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DRAINAGE REPORT
FOR
SCOTTSDALE ROAD IMPROVEMENTS

PREPARED FOR

CITY OF SCOTTSDALE
SCOTTSDALE ROAD IMPROVEMENTS
C.O.S. PROJECT NO. S5518

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PREPARED BY

BROOKS, HERSEY AND ASSOCIATES, INC.
5246 SOUTH 40TH STREET
PHOENIX, AZ 85040
(602) 4437-3733

December 1989

BHA 210-08-FP

BROOKS, HERSEY & ASSOCIATES, INC.
ENGINEERS/SURVEYORS

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ENGINEERS/SURVEYORS

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432 N. 44th Street Suite 250
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FAX (602) 220-9199

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☐ Copy of letter ☐ Change order ☒ Addendum to Drainage Report

COPIES	DATE	NO.	DESCRIPTION
3	6/19/90		Addendum to Drainage Report "Scottsdale Rd Widening"
3	6/19/90		Sets of Signed Cover & Index Sheets

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Registered Professional Engineer (Civil)
CERTIFICATE NO. 9328
ARTHUR N. BROOKS
DATE SIGNED
Arizona U. S. A.

BROOKS, HERSEY & ASSOCIATES, INC.
ENGINEERS/SURVEYORS

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Registered Professional Engineer (Civil)
CERTIFICATE NO. 9628
ARTHUR N. BROOKS
DATE SIGNED 6-14-90
Arizona U. S. A.

ADDENDUM

to the

DRAINAGE REPORT

for

SCOTTSDALE ROAD IMPROVEMENTS

(McDowell Rd to Earll Drive, December 1989)

June, 1990

I. BACKGROUND

This Addendum discusses briefly the significant differences between the Approved Drainage Report and the Approved Construction Plans and is to be placed between the Cover Sheet and Table of Contents Sheet of all signed copies of the Approved Drainage Report. The differences between the Drainage Report and Construction Plans, discussed below, were directed by the City of Scottsdale at a meeting on January 8, 1990 and were incorporated in the final construction plans as a result of those directions.

II. Directed Changes

A. Separated the main storm water transmission system at Oak Street, by removing the 60" section of storm drain south of Oak Street. This change will require providing additional outfall capacity (approximately 189cfs) at Oak Street easterly to outfall to the Indian Bend Wash.

B. With removal of the 60" pipe, the main storm waters transmission system from Oak Street to McDowell Road was downsized.

C. Construction limits on Thomas Road and McDowell Road were changed resulting in changed drainage collection features.

D. At Palm Lane and at Oak Street, the inlet grates were replaced with curbside catch basins, with resulting reduced capacity.

C. A number of other minor drainage changes were made as a result of road plan changes.

III. DISCUSSION OF IMPACT

The original drainage design criteria for this project was that the 10-year, 24 hour storm must be carried within the pipe with the 100-year, 24-hour storm not exceeding 8 inch water depth in the gutter, and with 1 dry lane provided in each direction of traffic. The general result of these changes is that in a few locations, the storm sewer system shown on the Construction Plans does not quite meet the design criteria.

As can be seen on Sheet SD-30 and SD-31, there are six locations where there are minor deviations from the original design criteria (refer to column entitled "Head between 0.5' below lip of gutter to H.G. Main".

Overall, the drainage improvements to be constructed in accordance with the Approved Constructions Plans will greatly improve the flood protection provided to local residents, business owners and motorists when adequate outfall storm sewers are constructed at Oak Street and at McDowell Road. Until such time as the outfall storm sewers are built, the areas served by the storm sewer sections North and South of Oak Street will be subject to drainage backup and flooding.

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1.0 INTRODUCTION

This report is the results of the drainage study for SCOTTSDALE ROAD IMPROVEMENTS from McDowell Road to Earll Drive. The purpose of this study was to:

a) Investigate drainage conditions affecting the proposed widening of Scottsdale Road and subsequently determine adequate underground storm drain pipe and catch basin sizes.

b) Recommend improvements which will provide reasonable protection of life and property in compliance with the City of Scottsdale, State, and Federal policy guidelines.

c) Size and space catch basins and storm drain pipes with a peak runoff from a 10-year - 24 hour frequency storm; to be checked with a peak runoff from the 100-year - 24 hour frequency storm which, specifically, would provide one dry lane each direction on Scottsdale Road during the 100 year event and allow no more than 8" depth of water above the gutters.

The 1.7 square mile study area has a predominately easterly slope towards Scottsdale Road and Indian Bend Wash. There is a lesser southerly slope towards McDowell Road, with ground undulations and east/west streets impeding long migrations of storm water in the southerly direction.

An outfall study verified the existence of a 90" storm drain located in Scottsdale Road and proceeding East in Thomas Road; two 42" storm drains in Oak Street proceeding East from Scottsdale Road; and a 60" storm drain located in Scottsdale Road proceeding South from McDowell Road. All of the above storm drains outfall into Indian Bend Wash.

Some existing storm drain collection facilities are located in Scottsdale Road and intersecting roads in the west. Each facility was analyzed as to its carrying capacity and "fit" into the proposed storm drain system. Inflows of the facilities that were to remain in the system were integrated into the design calculations.

The design of the storm drain system in Scottsdale Road is based on the Q10 and Q100 criteria. The design does not utilize all of the capacity of the 90" storm drain outfall at Thomas Road; it uses the capacity of the twin 42" storm drains at Oak Street; and it uses the 60" storm drain capacity in Scottsdale Road south of McDowell Road.

A future outfall is recommended in McDowell Road from Scottsdale Road east to Indian Bend Wash, which would tie into a storm drain to be located within the project west on McDowell Road. All catch basins along McDowell Road should tie into the McDowell Road storm drain.

At a September 1989 meeting, City of Scottsdale representatives indicated that future planned construction of a street couplet from Earll Drive northward along Scottsdale Road would include storm drainage north of and along Earll Drive and its intersection with Scottsdale Road.

Design of the Earll Drive to McDowell Road storm drain system on Scottsdale Road does not include provisions for storm flows north of or along Earll Drive and its intersection with Scottsdale Road. Catch basins have been designed and carefully placed along Scottsdale Road. Additional catch basins have been placed at or beyond the west side radii tangent points of intersecting streets, except for Earll Drive.

More detailed procedural descriptions and summaries have been provided in Section 4 - RESULTS/SUMMARIES.

2.0 DESCRIPTION OF DRAINAGE STUDY AREA

The study area is bounded by Scottsdale Road to the East, McDowell Road to the South, Arizona Cross Cut Canal to the West and 2nd Street to the North. Refer to the KEY MAP, page 6-1.

The total study area is approximately 1.7 square miles and generally slopes East and South at approximately 0.50% towards Scottsdale Road which shall be the location of catch basins and underground drainage structures, and ultimately outfall into Indian Bend Wash.

The majority of the drainage basin areas have been nearly fully developed, with a mix of commercial and residential, with the majority being residential.

3.0 HYDROLOGY

The computer program used to compute the peak discharges and volumes of runoff is the U.S. Army Corps of Engineers HEC-1 Flood Hydrograph Package (Reference 1, P. 5-1). The methology used in the program was the SCS Dimensionless Unit Hydrograph (Reference 2 & 3, P. 5-1). The following paragraphs describe the approach used in developing the various input parameters to the HEC-1 program.

3.1 WATERSHED AREA

The study area was divided into subbasins based on topography, street alignments, field observations, and points of concentration. The City of Scottsdale topography maps (1' contours) by Cooper Aerial Survey Company were used as a base for the subbasin delineations east of 68th Street. A USGS Quadrangle map, 7.5 minute series, was used west of 68th Street to the Crosscut Canal. See Exhibit 1.

3.2 PRECIPITATION DEPTH, DURATION, AND DISTRIBUTION

The average precipitation depths for the watershed were determined from the Arizona Department of Transportation design manual "Hydrologic Design for Highway Drainage" (Reference 4, P. 5-1). The storm used in the model has a 24-hour duration; distributed by the hypothetical storm in HEC-1 using the 5 minute, 15 minute, 1 hour, 2 hour, 3 hour, 6 hour, 12 hour, and 24 hour depth/duration data for the study area. The following is a list of the 10-year and 100-year depth/duration data.

DURATION	10 YEAR PRECIPITATION, IN.	100 YEAR PRECIPITATION, IN.
5-min.	0.45	0.75
10-min.	0.70	1.17
15-min.	0.88	1.48
30-min.	1.22	2.05
1-hour	1.55	2.59
2-hour	1.70	2.82
3-hour	1.81	2.98
6-hour	2.00	3.27
12-hour	2.20	3.55
24-hour	2.40	3.85

3.3 CURVE NUMBER

The curve number is used to describe the infiltration/interception characteristics of the drainage area. Factors that affect the curve number are soil type, cover type, and land use. The soils within the study area were all in the Hydrologic Soil Group B as shown in the SCS "Soil Survey of Maricopa County, Arizona, Central Part" (Reference 5 P. 5-1). The curve numbers are based on existing conditions.

The curve numbers were weighted by area to produce a representative curve number for each subwatershed. Aerial photos and City and County maps were used to identify the different land uses for each area. See Exhibits 5 & 5A.

3.4 TIME OF CONCENTRATION/LAG TIME

The lag time for the watershed is required input for the SCS dimensionless unit hydrograph method. The lag is calculated by using the Curve Number Method (Reference 2 & 3 P. 5-1):

$$L = \frac{\ell^{0.8}(S + 1)^{0.7}}{1{,}900\ Y^{0.5}}$$

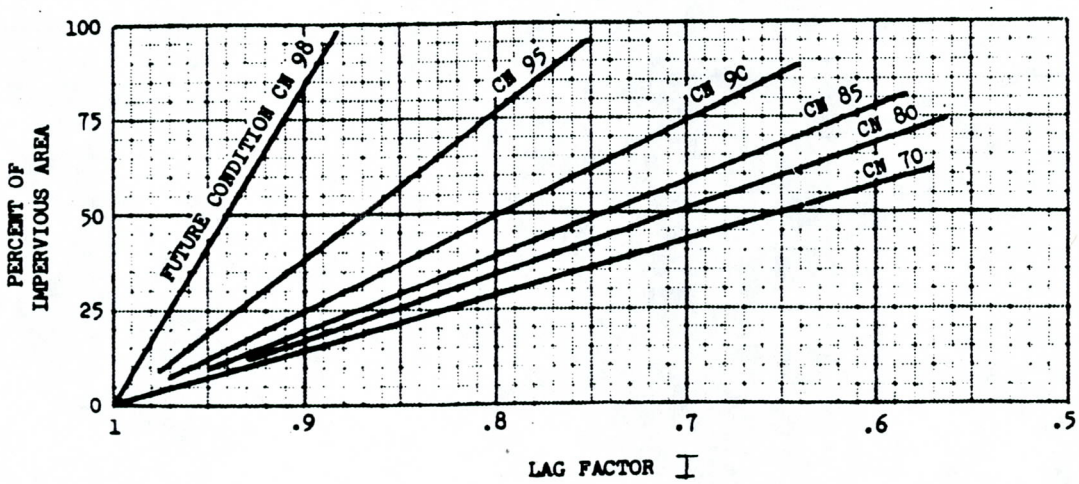
where

L = lag in hours

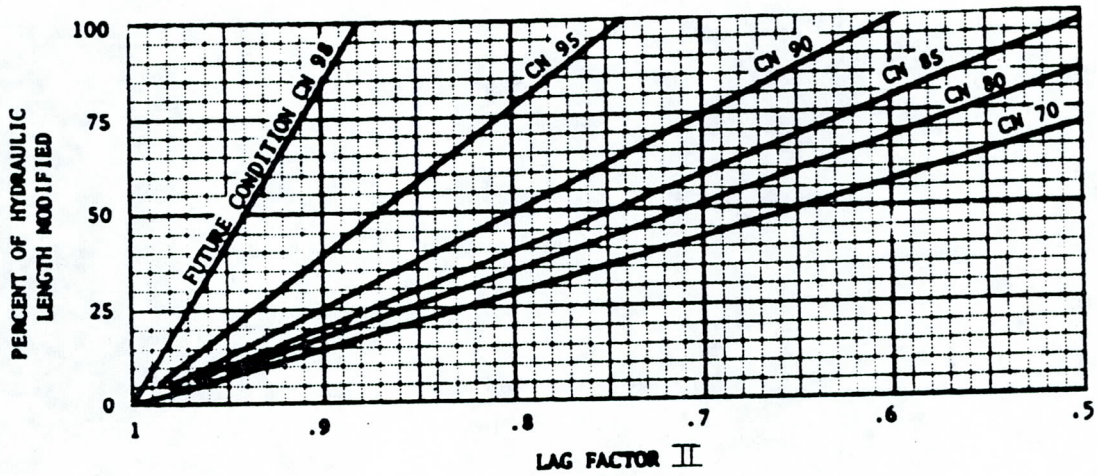
ℓ = hydraulic length of watershed in feet

$S = \frac{1{,}000}{CN'} - 10$ (where CN' is the retardance factor and is equivalent to the runoff curve number)

Y = average watershed land slope in percent.



Factors for adjusting lag from equation when impervious areas occur in the watershed.



Factors for adjusting lag from equation when the main channel has been hydraulically improved.

3.5 CHANNEL ROUTING

The kinematic wave method was used to route the hydrographs through the streets, channels, and storm drains. Channel routing in the streets was simulated by a triangular channel with 50:1 side slopes and manning's n=0.020.

4.0 RESULTS/SUMMARIES

Hydrologic models were developed for this report. The results are presented with summary printouts from the HEC-1 model with concentration points that correspond to points on the drainage tributary area map (Exhibit 1).

For clarification of Exhibit 1 the arrows in each subbasin (SB) indicates the general direction(s) of drainage flow. A Concentration Point (CP) location is needed for input into the HEC-1 program and provides the longest drainage flow travel distance for modeling purposes.

Based on available contours, generated north/south profiles of streets west of Scottsdale Road, numerous field reviews and review of a 1988 VCR taken during a storm in 1988, stormwater routing to Scottsdale Road occurs both as overland flow and flows in the major streets intercepting Scottsdale Road.

Tabs in Exhibit 1 show the Q10 and Q100 for the SB and the collective Q10 and Q100 for the CP, which progressively increases downstream approaching Scottsdale Road.

The tabs reading from South to North are the assigned overland flows and for calculation purposes are assumed to enter Scottsdale Road on a uniform spread basis along the frontage. The tabs reading East to West are the assigned street flows. Totals of street flows and overland flows equate to the HEC-1 generated total Q.

Construction of the couplet from Earll Drive is planned to accommodate drainage flows impacting Earll Drive and its intersection with Scottsdale Road. The design provides catch basins at appropriate locations and spacings on Scottsdale Road. Additional catch basins have been added west of the radii tangent points at the intersections of the streets with Scottsdale Road, and just south of Earll Drive on the west side of Scottsdale Road.

The design provides a main collector system in Scottsdale Road from north of Virginia Avenue that ties into the twin 42" pipes at Oak Street and terminates at a junction box at the intersection of Scottsdale Road and McDowell Road. From this junction box a 66" stub out pipe easterly will be provided for future construction of an outfall to Indian Bend Wash. From the junction box westerly, within the project, a 48" storm drain will carry runoff from catch basins on the south and north sides of McDowell Road. The storm drain has been sized to permit additional connection of westerly McDowell Road catch basins in the future. From the junction box southerly, the existing 60" storm drain in Scottsdale Road will be the only available discharge storm drain from the junction box until the 66" McDowell Road outfall pipe is constructed in the future. Until that time, there may be some temporary ponding of water along Scottsdale Road north of McDowell Road.

4.1 EXISTING DRAINAGE FACILITIES

Exhibit 2 shows the existing storm drainage collection system. Additionally, there are some catch basins along the north side of McDowell Road west of Scottsdale Road. To date, no as-built storm drain plans or evidence of existing storm drains connecting to these catch basins has been found in the field.

There are some catch basins on both the north and the south side of Thomas Road west of Scottsdale Road. No as-builts have been found and no evidence of a storm drain has been found in the field. In both McDowell Road and Thomas Road the catch basins have been receiving water during storms. It is assumed they are connected to irrigation pipes, although contacts with SRP representatives did not verify this to be a fact.

Following are the existing storm drains (S.D.) and a brief discussion on each:

- 60" S.D. on Scottsdale Road from McDowell Road south. Has a calculated capacity of 166 cfs at McDowell Road. Increases in size to 72" and has good slope to outfall into Indian Bend Wash such that the small downstream inflow still allows 166 cfs inflow at McDowell Road. Needs revision of outfall structure at Indian Bend Wash.

- 36" SD in Scottsdale Road between McDowell Road and Palm Lane is to be utilized to carry runoff intercepted along the east side of Scottsdale Road between McDowell Road and Palm Lane.

- 42" S.D. on Oak Street west of Scottsdale Road going into twin 42" lines east of Scottsdale Road. Q10 inflow from C.B. west of Scottsdale Road is 5.6 cfs + 37.5 cfs = 43.1 cfs maximum. Calculated capacity of the 42" westerly pipe is 67 cfs. Calculated capacity of the twin 42" S.D. just east of Scottsdale Road is 153 cfs.

- 90" S.D. in Scottsdale Road from Thomas Road north reduces to a 72" S.D. about 880' north of Thomas Road. The calculated capacity of the 90" S.D. on Scottsdale Road at Thomas is 432 cfs. The calculated capacity of the 90" S.D. on Thomas Road at the curved connection is 382 cfs.

- Twin S.D. varies in size from 48" to 54" is located 850' north of Thomas Road from Scottsdale Road west to 70th Street with one 48" S.D. proceeding west to 68th Street, and catching a maximum Q10 inflow of 47 cfs. The other 48" S.D. proceeds northerly on 70th STreet and catches a maximum inflow of 24.3 cfs. The total inflow of the twin S.D. is 47 + 24.3 = 71.3 cfs. The capacity of the twin S.D. is calculated at 224 cfs prior to connection to the 90" S.D. at Scottsdale Road.

4.2 RUNOFF SUMMARIES

The following pages summarize the pertinent runoff data. Because the couplet is planned to provide storm drain facilities including Earll Drive and to the North, the Runoff Summary will address the project between Earll Drive and McDowell Road. However, catch basins have been placed on the west side of Scottsdale Road just south of Earll Drive to intercept some runoff from the north.

RUNOFF SUMMARY
(WEST SIDE OF SCOTTSDALE ROAD)
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

(BETWEEN OSBORN ROAD & EARLL DRIVE)

OPERATION	STATION	PEAK FLOW 10-YEAR	PEAK FLOW 100-YEAR	BASIN AREA	LAG TIME	CURVE NUMBER
Hydrograph at	SB8	80	153	.0690	0.19	70
Routed to	CP10	76	149	.0690		
Hydrograph at	SB10	142	270	.1351	0.23	70
2 Combined at	CP10	211	412	.2041		
Routed to	CP12	207	407	.2041		
Hydrograph at	SB12	51	101	.0606	0.28	70
2 Combined at	CP12	257	507	.2647		
Routed to	CP14	252	503	.2647		
Hydrograph at	SB14	81	139	.0579	0.31	70
2 Combined at	CP14	329	638	.3226		
Assigned Overland		163	300			
Assigned Earll Dr.		166	338			

(BETWEEN EARLL DRIVE & THOMAS ROAD)

OPERATION	STATION	PEAK FLOW 10-YEAR	PEAK FLOW 100-YEAR	BASIN AREA	LAG TIME	CURVE NUMBER
Hydrograph at	SB9	43	84	.0471	0.26	70
Routed to	CP13	41	80	.0471		
Hydrograph at	SB13	47	87	.0558	0.38	70
2 Combined at	CP13	86	166	.1029		
Routed to	CP15	84	162	.1029		
Hydrograph at	SB15	78	133	.0587	0.34	70
2 Combined at	CP15	150	278	.1616		
Assigned Overland		104	192			
Assigned Thomas Rd.		46	86			

(BETWEEN THOMAS ROAD & VIRGINIA AVENUE)

OPERATION	STATION	PEAK FLOW 10-YEAR	PEAK FLOW 100-YEAR	BASIN AREA	LAG TIME	CURVE NUMBER
Hydrograph at	SB16	113	200	.0868	0.26	70
Routed to	CP15	105	191	.0868		
Routed to	CP18	103	189	.0868		
Hydrograph at	SB18	96	185	.1386	0.43	70
2 Combined at	CP18	193	371	.2254		
Assigned Overland		65	121			
Assigned Virginia Ave.		128	250			

(BETWEEN VIRGINIA AVENUE & OAK STREET)

OPERATION	STATION	PEAK FLOW 10-YEAR	PEAK FLOW 100-YEAR	BASIN AREA	LAG TIME	CURVE NUMBER
Hydrograph at	SB21	50	100	.0648	0.30	70
Hydrograph at	SB19	87	174	.1143	0.31	70
2 Combined at	CP19	137	273	.1791		
Routed to	CP20	133	269	.1791		
Hydrograph at	SB20	50	92	.0470	0.29	70
2 Combined at	CP20	178	354	.2261		
Assigned Overland		103	194			
Assigned Oak Street		75	160			

(BETWEEN OAK STREET & PALM LANE)

OPERATION	STATION	PEAK FLOW 10-YEAR	PEAK FLOW 100-YEAR	BASIN AREA	LAG TIME	CURVE NUMBER
Hydrograph at	SB22	43	87	.04884	0.23	70
Routed to	CP25	43	84	.04884		
Hydrograph at	SB25	53	102	.06486	0.35	70
2 Combined at	CP25	96	184	.1137		
Assigned Overland		51	95			
Assigned Palm Lane		45	89			

(BETWEEN PALM LANE & MCDOWELL ROAD)

OPERATION	STATION	PEAK FLOW 10-YEAR	PEAK FLOW 100-YEAR	BASIN AREA	LAG TIME	CURVE NUMBER
Hydrograph at	SB23	114	217	.1369	0.34	70
Routed to	CP24	114	217	.1369		
Hydrograph at	SB24	78	133	.0537	0.29	70
2 Combined at	CP24	186	338	.1906		
Assigned Overland		78	133			
Assigned McDowell Rd.		114	217			

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
RATIONAL METHOD
(EAST SIDE OF SCOTTSDALE ROAD)

CATCH BASIN NO.	PEAK FLOW 10-YEAR	100-YEAR	BASIN AREA (AC.)
CB1(S)	4.6	7.4	0.75
CB3(E)	3.7	6.0	0.61
CB8(E)	4.5	7.3	0.74
CB10(E)	4.1	6.6	0.67
CB13(E)	4.4	7.1	0.72
CB18(E)	2.6	4.2	0.43
CB21(E)	4.1	6.7	0.68
CB22(E)	2.9	4.7	0.48
CB26(E)	4.8	7.7	0.78
CB30(E)	3.7	6.0	0.61
CB34(E)	4.6	7.5	0.76
CB1A(S)	7.3	11.7	1.19
CB5A(E)	4.3	7.0	0.71
CB15B(E)	3.2	5.1	0.52
CB16A(E)	3.2	5.1	0.52
CB24A(E)	3.7	6.0	0.61
CB25A(E)	2.8	4.4	0.45
CB37(E)	3.7	6.0	0.61
CB39(N)	14.4		2.35
CB40(S)	21.4		3.50

E = East side
S = South side

4.3 PROPOSED NEW STORM DRAIN

Exhibits 3 & 4 show the proposed storm drain in Scottsdale Road designed to Q10 checked by Q100 to handle the assigned overland flow. Additionally a 42" SD westerly extension along Virginia Avenue has been included; and a McDowell Road 66" SD stub out easterly from Scottsdale Road and a westerly 48" SD extension has been added. Additionally, within the project on west Thomas Road a 42" SD has been included and street width inlet grating has been added at Virginia Avenue, Oak Street and Palm Lane.

The proposed SD system along Scottsdale Road, based on the assigned Q10 overland flows, is less than or closely balances with the available outfall capacities presently available in the 90" SD at Thomas Road; the twin 42" SD at Oak Street; the 60" SD at McDowell Road south to Roosevelt; and the proposed 66" SD easterly on McDowell Road.

This proposed system will go a long way in reducing storm drainage problems along Scottsdale Road until the McDowell Road outfall to Indian Bend Wash is constructed.

5.0 REFERENCES

5.0 REFERENCES

1. U.S. Army Corps of Engineers,
   HEC-1 Flood Hydrograph Package, Users Manual,
   Hydrologic Engineering Center, Davis, California, 1981.

2. Soil Conservation Service, National Engineering Handbook
   Section 4 - Hydrology, Washington, D.C., 1972

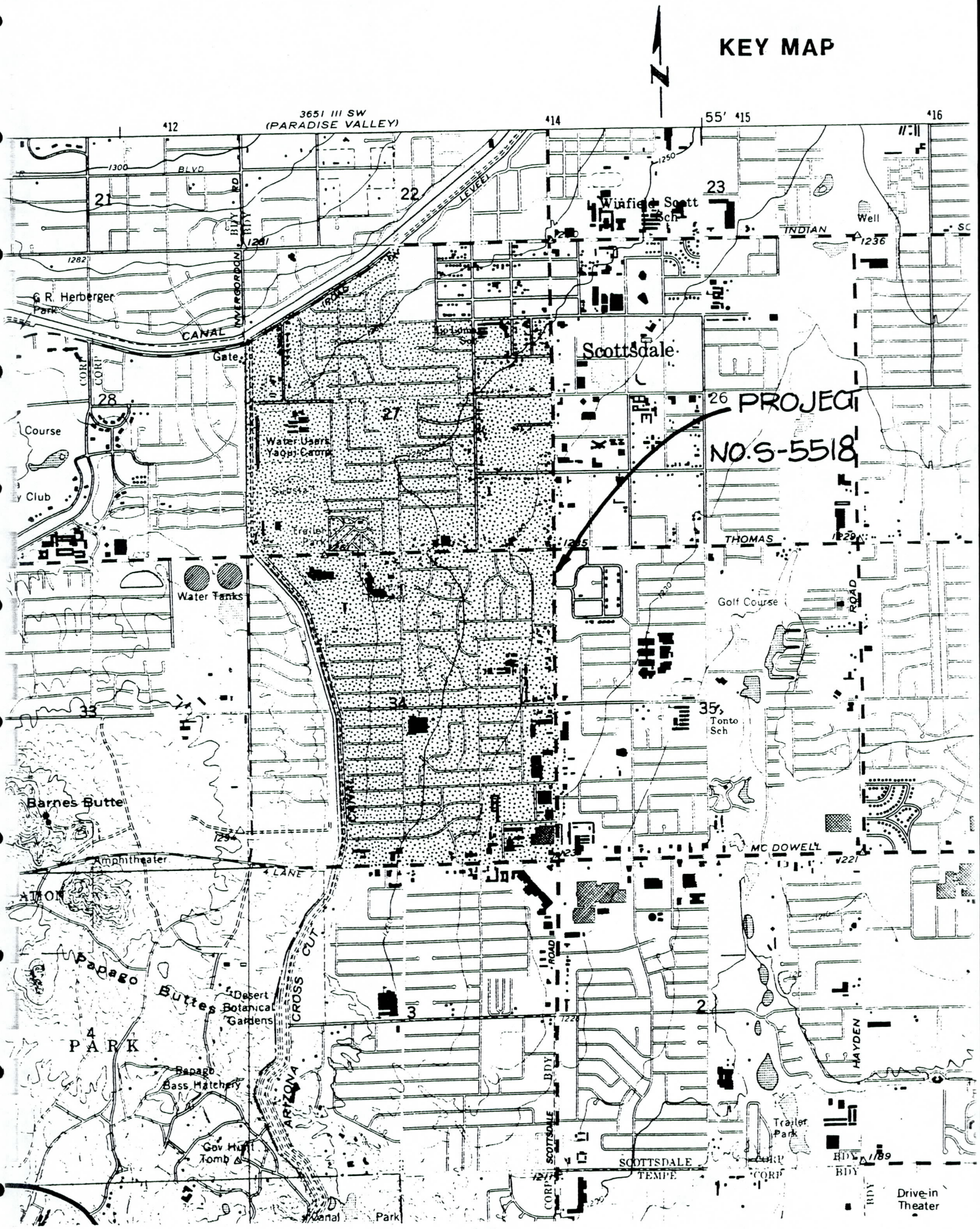
3. Soils Conservation Service, Urban Hydrology for Small Watersheds,
   Technical Release No. 55, January 1975

4. Arizona Department of Transportation, Hydrologic Design for Highway
   Drainage in Arizona, 1968, Revised 1969.

5. Soil Conservation Service, Soil Survey of Maricopa County, Arizona,
   Central Part, September 1977.

6.0 KEY MAP

KEY MAP


N
3651 III SW
(PARADISE VALLEY)
55'
BLVD
LEVEE
Winfield Scott Sch
INDIAN
Well
G.R. Herberger Park
CANAL
Gate
Scottsdale
PROJECT
NO. S-5518
Course
Water Users Yaqui Camp
Trailer Park
THOMAS
Water Tanks
Golf Course
ROAD
Tonto Sch
Barnes Butte
Amphitheater
MC DOWELL
LANE
Papago Buttes
Desert Botanical Gardens
PARK
CROSS CUT
Papago Bass Hatchery
ARIZONA
Gov Hunt Tomb
SCOTTSDALE
TEMPE
Trailer Park
HAYDEN
Canal
Park
Drive-in Theater

7.0 HEC-1 INPUT

BROOKS, HERSEY & ASSOCIATES, INC.
5246 South 40th Street
PHOENIX, ARIZONA 85040
(602) 437-3733

JOB
SHEET NO. OF
CALCULATED BY hdg DATE 1/20/89
CHECKED BY GK DATE 7/89
SCALE

CURVE NUMBER METHOD:

For areas less than 2000 Acs.
See pg. 15-7 National Eng'g Handbook, Section 4, Hydrology

$$L = \frac{L_o^{0.8}(S+1)^{0.7}}{1900\,Y^{0.5}}$$

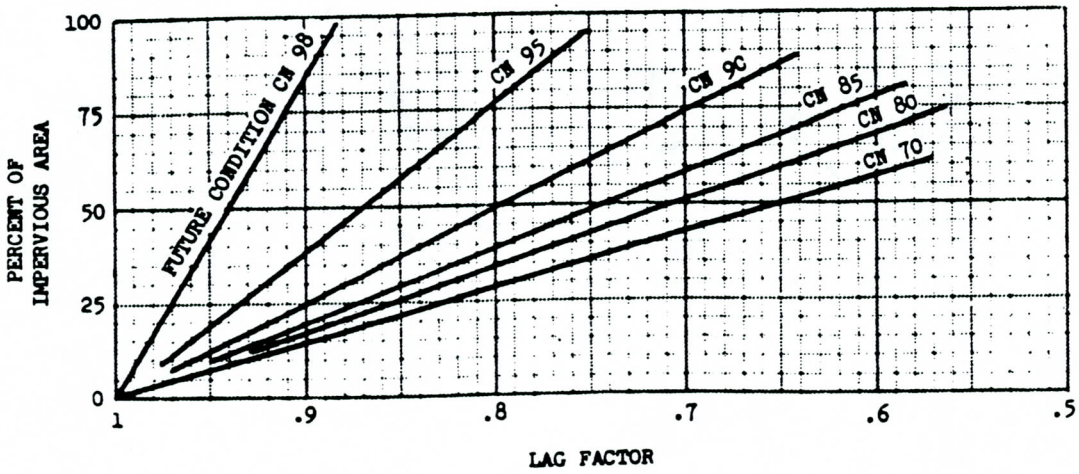
L = lag in hours

L_o = hydraulic length of watershed in feet

$$S = \frac{1000}{CN'} - 10$$

CN' ≅ hydrologic soil cover complex number

Y = average watershed land slope in percent



Factors for adjusting lag from equation when impervious areas occur in the watershed.

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& ASSOCIATES, INC.
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PHOENIX, ARIZONA 85040
(602) 437-3733

JOB: [illegible]
SHEET NO. ____ OF ____
CALCULATED BY: [illegible] DATE: 9/28/89
CHECKED BY: GTK DATE: 9/88
SCALE ____

$$Lag = \frac{L_o^{.8}(S+1)^{.7}}{1900\,Y^{.5}}$$

Subbasin Name (KK)	Basin Area (Mi.²) (BA)	CN*	Impervious (%) LS	Drainage Length (ft) L_o	Drainage Slope (%) Y	Factor I	Factor II	UD (hr)
1	.1604	85	48	3400	.50	.75	.50	.40
6	.0581	85	48	2550	.47	.75	.50	.31
7	.0635	92	90	2550	.46	.70	.67	.30
8	.0690	84	56	1450	.50	.72	.50	.19
9	.0471	86	50	2350	.56	.75	.50	.26
10	.1351	86	55	1950	.50	.73	.50	.23
12	.0606	85	48	2250	.44	.75	.50	.28
13	.0558	87	57	2700	.30	.75	.55	.38
14	.0579	92	90	2500	.40	.69	.67	.31
15	.0587	92	90	2500	.34	.69	.67	.34
16	.0868	90	75	2800	.66	.70	.60	.26
18	.1386	85	50	3800	.45	.74	.50	.43
19	.1143	84	45	3000	.70	.76	.50	.31
20	.0470	88	64	2250	.40	.71	.55	.29
21	.0648	84	45	2900	.70	.76	.50	.30
22	.04884	84	45	2400	.90	.76	.50	.23
23	.1369	85	53	3800	.70	.72	.50	.31
24	.0537	92	90	2640	.52	.69	.67	.29
25	.0648	85	53	2640	.36	.72	.50	.35

NOTES:
1. See Exhibit 5, MAP 3 & 4 for Zoning.
* CN = Curve Number, use to obtain Lag.
CN = 70 was being use for LS card input, since % impervious was applied.

PRODUCT 204-1 NEBS Inc. Groton, Mass. 01471

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(602) 437-3733

JOB Scottsdale Rd. Imprvmt 21008-FP-04
SHEET NO. ____ OF ____
CALCULATED BY hdg DATE 1/20/89
CHECKED BY CTK DATE 7/89
SCALE ____

```
File:  SDLNMC10.DAT

ID     Scottsdale Road                    10-year storm
ID
ID     Tributary area bounded by Palm Lane to the North,
ID     AZ. Cross Cut Canal to the West, McDowell Rd. to
ID     the South, and Scottsdale Rd. to the East.
ID
ID     10-year storm, 24-hr value = 2.40 inches
ID
ID     Project No. 21008-FP Scottsdale Rd Improvement.
ID     From McDowell Rd. to Earll Drive.
ID
ID     HEC1 Model Input & Analysis by Brooks, Hersey & Assoc.
ID     Feb. 1989 by hdg.
ID
*  Diagram
IT     2      0      0      150
IO     5      2      20
JD            .09
PH                   .45    .88    1.55   1.70   1.81   2.00   2.20  2.40
JD            1
JD            2
KK     SB23
KM           Runoff from SB23
BA     .1369
LS     0      70     53
UD     .9369
KK     CP24
KM           Route flow from SB23 to CP24
RK     1320   .0083  .02                   1      50
KK     SB24
KM           Runoff from SB24
BA     .0537
LS     0      70     90
UD     .618
```


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& ASSOCIATES, INC.
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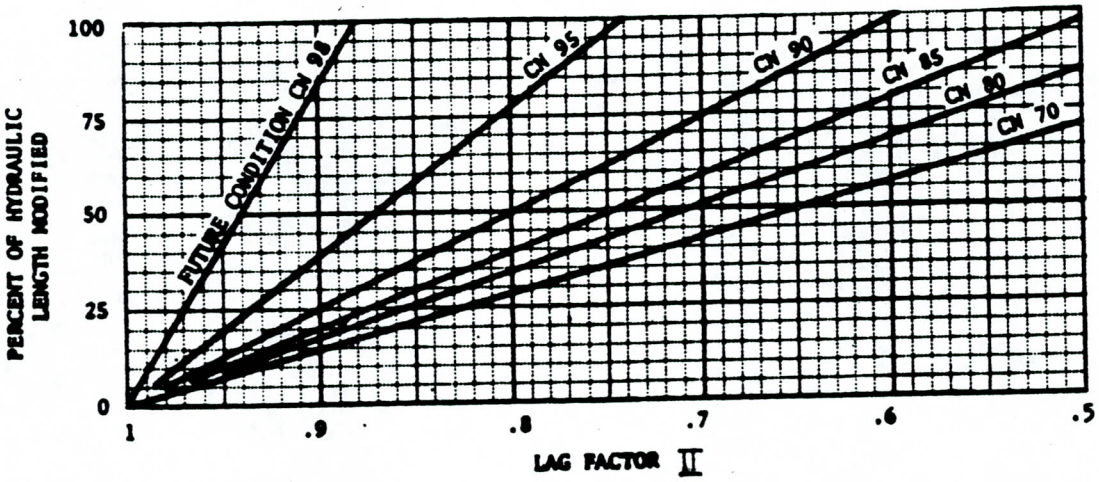
(602) 437-3733

JOB Scottsdale Rd. Imprvmt 21008-FP
SHEET NO. _____ OF _____
CALCULATED BY hdg DATE 1/20/89
CHECKED BY GTK DATE 7/89
SCALE _____

```
KK    CP24
KM        Combine Hydrographs @ CP24
RK    1320   .0083   .02                1    50
KK    SB24
KM        Runoff from SB24
BA    .0537
LS    0      70     90
UD    .618
KK    CP24
KM        Combine Hydrographs @ CP24
HC    2
ZZ
```



Factors for adjusting lag from equation when the main channel has been hydraulically improved.

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(602) 437-3733

JOB Scottsdale Rd. Imprvmt. 21008-FF
SHEET NO. _____ OF _____
CALCULATED BY Rdg. DATE 3/9/89
CHECKED BY GK DATE 7/89
SCALE _____

Oak St. to Thomas Rd.
East side of Scottsdale (BA)

(103+20 - 96+58) 65/43560 = .99 Ac = .0015 Sq. mi.

(96+58 - 83+40) 65/43560 = 1.97 Ac = .0031 Sq. mi.

(83+40 - 76+61) 65/43560 = 1.01 Ac = .0016 Sq. mi.

STA	BA	CN	% Impervious	Length	Slope	Tc	Lag
103+20 - 96+58	.0015	98	90	662	.0024		.2209
96+58 - 83+40	.0031	98	90	798	.0024		.2566
83+40 76+61	.0016	98	90	679	.0021		.2410

Thomas Rd. to Earll Drive
(Eastside of Scottsdale

(116+47.60 - 110+00) 65/43560 = 0.97 Ac = 0.0015 Sq. mi.

(110+00 - 103+20) 65/43560 = 1.01 Ac = 0.0016 Sq. mi.

116+47.6 - 110+00	.0015	98	90	647.6	.0038		.1725
110+00 - 103+20	.0016	98	90	680	.0020		.2473

PRODUCT 204-1 NEBS Inc., Groton, Mass. 01471.

BROOKS, HERSEY
& ASSOCIATES, INC.
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PHOENIX, ARIZONA 85040
(602) 437-3733

JOB Scottsdale Rd 21006-11-04
SHEET NO. _____ OF _____
CALCULATED BY hdg DATE 1/6/89
CHECKED BY GK DATE 7/89
SCALE _____

Duration	Precipitation, Inches		
	10-year	50-year	100-year
5-min.	0.45	0.67	0.75
10-min.	0.70	1.00	1.17
15-min.	0.88	1.27	1.48
30-min.	1.22	1.76	2.05
1-hr.	1.55	2.23	2.59
2-hr.	1.70	2.44	2.82
3-hr.	1.81	2.59	2.98
6-hr.	2.00	2.86	3.27
12-hr.	2.20	3.12	3.55
24-hr.	2.40	3.40	3.85

PRODUCT 204-1 NEBS Inc., Groton, Mass. 01471.

Project No. 21008.00 Station

hdg 1/6/89

Scottsdale Road

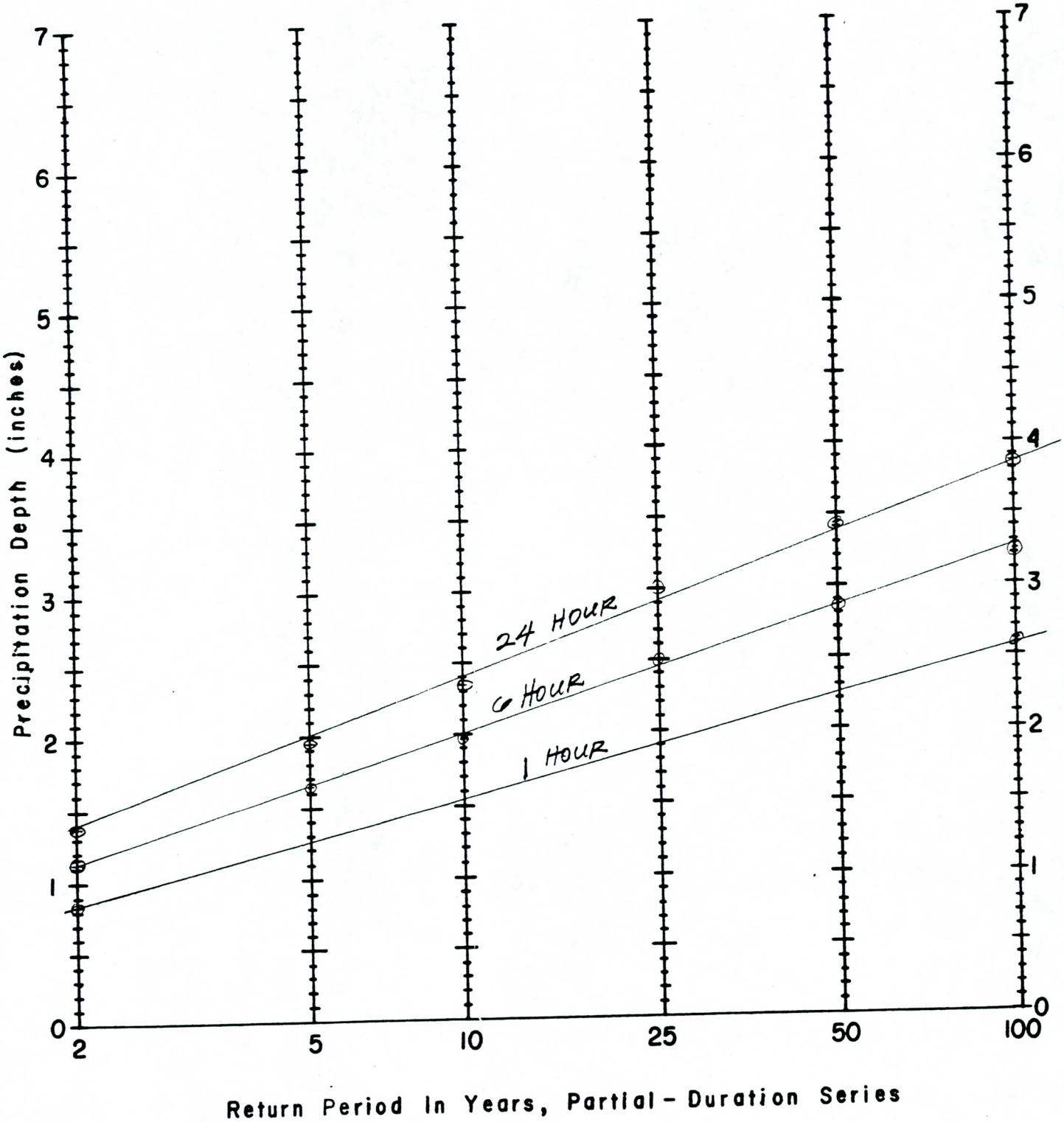

Figure 1 Precipitation Depth Versus Return Period for Partial-Duration Series

Scottsdale Rd. Improvement

ADDENDUM to "HYDROLOGIC DESIGN FOR HIGHWAY DRAINAGE IN ARIZONA" April 1975

21008-FP

Steps to be used to determine precipitation values for various durations and return periods.

STEP 1. From the precipitation maps in the manual "Hydrologic Design for Highway Drainage in Arizona", determine the precipitation values for the 6 and 24 hour duration storms for return periods of 2, 5, 10, 25, 50 and 100 years. Tabulate these values in Table 1 in the column headed 'Map Values'

1 HR: $Y_2 = -0.011 + 0.942 \left(\frac{1.12^2}{1.40}\right) = 0.833$

$Y_{100} = 0.494 + 0.755 \left(\frac{3.27^2}{3.85}\right) = 2.591$

TABLE 1

Return Period (Years)	Precipitation Values (inches)			
	6 hour duration		24 hour duration	
	Map Value	Corrected Value	Map Value	Corrected Value
2	1.12	1.12	1.38	1.40
5	1.64	1.65	1.93	2.00
10	1.97	2.00	2.33	2.40
25	2.50	2.46	3.00	2.91
50	2.86	2.86	3.42	3.40
100	3.21	3.27	3.85	3.85

NOTE: There is a possibility of making an error while reading the maps because, (1) a site is not easy to locate precisely on a series of 12 maps, (2) there may be some slight registration differences in printing, and (3) precise interpolation between isolines is difficult. In order to minimize any errors in reading the maps, these values should be plotted on the diagram "Precipitation Depth versus Return Period" Fig. 1.

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& ASSOCIATES, INC.
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PHOENIX, ARIZONA 85040
(602) 437-3733

JOB 21008-FF-04 Scottsdale Rd.
SHEET NO. _____ OF _____
CALCULATED BY hdg DATE 1/6/89
CHECKED BY CK DATE 7/89
SCALE _____

1. Compute the 5 min. precipitation value for return periods of 10 year, 50 year and 100 year.

$P_{10yr} = 0.29(1.55) = 0.45''$
$P_{50yr} = 0.29(2.23) = 0.67''$
$P_{100yr} = 0.29(2.59) = 0.75''$

2. Compute the 10 min. precipitation

$P_{10yr} = 0.45(1.55) = 0.70''$
$P_{50yr} = 0.45(2.23) = 1.00''$
$P_{100yr} = 0.45(2.59) = 1.17''$

3. Compute the 15 min. precipitation

$P_{10yr} = 0.57(1.55) = 0.88''$
$P_{50yr} = 0.57(2.23) = 1.27''$
$P_{100yr} = 0.57(2.59) = 1.48''$

4. Compute the 30 min. precipitation

$P_{10yr} = 0.79(1.55) = 1.22''$
$P_{50yr} = 0.79(2.23) = 1.76''$
$P_{100yr} = 0.79(2.59) = 2.05''$

5. Compute the 2-hr precipitation

$P_{10yr} = 0.341(2.00) + 0.659(1.55) = 1.70''$
$P_{50yr} = 0.341(2.86) + 0.659(2.23) = 2.44''$
$P_{100yr} = 0.341(3.27) + 0.659(2.59) = 2.82''$

6. Compute the 3-hr precipitation

$P_{10yr} = 0.569(2.00) + 0.431(1.55) = 1.81''$
$P_{50yr} = 0.569(2.86) + 0.431(2.23) = 2.59''$
$P_{100yr} = 0.569(3.27) + 0.431(2.59) = 2.98''$

7. Compute the 12-hr precipitation

$P_{10yr} = 2.40 - 0.51(2.40 - 2.00) = 2.20''$
$P_{50yr} = 3.40 - 0.51(3.40 - 2.86) = 3.12''$
$P_{100yr} = 3.85 - 0.51(3.85 - 3.27) = 3.55''$

HEC-1 RUN

8.0 10 - YEAR STORM

HEC 1 10 YR. STORM

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*            FEBRUARY 1981              *
*           REVISED  6 FEB 87           *
*                                       *
*  RUN DATE  10/25/1989  TIME  07:48:23 *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*  THE HYDROLOGIC ENGINEERING CENTER    *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*  (916) 440-3285 OR (FTS) 448-3285     *
*                                       *
*****************************************
```

```
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
```

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

HEC-1 INPUT

PAGE 1

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

  1           ID     SCOTTSDALE ROAD          10-YEAR STORM
  2           ID     TRIBUTARY AREA BOUNDED BY OSBORN RD. TO THE NORTH AZ. CROSS CUT
  3           ID     CANAL TO THE WEST, EARLL DR. TO THE SOUTH, AND SCOTTSDALE RD.
  4           ID     TO THE EAST.
  5           ID
  6           ID     FILE NAME: "5SDLNE10.DAT"
  7           ID
  8           ID      10-YEAR STORM, 24-HOUR VALUE=2.40 INCHES
  9           ID
 10           ID     PROJECT NO. 21008-FP  SCOTTSDALE ROAD IMPROVEMENT
 11           ID     FROM McDOWELL RD. TO EARLL DRIVE.
 12           ID
 13           ID     HEC-1 MODEL INPUT & ANALYSIS BY BROOKS, HERSEY & ASSOC.
 14           ID     FEBRUARY,  1989. BY HDG.
 15           ID
              *DIAGRAM
 16           IT       2       0       0     150
 17           IO       5
 18           JD               .09
 19           PH                      .45    0.88    1.55    1.70    1.81    2.00    2.20    2.40
 20           JD               1
 21           JD               2
```

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             FEBRUARY 1981             *
*           REVISED  6 FEB 87           *
*                                       *
*  RUN DATE  10/25/1989  TIME  07:48:23 *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*  THE HYDROLOGIC ENGINEERING CENTER    *
*          609 SECOND STREET            *
*        DAVIS, CALIFORNIA 95616        *
*  (916) 440-3285 OR (FTS) 448-3285     *
*                                       *
*****************************************
```

```
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
```

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

1 HEC-1 INPUT PAGE 1

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

  1           ID     SCOTTSDALE ROAD          10-YEAR STORM
  2           ID     TRIBUTARY AREA BOUNDED BY OSBORN RD. TO THE NORTH AZ. CROSS CUT
  3           ID     CANAL TO THE WEST, EARLL DR. TO THE SOUTH, AND SCOTTSDALE RD.
  4           ID     TO THE EAST.
  5           ID
  6           ID     FILE NAME: "5SDLNE10.DAT"
  7           ID
  8           ID      10-YEAR STORM, 24-HOUR VALUE=2.40 INCHES
  9           ID
 10           ID     PROJECT NO. 21008-FP  SCOTTSDALE ROAD IMPROVEMENT
 11           ID     FROM McDOWELL RD. TO EARLL DRIVE.
 12           ID
 13           ID     HEC-1 MODEL INPUT & ANALYSIS BY BROOKS, HERSEY & ASSOC.
 14           ID     FEBRUARY,  1989. BY HDG.
 15           ID
              *DIAGRAM
 16           IT       2       0       0     150
 17           IO       5
 16           JD               .09
 19           PH                       .45    0.88    1.55    1.70    1.81    2.00    2.20    2.40
 20           JD                 1
 21           JD                 2
```

```
22          KK     SB8
23          KM       RUNOFF FROM SB8
24          BA   .0690
25          LS       0      70      56
26          UD     .19

27          KK    CP10
28          KM       ROUTE RUNOFF FROM SB8 TO CP10
29          RK    1980   .0050     .02                    1      50

30          KK    SB10
31          KM       RUNOFF FROM SB10
32          BA   .1351
33          LS       0      70      55
34          UD     .23

35          KK    CP10
36          KM       COMBINE HYDROGRAPHS AT CP10
37          HC       2

38          KK    CP12
39          KM       ROUTE COMBINED HYDROGRAPHS AT CP10 TO CP12
40          RK    1320   .0030     .02                    1      50

41          KK    SB12
42          KM       RUNOFF FROM SB12
43          BA   .0606
44          LS       0      70      48
45          UD     .28
```



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

46          KK    CP12
47          KM       COMBINE HYDROGRAPHS AT CP12
48          HC       2

49          KK    CP14
50          KM       ROUTE COMBINED HYDROGRAPHS AT CP12 TO CP14
51          RK    1320   .0031     .02                    1      50

52          KK    SB14
53          KM       RUNOFF FROM SB14
54          BA   .0579
55          LS       0      70      90
56          UD     .31

57          KK    CP14
58          KM       COMBINE HYDROGRAPHS AT CP14
59          HC       2
60          ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE NO.		
	(V) ROUTING	(--->) DIVERSION OR PUMP FLOW
	(.) CONNECTOR	(<---) RETURN OF DIVERTED OR PUMPED FLOW
22	SB8	

```
            V
            V
27        CP10
            .
            .
30          .        SB10
            .          .
            .          .
35        CP10............
            V
            V
38        CP12
            .
            .
41          .        SB12
            .          .
            .          .
46        CP12............
            V
            V
49        CP14
            .
            .
52          .        SB14
            .          .
            .          .
57        CP14............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            FEBRUARY 1981             *
*          REVISED  6 FEB 87           *
*                                      *
*  RUN DATE  10/25/1989  TIME  07:48:23 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*  THE HYDROLOGIC ENGINEERING CENTER   *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*  (916) 440-3285 OR (FTS) 448-3285    *
*                                      *
****************************************
```

SCOTTSDALE ROAD 10-YEAR STORM
TRIBUTARY AREA BOUNDED BY OSBORN RD. TO THE NORTH AZ. CROSS CUT CANAL TO THE WEST, EARLL DR. TO THE SOUTH, AND SCOTTSDALE RD. TO THE EAST.

FILE NAME: "5SDLNE10.DAT"

10-YEAR STORM, 24-HOUR VALUE=2.40 INCHES

PROJECT NO. 21008-FP SCOTTSDALE ROAD IMPROVEMENT
FROM McDOWELL RD. TO EARLL DRIVE.

HEC-1 MODEL INPUT & ANALYSIS BY BROOKS, HERSEY & ASSOC.
FEBRUARY, 1989. BY HDG.

17 IO OUTPUT CONTROL VARIABLES

```
          IPRNT          5  PRINT CONTROL
          IPLOT          0  PLOT CONTROL
          QSCAL         0.  HYDROGRAPH PLOT SCALE

IT      HYDROGRAPH TIME DATA
           NMIN          2  MINUTES IN COMPUTATION INTERVAL
          IDATE     1    0  STARTING DATE
          ITIME       0000  STARTING TIME
             NQ        150  NUMBER OF HYDROGRAPH ORDINATES
         NDDATE     1    0  ENDING DATE
         NDTIME       0458  ENDING TIME
          ICENT         19  CENTURY MARK

      COMPUTATION INTERVAL     .03 HOURS
           TOTAL TIME BASE    4.97 HOURS

    ENGLISH UNITS
        DRAINAGE AREA        SQUARE MILES
        PRECIPITATION DEPTH  INCHES
        LENGTH, ELEVATION    FEET
        FLOW                 CUBIC FEET PER SECOND
        STORAGE VOLUME       ACRE-FEET
        SURFACE AREA         ACRES
        TEMPERATURE          DEGREES FAHRENHEIT

18 JD     INDEX STORM NO. 1
           STRM       1.95  PRECIPITATION DEPTH
           TRDA        .09  TRANSPOSITION DRAINAGE AREA

19 PI      PRECIPITATION PATTERN
          .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
          .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
          .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
          .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
          .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
          .00    .00    .00    .01    .01    .01    .01    .01    .01    .02
          .02    .02    .02    .02    .02    .03    .03    .04    .04    .05
          .06    .07    .10    .18    .18    .15    .09    .07    .05    .04
          .04    .04    .03    .03    .02    .02    .02    .02    .02    .01
          .01    .01    .01    .01    .01    .01    .00    .00    .00    .00
          .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
          .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
          .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
          .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
          .00    .00    .00    .00    .00    .00    .00    .00    .00

20 JD     INDEX STORM NO. 2
           STRM       1.94  PRECIPITATION DEPTH
           TRDA       1.00  TRANSPOSITION DRAINAGE AREA

19 PI      PRECIPITATION PATTERN
          .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
          .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
          .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
          .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
          .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
          .00    .00    .01    .01    .01    .01    .01    .01    .01    .02
          .02    .02    .02    .02    .02    .03    .03    .04    .04    .05
          .06    .07    .10    .18    .18    .15    .09    .07    .05    .04
          .04    .04    .03    .03    .02    .02    .02    .02    .02    .01
```

.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

21 JD INDEX STORM NO. 3

STRM 1.94 PRECIPITATION DEPTH

TRDA 2.00 TRANSPOSITION DRAINAGE AREA

19 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.01	.01	.01	.01	.01	.01	.01	.02
.02	.02	.02	.02	.02	.03	.03	.04	.04	.05
.06	.07	.10	.18	.18	.14	.09	.07	.05	.04
.04	.04	.03	.03	.02	.02	.02	.02	.02	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

1

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	SB8	80.	2.70	11.	11.	11.	.07		
ROUTED TO	CP10	76.	2.80	10.	10.	10.	.07		
HYDROGRAPH AT	SB10	142.	2.73	20.	20.	20.	.14		
2 COMBINED AT	CP10	211.	2.77	31.	31.	31.	.20		
ROUTED TO	CP12	207.	2.83	30.	30.	30.	.20		
HYDROGRAPH AT	SB12	51.	2.80	8.	8.	8.	.06		
2 COMBINED AT	CP12	257.	2.83	38.	38.	38.	.26		
ROUTED TO	CP14	252.	2.90	38.	38.	38.	.26		

HYDROGRAPH AT	SB14	81.	2.80	13.	13.	13.	.06
2 COMBINED AT	CP14	329.	2.87	51.	51.	51.	.32

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

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             FEBRUARY 1981             *
*            REVISED  6 FEB 87          *
*                                       *
*                                       *
*  RUN DATE  10/25/1989  TIME  08:13:37 *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*  THE HYDROLOGIC ENGINEERING CENTER    *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*  (916) 440-3285 OR (FTS) 448-3285     *
*                                       *
*****************************************
```

```
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
```

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

HEC-1 INPUT

```
1

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

  1           ID     SCOTTSDALE ROAD          10-YEAR STORM
  2           ID     TRIBUTARY AREA BOUNDED BY EARLL DRIVE TO THE NORTH, AZ. CROSS CUT
  3           ID     CANAL TO THE WEST, THOMAS RD. TO THE SOUTH, AND SCOTTSDALE RD.
  4           ID     TO THE EAST.
  5           ID
  6           ID     FILE NAME: "5SDLTM10.DAT"
  7           ID
  8           ID      10-YEAR STORM, 24-HOUR VALUE=2.40 INCHES
  9           ID
 10           ID     PROJECT NO. 21008-FP  SCOTTSDALE ROAD IMPROVEMENT
 11           ID     FROM McDOWELL RD. TO EARLL DRIVE.
 12           ID
 13           ID     HEC-1 MODEL INPUT & ANALYSIS BY BROOKS, HERSEY & ASSOC.
 14           ID     FEBRUARY,  1989. BY HDG.
 15           ID
              *DIAGRAM
 16           IT       2       0       0     150
 17           IO       5
 18           JD               .09
 19           PH                      .45    0.88    1.55    1.70    1.81    2.00    2.20    2.40
 20           JD               1
 21           JD               2
```

```
22          KK     SB9
23          KM       RUNOFF FROM SUBBASIN 9
24          BA   .0471
25          LS       0      70      50
26          UD     .26

27          KK    CP13
28          KM       ROUTE FLOW FROM SB9 TO CP13
29          RK    2640   .0050     .02                        1      50

30          KK    SB13
31          KM       RUNOFF FROM SB13
32          BA   .0558
33          LS       0      70      57
34          UD     .38

35          KK    CP13
36          KM       COMBINE HYDROGRAPHS AT CP13
37          HC       2

38          KK    CP15
39          KM       ROUTE COMBINED HYDROGRAPHS AT CP13 TO CP15
40          RK    1320   .0044     .02                        1      50

41          KK    SB15
42          KM       RUNOFF AT SB15
43          BA   .0587
44          LS       0      70      90
45          UD     .34
```



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

46          KK    CP15
47          KM       COMBINE HYDROGRAPHS AT CP15
48          HC       2
49          ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

  22        SB9
             V
             V
  27       CP13
             .
             .
  30         .        SB13
             .          .
             .          .
  35       CP13............
             V
             V
  38       CP15
             .
             .
```

```
41          .        SB15
            .          .
            .          .
46       CP15............

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            FEBRUARY 1981             *
*          REVISED  6 FEB 87           *
*                                      *
*  RUN DATE  10/25/1989  TIME  08:13:37 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*  THE HYDROLOGIC ENGINEERING CENTER   *
*          609 SECOND STREET           *
*        DAVIS, CALIFORNIA 95616       *
*  (916) 440-3285 OR (FTS) 448-3285    *
*                                      *
****************************************
```

SCOTTSDALE ROAD 10-YEAR STORM
TRIBUTARY AREA BOUNDED BY EARLL DRIVE TO THE NORTH, AZ. CROSS CUT CANAL TO THE WEST, THOMAS RD. TO THE SOUTH, AND SCOTTSDALE RD. TO THE EAST.

FILE NAME: "5SDLTM10.DAT"

10-YEAR STORM, 24-HOUR VALUE=2.40 INCHES

PROJECT NO. 21008-FP SCOTTSDALE ROAD IMPROVEMENT
FROM McDOWELL RD. TO EARLL DRIVE.

HEC-1 MODEL INPUT & ANALYSIS BY BROOKS, HERSEY & ASSOC.
FEBRUARY, 1989. BY HDG.

```
17 IO        OUTPUT CONTROL VARIABLES
                  IPRNT          5  PRINT CONTROL
                  IPLOT          0  PLOT CONTROL
                  QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT        HYDROGRAPH TIME DATA
                   NMIN          2  MINUTES IN COMPUTATION INTERVAL
                  IDATE     1    0  STARTING DATE
                  ITIME       0000  STARTING TIME
                     NQ        150  NUMBER OF HYDROGRAPH ORDINATES
                 NDDATE     1    0  ENDING DATE
                 NDTIME       0458  ENDING TIME
                  ICENT         19  CENTURY MARK

          COMPUTATION INTERVAL     .03 HOURS
               TOTAL TIME BASE    4.97 HOURS

      ENGLISH UNITS
          DRAINAGE AREA          SQUARE MILES
          PRECIPITATION DEPTH    INCHES
          LENGTH, ELEVATION      FEET
          FLOW                   CUBIC FEET PER SECOND
          STORAGE VOLUME         ACRE-FEET
          SURFACE AREA           ACRES
```

TEMPERATURE DEGREES FAHRENHEIT

18 JD INDEX STORM NO. 1

STRM 1.95 PRECIPITATION DEPTH

TRDA .09 TRANSPOSITION DRAINAGE AREA

19 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.01	.01	.01	.01	.01	.01	.02
.02	.02	.02	.02	.02	.03	.03	.04	.04	.05
.06	.07	.10	.18	.18	.15	.09	.07	.05	.04
.04	.04	.03	.03	.02	.02	.02	.02	.02	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

20 JD INDEX STORM NO. 2

STRM 1.94 PRECIPITATION DEPTH

TRDA 1.00 TRANSPOSITION DRAINAGE AREA

19 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.01	.01	.01	.01	.01	.01	.01	.02
.02	.02	.02	.02	.02	.03	.03	.04	.04	.05
.06	.07	.10	.18	.18	.15	.09	.07	.05	.04
.04	.04	.03	.03	.02	.02	.02	.02	.02	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

21 JD INDEX STORM NO. 3

STRM 1.94 PRECIPITATION DEPTH

TRDA 2.00 TRANSPOSITION DRAINAGE AREA

19 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.01	.01	.01	.01	.01	.01	.01	.02
.02	.02	.02	.02	.02	.03	.03	.04	.04	.05
.06	.07	.10	.18	.18	.14	.09	.07	.05	.04
.04	.04	.03	.03	.02	.02	.02	.02	.02	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

1

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	SB9	43.	2.77	7.	7.	7.	.05		
ROUTED TO	CP13	41.	2.97	6.	6.	6.	.05		
HYDROGRAPH AT	SB13	47.	2.90	9.	9.	9.	.06		
2 COMBINED AT	CP13	86.	2.93	15.	15.	15.	.10		
ROUTED TO	CP15	84.	3.03	15.	15.	15.	.10		
HYDROGRAPH AT	SB15	78.	2.83	13.	13.	13.	.06		
2 COMBINED AT	CP15	150.	2.97	28.	28.	28.	.16		

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

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*            FEBRUARY 1981              *
*           REVISED  6 FEB 87           *
*                                       *
*  RUN DATE  10/25/1989  TIME  08:15:04 *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*  THE HYDROLOGIC ENGINEERING CENTER    *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*  (916) 440-3285 OR (FTS) 448-3285     *
*                                       *
*****************************************
```

```
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
```

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

HEC-1 INPUT

```
1

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

   1          ID     SCOTTSDALE ROAD          10-YEAR STORM
   2          ID
   3          ID     TRIBUTARY AREA BOUNDED BY THOMAS TO THE NORTH, AZ. CROSS CUT
   4          ID     CANAL TO THE WEST, VIRGINIA AVE. TO THE SOUTH, AND SCOTTSDALE
   5          ID     RD. TO THE EAST.
   6          ID
   7          ID     FILE NAME: "5SDLNV10.DAT"
   8          ID
   9          ID      10-YEAR STORM, 24-HOUR VALUE=2.40 INCHES
  10          ID
  11          ID     PROJECT NO. 21008-FP  SCOTTSDALE ROAD IMPROVEMENT
  12          ID     FROM McDOWELL RD. TO EARLL DRIVE.
  13          ID
  14          ID     HEC-1 MODEL INPUT & ANALYSIS BY BROOKS, HERSEY & ASSOC.
  15          ID     FEBRUARY,  1989. BY HDG.
  16          ID
              *DIAGRAM
  17          IT       2       0       0     150
  18          IO       5
  19          JD               .09
  20          PH                      .45    0.88    1.55    1.70    1.81    2.00    2.20    2.40
  21          JD                 1
  22          JD                 2
```

```
23          KK    SB16
24          KM       FLOW FROM SB16
25          BA   .0868
26          LS       0      70      75
27          UD     .26

28          KK    CP15
29          KM       ROUTE FLOW FROM SB16 TO CP15
30          RK    2640    .003     .02                          1      50

31          KK    CP18
32          KM       ROUTE FLOW FROM CP15 TO CP18
33          RK    1320   .0018     .02                          1      50

34          KK    SB18
35          KM       RUNOFF FROM SB18
36          BA   .1386
37          LS       0      70      50
38          UD     .43

39          KK    CP18
40          KM       COMBINE HYDROGRAPHS AT CP18
41          HC       2
42          ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

   23        SB16
                V
                V
   28        CP15
                V
                V
   31        CP18
                .
                .
   34           .        SB18
                .           .
                .           .
   39        CP18............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             FEBRUARY 1981             *
*           REVISED  6 FEB 87           *
*                                       *
*  RUN DATE  10/25/1989  TIME  08:15:04 *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*  THE HYDROLOGIC ENGINEERING CENTER    *
*          609 SECOND STREET            *
*        DAVIS, CALIFORNIA 95616        *
*  (916) 440-3285 OR (FTS) 448-3285     *
*                                       *
*****************************************
```

SCOTTSDALE ROAD 10-YEAR STORM

TRIBUTARY AREA BOUNDED BY THOMAS TO THE NORTH, AZ. CROSS CUT CANAL TO THE WEST, VIRGINIA AVE. TO THE SOUTH, AND SCOTTSDALE RD. TO THE EAST.

FILE NAME: "5SDLNV10.DAT"

10-YEAR STORM, 24-HOUR VALUE=2.40 INCHES

PROJECT NO. 21008-FP SCOTTSDALE ROAD IMPROVEMENT
FROM McDOWELL RD. TO EARLL DRIVE.

HEC-1 MODEL INPUT & ANALYSIS BY BROOKS, HERSEY & ASSOC.
FEBRUARY, 1989. BY HDG.

```
18 IO        OUTPUT CONTROL VARIABLES
                 IPRNT          5  PRINT CONTROL
                 IPLOT          0  PLOT CONTROL
                 QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT        HYDROGRAPH TIME DATA
                  NMIN          2  MINUTES IN COMPUTATION INTERVAL
                 IDATE     1    0  STARTING DATE
                 ITIME       0000  STARTING TIME
                    NQ        150  NUMBER OF HYDROGRAPH ORDINATES
                NDDATE     1    0  ENDING DATE
                NDTIME       0458  ENDING TIME
                 ICENT         19  CENTURY MARK

           COMPUTATION INTERVAL     .03 HOURS
                TOTAL TIME BASE    4.97 HOURS

      ENGLISH UNITS
          DRAINAGE AREA          SQUARE MILES
          PRECIPITATION DEPTH    INCHES
          LENGTH, ELEVATION      FEET
          FLOW                   CUBIC FEET PER SECOND
          STORAGE VOLUME         ACRE-FEET
          SURFACE AREA           ACRES
          TEMPERATURE            DEGREES FAHRENHEIT

19 JD        INDEX STORM NO. 1
                 STRM       1.95  PRECIPITATION DEPTH
                 TRDA        .09  TRANSPOSITION DRAINAGE AREA

20 PI        PRECIPITATION PATTERN
                .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
                .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
                .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
                .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
                .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
                .00    .00    .00    .01    .01    .01    .01    .01    .01    .02
                .02    .02    .02    .02    .02    .03    .03    .04    .04    .05
                .06    .07    .10    .18    .18    .15    .09    .07    .05    .04
                .04    .04    .03    .03    .02    .02    .02    .02    .02    .01
                .01    .01    .01    .01    .01    .01    .00    .00    .00    .00
                .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
```

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

21 JD INDEX STORM NO. 2

STRM 1.94 PRECIPITATION DEPTH

TRDA 1.00 TRANSPOSITION DRAINAGE AREA

20 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.01	.01	.01	.01	.01	.01	.01	.02
.02	.02	.02	.02	.02	.03	.03	.04	.04	.05
.06	.07	.10	.18	.18	.15	.09	.07	.05	.04
.04	.04	.03	.03	.02	.02	.02	.02	.02	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

22 JD INDEX STORM NO. 3

STRM 1.94 PRECIPITATION DEPTH

TRDA 2.00 TRANSPOSITION DRAINAGE AREA

20 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.01	.01	.01	.01	.01	.01	.01	.02
.02	.02	.02	.02	.02	.03	.03	.04	.04	.05
.06	.07	.10	.18	.18	.14	.09	.07	.05	.04
.04	.04	.03	.03	.02	.02	.02	.02	.02	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

1

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	SB16	113.	2.77	17.	17.	17.	.09		
ROUTED TO	CP15	105.	2.97	16.	16.	16.	.09		

ROUTED TO	CP18	103.	3.07	16.	16.	16.	.09
HYDROGRAPH AT	SB18	96.	2.93	19.	19.	19.	.14
2 COMBINED AT	CP18	193.	3.03	35.	35.	35.	.23

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

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            FEBRUARY 1981             *
*           REVISED  6 FEB 87          *
*                                      *
*  RUN DATE  10/25/1989  TIME  08:19:38 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*  THE HYDROLOGIC ENGINEERING CENTER   *
*          609 SECOND STREET           *
*        DAVIS, CALIFORNIA 95616       *
*  (916) 440-3285 OR (FTS) 448-3285    *
*                                      *
****************************************
```

```
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
```

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

1 HEC-1 INPUT

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

  1           ID     SCOTTSDALE ROAD          10-YEAR STORM
  2           ID
  3           ID     TRIBUTARY AREA BOUNDED BY VIRGINIA AVE. TO THE NORTH, AZ. CROSS CUT
  4           ID     CANAL TO THE WEST, OAK ST. TO THE SOUTH, AND SCOTTSDALE RD. TO THE
  5           ID     EAST.
  6           ID
  7           ID     FILE NAME: "5SDLOK10.DAT"
  8           ID
  9           ID      10-YEAR STORM, 24-HOUR VALUE=2.40 INCHES
 10           ID
 11           ID     PROJECT NO. 21008-FP  SCOTTSDALE ROAD IMPROVEMENT
 12           ID     FROM McDOWELL RD. TO EARLL DRIVE.
 13           ID
 14           ID     HEC-1 MODEL INPUT & ANALYSIS BY BROOKS, HERSEY & ASSOC.
 15           ID     FEBRUARY,  1989. BY HDG.
 16           ID
              *DIAGRAM
 17           IT       2       0       0     150
 18           IO       5
 19           JD               .09
 20           PH                       .45    0.88    1.55    1.70    1.81    2.00    2.20    2.40
 21           JD                 1
 22           JD                 2
```

```
23          KK    SB21
24          KM       RUNOFF FROM SB21
25          BA   .0648
26          LS       0      70      45
27          UD     .30

28          KK    SB19
29          KM       RUNOFF FROM SB19
30          BA   .1143
31          LS       0      70      45
32          UD     .31

33          KK    CP19
34          KM       COMBINE HYDROGRAPHS AT CP19
35          HC       2

36          KK    CP20
37          KM       ROUTE FLOW FROM CP19 TO CP20
38          RK    1600    .004     .02                    1      50

39          KK    SB20
40          KM       RUNOFF FROM SB20
41          BA    .047
42          LS       0      70      64
43          UD     .29
```



```
1

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


44          KK    CP20
45          KM       COMBINE HYDROGRAPHS AT CP20
46          HC       2
47          ZZ

1
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

  23        SB21
              .
              .
  28          .        SB19
              .          .
              .          .
  33        CP19............
              V
              V
  36        CP20
              .
              .
  39          .        SB20
              .          .
              .          .
  44        CP20............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*            FEBRUARY 1981              *
*           REVISED  6 FEB 87           *
*                                       *
*  RUN DATE  10/25/1989  TIME  08:19:38 *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*  THE HYDROLOGIC ENGINEERING CENTER    *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*  (916) 440-3285 OR (FTS) 448-3285     *
*                                       *
*****************************************
```

```
                    SCOTTSDALE ROAD          10-YEAR STORM

                    TRIBUTARY AREA BOUNDED BY VIRGINIA AVE. TO THE NORTH, AZ. CROSS CUT
                    CANAL TO THE WEST, OAK ST. TO THE SOUTH, AND SCOTTSDALE RD. TO THE
                    EAST.

                    FILE NAME: "5SDLOK10.DAT"

                     10-YEAR STORM, 24-HOUR VALUE=2.40 INCHES

                    PROJECT NO. 21008-FP  SCOTTSDALE ROAD IMPROVEMENT
                    FROM McDOWELL RD. TO EARLL DRIVE.

                    HEC-1 MODEL INPUT & ANALYSIS BY BROOKS, HERSEY & ASSOC.
                    FEBRUARY,  1989. BY HDG.


 18 IO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN          2  MINUTES IN COMPUTATION INTERVAL
                      IDATE     1    0  STARTING DATE
                      ITIME       0000  STARTING TIME
                         NQ        150  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE     1    0  ENDING DATE
                     NDTIME       0458  ENDING TIME
                      ICENT         19  CENTURY MARK

                 COMPUTATION INTERVAL     .03 HOURS
                      TOTAL TIME BASE    4.97 HOURS

          ENGLISH UNITS
              DRAINAGE AREA          SQUARE MILES
              PRECIPITATION DEPTH    INCHES
              LENGTH, ELEVATION      FEET
              FLOW                   CUBIC FEET PER SECOND
              STORAGE VOLUME         ACRE-FEET
              SURFACE AREA           ACRES
              TEMPERATURE            DEGREES FAHRENHEIT

 19 JD          INDEX STORM NO. 1
                      STRK       1.95  PRECIPITATION DEPTH
                      TRDA        .09  TRANSPOSITION DRAINAGE AREA
```

20 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.01	.01	.01	.01	.01	.01	.02
.02	.02	.02	.02	.02	.03	.03	.04	.04	.05
.06	.07	.10	.18	.18	.15	.09	.07	.05	.04
.04	.04	.03	.03	.02	.02	.02	.02	.02	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

21 JD INDEX STORM NO. 2

STRM 1.94 PRECIPITATION DEPTH

TRDA 1.00 TRANSPOSITION DRAINAGE AREA

20 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.01	.01	.01	.01	.01	.01	.01	.02
.02	.02	.02	.02	.02	.03	.03	.04	.04	.05
.06	.07	.10	.18	.18	.15	.09	.07	.05	.04
.04	.04	.03	.03	.02	.02	.02	.02	.02	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

22 JD INDEX STORM NO. 3

STRM 1.94 PRECIPITATION DEPTH

TRDA 2.00 TRANSPOSITION DRAINAGE AREA

20 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.01	.01	.01	.01	.01	.01	.01	.02
.02	.02	.02	.02	.02	.03	.03	.04	.04	.05
.06	.07	.10	.18	.18	.14	.09	.07	.05	.04
.04	.04	.03	.03	.02	.02	.02	.02	.02	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

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			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
				6-HOUR	24-HOUR	72-HOUR			
HYDROGRAPH AT	SB21	50.	2.80	8.	8.	8.	.06		
HYDROGRAPH AT	SB19	87.	2.83	15.	15.	15.	.11		
2 COMBINED AT	CP19	137.	2.83	23.	23.	23.	.18		
ROUTED TO	CP20	133.	2.90	22.	22.	22.	.18		
HYDROGRAPH AT	SB20	50.	2.80	8.	8.	8.	.05		
2 COMBINED AT	CP20	178.	2.87	30.	30.	30.	.23		

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

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*            FEBRUARY 1981              *
*           REVISED  6 FEB 87           *
*                                       *
*  RUN DATE  10/25/1989  TIME  08:21:30 *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*  THE HYDROLOGIC ENGINEERING CENTER    *
*          609 SECOND STREET            *
*        DAVIS, CALIFORNIA 95616        *
*  (916) 440-3285 OR (FTS) 448-3285     *
*                                       *
*****************************************
```

```
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
```

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

1 HEC-1 INPUT PAGE 1

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

  1           ID     SCOTTSDALE ROAD          10-YEAR STORM
  2           ID
  3           ID     TRIBUTARY AREA BOUNDED BY OAK ST. TO THE NORTH, AZ. CROSS CUT CANAL TO THE
  4           ID     WEST, PALM LANE TO SOUTH, AND SCOTTSDALE RD. TO THE
  5           ID     EAST.
  6           ID
  7           ID     FILE NAME: "5SDLNP10.DAT"
  8           ID
  9           ID      10-YEAR STORM, 24-HOUR VALUE=2.40 INCHES
 10           ID
 11           ID     PROJECT NO. 21008-FP  SCOTTSDALE ROAD IMPROVEMENT
 12           ID     FROM McDOWELL RD. TO EARLL DRIVE.
 13           ID
 14           ID     HEC-1 MODEL INPUT & ANALYSIS BY BROOKS, HERSEY & ASSOC.
 15           ID     FEBRUARY,  1989. BY HDG.
 16           ID
              *DIAGRAM
 17           IT       2       0       0     150
 18           IO       5
 19           JD               .09
 20           PH                     0.45    0.88    1.55    1.70    1.81    2.00    2.20    2.40
 21           JD                 1
 22           JD                 2
```

```
23          KK    SB22
24          KM       RUNOFF FROM SB22
25          BA  .04884
26          LS       0      70      45
27          UD     .23

28          KK    CP25
29          KM       ROUTE FLOW FROM SB22 TO CP25
30          RK    1320   .0050     .02                    1      50

31          KK    SB25
32          KM       HYDROGRAPH AT SB25
33          BA  .06486
34          LS       0      70      53
35          UD     .35

36          KK    CP25
37          KM       COMBINE HYDROGRAPH AT CP25
38          HC       2
39          ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

   23        SB22
               V
               V
   28        CP25
               .
               .
   31          .        SB25
               .          .
               .          .
   36        CP25............
               .
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *            FEBRUARY 1981              *
 *           REVISED  6 FEB 87           *
 *                                       *
 *  RUN DATE  10/25/1989  TIME  08:21:30 *
 *                                       *
 *****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*  THE HYDROLOGIC ENGINEERING CENTER    *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*  (916) 440-3285 OR (FTS) 448-3285     *
*                                       *
*****************************************
```

SCOTTSDALE ROAD 10-YEAR STORM

TRIBUTARY AREA BOUNDED BY OAK ST. TO THE NORTH, AZ. CROSS CUT CANAL TO THE WEST, PALM LANE TO SOUTH, AND SCOTTSDALE RD. TO THE EAST.

FILE NAME: "5SDLNP10.DAT"

10-YEAR STORM, 24-HOUR VALUE=2.40 INCHES

PROJECT NO. 21008-FP SCOTTSDALE ROAD IMPROVEMENT
FROM McDOWELL RD. TO EARLL DRIVE.

HEC-1 MODEL INPUT & ANALYSIS BY BROOKS, HERSEY & ASSOC.
FEBRUARY, 1989. BY HDG.

```
18 IO        OUTPUT CONTROL VARIABLES
                  IPRNT          5  PRINT CONTROL
                  IPLOT          0  PLOT CONTROL
                  QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT        HYDROGRAPH TIME DATA
                   NMIN          2  MINUTES IN COMPUTATION INTERVAL
                  IDATE     1    0  STARTING DATE
                  ITIME       0000  STARTING TIME
                     NQ        150  NUMBER OF HYDROGRAPH ORDINATES
                 NDDATE     1    0  ENDING DATE
                 NDTIME       0458  ENDING TIME
                  ICENT         19  CENTURY MARK

            COMPUTATION INTERVAL     .03 HOURS
                 TOTAL TIME BASE    4.97 HOURS

      ENGLISH UNITS
          DRAINAGE AREA          SQUARE MILES
          PRECIPITATION DEPTH    INCHES
          LENGTH, ELEVATION      FEET
          FLOW                   CUBIC FEET PER SECOND
          STORAGE VOLUME         ACRE-FEET
          SURFACE AREA           ACRES
          TEMPERATURE            DEGREES FAHRENHEIT

19 JD        INDEX STORM NO. 1
                 STRM       1.95  PRECIPITATION DEPTH
                 TRDA        .09  TRANSPOSITION DRAINAGE AREA

20 PI          PRECIPITATION PATTERN
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .01     .01     .01     .01     .01     .01     .02
                 .02     .02     .02     .02     .02     .03     .03     .04     .04     .05
                 .06     .07     .10     .18     .18     .15     .09     .07     .05     .04
                 .04     .04     .03     .03     .02     .02     .02     .02     .02     .01
                 .01     .01     .01     .01     .01     .01     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00
21 JD        INDEX STORM NO. 2
                 STRM       1.94  PRECIPITATION DEPTH
```

TRDA 1.00 TRANSPOSITION DRAINAGE AREA

20 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.01	.01	.01	.01	.01	.01	.01	.02
.02	.02	.02	.02	.02	.03	.03	.04	.04	.05
.06	.07	.10	.18	.18	.15	.09	.07	.05	.04
.04	.04	.03	.03	.02	.02	.02	.02	.02	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

22 JD INDEX STORM NO. 3

STRM 1.94 PRECIPITATION DEPTH

TRDA 2.00 TRANSPOSITION DRAINAGE AREA

20 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.01	.01	.01	.01	.01	.01	.01	.02
.02	.02	.02	.02	.02	.03	.03	.04	.04	.05
.06	.07	.10	.18	.18	.14	.09	.07	.05	.04
.04	.04	.03	.03	.02	.02	.02	.02	.02	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

1

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	SB22	43.	2.73	6.	6.	6.	.05		
+	ROUTED TO	CP25	43.	2.83	6.	6.	6.	.05		
+	HYDROGRAPH AT	SB25	53.	2.87	9.	9.	9.	.06		
+	2 COMBINED AT	CP25	96.	2.83	16.	16.	16.	.11		

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

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            FEBRUARY 1981             *
*           REVISED  6 FEB 87          *
*                                      *
*  RUN DATE  10/25/1989  TIME  08:24:52 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*  THE HYDROLOGIC ENGINEERING CENTER   *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*  (916) 440-3285 OR (FTS) 448-3285    *
*                                      *
****************************************
```

```
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
```

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

1 HEC-1 INPUT PAGE 1

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

  1           ID     SCOTTSDALE ROAD          10-YEAR STORM
  2           ID
  3           ID     TRIBUTARY AREA BOUNDED BY PALM LANE TO THE NORTH, AZ. CROSS CUT CANAL TO
  4           ID     THE WEST, McDOWELL RD. TO THE SOUTH, AND SCOTTSDALE RD. TO THE
  5           ID     EAST.
  6           ID
  7           ID     FILE NAME: "5SDLMC10.DAT"
  8           ID
  9           ID      10-YEAR STORM, 24-HOUR VALUE=2.40 INCHES
 10           ID
 11           ID     PROJECT NO. 21008-FP  SCOTTSDALE ROAD IMPROVEMENT
 12           ID     FROM McDOWELL RD. TO EARLL DRIVE.
 13           ID
 14           ID     HEC-1 MODEL INPUT & ANALYSIS BY BROOKS, HERSEY & ASSOC.
 15           ID     FEBRUARY,  1989. BY HDG.
 16           ID
              *DIAGRAM
 17           IT       2       0       0     150
 18           IO       5
 19           JD               .09
 20           PH                       0.45    0.88    1.55    1.70    1.81    2.00    2.20    2.40
 21           JD               1
 22           JD               2
```

```
23          KK    SB23
24          KM       RUNOFF FROM SB23
25          BA   .1369
26          LS       0      70      53
27          UD     .34

28          KK    CP24
29          KM       ROUTE RUNOFF FROM SB23 TO CP24
30          RK    1320   .0083     .02                        1      50

31          KK    SB24
32          KM       RUNOFF FROM SB24
33          BA   .0537
34          LS       0      70      90
35          UD     .29

36          KK    CP24
37          KM       COMBINE HYDROGRAPHS AT CP24
38          HC       2
39          ZZ
```

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

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

  23        SB23
              V
              V
  28        CP24
              .
              .
  31          .        SB24
              .          .
              .          .
  36        CP24............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1****************************************
 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
 *            FEBRUARY 1981             *
 *          REVISED  6 FEB 87           *
 *                                      *
 *  RUN DATE  10/25/1989  TIME  08:24:52 *
 *                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*  THE HYDROLOGIC ENGINEERING CENTER   *
*          609 SECOND STREET           *
*        DAVIS, CALIFORNIA 95616       *
*  (916) 440-3285 OR (FTS) 448-3285    *
*                                      *
****************************************
```

SCOTTSDALE ROAD 10-YEAR STORM

TRIBUTARY AREA BOUNDED BY PALM LANE TO THE NORTH, AZ. CROSS CUT CANAL TO THE WEST, McDOWELL RD. TO THE SOUTH, AND SCOTTSDALE RD. TO THE EAST.

FILE NAME: "5SDLMC10.DAT"

10-YEAR STORM, 24-HOUR VALUE=2.40 INCHES

PROJECT NO. 21008-FP SCOTTSDALE ROAD IMPROVEMENT
FROM McDOWELL RD. TO EARLL DRIVE.

HEC-1 MODEL INPUT & ANALYSIS BY BROOKS, HERSEY & ASSOC.
FEBRUARY, 1989. BY HDG.

```
18 IO        OUTPUT CONTROL VARIABLES
                  IPRNT          5  PRINT CONTROL
                  IPLOT          0  PLOT CONTROL
                  QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT        HYDROGRAPH TIME DATA
                   NMIN          2  MINUTES IN COMPUTATION INTERVAL
                  IDATE     1    0  STARTING DATE
                  ITIME       0000  STARTING TIME
                     NQ        150  NUMBER OF HYDROGRAPH ORDINATES
                 NDDATE     1    0  ENDING DATE
                 NDTIME       0458  ENDING TIME
                  ICENT         19  CENTURY MARK

            COMPUTATION INTERVAL     .03 HOURS
                 TOTAL TIME BASE    4.97 HOURS

      ENGLISH UNITS
          DRAINAGE AREA          SQUARE MILES
          PRECIPITATION DEPTH    INCHES
          LENGTH, ELEVATION      FEET
          FLOW                   CUBIC FEET PER SECOND
          STORAGE VOLUME         ACRE-FEET
          SURFACE AREA           ACRES
          TEMPERATURE            DEGREES FAHRENHEIT

19 JD        INDEX STORM NO. 1
                  STRM       1.95  PRECIPITATION DEPTH
                  TRDA        .09  TRANSPOSITION DRAINAGE AREA

20 PI          PRECIPITATION PATTERN
                 .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
                 .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
                 .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
                 .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
                 .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
                 .00    .00    .00    .01    .01    .01    .01    .01    .01    .02
                 .02    .02    .02    .02    .02    .03    .03    .04    .04    .05
                 .06    .07    .10    .18    .18    .15    .09    .07    .05    .04
                 .04    .04    .03    .03    .02    .02    .02    .02    .02    .01
                 .01    .01    .01    .01    .01    .01    .00    .00    .00    .00
                 .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
                 .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
                 .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
                 .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
                 .00    .00    .00    .00    .00    .00    .00    .00    .00
```

```
21 JD        INDEX STORM NO. 2
                  STRM       1.94  PRECIPITATION DEPTH
```

TRDA 1.00 TRANSPOSITION DRAINAGE AREA

20 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.01	.01	.01	.01	.01	.01	.01	.02
.02	.02	.02	.02	.02	.03	.03	.04	.04	.05
.06	.07	.10	.18	.18	.15	.09	.07	.05	.04
.04	.04	.03	.03	.02	.02	.02	.02	.02	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

22 JD INDEX STORM NO. 3

STRM 1.94 PRECIPITATION DEPTH

TRDA 2.00 TRANSPOSITION DRAINAGE AREA

20 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.01	.01	.01	.01	.01	.01	.01	.02
.02	.02	.02	.02	.02	.03	.03	.04	.04	.05
.06	.07	.10	.18	.18	.14	.09	.07	.05	.04
.04	.04	.03	.03	.02	.02	.02	.02	.02	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

1

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	SB23	114.	2.83	20.	20.	20.	.14		
+ ROUTED TO	CP24	114.	2.90	20.	20.	20.	.14		
+ HYDROGRAPH AT	SB24	78.	2.80	12.	12.	12.	.05		
+ 2 COMBINED AT	CP24	186.	2.83	32.	32.	32.	.19		

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

8.1 EAST SIDE OF SCOTTSDALE ROAD CENTERLINE TO THE RIGHT OF WAY

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway McDowell - Southside County _____
Location _____
Project No. 21008FP Station _____
Name of Stream CBI(S)

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	.75	acres
	A_2		acres
1300 X 65 / 43560			
Drainage Length		500	feet
Elevation			
Top of Drainage Area		1233.0	feet
At Structure		1229.0	feet
Drainage Area Slope		0.88	%
		Continuous Grade	
Precipitation			inches
P = 6-hour			inches
P = 24-hour		2.4	

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches	
Time of Concentration	Tc	10	minutes	Fig 2-12
Rainfall Intensity	i	6.5	inches/hour	Fig. 2-7
Curve Numbers	CN_1	98		
	CN_2			
Weighted Curve Number	CN_W			
Runoff Coefficient	C	0.94		Fig 2-17
Peak Discharge Qp = CiA =		4.6	cfs	

Computed by hdg Date 10/4/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Scottsdale Rd - Eastside County
Location 50+00 to 54+10 flowing South Sag
Project No. 21008 FP Station
Name of Stream CB 3 (E)

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	.61	acres
410 x 65 / 43560	A_2		acres
Drainage Length		410	feet
Elevation			
Top of Drainage Area		1229.98	feet
At Structure		1228.71	feet
Drainage Area Slope		0.2	%
Precipitation			inches
P = 6-hour			inches
P = 24-hour		2.4	

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches	
Time of Concentration	Tc	10	minutes	Fig 2-12
Rainfall Intensity	i	6.5	inches/hour	Fig 2-7
Curve Numbers	CN_1	98		
	CN_2			
Weighted Curve Number	CN_W			
Runoff Coefficient	C	.94		
Peak Discharge Qp = CiA =		3.7	cfs	

Computed by hdg Date 11/5/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Scottsdale Rd County
Location 58+85 to 63+80 flowing South Cont.
Project No. 21008FP Station
Name of Stream CB 8(E)

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	0.74	acres
	A_2		acres
$\frac{495 \times 65}{43560}$			
Drainage Length		495	feet
Elevation			
Top of Drainage Area		1232.12	feet
At Structure		1229.98	feet
Drainage Area Slope		0.2	%
Precipitation			
P = 6-hour			inches
P = 24-hour		2.4	inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	6.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	0.94	
Peak Discharge Qp = CiA =		4.5	cfs

Computed by hdg Date 10/4/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Scottsdale Rd County Maricopa
Location 63+80 to 68+30 Station
Project No. 21008FP
Name of Stream CB10(E)

DESIGN DATA

Design Frequency 10 years
Drainage Area A_1 0.67 acres
A_2 acres

Drainage Length 450 feet

Elevation
Top of Drainage Area feet
At Structure feet

Drainage Area Slope 0.2 %

Precipitation
P = 6-hour inches
P = 24-hour 2.4 inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour inches

Time of Concentration Tc 10 minutes

Rainfall Intensity i 6.5 inches/hour

Curve Numbers CN_1 98
CN_2
Weighted Curve Number CN_W
Runoff Coefficient C 0.94

Peak Discharge Qp = CiA = 4.1 cfs

Computed by Ldg Date 10/4/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Scottsdale Rd County Flowing South Cond.
Location 68+30 to 73+10 Station
Project No. 21008FP
Name of Stream CB 13(E)

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	.72	acres
	A_2		acres
Drainage Length		480	feet
Elevation			feet
Top of Drainage Area			feet
At Structure			
Drainage Area Slope		0.20	%
Precipitation			inches
P = 6-hour			inches
P = 24-hour		2.4	

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	6.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	0.94	
Peak Discharge Qp = CiA =		4.4	cfs

Computed by hdg Date 11/5/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Scottsdale Rd County
Location 80+10 to 83+00 flowing North Cont.
Project No. 24008 FP Station
Name of Stream CB 18 (E)

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	.43	acres
	A_2		acres
Drainage Length		290	feet
Elevation			
Top of Drainage Area			feet
At Structure			feet
Drainage Area Slope		0.20	%
Precipitation			
P = 6-hour			inches
P = 24-hour		2.4	inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	6.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	0.94	
Peak Discharge Qp = CiA =		2.6	cfs

Computed by hdg Date 11/5/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Scottsdale Rd County
Location 83+00 to 87+57 flowing North - Sag
Project No. 21008 FP Station
Name of Stream CB 21(E)

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	0.68	acres
	A_2		acres
Drainage Length		457	feet
Elevation			
Top of Drainage Area		1232.07	feet
At Structure		1231.25	feet
Drainage Area Slope		0.20	%
Precipitation			
P = 6-hour			inches
P = 24-hour		2.4	inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	6.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	0.94	
Peak Discharge Qp = CiA =		4.1	cfs

Computed by Kdg Date 10-5/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Scottsdale Rd County
Location 87+57 to 90+80 flowing South-Sag
Project No. 21008 FP Station
Name of Stream CB 22(E)

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	.48	acres
	A_2		acres
Drainage Length		323	feet
Elevation			
Top of Drainage Area			feet
At Structure			feet
Drainage Area Slope		0.20	%
Precipitation			
P = 6-hour			inches
P = 24-hour		2.4	inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	6.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	0.94	
Peak Discharge Qp = CiA =		2.9	cfs

Computed by hdg Date 11/5/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Scottsdale Rd County
Location 97+94 to 103+20 flowing N & S - Sag
Project No. 21008FP Station
Name of Stream CB 26(E)

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	.78	acres
	A_2		acres
Drainage Length		526	feet
Elevation			
Top of Drainage Area			feet
At Structure		1233.15	feet
Drainage Area Slope		0.2	%
Precipitation			
P = 6-hour			inches
P = 24-hour		2.4	inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	6.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	0.94	
Peak Discharge Qp = CiA =		4.8	cfs

Computed by Ady Date 10/5/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Scottsdale Rd County
Location 103+20 to 107+30 flowing South - Sag Station
Project No. 21008 FP
Name of Stream CB 30 (E)

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	.61	acres
	A_2		acres
Drainage Length		410	feet
Elevation			
Top of Drainage Area			feet
At Structure			feet
Drainage Area Slope		0.38	%
Precipitation			
P = 6-hour			inches
P = 24-hour		2.4	inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	6.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	0.94	
Peak Discharge Qp = CiA =		3.7	cfs

Computed by Adg Date 11/5/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Scottsdale Rd County
Location 110+00 to 115+80 flowing south - Cont.
Project No. 21008 FP Station
Name of Stream CB34(E)

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	0.86	acres
	A_2		acres
Drainage Length		580	feet
Elevation			
Top of Drainage Area			feet
At Structure		1236.86	feet
Drainage Area Slope		0.38	%
Precipitation			
P = 6-hour			inches
P = 24-hour		2.4	inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	6.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	0.94	
Peak Discharge Qp = CiA =		5.2	cfs

Computed by hdg Date 10/5/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway McDowell - Southside County _____
Location _____
Project No. _____ Station _____
Name of Stream CBIA (S) 15+00

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	1.19	acres
	A_2		acres
Drainage Length		800	feet
Elevation			
Top of Drainage Area		1240.4	feet
At Structure		1233.0	feet
Drainage Area Slope		.88	%
		Continuous Grade	
Precipitation			
P = 6-hour			inches
P = 24-hour		2.4	inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	6.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	.94	
Peak Discharge Qp = CiA =		7.3	cfs

Computed by hdg Date 11/5/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Scottsdale Rd - Eastside County _____
Location 54+10 to 58+82.50
Project No. 21008FP Station _____
Name of Stream OB5A(E)

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	.71	acres
	A_2		acres
Drainage Length		472.5	feet
Elevation			
Top of Drainage Area			feet
At Structure			feet
Drainage Area Slope		0.20	%
Precipitation			
P = 6-hour			inches
P = 24-hour		2.4	inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	6.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	0.94	
Peak Discharge Qp = CiA =		4.3	cfs

Computed by hdg Date 11/5/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Scottsdale Rd County _____
Location 73+10 to 76+60
Project No. 2100 8 FP Station _____
Name of Stream OB15B(E)

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	.52	acres
	A_2		acres
Drainage Length		350	feet
Elevation			
Top of Drainage Area			feet
At Structure			feet
Drainage Area Slope		0.20	%
Precipitation			
P = 6-hour			inches
P = 24-hour		2.4	inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	6.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	.94	
Peak Discharge Qp = CiA =		3.2	cfs

Computed by Shdy Date 11/5/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Scottsdale Rd County _____
Location 76+60 to 80+10 following north continuous Station _____
Project No. 21008FP
Name of Stream CB 116A (E)

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	.52	acres
	A_2		acres
Drainage Length		350	feet
Elevation			feet
Top of Drainage Area			feet
At Structure			
Drainage Area Slope		0.20	%
Precipitation			inches
P = 6-hour			inches
P = 24-hour		2.4	

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	6.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	.94	
Peak Discharge Qp = CiA =		3.2	cfs

Computed by hdg Date 11/5/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Scottsdale Rd County _____
Location 90+80 to 94+90 flowing South continuous
Project No. 21008 FP Station _____
Name of Stream CB 24A(E)

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	.61	acres
	A_2		acres
Drainage Length		410	feet
Elevation			
Top of Drainage Area			feet
At Structure			feet
Drainage Area Slope		0.20	%
Precipitation			
P = 6-hour			inches
P = 24-hour		2.4	inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	6.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	.94	
Peak Discharge Qp = CiA =		3.7	cfs

Computed by hdg Date 11/05/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Scottsdale Rd County
Location 94+90 to 97+94 Flowing South continuous
Project No. 21008FP Station
Name of Stream CB 25A (E)

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	.45	acres
	A_2		acres
Drainage Length		304	feet
Elevation			
Top of Drainage Area			feet
At Structure			feet
Drainage Area Slope		0.20	%
Precipitation			
P = 6-hour			inches
P = 24-hour		2.4	inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	6.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	.94	
Peak Discharge Qp = CiA =		2.8	cfs

Computed by hdg Date 11/05/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Scottsdale Rd County _____
Location 112+40 to 116+47 flowing South cont.
Project No. 21008 FP Station _____
Name of Stream CB37(E)

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	.61	acres
	A_2		acres
Drainage Length		407	feet
Elevation			
Top of Drainage Area			feet
At Structure			feet
Drainage Area Slope		0.38	%
Precipitation			
P = 6-hour			inches
P = 24-hour		2.4	inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	6.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	.94	
Peak Discharge Qp = CiA =		3.7	cfs

Computed by Kdg Date 11/5/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway _____ County _____
Location @ Thomas & 73rd St. Northside
Project No. Scottsdale Rd. Imprvmt. Station _____
Name of Stream CB39(N)

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	2.35	acres
	A_2		acres
Drainage Length		450	feet
Elevation			
Top of Drainage Area			feet
At Structure			feet
Drainage Area Slope		0.5	%
Precipitation			
P = 6-hour			inches
P = 24-hour		2.4	inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	6.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	0.94	
Peak Discharge Qp = CiA =		14.36	cfs

Computed by hdg Date 12/8/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway _____ County _____
Location @ Thomas & 73rd st. Southside
Project No. Scottsdale Rd Imprvmt. Station _____
Name of Stream CB40(S)

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	3.5	acres
	A_2		acres
Drainage Length		500	feet
Elevation			
Top of Drainage Area		1234.5	feet
At Structure		1232.0	feet
Drainage Area Slope		0.5	%
Precipitation			
P = 6-hour			inches
P = 24-hour		2.4	inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	6.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	0.94	
Peak Discharge Qp = CiA =		21.4	cfs

Computed by Kdg Date 12/8/89

FIGURE 2-22

HEC-1 RUN

9.0 100 - YEAR STORM

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             FEBRUARY 1981             *
*            REVISED  6 FEB 87          *
*                                       *
*  RUN DATE  10/26/1989  TIME  07:43:15 *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*  THE HYDROLOGIC ENGINEERING CENTER    *
*          609 SECOND STREET            *
*        DAVIS, CALIFORNIA 95616        *
*  (916) 440-3285 OR (FTS) 448-3285     *
*                                       *
*****************************************
```

```
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
```

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

1 HEC-1 INPUT

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

  1           ID     SCOTTSDALE ROAD         100-YEAR STORM
  2           ID
  3           ID     TRIBUTARY AREA BOUNDED BY OSBORN RD. TO THE NORTH AZ. CROSS CUT
  4           ID     CANAL TO THE WEST, EARLL DRIVE TO THE SOUTH, AND SCOTTSDALE RD.
  5           ID     TO THE EAST.
  6           ID
  7           ID     FILE NAME: "5SDLNE00.DAT"
  8           ID
  9           ID     100-YEAR STORM, 24-HOUR VALUE=3.85 INCHES
 10           ID
 11           ID     PROJECT NO. 21008-FP  SCOTTSDALE ROAD IMPROVEMENT
 12           ID     FROM McDOWELL RD. TO EARLL DRIVE.
 13           ID
 14           ID     HEC-1 MODEL INPUT & ANALYSIS BY BROOKS, HERSEY & ASSOC.
 15           ID     FEBRUARY,  1989. BY HDG.
 16           ID
              *DIAGRAM
 17           IT       2       0       0     150
 18           IO       5
 19           JD               .09
 20           PH                       .75    1.48    2.59    2.82    2.98    3.27    3.55    3.85
 21           JD                 1
 22           JD                 2
```

```
23          KK     SB8
24          KM       RUNOFF FROM SB8
25          BA   .0690
26          LS       0      70      56
27          UD     .19

28          KK    CP10
29          KM       ROUTE RUNOFF FROM SB8 TO CP10
30          RK    1980   .0050     .02                        1      50

31          KK    SB10
32          KM       RUNOFF FROM SB10
33          BA   .1351
34          LS       0      70      55
35          UD     .23

36          KK    CP10
37          KM       COMBINE HYDROGRAPHS AT CP10
38          HC       2

39          KK    CP12
40          KM       ROUTE COMBINED HYDROGRAPHS AT CP10 TO CP12
41          RK    1320   .0030     .02                        1      50

42          KK    SB12
43          KM       RUNOFF FROM SB12
44          BA   .0606
45          LS       0      70      48
46          UD     .28
```



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

47          KK    CP12
48          KM       COMBINE HYDROGRAPHS AT CP12
49          HC       2

50          KK    CP14
51          KM       ROUTE COMBINED HYDROGRAPHS AT CP12 TO CP14
52          RK    1320   .0031     .02                        1      50

53          KK    SB14
54          KM       RUNOFF FROM SB14
55          BA   .0579
56          LS       0      70      90
57          UD     .31

58          KK    CP14
59          KM       COMBINE HYDROGRAPHS AT CP14
60          HC       2
61          ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT
LINE (V) ROUTING (--->) DIVERSION OR PUMP FLOW

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

```
23        SB8
            V
            V
28       CP10
            .
            .
31          .        SB10
            .           .
            .           .
36       CP10............
            V
            V
39       CP12
            .
            .
42          .        SB12
            .           .
            .           .
47       CP12............
            V
            V
50       CP14
            .
            .
53          .        SB14
            .           .
            .           .
58       CP14............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            FEBRUARY 1981             *
*          REVISED  6 FEB 87           *
*                                      *
*  RUN DATE  10/26/1989  TIME  07:43:15 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*  THE HYDROLOGIC ENGINEERING CENTER   *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*  (916) 440-3285 OR (FTS) 448-3285    *
*                                      *
****************************************
```

SCOTTSDALE ROAD 100-YEAR STORM

TRIBUTARY AREA BOUNDED BY OSBORN RD. TO THE NORTH AZ. CROSS CUT CANAL TO THE WEST, EARLL DRIVE TO THE SOUTH, AND SCOTTSDALE RD. TO THE EAST.

FILE NAME: "5SDLNE00.DAT"

100-YEAR STORM, 24-HOUR VALUE=3.85 INCHES

PROJECT NO. 21008-FP SCOTTSDALE ROAD IMPROVEMENT
FROM McDOWELL RD. TO EARLL DRIVE.

HEC-1 MODEL INPUT & ANALYSIS BY BROOKS, HERSEY & ASSOC.
FEBRUARY, 1989. BY HDG.

```
18 IO        OUTPUT CONTROL VARIABLES
                 IPRNT          5  PRINT CONTROL
                 IPLOT          0  PLOT CONTROL
                 QSCAL         0.  HYDROGRAPH PLOT SCALE

 IT          HYDROGRAPH TIME DATA
                  NMIN          2  MINUTES IN COMPUTATION INTERVAL
                 IDATE     1    0  STARTING DATE
                 ITIME       0000  STARTING TIME
                    NQ        150  NUMBER OF HYDROGRAPH ORDINATES
                NDDATE     1    0  ENDING DATE
                NDTIME       0458  ENDING TIME
                 ICENT         19  CENTURY MARK

            COMPUTATION INTERVAL     .03 HOURS
                TOTAL TIME BASE    4.97 HOURS

      ENGLISH UNITS
          DRAINAGE AREA          SQUARE MILES
          PRECIPITATION DEPTH    INCHES
          LENGTH, ELEVATION      FEET
          FLOW                   CUBIC FEET PER SECOND
          STORAGE VOLUME         ACRE-FEET
          SURFACE AREA           ACRES
          TEMPERATURE            DEGREES FAHRENHEIT

19 JD        INDEX STORM NO. 1
                 STRM        3.19  PRECIPITATION DEPTH
                 TRDA         .09  TRANSPOSITION DRAINAGE AREA

20 PI         PRECIPITATION PATTERN
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .01      .01      .01      .01      .01      .01
                 .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                 .01      .01      .01      .01      .01      .01      .01      .01      .01      .03
                 .03      .03      .04      .04      .04      .04      .05      .06      .07      .08
                 .10      .13      .18      .30      .30      .24      .16      .12      .08      .07
                 .07      .06      .05      .04      .04      .04      .04      .03      .03      .01
                 .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                 .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                 .01      .01      .01      .01      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00

21 JD        INDEX STORM NO. 2
                 STRM        3.18  PRECIPITATION DEPTH
                 TRDA        1.00  TRANSPOSITION DRAINAGE AREA

20 PI         PRECIPITATION PATTERN
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .01      .01      .01      .01      .01      .01
                 .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                 .01      .01      .01      .01      .01      .01      .01      .01      .01      .03
                 .03      .03      .04      .04      .04      .04      .05      .06      .07      .08
```

.10	.13	.17	.30	.30	.24	.16	.12	.08	.07
.07	.06	.05	.04	.04	.04	.04	.03	.03	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

22 JD INDEX STORM NO. 3

STRM 3.17 PRECIPITATION DEPTH

TRDA 2.00 TRANSPOSITION DRAINAGE AREA

20 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.03
.03	.03	.04	.04	.04	.04	.05	.06	.07	.08
.10	.12	.17	.30	.30	.24	.16	.12	.08	.07
.07	.06	.05	.04	.04	.04	.04	.03	.03	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

1

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	SB8	153.	2.70	19.	19.	19.	.07		
+	ROUTED TO	CP10	149.	2.80	19.	19.	19.	.07		
+	HYDROGRAPH AT	SB10	270.	2.73	37.	37.	37.	.14		
+	2 COMBINED AT	CP10	412.	2.77	56.	56.	56.	.20		
+	ROUTED TO	CP12	407.	2.80	55.	55.	55.	.20		
+	HYDROGRAPH AT	SB12	101.	2.80	15.	15.	15.	.06		
+	2 COMBINED AT	CP12	507.	2.80	70.	70.	70.	.26		
	ROUTED TO									

	CP14	503.	2.87	70.	70.	70.	.26
HYDROGRAPH AT	SB14	139.	2.80	22.	22.	22.	.06
2 COMBINED AT	CP14	638.	2.83	91.	91.	91.	.32

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

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            FEBRUARY 1981             *
*          REVISED  6 FEB 87           *
*                                      *
*  RUN DATE  10/26/1989  TIME  07:48:43 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*  THE HYDROLOGIC ENGINEERING CENTER   *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*  (916) 440-3285 OR (FTS) 448-3285    *
*                                      *
****************************************
```

```
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
```

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

1 HEC-1 INPUT PAGE 1

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

  1           ID     SCOTTSDALE ROAD         100-YEAR STORM
  2           ID
  3           ID     TRIBUTARY AREA BOUNDED BY EARLL DR.TO THE NORTH, AZ. CROSS CUT
  4           ID     CANAL TO THE WEST, THOMAS RD. TO THE SOUTH, AND SCOTTSDALE RD.
  5           ID     TO THE EAST.
  6           ID
  7           ID     FILE NAME: "5SDLTM00.DAT"
  8           ID
  9           ID     100-YEAR STORM, 24-HOUR VALUE=3.85 INCHES
 10           ID
 11           ID     PROJECT NO. 21008-FP  SCOTTSDALE ROAD IMPROVEMENT
 12           ID     FROM McDOWELL RD. TO EARLL DRIVE
 13           ID
 14           ID     HEC-1 MODEL INPUT & ANALYSIS BY BROOKS, HERSEY & ASSOC.
 15           ID     FEBRUARY,  1989. BY HDG.
 16           ID
              *DIAGRAM
 17           IT       2       0       0     150
 18           IO       5
 19           JD               .09
 20           PH                      .75    1.48    2.59    2.82    2.98    3.27    3.55    3.85
 21           JD               1
 22           JD               2
```

```
 23          KK     SB9
 24          KM       RUNOFF FROM SUBBASIN 9
 25          BA    .0471
 26          LS       0      70      50
 27          UD     .26

 28          KK    CP13
 29          KM       ROUTE FLOW FROM SB9 TO CP13
 30          RK    2640   .0050     .02                        1      50

 31          KK    SB13
 32          KM       RUNOFF FROM SB13
 33          BA    .0558
 34          LS       0      70      57
 35          UD     .38

 36          KK    CP13
 37          KM       COMBINE HYDROGRAPHS AT CP13
 38          HC       2

 39          KK    CP15
 40          KM       ROUTE COMBINED HYDROGRAPHS AT CP13 TO CP15
 41          RK    1320    .003     .02                        1      50

 42          KK    SB15
 43          KM       RUNOFF AT SB15
 44          BA    .0587
 45          LS       0      70      90
 46          UD     .34
1                                        HEC-1 INPUT                                        PAGE  2

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


 47          KK    CP15
 48          KM       COMBINE HYDROGRAPHS AT CP15
 49          HC       2
 50          ZZ
1
            SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

  23        SB9
              V
              V
  28        CP13
              .
              .
  31          .        SB13
              .           .
              .           .
  36        CP13............
              V
              V
  39        CP15
              .
```

```
                .
42              .        SB15
                .          .
                .          .
47          CP15............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            FEBRUARY 1981             *
*          REVISED  6 FEB 87           *
*                                      *
*  RUN DATE  10/26/1989  TIME  07:48:43 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*  THE HYDROLOGIC ENGINEERING CENTER   *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*  (916) 440-3285 OR (FTS) 448-3285    *
*                                      *
****************************************
```

SCOTTSDALE ROAD 100-YEAR STORM

TRIBUTARY AREA BOUNDED BY EARLL DR.TO THE NORTH, AZ. CROSS CUT CANAL TO THE WEST, THOMAS RD. TO THE SOUTH, AND SCOTTSDALE RD. TO THE EAST.

FILE NAME: "5SDLTM00.DAT"

100-YEAR STORM, 24-HOUR VALUE=3.85 INCHES

PROJECT NO. 21008-FP SCOTTSDALE ROAD IMPROVEMENT
FROM McDOWELL RD. TO EARLL DRIVE

HEC-1 MODEL INPUT & ANALYSIS BY BROOKS, HERSEY & ASSOC.
FEBRUARY, 1989. BY HDG.

```
18 IO        OUTPUT CONTROL VARIABLES
                  IPRNT          5  PRINT CONTROL
                  IPLOT          0  PLOT CONTROL
                  QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT        HYDROGRAPH TIME DATA
                   NMIN          2  MINUTES IN COMPUTATION INTERVAL
                  IDATE     1    0  STARTING DATE
                  ITIME       0000  STARTING TIME
                     NQ        150  NUMBER OF HYDROGRAPH ORDINATES
                 NDDATE     1    0  ENDING DATE
                 NDTIME       0458  ENDING TIME
                  ICENT         19  CENTURY MARK

            COMPUTATION INTERVAL     .03 HOURS
                 TOTAL TIME BASE    4.97 HOURS

      ENGLISH UNITS
          DRAINAGE AREA          SQUARE MILES
          PRECIPITATION DEPTH    INCHES
          LENGTH, ELEVATION      FEET
          FLOW                   CUBIC FEET PER SECOND
```

STORAGE VOLUME ACRE-FEET
SURFACE AREA ACRES
TEMPERATURE DEGREES FAHRENHEIT

19 JD INDEX STORM NO. 1
STRM 3.19 PRECIPITATION DEPTH
TRDA .09 TRANSPOSITION DRAINAGE AREA

20 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.03
.03	.03	.04	.04	.04	.04	.05	.06	.07	.08
.10	.13	.18	.30	.30	.24	.16	.12	.08	.07
.07	.06	.05	.04	.04	.04	.04	.03	.03	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

21 JD INDEX STORM NO. 2
STRM 3.18 PRECIPITATION DEPTH
TRDA 1.00 TRANSPOSITION DRAINAGE AREA

20 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.03
.03	.03	.04	.04	.04	.04	.05	.06	.07	.08
.10	.13	.17	.30	.30	.24	.16	.12	.08	.07
.07	.06	.05	.04	.04	.04	.04	.03	.03	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

22 JD INDEX STORM NO. 3
STRM 3.17 PRECIPITATION DEPTH
TRDA 2.00 TRANSPOSITION DRAINAGE AREA

20 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.03
.03	.03	.04	.04	.04	.04	.05	.06	.07	.08
.10	.12	.17	.30	.30	.24	.16	.12	.08	.07
.07	.06	.05	.04	.04	.04	.04	.03	.03	.01

.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

1

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	SB9	84.	2.77	12.	12.	12.	.05		
+	ROUTED TO	CP13	80.	2.93	12.	12.	12.	.05		
+	HYDROGRAPH AT	SB13	87.	2.90	15.	15.	15.	.06		
+	2 COMBINED AT	CP13	166.	2.93	27.	27.	27.	.10		
+	ROUTED TO	CP15	162.	3.00	27.	27.	27.	.10		
+	HYDROGRAPH AT	SB15	133.	2.83	22.	22.	22.	.06		
+	2 COMBINED AT	CP15	278.	2.97	49.	49.	49.	.16		

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

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            FEBRUARY 1981             *
*          REVISED  6 FEB 87           *
*                                      *
*  RUN DATE  10/26/1989  TIME  07:51:13 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*   U.S. ARMY CORPS OF ENGINEERS       *
*  THE HYDROLOGIC ENGINEERING CENTER   *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*  (916) 440-3285 OR (FTS) 448-3285    *
*                                      *
****************************************
```

```
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
```

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

1 HEC-1 INPUT PAGE 1

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

  1           ID     SCOTTSDALE ROAD         100-YEAR STORM
  2           ID
  3           ID     TRIBUTARY AREA BOUNDED BY THOMAS TO THE NORTH, AZ. CROSS CUT
  4           ID     CANAL TO THE WEST, VIRGINIA AVE. TO THE SOUTH, AND SCOTTSDALE
  5           ID     RD. TO EAST.
  6           ID
  7           ID     FILE NAME: "5SDLNV00.DAT"
  8           ID
  9           ID     100-YEAR STORM, 24-HOUR VALUE=3.85 INCHES
 10           ID
 11           ID     PROJECT NO. 21008-FP  SCOTTSDALE ROAD IMPROVEMENT
 12           ID     FROM McDOWELL RD. TO EARLL DRIVE.
 13           ID
 14           ID     HEC-1 MODEL INPUT & ANALYSIS BY BROOKS, HERSEY & ASSOC.
 15           ID     FEBRUARY,  1989. BY HDG.
 16           ID
              *DIAGRAM
 17           IT       2       0       0     150
 18           IO       5
 19           JD               .09
 20           PH                      0.75    1.48    2.59    2.82    2.98    3.27    3.55    3.85
 21           JD               1
 22           JD               2
```

```
23          KK    SB16
24          KM       FLOW FROM SB16
25          BA   .0868
26          LS       0      70      75
27          UD     .26

28          KK    CP15
29          KM       ROUTE FLOW FROM SB16 TO CP15
30          RK    2640    .003     .02                    1      50

31          KK    CP18
32          KM       ROUTE FLOW FROM CP15 TO CP18
33          RK    1320   .0018     .02                    1      50

34          KK    SB18
35          KM       RUNOFF FROM SB18
36          BA   .1386
37          LS       0      70      50
38          UD     .43

39          KK    CP18
40          KM       COMBINE HYDROGRAPHS AT CP18
41          HC       2
42          ZZ
```

1

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

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

   23        SB16
                V
                V
   28        CP15
                V
                V
   31        CP18
                .
                .
   34           .        SB18
                .           .
                .           .
   39        CP18............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            FEBRUARY 1981             *
*          REVISED  6 FEB 87           *
*                                      *
*  RUN DATE  10/26/1989  TIME  07:51:13 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*  THE HYDROLOGIC ENGINEERING CENTER   *
*          609 SECOND STREET           *
*        DAVIS, CALIFORNIA 95616       *
*  (916) 440-3285 OR (FTS) 448-3285    *
*                                      *
****************************************
```

SCOTTSDALE ROAD 100-YEAR STORM

TRIBUTARY AREA BOUNDED BY THOMAS TO THE NORTH, AZ. CROSS CUT CANAL TO THE WEST, VIRGINIA AVE. TO THE SOUTH, AND SCOTTSDALE RD. TO EAST.

FILE NAME: "5SDLNV00.DAT"

100-YEAR STORM, 24-HOUR VALUE=3.85 INCHES

PROJECT NO. 21008-FP SCOTTSDALE ROAD IMPROVEMENT
FROM McDOWELL RD. TO EARLL DRIVE.

HEC-1 MODEL INPUT & ANALYSIS BY BROOKS, HERSEY & ASSOC.
FEBRUARY, 1989. BY HDG.

```
18 IO        OUTPUT CONTROL VARIABLES
                 IPRNT          5  PRINT CONTROL
                 IPLOT          0  PLOT CONTROL
                 QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT        HYDROGRAPH TIME DATA
                  NMIN          2  MINUTES IN COMPUTATION INTERVAL
                 IDATE     1    0  STARTING DATE
                 ITIME       0000  STARTING TIME
                    NQ        150  NUMBER OF HYDROGRAPH ORDINATES
                NDDATE     1    0  ENDING DATE
                NDTIME       0458  ENDING TIME
                 ICENT         19  CENTURY MARK

            COMPUTATION INTERVAL     .03 HOURS
                 TOTAL TIME BASE    4.97 HOURS

      ENGLISH UNITS
          DRAINAGE AREA          SQUARE MILES
          PRECIPITATION DEPTH    INCHES
          LENGTH, ELEVATION      FEET
          FLOW                   CUBIC FEET PER SECOND
          STORAGE VOLUME         ACRE-FEET
          SURFACE AREA           ACRES
          TEMPERATURE            DEGREES FAHRENHEIT

19 JD        INDEX STORM NO. 1
                 STRM       3.19  PRECIPITATION DEPTH
                 TRDA        .09  TRANSPOSITION DRAINAGE AREA

20 PI         PRECIPITATION PATTERN
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .01     .01     .01     .01     .01     .01
                 .01     .01     .01     .01     .01     .01     .01     .01     .01     .01
                 .01     .01     .01     .01     .01     .01     .01     .01     .01     .03
                 .03     .03     .04     .04     .04     .04     .05     .06     .07     .08
                 .10     .13     .18     .30     .30     .24     .16     .12     .08     .07
                 .07     .06     .05     .04     .04     .04     .04     .03     .03     .01
                 .01     .01     .01     .01     .01     .01     .01     .01     .01     .01
                 .01     .01     .01     .01     .01     .01     .01     .01     .01     .01
```

.01	.01	.01	.01	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

21 JD INDEX STORM NO. 2

STRM 3.18 PRECIPITATION DEPTH

TRDA 1.00 TRANSPOSITION DRAINAGE AREA

20 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.03
.03	.03	.04	.04	.04	.04	.05	.06	.07	.08
.10	.13	.17	.30	.30	.24	.16	.12	.08	.07
.07	.06	.05	.04	.04	.04	.04	.03	.03	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

22 JD INDEX STORM NO. 3

STRM 3.17 PRECIPITATION DEPTH

TRDA 2.00 TRANSPOSITION DRAINAGE AREA

20 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.03
.03	.03	.04	.04	.04	.04	.05	.06	.07	.08
.10	.12	.17	.30	.30	.24	.16	.12	.08	.07
.07	.06	.05	.04	.04	.04	.04	.03	.03	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

1

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	SB16	200.	2.77	29.	29.	29.	.09		
+	ROUTED TO	CP15	191.	2.93	28.	28.	28.	.09		

	ROUTED TO						
+		CP18	189.	3.03	28.	28.	28.	.09
	HYDROGRAPH AT						
+		SB18	185.	2.97	35.	35.	35.	.14
	2 COMBINED AT						
+		CP18	371.	3.00	63.	63.	63.	.23

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

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            FEBRUARY 1981             *
*           REVISED  6 FEB 87          *
*                                      *
*  RUN DATE  10/26/1989  TIME  07:53:55 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*  THE HYDROLOGIC ENGINEERING CENTER   *
*          609 SECOND STREET           *
*        DAVIS, CALIFORNIA 95616       *
*  (916) 440-3285 OR (FTS) 448-3285    *
*                                      *
****************************************
```

```
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
```

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

1 HEC-1 INPUT PAGE 1

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

  1           ID     SCOTTSDALE ROAD         100-YEAR STORM
  2           ID
  3           ID     TRIBUTARY AREA BOUNDED BY VIRGINIA AVE. TO THE NORTH, AZ. CROSS CUT
  4           ID     CANAL TO THE WEST, OAK ST. TO THE SOUTH, AND SCOTTSDALE RD. TO THE
  5           ID     EAST.
  6           ID
  7           ID     FILE NAME: "5SDLOK00.DAT"
  8           ID
  9           ID     100-YEAR STORM, 24-HOUR VALUE=3.85 INCHES
 10           ID
 11           ID     PROJECT NO. 21008-FP  SCOTTSDALE ROAD IMPROVEMENT
 12           ID     FROM McDOWELL RD. TO EARLL DRIVE.
 13           ID
 14           ID     HEC-1 MODEL INPUT & ANALYSIS BY BROOKS, HERSEY & ASSOC.
 15           ID     FEBRUARY,  1989. BY HDG.
 16           ID
              *DIAGRAM
 17           IT       2       0       0     150
 18           IO       5
 19           JD               .09
 20           PH                       0.75    1.48    2.59    2.82    2.98    3.27    3.55    3.85
 21           JD               1
 22           JD               2
```

```
23          KK    SB21
24          KM       RUNOFF FROM SB21
25          BA   .0648
26          LS       0      70      45
27          UD     .30

28          KK    SB19
29          KM       RUNOFF FROM SB19
30          BA   .1143
31          LS       0      70      45
32          UD     .31

33          KK    CP19
34          KM       COMBINE HYDROGRAGHS AT CP19
35          HC       2

36          KK    CP20
37          KM       ROUTE FLOW FROM CP19 TO CP20
38          RK    1600    .004     .02                    1      50

39          KK    SB20
40          KM       RUNOFF FROM SB20
41          BA   .047
42          LS       0      70      64
43          UD     .29
```



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

44          KK    CP20
45          KM       COMBINE HYDROGRAPHS AT CP20
46          HC       2
47          ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

 23        SB21
             .
             .
 28          .        SB19
             .          .
             .          .
 33        CP19............
             V
             V
 36        CP20
             .
             .
 39          .        SB20
             .          .
             .          .
 44        CP20............

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
```

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             FEBRUARY 1981             *
*           REVISED  6 FEB 87           *
*                                       *
*  RUN DATE  10/26/1989  TIME  07:53:55 *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*  THE HYDROLOGIC ENGINEERING CENTER    *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*  (916) 440-3285 OR (FTS) 448-3285     *
*                                       *
*****************************************
```

SCOTTSDALE ROAD 100-YEAR STORM

TRIBUTARY AREA BOUNDED BY VIRGINIA AVE. TO THE NORTH, AZ. CROSS CUT CANAL TO THE WEST, OAK ST. TO THE SOUTH, AND SCOTTSDALE RD. TO THE EAST.

FILE NAME: "5SDLOK00.DAT"

100-YEAR STORM, 24-HOUR VALUE=3.85 INCHES

PROJECT NO. 21008-FP SCOTTSDALE ROAD IMPROVEMENT
FROM McDOWELL RD. TO EARLL DRIVE.

HEC-1 MODEL INPUT & ANALYSIS BY BROOKS, HERSEY & ASSOC.
FEBRUARY, 1989. BY HDG.

```
18 IO        OUTPUT CONTROL VARIABLES
                  IPRNT          5  PRINT CONTROL
                  IPLOT          0  PLOT CONTROL
                  QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT        HYDROGRAPH TIME DATA
                   NMIN          2  MINUTES IN COMPUTATION INTERVAL
                  IDATE     1    0  STARTING DATE
                  ITIME       0000  STARTING TIME
                     NQ        150  NUMBER OF HYDROGRAPH ORDINATES
                 NDDATE     1    0  ENDING DATE
                 NDTIME       0458  ENDING TIME
                  ICENT         19  CENTURY MARK

            COMPUTATION INTERVAL     .03 HOURS
                 TOTAL TIME BASE    4.97 HOURS

      ENGLISH UNITS
          DRAINAGE AREA          SQUARE MILES
          PRECIPITATION DEPTH    INCHES
          LENGTH, ELEVATION      FEET
          FLOW                   CUBIC FEET PER SECOND
          STORAGE VOLUME         ACRE-FEET
          SURFACE AREA           ACRES
          TEMPERATURE            DEGREES FAHRENHEIT

   19 JD        INDEX STORM NO. 1
                  STRM        3.19  PRECIPITATION DEPTH
                  TRDA         .09  TRANSPOSITION DRAINAGE AREA
```

20 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.03
.03	.03	.04	.04	.04	.04	.05	.06	.07	.08
.10	.13	.18	.30	.30	.24	.16	.12	.08	.07
.07	.06	.05	.04	.04	.04	.04	.03	.03	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

21 JD INDEX STORM NO. 2

STRM 3.18 PRECIPITATION DEPTH

TRDA 1.00 TRANSPOSITION DRAINAGE AREA

20 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.03
.03	.03	.04	.04	.04	.04	.05	.06	.07	.08
.10	.13	.17	.30	.30	.24	.16	.12	.08	.07
.07	.06	.05	.04	.04	.04	.04	.03	.03	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

22 JD INDEX STORM NO. 3

STRM 3.17 PRECIPITATION DEPTH

TRDA 2.00 TRANSPOSITION DRAINAGE AREA

20 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.03
.03	.03	.04	.04	.04	.04	.05	.06	.07	.08
.10	.12	.17	.30	.30	.24	.16	.12	.08	.07
.07	.06	.05	.04	.04	.04	.04	.03	.03	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

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	SB21	100.	2.83	16.	16.	16.	.06		
+	HYDROGRAPH AT	SB19	174.	2.83	28.	28.	28.	.11		
+	2 COMBINED AT	CP19	273.	2.83	43.	43.	43.	.18		
+	ROUTED TO	CP20	269.	2.90	43.	43.	43.	.18		
+	HYDROGRAPH AT	SB20	92.	2.80	14.	14.	14.	.05		
+	2 COMBINED AT	CP20	354.	2.87	57.	57.	57.	.23		

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

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*            FEBRUARY 1981              *
*           REVISED  6 FEB 87           *
*                                       *
*  RUN DATE  10/26/1989  TIME  07:56:28 *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*  THE HYDROLOGIC ENGINEERING CENTER    *
*          609 SECOND STREET            *
*        DAVIS, CALIFORNIA 95616        *
*  (916) 440-3285 OR (FTS) 448-3285     *
*                                       *
*****************************************
```

```
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
```

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

1 HEC-1 INPUT PAGE 1

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

  1           ID     SCOTTSDALE ROAD         100-YEAR STORM
  2           ID
  3           ID     TRIBUTARY AREA BOUNDED BY OAK ST. TO THE NORTH, AZ. CROSS CUT CANAL
  4           ID     TO THE WEST, PALM LANE TO THE SOUTH, AND SCOTTSDALE RD. TO THE
  5           ID     EAST.
  6           ID
  7           ID     FILE NAME: "5SDLNP00.DAT"
  8           ID
  9           ID     100-YEAR STORM, 24-HOUR VALUE=3.85 INCHES
 10           ID
 11           ID     PROJECT NO. 21008-FP  SCOTTSDALE ROAD IMPROVEMENT
 12           ID     FROM McDOWELL RD. TO EARLL DRIVE.
 13           ID
 14           ID     HEC-1 MODEL INPUT & ANALYSIS BY BROOKS, HERSEY & ASSOC.
 15           ID     FEBRUARY,  1989. BY HDG.
 16           ID
              *DIAGRAM
 17           IT       2       0       0     150
 18           IO       5
 19           JD               .09
 20           PH                     0.75    1.48    2.59    2.82    2.98    3.27    3.55    3.85
 21           JD                 1
 22           JD                 2
```

```
23          KK    SB22
24          KM       RUNOFF FROM SB22
25          BA  .04884
26          LS       0      70      45
27          UD     .23

28          KK    CP25
29          KM       ROUTE FLOW FROM SB22 TO CP25
30          RK    1320   .0050     .02                        1      50

31          KK    SB25
32          KM       HYDROGRAPH AT SB25
33          BA  .06486
34          LS       0      70      53
35          UD     .35

36          KK    CP25
37          KM       COMBINE HYDROGRAPH AT CP25
38          HC       2
39          ZZ
```

1

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

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

   23        SB22
                V
                V
   28        CP25
                .
                .
   31           .        SB25
                .           .
                .           .
   36        CP25............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            FEBRUARY 1981             *
*          REVISED  6 FEB 87           *
*                                      *
*  RUN DATE  10/26/1989  TIME  07:56:28 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*  THE HYDROLOGIC ENGINEERING CENTER   *
*          609 SECOND STREET           *
*        DAVIS, CALIFORNIA 95616       *
*  (916) 440-3285 OR (FTS) 448-3285    *
*                                      *
****************************************
```

SCOTTSDALE ROAD 100-YEAR STORM

TRIBUTARY AREA BOUNDED BY OAK ST. TO THE NORTH, AZ. CROSS CUT CANAL TO THE WEST, PALM LANE TO THE SOUTH, AND SCOTTSDALE RD. TO THE EAST.

FILE NAME: "5SDLNP00.DAT"

100-YEAR STORM, 24-HOUR VALUE=3.85 INCHES

PROJECT NO. 21008-FP SCOTTSDALE ROAD IMPROVEMENT
FROM McDOWELL RD. TO EARLL DRIVE.

HEC-1 MODEL INPUT & ANALYSIS BY BROOKS, HERSEY & ASSOC.
FEBRUARY, 1989. BY HDG.

```
18 IO        OUTPUT CONTROL VARIABLES
                 IPRNT          5  PRINT CONTROL
                 IPLOT          0  PLOT CONTROL
                 QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT        HYDROGRAPH TIME DATA
                  NMIN          2  MINUTES IN COMPUTATION INTERVAL
                 IDATE     1    0  STARTING DATE
                 ITIME       0000  STARTING TIME
                    NQ        150  NUMBER OF HYDROGRAPH ORDINATES
                NDDATE     1    0  ENDING DATE
                NDTIME       0458  ENDING TIME
                 ICENT         19  CENTURY MARK

            COMPUTATION INTERVAL     .03 HOURS
                 TOTAL TIME BASE    4.97 HOURS

      ENGLISH UNITS
          DRAINAGE AREA          SQUARE MILES
          PRECIPITATION DEPTH    INCHES
          LENGTH, ELEVATION      FEET
          FLOW                   CUBIC FEET PER SECOND
          STORAGE VOLUME         ACRE-FEET
          SURFACE AREA           ACRES
          TEMPERATURE            DEGREES FAHRENHEIT

19 JD        INDEX STORM NO. 1
                 STRM       3.19  PRECIPITATION DEPTH
                 TRDA        .09  TRANSPOSITION DRAINAGE AREA

20 PI         PRECIPITATION PATTERN
                 .00        .00        .00        .00        .00        .00        .00        .00        .00        .00
                 .00        .00        .00        .00        .00        .00        .00        .00        .00        .00
                 .00        .00        .00        .00        .00        .00        .00        .00        .00        .00
                 .00        .00        .00        .00        .01        .01        .01        .01        .01        .01
                 .01        .01        .01        .01        .01        .01        .01        .01        .01        .01
                 .01        .01        .01        .01        .01        .01        .01        .01        .01        .03
                 .03        .03        .04        .04        .04        .04        .05        .06        .07        .08
                 .10        .13        .18        .30        .30        .24        .16        .12        .08        .07
                 .07        .06        .05        .04        .04        .04        .04        .03        .03        .01
                 .01        .01        .01        .01        .01        .01        .01        .01        .01        .01
                 .01        .01        .01        .01        .01        .01        .01        .01        .01        .01
                 .01        .01        .01        .01        .00        .00        .00        .00        .00        .00
                 .00        .00        .00        .00        .00        .00        .00        .00        .00        .00
                 .00        .00        .00        .00        .00        .00        .00        .00        .00        .00
                 .00        .00        .00        .00        .00        .00        .00        .00        .00

21 JD        INDEX STORM NO. 2
                 STRM       3.18  PRECIPITATION DEPTH
```

TRDA 1.00 TRANSPOSITION DRAINAGE AREA

20 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.03
.03	.03	.04	.04	.04	.04	.05	.06	.07	.08
.10	.13	.17	.30	.30	.24	.16	.12	.08	.07
.07	.06	.05	.04	.04	.04	.04	.03	.03	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

22 JD INDEX STORM NO. 3

STRM 3.17 PRECIPITATION DEPTH

TRDA 2.00 TRANSPOSITION DRAINAGE AREA

20 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.03
.03	.03	.04	.04	.04	.04	.05	.06	.07	.08
.10	.12	.17	.30	.30	.24	.16	.12	.08	.07
.07	.06	.05	.04	.04	.04	.04	.03	.03	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

1

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	SB22	87.	2.73	12.	12.	12.	.05		
+	ROUTED TO	CP25	84.	2.80	12.	12.	12.	.05		
+	HYDROGRAPH AT	SB25	102.	2.87	17.	17.	17.	.06		
+	2 COMBINED AT	CP25	184.	2.83	29.	29.	29.	.11		

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

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*            FEBRUARY 1981              *
*           REVISED  6 FEB 87           *
*                                       *
*  RUN DATE  10/26/1989  TIME  07:58:14 *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*  THE HYDROLOGIC ENGINEERING CENTER    *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*  (916) 440-3285 OR (FTS) 448-3285     *
*                                       *
*****************************************
```

```
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
```

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

1 HEC-1 INPUT PAGE 1

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

  1           ID     SCOTTSDALE ROAD        100-YEAR STORM
  2           ID
  3           ID     TRIBUTARY AREA BOUNDED BY PALM LANE TO THE NORTH, AZ. CROSS CUT CANAL TO
  4           ID     THE WEST, McDOWELL RD. TO THE SOUTH AND SCOTTSDALE RD.TO THE
  5           ID     EAST.
  6           ID
  7           ID     FILE NAME: "5SDLMC00.DAT"
  8           ID
  9           ID     100-YEAR STORM, 24-HOUR VALUE=3.85 INCHES
 10           ID
 11           ID     PROJECT NO. 21008-FP  SCOTTSDALE ROAD IMPROVEMENT
 12           ID     FROM McDOWELL RD. TO EARLL DRIVE.
 13           ID
 14           ID     HEC-1 MODEL INPUT & ANALYSIS BY BROOKS, HERSEY & ASSOC.
 15           ID     FEBRUARY,  1989. BY HDG.
 16           ID
              *DIAGRAM
 17           IT       2       0       0     150
 18           IO       5
 19           JD              .09
 20           PH                     .75    1.48    2.59    2.82    2.98    3.27    3.55    3.85
 21           JD               1
 22           JD               2
```

```
23          KK    SB23
24          KM       RUNOFF FROM SB23
25          BA   .1369
26          LS       0      70      53
27          UD     .34

28          KK    CP24
29          KM       ROUTE RUNOFF FROM SB23 TO CP24
30          RK    1320   .0083     .02                    1      50

31          KK    SB24
32          KM       RUNOFF FROM SB24
33          BA   .0537
34          LS       0      70      90
35          UD     .29

36          KK    CP24
37          KM       COMBINE HYDROGRAPHS AT CP24
38          HC       2
39          ZZ
```

1

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

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

  23        SB23
               V
               V
  28        CP24
               .
               .
  31           .        SB24
               .           .
               .           .
  36        CP24............

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
```

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            FEBRUARY 1981             *
*           REVISED  6 FEB 87          *
*                                      *
*  RUN DATE  10/26/1989  TIME  07:58:14 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*  THE HYDROLOGIC ENGINEERING CENTER   *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*  (916) 440-3285 OR (FTS) 448-3285    *
*                                      *
****************************************
```

SCOTTSDALE ROAD 100-YEAR STORM

TRIBUTARY AREA BOUNDED BY PALM LANE TO THE NORTH, AZ. CROSS CUT CANAL TO THE WEST, McDOWELL RD. TO THE SOUTH AND SCOTTSDALE RD.TO THE EAST.

FILE NAME: "5SDLMC00.DAT"

100-YEAR STORM, 24-HOUR VALUE=3.85 INCHES

PROJECT NO. 21008-FP SCOTTSDALE ROAD IMPROVEMENT
FROM McDOWELL RD. TO EARLL DRIVE.

HEC-1 MODEL INPUT & ANALYSIS BY BROOKS, HERSEY & ASSOC.
FEBRUARY, 1989. BY HDG.

```
18 IO        OUTPUT CONTROL VARIABLES
                 IPRNT          5  PRINT CONTROL
                 IPLOT          0  PLOT CONTROL
                 QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT        HYDROGRAPH TIME DATA
                  NMIN          2  MINUTES IN COMPUTATION INTERVAL
                 IDATE     1    0  STARTING DATE
                 ITIME       0000  STARTING TIME
                    NQ        150  NUMBER OF HYDROGRAPH ORDINATES
                NDDATE     1    0  ENDING DATE
                NDTIME       0458  ENDING TIME
                 ICENT         19  CENTURY MARK

          COMPUTATION INTERVAL     .03 HOURS
               TOTAL TIME BASE    4.97 HOURS

      ENGLISH UNITS
          DRAINAGE AREA          SQUARE MILES
          PRECIPITATION DEPTH    INCHES
          LENGTH, ELEVATION      FEET
          FLOW                   CUBIC FEET PER SECOND
          STORAGE VOLUME         ACRE-FEET
          SURFACE AREA           ACRES
          TEMPERATURE            DEGREES FAHRENHEIT

19 JD        INDEX STORM NO. 1
                 STRM       3.19  PRECIPITATION DEPTH
                 TRDA        .09  TRANSPOSITION DRAINAGE AREA

20 PI         PRECIPITATION PATTERN
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .01     .01     .01     .01     .01     .01
                 .01     .01     .01     .01     .01     .01     .01     .01     .01     .01
                 .01     .01     .01     .01     .01     .01     .01     .01     .01     .03
                 .03     .03     .04     .04     .04     .04     .05     .06     .07     .08
                 .10     .13     .18     .30     .30     .24     .16     .12     .08     .07
                 .07     .06     .05     .04     .04     .04     .04     .03     .03     .01
                 .01     .01     .01     .01     .01     .01     .01     .01     .01     .01
                 .01     .01     .01     .01     .01     .01     .01     .01     .01     .01
                 .01     .01     .01     .01     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                 .00     .00     .00     .00     .00     .00     .00     .00     .00

21 JD        INDEX STORM NO. 2
                 STRM       3.18  PRECIPITATION DEPTH
```

TRDA 1.00 TRANSPOSITION DRAINAGE AREA

20 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.03
.03	.03	.04	.04	.04	.04	.05	.06	.07	.08
.10	.13	.17	.30	.30	.24	.16	.12	.08	.07
.07	.06	.05	.04	.04	.04	.04	.03	.03	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

22 JD INDEX STORM NO. 3

STRM 3.17 PRECIPITATION DEPTH

TRDA 2.00 TRANSPOSITION DRAINAGE AREA

20 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.03
.03	.03	.04	.04	.04	.04	.05	.06	.07	.08
.10	.12	.17	.30	.30	.24	.16	.12	.08	.07
.07	.06	.05	.04	.04	.04	.04	.03	.03	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

1

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	SB23	217.	2.87	36.	36.	36.	.14		
+	ROUTED TO	CP24	217.	2.90	36.	36.	36.	.14		
+	HYDROGRAPH AT	SB24	133.	2.80	20.	20.	20.	.05		
+	2 COMBINED AT	CP24	338.	2.87	56.	56.	56.	.19		

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

9.1 EAST SIDE OF

SCOTTSDALE ROAD CENTERLINE TO

THE RIGHT OF WAY

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway McDowell - Southside County _____
Location _____ Station _____
Project No. 21008 FP
Name of Stream CB1(S)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	.75	acres
	A_2		acres
Drainage Length		500	feet
Elevation			feet
Top of Drainage Area			feet
At Structure			
Drainage Area Slope		0.88	%
Precipitation			inches
P = 6-hour		3.85	inches
P = 24-hour			

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	10.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	0.94	
Peak Discharge Qp = CiA =		7.4	cfs

Computed by hdg Date 11/7/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Scottsdale Rd - Eastside County _____

Location _____ Station _____

Project No. 2100FP

Name of Stream CB 3(E)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	.61	acres
	A_2		acres
Drainage Length		410	feet
Elevation			feet
Top of Drainage Area			feet
At Structure			
Drainage Area Slope		0.20	%
Precipitation			inches
P = 6-hour			inches
P = 24-hour		3.85	

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	10.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	0.94	
Peak Discharge Qp = CiA =		6.0	cfs

Computed by hdg Date 11/7/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Scottsdale Rd County _____
Location _____
Project No. 2/008FP Station _____
Name of Stream CB8 (E)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	0.74	acres
	A_2		acres
Drainage Length		495	feet
Elevation			
Top of Drainage Area		1232.12	feet
At Structure		1229.98	feet
Drainage Area Slope		0.2	%
Precipitation			inches
P = 6-hour			inches
P = 24-hour		3.85	inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	10.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	0.94	
Peak Discharge Qp = CiA =		7.3	cfs

Computed by hdg Date 10/5/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Scottsdale Rd County _____
Location _____
Project No. 24008 FP Station _____
Name of Stream CB10(E)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	0.67	acres
	A_2		acres
Drainage Length		450	feet
Elevation			
Top of Drainage Area			feet
At Structure			feet
Drainage Area Slope		0.20	%
Precipitation			
P = 6-hour			inches
P = 24-hour		3.85	inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	10.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	0.94	
Peak Discharge Qp = CiA =		6.6	cfs

Computed by Ady Date 10/5/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Scottsdale Rd County _____
Location _____
Project No. 21008 FP Station _____
Name of Stream CB13(E)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	.72	acres
	A_2		acres
Drainage Length			feet
Elevation			feet
Top of Drainage Area			feet
At Structure			
Drainage Area Slope		0.20	%
Precipitation			inches
P = 6-hour			inches
P = 24-hour		3.85	

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	10.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	0.94	
Peak Discharge Qp = CiA =		7.1	cfs

Computed by Kdg Date 11/7/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Scottsdale Rd County _____
Location _____
Project No. 21008FP Station _____
Name of Stream CB18(E)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	.43	acres
	A_2		acres
Drainage Length		290	feet
Elevation			feet
Top of Drainage Area			feet
At Structure			
Drainage Area Slope		0.20	%
Precipitation			inches
P = 6-hour			inches
P = 24-hour		3.85	

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	10.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	0.94	
Peak Discharge Qp = CiA =		4.2	cfs

Computed by holy Date 11/7/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Scottsdale Rd County _____
Location _____
Project No. 21008 FP Station _____
Name of Stream CB21 (E)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	0.68	acres
	A_2		acres
Drainage Length		457	feet
Elevation			
Top of Drainage Area		1232.07	feet
At Structure		1231.25	feet
Drainage Area Slope		0.20	%
Precipitation			
P = 6-hour			inches
P = 24-hour		3.85	inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	10.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	0.94	
Peak Discharge Qp = CiA =		6.7	cfs

Computed by hdg Date 10/5/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Scottsdale Rd County _____
Location _____
Project No. 21008 FP Station _____
Name of Stream CB22 (E)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	.48	acres
	A_2		acres
Drainage Length		323	feet
Elevation			feet
Top of Drainage Area			feet
At Structure			
Drainage Area Slope		0.20	%
Precipitation			inches
P = 6-hour			inches
P = 24-hour		3.85	

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	10.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	0.94	
Peak Discharge Qp = CiA =		4.7	cfs

Computed by hdg Date 11/7/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Scottsdale Rd County _____
Location _____
Project No. 21008 FP Station _____
Name of Stream CB26(E)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	.78	acres
	A_2		acres
Drainage Length		526	feet
Elevation			
Top of Drainage Area			feet
At Structure		1233.15	feet
Drainage Area Slope		0.2	%
Precipitation			
P = 6-hour			inches
P = 24-hour		3.85	inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	10.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	0.94	
Peak Discharge Qp = CiA =		7.7	cfs

Computed by hdg Date 10/5/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Scottsdale Rd County

Location

Project No. 21008 FP Station

Name of Stream CB 30 (E)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	.61	acres
	A_2		acres
Drainage Length		410	feet
Elevation			feet
Top of Drainage Area			feet
At Structure			
Drainage Area Slope		0.38	%
Precipitation			inches
P = 6-hour			inches
P = 24-hour		3.85	

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	10.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	0.94	
Peak Discharge Qp = CiA =		6.0	cfs

Computed by hdg Date 11/7/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Scottsdale Rd County _____
Location 110+00 to 115+80
Project No. 21008 FP Station _____
Name of Stream CB34 (E)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	.86	acres
	A_2		acres
Drainage Length		580	feet
Elevation			
Top of Drainage Area			feet
At Structure		1236.86	feet
Drainage Area Slope		0.38	%
Precipitation			
P = 6-hour			inches
P = 24-hour		3.85	inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	10.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	0.94	
Peak Discharge Qp = CiA =		8.5	cfs

Computed by hdg Date 10/5/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway McDowell - Southside County _____
Location _____
Project No. _____ Station _____
Name of Stream CBIA(S) 15+00

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	1.19	acres
	A_2		acres
Drainage Length		800	feet
Elevation			
Top of Drainage Area			feet
At Structure			feet
Drainage Area Slope		.88	%
Precipitation			
P = 6-hour			inches
P = 24-hour		3.85	inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	10.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	.94	
Peak Discharge Qp = CiA =		11.7	cfs

Computed by hdg Date 11/7/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Scottsdale Rd - County _____
Location 54+10 to 58+82.5
Project No. 21008 FP Station _____
Name of Stream CB 5A(E)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	.71	acres
	A_2		acres
Drainage Length		472.5	feet
Elevation			feet
Top of Drainage Area			feet
At Structure			
Drainage Area Slope		0.20	%
Precipitation			inches
P = 6-hour			inches
P = 24-hour		3.85	

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	10.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	.94	
Peak Discharge Qp = CiA =		7.0	cfs

Computed by Rdg Date 11/7/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Scottsdale Rd County _____
Location 73+10 to 76+60
Project No. 2100 SFT Station _____
Name of Stream OB 15B (E)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	.52	acres
	A_2		acres
Drainage Length		350	feet
Elevation			
Top of Drainage Area			feet
At Structure			feet
Drainage Area Slope		0.20	%
Precipitation			
P = 6-hour			inches
P = 24-hour		3.85	inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	10.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	.94	
Peak Discharge Qp = CiA =		5.1	cfs

Computed by hdg Date 11/7/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Scottsdale Rd County _____
Location 76+60 to 80+10
Project No. 21008 FP Station _____
Name of Stream CB16A(E)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	.52	acres
	A_2		acres
Drainage Length		350	feet
Elevation			
Top of Drainage Area			feet
At Structure			feet
Drainage Area Slope		0.20	%
Precipitation			
P = 6-hour			inches
P = 24-hour		3.85	inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	10.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	.94	
Peak Discharge Qp = CiA =		5.1	cfs

Computed by hdg Date 11/7/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Scottsdale Rd County _____
Location 90+80 to 94+90
Project No. 21008FP Station _____
Name of Stream OB 24A (E)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	.61	acres
	A_2		acres
Drainage Length		410	feet
Elevation			
Top of Drainage Area			feet
At Structure			feet
Drainage Area Slope		0.20	%
Precipitation			
P = 6-hour			inches
P = 24-hour		3.85	inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	10.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	.94	
Peak Discharge Qp = CiA =		6.0	cfs

Computed by hdg Date 11/7/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Scottsdale Rd County _____
Location 94+90 to 97+94 flowing south continuous grade
Project No. 21008FP Station _____
Name of Stream OB25A (E)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	.45	acres
	A_2		acres
Drainage Length		304	feet
Elevation			
Top of Drainage Area			feet
At Structure			feet
Drainage Area Slope		0.20	%
Precipitation			
P = 6-hour			inches
P = 24-hour		3.85	inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	10.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	.94	
Peak Discharge Qp = CiA =		4.4	cfs

Computed by hdg Date 11/7/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway Scottsdale Rd County _____
Location 112+40 to 116+47
Project No. 21008 FP Station _____
Name of Stream CB37(E)

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	.101	acres
	A_2		acres
Drainage Length		407	feet
Elevation			
Top of Drainage Area			feet
At Structure			feet
Drainage Area Slope		0.38	%
Precipitation			
P = 6-hour			inches
P = 24-hour		3.85	inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	10.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	.94	
Peak Discharge Qp = CiA =		6.0	cfs

Computed by hdg Date 11/7/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway _____ County _____
Location @ Thomas & 73rd St. Northside
Project No. Scottsdale Rd Imprvmt Station _____
Name of Stream CB 89 (N)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	2.35	acres
	A_2		acres
Drainage Length		450	feet
Elevation			
Top of Drainage Area			feet
At Structure			feet
Drainage Area Slope		0.5	%
Precipitation			
P = 6-hour			inches
P = 24-hour		3.85	inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	10.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	0.94	
Peak Discharge Qp = CiA =		23	cfs

Computed by hdg Date 12/8/89

FIGURE 2-22

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
RATIONAL METHOD

LOCATION DATA

Highway _____ County _____
Location @ Thomas & 73rd st. Southside
Project No. Scottsdale Rd Imprvmt Station _____
Name of Stream CB46 (S)

DESIGN DATA

Design Frequency		100	years
Drainage Area	A_1	3.5	acres
	A_2		acres
Drainage Length		500	feet
Elevation			
Top of Drainage Area			feet
At Structure			feet
Drainage Area Slope		0.5	%
Precipitation			
P = 6-hour			inches
P = 24-hour		3.85	inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour			inches
Time of Concentration	Tc	10	minutes
Rainfall Intensity	i	10.5	inches/hour
Curve Numbers	CN_1	98	
	CN_2		
Weighted Curve Number	CN_W		
Runoff Coefficient	C	0.94	
Peak Discharge Qp = CiA =		34	cfs

Computed by hdg Date 12/8/89

FIGURE 2-22

10.0 SUPPORTING CALCULATIONS

CURVE NUMBERS FOR DEVELOPED RESIDENTIAL AREAS TO BE USED WITH A.D.O.T. OR S.C.S. HYDROLOGIC DESIGN PROCEDURES

Zoning Designation	Curve Numbers by S.C.S. Hydrologic Soil Groups		
	B	C	D
R1-190	84	90	92
R1-130	85	90	92
R1-70	86	90	92
R1-43	87	91	93
R1-35	88	91	93
R1-18	89	91	93
R1-10	90	92	93
R1-7	91	92	93

The curve numbers listed above were determined by assuming that subdivisions existed with fully developed streets and lots in accordance with the zoning for the land and Title 12 of the City Code. The undeveloped portions of each lot were assumed to have desert brush with 15% cover density. In accordance with Figure 2-3 of A.D.O.T.'s hydrologic design manual, the curve numbers for undeveloped land with a 15% coverage of desert brush would be 83 for Soil Group B, 89 for Soil Group C, and 92 for Soil Group D.

The following additional curve number information is also provided for use in runoff analyses:

Land Cover	Curve Numbers by S.C.S. Hydrologic Soil Groups		
Areas with good grass cover such as lawns, golf courses, etc.	70	75	80
Paved surfaces	98	98	98

FIGURE 2-16

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

	ZONING	TYPE B	TYPE C	TYPE D
Single family — 43,560 SF	RE-43) S-1)	77	83	86
	RE-35	79	84	87
Single family — 24,000 SF	RE-25	79	84	87
	E1-18	80	84	87
one family — 14,000 SF	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
Light Industrial — Industrial	A-1) A-2)	85	91	93
Neighborhood retail — Intermediate Commercial — Gen. Commercial	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

Residential

Commercial

RUNOFF COEFFICIENT "C" FOR THE RATIONAL METHOD
USING SCS CURVE NUMBERS AND PRECIPITATION DATA

This figure is a graphic representation of the information provided in paragraphs 6a and 6b of Section I, Part J of the December 1973 Hydrologic and Hydraulic Training Session Manual prepared by the Arizona Highway Department to supplement its manual titled "Hydrologic Design for Highway Drainage in Arizona."

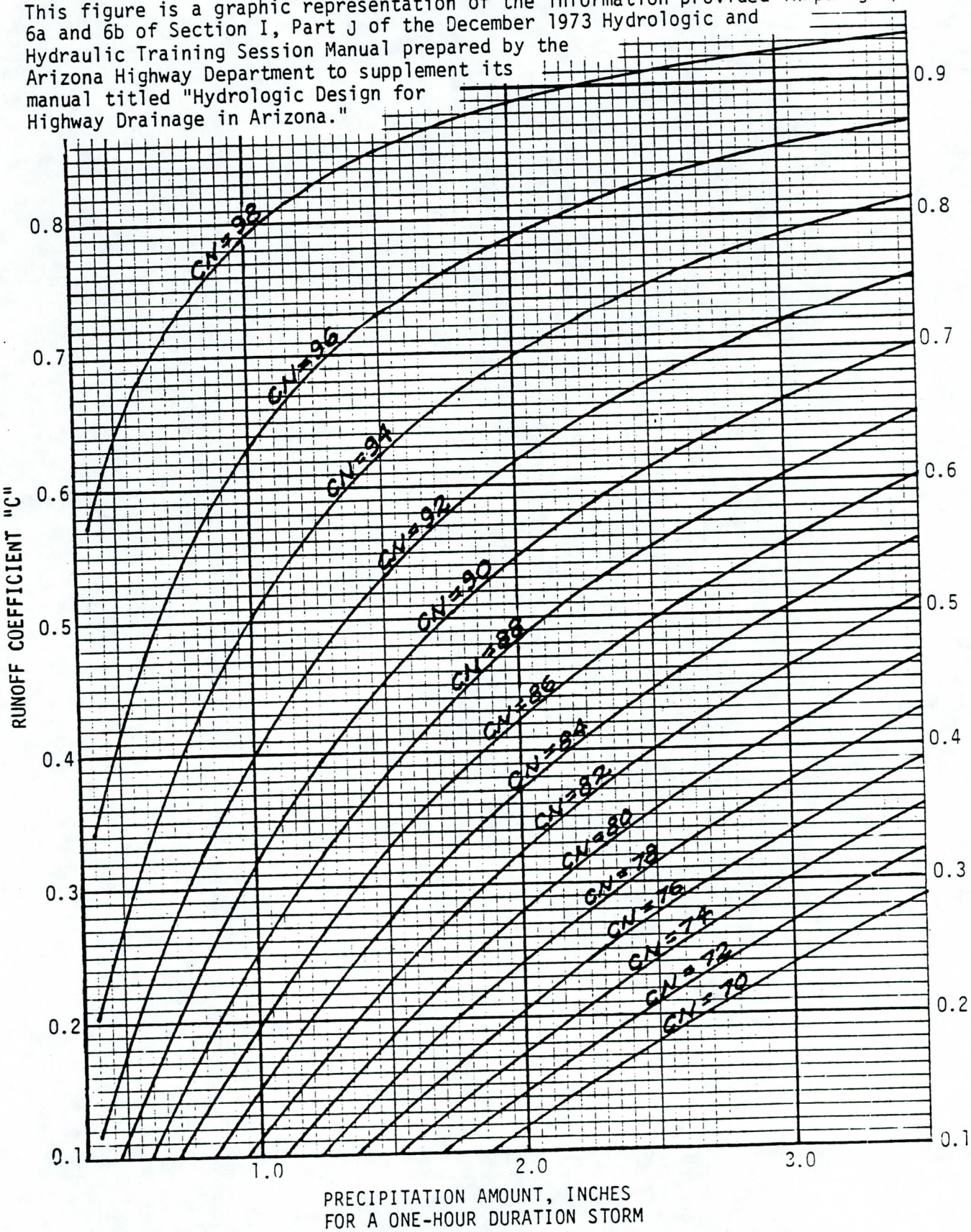


FIGURE 2-21

RUNOFF CO-EFFICIENTS FOR USE WITH THE RATIONAL FORMULA Q = CIA

Land Use	"C" Value
Paved Street or Parking Lot	0.95
Commercial Areas	0.90
Residential Areas (Average lot zoning)	0.45
Townhouses	0.55
Apartments and Condominiums	0.65
Parks and Grassed Areas (no irrigation)	0.20
Railroad Yards	0.25
Undeveloped Desert	0.35
Mountain Terrain — slopes greater than 10%	0.70
Industrial Areas	0.90
Agricultural Areas	0.20

SVERDRUP

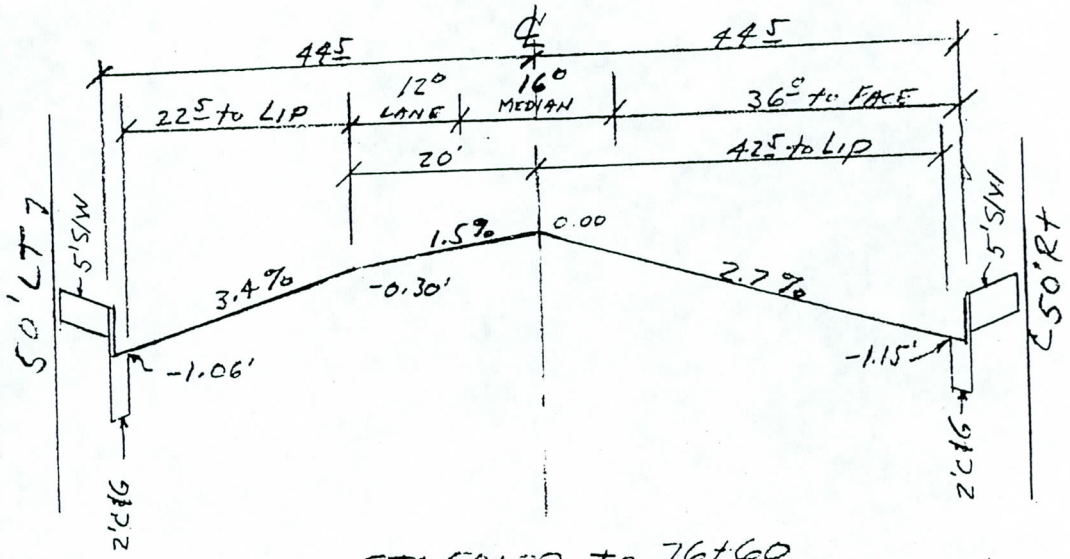
SHEET NO. 1 OF 2

JOB Southern Road

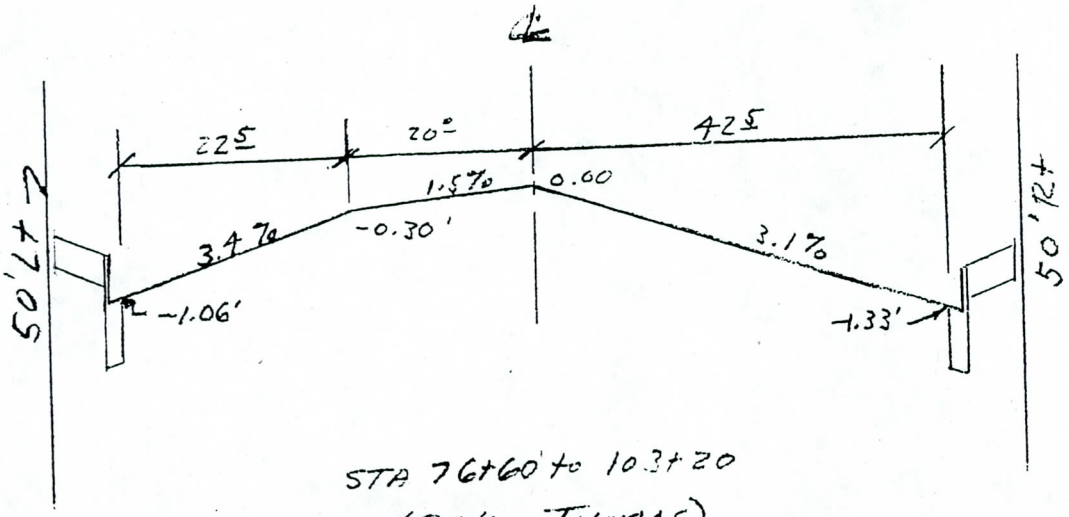
DATE 5/25/89 (Rev. 7/3/89)

COMPUTATIONS FOR Typical Section

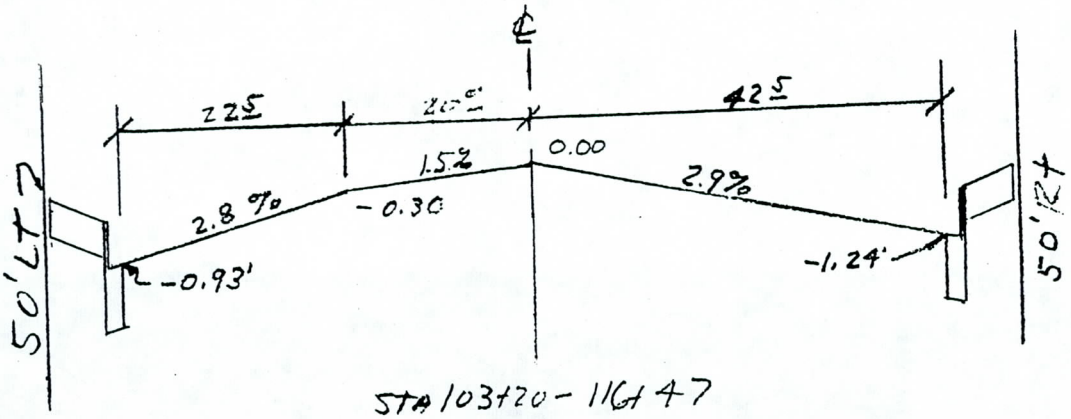
BY VIRS CHKD



STA 50+00 to 76+60
(McDowell - Oak)



STA 76+60 to 103+20
(Oak - Thomas)



STA 103+20 - 116+47
(Thomas - Earl)

SVERDRUP

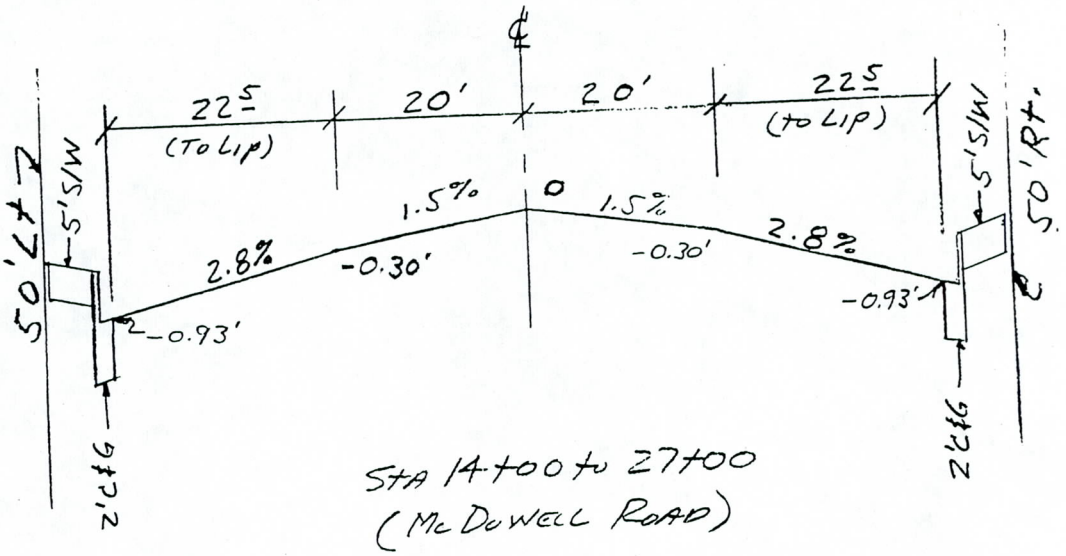
SHEET NO. 2 OF 2

JOB Scottsdale Road

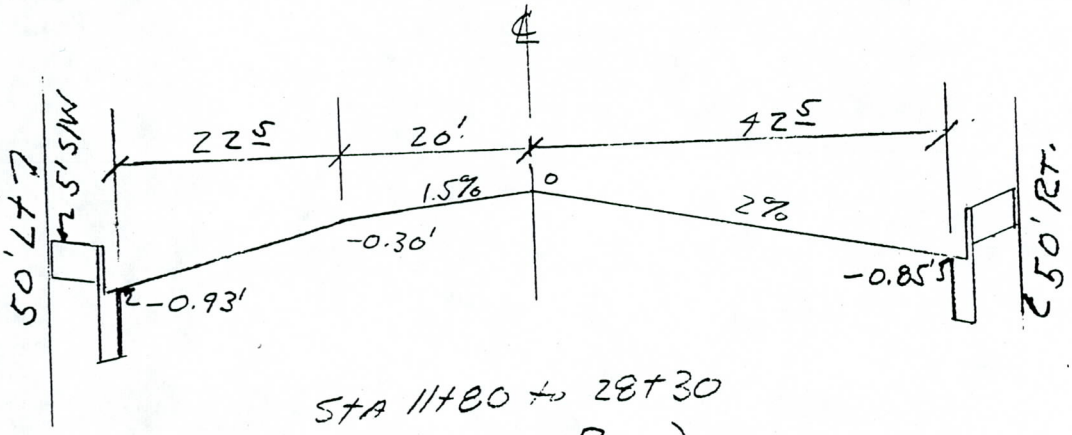
DATE 6/5/89 (Rev. 7/3/89)

COMPUTATIONS FOR McDowell/Thomas Rd (Typical Sections)

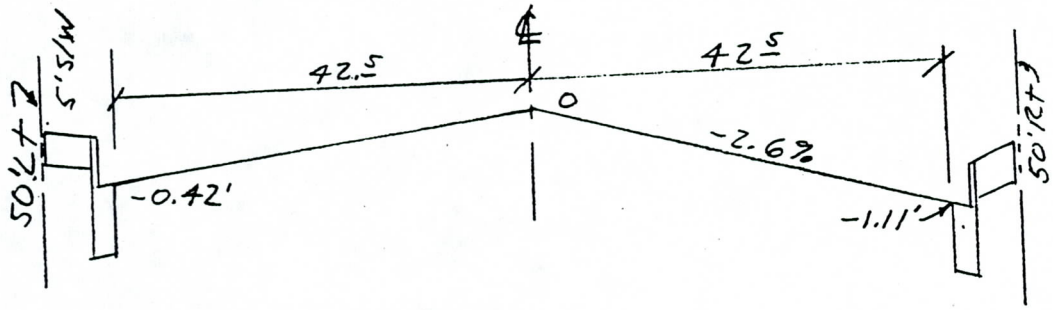
BY WRS CHKD



STA 14+00 to 27+00
(McDowell Road)



STA 11+80 to 28+30
(Thomas Road)



STA 44+00 to 50+00
(Scottsdale Rd)

SVERDRUP

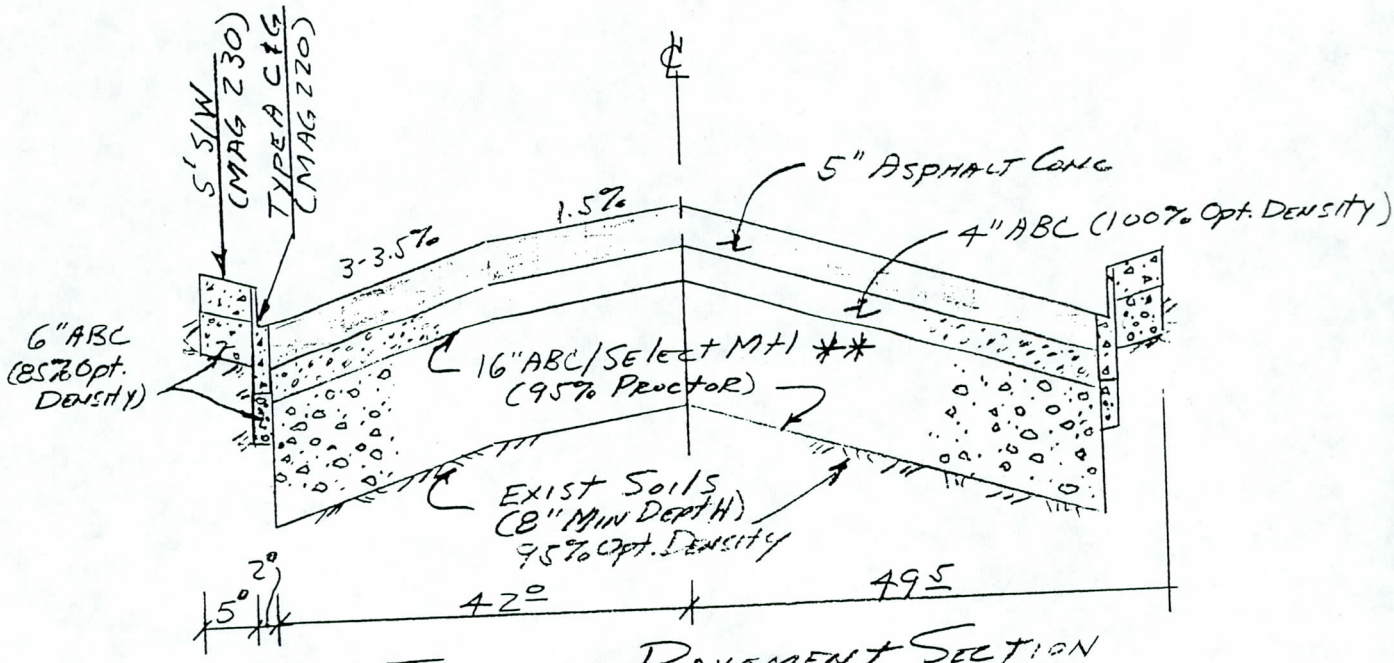
JOB Scottsdale Road

COMPUTATIONS FOR Typical Pvmt.

SHEET NO. 1 OF 1

DATE 6/5/89

BY WRS CHKD



Typical Pavement Section

(Scottsdale, McDowell & Thomas Rds)

* Thomas Hartig
Geotech Rpt (4/24/89)
- Pg 7, 10-12

** 7" A/C Base (Full Depth)

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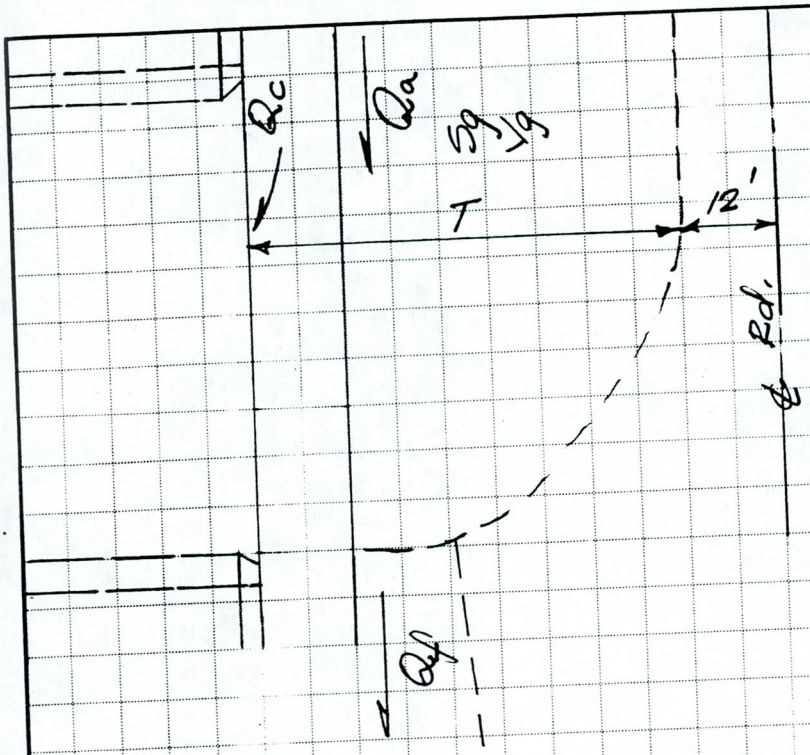
SHEET NO. _____ OF _____
CALCULATED BY hdg DATE 2/27/89
CHECKED BY GK DATE 7/89
SCALE _____

USE S.D. P-1569

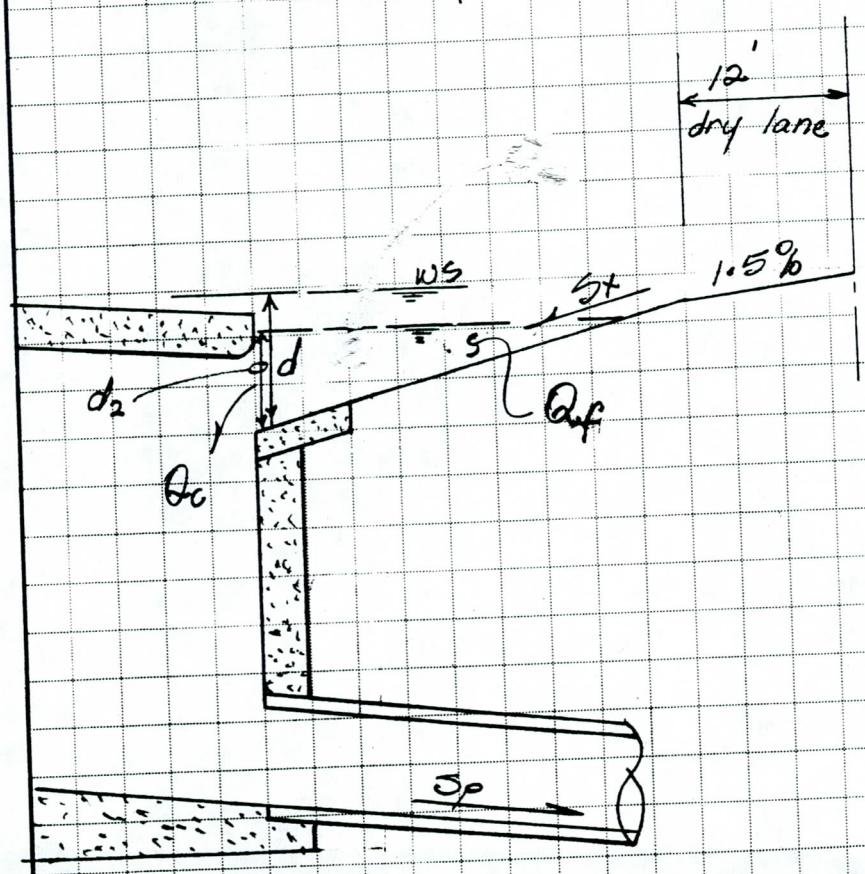


Q_c = flow intercepted by curb opening.

Q_a = runoff just before curb opening.

S_g = gutter slope

S_x = Street Cross-slope



Q_f = flowby runoff

12' dry lane

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CALCULATED BY hdg DATE 2/27/89
CHECKED BY GTC DATE 3/89
SCALE ____

Equations: Continuous gutter grade:

$$d = \left(\frac{Q_a\, n}{0.56\, Z\, S_g^{1/2}}\right)^{3/8}$$

d = depth of flow in feet
Q_a = flow in cubic feet per second
n = roughness coefficient = 0.015
$Z = 1/S_x$; the reciprocal of the cross-slope
S_x = Cross-slope of pavement in ft./ft.
S_g = longitudinal slope of the gutter in ft./ft.

$$L_a = \frac{Q_a}{0.7\,(a+d)^{1.5}\left[1-\left(1-\frac{d}{a+d}\right)^{2.5}\right]}$$

a = 2" gutter depression adjacent to curb inlet
d = depth of flow
L_a = length required to catch 100% of runoff

$$Q_b = 0.56\, Z/n\, S_g^{1/2}\, d_1^{8/3}$$

$$Q_c = \frac{Q_a\left[\left(\frac{a}{d}+1\right)^{2.5} - \left(\frac{a}{d}+1-\frac{L_c}{L_a}\right)^{2.5}\right]}{\left(\frac{a}{d}+1\right)^{2.5} - \left(\frac{a}{d}\right)^{2.5}}$$

L_c = length of curb opening less 20% clogging factor.

$$Q_f = Q_a - Q_c$$

$$V_g = \frac{Q_a}{A}$$

$$T = Zd$$

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CALCULATED BY hdg DATE 4/17/89
CHECKED BY GK DATE 3/89
SCALE _____

Q_c = flow intercepted by curb opening

Q_f = flow by runoff

V_g = velocity along the gutter in feet per second

T = spread of water (maximum ≈ 24')

Equations: Sag condition:

$$Q_c = 3L_c\, d_s^{1.5} \quad \text{for } d_s < 1.4h$$

$$d_s = \left(\frac{Q_a}{3L_c}\right)^{2/3}$$

d_s = depth of water in sag

L_c = length of curb opening less 20% clogging factor

NOTE:
Programs were developed using these equations on HP-41CX.

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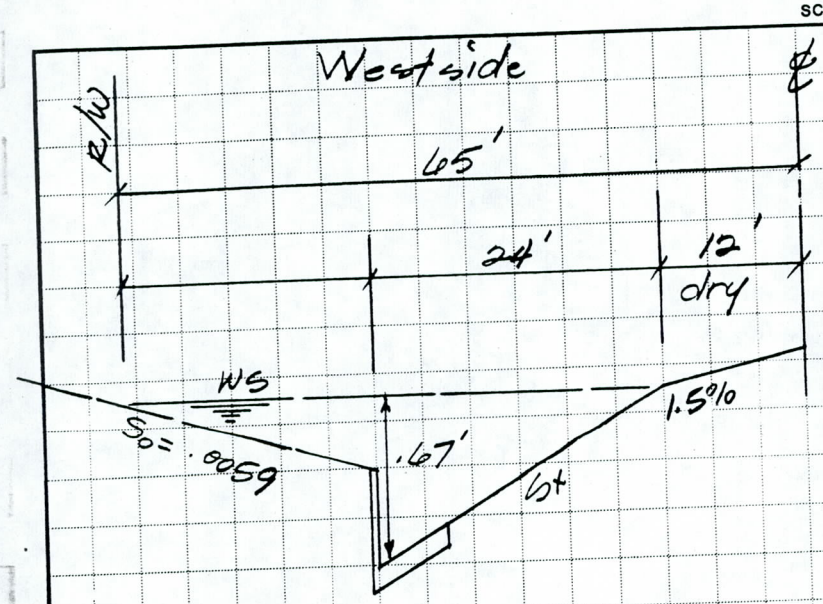
CALCULATED BY hdg DATE 3/8/89
CHECKED BY GTC DATE 3/89
SCALE _____



$Q = 0.56 \frac{z}{n} S_g^{1/2} d^{8/3}$

$z = 1/S_x$
n = .015 roughness coefficient
S_x = pavement cross-slope
S_g = gutter slope
d = depth of water
n_o = .02 roughness coefficient for unpaved areas

S_x = 0.03 typical

STA.	S_g (FT/FT)	Q_{pv} (cfs)	V_g (fps)	n_o	d_o FT	Q_o (cfs)	V_o (fps)	Q_T (cfs)
76+61								
	-.0314	75.8	10.1	.02	.17	7.5	3.0	83.3
77+60	32.0							
	+.0022	20.1	2.7			1.9	0.8	22.0
83+40	33.0							
	-.0026	21.8	2.9			2.1	0.9	23.9
88+60	31.0							
	+.0092	41.0	5.5			4.0	1.6	45.0
90+00								
90+50								
	-.0020	19.1	2.6			1.9	0.8	21.0
90+90								
	+.0026	21.8	2.9			2.1	0.9	23.9
102+00	35.0							
	+.0180	57.4	7.7	.02	.17	5.6	2.3	63.0
102+70								

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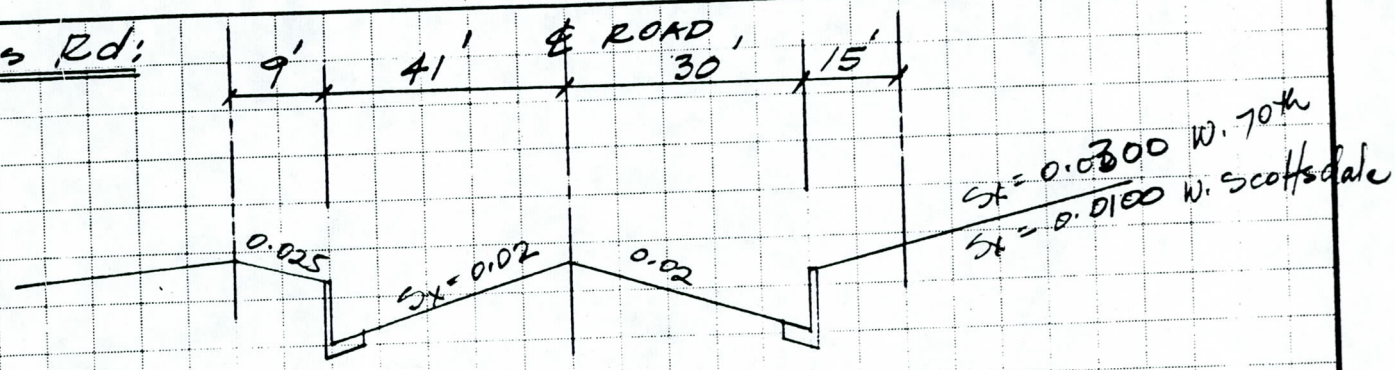
SHEET NO. _____ OF _____
CALCULATED BY hdg DATE 1/18/89
CHECKED BY GK DATE 3/89
SCALE _____

Thomas Rd:



West of Scottsdale Rd.

d	Sx	x	Sg	n	Q	V
.50	0.02	25	0.0046	0.015	19.93	3.19
.67	"	33.5	"	"	43.5	3.88
.24	"	12	"	"	2.8	1.95
.40	"	20	"	"	10.99	2.75
.6	"	30	"	"	32.41	3.60

West of 70th St.

.24	0.02	12	0.0095	0.015	4.04	2.8
.40	"	20	"	"	15.80	3.9
.50	"	25	"	"	28.65	4.58
.67	"	33.5	"	"	62.52	5.57
.60	"	30	"	"	46.58	5.17

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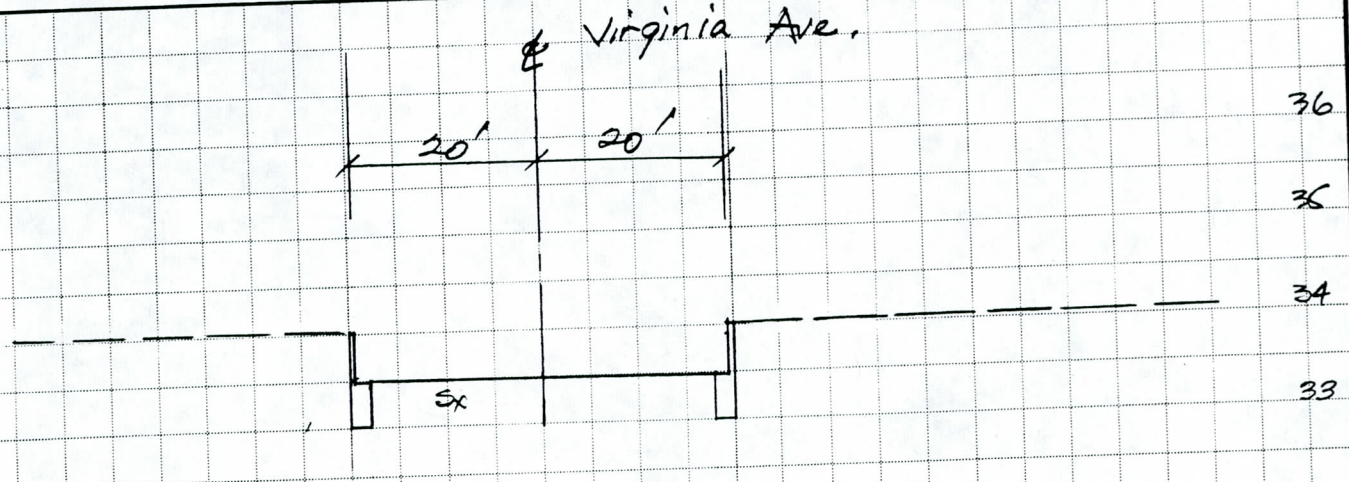
CALCULATED BY hdg DATE 1/18/89
CHECKED BY GTK DATE 3/89
SCALE _____



Virginia (Just West of Scottsdale)

$S_g = .0076$

S_x = flat

$A = .5(40) = 20$ SF

Total Q to top of curb:

$$Q = \frac{1.486}{.015}(20)\left(\frac{20}{41}\right)^{2/3}(.0076)^{1/2}$$

$= 107$ cfs

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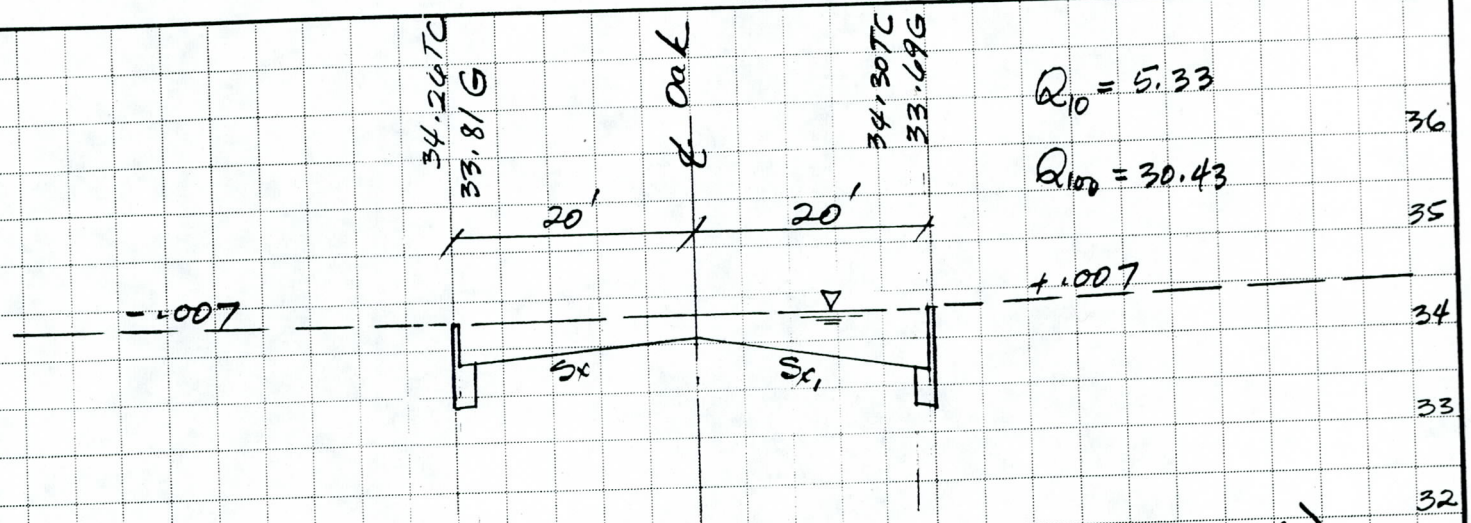
SHEET NO. _____ OF _____
CALCULATED BY hdg DATE 1/18/89
CHECKED BY CTK DATE 3/89
SCALE _____



Oak St. (Just West of Scottsdale)

$n = 0.015$

$S_g = .0071$

$S_x = .0143$

$S_{x_1} = .0175$

$d_x = 20(.0143) = 0.286'$

$d_{x_1} = 20(.0175) = 0.35'$

$A_x = \frac{1}{2}(.286)(20) = 2.86$

$A_{x_1} = \frac{1}{2}(.35)(20) = 3.5$

$A = 2.86 + 3.5 + 40(.5 - .286)$
$= 14.92$ SF

$R^{2/3} = \left(\frac{14.92}{41}\right)^{2/3} = 0.5097$

Total Q to top of curb:

$Q = \frac{1.486}{.015} A R^{2/3} S^{1/2}$

$= \frac{1.486}{.015}(14.92)(.5097)^{2/3}(.0071)^{1/2}$

$= 79.47$ cfs

Southside:

d (FT)	Q (cfs)	V (fps)
.286'	7.8	2.7

Northside:

.35'	10.9	3.1

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SHEET NO. ____ OF ____
CALCULATED BY hdg DATE 11/1/89
CHECKED BY GK DATE 11/89
SCALE ____

Drainage between Palm Lane and Oak St.
(76+60.21 − 63+29.90) = 1330.31 Ft.

From HEC-1: $Q_{10} = 96$ cfs

$Q_{100} = 184$ cfs

Total Run-off intercepted by existing Catch Basins along Southside of Oak St. (see Exhibit 4)

$Q_{10} = 5.61$ cfs
$Q_{100} = 8.26$ cfs

Capacity Allocation:

	Overland	Street
Q_{10}	51 − 5.61 = 45.3	45
Q_{100}	95 − 8.26 = 87	89

Average Overland Flow along Scottsdale Road:

$$Q_{10} = \frac{5-5.61}{1330.31} = 0.0341 \text{ cfs/ft}$$

$$Q_{100} = \frac{95-8.26}{1330.31} = 0.0652 \text{ cfs/ft}$$

PRODUCT 204-1 NEBS Inc., Groton, Mass. 01471.

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JOB Scottsdale Rd. Improvements
SHEET NO. ____ OF ____
CALCULATED BY hdg DATE 11/1/89
CHECKED BY CK DATE 11/89
SCALE ____

For Catch Basin use C.O.P. P-1569

Sta 73+60:

Dist. = 300.2 ft
Q_{100} = 19.6 cfs
n = 0.015
S_g = 0.002
S_x = 0.034
L_c = 10' double wing

Q_{10} = 10.2 cfs

$$\text{Clogging factor} = \frac{10 \times 2 + 3}{1.25} = 18.4'$$

d = 0.71'
L_a = 34.7'
Q_c = 15.0 cfs
Q_f = 4.6 cfs
V_g = 2.6 fps
T = 20.8 ft.

d = 0.55'
L_a = 24.4'
Q_c = 9.3 cfs
Q_f = 0.9 cfs
V_g = 2.2 fps
T = 16.3 ft.

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JOB Scottsdale Rd. Improvement Project OF

SHEET NO. CALCULATED BY Kofe DATE 11/3/88

CHECKED BY CK DATE 11/88

SCALE

STA	CB West	Sg (FT/FT)	Sx (FT/FT)	Lc (FT)	Qa/100 (cfs)	Qa/10 (cfs)	d (ft)	La (ft)	Qc (cfs)	Qf (cfs)	Vg fps	T (FT)
115+82	38	.0038 Cont.	.028	M-2, L=17' = 29.6		47.4+4.6 = 52	.84	74	33.5	18.5	4.1	30.0
					43.3+8.7 = 52		.84	74	33.5	18.5	4.1	30.0
114+00	36A	.0038 Cont.	.028	M-2, L=17'		12.7	.50	34.6	12.1	0.6 to CB36	2.9	17.7
					24		.63	49.1	19.6	4.4	3.4	22.5
112+30	36	.0038 Cont.	.028	M-2, L=17'		11.9 .6 12.5	.49	34.4	11.9	0.6 to CB35	2.9	17.6
					22.4 4.4 26.8		.66	52.1	21.2	5.5	3.5	23.5
110+98	35	.0038 Cont.	.028	M-2, L=17'		9.3 .6 9.9	.45	30.2	9.8	0.1 to CB33	2.7	16.1
					17.4 5.5 22.9		.62	47.9	19.0	3.9	3.3	22.1
109+04.55	33	.0038 Cont.	.028	M-2, L=17'		13.6 .1 13.7	.51	36.2	12.8	0.9 to CB32	2.9	18.2
					25.5 3.9 29.4		.68	54.8	22.7	6.7	3.6	24.2

STA	CB West	Sg (FT/FT)	Sx (FT/FT)	Lc (FT)	Qa/100 (cfs)	Qa/10 (cfs)	d (ft)	La (ft)	Qc (cfs)	Qf (cfs)	Vg fps	T (FT)
106+93.75	32	.0038 Cont	.028	M-2, L=17 = 29.6		13.6 .9 14.5	.52	37.3	13.4	1.1 to CB31	3.0	18.6
					25.6 6.7 32.3		.70	57.6	24.2	8.0	3.6	25.1
104+68.75	31	.002 SAG	.028	M-2, L=17		27.3 1.1 28.4		.47	28.4			16.7
					51.3 8 59.3		.76		59.3			27.0

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JOB Scottsdale Rd. Improvement District

SHEET NO. ____ OF ____

CALCULATED BY Kolb DATE 11/3/89

CHECKED BY ____ DATE 11/89

SCALE ____

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JOB Scottsdale Rd. Improvement District

SHEET NO. ____ OF ____

CALCULATED BY Kole DATE 11/3/89

CHECKED BY GF DATE 11/89

SCALE ____

STA	CB WEST	Sg (FT/FT)	Sx (FT/FT)	Lc (FT)	Qa100 (cfs)	Qa10 (cfs)	d (ft)	La (ft)	Qc (cfs)	Qf (cfs)	Vg fps	T (FT)
99+13	27	.002 Cont.	.034	17(2)+3÷1.25 =29.6		7.54	.49	20.6	7.54	0	2.1	14.6
					18.85		.70	33.9	18.2	0.6 to CB25	2.6	20.5
94+84	25	.002 Cont.	.034	M-2, L=17'		7.94	.50	21.2	7.94	0	2.1	14.8
					19.84 + .6 = 20.44		.72	35.5	19.5	0.9 to CB24	2.7	21.2
90+78.83	24	.002 SAG	.034	M-2, L=10' =18.4		8.52	.29		8.52	0		8.5
					21.31 + .9 = 22.21		.54		22.21	0		16.0
89+00	23	.002 Cont.	.034	M-1, L=17' =16		5.92	.45	18.0	5.7	0.22 to CB20	2.0	13.3
					12.65		.60	27.4	10.1	2.5 to CB20	2.4	17.7
86+33	20	.002 SAG	.034	M-2, L=17'		21.72 + .22 + .0 = 21.94	.39		21.94	0		11.6
					47.3 + 2.5 + 5.5 = 55.3		.73		55.3	0		21.4

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JOB Scottsdale Rd. Improvement District

SHEET NO. _____ OF _____

CALCULATED BY Lofe DATE 11/3/89

CHECKED BY GR DATE 11/89

SCALE _____

STA	CB West	Sg (FT/FT)	Sx (FT/FT)	Lc (FT)	Qa/100 (cfs)	Qa/10 (cfs)	d (ft)	La (ft)	Qc (cfs)	Qf (cfs)	Vg fps	T (FT)
84+48	19	.002 Cont.	.034	M2, L=17		14.1 + .2 = 14.3	.63	29.3	14.3	0	2.4	18.5
					30.1 + 6.2 = 36.3		.89	48.0	30.8	5.5 to CB20	3.1	26.3
81+55	17	.002 Cont.	.034	M-2, L=17		15.71 + .8 = 16.51	.66	31.7	16.3	0.2 to CB19	2.5	19.5
					33.59 + 4.7 = 38.29		.91	49.3	32.0	6.2 to CB19	3.1	26.8
78+28	16	.002 Cont	.034	M-1, L=17 = 16		8.06	.51	21.4	7.3	0.8 to CB17	2.1	14.9
					17.23		.67	32.4	12.6	4.7 to CB17	2.6	19.9
73+60	15	.002 Cont.	.034	M-2, L=10 = 18.4		10.2	.55	24.4	9.3	0.9 to CB14	2.2	16.3
					19.6		.71	34.7	15.0	4.6 to CB14	2.6	20.8
70+24	14	.002 Cont	.034	M-2, L=17 = 29.6		11.37 + .9 = 12.27	.59	26.9	12.27	0	2.4	17.5
					21.97 + 4.6 = 26.57		.79	40.8	24.2	2.4 to CB12	2.9	23.4

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JOB Scottsdale Rd. improvement district
SHEET NO. ____ OF ____
CALCULATED BY Lofe DATE 11/3/89
CHECKED BY CR DATE 11/89
SCALE ____

STA	CB West	Sg (FT/FT)	Sx (FT/FT)	Lc (FT)	Qa/100 (cfs)	Qa/10 (cfs)	d (ft)	La (ft)	Qc (cfs)	Qf (cfs)	Vg fps	T (FT)
67+20	12	.002 Cont.	.034	M-2, L=17		10.28	.55	24.5	10.28	0	2.2	16.4
					19.88 + 2.4 = 22.28		.74	37.2	20.97	1.3 to CB 11	2.7	21.9
63+92.76	11	.002 Cont.	.034	M-2, L=17		13.20	.61	28.1	13.2	0	2.4	18.0
					25.51 + 1.3 = 26.81		.79	40.9	24.3	2.5 to CB9	2.9	23.4
61+00	9	.002 Cont.	.034	M-2, L=17		13.48	.61	28.4	13.48	0	2.4	18.1
					22.99 + 2.5 = 25.49		.78	39.9	23.4	2.1 to CB 7	2.8	23.0
58+45	7	.002 Cont.	.034	M-2, L=17		14.96	.64	30.0	14.9	0.06 to CB6	2.5	18.8
					25.5 + 2.1 = 27.6		.80	41.6	24.9	2.7 to CB6	2.9	23.7
55+94.32	6	.002 Cont.	.034	M-2, L=17		14.70 + .06 = 14.76	.64	29.8	14.74	0.02 to CB5	2.5	18.7
					25.07 2.7 = 27.77		.81	41.7	25.0	2.7 to CB5	2.9	23.7

STA	CB West	Sg (FT/FT)	Sx (FT/FT)	Lc (FT)	Qa100 (cfs)	Qa10 (cfs)	d (ft)	La (ft)	Qc (cfs)	Qf (cfs)	Vg fps	T (FT)
54+00.68	5	.002 Cont.	.034	M-2, L=17'		11.36 + .02 = 11.38	.58	25.9	11.38	0	2.3	17.0
					19.36 + 2.7 = 22.06		.74	36.9	20.8	1.3 to CB4	2.7	21.8
50+97.36	4	.002 SAG	.034	M-2, L=17'		23.5	.41		23.5	0		12.1
					40.07 + 1.3 = 41.37		.60		41.37	0		17.7

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JOB Scottsdale Est. Improvement District
SHEET NO. ____ OF ____
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CHECKED BY GR DATE 11/89
SCALE ____

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JOB Scottsdale Rd. Improvement 2/1985
SHEET NO. ____ OF ____
CALCULATED BY Lofe DATE 11/3/89
CHECKED BY ____ DATE ____
SCALE ____

STA	CB EAST	Sg (FT/FT)	Sx (FT/FT)	Lc (FT)	Qa/100 (cfs)	Qa/10 (cfs)	d (ft)	La (ft)	Qc (cfs)	Qf (cfs)	Vg fps	T (FT)
112+40	37	.0038 Cont.	.029	M-1, L=10 =10.4		3.7	.32	16.9	2.9	0.8 to CB 34	2.1	10.9
					6.0		.38	22.3	3.9	2.1	2.4	13.0
107+30	34	.0038 Cont.	.029	M-1, L=17 =16		4.6 .8 / 5.4	.36	21.3	4.8	0.6 to CB30	2.3	12.8
					7.5 2.1 / 9.6		.45	29.6	7.1	2.5	2.7	15.9
104+11.42	30	.0038 SAG	.029	M-1, L=6 =7.2		3.7 .6 / 4.3	.34		4.3	0		11.7
					6.0 2.5 / 8.5		.54		8.5	0		18.5

STA	CB EAST	Sg (FT/FT)	Sx (FT/FT)	Lc (FT)	Qa/100 (cfs)	Qa/10 (cfs)	d (ft)	La (ft)	Qc (cfs)	Qf (cfs)	Vg fps	T (FT)
99+14.85	CB26	.002 Cont.	.031	10+3 / 1.25 = 10.4		4.8	.40	16.6	3.8	0.9 to CB25A	1.8	13.0
					7.7		.48	21.7	5.3	2.4	2.0	15.5
94+90	CB25A	.002 Cont.	.031	M1, L=10' = 10.4		2.8 + .9 = 3.7	.36	14.3	3.2	0.5 to CB24A	1.7	11.8
					4.4 + 2.4 = 6.8		.46	20.2	4.9	1.9	2.0	14.8
90+80	CB24A	.002 Cont.	.031	M-1, L=10'		3.7 + .5 = 4.2	.38	15.4	3.5	.6 to CB22	1.7	12.4
					6.0 + 1.9 = 7.9		.48	22.1	5.4	2.5	2.1	15.7
88+00.62	CB22	.002 SAG	.031	M-1, L=6'		2.9 + .6 = 3.5	.30		3.5	0		9.6
					4.7 + 2.5 = 7.2		.48		7.2	0		15.5
87+14.62	CB21	.002 SAG	.031	M-1, L=6		4.1 + .7 = 4.8	.37		4.8	0		11.8
					6.7 + 2.1 = 8.8		.55		8.8	0		17.7
83+00	CB18	.002 Cont	.031	M-1, L=6 = 7.2		2.6 + .3 = 2.9	.33	12.5	2.2	0.7 to CB21	1.6	10.8
					4.2 + 1.1 = 5.3		.42	17.6	3.2	2.1	1.9	13.5

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JOB Scottsdale Sol. Improvement District
SHEET NO. ____ OF ____
CALCULATED BY Hofe DATE 11/3/88
CHECKED BY GK DATE 11/8/9
SCALE

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JOB Scottsdale Est. Improvement 21008
SHEET NO. ____ OF ____
CALCULATED BY [illegible] DATE 11/5/88
CHECKED BY [illegible] DATE 11/89
SCALE

STA	CB EAST	Sg (FT/FT)	Sx (FT/FT)	Lc (FT)	Qa/100 (cfs)	Qa/10 (cfs)	d (ft)	La (ft)	Qc (cfs)	Qf (cfs)	Vg fps	T (FT)
80+10	CB16A	.002 Cont.	.031	M-1, L=10 = 10.4		3.2	.34	13.2	2.9	0.3 to CB18	1.6	11.2
					5.1		.41	17.2	4.0	1.1	1.8	13.3
73+10	CB15B	.002 Cont.	.027	M-1, L=10 = 10.4		3.2	.33	14.0	2.8	0.4 to CB13	1.6	12.2
					5.1		.39	18.3	3.8	1.2	1.8	14.5
68+26.5	CB13	.002 Cont	.027	M-1, L=17 = 16		4.4 + .4 = 4.8	.38	17.7	4.6	0.2 to CB10	1.7	14.2
					7.1 + 1.2 = 8.3		.47	24.1	7.0	1.3	2.0	17.4
63+80	CB10	.002 Cont.	.027	M-1, L=17		4.1 + .2 = 4.3	.37	16.6	4.2	0.1 to CB8	1.7	13.6
					6.6 + 1.3 = 7.9		.46	23.5	6.7	1.1	2.0	17.1
58+82.5	CB8	.002 Cont.	.027	M-1, L=17 10		4.5 + .1 = 4.6	.37	17.3	4.5	0.1 to CB5A	1.7	13.9
					7.3 + 1.1 = 8.4		.47	24.3	7.1	1.3	2.0	17.5

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JOB Scottsdale Rd. Improvement 21008.
SHEET NO. ____ OF ____
CALCULATED BY Lofa DATE 11/3/88
CHECKED BY GK DATE 11/88
SCALE

STA	CB EAST	Sg (FT/FT)	Sx (FT/FT)	Lc (FT)	Qa/100 (cfs)	Qa/10 (cfs)	d (ft)	La (ft)	Qc (cfs)	Qf (cfs)	Vg fps	T (FT)
54+10	CB5A	.002 Cont	.027	M-1, L=17		4.3 + .1 = 4.4	.37	16.8	4.3	0.1 to CB 3	1.7	13.7
					7.0 + 1.3 = 8.3		.47	24.1	7.0	1.3	2.0	17.4
50+91.70	CB3	.002 SAG	.027	M-1, L=6'		3.7 + .1 = 3.8	.31		3.8	0		11.6
					6.0 + 1.3 = 7.3		.48		7.3	0		17.9

CB STA	CONNECTOR PIPE Q_{CB} cfs	D_{CB} in.	V_{CB} fps	Q_{PCB} cfs	Junction Type	MAIN PIPE Q_D cfs	Dia. in.	Sp ft/ft.	V_D fps	Q_P cfs
CB38	33.5	24" .020	11.0	34.6			EXIST. 72			
CB36A	12.1	18" @ .012	7.0	12.4			EXIST. 90			
CB37(E)	2.9	18 @ .002	2.8	5.0						
CB36	11.9	18 @ .012	7.0	12.4						
CB35	9.8	18" @ .002	5.7	10.1						
CB34(E)	4.8	18" @ .002	2.8	5.0						
CB33	12.8	18 @ .014	7.6	13.4						
CB32	13.4	18" @ .014	7.6	13.4						
CB31	28.4	24" @ .014	9.2	28.9						
CB30	4.3	18" @ .002	2.8	5.0						

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JOB Scottsdale Rd. Improvements 21008-EE-04
SHEET NO. ____ OF ____
CALCULATED BY Mdp DATE 11/6/89
CHECKED BY GK DATE 11/89
SCALE ____

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JOB Scottsdale Rd. improvements SHEET NO. ____ OF ____
CALCULATED BY hdg DATE 11/6/89
CHECKED BY BTC DATE 11/89
SCALE @ Scottsdale Rd

CB STA	CONNECTOR PIPE Q_{CB} cfs	D_{CB} in.	V_{CB} fps	Q_{pCB} cfs	Junction Type	MAIN PIPE Q_D cfs	Dia. in.	Sp ft/ft.	V_D fps	Q_p cfs
27(W)	7.5	18	4.5@.005	8.0	MH#12	11.3	24	.0025		
26(E)	3.8	18	2.8@.002	5.1	MH#12	↓	↓	↓		
100+80					MH#13					
103+30					Tee					
25(W)	7.9	18	4.5@.005	8.0	MH#11	7.9	30	.0015		
25A(E)	3.2	18	2.8@.002	5.1	MH#11	11.1	↓	↓		
92+30					MH#10					
24(W)	8.5	18	4.9@.006	8.81		19.6	30	.0030		
						23.1	↓	↓		
24A(E)	3.5	18	2.8@.002	5.1		151.1				
90+23.19	Virginia Co. CB			128	MH#9	156.8	66	.0012		
23(W)	5.7	18	3.5@.003	6.2						
						160.3				
22(E)	3.5	18	2.8@.002	5.1						
						165.1				
21(E)	4.8	18	2.8@.002	5.1						
						187				
20(W)	21.9	24	6.9@.008	21.9						
						201.3				
19(W)	14.3	24	4.9@.004	15.5						
83+40					MH#8					
18(E)	2.2	18	2.8@.002	5.1		203.5	72	.0012		
						219.8				
17(W)	16.3	24	5.5@.005	17.3						

CB STA	CONNECTOR PIPE Q_{CB} cfs	D_{CB} in.	V_{CB} fps	Q_{PCB} cfs	Junction Type	MAIN PIPE Q_D cfs	Dia. in.	Sp ft/ft.	V_D fps	Q_P cfs
							72	.0012		
16A(E)	2.9	18	2.8@.002	5.1		222.7				
16(W)	7.3	18	4.5@.005	8.0		230				
76+54.71					J.S. & MH #7	305-(153-37.5)		=189.5	to	MH #6
	Oak St. Conc. CB			75						
15(W)	9.3	18	5.4@.007	9.5	MH#6	198.8	60			
73+60					MH#6		66	.0025		
15B(E)	2.8	18	2.8@.002	5.1		201.6				
70+68					MH#5					
14(W)	12.3	18	7.9@.015	13.9		213.9	72	.0023		
13(E)	4.6	18	2.8@.002	5.1		218.5				
12(W)	10.3	18	7.9@.015	13.9		228.8				
66+30					MH# 4A		72	.0032		
11(W)	13.2	18	7.9@.015	13.9		242				
63+90					MH #4					
10(E)	4.2	18	2.8@.002	5.1		246.2	78	.0020		
63+51	Palm Ln Conc. CB			45.3		291.5				
9(W)	13.5	18	7.9@.015	13.9		305				
8(E)	4.5	18	2.8@.002	5.1		—				

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JOB Scottsdale Rd. improvements
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CALCULATED BY Shdg DATE 11/6/89
CHECKED BY GK DATE 11/89
SCALE @ Scottsdale Rd

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JOB Scottsdale Rd. Improvmt. 2100B-EP-04
SHEET NO. ____ OF ____
CALCULATED BY hdg DATE 11/6/89
CHECKED BY GK DATE 11/89
SCALE @ Scottsdale Rd

CB STA	CONNECTOR PIPE Q_{CB} cfs	D_{CB} in.	V_{CB} fps	Q_{pCB} cfs	Junction Type	MAIN PIPE Q_D cfs	Dia. in.	Sp ft/ft.	V_D fps	Q_p cfs
58+82.5					MH #3	—	↓	↓	—	—
							84	.0023		
7(W)	14.9	24	4.9@.004	15.5		319.9				
6(W)	14.7	24	4.9@.004	15.5		334.6				
5A(E)	4.3	18	2.8@.002	5.1		—	↓	↓		
54+10					MH #2					
							84	.0035		
5(W)	11.4	18	7.0@.012	12.5		346				
4(W)	23.5	24	7.8@.010	24.5		369.5				
3(E)	3.8	18	2.8@ .002	5.1		—				
50+15					MH #1 & J.S.		↓	↓		

CB STA	CONNECTOR PIPE Q_{CB} cfs	D_{CB} in.	V_{CB} fps	Q_{PCB} cfs	Junction Type	MAIN PIPE Q_D cfs	Dia. in.	Sp ft/ft.	V_D fps	Q_P cfs
					Note: Pipe be size for 114 cfs + 11.9 cfs					
McDowell Rd										
14+50					Plug		48	.0080		
2A (N)	45.4	24 @ .015	9.5	30		30				
1A (S)	7.2	24 @ .0015	3.0	9.5		39.5				
15+80					MH #1A		48	.0080		
2 (N)	68.6	24 @ .015	9.5	30		69.5				
1 (S)	4.7	12 @ .002	2.8	5.0		74.5				
20+00					I.S. & MH #1					
Thomas Rd										
9+59					MH #18		42	.0048		
29B (N)	28.3	24 @ .015	9.5	30		28.3				
28B (S)	25.5	24 @ .012	8.5	26.8		53.8				
12+19					MH #17		42	.0048		
28A (S)	10.8	24				64.6				
29A (N)	13.2	24 @ .004	4.9	15.5		77.8				
16+00					MH #16		42	.0048		
29 (N)	1.5	24 @ .0007	2.0	6.4		79.3				
28 (S)	0.6	18 @ .002	2.8	5.1		79.9				
Tee	11.3					91.2				
20+22					MH #15					

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JOB Scottsdale No. Hyatt Sheet 17 OF
SHEET NO.
CALCULATED BY hdg DATE 11/6/89
CHECKED BY GK DATE 11/89
SCALE

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JOB Scottsdale Rd. Imprvmt 4008FP
SHEET NO. _____ OF _____
CALCULATED BY hdg DATE 11/7/89
CHECKED BY GTC DATE 11/89
SCALE _____

Concrete Catch Basin - Grating:

Neenah R-4999-Nx, Type "C"
Grate Opening/pc = 1.6 S.F.

Palm Lane: Rd. Width = 40' B/C
= 36 E/P ≈ 17 pcs
Q_{10} = 45.3 cfs
d = 4"
Actual Q per piece = $\frac{45.3}{17}$ = 2.7 cfs
Capacity per piece = 4.0 cfs/pc > 2.7 OK

Oak St.: W = 48' B/C
= 44' EP ≈ 21 pcs
Q_{10} = 75 cfs
d = 4"

Actual Q/pc = $\frac{75}{21}$ = 3.6 cfs
Capacity/pc = 4.0 cfs > 3.6 cfs OK

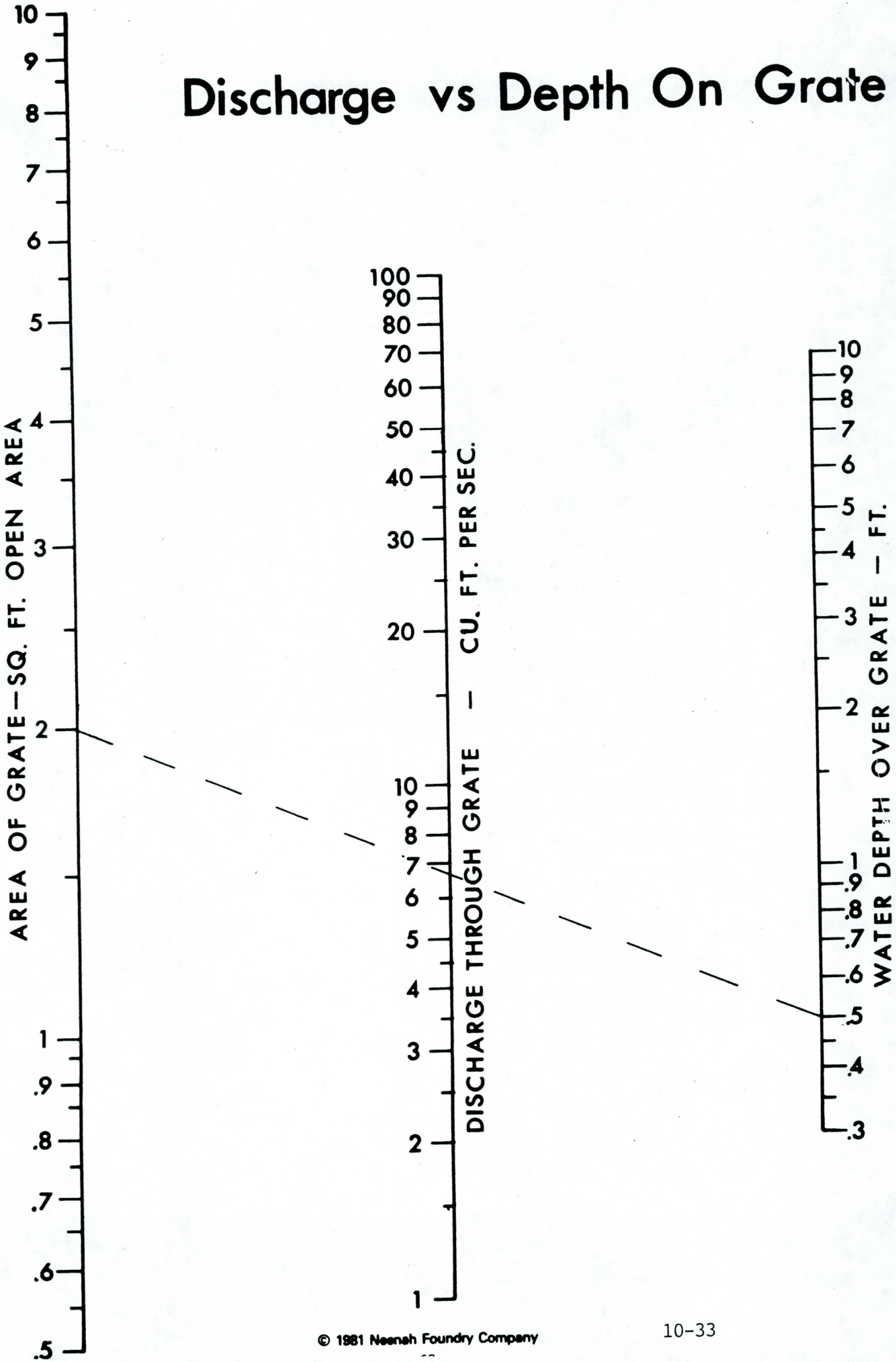
Virginia St.: W = 40' B/C
= 36 E/P ≈ 17 pcs
Q_{10} = 128 cfs
d = 12"

Actual Q/pc = $\frac{128}{17}$ = 7.5 cfs

Capacity/pc = 7.5 cfs ≈ 7.5 cfs OK

PRODUCT 204-1 NEBS Inc., Groton, Mass. 01471

Discharge vs Depth On Grate



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11.0 EXISTING STORM DRAIN INTERCEPTED CAPACITIES

STREET NAME	S_o (FT/FT)	S_x (FT/FT)	Q_a (CFS)	n	d (FT)	a (FT)	L_a (FT)	L (FT)	Q_i (CFS)	$Q_B = Q_a - Q_i$ (CFS)
McDowell & 70th St 2'x3'4" G	0.0053	0.0056	59	0.015	d=.454 d'=.443	0.167			3.80	55.20
McDowell 150' west/o Scottsdale 4'c	0.0083	0.0203	99	0.015	0.821	0.167	145.74	4	5.61	93.39
8'c	0.0083	0.0202	93.39	0.015	0.803	0.167	141.35	8	10.69	82.70

TOTAL INTERCEPTION ALONG McDOWELL = 20.10

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JOB Scottsdale Road Drainage
SHEET NO. 1 OF 1
CALCULATED BY [illegible] DATE 13-Feb-89
CHECKED BY GTL DATE 3/89
SCALE McDowell Road Drainage

BROOKS, HERSEY
& ASSOCIATES, INC.
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(602) 437-3733

JOB SCOTTSDALE ROAD VERIFICATION
SHEET NO. 1 OF 1
CALCULATED BY [illegible] DATE 12 FEB 89
CHECKED BY GTK DATE 3/89
SCALE McDOWELL ROAD 100YR STORM EAST

STREET NAME	S_o (FT/FT)	S_x (FT/FT)	Q_a (CFS)	λ	d (FT)	a (FT)	L_a (FT)	L (FT)	Q_i (CFS)	$Q_o - Q_a - Q_i$ (CFS)
McDowell : 70th St	0.0053	0.0056	112	0.015	d=.577 d'=.566				5.81	106.19
2'x3'-4"G										
McDowell 150' west to Scottsdale										
4'c	0.0083	0.0203	179	0.015	1.025	0.167	197.98	4	7.73	171.29
8'c	0.0083	0.0203	171.29	0.015	1.008	0.167	193.52	8	14.90	156.39

TOTAL INTERCEPTION ALONG McDOWELL RD: 28.44 CFS

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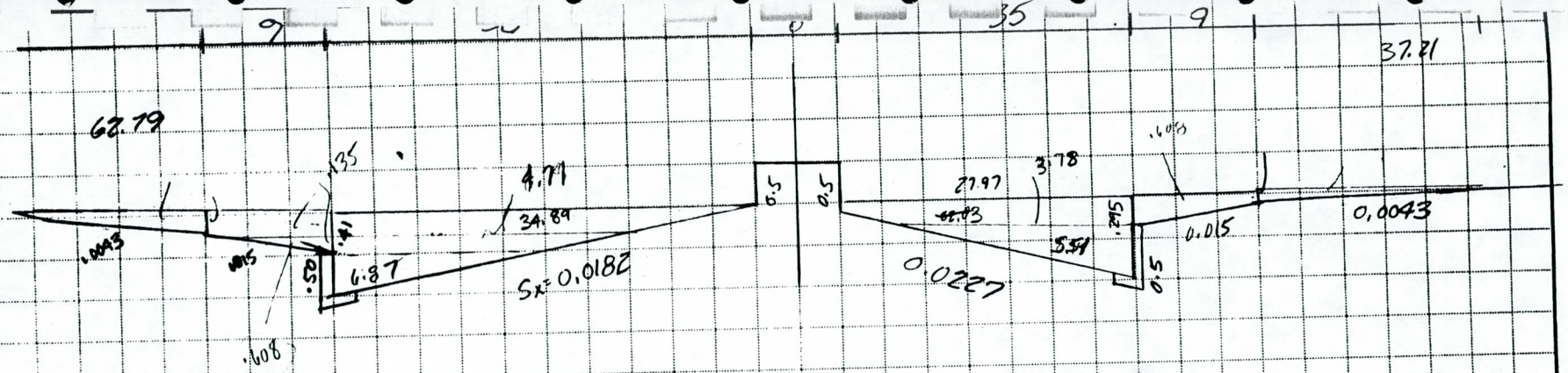
JOB: SCOTTSDALE ROAD
SHEET NO. 1 OF
CALCULATED BY: [illegible] DATE: 14-FEB-89
CHECKED BY: GTK DATE: 3/88
SCALE: NEDRWELL ROAD



$Q_a = 179$
$Q_i = 28.4$
$Q_b = 150.6$

S_o (FT/FT)	n	A (FT²)	R_H (FT)	d_{CURB} (FT)	X (FT)	V_{cc} (FPS)	Q_{REQ} (CFS)	Q_{PROV} (CFS)
0.0091	0.015	53.23	0.2604	0.91 SOUTH 0.795 NORTH	81.21 NORTH 121.8 SOUTH	3.85	86.6	205.04
0.0091	0.015	12.37	0.2496	0.50 SOUTH 0.50 NORTH	35 NORTH 50 SOUTH	3.75	86.6	46.32
0.0091	0.015	21.18	0.2613	0.635 SOUTH 0.635 NORTH	44 NORTH 59 SOUTH	3.86	86.6	81.77
0.0091	0.015	51.4	0.257	0.55 S 0.55 N	109 SOUTH 90 NORTH	3.82	[illegible]	[illegible]
.0091	[illegible]	77.77	0.242	.79 .70	74.11 SOUTH 59.11 NORTH			[illegible]

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JOB SCOTTSDALE PARK
SHEET NO. 1 OF
CALCULATED BY WED DATE 9-FEB-89
CHECKED BY GTK DATE 3/89
SCALE AVALON S.D. Q = 10YR

STREET NAME	So (FT/FT)	Sx (FT/FT)	Qa (CFS)	n	d (FT)	a (FT)	La (FT)	L (FT)	Qi (CFS)	QB = Qa - Qi (CFS)
68th ST @ AVALON 2-3'-2¾G	0.0023	0.005	.94	0.015	0.606	0.167				
	EFFECTIVE PERIMETER 2[(0.60)(20)(2.0) + 3.279] = 11.36						GRAPH 3-48		Q/P = 2.31	Qi = 26.13 QB = 67.87
AVALON EAST TO 68th ST 9.5'C 6.0'C	0.0061	0.005	67.87	0.015	0.446	0.167	209.95	9.5	5.67	
	0.0061	0.005	67.87	0.015	0.446	0.167	209.95	6.0	3.61 9.28	58.59
AVALON 210' E/O 68th ST 2x2G	0.0061	0.005	58.59	0.015	d = 0.422 d' = 0.421	0.167	—	—	3.94	54.65
PINCHOT AVE & 69th PLACE 2-18x2 SLOT DRAIN	0.005	0.005	54.65	0.015	0.434	0.167		18		
	$L_E = (4.762)(Q)^{.427}(S_o)^{.305}(1/S_x)^{.766}$ $4.762(54.65)^{.427}(0.005)^{.305}(1/0.005)^{.766} = 302.35$								$Q_a L_a / L_E = (18/302.35)(0.546)(62.71) = 3.25$ x 2 6.50	
										QB = 48.15

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JOB: Scottsdale Road Drainage
SHEET NO.: 2 OF:
CALCULATED BY: JRD DATE:
CHECKED BY: GTK DATE: 3/89
SCALE: Annual S.D. 10YR

STREET NAME	S_o (FT/FT)	S_x (FT/FT)	Q_a (CFS)	n	d (FT)	a (FT)	L_a (FT)	L (FT)	Q_i (CFS)	$Q_B = Q_a - Q_i$ (CFS)
70th ST @ EAGLE										
13.5'C W/2-3'-8'G	0.0024	0.005	120	0.015	0.658 d=.629 d'=.619'	0.167	232.90	13.5	13.65 4.72	
13.5'C	0.0024	0.005	120	0.015	0.658	0.167	232.90	13.5	13.65 32.02	87.98
54' SLOTTED DRAIN	$L_r = 4.762(87.98)^{.427}(0.0024)^{.305}(1/.005)^{.766} = 296.22$								$Q_a L_o/L_r = 87.98(54/296.22) = 16.04$	71.95
3'-4"x2'G	0.0024	0.005	71.95	0.015	d=.543 d'=.533				3.78	68.17
9.5'C	0.0024	0.005	68.17	0.015	.533	0.167	171.20	8.01	7.17	61.00

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JOB: SCOTTSDALE ROAD DRAINAGE
SHEET NO. 3 OF
CALCULATED BY: JRD DATE
CHECKED BY: CK DATE: 3/89
SCALE: AVALON S.D. 10 YR

AVALON STORM DRAIN 10 YR 24 HR STORM

70th ST & EARLL

Q_{PIPE} = 59.00 CFS

PIPE - 1-48" RGRCP
S_o = 0.0052 FT/FT
R_h = 2.0 FT
A = 12.57 FT²
n = 0.012
V = 14.18
Q = 220.76 CFS TOTAL CAPACITY

REMAINING CAPACITY = 73%

70th ST & EARLL (FROM PINECHOT)

Q_{PIPE} = 45.85

PIPE = 48" RGRCP
S_o = 0.0052 FT/FT
R_h = 2.0 FT
A = 12.57 FT²
n = 0.012
V = 14.17
Q = 220.76 CFS TOTAL CAPACITY

REMAINING CAPACITY = 79%

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JOB: SCOTTSDALE ROAD DRAINAGE
SHEET NO.: 1 OF
CALCULATED BY: [illegible] DATE: 10-FEB-89
CHECKED BY: BTS DATE: 3/89
SCALE: ANALOG S.D. 100YR

STREET NAME	S_o (FT/FT)	S_x (FT/FT)	Q_a (CFS)	n	d (FT)	a (FT)	L_a (FT)	L (FT)	Q_i (CFS)	$Q_B = Q_a - Q_i$ (CFS)
68TH ST @ ANALOG 2-3'x2' G	0.0023	0.005	173	0.015	0.789	0.167				
	EFFECTIVE PERIMETER			2[(0.60)(20)(2.0) + 3.279] = 11.36			GRATE	3.48	Q/P: 2.31	Q_i = 26.13 Q_B = 146.87
ANALOG EAST TO 68TH 9.5'C 6.0'C	0.0061	0.005	146.87	0.015	0.596	0.167	321.86	9.5	8.51	
	0.0061	0.005	146.87	0.015	0.596	0.167	321.86	6.0	5.41	
									13.92	132.95
ANALOG 210' EAST TO 68TH ST 2x2 G	0.0061	0.005	132.95	0.015	d=.574 d'=.564				6.56	126.39
PINCHOT: AVE 68TH PL 2-18'x2' SLOTT	0.005	0.005	126.39	0.015				18		
	$L_r = 4.762(126.39)^{.427}(0.005)^{0.305}(1/.005)^{.766} = 432.51$						$Q_a\ L_a/L_r = 126.39(18/432.51) = 5.26$			115.87
								$= 10.52$		

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JOB: SCOTTSDALE ROAD WEST LAKE
SHEET NO. 2 OF
CALCULATED BY: [illegible] DATE: 10-FEB-89
CHECKED BY: GTC DATE: 3/89
SCALE: ANNUAL SD 100YR

STREET NAME	So (FT/FT)	Sx (FT/FT)	Qa (CFS)	n	d (FT)	a (FT)	La (FT)	L (FT)	Qi (CFS)	Qb = Qa - Qi (CFS)
70th St C	0.0024	0.005	225	0.015	0.833	0.167	324.83	13.5	19.18	205.82
EXCEL 13.5'C W/2'13'G	0.0024	0.005	205.82	0.015	d=0.806 d'=0.796				6.90	198.92
13.5'C	0.0024	0.005	198.92	0.015	0.796	0.167	304.63	13.5	17.94	180.98
54' SLOPE DRAIN	0.0024	0.005	38.60							
	$L_r = 4.762(180.98)^{.427}(.0024)^{.305}(1/.005)^{.766} = 403.04$								$Q_a L_a/L_r = 180.98(54/403.04) = 24.25$	156.73
34"x2' G	0.0024	0.005	156.73	0.015	d=.728 d'=.718				5.69	151.04
9.5'C	0.0024	0.005	151.04	0.015	.718	0.167	263.37	9.5	10.98	140.06

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JOB: SCOTTSDALE ROAD DRAINAGE
SHEET NO. 3 OF
CALCULATED BY: [illegible] DATE: 10-FEB-89
CHECKED BY: GK DATE: 3/89
SCALE: AVALON S.D. 100 YR

AVALON STORM DRAIN 100 YR 24 HR STORM

70TH ST & EARLL

Q_{PIPE} = 84.34

PIPE - 1-48" RCRCP
S_o - 0.0052 FT/FT
R_h - 2.0 FT
A - 12.57 FT²
n - 0.012
V - 14.18 FPS
Q = 220.76 CFS TOTAL CAPACITY

REMAINING CAPACITY = 62%

70TH ST & EARLL (FROM PINCHOT)

Q_{PIPE} = 57.13

PIPE = 1-48" RCRCP
S_o = 0.0052 FT/FT
R_h = 2.0 FT
A = 12.57 FT²
n = 0.012
V = 14.18 FPS
Q = 220.76 CFS TOTAL CAPACITY

REMAINING CAPACITY 74%

STREET NAME	So (FT/FT)	Sx (FT/FT)	Qa (CFS)	n	d (FT)	a (FT)	La (FT)	L (FT)	Qi (CFS)	Qb = Qa - Qi (CFS)
THOMAS @ 68TH ST										
4'C	0.0053	0.0188	68	0.015	.754	0.167	111.53	4	4.95	63.05
3'x3' G	0.0053	0.0188	63.05	0.015	d=.733 d'=.677				12.03	51.02
THOMAS @ 70TH ST										
3'-4"x2' G	0.0167	0.0286	50	0.015	d=.634 d'=.577				11.15	38.85
THOMAS Ld 520' EAST/O 70TH ST										
7'C W/3'x2' G	0.0087	0.0211	38.85	0.015	d=.581	0.167	87.80	7	5.88	
			32.97		d'=.504				6.48	
								Σ=	12.36	26.49
THOMAS @ SCOTTSDALE 2'x3'-4" G	0.0041	0.0222	93	0.015	d=.95 d'=.90				11.72	81.28

TOTAL INTERCEPTION ALONG THOMAS = 52.21

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JOB SCOTTSDALE ROAD VERMILLAGE
SHEET NO. ____ OF ____
CALCULATED BY [illegible] DATE ____
CHECKED BY GE DATE 3/88
SCALE THOMAS ROAD 10YR STORM EVE

STREET NAME	So (FT/FT)	Sx (FT/FT)	Qa (CFS)	n	d (FT)	a (FT)	La (FT)	L (FT)	Qi (CFS)	Qb-Qa-Qi (CFS)
THOMAS & 68th ST										
4'C	0.0053	0.0188	119	0.015	.930	0.167	149.39	4	6.70	112.30
3'x3'G	0.0053	0.0188	112.30	0.015	d=.910 d'=.853				17.74	94.56
THOMAS & 70th ST										
3'-4"x2'G	0.0167	0.0286	94	0.015	d=.803 d'=.746				16.86	77.14
THOMAS 570' EAST OF 70th ST	0.0087	0.0211	77.14	0.015	.752	0.167	126.90	7	8.53	68.61
7'C w/3'x2'G	0.0087	0.0211	68.61	0.015	d=.720 d'=.677				10.37	58.24
THOMAS & SCOTTSDALE 2'x3'-4"G	0.0041	0.0222	167	0.015	d=1.179 d'=1.13				17.77	149.23

TOTAL INTERCEPTION ALONG THOMAS = 77.97

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JOB SCOTTSDALE ROAD DRAINAGE
SHEET NO. 1 OF
CALCULATED BY DATE 10-FEB-89
CHECKED BY DATE 3/89
SCALE THOMAS ROAD WORK STORM 24 HR

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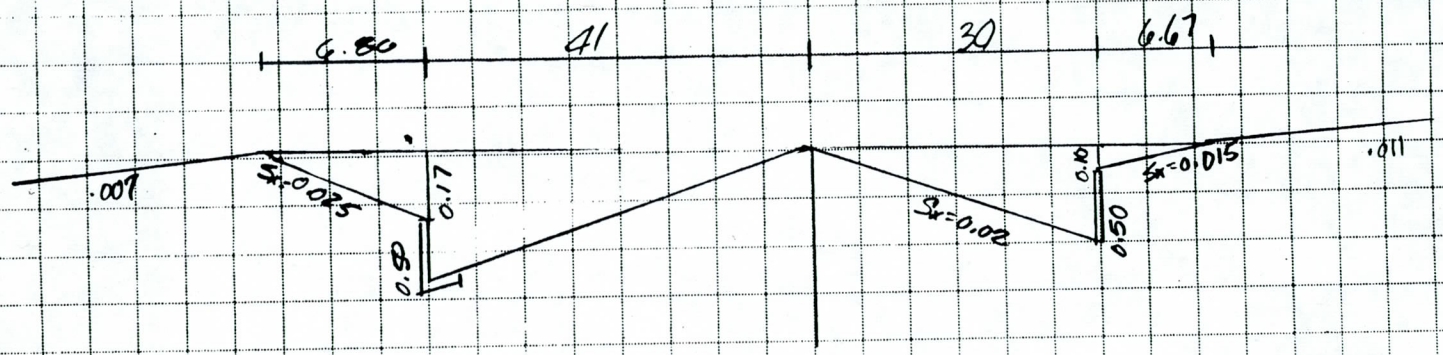
JOB SCOTTSDALE ROAD DRAINAGE
SHEET NO. 1 OF
CALCULATED BY [illegible] DATE 14 FEB 89
CHECKED BY GK DATE 3/89
SCALE THOMAS ROAD 10 YR STORM 84 HR



Q_a = 93 CFS
$-Q_i$ = 11.7 CFS
Q_B = 81.3 CFS

S_o (FT/FT)	λ	Δ (FT)²	R_H (FT)	d_{CURB} (FT)	X (FT)	V FPS	Q_{REQ} CFS	Q_{PROV} CFS
0.0046	0.015	23.65	0.2793	0.67 South 0.60 North	84.50	2.87	62.90	67.88

MAX

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JOB SCOTTSDALE ROAD DRAINAGE
SHEET NO. 1 OF 1
CALCULATED BY [illegible] DATE 12-FEB-92
CHECKED BY GTS DATE 3/89
SCALE OAK ST 10YR STORM CALC

STREET NAME	S_o (FT/FT)	S_x (FT/FT)	Q_a (CFS)	n	d (FT)	a (FT)	L_a (FT)	L (FT)	Q_i (CFS)	$Q_B = Q_a - Q_i$ (CFS)
70th St: Vermont	0.0068	0.0055	49	0.015						
2-54' SLOT w/2.0 ¢G			$L_r = 4.762(49)^{.427}(.0068)^{.305}(1/.0055)^{.766} = 249.65$					Q_a $L_a/L_r = 49(54/249.65) =$	8.98	
N	0.0068	0.0055	49	0.015	d=0.401 d'=0.390				3.63	
								Σ =	12.61	
								2 GRATES	X 2	
									25.22	23.78
70th St: OAK	0.0182	0.0074	28	0.015						
25' SLOT w/ 2x2 G	$L_r = 4.762(28)^{.427}(.0182)^{.305}(1/.0074)^{.766} = 249.58$					$28(25/249.58) = 3.48$			3.48	
	0.0182	0.0074	28	0.015	d=.302 d'=.287				3.71	
50' SLOT	0.0182	0.0074	28							
	$L_r = 4.762(28)^{.427}(.0182)^{.305}(1/.0074)^{.766} = 249.58$					$28(50/249.58) = 5.61$			5.61	
								Σ =	12.80	15.20
OAK & SCOTTSDALE 7'C	0.0034	0.0291	15.20	0.015	0.550	0.167	36.72	?	5.10	10.10

TOTAL INTERCEPTION ALONG OAK = 43.12 CFS

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JOB: SCOTTSDALE ROAD DRAINAGE
SHEET NO. 1 OF 1
CALCULATED BY: [illegible] DATE: 13 FEB 89
CHECKED BY: GTC DATE: 3/89
SCALE: OAK ST 100YR STORM 24HR

STREET NAME	S_o (FT/FT)	S_x (FT/FT)	Q_a (CFS)	n	d (FT)	a (FT)	L_a (FT)	L (FT)	Q_i (CFS)	$Q_B = Q_a - Q_i$ (CFS)
70th ST: Verlon 2 54' slots	0.0068	0.0055	95	0.015						
	$L_r = 4.762(95)^{.427}(.0068)^{.305}(1/.0055)^{.766} =$				390.91	95(54/390.91)			13.12	
W 2 of G	0.0068	0.0055	95	0.015	d=0.514 d'=0.503				5.63	
N								Σ =	18.75	
								2 GRATES	37.50	
70th St: Oak 25 slot w/ 2x24	0.0182	0.0074	55	0.015						
	$L_r = 4.762(55)^{.427}(.0182)^{.305}(1/.0074)^{.766} =$				332.98	55(25/332.98)			4.13	
N	0.0182	0.0074	55	0.015	d=.389 d'=.375				5.39	
50' slot	0.0182	0.0074	55							
	$L_r = 4.762(\ldots)^{.427}(0.0182)^{.305}(1/.0074)^{.766} =$				332.98	55(50/348.03)			8.26	
								Σ =	17.78	
Oak: Scottsdale 7'C	0.0034	0.0291	37.22	0.015	.770	0.167	59.45	7	8.47	28.75
							TOTAL INTERCEPTION ALONG OAK: 61.75			

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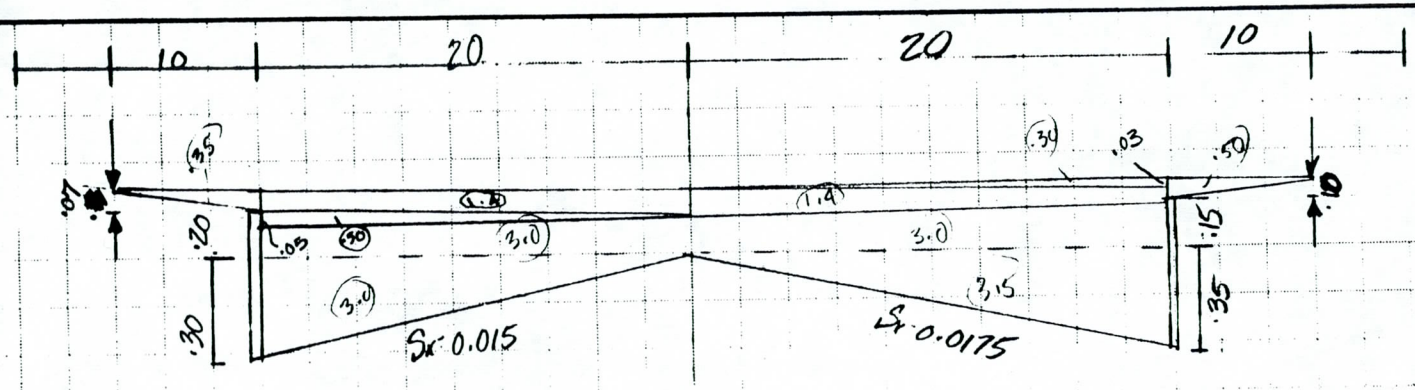
JOB SCOTTSDALE COMP REHABILITATION
SHEET NO. 1 OF
CALCULATED BY [illegible] DATE 14-FEB-92
CHECKED BY GTC DATE 3/89
SCALE OAK ST 10YR STORM ZONE



S_o FT/FT	A FT²	R_H FT	d_{CURB} FT	X FT	V FPS	Q_{REQ} CFS	Q_{PROV} CFS	n
0.0063	17.45	0.2851	0.50	60	3.40	10.23	59.41	0.015
0.0063	6.50	0.1600	0.30S 0.35N	40	2.32	10.23	15.08	0.015

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JOB Scottsdale Road
SHEET NO. ____ OF ____
CALCULATED BY [illegible] DATE 10-Feb-89
CHECKED BY GTC DATE 3/89
SCALE 10 yr STORM 24 HR Osborn Road

STREET NAME	S_o (FT/FT)	S_x (FT/FT)	Q_a (CFS)	n	d (FT)	a (FT)	L_a (FT)	L (FT)	Q_i (CFS)	Q_t (CFS)
Osborn at 68th St										ASSUME 68th ST FLOWS PAST OSBORN
2x2 G	0.0032	0.011	58	0.015	d=.638 d'=.616	0.167			5.34	
2.5'ϕG	0.0032	0.011	58	0.015	d=.638 d'=.616	0.167			6.48	46.18
2x2 G	0.0032	0.011	46.18	0.015	d=.586 d'=.564	0.167			4.57	41.61
Osborne 70th St 2-3.5'C	0.005	0.005	80	0.015	.493	0.167	220.34	3.5	2.14 x 2 = 4.86	75.14
8'C	0.005	0.005	75.14	0.015	.481	0.167	212.78	8.0	5.31	69.83
Osborn 400' East to 70th St										
3.5'C	0.0045	0.0136	69.83	0.015	.695	0.167	126.71	3.5	3.89	65.94
7.0'C	0.0045	0.0136	65.94	0.015	.680	0.167	122.88	7.0	7.41	58.53

STREET NAME	S_o (FT/FT)	S_x (FT/FT)	Q_a (CFS)	n	d (FT)	a (FT)	L_a (FT)	L (FT)	Q_i (CFS)	Q_{B3} (CFS)
OSBORN Rd 240' WEST to SCOTTSDALE 7'C	0.0014	0.005	58.53	0.015	.557	0.167	139.45	7	5.63	52.90
OSBORN Rd & SCOTTSDALE Rd 2-7'C	0.0014	0.005	52.90	0.015	.536	0.167	131.90	7	5.34 × 2 = 10.68	42.22

TOTAL FLOW INTERCEPTED ALONG OSBORN = 54.16 CFS

BROOKS, HERSEY & ASSOCIATES, INC.
5246 South 40th Street
PHOENIX, ARIZONA 85040
(602) 437-3733

JOB SCOTTSDALE ROAD
SHEET NO. 2 OF
CALCULATED BY
DATE 10-FEB-89
CHECKED BY
DATE 3/89
SCALE

BROOKS, HERSEY
& ASSOCIATES, INC.
5246 South 40th Street
PHOENIX, ARIZONA 85040
(602) 437-3733

JOB SCOTTSDALE ROAD LIBERALIZE
SHEET NO. 2 OF 2
CALCULATED BY [illegible] DATE
CHECKED BY GTK DATE 3/89
SCALE 100YR STORM 20 HR OSBORN ROAD

STREET NAME	So (FT/FT)	Sx (FT/FT)	Qa (CFS)	n	d (FT)	a (FT)	La (FT)	L (FT)	Qi (CFS)	QB=Qa-Qi (CFS)
OSBORN Rd & SCOTTSDALE 2-7'C	0.0014	0.005	115.53	0.015	.718	0.167	201.31	7	8.10 x 2 = 16.20	99.33

TOTAL FLOW INTERCEPTED ALONG OSBORN ROAD = 80.97

BROOKS, HERSEY & ASSOCIATES, INC.
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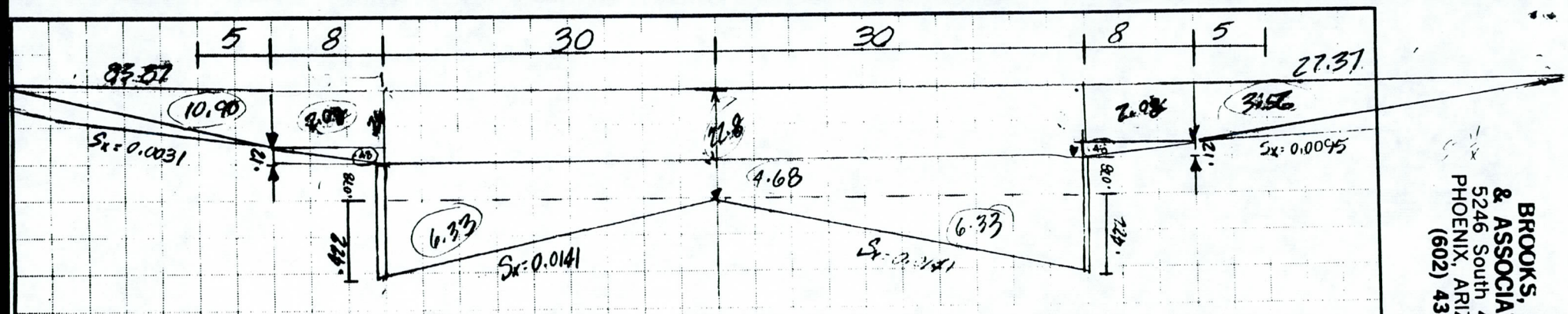
PHOENIX, ARIZONA 85040
(602) 437-3733

JOB: SCOTTSDALE ROAD DRAINAGE
SHEET NO. 1 OF 2
CALCULATED BY: [illegible] DATE: 10-FEB-89
CHECKED BY: GK DATE: 3/8/89
SCALE: NONE STORM GAIN OSBORN ROAD

STREET NAME	So (FT/FT)	Sx (FT/FT)	Qa (CFS)	n	d (FT)	a (FT)	La (FT)	L (FT)	Qi (CFS)	QB = Qa - Qi (CFS)
OSBORN AT 68th ST										ASSUME 68th ST FLOWS PAST OSBORN
2x2 G	0.0032	0.011	112	0.015	d = .817 d' = .795				7.95	
2.5'φG	0.0032	0.011	112	0.015	d = .817 d' = .795				9.68	94.37
2x2 G	0.0032	0.011	94.37	0.015	d = .766 d' = .744				7.17	87.17
OSBORNE 70th ST										
2-3.5'C	0.005	0.005	155	0.015	.632	0.167	316.64	3.5	3.43 × 2 = 6.87	148.13
8'C	0.005	0.005	148.13	0.015	.621	0.167	308.98	8	7.60	140.53
OSBORN 400' EAST o/o										
3.5'C	0.0045	0.0136	140.53	0.015	.904	0.167	182.99	3.5	5.66	134.87
7.0'C	0.0045	0.0136	134.87	0.015	.850	0.167	179.13	7.0	10.93	123.94
OSBORN Rd 210' WEST o/o SCOTTSDALE 7'C	0.0014	0.005	123.94	0.015	.737	0.167	208.96	7.0	8.41	115.53



$Q_B = 221$ CFS
$-Q_i = 54.20$ CFS
$Q_B = 166.80$

S_o FT/FT	A FT²	R_H FT	d_{CURB} FT	X FT	V FPS	Q_{REQ} CFS	Q_{PROV} CFS	n
0.0033	85.27	0.356	0.50	222.58	2.86	152.80	243.67	0.015
0.0033	54.29	0.308	0.35	174.41	2.59	152.80	140.61	0.015
0.0033	63.56	0.322	0.40	195.79	2.67	152.80	169.87	0.015
0.0033	59.72	0.317	0.38	187.24	2.64	152.80	157.95	0.015

10 YR

BROOKS, HERSEY & ASSOCIATES, INC.
5246 South 40th Street
PHOENIX, ARIZONA 85040
(602) 437-3733

JOB
SHEET NO. ____ OF ____
CALCULATED BY GTK DATE 3/30/99
CHECKED BY ____ DATE ____
SCALE CURB & GUTTER SECTION

12.0 EXHIBITS

1. Drainage Sub Areas
2. Existing Storm Drain System and Intercepted Capacities.
3. Storm Drain Size Requirements from McDowell to Oak
4. Storm Drain Size REquirements from Oak to Thomas
5. Zoning Map

Scale 1" = 400'

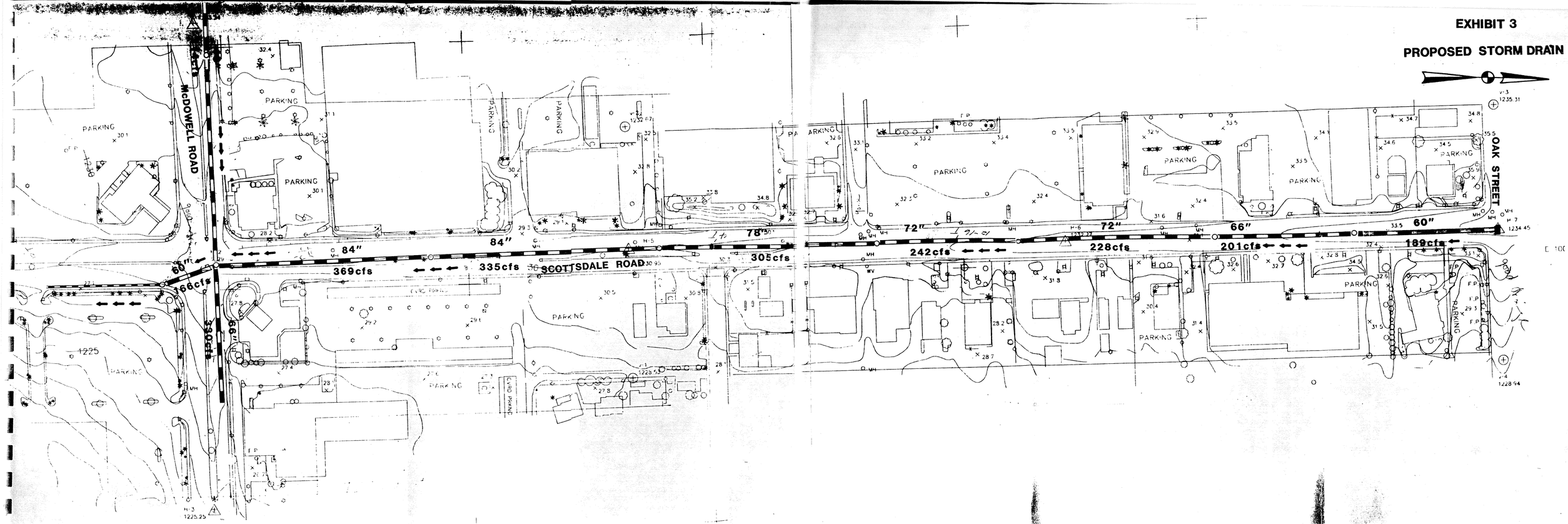
T.2N, R.4E

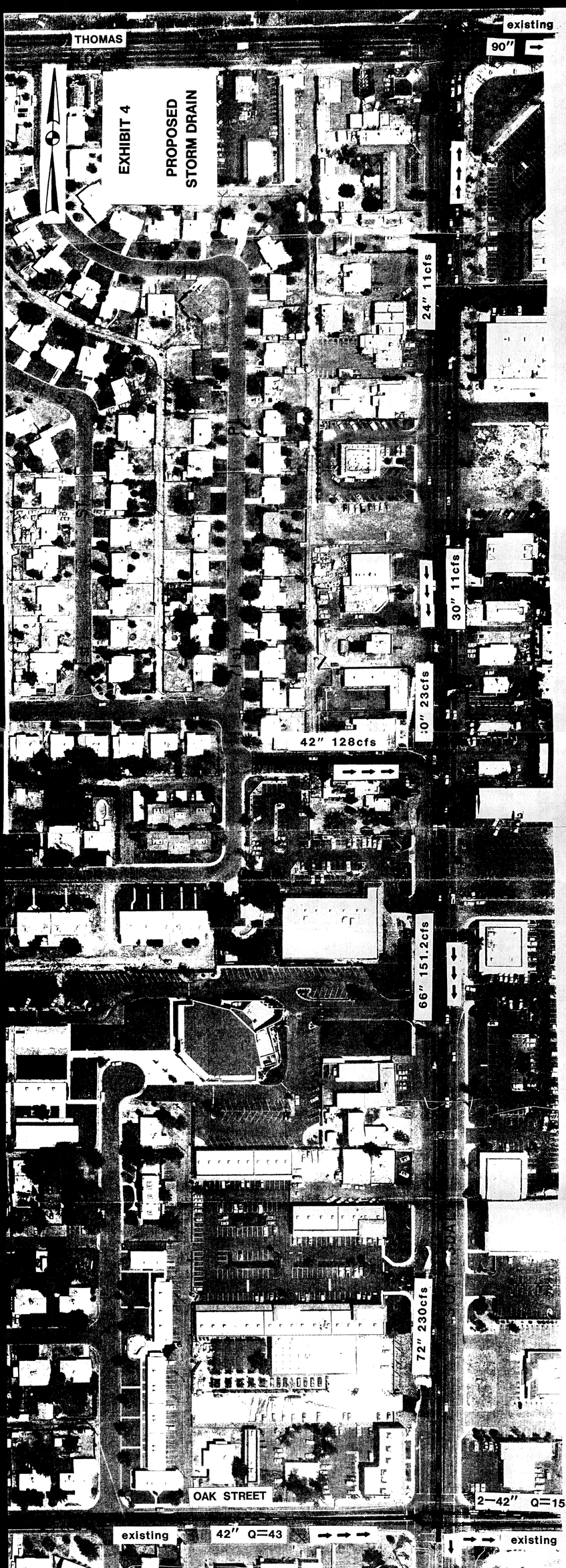
28 | 27
33 | 34

O-2

EXHIBIT 3

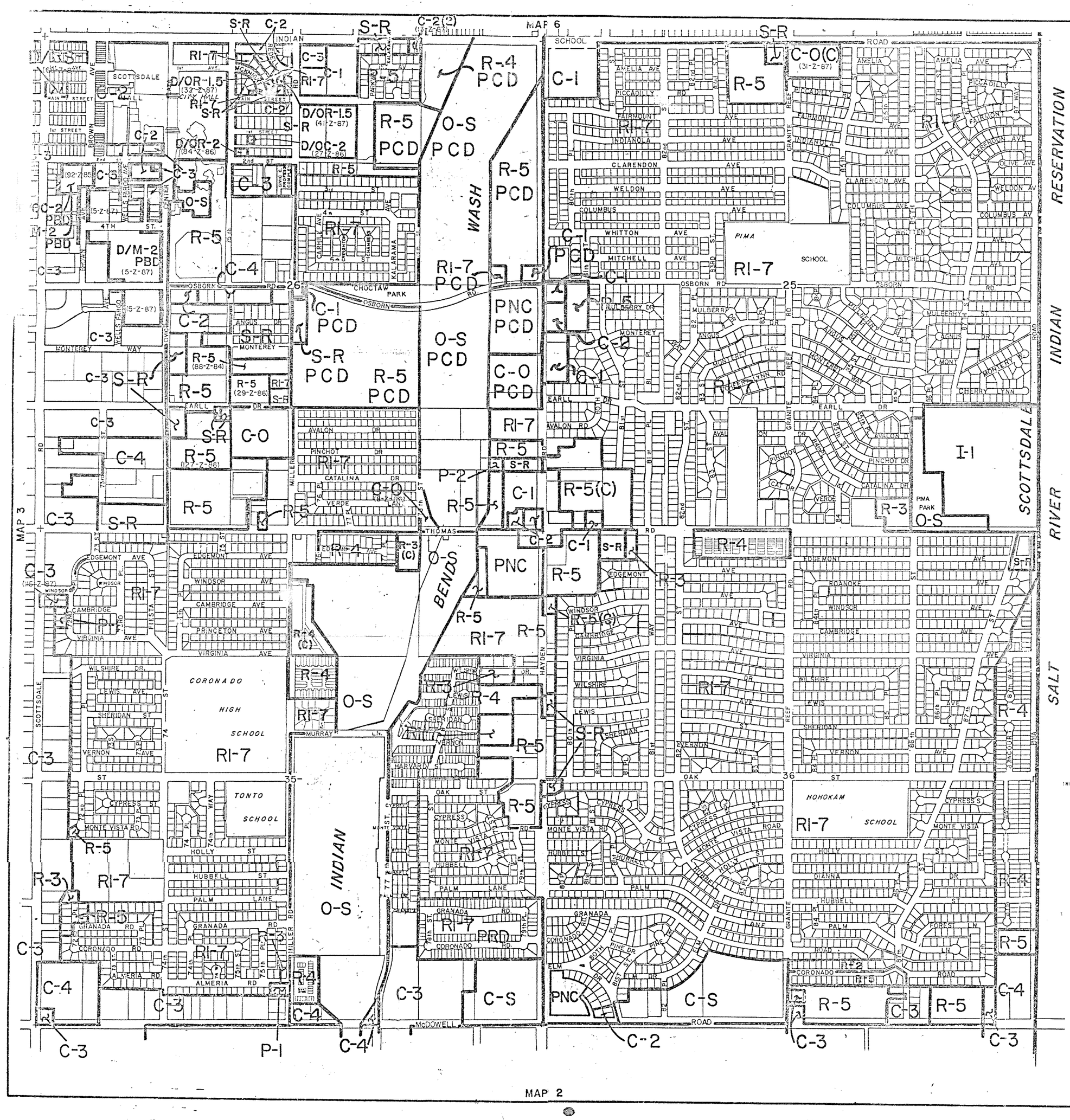
PROPOSED STORM DRAIN





Scale 1" = 100'

Quarter Section Number 14-44



R-5	MULTIPLE FAMILY RESIDENTIAL
C-1	NEIGHBORHOOD COMMERCIAL DISTRICT
I-G	GARDEN INDUSTRIAL
R1-7	SINGLE FAMILY RESIDENTIAL
C-3	HIGHWAY COMMERCIAL
C-4	GENERAL COMMERCIAL
S-R	SERVICE RESIDENTIAL
O-S	OPEN SPACE
C-S	SHOPPING CENTER

Scale In Feet

T2N, R4E

16-45	16-46	16-47	16-48
15-45	15-46	15-47	15-48
14-45	14-46	14-47	14-48
13-45	13-46	13-47	13-48

INDIAN SCHOOL ROAD (4100 N.) — THOMAS ROAD (2900 N.) — McDOWELL ROAD (1600 N.) — SCOTTSDALE ROAD — ROAD — ROAD

EXHIBIT 5—A

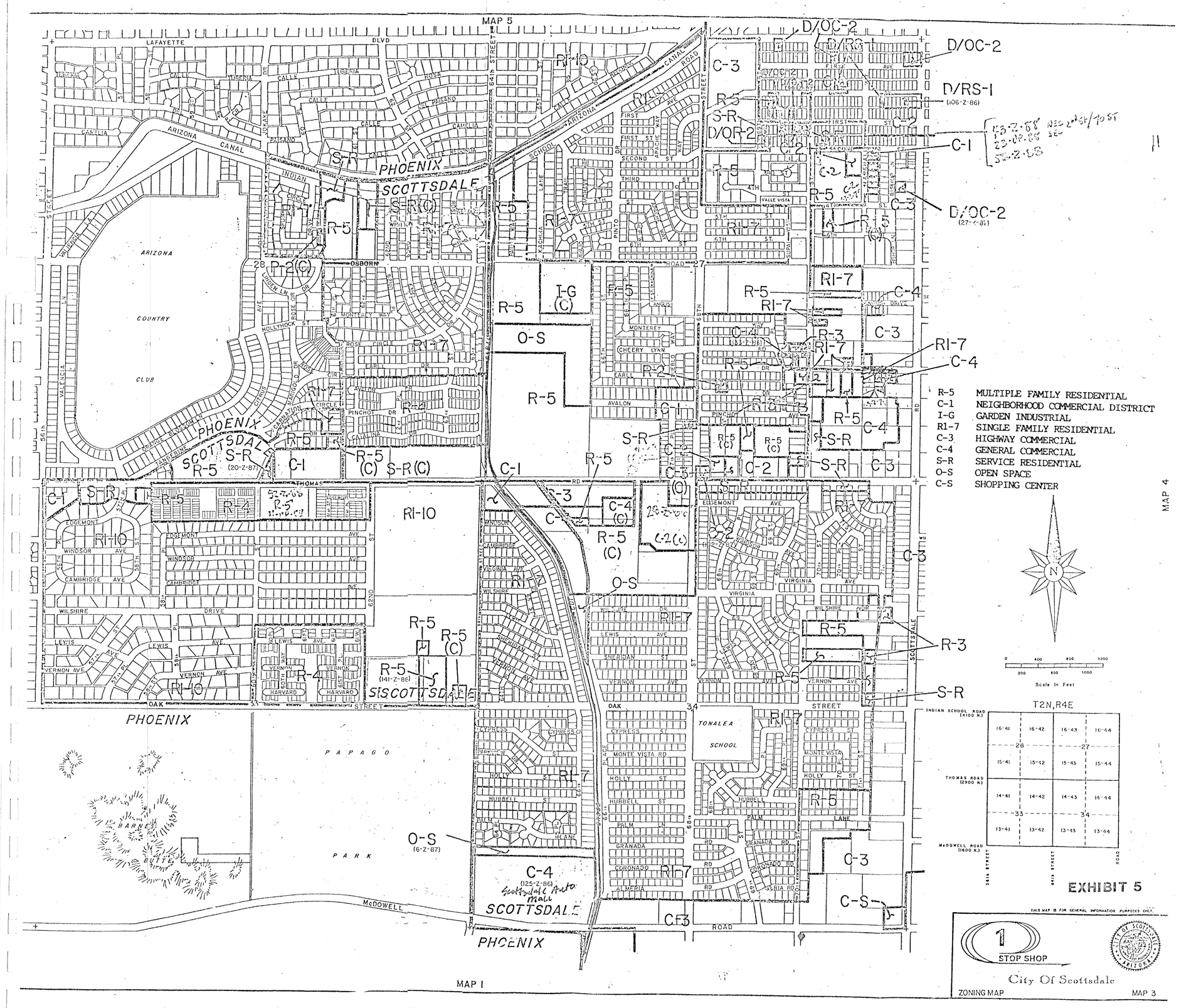
THIS MAP IS FOR GENERAL INFORMATION PURPOSES ONLY.

1 STOP SHOP

City Of Scottsdale

ZONING MAP

MAP 4


MAP 5
MAP 4
MAP 1
MAP 3
LAFAYETTE BLVD
ARIZONA CANAL
PHOENIX
SCOTTSDALE
ARIZONA COUNTRY CLUB
OSBORN
THOMAS RD
OAK STREET
McDOWELL ROAD
PAPAGO PARK
TONALEA SCHOOL
SCOTTSDALE ROAD
64th STREET
68th STREET
D/OC-2
D/RS-1
(106-Z-86)
C-1
D/OC-2
(27-Z-87)
R-5 MULTIPLE FAMILY RESIDENTIAL
C-1 NEIGHBORHOOD COMMERCIAL DISTRICT
I-G GARDEN INDUSTRIAL
R1-7 SINGLE FAMILY RESIDENTIAL
C-3 HIGHWAY COMMERCIAL
C-4 GENERAL COMMERCIAL
S-R SERVICE RESIDENTIAL
O-S OPEN SPACE
C-S SHOPPING CENTER
N
Scale in Feet
T2N,R4E
INDIAN SCHOOL ROAD (4100 N.)
THOMAS ROAD (2900 N.)
McDOWELL ROAD (1600 N.)
EXHIBIT 5
THIS MAP IS FOR GENERAL INFORMATION PURPOSES ONLY
1 STOP SHOP
City Of Scottsdale
ZONING MAP

13.0 HYDRAULIC GRADE LINE ANALYSIS

INPUT DATA LISTING

CD	L2	MAX Q	ADJ Q	LENGTH	FL 1	FL 2	CTL/TW	D	W	S	KJ	KE	KM	LC	L1	L3	L4	A1	A3	A4	J	N
8	1						1224.77															
2	2	370.0	370.0	75.00	1217.77	1218.03	.00	84.	0.	3	.00	.10	.00	1	3	0	0	0.	0.	0.	2.00	.012
2	3	346.0	346.0	310.66	1218.03	1219.10	.00	84.	0.	3	.00	.10	.00	0	4	0	0	0.	0.	0.	1.50	.012
2	4	335.0	335.0	9.32	1219.10	1219.15	.00	84.	0.	3	.00	.20	.00	0	5	0	0	0.	0.	0.	4.00	.012
2	5	335.0	335.0	184.32	1219.15	1219.56	.00	84.	0.	3	.00	.10	.00	0	6	0	0	0.	0.	0.	2.00	.012
2	6	320.0	320.0	250.68	1219.56	1220.14	.00	84.	0.	3	.00	.10	.00	0	7	0	0	0.	0.	0.	2.00	.012
2	7	305.0	305.0	37.50	1220.14	1220.23	.00	84.	0.	3	.00	.20	.00	0	8	0	0	0.	0.	0.	4.00	.012
2	8	305.0	305.0	217.50	1220.73	1221.16	.00	78.	0.	3	.00	.10	.00	0	9	0	0	0.	0.	0.	1.50	.012
2	9	292.0	292.0	251.00	1221.16	1221.66	.00	78.	0.	3	.00	.10	.00	0	10	0	0	0.	0.	0.	3.00	.012
2	10	246.0	246.0	29.00	1221.66	1221.72	.00	78.	0.	3	.00	.10	.00	0	11	0	0	0.	0.	0.	1.50	.012
2	11	242.0	242.0	12.76	1221.72	1221.74	.00	78.	0.	3	.00	.20	.00	0	12	0	0	0.	0.	0.	4.00	.012
2	12	229.0	229.0	240.00	1222.24	1223.00	.00	72.	0.	3	.00	.20	.00	0	13	0	0	0.	0.	0.	4.00	.012
2	13	229.0	229.0	90.00	1223.00	1223.18	.00	72.	0.	3	.00	.10	.00	0	14	0	0	0.	0.	0.	1.50	.012
2	14	218.0	218.0	106.50	1223.18	1223.43	.00	72.	0.	3	.00	.10	.00	0	15	0	0	0.	0.	0.	1.50	.012
2	15	214.0	214.0	197.50	1223.43	1223.90	.00	72.	0.	3	.00	.10	.00	0	16	0	0	0.	0.	0.	1.50	.012
2	16	202.0	202.0	44.00	1223.90	1224.00	.00	72.	0.	3	.00	.20	.00	0	17	0	0	0.	0.	0.	4.00	.012
2	17	202.0	202.0	242.00	1224.50	1225.10	.00	66.	0.	3	.00	.10	.00	0	18	0	0	0.	0.	0.	1.50	.012
2	18	199.0	199.0	50.00	1225.10	1225.22	.00	66.	0.	1	.00	.20	.00	0	0	0	0	0.	0.	0.	.00	.012

STORM DRAIN ANALYSIS RESULTS

Line No	Q (cfs)	D (in)	W (in)	Dn (ft)	Dc (ft)	Flow Type	Sf-full (ft/ft)	V 1 (fps)	V 2 (fps)	FL 1 (ft)	FL 2 (ft)	HG 1 Calc	HG 2 Calc	D 1 (ft)	D 2 (ft)	TW Calc	TW CK
1	Hydraulic grade line control = 1224.77																
2	370.0	84	0	5.24	5.07	Part	.00286	9.6	9.6	1217.77	1218.03	1224.77	1224.97	7.00	6.94	.00	.00
3	346.0	84	0	4.97	4.90	Full	.00250	9.0	9.0	1218.03	1219.10	1225.33	1226.11	7.30	7.01	.00	.00

X = .00 X(N) = 44.29

4	335.0	84	0	4.16	4.82	Full	.00234	8.7	8.7	1219.10	1219.15	1226.40	1226.42	7.30	7.27	.00	.00
5	335.0	84	0	7.00	4.82	Full	.00234	8.7	8.7	1219.15	1219.56	1226.66	1227.09	7.51	7.53	.00	.00
6	320.0	84	0	5.51	4.70	Full	.00214	8.3	8.3	1219.56	1220.14	1227.42	1227.96	7.86	7.82	.00	.00
7	305.0	84	0	5.20	4.58	Full	.00194	7.9	7.9	1220.14	1220.23	1228.27	1228.34	8.13	8.11	.00	.00
8	305.0	78	0	6.50	4.69	Full	.00288	9.2	9.2	1220.73	1221.16	1228.21	1228.84	7.48	7.68	.00	.00
9	292.0	78	0	6.50	4.59	Full	.00264	8.8	8.8	1221.16	1221.66	1229.19	1229.85	8.03	8.19	.00	.00
10	246.0	78	0	5.08	4.19	Full	.00188	7.4	7.4	1221.66	1221.72	1230.68	1230.73	9.02	9.01	.00	.00
11	242.0	78	0	6.50	4.15	Full	.00181	7.3	7.3	1221.72	1221.74	1230.88	1230.90	9.16	9.16	.00	.00
12	229.0	72	0	4.40	4.14	Full	.00249	8.1	8.1	1222.24	1223.00	1230.98	1231.58	8.74	8.58	.00	.00
13	229.0	72	0	6.00	4.14	Full	.00249	8.1	8.1	1223.00	1223.18	1231.79	1232.02	8.79	8.84	.00	.00
14	218.0	72	0	4.82	4.03	Full	.00226	7.7	7.7	1223.18	1223.43	1232.31	1232.56	9.13	9.13	.00	.00
15	214.0	72	0	4.70	3.99	Full	.00218	7.6	7.6	1223.43	1223.90	1232.72	1233.15	9.29	9.25	.00	.00
16	202.0	72	0	4.66	3.87	Full	.00194	7.1	7.1	1223.90	1224.00	1233.43	1233.52	9.53	9.52	.00	.00
17	202.0	66	0	5.50	3.98	Full	.00308	8.5	8.5	1224.50	1225.10	1233.36	1234.10	8.86	9.01	.00	.00
18	199.0	66	0	5.50	3.95	Full	.00299	8.4	8.4	1225.10	1225.22	1234.29	1234.44	9.19	9.22	1235.74	.00

1

LIST OF ABBREVIATIONS

V 1, FL 1, D 1 and HG 1 refer to downstream end
0 V 2, FL 2, D 2 and HG 2 refer to upstream end
0 X - Distance in feet from downstream end to point where HG intersects soffit in seal condition
0 X(N) - Distance in feet from downstream end to point where water surface reaches normal depth by either drawdown or backwater
0 X(J) - Distance in feet from downstream end to point where hydraulic jump occurs in line
0 F(J) - The computed force at the hydraulic jump
0 D(BJ) - Depth of water before the hydraulic jump (upstream side)
0 D(AJ) - Depth of water after the hydraulic jump (downstream side)
0 SEAL indicates flow changes from part to full or from full to part
0 HJ indicates that flow changes from supercritical to subcritical through a hydraulic jump
0 HJU indicates that hydraulic jump occurs at the junction at the upstream end of the line
0 HJD indicates that hydraulic jump occurs at the junction at the downstream end of the line
1

Project : SCOTTSDALE RD STORM DRAIN (OAK-94+42) Proj.No. S-5518 Date: 12/ 1/1989 Time: 13:34:42

INPUT DATA LISTING

CD	L2	MAX Q	ADJ Q	LENGTH	FL 1	FL 2	CTL/TW	D	W	S	KJ	KE	KM	LC	L1	L3	L4	A1	A3	A4	J	N
8	1						1225.30															
2	2	230.0	230.0	170.00	1221.38	1221.56	.00	72.	0.	3	.00	.10	.00	1	3	0	0	0.	0.	0.	1.50	.012
2	3	223.0	223.0	182.00	1221.56	1221.78	.00	72.	0.	3	.00	.10	.00	0	4	0	0	0.	0.	0.	1.50	.012
2	4	220.0	220.0	145.00	1221.78	1221.97	.00	72.	0.	3	.00	.10	.00	0	5	0	0	0.	0.	0.	2.00	.012
2	5	204.0	204.0	145.00	1221.97	1222.14	.00	72.	0.	3	.00	.10	.00	0	6	0	0	0.	0.	0.	1.50	.012
2	6	201.0	201.0	40.00	1222.14	1222.19	.00	72.	0.	3	.00	.20	.00	0	7	0	0	0.	0.	0.	4.00	.012
2	7	201.0	201.0	108.00	1222.19	1222.32	.00	66.	0.	3	.00	.10	.00	0	8	0	0	0.	0.	0.	2.00	.012
2	8	187.0	187.0	185.00	1222.32	1222.55	.00	66.	0.	3	.00	.10	.00	0	9	0	0	0.	0.	0.	2.00	.012
2	9	165.0	165.0	81.62	1222.55	1222.65	.00	66.	0.	3	.00	.10	.00	0	10	0	0	0.	0.	0.	1.50	.012
2	10	160.0	160.0	86.00	1222.65	1222.76	.00	66.	0.	3	.00	.10	.00	0	11	0	0	0.	0.	0.	1.50	.012
2	11	157.0	157.0	99.38	1222.76	1222.87	.00	66.	0.	3	.00	.10	.00	0	12	0	0	0.	0.	0.	1.50	.012
2	12	151.0	151.0	123.19	1222.87	1223.01	.00	66.	0.	3	.00	.20	.00	0	13	0	0	0.	0.	0.	4.00	.012
2	13	23.0	23.0	46.81	1226.01	1226.15	.00	30.	0.	3	.00	.10	.00	0	14	0	0	0.	0.	0.	1.50	.012
2	14	20.0	20.0	8.83	1226.15	1226.17	.00	30.	0.	3	.00	.10	.00	0	15	0	0	0.	0.	0.	1.50	.012
2	15	11.0	11.0	150.00	1226.17	1226.69	.00	30.	0.	3	.00	.20	.00	0	16	0	0	0.	0.	0.	4.00	.012
2	16	11.0	11.0	254.00	1226.69	1227.07	.00	30.	0.	1	.00	.20	.00	0	0	0	0	0.	0.	0.	.00	.012

1Project : SCOTTSDALE RD STORM DRAIN (OAK-94+42) Proj.No. S-5518 Date: 12/ 1/1989 Time: 13:34:42

STORM DRAIN ANALYSIS RESULTS

Line No	Q (cfs)	D (in)	W (in)	Dn (ft)	Dc (ft)	Flow Type	Sf-full (ft/ft)	V 1 (fps)	V 2 (fps)	FL 1 (ft)	FL 2 (ft)	HG 1 Calc	HG 2 Calc	D 1 (ft)	D 2 (ft)	TW Calc	TW CK
1	Hydraulic grade line control = 1225.30																
2	230.0	72	0	6.00	4.15	Part	.00251	11.0	9.1	1221.38	1221.56	1225.53	1226.61	4.15	5.05	.00	.00 HJ
	X =	.00	X(N) =	.00	X(J) =	169.78	F(J) =	123.73	D(BJ) =	5.05	D(AJ) =	5.04					
3	223.0	72	0	6.00	4.08	Part	.00236	8.5	8.2	1221.56	1221.78	1226.84	1227.30	5.28	5.52	.00	.00 HJU
4	220.0	72	0	6.00	4.05	Part	.00230	8.0	7.9	1221.78	1221.97	1227.37	1227.70	5.59	5.73	.00	.00 HJU

5	204.0	72	0	6.00	3.89	Full	.00198	7.2	7.2	1221.97	1222.14	1227.99	1228.28	6.02	6.14	.00	.00
6	201.0	72	0	6.00	3.86	Full	.00192	7.1	7.1	1222.14	1222.19	1228.41	1228.49	6.27	6.30	.00	.00
7	201.0	66	0	5.50	3.97	Full	.00305	8.5	8.5	1222.19	1222.32	1228.33	1228.66	6.14	6.34	.00	.00
8	187.0	66	0	5.50	3.83	Full	.00264	7.9	7.9	1222.32	1222.55	1229.07	1229.56	6.76	7.01	.00	.00
9	165.0	66	0	5.50	3.58	Full	.00206	6.9	6.9	1222.55	1222.65	1230.09	1230.26	7.54	7.61	.00	.00
10	160.0	66	0	5.50	3.52	Full	.00193	6.7	6.7	1222.65	1222.76	1230.43	1230.59	7.78	7.83	.00	.00
11	157.0	66	0	5.50	3.49	Full	.00186	6.6	6.6	1222.76	1222.87	1230.72	1230.90	7.96	8.03	.00	.00
12	151.0	66	0	5.50	3.42	Full	.00172	6.4	6.4	1222.87	1223.01	1231.07	1231.29	8.20	8.28	.00	.00
13	23.0	30	0	1.94	1.63	Full	.00268	4.7	4.7	1226.01	1226.15	1233.27	1233.39	7.26	7.24	.00	.00
14	20.0	30	0	1.94	1.52	Full	.00203	4.1	4.1	1226.15	1226.17	1233.60	1233.61	7.45	7.44	.00	.00
15	11.0	30	0	1.13	1.10	Full	.00061	2.2	2.2	1226.17	1226.69	1234.00	1234.09	7.83	7.40	.00	.00
	X =	.00	X(N) =	5.07													
16	11.0	30	0	1.45	1.10	Full	.00061	2.2	2.2	1226.69	1227.07	1234.11	1234.27	7.42	7.20	1234.36	.00

1 LIST OF ABBREVIATIONS

V 1, FL 1, D 1 and HG 1 refer to downstream end
0 V 2, FL 2, D 2 and HG 2 refer to upstream end
0 X - Distance in feet from downstream end to point where HG intersects soffit in seal condition
0 X(N) - Distance in feet from downstream end to point where water surface reaches normal depth by either drawdown or backwater
0 X(J) - Distance in feet from downstream end to point where hydraulic jump occurs in line
0 F(J) - The computed force at the hydraulic jump
0 D(BJ) - Depth of water before the hydraulic jump (upstream side)
0 D(AJ) - Depth of water after the hydraulic jump (downstream side)
0 SEAL indicates flow changes from part to full or from full to part
0 HJ indicates that flow changes from supercritical to subcritical through a hydraulic jump
0 HJU indicates that hydraulic jump occurs at the junction at the upstream end of the line
0 HJD indicates that hydraulic jump occurs at the junction at the downstream end of the line
1

Project : Scottsdale Rd. Storm Drain (MH7 to MH6) Date: 12/ 1/1989 Time: 14:44: 2

INPUT DATA LISTING

CD	L2	MAX Q	ADJ Q	LENGTH	FL 1	FL 2	CTL/TW	D	W	S	KJ	KE	KM	LC	L1	L3	L4	A1	A3	A4	J	N
8	1						1225.30															
2	2	290.0	290.0	288.00	1221.38	1225.22	.00	60.	0.	1	.00	.20	.00	1	0	0	0	0.	0.	0.	.00	.012

1Project : Date: 12/ 1/1989 Time: 14:44: 2

STORM DRAIN ANALYSIS RESULTS

Line No	Q (cfs)	D (in)	W (in)	Dn (ft)	Dc (ft)	Flow Type	Sf-full (ft/ft)	V 1 (fps)	V 2 (fps)	FL 1 (ft)	FL 2 (ft)	HG 1 Calc	HG 2 Calc	D 1 (ft)	D 2 (ft)	TW Calc	TW CK
1	Hydraulic grade line control = 1225.30																
2	290.0	60	0	3.68	4.63	Part	.01056	17.6	15.3	1221.38	1225.22	1225.30	1229.85	3.92	4.63	1234.20	.00

1 LIST OF ABBREVIATIONS

V 1, FL 1, D 1 and HG 1 refer to downstream end
0 V 2, FL 2, D 2 and HG 2 refer to upstream end
0 X - Distance in feet from downstream end to point where HG intersects soffit in seal condition
0 X(N) - Distance in feet from downstream end to point where water surface reaches normal depth by either drawdown or backwater
0 X(J) - Distance in feet from downstream end to point where hydraulic jump occurs in line
0 F(J) - The computed force at the hydraulic jump
0 D(BJ) - Depth of water before the hydraulic jump (upstream side)
0 D(AJ) - Depth of water after the hydraulic jump (downstream side)
0 SEAL indicates flow changes from part to full or from full to part
0 HJ indicates that flow changes from supercritical to subcritical through a hydraulic jump
0 HJU indicates that hydraulic jump occurs at the junction at the upstream end of the line
0 HJD indicates that hydraulic jump occurs at the junction at the downstream end of the line
1

Project : SCOTTSDALE RD STORM DRAIN(TEE TO MH12) Proj.No. S-5518 Date: 12/ 4/1989 Time: 9:22:48

INPUT DATA LISTING

CD	L2	MAX Q	ADJ Q	LENGTH	FL 1	FL 2	CTL/TW	D	W	S	KJ	KE	KM	LC	L1	L3	L4	A1	A3	A4	J	N
8	1						1232.93															
2	2	11.3	11.3	250.00	1230.00	1230.62	.00	24.	0.	3	.00	.20	.00	1	3	0	0	0.	0.	0.	4.00	.012
2	3	11.3	11.3	165.00	1230.62	1231.00	.00	24.	0.	1	.00	.20	.00	0	0	0	0	0.	0.	0.	.00	.012

1Project : SCOTTSDALE RD STORM DRAIN(TEE TO MH12) Proj.No. S-5518 Date: 12/ 4/1989 Time: 9:22:48

STORM DRAIN ANALYSIS RESULTS

Line No	Q (cfs)	D (in)	W (in)	Dn (ft)	Dc (ft)	Flow Type	Sf-full (ft/ft)	V 1 (fps)	V 2 (fps)	FL 1 (ft)	FL 2 (ft)	HG 1 Calc	HG 2 Calc	D 1 (ft)	D 2 (ft)	TW Calc	TW CK
1	Hydraulic grade line control = 1232.93																
2	11.3	24	0	1.52	1.21	Full	.00213	3.6	3.6	1230.00	1230.62	1232.93	1233.46	2.93	2.84	.00	.00
3	11.3	24	0	1.57	1.21	Full	.00213	3.6	3.6	1230.62	1231.00	1233.51	1233.86	2.89	2.86	1234.10	.00

1

LIST OF ABBREVIATIONS

V 1, FL 1, D 1 and HG 1 refer to downstream end
0 V 2, FL 2, D 2 and HG 2 refer to upstream end
0 X - Distance in feet from downstream end to point where HG intersects soffit in seal condition
0 X(N) - Distance in feet from downstream end to point where water surface reaches normal depth by either drawdown or backwater
0 X(J) - Distance in feet from downstream end to point where hydraulic jump occurs in line
0 F(J) - The computed force at the hydraulic jump
0 D(BJ) - Depth of water before the hydraulic jump (upstream side)
0 D(AJ) - Depth of water after the hydraulic jump (downstream side)
0 SEAL indicates flow changes from part to full or from full to part
0 HJ indicates that flow changes from supercritical to subcritical through a hydraulic jump
0 HJU indicates that hydraulic jump occurs at the junction at the upstream end of the line
0 HJD indicates that hydraulic jump occurs at the junction at the downstream end of the line
1

Project : Scottsdale Rd. (McDowell S.D. 15+00 to 20+00) Date: 12/ 1/1989 Time: 14:50:56

INPUT DATA LISTING

CD	L2	MAX Q	ADJ Q	LENGTH	FL 1	FL 2	CTL/TW	D	W	S	KJ	KE	KM	LC	L1	L3	L4	A1	A3	A4	J	N
8	1						1224.77															
2	2	130.0	130.0	84.68	1219.43	1220.11	.00	48.	0.	3	.00	.10	.00	1	3	0	0	0.	0.	0.	1.50	.012
2	3	125.0	125.0	21.85	1220.11	1220.28	.00	48.	0.	3	.00	.10	.00	0	4	0	0	0.	0.	0.	2.00	.012
2	4	95.0	95.0	313.47	1220.28	1222.94	.00	48.	0.	3	.00	.20	.00	0	5	0	0	0.	0.	0.	4.00	.012
2	5	95.0	95.0	75.75	1222.94	1223.55	.00	48.	0.	1	.00	.20	.00	0	0	0	0	0.	0.	0.	.00	.012

Date: 12/ 1/1989 Time: 14:50:56

1Project :

STORM DRAIN ANALYSIS RESULTS

Line No	Q (cfs)	D (in)	W (in)	Dn (ft)	Dc (ft)	Flow Type	Sf-full (ft/ft)	V 1 (fps)	V 2 (fps)	FL 1 (ft)	FL 2 (ft)	HG 1 Calc	HG 2 Calc	D 1 (ft)	D 2 (ft)	TW Calc	TW CK
1	Hydraulic grade line control = 1224.77																
2	130.0	48	0	3.06	3.41	Full	.00698	10.3	10.3	1219.43	1220.11	1224.77	1225.36	5.34	5.25	.00	.00
3	125.0	48	0	3.00	3.35	Full	.00645	9.9	9.9	1220.11	1220.28	1225.79	1225.93	5.68	5.65	.00	.00
4	95.0	48	0	2.38	2.95	Full	.00373	7.6	7.6	1220.28	1222.94	1227.39	1228.56	7.11	5.62	.00	.00
5	95.0	48	0	2.42	2.95	Full	.00373	7.6	7.6	1222.94	1223.55	1228.75	1229.03	5.81	5.48	1230.10	.00

1

LIST OF ABBREVIATIONS

V 1, FL 1, D 1 and HG 1 refer to downstream end
0 V 2, FL 2, D 2 and HG 2 refer to upstream end
0 X - Distance in feet from downstream end to point where HG intersects soffit in seal condition
0 X(N) - Distance in feet from downstream end to point where water surface reaches normal depth by either drawdown or backwater
0 X(J) - Distance in feet from downstream end to point where hydraulic jump occurs in line
0 F(J) - The computed force at the hydraulic jump
0 D(BJ) - Depth of water before the hydraulic jump (upstream side)
0 D(AJ) - Depth of water after the hydraulic jump (downstream side)
0 SEAL indicates flow changes from part to full or from full to part
0 HJ indicates that flow changes from supercritical to subcritical through a hydraulic jump
0 HJU indicates that hydraulic jump occurs at the junction at the upstream end of the line
0 HJD indicates that hydraulic jump occurs at the junction at the downstream end of the line
1

Project : SCOTTSDALE RD STORM DRAIN (VIRGINIA) Proj.No. S-5518 Date: 12/ 7/1989 Time: 14:11:20

INPUT DATA LISTING

CD	L2	MAX Q	ADJ Q	LENGTH	FL 1	FL 2	CTL/TW	D	W	S	KJ	KE	KM	LC	L1	L3	L4	A1	A3	A4	J	N
8	1						1231.29															
2	2	128.0	128.0	324.00	1223.10	1227.00	.00	42.	0.	1	.00	.20	.00	1	0	0	0	0.	0.	0.	.00	.012

1Project : SCOTTSDALE RD STORM DRAIN (VIRGINIA) Proj.No. S-5518 Date: 12/ 7/1989 Time: 14:11:20

STORM DRAIN ANALYSIS RESULTS

Line No	Q (cfs)	D (in)	W (in)	Dn (ft)	Dc (ft)	Flow Type	Sf-full (ft/ft)	V 1 (fps)	V 2 (fps)	FL 1 (ft)	FL 2 (ft)	HG 1 Calc	HG 2 Calc	D 1 (ft)	D 2 (ft)	TW Calc	TW CK
1	Hydraulic grade line control = 1231.29																
2	128.0	42	0	3.50	3.29	Full	.01379	13.3	13.3	1223.10	1227.00	1231.29	1235.76	8.19	8.76	1239.06	.00

1

LIST OF ABBREVIATIONS

V 1, FL 1, D 1 and HG 1 refer to downstream end
0 V 2, FL 2, D 2 and HG 2 refer to upstream end
0 X - Distance in feet from downstream end to point where HG intersects soffit in seal condition
0 X(N) - Distance in feet from downstream end to point where water surface reaches normal depth by either drawdown or backwater
0 X(J) - Distance in feet from downstream end to point where hydraulic jump occurs in line
0 F(J) - The computed force at the hydraulic jump
0 D(BJ) - Depth of water before the hydraulic jump (upstream side)
0 D(AJ) - Depth of water after the hydraulic jump (downstream side)
0 SEAL indicates flow changes from part to full or from full to part
0 HJ indicates that flow changes from supercritical to subcritical through a hydraulic jump
0 HJU indicates that hydraulic jump occurs at the junction at the upstream end of the line
0 HJD indicates that hydraulic jump occurs at the junction at the downstream end of the line
1

Project : Scottsdale Rd (Thomas S-D 9+59 to 20+22) Date: 12/ 1/1989 Time: 14:59:14

INPUT DATA LISTING

CD	L2	MAX Q	ADJ Q	LENGTH	FL 1	FL 2	CTL/TW	D	W	S	KJ	KE	KM	LC	L1	L3	L4	A1	A3	A4	J	N
8	1						1232.80															
2	2	91.0	91.0	22.00	1228.39	1228.50	.00	42.	0.	3	.00	.10	.00	1	3	0	0	0.	0.	0.	2.00	.012
2	3	80.0	80.0	81.68	1228.50	1228.89	.00	42.	0.	3	.00	.10	.00	0	4	0	0	0.	0.	0.	1.50	.012
2	4	79.0	79.0	85.32	1228.89	1229.30	.00	42.	0.	3	.00	.10	.00	0	5	0	0	0.	0.	0.	2.00	.012
2	5	79.0	79.0	233.00	1229.30	1230.42	.00	42.	0.	3	.00	.20	.00	0	6	0	0	0.	0.	0.	4.00	.012
2	6	77.0	77.0	180.00	1230.42	1231.28	.00	42.	0.	3	.00	.10	.00	0	7	0	0	0.	0.	0.	2.00	.012
2	7	65.0	65.0	201.00	1231.28	1232.25	.00	42.	0.	3	.00	.20	.00	0	8	0	0	0.	0.	0.	4.00	.012
2	8	54.0	54.0	260.00	1232.25	1233.50	.00	42.	0.	1	.00	.20	.00	0	0	0	0	0.	0.	0.	.00	.012

1Project : Date: 12/ 1/1989 Time: 14:59:14

STORM DRAIN ANALYSIS RESULTS

Line No	Q (cfs)	D (in)	W (in)	Dn (ft)	Dc (ft)	Flow Type	Sf-full (ft/ft)	V 1 (fps)	V 2 (fps)	FL 1 (ft)	FL 2 (ft)	HG 1 Calc	HG 2 Calc	D 1 (ft)	D 2 (ft)	TW Calc	TW CK
1	Hydraulic grade line control = 1232.80																
2	91.0	42	0	3.50	2.96	Full	.00697	9.5	9.5	1228.39	1228.50	1232.80	1232.95	4.41	4.45	.00	.00
3	80.0	42	0	3.50	2.79	Full	.00539	8.3	8.3	1228.50	1228.89	1233.74	1234.18	5.24	5.29	.00	.00
4	79.0	42	0	3.50	2.78	Full	.00525	8.2	8.2	1228.89	1229.30	1234.34	1234.79	5.45	5.49	.00	.00
5	79.0	42	0	3.50	2.78	Full	.00525	8.2	8.2	1229.30	1230.42	1234.91	1236.13	5.61	5.71	.00	.00
6	77.0	42	0	3.50	2.74	Full	.00499	8.0	8.0	1230.42	1231.28	1236.47	1237.36	6.05	6.08	.00	.00
7	65.0	42	0	2.50	2.53	Full	.00356	6.8	6.8	1231.28	1232.25	1238.04	1238.76	6.76	6.51	.00	.00
8	54.0	42	0	2.19	2.29	Full	.00245	5.6	5.6	1232.25	1233.50	1239.35	1239.99	7.10	6.49	1240.58	.00

1

LIST OF ABBREVIATIONS

V 1, FL 1, D 1 and HG 1 refer to downstream end
0 V 2, FL 2, D 2 and HG 2 refer to upstream end
0 X - Distance in feet from downstream end to point where HG intersects soffit in seal condition
0 X(N) - Distance in feet from downstream end to point where water surface reaches normal depth by either drawdown or backwater
0 X(J) - Distance in feet from downstream end to point where hydraulic jump occurs in line

```
0     F(J)  - The computed force at the hydraulic jump
0     D(BJ) - Depth of water before the hydraulic jump (upstream side)
0     D(AJ) - Depth of water after the hydraulic jump (downstream side)
0     SEAL indicates flow changes from part to full or from full to part
0     HJ    indicates that flow changes from supercritical to subcritical through a hydraulic jump
0     HJU   indicates that hydraulic jump occurs at the junction at the upstream end of the line
0     HJD   indicates that hydraulic jump occurs at the junction at the downstream end of the line
1
```

14.0 DESIGN SUMMARY SHEET

APPENDIX I

REPORT FOR DRAINAGE OUTFALL STUDY
FOR
SCOTTSDALE ROAD IMPROVEMENTS

PREPARED FOR

CITY OF SCOTTSDALE
SCOTTSDALE ROAD IMPROVEMENTS
C.O.S. PROJECT NO. S5518

PREPARED BY

BROOKS, HERSEY AND ASSOCIATES, INC.
5246 SOUTH 40TH STREET
PHOENIX, AZ 85040

APRIL 1989

BHA 210-08-FP

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	3.3 Curve Number	
	3.4 Time & Concentration/Lag Time	
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1.0 INTRODUCTION

This is the outfall hydrology report for the Scottsdale Road Improvement between McDowell Road and Earll Drive. The purpose of this report is to determine and investigate adequate outfall sizes from the intersection of McDowell and Scottsdale Roads to Indian Bend Wash.

2.0 DESCRIPTION OF DRAINAGE AREA

The total drainage area is 1.094 square miles and generally slopes South and East at approximately 0.68% towards Indian Bend Wash which shall be the outfall for the Scottsdale Road drainage system.

The majority of the drainage basins has been developed into a mix commercial and residential with the majority being residential.

3.0 HYDROLOGY

The computer program used to compute the peak discharges and volumes of runoff is the U.S. Army Corps of Engineers HEC-1 Flood Hydrograph Package (Reference 1). The methology used in the program was the SCS Dimensionless Unit Hydrograph (Reference 2). The following paragraphs describe the approach used in developing the various input parameters to the HEC-1 program.

3.1 WATERSHED AREA

The study area was divided into subbasins based on topography, street alignments, field observations, and points of concentration. The City of Scottsdale topography maps by Cooper Aerial Survey Company were used as a base for the subbasin delineations.

3.2 PRECIPITATION DEPTH, DURATION, AND DISTRIBUTION

The average precipitation depths for the watershed were determined from the Arizona Department of Transportation design manual "Hydrologic Design for Highway Drainage" (Reference 3). The storm used in the model has a 24-hour duration; distributed by the hypothetical storm in HEC-1 using the 5 minute, 15 minute, 1 hour, 2 hour, 3 hour, 6 hour, 12 hour, and 24 hour depth/duration data for the study area. The following is a list of the 10-year and 100-year depth/duration data.

DURATION	10 YEAR PRECIPITATION, IN.	100 YEAR PRECIPITATION, IN.
5-min.	0.45	0.75
10-min.	0.70	1.17
15-min.	0.88	1.48
30-min.	1.22	2.05
1-hour	1.55	2.59
2-hour	1.70	2.82
3-hour	1.81	2.98
6-hour	2.00	3.27
12-hour	2.20	3.55
24-hour	2.40	3.85

3.3 CURVE NUMBER

The curve number is used to describe the infiltration/interception characteristics of the drainage area. Factors that affect the curve number are soil type, cover type, and land use. The soils within the study area were all in the Hydrologic Soil Group B as shown in the SCS "Soil Survey of Maricopa County, Arizona, Central Part" (Reference 4). The curve numbers are based on existing conditions.

The curve numbers were weighted by area to produce a representative curve number for each subwatershed. Aerial photos and City and County maps were used to identify the different land uses for each area.

3.4 TIME OF CONCENTRATION/LAG TIME

The lag time for the watershed is required input for the SCS dimensionless unit hydrograph method. The lag is calculated by using the Curve Number Method (Reference 2):

$$L = \frac{L_o^{0.8} (S+1)^{0.7}}{1900 \; Y^{0.5}}$$

where L = lag in hours

L_o = hydraulic length of watershed in feet

$S = \frac{1000}{CN} - 10$

CN = hydrologic soils cover complex number

Y = average watershed land slope in percent.

3.5 CHANNEL ROUTING

The kinematic wave method was used to route the hydrographs through the streets, channels, and storm drains. Channel routing in the streets was simulated by a triangular channel with 50:1 side slopes and manning's n= .020.

4.0 RESULTS

Hydrologic models were developed for this report. The results are presented with summary printouts from the HEC-1 model with concentration points that correspond to points on the drainage tributary area maps.

5.0 REFERENCES

1. U.S. Army Corps of Engineers,
   HEC-1 Flood Hydrograph Package, Users Manual,
   Hydrologic Engineering Center, Davis, California, 1981.

2. Soil Conservation Service, National Engineering Handbook
   Section 4 - Hydrology, Washington, D.C., 1972

3. Arizona Department of Transportation, Hydrologic Design for Highway
   Drainage in Arizona, 1968, Revised 1969.

4. Soil Conservation Service, Soil Survey of Maricopa County, Arizona,
   Central Part, September 1977.

6.0 RECOMMENDATION

Investigations were made to determine the location and adequate pipe size to carry the outfall east, along McDowell Road to Indian Bend Wash from the intersection of McDowell Road and Scottsdale Road.

The existing 60" diameter at the intersection of Scottsdale and McDowell Roads that flows south on Scottsdale Road approximately 1200 feet, then east along Belleview, then south on Miller, then east on Roosevelt into Indian Bend Wash, was designed to carry approximately 226 cfs. and gradually increases downstream. Runoff intercepted by this existing storm drain system is approximately 80 cfs.

Proposed catch basins along Scottsdale Road between Oak Street and McDowell Road will intercept Q_{10} = 123 cfs. These flows can be temporarily merged into the existing 60" diameter pipe while waiting for the future storm drainage system along McDowell Road to Indian Bend Wash.

Future storm drainage pipe along McDowell Road shall range in size from 60" diameter to 66" diameter with a minimum slope of 0.50%. The pipe shall be located at approximately 15 feet north of the Monument Line then angles southeast approaching the bridge then outfalls into Indian Bend Wash, south of the bridge.

Existing outfall pipe at Roosevelt (Exhibit 3) requires to be revised to handle the Q_{10} = 246 cfs. Existing 18" diameter pipe will be replaced w/ 2-48" diameter pipe with headwall and grouted riprap at the ditch.

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

EAST OF SCOTTSDALE ROAD
(BETWEEN INDIAN SCHOOL ROAD & THOMAS)

OPERATION	STATION	PEAK 10-YEAR	FLOW 100-YEAR	BASIN AREA	LAG TIME	CURVE NUMBER
Hydrolograph at	SB1E	89	150	0.1192	0.84	92
Routed to	CP2E	89	150	0.1192		
Hydrograph at	SB2E	29	53	0.0583	0.91	86
2 Combined at	CP2E	118	203	0.1775		
Routed to	CP3E	118	203	0.1775		
Hydrograph at	SB3E	29	53	0.0636	1.03	85
2 combined at	CP3E	146	254	0.2411		
Routed to	CP6E	146	254	0.2411		
Hydrograph at	SB5E	79	135	0.0633	0.379	92
Routed to	CP6E	78	134	0.0633		
Hydrograph at	SB6E	52	93	0.0626	0.531	88
3 Combined at	CP6E	221	388	0.3670		
Routed to	CP8E	221	388	0.3670		
Hydrograph at	SB7E	50	85	0.0595	0.704	92
Routed to	CP8E	50	85	0.0595		
Hydrograph at	SB8E	57	102	0.0615	0.455	88
3 Combined at	CP8E	312	547	0.4880		
Routed to	CP9E	311	540	0.4880		
Hydrograph at	SB9E	39	71	0.1168	1.397	82
2 Combined at	CP9E	336	591	0.6048		

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

EAST OF SCOTTSDALE ROAD
(BETWEEN THOMAS ROAD & MCDOWELL ROAD)

OPERATION	STATION	PEAK 10-YEAR	FLOW 100-YEAR	BASIN AREA	LAG TIME	CURVE NUMBER
Hydrograph at	SB11E	48	88	.1238	1.192	88
Routed to	CP12E	47	87	.1238		
Hydrograph at	SB10E	19	37	.0592	1.121	79
Routed to	CP12E	19	37	.0592		
Hydrograph at	SB12E	31	61	.0607	0.607	86
3 Combined at	CP12E	81	155	.2437		
Routed to	CP14E	80	154	.2437		
Hydrograph at	SB13E	60	108	.1228	0.962	84
Routed to	CP14E	60	108	.1228		
Hydrograph at	SB14E	39	74	.1226	1.290	80
3 Combined at	CP14E	175	330	.4891		

Subbasin Name KK	Basin Area BA (mi²)	Curve Number LS	% Imperv. LS %	Drainage Length L_o (FT)	Drainage Slope S_o (FT/FT)	Time Concen. T_c	L LID (HRS)	Adjusted Lag
SB1	0.1192	92	90.4	3735	0.0049	34.12	0.840	.55
							Factor .66	
SB2	0.0583	86	61	3055	0.0049	29.28	0.908	.64
							.71	
SB3	0.0636	85	62	3220	0.0044	31.57	1.035	.70
							.68	
SB4	0.0710	79	45	2000	0.0086	16.95	0.615	.44
							.72	
SB5	0.0633	92	90.5	1235	0.0041	15.62	0.379	.25
							.67	
SB6	0.0626	88	71.6	1866	0.0056	19.00	0.531	.37
							.70	
SB7	0.0595	92	90.3	2640	0.0040	28.29	0.704	.48
							.68	
SB8	0.0615	88	72.6	1640	0.0062	16.52	0.455	.31
							.68	
SB9	0.1168	82	55	3250	0.0030	36.94	1.397	.96
							.69	
SB10	0.0592	79	42	2540	0.0038	27.93	1.121	.83
							.74	
SB11	0.1238	88	57	3820	0.0035	39.43	1.192	.89
							.75	
SB12	0.0607	86	45	1870	0.0050	19.78	0.607	.47
							.78	
SB13	0.1228	84	62	3050	0.0050	28.86	0.902	.64
							.67	
SB14	0.1226	80	49	3300	0.0041	33.15	1.290	.91
							.71	

$$L = \frac{(L_o)^{.8}(S+1)^{.7}}{1900\,Y^{.5}}$$

$$S = \frac{1000}{CN} - 10$$

Y = Slope %

$$T_c = \frac{0.0459\,L^{.77}}{S^{.38}}$$

BROOKS, HERSEY & ASSOCIATES, INC.
5246 South 40th Street
PHOENIX, ARIZONA 85040
(602) 437-3733

JOB SCOTTSDALE ROAD CORRIDOR

SHEET NO. 1 OF

CALCULATED BY GTC DATE 14 FEB 89

CHECKED BY DATE 7/89

SCALE HEC-RUN

BROOKS, HERSEY
& ASSOCIATES, INC.
5246 South 40th Street
PHOENIX, ARIZONA 85040
(602) 437-3733

JOB Scottsdale Rd 21000-11-04
SHEET NO. _____ OF _____
CALCULATED BY hdg DATE 1/6/89
CHECKED BY GK DATE 3/89
SCALE _____

Duration	Precipitation, Inches		
	10-year	50-year	100-year
5-min.	0.45	0.67	0.75
10-min.	0.70	1.00	1.17
15-min.	0.88	1.27	1.48
30-min.	1.22	1.76	2.05
1-hr.	1.55	2.23	2.59
2-hr.	1.70	2.44	2.82
3-hr.	1.81	2.59	2.98
6-hr.	2.00	2.86	3.27
12-hr.	2.20	3.12	3.55
24-hr.	2.40	3.40	3.85

8.0 HEC - 1 RUN

10-YEAR STORM

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            FEBRUARY 1981             *
*          REVISED  6 FEB 87           *
*                                      *
*  RUN DATE  06/15/1989  TIME  09:08:25 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*  THE HYDROLOGIC ENGINEERING CENTER   *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*  (916) 440-3285 OR (FTS) 448-3285    *
*                                      *
****************************************
```

```
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
```

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

1 HEC-1 INPUT PAGE 1

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

  1           ID      SCOTTSDALE ROAD IMPROVEMENTS                    10-YEAR STORM
  2           ID
  3           ID      FILE NAME: "ESOFNT10.DAT"
  4           ID
  5           ID      TRIBUTARY AREA BOUNDED BY INDIAN SCHOOL RD. TO THE NORTH, SCOTTSDALE RD.
  6           ID      TO THE WEST, THOMAS RD. TO THE SOUTH AND INDIAN BEND WASH TO THE EAST.
  7           ID
  8           ID      10-YEAR STORM, 24-HOUR VALUE=2.40 INCHES
  9           ID
 10           ID      PROJECT NO. 21008-FP "SCOTTSDALE ROAD IMPROVEMENT & OUTFALL STUDY"
 11           ID
 12           ID      HEC-1 MODEL INPUT & ANALYSIS BY BROOKS, HERSEY & ASSOC.
 13           ID      MARCH, 1989, BY HDG.
 14           ID
              *DIAGRAM
 15           IT      2       0       0     150
 16           IO      5
 17           JD            .09
 18           PH                    0.45    0.88    1.55    1.70    1.81    2.00    2.20    2.40
 19           JD              1
 20           JD              2

 21           KK    SB1E
```

```
22          KM      RUNOFF FROM SUBBASIN "1E"
23          BA   .1192
24          LS      0      70      90
25          UD    .840

26          KK    CP2E
27          KM      ROUTE FLOW FROM SB1E TO CP2E
28          RK     660   .0056     .02                    1      50

29          KK    SB2E
30          KM      RUNOFF FROM SB2E
31          BA   .0583
32          LS      0      70      61
33          UD    .908

34          KK    CP2E
35          KM      COMBINE HYDROGRAPHS AT CP2E
36          HC      2

37          KK    CP3E
38          KM      ROUTE COMBINED HYDROGRAPH AT CP2E TO CP3E
39          RK     660   .0048     .02                    1      50

40          KK    SB3E
41          KM      RUNOFF FROM SB3E
42          BA   .0636
43          LS      0      70      62
44          UD   1.035
```



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

45          KK    CP3E
46          KM      COMBINE HYDROGRAPHS AT CP3E
47          HC      2

48          KK    CP6E
49          KM      ROUTE COMBINED HYDROGRAPH AT CP3E TO CP6E
50          RK    1320   .0033     .02                    1      50

51          KK    SB5E
52          KM      RUNOFF FROM SB5E
53          BA   .0633
54          LS      0      70      90
55          UD    .379

56          KK    CP6E
57          KM      ROUTE FLOW FROM SB5E TO CP6E
58          RK    1320    .004     .02                    1      50

59          KK    SB6E
60          KM      RUNOFF FROM SB6E
61          BA   .0626
62          LS      0      70      72
63          UD    .531

64          KK    CP6E
65          KM      COMBINE HYDROGRAPHS AT CP6E
66          HC      3
```

```
 67          KK    CP8E
 68          KM       ROUTE COMBINED HYDROGRAPH AT CP6E TO CP8E
 69          RK    1320    .004     .02                     1      50

 70          KK    SB7E
 71          KM       RUNOFF FROM SB7E
 72          BA   .0595
 73          LS       0      70      90
 74          UD    .704

 75          KK    CP8E
 76          KM       ROUTE FLOW FROM SB7E TO CP8E
 77          RK    1320   .0046     .02                     1      50

 78          KK    SB8E
 79          KM       RUNOFF FROM SB8E
 80          BA   .0615
 81          LS       0      70      73
 82          UD    .455

 83          KK    CP8E
 84          KM       COMBINE HYDROGRAPHS AT CP8E
 85          HC       3
1                                        HEC-1 INPUT                                          PAGE  3

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


 86          KK    CP9E
 87          KM       ROUTE COMBINED HYDROGRAPH AT CP8E TO CP9E
 88          RK    1320   .0030     .02                     1      50

 89          KK    SB9E
 90          KM       RUNOFF FROM SB9E
 91          BA   .1168
 92          LS       0      70      55
 93          UD   1.397

 94          KK    CP9E
 95          KM       COMBINE HYDROGRAPHS AT CP9E
 96          HC       2
 97          ZZ
1
          SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

  21        SB1E
               V
               V
  26        CP2E
               .
               .
  29           .        SB2E
               .           .
               .           .
  34        CP2E............
```

```
            V
            V
37        CP3E
            .
            .
40          .        SB3E
            .          .
            .          .
45        CP3E............
            V
            V
48        CP6E
            .
            .
51          .        SB5E
            .          V
            .          V
56          .        CP6E
            .          .
            .          .
59          .          .        SB6E
            .          .          .
            .          .          .
64        CP6E......................
            V
            V
67        CP8E
            .
            .
70          .        SB7E
            .          V
            .          V
75          .        CP8E
            .          .
            .          .
78          .          .        SB8E
            .          .          .
            .          .          .
83        CP8E......................
            V
            V
86        CP9E
            .
            .
89          .        SB9E
            .          .
            .          .
94        CP9E............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1****************************************
 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
 *            FEBRUARY 1981             *
 *          REVISED  6 FEB 87           *
 *                                      *
 *  RUN DATE  06/15/1989  TIME  09:08:25 *
 *                                      *
 ****************************************
```

```
****************************************
*                                      *
*   U.S. ARMY CORPS OF ENGINEERS       *
*  THE HYDROLOGIC ENGINEERING CENTER   *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*  (916) 440-3285 OR (FTS) 448-3285    *
*                                      *
****************************************
```

SCOTTSDALE ROAD IMPROVEMENTS 10-YEAR STORM

FILE NAME: "ESOFNT10.DAT"

TRIBUTARY AREA BOUNDED BY INDIAN SCHOOL RD. TO THE NORTH, SCOTTSDALE RD. TO THE WEST, THOMAS RD. TO THE SOUTH AND INDIAN BEND WASH TO THE EAST.

10-YEAR STORM, 24-HOUR VALUE=2.40 INCHES

PROJECT NO. 21008-FP "SCOTTSDALE ROAD IMPROVEMENT & OUTFALL STUDY"

HEC-1 MODEL INPUT & ANALYSIS BY BROOKS, HERSEY & ASSOC.
MARCH, 1989, BY HDG.

```
16 IO        OUTPUT CONTROL VARIABLES
                 IPRNT          5  PRINT CONTROL
                 IPLOT          0  PLOT CONTROL
                 QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT        HYDROGRAPH TIME DATA
                  NMIN          2  MINUTES IN COMPUTATION INTERVAL
                 IDATE     1    0  STARTING DATE
                 ITIME       0000  STARTING TIME
                    NQ        150  NUMBER OF HYDROGRAPH ORDINATES
                NDDATE     1    0  ENDING DATE
                NDTIME       0458  ENDING TIME
                 ICENT         19  CENTURY MARK

            COMPUTATION INTERVAL     .03 HOURS
                 TOTAL TIME BASE    4.97 HOURS

      ENGLISH UNITS
          DRAINAGE AREA          SQUARE MILES
          PRECIPITATION DEPTH    INCHES
          LENGTH, ELEVATION      FEET
          FLOW                   CUBIC FEET PER SECOND
          STORAGE VOLUME         ACRE-FEET
          SURFACE AREA           ACRES
          TEMPERATURE            DEGREES FAHRENHEIT

17 JD        INDEX STORM NO. 1
                 STRM        1.95  PRECIPITATION DEPTH
                 TRDA         .09  TRANSPOSITION DRAINAGE AREA

18 PI         PRECIPITATION PATTERN
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .01      .01      .01      .01      .01      .01      .02
                 .02      .02      .02      .02      .02      .03      .03      .04      .04      .05
                 .06      .07      .10      .18      .18      .15      .09      .07      .05      .04
                 .04      .04      .03      .03      .02      .02      .02      .02      .02      .01
                 .01      .01      .01      .01      .01      .01      .00      .00      .00      .00
```

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

19 JD INDEX STORM NO. 2

STRM 1.94 PRECIPITATION DEPTH

TRDA 1.00 TRANSPOSITION DRAINAGE AREA

18 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.01	.01	.01	.01	.01	.01	.01	.02
.02	.02	.02	.02	.02	.03	.03	.04	.04	.05
.06	.07	.10	.18	.18	.15	.09	.07	.05	.04
.04	.04	.03	.03	.02	.02	.02	.02	.02	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

20 JD INDEX STORM NO. 3

STRM 1.94 PRECIPITATION DEPTH

TRDA 2.00 TRANSPOSITION DRAINAGE AREA

18 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.01	.01	.01	.01	.01	.01	.01	.02
.02	.02	.02	.02	.02	.03	.03	.04	.04	.05
.06	.07	.10	.18	.18	.14	.09	.07	.05	.04
.04	.04	.03	.03	.02	.02	.02	.02	.02	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

UNIT HYDROGRAPH TRUNCATED FROM 157 TO 150 INTERVALS

UNIT HYDROGRAPH TRUNCATED FROM 212 TO 150 INTERVALS

1

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	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE

				6-HOUR	24-HOUR	72-HOUR	
HYDROGRAPH AT	SB1E	89.	3.33	26.	26.	26.	.12
ROUTED TO	CP2E	89.	3.37	25.	25.	25.	.12
HYDROGRAPH AT	SB2E	29.	3.43	9.	9.	9.	.06
2 COMBINED AT	CP2E	118.	3.40	34.	34.	34.	.18
ROUTED TO	CP3E	118.	3.43	34.	34.	34.	.18
HYDROGRAPH AT	SB3E	29.	3.57	9.	9.	9.	.06
2 COMBINED AT	CP3E	146.	3.43	43.	43.	43.	.24
ROUTED TO	CP6E	146.	3.50	42.	42.	42.	.24
HYDROGRAPH AT	SB5E	79.	2.87	14.	14.	14.	.06
ROUTED TO	CP6E	78.	2.97	14.	14.	14.	.06
HYDROGRAPH AT	SB6E	52.	3.03	12.	12.	12.	.06
3 COMBINED AT	CP6E	221.	3.23	68.	68.	68.	.37
ROUTED TO	CP8E	221.	3.27	67.	67.	67.	.37
HYDROGRAPH AT	SB7E	50.	3.20	13.	13.	13.	.06
ROUTED TO	CP8E	50.	3.30	13.	13.	13.	.06
HYDROGRAPH AT	SB8E	57.	2.97	12.	12.	12.	.06
3 COMBINED AT	CP8E	312.	3.20	91.	91.	91.	.49
ROUTED TO	CP9E	311.	3.27	90.	90.	90.	.49
HYDROGRAPH AT	SB9E	39.	3.93	14.	14.	14.	.12
2 COMBINED AT							

```
+                    CP9E      336.    3.30        103.        103.        103.        .60


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

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*           FEBRUARY 1981              *
*          REVISED  6 FEB 87           *
*                                      *
*  RUN DATE  06/15/1989  TIME  09:22:37 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*  THE HYDROLOGIC ENGINEERING CENTER   *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*  (916) 440-3285 OR (FTS) 448-3285    *
*                                      *
****************************************
```

```
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
```

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

```
1                                    HEC-1 INPUT                                    PAGE  1

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

  1           ID      SCOTTSDALE ROAD IMPROVEMENTS                  10-YEAR STORM
  2           ID
  3           ID      FILE NAME: "ESOFNM10.DAT"
  4           ID
  5           ID      TRIBUTARY AREA BOUNDED BY THOMAS RD.TO THE NORTH, SCOTTSDALE RD.
  6           ID      TO THE WEST, McDOWELL RD. TO THE SOUTH, AND INDIAN BEND WASH TO THE EAST.
  7           ID
  8           ID      10-YEAR STORM, 24-HOUR VALUE=2.40 INCHES
  9           ID
 10           ID      PROJECT NO. 21008-FP "SCOTTSDALE ROAD IMPROVEMENT & OUTFALL STUDY"
 11           ID
 12           ID      HEC-1 MODEL INPUT & ANALYSIS BY BROOKS, HERSEY & ASSOC.
 13           ID      MARCH, 1989, BY HDG.
 14           ID
              *DIAGRAM
 15           IT      2       0       0     150
 16           IO      5
 17           JD            .09
 18           PH                  0.45    0.88    1.55    1.70    1.81    2.00    2.20    2.40
 19           JD              1
 20           JD              2

 21           KK   SB11E
```

```
 22          KM      RUNOFF FROM SUBBASIN "11E"
 23          BA   .1238
 24          LS      0      70      57
 25          UD   1.192

 26          KK   CP12E
 27          KM      ROUTE FLOW FROM SB11E TO CP12E
 28          RK    1320   .0056     .02                    1      50

 29          KK   SB10E
 30          KM      RUNOFF FROM SB10E
 31          BA   .0592
 32          LS      0      70      42
 33          UD   1.121

 34          KK   CP12E
 35          KM      ROUTE FLOW FROM SB10E TO CP12E
 36          RK    1320   .0037     .02                    1      50

 37          KK   SB12E
 38          KM      RUNOFF FROM SB12E
 39          BA   .0607
 40          LS      0      70      45
 41          UD    .607

 42          KK   CP12E
 43          KM      COMBINE HYDROGRAPHS AT CP12E
 44          HC      3
```



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


 45          KK   CP14E
 46          KM      ROUTE COMBINED HYDROGRAPH AT CP12E TO CP14E
 47          RK    2640   .0023     .02                    1      50

 48          KK   SB13E
 49          KM      RUNOFF FROM SB13E
 50          BA   .1228
 51          LS      0      70      62
 52          UD    .962

 53          KK   CP14E
 54          KM      ROUTE FLOW FROM SB13E TO CP14E
 55          RK    1320   .0073     .02                    1      50

 56          KK   SB14E
 57          KM      RUNOFF FROM SB14E
 58          BA   .1226
 59          LS      0      70      49
 60          UD    1.29

 61          KK   CP14E
 62          KM      COMBINE HYDROGRAPHS AT CP14E
 63          HC      3
 64          ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT

```
LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

  21      SB11E
             V
             V
  26      CP12E
             .
             .
  29         .       SB10E
             .          V
             .          V
  34         .       CP12E
             .          .
             .          .
  37         .          .       SB12E
             .          .          .
             .          .          .
  42      CP12E.......................
             V
             V
  45      CP14E
             .
             .
  48         .       SB13E
             .          V
             .          V
  53         .       CP14E
             .          .
             .          .
  56         .          .       SB14E
             .          .          .
             .          .          .
  61      CP14E.......................

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
```

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            FEBRUARY 1981             *
*           REVISED  6 FEB 87          *
*                                      *
*  RUN DATE  06/15/1989  TIME  09:22:37 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*  THE HYDROLOGIC ENGINEERING CENTER   *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*  (916) 440-3285 OR (FTS) 448-3285    *
*                                      *
****************************************
```

SCOTTSDALE ROAD IMPROVEMENTS 10-YEAR STORM

FILE NAME: "ESOFNM10.DAT"

TRIBUTARY AREA BOUNDED BY THOMAS RD.TO THE NORTH, SCOTTSDALE RD.
TO THE WEST, McDOWELL RD. TO THE SOUTH, AND INDIAN BEND WASH TO THE EAST.

10-YEAR STORM, 24-HOUR VALUE=2.40 INCHES

PROJECT NO. 21008-FP "SCOTTSDALE ROAD IMPROVEMENT & OUTFALL STUDY"

HEC-1 MODEL INPUT & ANALYSIS BY BROOKS, HERSEY & ASSOC.
MARCH, 1989, BY HDG.

```
16 IO        OUTPUT CONTROL VARIABLES
                  IPRNT          5  PRINT CONTROL
                  IPLOT          0  PLOT CONTROL
                  QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT        HYDROGRAPH TIME DATA
                   NMIN          2  MINUTES IN COMPUTATION INTERVAL
                  IDATE     1    0  STARTING DATE
                  ITIME       0000  STARTING TIME
                     NQ        150  NUMBER OF HYDROGRAPH ORDINATES
                 NDDATE     1    0  ENDING DATE
                 NDTIME       0458  ENDING TIME
                  ICENT         19  CENTURY MARK

            COMPUTATION INTERVAL     .03 HOURS
                 TOTAL TIME BASE    4.97 HOURS

        ENGLISH UNITS
            DRAINAGE AREA          SQUARE MILES
            PRECIPITATION DEPTH    INCHES
            LENGTH, ELEVATION      FEET
            FLOW                   CUBIC FEET PER SECOND
            STORAGE VOLUME         ACRE-FEET
            SURFACE AREA           ACRES
            TEMPERATURE            DEGREES FAHRENHEIT

17 JD        INDEX STORM NO. 1
                  STRM       1.95  PRECIPITATION DEPTH
                  TRDA        .09  TRANSPOSITION DRAINAGE AREA

18 PI          PRECIPITATION PATTERN
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .01       .01       .01       .01       .01       .01       .02
                 .02       .02       .02       .02       .02       .03       .03       .04       .04       .05
                 .06       .07       .10       .18       .18       .15       .09       .07       .05       .04
                 .04       .04       .03       .03       .02       .02       .02       .02       .02       .01
                 .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00

19 JD        INDEX STORM NO. 2
                  STRM       1.94  PRECIPITATION DEPTH
                  TRDA       1.00  TRANSPOSITION DRAINAGE AREA

18 PI          PRECIPITATION PATTERN
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
```

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.01	.01	.01	.01	.01	.01	.01	.02
.02	.02	.02	.02	.02	.03	.03	.04	.04	.05
.06	.07	.10	.18	.18	.15	.09	.07	.05	.04
.04	.04	.03	.03	.02	.02	.02	.02	.02	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

20 JD INDEX STORM NO. 3

STRM 1.94 PRECIPITATION DEPTH

TRDA 2.00 TRANSPOSITION DRAINAGE AREA

18 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.01	.01	.01	.01	.01	.01	.01	.02
.02	.02	.02	.02	.02	.03	.03	.04	.04	.05
.06	.07	.10	.18	.18	.14	.09	.07	.05	.04
.04	.04	.03	.03	.02	.02	.02	.02	.02	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

UNIT HYDROGRAPH TRUNCATED FROM 181 TO 150 INTERVALS

UNIT HYDROGRAPH TRUNCATED FROM 170 TO 150 INTERVALS

UNIT HYDROGRAPH TRUNCATED FROM 195 TO 150 INTERVALS

1

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	SB11E	48.	3.73	16.	16.	16.	.12		
+	ROUTED TO	CP12E	47.	3.80	16.	16.	16.	.12		
+	HYDROGRAPH AT	SB10E	19.	3.67	6.	6.	6.	.06		

	ROUTED TO						
+		CP12E	19.	3.80	6.	6.	6.	.06
	HYDROGRAPH AT						
+		SB12E	31.	3.13	8.	8.	8.	.06
	3 COMBINED AT						
+		CP12E	81.	3.57	29.	29.	29.	.24
	ROUTED TO						
+		CP14E	80.	3.80	26.	26.	26.	.24
	HYDROGRAPH AT						
+		SB13E	60.	3.50	19.	19.	19.	.12
	ROUTED TO						
+		CP14E	60.	3.53	18.	18.	18.	.12
	HYDROGRAPH AT						
+		SB14E	39.	3.83	14.	14.	14.	.12
	3 COMBINED AT						
+		CP14E	175.	3.70	58.	58.	58.	.49

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

HEC - 1 RUN

100-YEAR STORM

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            FEBRUARY 1981             *
*           REVISED  6 FEB 87          *
*                                      *
*  RUN DATE  06/15/1989  TIME  09:34:00 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*  THE HYDROLOGIC ENGINEERING CENTER   *
*          609 SECOND STREET           *
*        DAVIS, CALIFORNIA 95616       *
*  (916) 440-3285 OR (FTS) 448-3285    *
*                                      *
****************************************
```

```
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
```

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

HEC-1 INPUT

1

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

  1           ID      SCOTTSDALE ROAD IMPROVEMENTS                    100-YEAR STORM
  2           ID
  3           ID      FILE NAME: "ESOFNT00.DAT"
  4           ID
  5           ID      TRIBUTARY AREA BOUNDED BY INDIAN SCHOOL RD. TO THE NORTH, SCOTTSDALE RD.
  6           ID      TO THE WEST, THOMAS RD. TO THE SOUTH AND INDIAN BEND WASH TO THE EAST.
  7           ID
  8           ID      100-YEAR STORM, 24-HOUR VALUE=3.85 INCHES
  9           ID
 10           ID      PROJECT NO. 21008-FP "SCOTTSDALE ROAD IMPROVEMENT & OUTFALL STUDY"
 11           ID
 12           ID      HEC-1 MODEL INPUT & ANALYSIS BY BROOKS, HERSEY & ASSOC.
 13           ID      MARCH, 1989, BY HDG.
 14           ID
              *DIAGRAM
 15           IT      2       0       0     150
 16           IO      5
 17           JD              .09
 18           PH                    0.75    1.48    2.59    2.82    2.98    3.27    3.55    3.85
 19           JD              1
 20           JD              2

 21           KK    SB1E
```

```
22          KM       RUNOFF FROM SUBBASIN "1E"
23          BA   .1192
24          LS       0      70      90
25          UD    .840

26          KK    CP2E
27          KM       ROUTE FLOW FROM SB1E TO CP2E
28          RK     660   .0056     .02                        1      50

29          KK    SB2E
30          KM       RUNOFF FROM SB2E
31          BA   .0583
32          LS       0      70      61
33          UD    .908

34          KK    CP2E
35          KM       COMBINE HYDROGRAPHS AT CP2E
36          HC       2

37          KK    CP3E
38          KM       ROUTE COMBINED HYDROGRAPH AT CP2E TO CP3E
39          RK     660   .0048     .02                        1      50

40          KK    SB3E
41          KM       RUNOFF FROM SB3E
42          BA   .0636
43          LS       0      70      62
44          UD   1.035
```



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

45          KK    CP3E
46          KM       COMBINE HYDROGRAPHS AT CP3E
47          HC       2

48          KK    CP6E
49          KM       ROUTE COMBINED HYDROGRAPH AT CP3E TO CP6E
50          RK    1320   .0033     .02                        1      50

51          KK    SB5E
52          KM       RUNOFF FROM SB5E
53          BA   .0633
54          LS       0      70      90
55          UD    .379

56          KK    CP6E
57          KM       ROUTE FLOW FROM SB5E TO CP6E
58          RK    1320    .004     .02                        1      50

59          KK    SB6E
60          KM       RUNOFF FROM SB6E
61          BA   .0626
62          LS       0      70      72
63          UD    .531

64          KK    CP6E
65          KM       COMBINE HYDROGRAPHS AT CP6E
66          HC       3
```

```
67          KK    CP8E
68          KM       ROUTE COMBINED HYDROGRAPH AT CP6E TO CP8E
69          RK    1320    .004     .02                    1      50

70          KK    SB7E
71          KM       RUNOFF FROM SB7E
72          BA   .0595
73          LS       0      70      90
74          UD    .704

75          KK    CP8E
76          KM       ROUTE FLOW FROM SB7E TO CP8E
77          RK    1320   .0046     .02                    1      50

78          KK    SB8E
79          KM       RUNOFF FROM SB8E
80          BA   .0615
81          LS       0      70      73
82          UD    .455

83          KK    CP8E
84          KM       COMBINE HYDROGRAPHS AT CP8E
85          HC       3
```



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


86          KK    CP9E
87          KM       ROUTE COMBINED HYDROGRAPH AT CP8E TO CP9E
88          RK    1320   .0003     .02                    1      50

89          KK    SB9E
90          KM       RUNOFF FROM SB9E
91          BA   .1168
92          LS       0      70      55
93          UD   1.397

94          KK    CP9E
95          KM       COMBINE HYDROGRAPHS AT CP9E
96          HC       2
97          ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE    (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

  21       SB1E
             V
             V
  26       CP2E
             .
             .
  29         .        SB2E
             .          .
             .          .
  34       CP2E............
```

```
            V
            V
37        CP3E
            .
            .
40          .        SB3E
            .          .
            .          .
45        CP3E............
            V
            V
48        CP6E
            .
            .
51          .        SB5E
            .          V
            .          V
56          .        CP6E
            .          .
            .          .
59          .          .        SB6E
            .          .          .
            .          .          .
64        CP6E........................
            V
            V
67        CP8E
            .
            .
70          .        SB7E
            .          V
            .          V
75          .        CP8E
            .          .
            .          .
78          .          .        SB8E
            .          .          .
            .          .          .
83        CP8E........................
            V
            V
86        CP9E
            .
            .
89          .        SB9E
            .          .
            .          .
94        CP9E............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            FEBRUARY 1981             *
*           REVISED  6 FEB 87          *
*                                      *
*  RUN DATE  06/15/1989  TIME  09:34:00 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*  THE HYDROLOGIC ENGINEERING CENTER   *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*  (916) 440-3285 OR (FTS) 448-3285    *
*                                      *
****************************************
```

SCOTTSDALE ROAD IMPROVEMENTS 100-YEAR STORM

FILE NAME: "ESOFNT00.DAT"

TRIBUTARY AREA BOUNDED BY INDIAN SCHOOL RD. TO THE NORTH, SCOTTSDALE RD. TO THE WEST, THOMAS RD. TO THE SOUTH AND INDIAN BEND WASH TO THE EAST.

100-YEAR STORM, 24-HOUR VALUE=3.85 INCHES

PROJECT NO. 21008-FP "SCOTTSDALE ROAD IMPROVEMENT & OUTFALL STUDY"

HEC-1 MODEL INPUT & ANALYSIS BY BROOKS, HERSEY & ASSOC.
MARCH, 1989, BY HDG.

```
16 IO        OUTPUT CONTROL VARIABLES
                 IPRNT          5  PRINT CONTROL
                 IPLOT          0  PLOT CONTROL
                 QSCAL         0.  HYDROGRAPH PLOT SCALE

 IT          HYDROGRAPH TIME DATA
                  NMIN          2  MINUTES IN COMPUTATION INTERVAL
                 IDATE     1    0  STARTING DATE
                 ITIME       0000  STARTING TIME
                    NQ        150  NUMBER OF HYDROGRAPH ORDINATES
                NDDATE     1    0  ENDING DATE
                NDTIME       0458  ENDING TIME
                 ICENT         19  CENTURY MARK

            COMPUTATION INTERVAL     .03 HOURS
                 TOTAL TIME BASE    4.97 HOURS

      ENGLISH UNITS
          DRAINAGE AREA          SQUARE MILES
          PRECIPITATION DEPTH    INCHES
          LENGTH, ELEVATION      FEET
          FLOW                   CUBIC FEET PER SECOND
          STORAGE VOLUME         ACRE-FEET
          SURFACE AREA           ACRES
          TEMPERATURE            DEGREES FAHRENHEIT

17 JD         INDEX STORM NO. 1
                  STRM       3.19  PRECIPITATION DEPTH
                  TRDA        .09  TRANSPOSITION DRAINAGE AREA

18 PI          PRECIPITATION PATTERN
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .01      .01      .01      .01      .01      .01
                 .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                 .01      .01      .01      .01      .01      .01      .01      .01      .01      .03
                 .03      .03      .04      .04      .04      .04      .05      .06      .07      .08
                 .10      .13      .18      .30      .30      .24      .16      .12      .08      .07
                 .07      .06      .05      .04      .04      .04      .04      .03      .03      .01
                 .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
```

.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

19 JD INDEX STORM NO. 2

STRM 3.18 PRECIPITATION DEPTH

TRDA 1.00 TRANSPOSITION DRAINAGE AREA

18 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.03
.03	.03	.04	.04	.04	.04	.05	.06	.07	.08
.10	.13	.17	.30	.30	.24	.16	.12	.08	.07
.07	.06	.05	.04	.04	.04	.04	.03	.03	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

20 JD INDEX STORM NO. 3

STRM 3.17 PRECIPITATION DEPTH

TRDA 2.00 TRANSPOSITION DRAINAGE AREA

18 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.03
.03	.03	.04	.04	.04	.04	.05	.06	.07	.08
.10	.12	.17	.30	.30	.24	.16	.12	.08	.07
.07	.06	.05	.04	.04	.04	.04	.03	.03	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

UNIT HYDROGRAPH TRUNCATED FROM 157 TO 150 INTERVALS

UNIT HYDROGRAPH TRUNCATED FROM 212 TO 150 INTERVALS

1

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	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE

				6-HOUR	24-HOUR	72-HOUR	
HYDROGRAPH AT	SB1E	150.	3.37	43.	43.	43.	.12
ROUTED TO	CP2E	150.	3.37	42.	42.	42.	.12
HYDROGRAPH AT	SB2E	53.	3.43	16.	16.	16.	.06
2 COMBINED AT	CP2E	203.	3.40	58.	58.	58.	.18
ROUTED TO	CP3E	203.	3.40	58.	58.	58.	.18
HYDROGRAPH AT	SB3E	53.	3.57	17.	17.	17.	.06
2 COMBINED AT	CP3E	254.	3.43	74.	74.	74.	.24
ROUTED TO	CP6E	254.	3.50	73.	73.	73.	.24
HYDROGRAPH AT	SB5E	135.	2.87	24.	24.	24.	.06
ROUTED TO	CP6E	134.	2.93	24.	24.	24.	.06
HYDROGRAPH AT	SB6E	93.	3.03	20.	20.	20.	.06
3 COMBINED AT	CP6E	388.	3.20	116.	116.	116.	.37
ROUTED TO	CP8E	388.	3.27	115.	115.	115.	.37
HYDROGRAPH AT	SB7E	85.	3.20	22.	22.	22.	.06
ROUTED TO	CP8E	85.	3.27	22.	22.	22.	.06
HYDROGRAPH AT	SB8E	102.	2.97	20.	20.	20.	.06
3 COMBINED AT	CP8E	547.	3.20	156.	156.	156.	.49
ROUTED TO	CP9E	540.	3.33	149.	149.	149.	.49
HYDROGRAPH AT	SB9E	71.	3.93	25.	25.	25.	.12
2 COMBINED AT							

CP9E	591.	3.37	174.	174.	174.	.60

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

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            FEBRUARY 1981             *
*           REVISED  6 FEB 87          *
*                                      *
*  RUN DATE  06/15/1989  TIME  09:31:20 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*  THE HYDROLOGIC ENGINEERING CENTER   *
*          609 SECOND STREET           *
*        DAVIS, CALIFORNIA 95616       *
*  (916) 440-3285 OR (FTS) 448-3285    *
*                                      *
****************************************
```

```
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
```

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

HEC-1 INPUT PAGE 1

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

  1           ID      SCOTTSDALE ROAD IMPROVEMENTS                    100-YEAR STORM
  2           ID
  3           ID      FILE NAME: "ESOFNM00.DAT"
  4           ID
  5           ID      TRIBUTARY AREA BOUNDED BY THOMAS RD.TO THE NORTH, SCOTTSDALE RD.
  6           ID      TO THE WEST, McDOWELL RD. TO THE SOUTH, AND INDIAN BEND WASH TO THE EAST.
  7           ID
  8           ID      100-YEAR STORM, 24-HOUR VALUE=3.85 INCHES
  9           ID
 10           ID      PROJECT NO. 21008-FP "SCOTTSDALE ROAD IMPROVEMENT & OUTFALL STUDY"
 11           ID
 12           ID      HEC-1 MODEL INPUT & ANALYSIS BY BROOKS, HERSEY & ASSOC.
 13           ID      MARCH, 1989, BY HDG.
 14           ID
              *DIAGRAM
 15           IT      2       0       0     150
 16           IO      5
 17           JD              .09
 18           PH                      0.75    1.48    2.59    2.82    2.98    3.27    3.55    3.85
 19           JD              1
 20           JD              2

 21           KK   SB11E
```

```
22          KM      RUNOFF FROM SUBBASIN "11E"
23          BA   .1238
24          LS      0      70      57
25          UD   1.192

26          KK   CP12E
27          KM      ROUTE FLOW FROM SB11E TO CP12E
28          RK    1320   .0056     .02                    1      50

29          KK   SB10E
30          KM      RUNOFF FROM SB10E
31          BA   .0592
32          LS      0      70      42
33          UD   1.121

34          KK   CP12E
35          KM      ROUTE FLOW FROM SB10E TO CP12E
36          RK    1320   .0037     .02                    1      50

37          KK   SB12E
38          KM      RUNOFF FROM SB12E
39          BA   .0607
40          LS      0      70      45
41          UD    .607

42          KK   CP12E
43          KM      COMBINE HYDROGRAPHS AT CP12E
44          HC      3
```

1 HEC-1 INPUT PAGE 2

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

45          KK   CP14E
46          KM      ROUTE COMBINED HYDROGRAPH AT CP12E TO CP14E
47          RK    2640   .0023     .02                    1      50

48          KK   SB13E
49          KM      RUNOFF FROM SB13E
50          BA   .1228
51          LS      0      70      62
52          UD    .962

53          KK   CP14E
54          KM      ROUTE FLOW FROM SB13E TO CP14E
55          RK    1320   .0073     .02                    1      50

56          KK   SB14E
57          KM      RUNOFF FROM SB14E
58          BA   .1226
59          LS      0      70      49
60          UD    1.29

61          KK   CP14E
62          KM      COMBINE HYDROGRAPHS AT CP14E
63          HC      3
64          ZZ
```

1 SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT

```
LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

  21       SB11E
              V
              V
  26       CP12E
              .
              .
  29          .        SB10E
              .           V
              .           V
  34          .        CP12E
              .           .
              .           .
  37          .           .        SB12E
              .           .           .
              .           .           .
  42       CP12E.......................
              V
              V
  45       CP14E
              .
              .
  48          .        SB13E
              .           V
              .           V
  53          .        CP14E
              .           .
              .           .
  56          .           .        SB14E
              .           .           .
              .           .           .
  61       CP14E.......................
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            FEBRUARY 1981             *
*          REVISED  6 FEB 87           *
*                                      *
*  RUN DATE  06/15/1989  TIME  09:31:20 *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*  THE HYDROLOGIC ENGINEERING CENTER   *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*  (916) 440-3285 OR (FTS) 448-3285    *
*                                      *
****************************************
```

SCOTTSDALE ROAD IMPROVEMENTS 100-YEAR STORM

FILE NAME: "ESOFNM00.DAT"

TRIBUTARY AREA BOUNDED BY THOMAS RD.TO THE NORTH, SCOTTSDALE RD.
TO THE WEST, McDOWELL RD. TO THE SOUTH, AND INDIAN BEND WASH TO THE EAST.

100-YEAR STORM, 24-HOUR VALUE=3.85 INCHES

PROJECT NO. 21008-FP "SCOTTSDALE ROAD IMPROVEMENT & OUTFALL STUDY"

HEC-1 MODEL INPUT & ANALYSIS BY BROOKS, HERSEY & ASSOC.
MARCH, 1989, BY HDG.

```
16 IO        OUTPUT CONTROL VARIABLES
                 IPRNT          5  PRINT CONTROL
                 IPLOT          0  PLOT CONTROL
                 QSCAL         0.  HYDROGRAPH PLOT SCALE

  IT         HYDROGRAPH TIME DATA
                  NMIN          2  MINUTES IN COMPUTATION INTERVAL
                 IDATE     1    0  STARTING DATE
                 ITIME       0000  STARTING TIME
                    NQ        150  NUMBER OF HYDROGRAPH ORDINATES
                NDDATE     1    0  ENDING DATE
                NDTIME       0458  ENDING TIME
                 ICENT         19  CENTURY MARK

           COMPUTATION INTERVAL     .03 HOURS
                TOTAL TIME BASE    4.97 HOURS

      ENGLISH UNITS
          DRAINAGE AREA          SQUARE MILES
          PRECIPITATION DEPTH    INCHES
          LENGTH, ELEVATION      FEET
          FLOW                   CUBIC FEET PER SECOND
          STORAGE VOLUME         ACRE-FEET
          SURFACE AREA           ACRES
          TEMPERATURE            DEGREES FAHRENHEIT

17 JD        INDEX STORM NO. 1
                 STRM       3.19  PRECIPITATION DEPTH
                 TRDA        .09  TRANSPOSITION DRAINAGE AREA

18 PI         PRECIPITATION PATTERN
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .01       .01       .01       .01       .01       .01
                .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                .01       .01       .01       .01       .01       .01       .01       .01       .01       .03
                .03       .03       .04       .04       .04       .04       .05       .06       .07       .08
                .10       .13       .18       .30       .30       .24       .16       .12       .08       .07
                .07       .06       .05       .04       .04       .04       .04       .03       .03       .01
                .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                .01       .01       .01       .01       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00

19 JD        INDEX STORM NO. 2
                 STRM       3.18  PRECIPITATION DEPTH
                 TRDA       1.00  TRANSPOSITION DRAINAGE AREA

18 PI         PRECIPITATION PATTERN
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
```

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.03
.03	.03	.04	.04	.04	.04	.05	.06	.07	.08
.10	.13	.17	.30	.30	.24	.16	.12	.08	.07
.07	.06	.05	.04	.04	.04	.04	.03	.03	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

20 JD INDEX STORM NO. 3

STRM 3.17 PRECIPITATION DEPTH

TRDA 2.00 TRANSPOSITION DRAINAGE AREA

18 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.03
.03	.03	.04	.04	.04	.04	.05	.06	.07	.08
.10	.12	.17	.30	.30	.24	.16	.12	.08	.07
.07	.06	.05	.04	.04	.04	.04	.03	.03	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	

UNIT HYDROGRAPH TRUNCATED FROM 181 TO 150 INTERVALS

UNIT HYDROGRAPH TRUNCATED FROM 170 TO 150 INTERVALS

UNIT HYDROGRAPH TRUNCATED FROM 195 TO 150 INTERVALS

1

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	SB11E	88.	3.73	29.	29.	29.	.12		
+	ROUTED TO	CP12E	87.	3.80	28.	28.	28.	.12		
+	HYDROGRAPH AT	SB10E	37.	3.67	12.	12.	12.	.06		

	ROUTED TO						
+		CP12E	37.	3.77	11.	11.	11.	.06
	HYDROGRAPH AT						
+		SB12E	61.	3.13	14.	14.	14.	.06
	3 COMBINED AT						
+		CP12E	155.	3.53	54.	54.	54.	.24
	ROUTED TO						
+		CP14E	154.	3.73	49.	49.	49.	.24
	HYDROGRAPH AT						
+		SB13E	108.	3.50	33.	33.	33.	.12
	ROUTED TO						
+		CP14E	108.	3.53	32.	32.	32.	.12
	HYDROGRAPH AT						
+		SB14E	74.	3.83	25.	25.	25.	.12
	3 COMBINED AT						
+		CP14E	330.	3.67	107.	107.	107.	.49

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

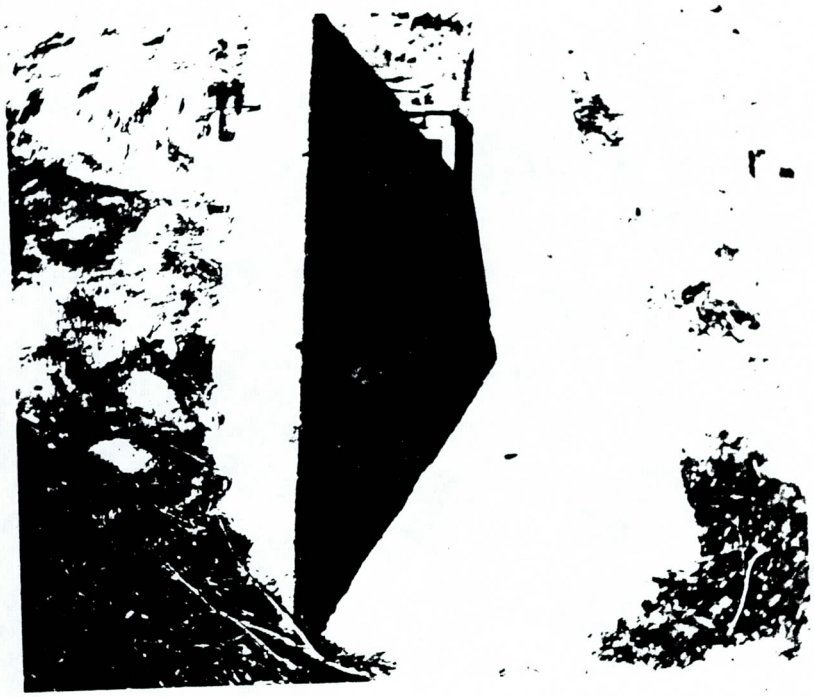
10.0 TRIBUTARY AREAS

Exhibit 1

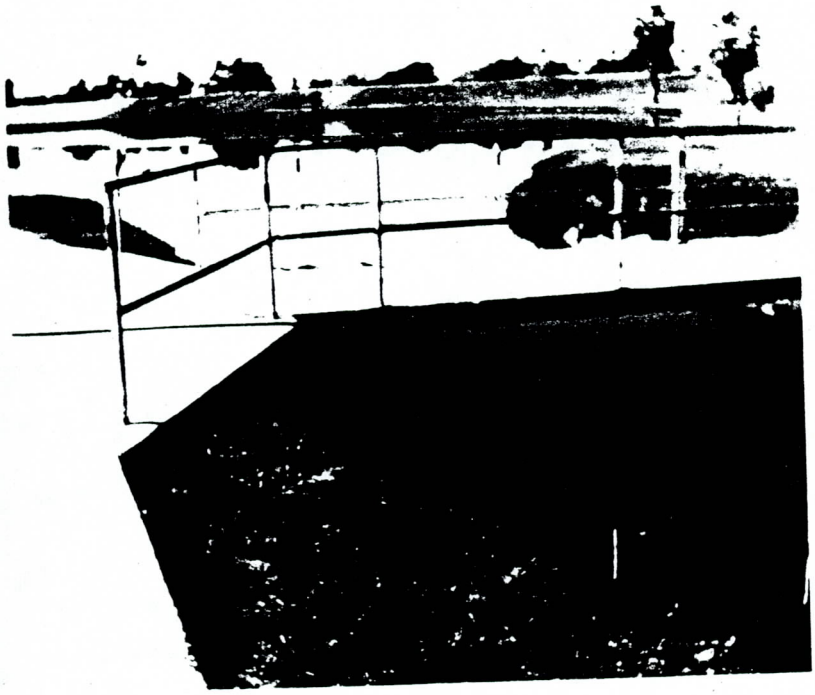
McKellips Lake

McKellips Lake

Exhibit 2

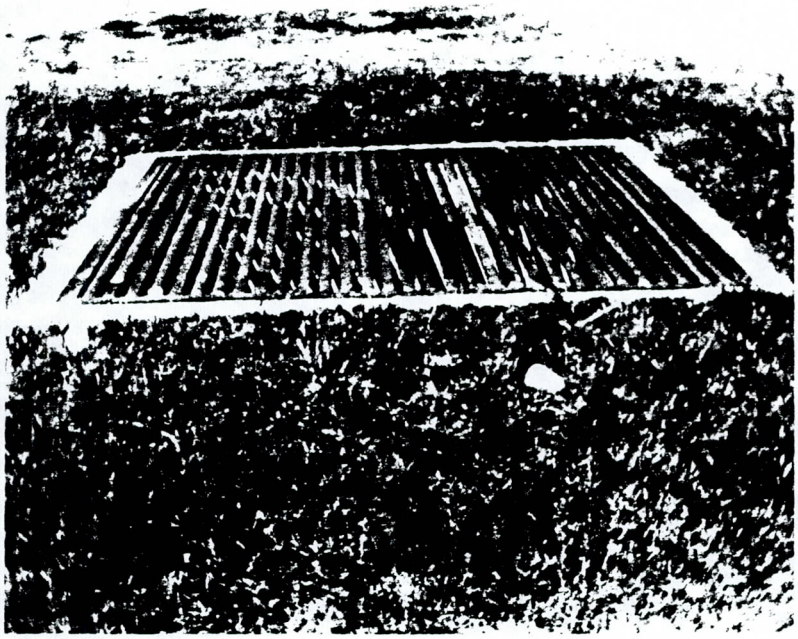


McKellips Lake



McKellips Lake

Exhibit 3



Roosevelt

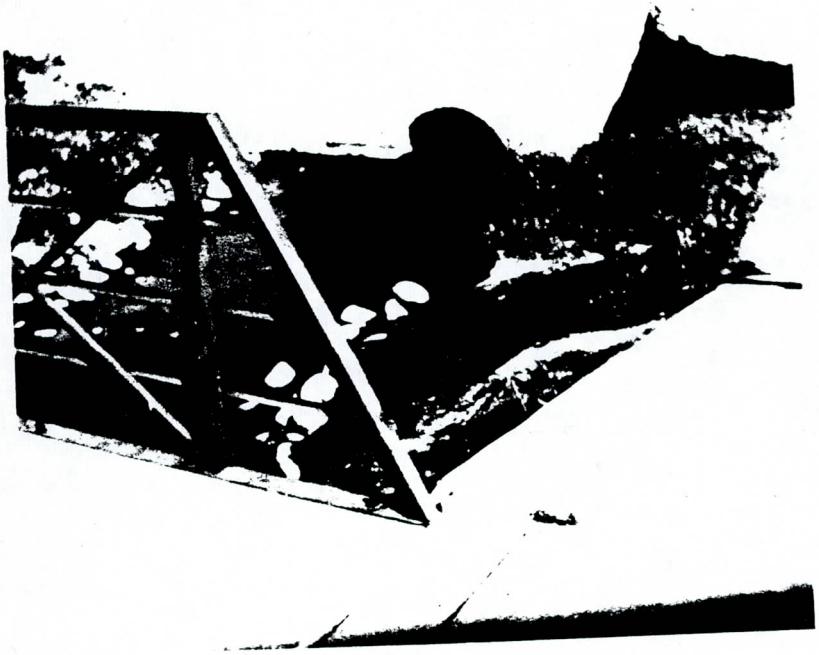
Roosevelt

Exhibit 4

Roosevelt

Roosevelt

Exhibit 5



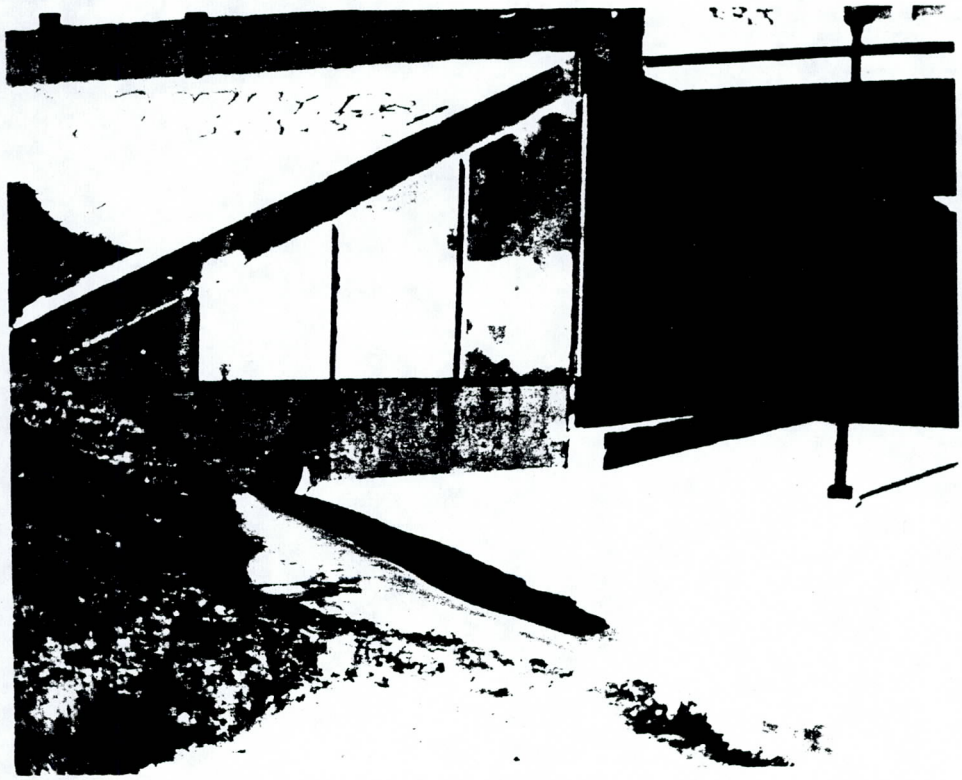
Roosevelt

Exhibit 6

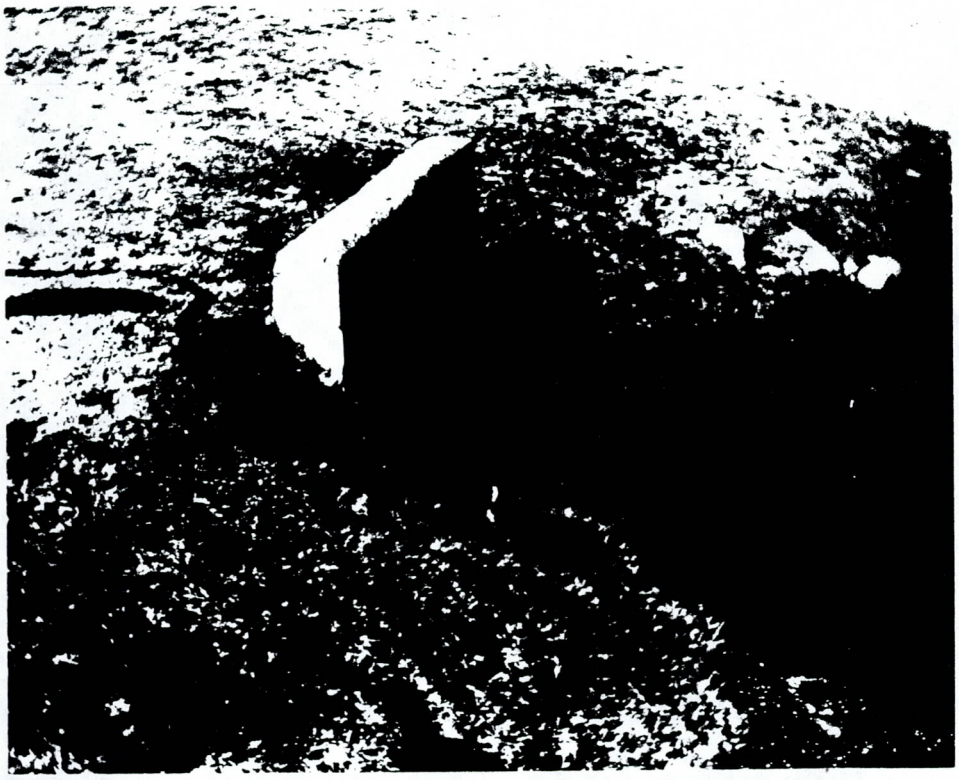
McDowell Bridge

McDowell Bridge

Exhibit 7

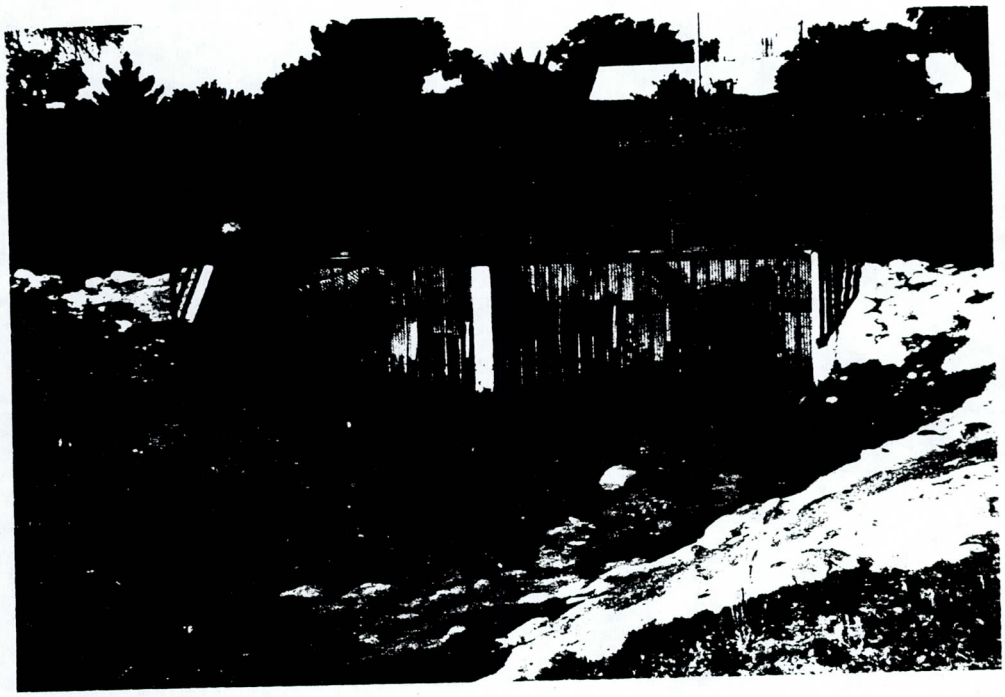


McDowell Bridge



McDowell Bridge

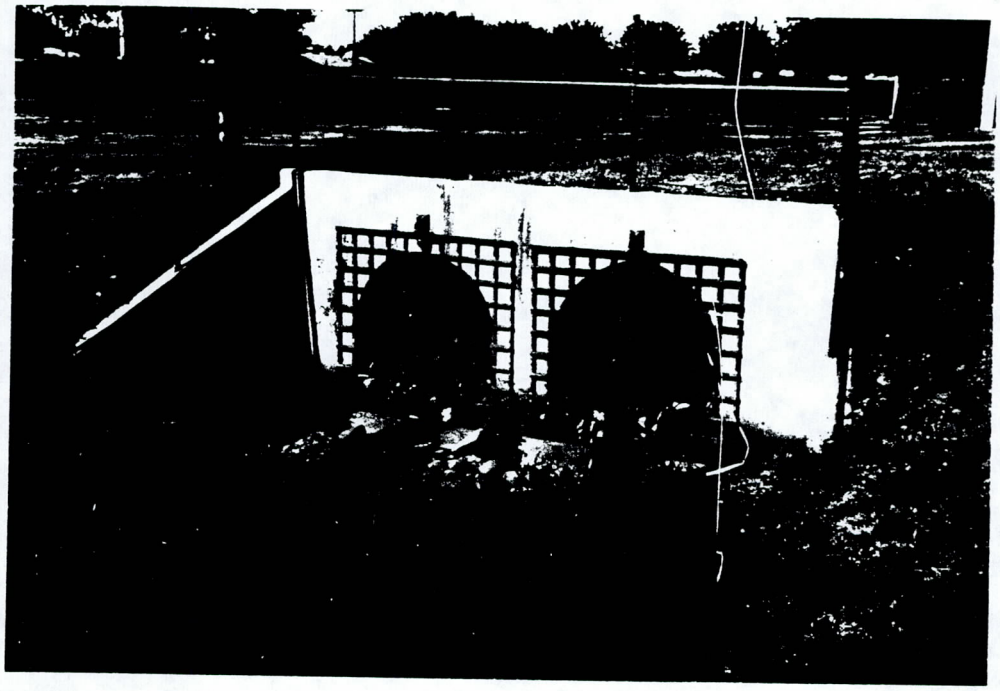
Exhibit 8



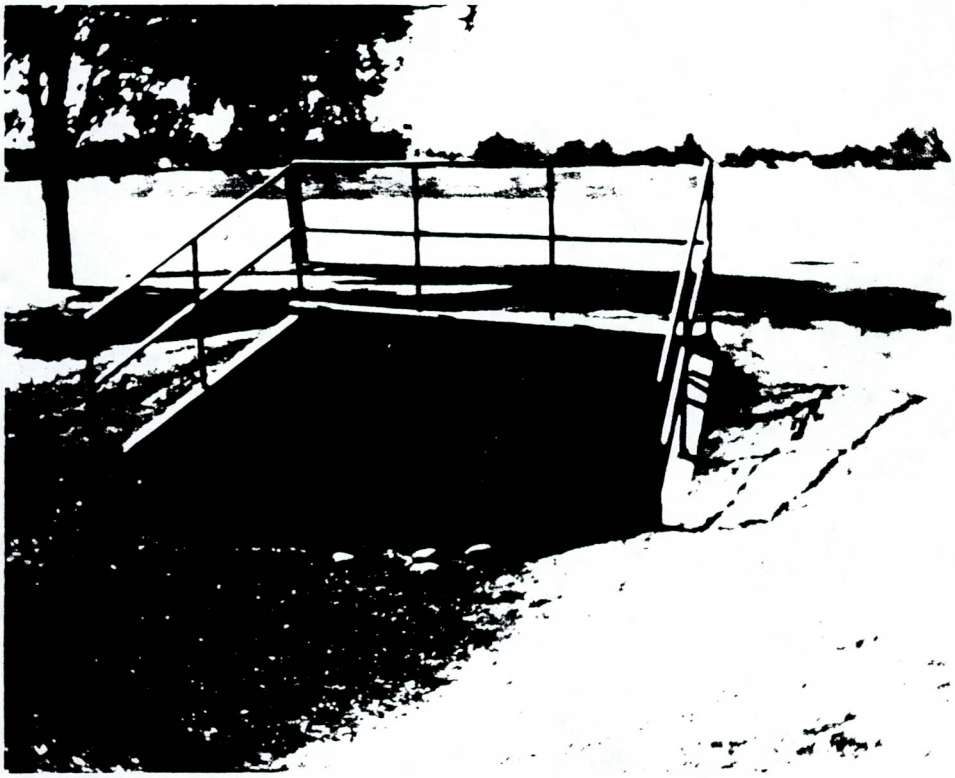
Palm Lane

Palm Lane

Exhibit 9

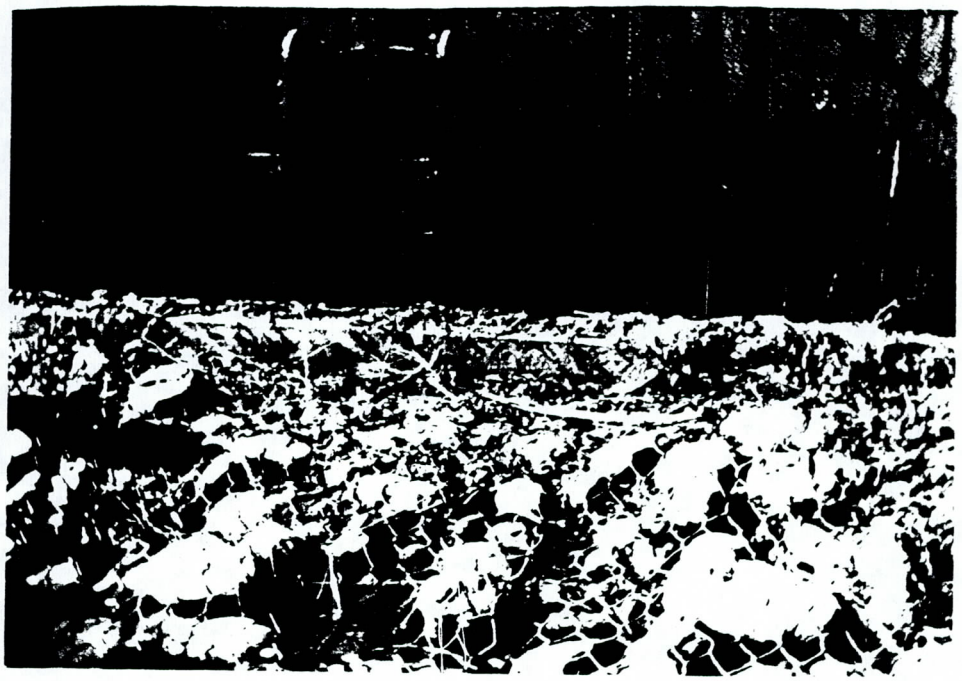


Oak



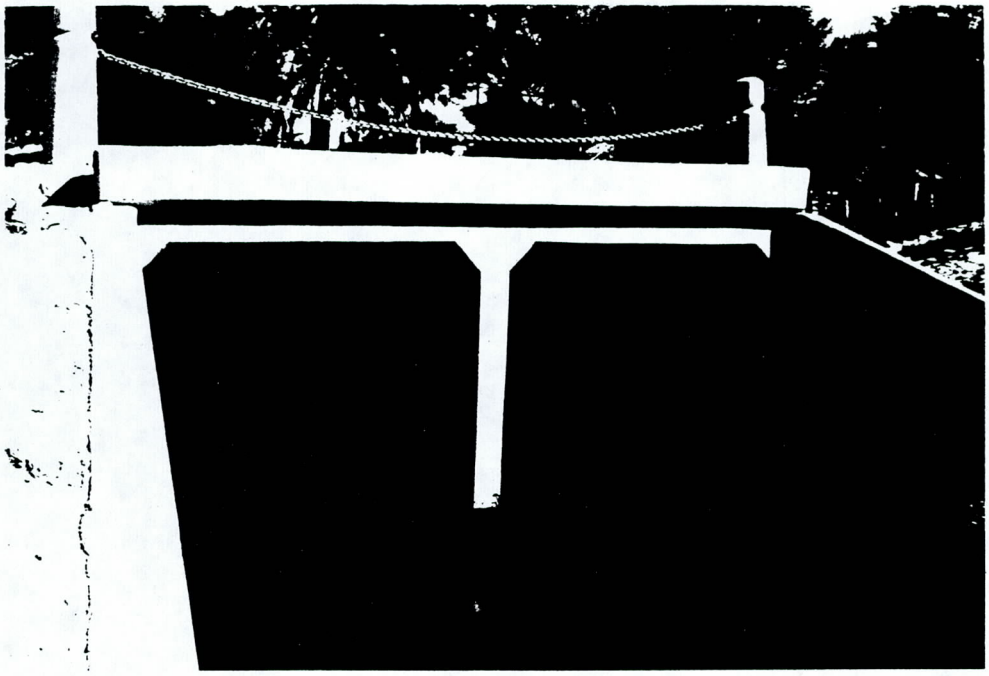
Oak

Exhibit 10



at the Pond on Murray

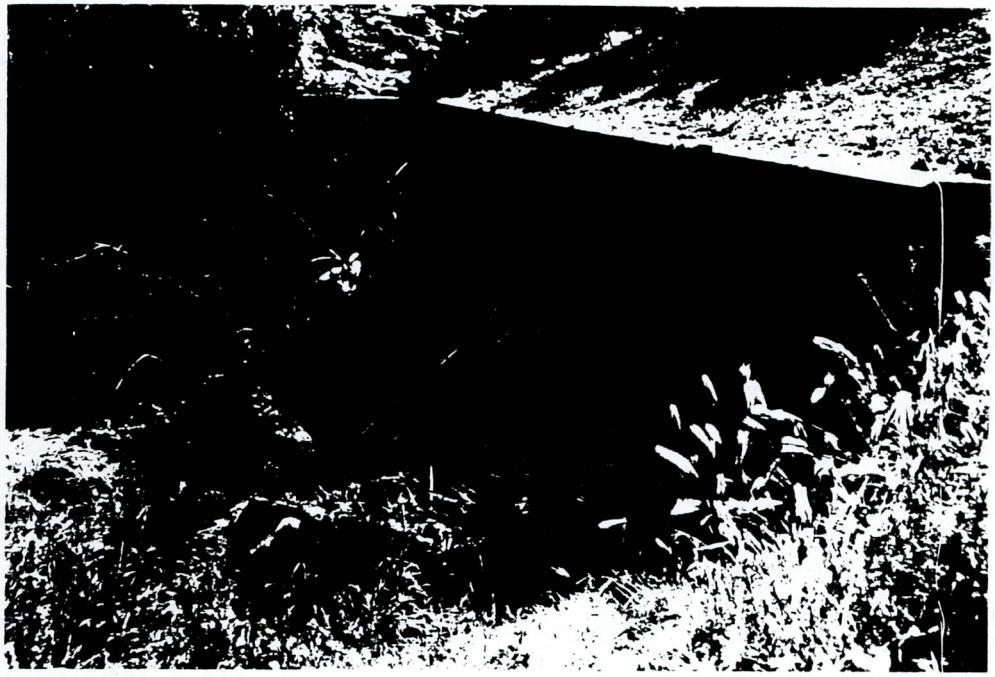
Exhibit 11



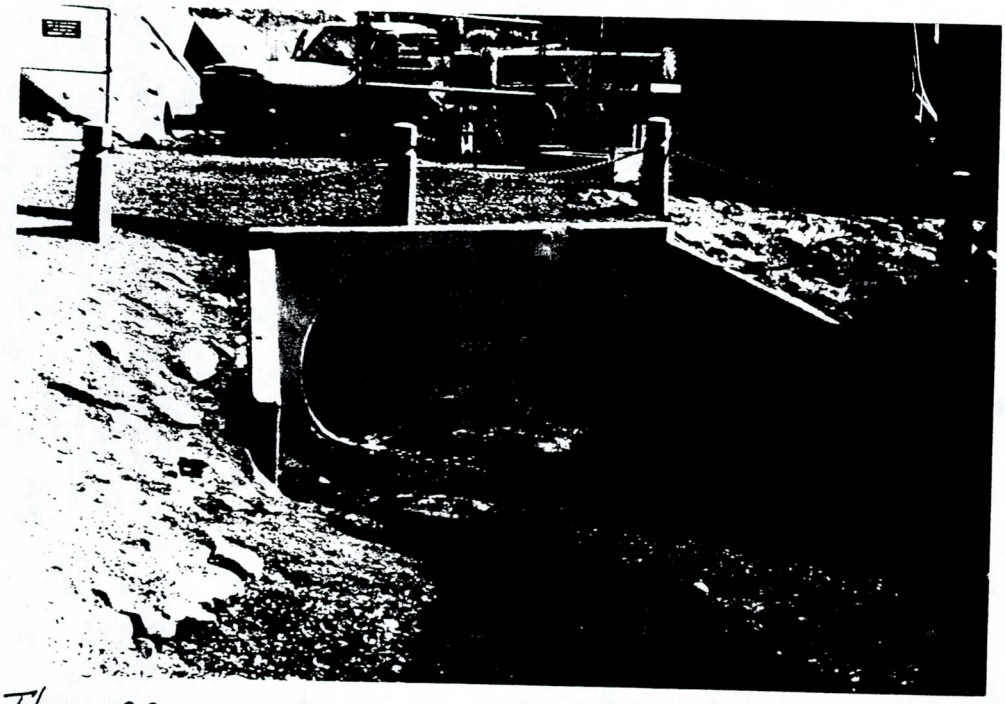
Thomas

Thomas

Exhibit 12



Thomas



Thomas

Exhibit 13

Thomas

Thomas

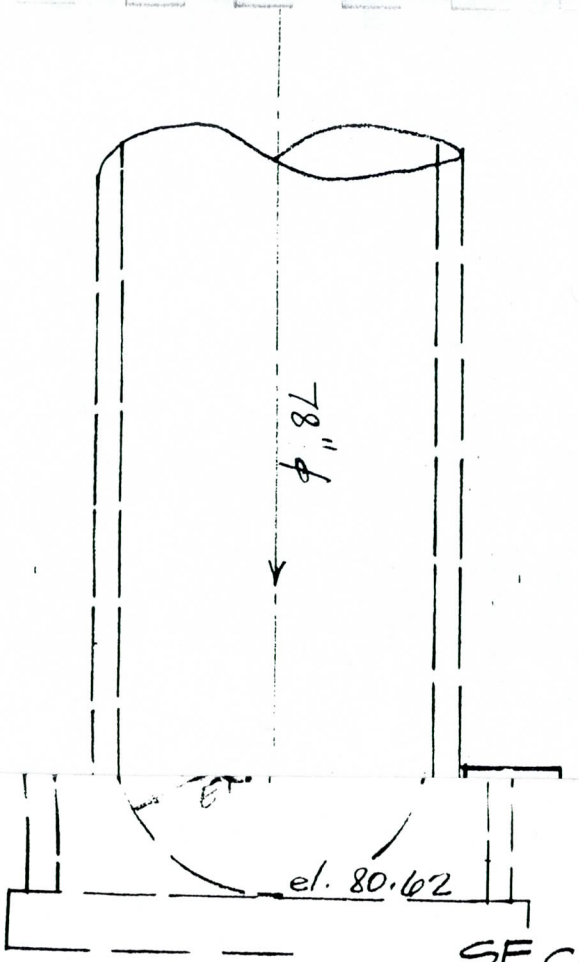
Exhibit 14

Thomas

Thomas

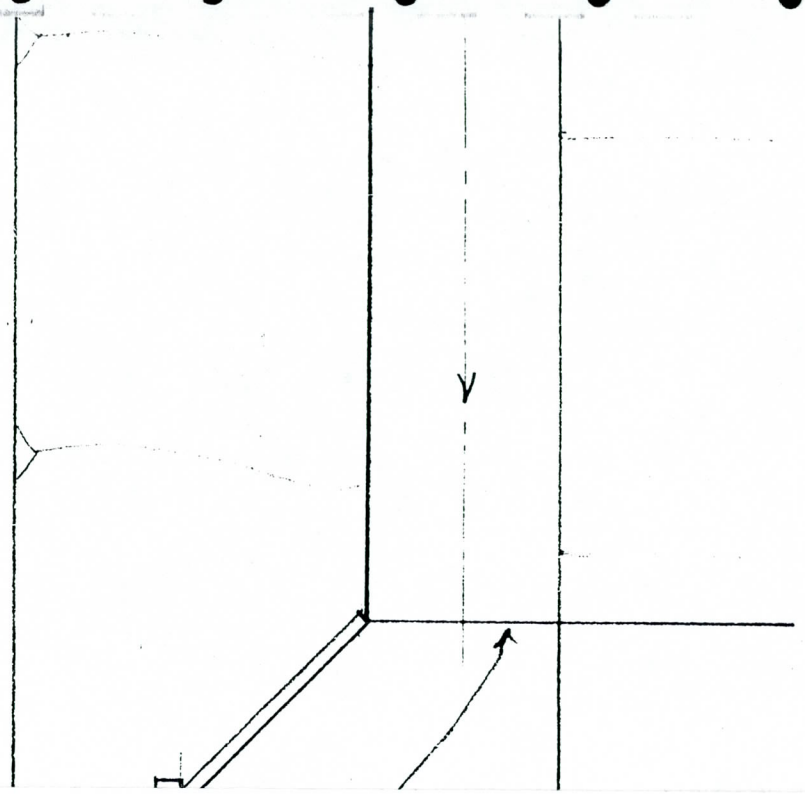
12.0 EXISTING STORM DRAIN AND CATCH BASIN LOCATION

13.0 SUPPORTING CALCULATIONS

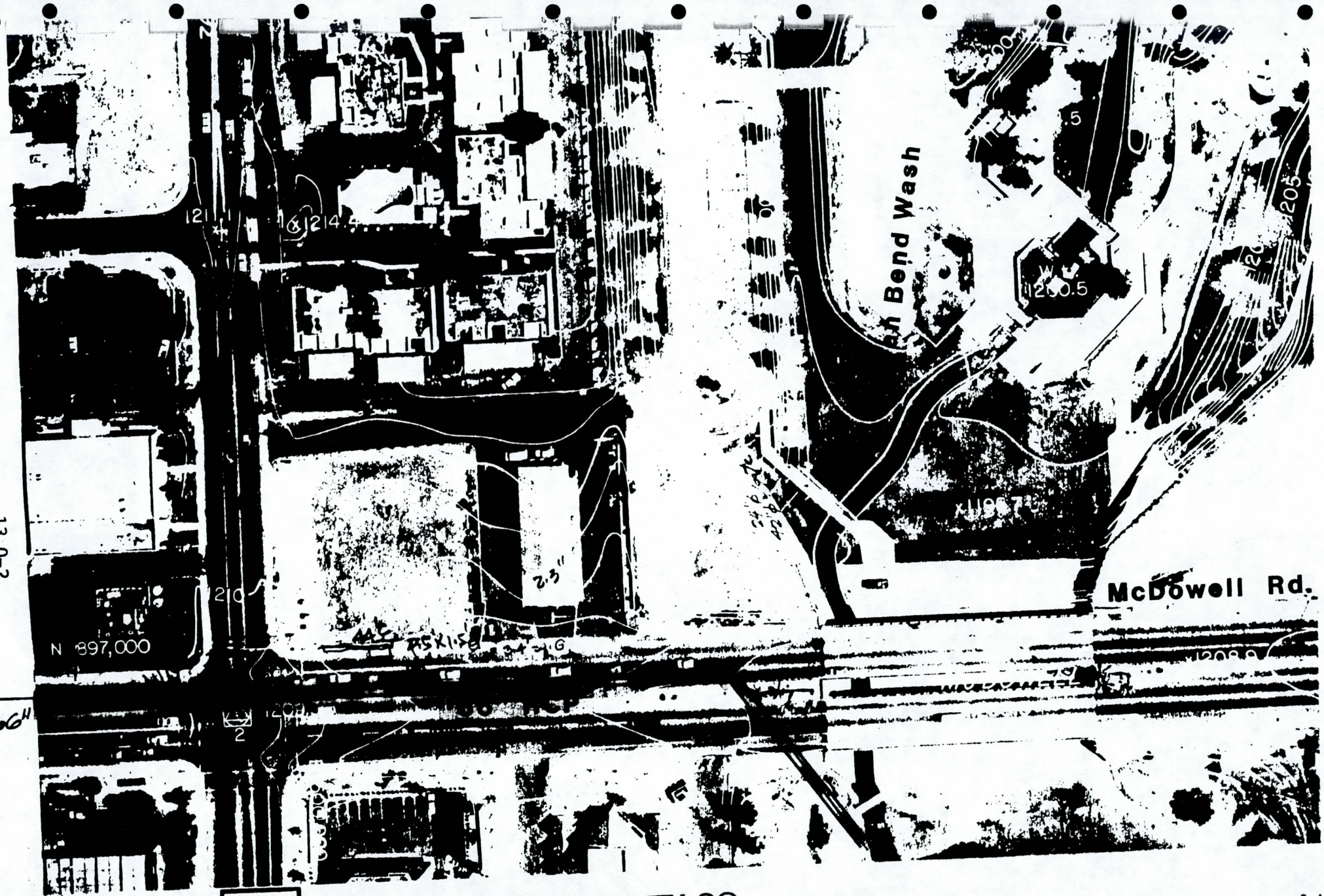


SECTION

holg.



4'



COOPER AERIAL SURVEY CO.

Phoenix, Arizona

(602) 266-2279

Scale 1" = 100'

1'

13.0-2

BROOKS, HERSEY
& ASSOCIATES, INC.
5246 South 40th Street
PHOENIX, ARIZONA 85040
(602) 437-3733

JOB: [illegible]
SHEET NO. ____ OF ____
CALCULATED BY: dbg DATE: 4/89
CHECKED BY: GK DATE: 7/89
SCALE ____

Capacities of existing catch basin

STA	Sg 1/FT	Sx 1/FT	Lc FT	n	d FT	Qa cfs	La FT	Qc cfs	Qi cfs	Qf cfs	Vg fps	T FT
0+82 1-CB SD216 Continuous	.0035	.02	3.5	.015	.5	18	47	2.4	2.4	15.6	2.8	26
7+49 2-CB SD216 Sag	.0035	.02	3.5	.015	.73 max. see profile	6.5	–	6.5	6.5 × 2 = 13	0	–	36
12+75 2-CB SD216 Continuous	.00271	.02	3.5	.015	.5	16	42	2.4	2.4 × 2 = 4.8	13.6	2.5	25
6+74 1-18"ϕ	.010	–	–	.012	1.5	–	–	–	11.4	–	6.4	–
12+40 1-30"ϕ	.010	–	–	.012	2.5	–	–	–	44.4	–	9.0	–
13+50 2-CB SD216 Continuous	.0035	.02	3.5	.015	.5	18	48	2.4	2.4 × 2 = 4.8	15.5	2.8	25

Total = 80.80 cfs

Note: Due to lack of information for this portion of the study, reasonable assumption was made.

Preliminary Estimate

CB STA	CONNECTOR PIPE Q_{CB} cfs	D_{CB} in.	V_{CB} fps	Q_{PCB} cfs	Junction Type		MAIN PIPE Q_D cfs	Dia. in.	Sp ft/ft.	V_D fps	Q_P cfs
73+60 W	11.5	18" @ .01	6.4	11.4	MH		11.4	24"	.0022	3.7	11.5
70+70W	11.24	18" @ .01	6.4	11.4		390' 24"	22.6				
70+70E	~~4.0~~ 2 (Assumed)	18" @ .0014	2.4	4.2	MH		26.6	30"	.0036	5.4	26.7
67+00 W	13.8	24" @ .0032	4.4	13.8		445' 36"	40.4	36" 42"	.0032 .0014	5.8 4.2	40.4 40.8
66+30 MH		18" @ .015	7.9	13.9	MH						
63+90 W MH	12.4	18" @ .012	7.0	12.5			52.8	42" 48"	.0023 .0012	5.4 4.3	52.3 53.9
63+80E (EXIST.)	~~4.0~~ 3 (Assumed)	18" @ .0014	2.4	4.2		440' 48"	56.8	42" 48"	.0027 .0014	5.9 4.6	56.6 58.2
61+90 W	13.0	18" @ .014	7.6	13.5	MH		69.8	48" 54"	.0020 .0011	5.5 4.4	69.6 70.6
61+ 60+10 W	1 13.4	18" @ .014	7.6	13.5			83.2	54"	.0015	5.2	82.5
58+85E (EXIST.)	1 ~~4.0~~	18" @ .0014	2.4	4.2			87.2	54"	.0017	5.5	87.8

Remove exist. 36" ϕ pipe then install new storm drain.

BROOKS, HERSEY & ASSOCIATES, INC.
5246 South 40th Street
PHOENIX, ARIZONA 85040
(602) 437-3733

JOB ____ SHEET NO. ____ OF ____
CALCULATED BY hdg DATE 4/3/89
CHECKED BY JTC DATE 7/89
SCALE

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PHOENIX, ARIZONA 85040
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JOB [illegible] OF [illegible]
SHEET NO. [illegible]
CALCULATED BY Kdg DATE 4/4/89
CHECKED BY CJC DATE 7/89
SCALE

Remove exist. 36" ø pipe then install new storm drain.

CB STA	CONNECTOR PIPE Q_{CB} cfs	D_{CB} in.	V_{CB} fps	Q_{PCB} cfs	Junction Type	MAIN PIPE Q_D cfs	Dia. in.	Sp ft/ft.	V_D fps	Q_P cfs
58+30 W	13.5	18" @ .014	7.6	13.5		100.7	54" 60"	.0023 .0013	6.4 5.2	102 101.7
56+40 W	16.5	24" @ .0045	5.2	16.4		117.1	54" 60"	.0030 .0017	7.3 5.9	116.7 116.3
55+30 MH					MH					
54+10 W	14.6	27" @ .0037	4.7	14.9		131.7	60"	.0022	6.7	131.3
50+90 W	31.2	30" @ .005	6.4	31.4						
50+90 E	~~4.0~~ 3 (Assumed)	18" @ .0014	2.4	4.2		166.9	60"	.0035	8.5	166.9
50+15 Box-MH					MH					
49+00 ± EXIST. MH										

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JOB Scottsdale Rd. Improvmt. 2100B-FP-04
SHEET NO. ____ OF ____
CALCULATED BY Hodg DATE 4/5/89
CHECKED BY GTK DATE 7/88
SCALE

New storm drain pipe along existing 36" & RCP bet. McDowell & Oak

CB STA	CONNECTOR PIPE Q_{CB} cfs	D_{CB} in.	V_{CB} fps	Q_{PCB} cfs	Junction Type	MAIN PIPE Q_D cfs	Dia. in.	Sp ft/ft.	V_D fps	Q_P cfs
73+60 W	11.5			11.4		11.4	24"	.0021	3.7	11.5
70+70 W	11.2			11.4	290' 24"					
70+70 E	2 4.0			4.2	MH	26.6	30"	.0026	5.4	26.7
67+00 W	13.8			13.8	440' 36"	40.4	36"	.0032	5.8	40.8
							42"	.0014	4.2	40.8
66+30 MH					MH					
63+90 W	12.4			12.5	440' 42"	52.9	42"	.0023	5.4	52.3
							42"	.0012	4.3	53.9
61+90 MH					MH					
63+80 E	3 4.0			4.2	550' 48"	56.9	42"	.0027	5.9	56.6
							48"	.0014	4.6	58.2
56+40 W	16.5			16.4	MH	73.3	48"	.0022	5.8	73.0
55+90 MH							54"	.0012	4.6	73.8
54+10 W	14.6			14.6	625' 48"	87.9	48"	.0032	7.0	88.0
							54"	.0017	5.5	87.8
50+15 Box-MH	31.2			31.2	MH 115' 60"	119.10	48"	.0060	9.6	120.5
							54"	.0032	7.58	120.5

49+00 MH

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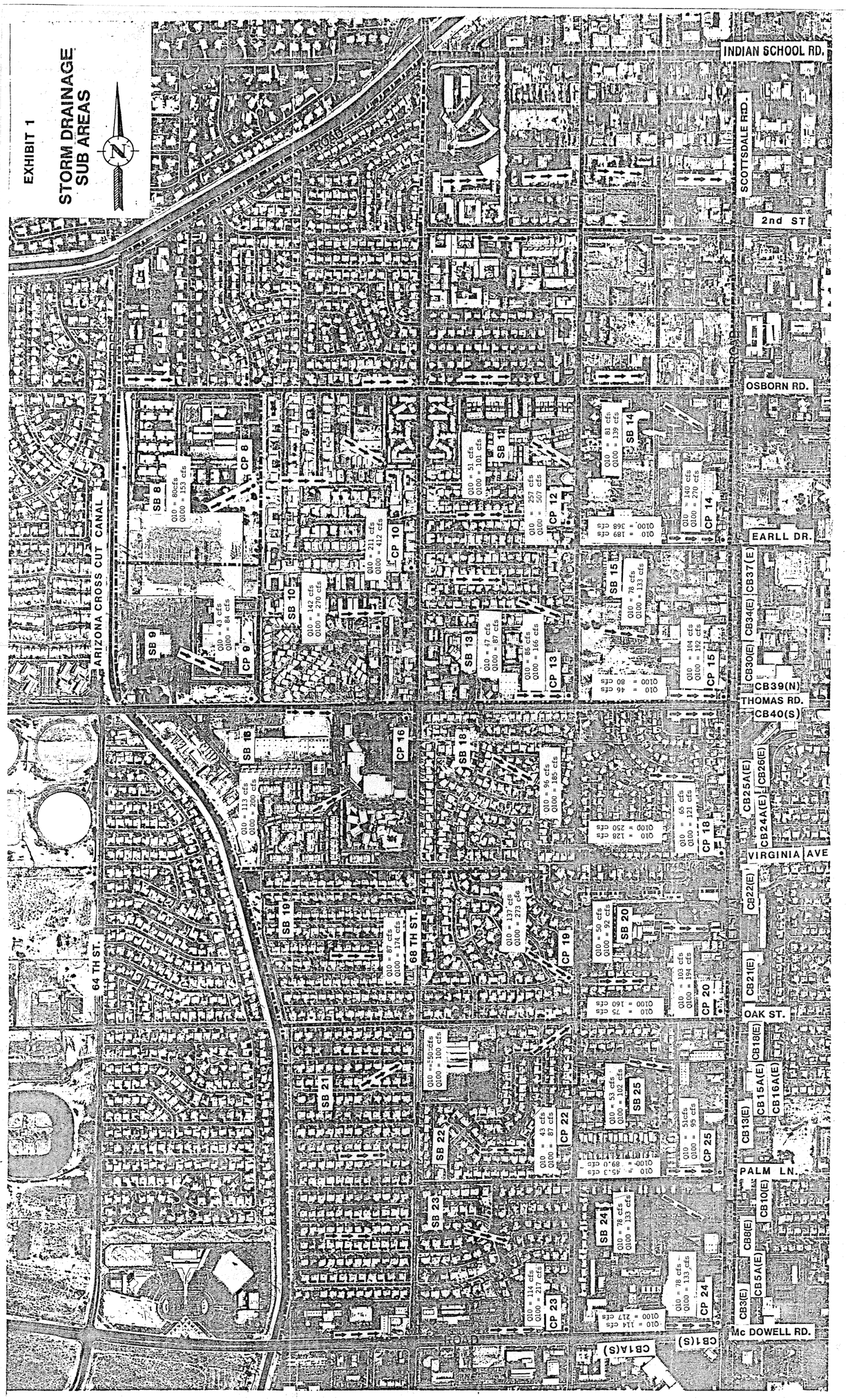
JOB: [illegible]
SHEET NO. ____ OF ____
CALCULATED BY: hdg DATE: 4/5/89
CHECKED BY: GTC DATE: 7/89
SCALE: Ex

Existing 36" ϕ RCP bet. McDowell & Ex

CB STA	CONNECTOR PIPE Q_{CB} cfs	D_{CB} in.	V_{CB} fps	Q_{PCB} cfs	Junction Type	MAIN PIPE Q_D cfs	Dia. in.	Sp ft/ft.	V_D fps	Q_P cfs
63+50 W	1.5				MH					
61+90 W	13.0				465' 36" .002					
60+10 W	13.4									
59+50 E	1 4.0				MH					
58+30 W	13.5				75' 36" .004					
50+90 E	3 4.0				MH					
50+15 Box-MH					75' 36" .006					
49+00 ± EXIST MH					MH 115' 60"					

	/UNIT	TOTAL COST
36"ϕ Pipe-Removal	.00	17,140
60"ϕ RGRCP		88,200
54"ϕ RGRCP		79,200
48"ϕ RGRCP		44,000
36"ϕ RGRCP		33,000
24"ϕ RGRCP		14,500
		$ 258,900
60"ϕ RGRCP		16,100
48"ϕ		117,500
42"ϕ		37,400
36"ϕ		37,500
24"ϕ		14,500
	ϕ	$ 223,000



Y OF SCOTTSDALE Scale 1" = 400' T.2N, R.4E 28|27 33|34 0-2