	100.	15.67	48.	12.	5.	.00		

ROUTED TO	CAME15	99.	13.17	48.	12.	6.	.00	1.84	13.17
	Zemic		16.17	48	12.	6.	.00		
HYDROGRAPH AT	CAME15	504.	12.67	129.	36.	17.	.50		
3 COMBINED AT	CAME15	735.	12.67	420.	116.	56.	1.54		
DIVERSION TO	SDFC15	135.	12.67	135.	44.	21.	1.54		
HYDROGRAPH AT	CAME15	600.	12.67	286.	72.	35.	1.54		
DIVERSION TO	SFC15E	242.	12.67	156.	40.	19.	1.54		
HYDROGRAPH AT	CAME15	358.	12.67	130.	32.	16.	1.54		
ROUTED TO	GRCA15	294.	13.17	129.	32.	16.	1.54	1.98	13.17
HYDROGRAPH AT	DIVEN7	57.	12.17	10.	2.	1.	.00		
ROUTED TO	GLEND7	54.	13.00	10.	2.	1.	.00	1.35	13.00
HYDROGRAPH AT	GLEND7	172.	12.67	39.	11.	5.	.12		
2 COMBINED AT	GLEND7	216.	12.67	49.	13.	6.	.12		
HYDROGRAPH AT	DIVG7A	192.	12.67	48.	14.	7.	.00		
ROUTED TO	GLEND7	159.	13.00	48.	14.	7.	.00	1.76	13.00
2 COMBINED AT	GLEND7	366.	12.67	96.	27.	13.	.12		
DIVERSION TO	SFGL7S	254.	12.67	72.	21.	10.	.12		
HYDROGRAPH AT	GLEND7	112.	12.67	24.	6.	3.	.12		
ROUTED TO	GLEN12	110.	13.00	24.	6.	3.	.12	1.57	13.00
HYDROGRAPH AT	GLEN12	421.	12.67	84.	23.	11.	.39		
2 COMBINED AT	GLEN12	519.	12.67	108.	29.	14.	.51		
ROUTED TO	BETH11	336.	13.50	108.	29.	14.	.51	2.18	13.50
HYDROGRAPH AT	BETH11	350.	12.67	75.	21.	10.	.28		
2 COMBINED AT	BETH11	490.	12.83	182.	50.	24.	.79		
ROUTED TO	CAME11	401.	14.17	182.	50.	24.	.79	2.42	14.17
HYDROGRAPH AT	CAME11	252.	12.50	48.	13.	6.	.20		
HYDROGRAPH AT	DIVC15	242.	12.67	156.	40.	19.	.00		
ROUTED TO	CAME11	232.	13.00	155.	40.	19.	.00	2.02	13.00
3 COMBINED AT	CAME11	591.	14.00	380.	103.	50.	.99		
DIVERSION TO	SFC11E	240.	14.00	181.	53.	26.	.99		
HYDROGRAPH AT	CAME11	351.	14.00	199.	50.	24.	.99		
ROUTED TO	GRCA11	337.	14.67	197.	50.	24.	.99	2.39	14.67
HYDROGRAPH AT	DIVEG7	254.	12.67	72.	21.	10.	.00		
ROUTED TO	BETHA7	216.	13.17	72.	21.	10.	.00	1.76	13.17

HYDROGRAPH A	BETHA7	201.	12.67	45.	13.	6.	.15		
	BETHA7	201	12.67	45	13,	6,	.15		
2 COMBINED AT	BETHA7	365.	12.83	117.	34.	16.	.15		
HYDROGRAPH AT	DIVB7A	225.	12.83	66.	16.	8.	.00		
ROUTED TO	BETHA7	218.	13.00	66.	16.	8.	.00	1.82	13.00
2 COMBINED AT	BETHA7	569.	13.00	183.	51.	24.	.15		
DIVERSION TO	SDFBE7	74.	13.00	54.	18.	9.	.15		
HYDROGRAPH AT	BETHA7	495.	13.00	129.	32.	16.	.15		
ROUTED TO	CAMEL7	423.	13.67	129.	32.	16.	.15	2.08	13.67
HYDROGRAPH AT	CAMEL7	299.	12.50	60.	17.	8.	.20		
2 COMBINED AT	CAMEL7	448.	13.67	189.	49.	24.	.35		
HYDROGRAPH AT	DIVE11	240.	14.00	181.	53.	26.	.00		
ROUTED TO	CAMEL7	238.	14.33	181.	53.	26.	.00	2.04	14.33
2 COMBINED AT	CAMEL7	672.	13.67	364.	102.	49.	.35		
DIVERSION TO	SFCA7A	286.	13.67	176.	55.	26.	.35		
HYDROGRAPH AT	CAMEL7	386.	13.67	189.	47.	23.	.35		
ROUTED TO	GRCA7A	377.	14.00	189.	47.	23.	.35	1.99	14.00
HYDROGRAPH AT	DIVCAC	328.	13.17	113.	28.	14.	.00		
ROUTED TO	CAME3A	318.	13.33	113.	28.	14.	.00	2.25	13.33
HYDROGRAPH AT	CAME3A	183.	12.50	36.	10.	5.	.13		
2 COMBINED AT	CAME3A	377.	12.67	149.	38.	18.	.13		
HYDROGRAPH AT	DIVC7A	285.	13.67	176.	55.	26.	.00		
ROUTED TO	CAME3A	282.	14.00	175.	55.	26.	.00	2.18	14.00
2 COMBINED AT	CAME3A	602.	13.17	321.	93.	45.	.13		
ROUTED TO	GRCA3A	599.	13.67	319.	93.	45.	.13	2.55	13.67
HYDROGRAPH AT	DIVGCC	590.	13.83	310.	95.	49.	.00		
DIVERSION TO	SFGC3A	476.	12.33	196.	49.	24.	.00		
HYDROGRAPH AT	GRCA3A	114.	12.33	114.	46.	25.	.00		
ROUTED TO	GRCA3A	113.	18.17	103.	45.	25.	.00	23.99	18.17
2 COMBINED AT	GRCA3A	555.	14.00	402.	138.	70.	.13		
DIVERSION TO	SFGC7A	452.	12.67	199.	50.	24.	.13		
HYDROGRAPH AT	GRCA3A	203.	12.67	203.	88.	46.	.13		
ROUTED TO	GRCA7A	203.	18.83	193.	87.	45.	.13	23.87	18.83
2 COMBINED AT	GRCA7A	514.	14.17	340.	135.	68.	.48		

ROUTED TO	GRCA11	439.	15.00	321.	134.	68.	.48	24.37	15.00
	GRCA11	439	15.00	221	134	68	.48		
2 COMBINED AT	GRCA11	768.	14.83	507.	184.	92.	1.47		
ROUTED TO	GRCA15	688.	15.50	483.	184.	91.	1.47	24.76	15.50
2 COMBINED AT	GRCA15	912.	15.50	581.	216.	107.	3.01		
HYDROGRAPH AT	GRCA15	505.	12.50	100.	28.	13.	.43		
2 COMBINED AT	GRCA15	829.	15.33	640.	243.	121.	3.44		
DIVERSION TO	SDFG15	75.	15.33	75.	60.	32.	3.44		
HYDROGRAPH AT	GRCA15	754.	15.33	565.	183.	88.	3.44		
ROUTED TO	INDI17	725.	16.33	544.	183.	88.	3.44	2.28	16.33
2 COMBINED AT	INDI17	1223.	16.00	959.	326.	157.	7.24		
ROUTED TO	THOM17	1185.	17.00	921.	326.	157.	7.24	1.87	17.00
HYDROGRAPH AT	THOM17	677.	12.67	149.	41.	20.	.64		
2 COMBINED AT	THOM17	1199.	17.00	949.	366.	177.	7.88		
ROUTED TO	ECAN17	1192.	17.33	946.	366.	177.	7.88	1.95	17.33
2 COMBINED AT	ECAN17	1361.	16.83	1157.	429.	208.	9.31		
ROUTED TO	MCDO17	1353.	17.33	1152.	428.	208.	9.31	1.74	17.33
HYDROGRAPH AT	MCDO17	677.	12.67	149.	41.	20.	.64		
2 COMBINED AT	MCDO17	1366.	17.33	1175.	469.	227.	9.95		
HYDROGRAPH AT	THOM22	410.	12.50	81.	23.	11.	.35		
ROUTED TO	REACHA	364.	12.83	81.	23.	11.	.35	2.22	12.83
ROUTED TO	REACHB	330.	13.00	81.	23.	11.	.35	1.34	13.00
ROUTED TO	MCDO19	282.	13.50	80.	23.	11.	.35	1.59	13.50
HYDROGRAPH AT	MCDO19	421.	12.83	111.	31.	15.	.48		
2 COMBINED AT	MCDO19	612.	13.17	190.	54.	26.	.83		
2 COMBINED AT	MCDO17	1428.	13.17	1298.	522.	253.	10.78		
HYDROGRAPH AT	DIGC3A	476.	13.83	196.	49.	24.	.00		
ROUTED TO	INDI3A	413.	14.33	195.	49.	24.	.00	2.20	14.33
HYDROGRAPH AT	INDI3A	331.	12.50	59.	16.	8.	.24		
2 COMBINED AT	INDI3A	429.	14.33	250.	65.	32.	.24		
ROUTED TO	THOM3A	404.	15.00	246.	65.	32.	.24	1.98	15.00
HYDROGRAPH AT	THOM3A	415.	12.50	86.	24.	12.	.29		
2 COMBINED AT	THOM3A	566.	12.67	324.	89.	43.	.53		
ROUTED TO	MCDO3A	371.	16.17	296.	89.	43.	.53	2.34	16.17

DIVERSION TO	SFMC3A	150.	16.17	88.	22.	...	.53		
HYDROGRAPH AT	MCDO3A	221.	16.17	202.	67.	33.	.53		
ROUTED TO	MCDO7A	220.	16.83	201.	67.	33.	.53	2.23	16.83
HYDROGRAPH AT	MCDO7A	479.	12.83	114.	32.	15.	.49		
2 COMBINED AT	MCDO7A	512.	12.83	268.	99.	48.	1.02		
HYDROGRAPH AT	DIGC7A	452.	14.00	199.	50.	24.	.00		
ROUTED TO	OSBO7A	433.	14.83	198.	50.	24.	.00	2.18	14.83
HYDROGRAPH AT	OSBO7A	513.	12.67	105.	29.	14.	.45		
2 COMBINED AT	OSBO7A	513.	12.67	299.	79.	38.	.45		
ROUTED TO	EDGE7A	445.	15.33	298.	79.	38.	.45	2.27	15.33
HYDROGRAPH AT	EDGE7A	371.	12.50	70.	19.	9.	.29		
2 COMBINED AT	EDGE7A	565.	12.67	365.	99.	47.	.74		
ROUTED TO	MCDO7A	411.	15.83	336.	99.	47.	.74	2.17	15.83
2 COMBINED AT	MCDO7A	813.	12.83	603.	198.	95.	1.77		
DIVERSION TO	SFMC7A	350.	12.83	248.	76.	37.	1.77		
HYDROGRAPH AT	MCDO7A	463.	12.83	355.	121.	58.	1.77		
ROUTED TO	MCDO15	367.	16.67	331.	121.	58.	1.77	2.32	16.67
HYDROGRAPH AT	ECAN11	111.	12.67	23.	6.	3.	.10		
ROUTED TO	MCDO15	56.	13.83	23.	6.	3.	.10	1.87	13.83
ROUTED TO	MCDO15	53.	14.50	23.	6.	3.	.10	1.53	14.50
2 COMBINED AT	MCDO15	391.	14.83	352.	128.	62.	1.87		
HYDROGRAPH AT	MCDO15	208.	12.67	48.	13.	6.	.21		
2 COMBINED AT	MCDO15	406.	14.67	371.	141.	68.	2.07		
ROUTED TO	MCDO17	405.	15.17	369.	141.	68.	2.07	2.29	15.17
2 COMBINED AT	MCDO17	1756.	17.17	1661.	663.	321.	12.85		
ROUTED TO	VANB17	1666.	18.67	1507.	662.	322.	12.85	2.95	18.67
HYDROGRAPH AT	VANB17	903.	12.83	217.	60.	29.	.84		
2 COMBINED AT	VANB17	1684.	18.67	1526.	720.	351.	13.69		
HYDROGRAPH AT	ROO16S	317.	12.50	63.	17.	8.	.26		
ROUTED TO	ROOS7S	191.	13.17	62.	17.	8.	.26	2.18	13.17
HYDROGRAPH AT	ROOS7S	611.	12.83	154.	43.	21.	.60		
2 COMBINED AT	ROOS7S	770.	12.83	216.	60.	29.	.86		
DIVERSION TO	SDER7S	60.	12.83	48.	18.	9.	.96		

HYDROGRAPH AT	ROOST5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	ROOST5	710	12.83	168	42	20.	.86		
ROUTED TO	MCKI7A	317.	14.50	151.	42.	20.	.86	1.54	14.50
HYDROGRAPH AT	MCKI7A	729.	13.00	209.	59.	28.	.74		
2 COMBINED AT	MCKI7A	743.	13.00	351.	100.	48.	1.59		
DIVERSION TO	SDFMI7	52.	13.00	52.	25.	12.	1.59		
HYDROGRAPH AT	MCKI7A	691.	13.00	299.	75.	36.	1.59		
ROUTED TO	VANB17	330.	15.67	233.	74.	36.	1.59	1.54	15.67
2 COMBINED AT	VANB17	1859.	18.00	1722.	794.	387.	15.29		
ROUTED TO	REACHA	1858.	18.33	1719.	793.	387.	15.29	2.06	18.33
ROUTED TO	JACI10	1853.	18.83	1715.	793.	386.	15.29	3.94	18.83
HYDROGRAPH AT	JACI10	702.	13.00	197.	55.	26.	.76		
2 COMBINED AT	JACI10	1869.	18.83	1733.	846.	413.	16.05		
HYDROGRAPH AT	VANB21	710.	12.83	179.	50.	24.	.67		
ROUTED TO	JACI10	580.	13.33	179.	50.	24.	.67	3.03	13.33
2 COMBINED AT	JACI10	1885.	18.83	1756.	896.	437.	16.72		
HYDROGRAPH AT	LINC7S	1286.	13.33	477.	134.	64.	1.80		
DIVERSION TO	SDFL7S	120.	13.33	110.	42.	20.	1.80		
HYDROGRAPH AT	LINC7S	1166.	13.33	367.	92.	44.	1.80		
ROUTED TO	GRAN7A	984.	14.33	360.	92.	44.	1.80	2.60	14.33
HYDROGRAPH AT	GRAN7A	1171.	12.83	289.	81.	39.	1.05		
2 COMBINED AT	GRAN7A	1177.	12.83	638.	172.	83.	2.85		
ROUTED TO	REACHA	1078.	14.83	620.	172.	83.	2.85	1.90	14.83
ROUTED TO	PIMA19	1033.	15.33	590.	172.	83.	2.85	1.88	15.33
HYDROGRAPH AT	PIMA19	973.	12.83	253.	70.	34.	.98		
2 COMBINED AT	PIMA19	1103.	15.33	779.	242.	117.	3.83		
DIVERSION TO	SDFP19	110.	15.33	110.	63.	30.	3.83		
HYDROGRAPH AT	PIMA19	993.	15.33	669.	179.	86.	3.83		
HYDROGRAPH AT	PIMA22	537.	12.67	110.	31.	15.	.43		
3 COMBINED AT	PIMA22	2523.	13.00	2281.	1105.	538.	20.98		
DIVERSION TO	SDI10F	107.	13.00	107.	102.	54.	20.98		
HYDROGRAPH AT	PIMA22	2416.	13.00	2174.	1003.	484.	20.98	RESVOIR ROUTING	
ROUTED TO	I10DUE	2222.	16.50	2007.	852.	411.	20.98	1059.05	16.50
ROUTED TO	DURA31	2198.	17.50	1982.	850.	413.	20.98	2.24	17.50

HYDROGRAPH AT	DURA31	863.	13.00	249.	69.	33.	1.00		
2 COMBINED AT	DURA31	2221.	17.50	2005.	916.	447.	21.98		
ROUTED TO	BUCK35	2214.	18.17	1997.	914.	447.	21.98	2.73	18.17
HYDROGRAPH AT	BUCK35	431.	13.33	154.	43.	21.	.60		
2 COMBINED AT	BUCK35	2229.	18.17	2012.	954.	467.	22.58		
ROUTED TO	BUCK43	2218.	18.83	1996.	951.	467.	22.58	2.09	18.83
HYDROGRAPH AT	BUCK43	684.	13.00	200.	56.	27.	.75		
2 COMBINED AT	BUCK43	2235.	18.83	2013.	1001.	494.	23.33		
HYDROGRAPH AT	DURA39	852.	13.00	249.	59.	33.	1.00		
ROUTED TO	BUCK43	801.	13.33	246.	69.	33.	1.00	1.80	13.33
2 COMBINED AT	BUCK43	2260.	18.83	2036.	1070.	527.	24.33		
ROUTED TO	LASTBA	2246.	19.83	2012.	1065.	527.	24.33	2.51	19.83
HYDROGRAPH AT	LASTBA	613.	13.00	179.	50.	24.	.67		
2 COMBINED AT	SALTRI	2260.	19.83	2026.	1106.	551.	25.00		

*** NORMAL END OF HEC-1 ***