

HYDROLOGIC ANALYSIS

For:

Thomas Creek, Dry Creek, and the  
Boyton Slough  
Washoe County, Nevada

Prepared for:  
Federal Emergency Management Agency  
Contract #EMW-89-C-2841  
August, 1990  
Nimbus Job # 8901  
Revised November, 1990

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Engineering Div.



# Nimbus Engineers

3710 Grant Dr., Suite D • Reno, NV 89509  
Mail: P.O. Box 10220 • Reno, NV 89510  
(702) 689-8630

November 27, 1990

Mr. Steve Varela  
City Engineer, City of Reno  
City Hall Annex  
P.O. Box 1900  
Reno, Nevada 89502

RE: Revised Hydrologic Analyses for Thomas Creek, Dry Creek, and the Boynton Slough (Nimbus Job #8901)

Dear Mr. Varela:

In August 1990, Nimbus sent copies of a hydrology report for portions of Washoe County and the City of Reno to federal, state, and local agencies for review. Enclosed is a copy of the revised hydrology report which addresses the comments from the various agencies as well as incorporating an expanded area of study which includes the Boynton Slough. The results of this revised report will be used in the hydraulic analyses to delineate flood hazards within the watersheds studied. This revised report is submitted to you for review and comment at the request of Les Sakumoto of FEMA Region IX.

We respectfully request that this revised report be reviewed by your office and comments be provided by December 18, 1990. Should you have any questions, please do not hesitate to call Mr. Paul Frost or me at (702) 689-8630.

Sincerely,  
Nimbus Engineers

Margaret (Peggy) Bowker, P.E.  
Principal

Encl.

xc: Les Sakumoto, FEMA Region IX

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3710 Grant St., Suite D, Reno, NV 89509  
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(702) 689-8630

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## 1.0 INTRODUCTION

In 1989, Nimbus Engineers was authorized by the Federal Emergency Management Agency (FEMA) under Contract No. EMW-89-C-2841 and a subsequent special problem report to conduct a flood insurance restudy for Thomas and Dry Creeks in Washoe County and the City of Reno (see figure 1 for vicinity map). Nimbus developed five rainfall-runoff models for these watersheds utilizing the Corps of Engineers HEC-1 Computer program. The purpose of these analyses is to establish 100-year discharges at key concentration points along Thomas Creek, Dry Creek, and the Boynton Slough. These discharges will be used in the hydraulic analysis for the flood insurance restudy of Thomas Creek, Dry Creek, and the Boynton Slough.

Discharges have previously been established for these watersheds by Tudor Engineers in the original Flood Insurance Study (FIS) utilizing a regional regression equation. These do not compare with other published values calculated by the Corps of Engineers, U.S. Soil Conservation Services, U.S. Geological Survey and studies prepared by local consultants. Due to wide divergence of values which have been computed, Nimbus created the new models in order to do a comparative analysis. It was agreed by the communities that the Corps of Engineers (COE) study (Reference 8) contained the more reasonable values. The results of the analysis performed by Nimbus compare with the COE values and are therefore proposed to be adopted by the communities as the regulatory peak discharges.

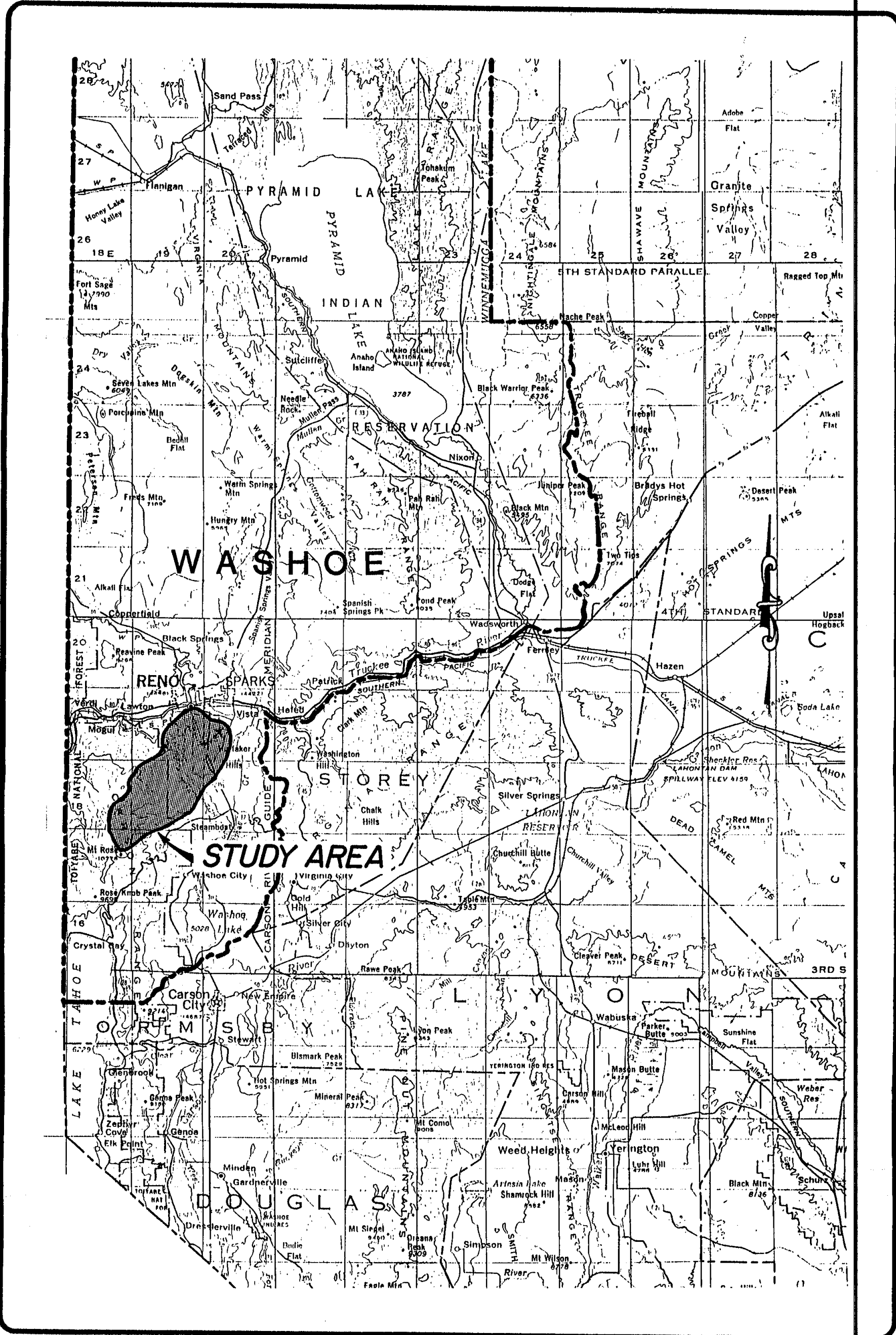


FIGURE 1



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 (702) 689-8630

**FIGURE 1**

**Vicinity Map**

## 2.0 PHYSICAL DESCRIPTION OF AREA

Dry Creek (which becomes Boynton Slough) and Thomas Creek are located in Washoe County and in southern Reno. The watersheds and tributaries for these streams originate in the Carson Range of the Sierra Nevada and drain through a combination of rural, residential, light industrial and commercial areas. Average annual precipitation in the headwaters is approximately 40" lowering to 6" to 8" annually in the valley floor. Winter precipitation occurs as snow in the upper elevations, and a significant snow pack accumulates. The lower regions also experience snow; however, the snow usually remains only for a few days on the valley floor. Figure 2 is a Watershed Location Map and Figure 3 is the Watershed Map.

### Thomas Creek

The upper Thomas Creek watershed is characterized by steep slopes with a well-incised channel. The upper area is approximately 8.5 square miles with an average slope of 9%. The lower area has a flatter slope and the channel capacity is limited to about 400 cfs.

In larger flood events, flow in excess of the channel capacity will be overland flow, flowing in a northeasterly direction. Just west of South Virginia Street, approximately one third of the flow is diverted further North. This flow will travel as shallow overland flow through the I-580 freeway opening at Virginia Street, through the subdivisions on the east side of Longley Lane, and join Dry Creek/Boynton Slough at South McCarran Blvd.\* The majority of the flow, however, is directed east across the Truckee Meadows through Alexander Lake, and joins Steamboat Creek at Huffaker Narrows.

The total drainage area of Thomas Creek above Virginia Street is 11.5 square miles. The Thomas Creek watershed ranges in elevation from 4500 feet to 9800 feet. The watershed was divided into subbasins according to differences in rainfall depths, soil types, and vegetation types. Vegetation in the subbasins above 6000 feet (T1-T4) is comprised mainly of pine trees with a very thick understory. The ground cover for these upper areas is close to 90%. The soils are a mixture of type C and D. Due to the change in elevation, the 100-year 24 hour rainfall varies from 5.5 inches in the highest subbasin to 2.8 inches in the lowest subbasin.

The vegetation type for subbasins T5 and T6A is mainly a mixture of sagebrush and mahogany with some pine and aspen scattered throughout the subbasin. The average ground cover for this portion of the watershed is approximately 25%. Over 80% of the soil in these basins is a type C. The subbasin below the apex of Thomas Creek (T6B) is a mixture of irrigated pastures and low density residential areas. This area has a fairly even distribution of type B, C, and D soils.

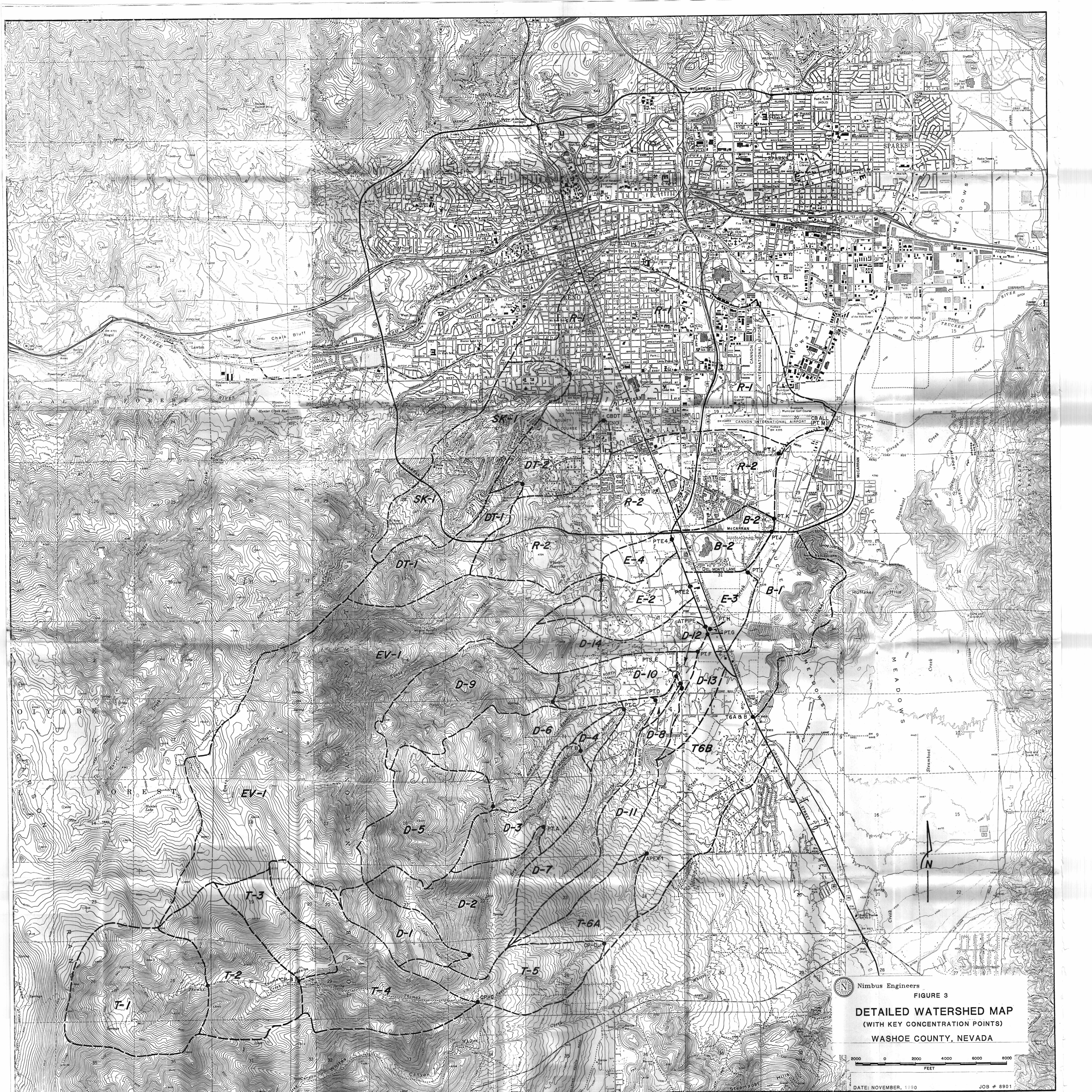
Above the Apex, velocities in the channel, as reflected in the Muskingum routing parameters, are high. The velocities range from 10 to over 15 ft/sec for some reaches. Below the apex, the 100-year flows will not be contained in a well-defined channel. The average velocities for this reach range between 3 and 6 ft/sec.

\* AT SUCH POINT AS FLOW ESCAPES CONFINED CHANNEL @ VIRGINIA ST./I-580 INTERCHANGE, WILL SHEET NORTHERLY WITHIN VIRGINIA ST., LONGLEY LANE, AS WELL AS RANCHLAND AND SUBDIVISION AREA.

$$\text{INITIAL } t_c = \frac{(5 \text{ MI.})(5280)}{6} + \frac{(5.1 \text{ MI.})(5280)}{15} \times \frac{1}{3600} = 1.72 \text{ HRS. MIN.}$$

DRAINAGE IMPROVEMENTS @ U.S. 395 INTERCHANGE DESIGNED TO RECEIVE 10-YEAR STORM FLOW OF 115 CFS AND RELEASE IT AT PEAK RATE OF 70 CFS SEE PG. 18

ASSUMED 100 YR.



Nimbus Engineers  
FIGURE 3  
**DETAILED WATERSHED MAP**  
(WITH KEY CONCENTRATION POINTS)  
WASHOE COUNTY, NEVADA

2000 0 2000 4000 6000 8000  
FEET

DATE: NOVEMBER, 1990 JOB # 8901

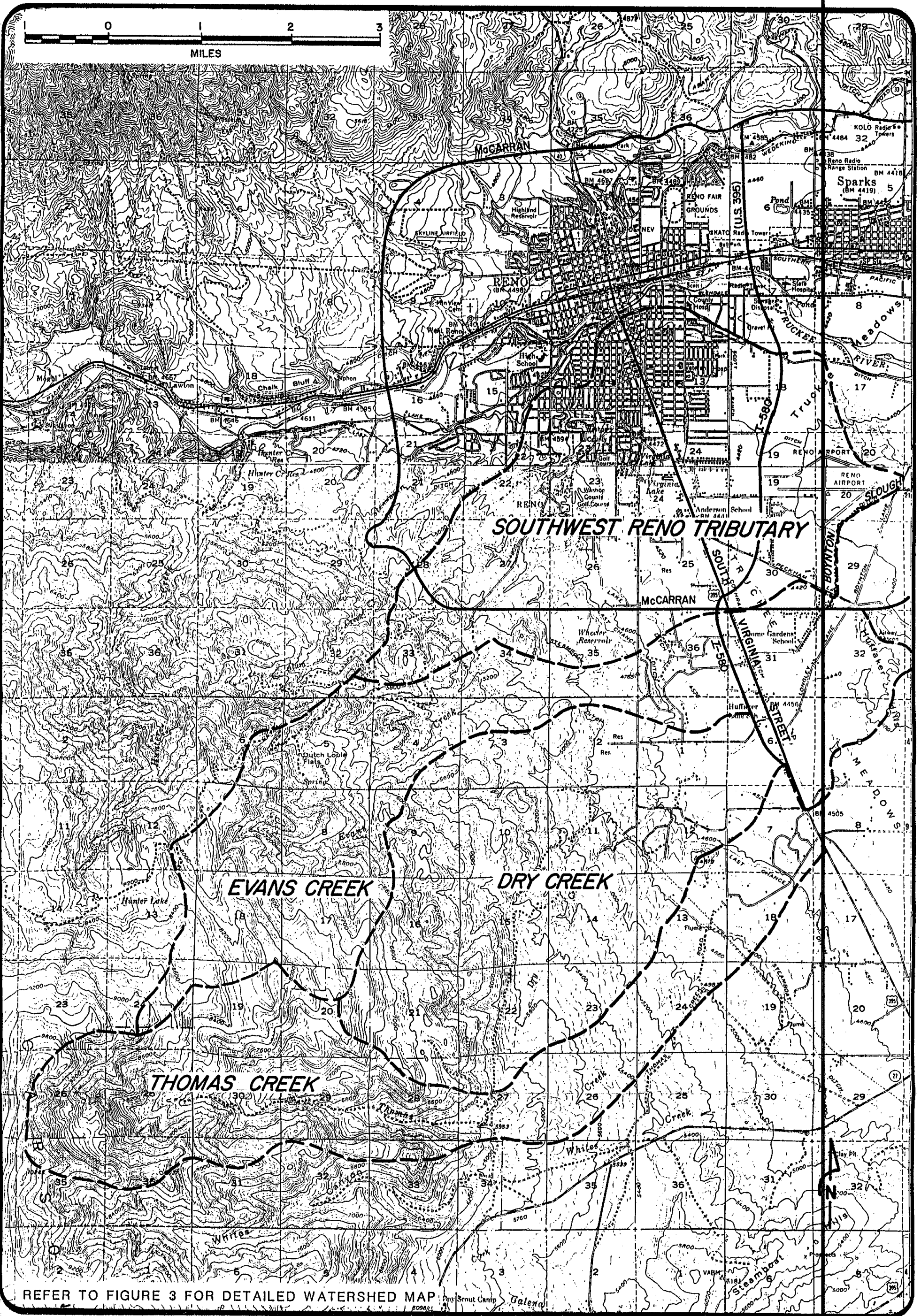


FIGURE 2



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**FIGURE 2**  
**WATERSHED LOCATION MAP**  
**WASHOE COUNTY, NEVADA**

DATE: NOVEMBER 1990

JOB # 8901

## Dry Creek

Dry Creek is formed by the convergence of four small streams at the mountain front. The 100-year flow is mostly contained within the channel down to I-580. The drainage area of Dry Creek above I-580 is 13 square miles (Figure 3). This watershed ranges in elevation from 4460 feet to 7800 feet (an average slope of approximately 9%). The watershed was divided into 14 basins in order to account for the differences in rainfall depths, soil types, and vegetation types within the watershed, and to provide concentration points at key locations in the watershed for the hydraulic analysis, such as confluences of tributaries.

The 100-year 24-hour precipitation ranges from 4.0 inches for the upper subbasins of the watershed to 2.8 inches for the lower subbasins. The watershed above Steamboat Ditch (approximately 10 square miles) contains mainly a mixture of mahogany and sagebrush with ground cover between 30 and 50%. The soil types for the watershed above Steamboat Ditch are mainly type D soils with small areas of type C. The area below Steamboat Ditch is rural with few impervious areas, and a majority of this area is developed for pasture. The soil survey maps also indicate that this area is primarily a type D soil. Channel velocities range between 6 and 10 ft/sec.

Evans Creek is a major tributary of Dry Creek. The stream channel joins Dry Creek south of Del Monte Lane, just east of Sierra Pacific Power Company. The watershed of Evans Creek above its confluence with Dry Creek is approximately 10 square miles (Figure 3). The watershed was divided into four subbasins. The upper subbasin is the area above Lakeside Drive, the middle two subbasins are between Lakeside Drive and I-580 and the lower subbasin is between I-580 and the confluence of Evans and Dry Creeks.

The drainage area above Lakeside Drive, the upper subbasin, is approximately 8.5 square miles. The watershed ranges in elevation from 4600 to 9100 feet. The average slope of this basin is 10% with velocities ranging from 8-11 ft/sec. Vegetation for the area above 6000 feet consists of pine and aspen trees on the north-facing slopes and along the creek. The south-facing slopes consist of Mountain Mahogany, sagebrush, and some pine trees. The ground cover for the area above 6000 feet averages 50%. The drainage area below 6000 feet and above Lakeside Drive is comprised mainly of sage brush with an average ground cover of 50%. The soils for the entire subbasin are a mixture of type C and D soils. The 100-year 24-hour rainfall averages 4.2 inches for this subbasin.

The middle subbasins (EV2 and EV4) are mainly pastures and rural dwellings with some residential developments within the basin. The lower subbasin (EV3) is a mixture of pastures, residential and commercial developments.

## Dry Creek/Boynton Slough

A major tributary of Dry Creek/Boynton Slough is a 14 square mile area of Southwest Reno. The upper regions of the watershed contain the Skyline Wash and a new detention facility at Dant Boulevard. The lower regions include a portion of the area known as the "old southwest", the Lakeridge Development, Smithridge, the Veterans Hospital and McCarran International Airport. This watershed ranges in elevation from approximately 4400 feet to 6300 feet. The watershed was subdivided into five subbasins: SK1, R1, R2, DT1, and DT2. The average 100-year 24 hour point rainfall for all these basins is 2.8 inches.

Subbasins SK1 and DT1 are the upper subbasins. The drainage areas of these basins are 1.21 and 2.2 square miles for SK1 and DT1, respectively. The vegetation cover of these subbasins is comprised mainly of sagebrush in the upper reaches, and a mix of sagebrush and residential for the remainder. For the DT1 watershed, the average flow velocity of 6 ft/sec was developed using the calculation sheets developed by Kennedy/Jenks/Chilton (Reference 18). In that report for the design of Dant Dam, the watershed above the dam (DT1) was subdivided into four basins. For the purpose of this study, the basins were consolidated into one basin.

Subbasin DT2 is comparatively small to the other subbasins within the Southwest Reno watershed. The drainage area, 0.94, and velocity, 5 ft/sec were also generated from the data and calculations supplied in the KJC report.

Subbasin R1 is the largest subbasin within the Southwest Reno watershed, 5.5 square miles. This subbasin is mainly an urbanized watershed with a mix of commercial, industrial, residential, and some open space. The soils are a mixture of type B, type C, and type D soils. Subbasin R2 has a drainage area of 4.1 square miles. This subbasin is also an urbanized watershed. The soils for this subbasin are mainly type C and D soils. The runoff from this watershed would flow underneath the freeway at Peckham and Moana Lanes. Overland flow occurs in R1 and R2 as there are no defined channels. Velocities average 2 ft/sec.

CONSIDERATION SHOULD BE GIVEN TO MORE EFFECTIVELY PASSING THIS FLOW TO BOYNTON SLOUGH AS FUTURE PROJECT.

Also contributing runoff to the slough are subbasins B1 and B2. Subbasin B1 which includes the north slope of Huffaker Hills has a drainage of 1.7 square miles. The concentration point for this subbasin is at South McCarran Boulevard. This subbasin is a mixture of pasture, residential and an undeveloped hillside. Subbasin B2 has a drainage area of approximately 0.7 square miles. It is a mixture of commercial, pasture and some residential. For both subbasins the 100-year 24-hour rainfall used in the model is 2.8 inches.

NOTE: DT-1, DT-2 WILL CONCENTRATE WITHIN PLUMAS-MOANA SYSTEM UNDER CONSTRUCTION TO VIRGINIA LAKE.

### 3.0 RAINFALL-RUNOFF MODELING

To assess the COE's and the original Flood Insurance Study's (FIS) hydrology, Nimbus conducted a hydrologic analysis using the SCS methods option in the HEC-1 computer model (Reference 1). Table 1 lists the models used in this study and the purpose of each model.

The following parameters were used within the models to calculate runoff:

- 1) Basin area in square miles.
- 2) Runoff curve number, which is an estimate of how much rainfall will become runoff for a given basin. The number is selected based upon soil type, relative soil moisture content, vegetation type, and vegetation cover density.
- 3) Percentage of the drainage area that is impervious.
- 4) Rainfall depth, duration, and distribution.
- 5) Basin lag time, which is defined as the time from the center of mass of rainfall excess to the peak discharge, expressed in hours.
- 6) Hydrograph routing parameters.
- 7) Hydrograph diversion parameters.

Figures 4a and 4b, Flow Routing Diagrams, were prepared in order to assist the reader in following the structure of the HEC-1 model. Models which were produced for this study are set forth in the Appendix.

#### Basin Area

The watershed boundaries were identified using USGS 7.5 minute quadrangle maps (Reference 2) and field inspection. The area of each contributing drainage area was measured from the maps.

#### Curve Numbers

The first step to estimating runoff curve number is identification of soil types for each individual drainage area. In the cases where the soil type had more than one possible hydrologic soil group, the soil group was selected based upon field inspection or use of the more conservative possibility. Soils are classified by the SCS into four hydrologic soil groups, type A, B, C and D. Type A soils have a rapid infiltration rate and include very porous soils such as sandy soils. Type D soils have a very slow infiltration rate which results in a larger percentage of the rainfall expressed as runoff. Soil types and hydrologic soil groups were identified using the SCS Soil Survey for Washoe County (Reference 3).

**TABLE 1**  
**Description of Rainfall-Runoff Models**  
**(to determine 100-year discharge for the 1989 Flood Insurance Re-Study)**

DRYCR.901	This model determines the 100-year discharges for concentrations points above Point H for Dry Creek (See Figure 3). Aerial reductions based on 13 square miles.
THOM100.901 THOM10.901 THOM02.901	These models determine the 2-year, 10-year, and 100-year discharges for Thomas Creek at its apex and at Virginia Street. Aerial reduction based on 11.5 square miles.
DREV.901	This model combines the Evans Creek and Dry Creek watersheds. This model determines the 100-year water surface elevation for the ponding area along I-580 between the Evans and Dry Creek boxes, and the 100-year discharge at the confluence of Evans and Dry Creeks (PT1 See Figure 3). Aerial reduction based on 24 square miles.
WSHYD.901	This model combines Dry Creek, Evans Creek, and the overflow from the Thomas Creek watershed and subbasins B1, B2, and E4. This model determines the 100-year discharges at PTJ and PTK (See Figure 3). Aerial reduction based on 38 square miles.
RNWSHYD.901	This model combines the Southwest Reno watershed (SK1, DT1, DT2, R2, R1) with WSHYD.901. Aerial reduction based on 52 square miles. This model determines the 100-year discharges for PTL and PTM (See Figure 3). PTM is at Longley Lane and Boynton Slough.

Relative soil moisture content is described in the SCS methodology by a term identified as "antecedent moisture condition" (AMC). Three different relative conditions are described by the SCS: AMC I, II and III. AMC I is an extremely dry condition where soil moisture has been depleted and infiltration rates for the soil are near their maximum. AMC II is an average condition. AMC II is the standard condition used for hydrologic analysis in the western states. AMC III is a saturated condition which represents the condition where the soil infiltration rate is near its lowest level. The AMC II soil moisture condition was used in selecting the appropriate table of curve numbers.

Vegetation and cover density for the drainage areas were determined from field inspection and aerial photos. Using the identified hydrologic soil groups and vegetation information, curve numbers used in the HEC-1 models were selected using the SCS TR-55 handbook and SCS NEH-4 as a guide (References 4 and 5).

### Rainfall

The rainfall distribution used in this model is a hypothetical distribution similar to the SCS Type I and II but uses data specific to the watershed. The depths for 5 and 15 minute, 1, 2, 3, 6, 12, and 24-hour values are entered into the HEC-1 model using the PH record. A rainfall mass curve is generated by HEC-1 by rearrangement of the depths for each duration so that the central 5 minute period of the 24-hour distribution contains the 5 minute depth specified and the central 15 minute period contains the 15 minute depth, etc. This same procedure was used by the SCS in generating the Type 1, 1A, II, and III dimensionless temporal distributions. The SCS distributions are based on regional averages. A considerable amount of uncertainty exists regarding the nature of extreme storm events for the study area. Due to lack of recorded data on depths and temporal distributions, a technically superior method was not available.

Rainfall depths to be used in the HEC-1 model for each drainage area were derived according to NOAA Atlas 2, Volume VII - Nevada (Reference 6). The point rainfall within each of the models was reduced according to the total drainage area being modeled. The reduction of the point rainfall was based on the aerial reduction curves developed in TP-40 which are also included in NOAA Atlas 2, Volume V11-Nevada. An option was used in the HEC-1 model that automatically reduces the point rainfall per TP-40 when the total drainage area is placed in the second field of the PH card.

### Basin Lag

Basin travel time, or time of concentration, is the time it takes for water to reach the outlet from the hydraulic most distance point in the basin. For subbasins less than 2000 acres (3.12 square miles) or subbasins with no defined channel, the Upland Method in NEH-4 was used to develop the travel time. This method estimates a flow velocity based on channel slope and ground cover.

Travel time for larger subbasins with defined channels were developed using the procedure described in TR-55. Using this method, the hydraulic length was divided into three types of reaches ; sheet flow, shallow concentrated flow, and channel flow. A flow velocity was estimated for each type of reach, and the travel time calculated. For a more detailed explanation of this method, refer to Chapter 3 in the TR-55 manual (Reference 4).

Due to the variability of the channel characteristics, all travel times were performed by a reach by reach analysis. The resulting travel times were then multiplied by the empirical factor of 0.6 (NEH-4) to obtain the subbasin lag time.

### Routing

Channel routing and overland flow routing were performed with the Muskingum method. The parameters for the reaches modeled with the Muskingum method were estimated using channel and overbank characteristics, lengths, slopes and typical roughness. Manning's equation and the COE's hydraulic model HEC-2 were used to estimate travel times for reaches with defined channels (Reference 19). For reaches without a defined channel, travel times were estimated using the chart for shallow concentrated flow in TR-55. The guidelines set forth in the HEC-1 manual were used to estimate values for k,t, and x (Reference 1).

The Modified Puls routing method was used to route the flow under I-580 at two locations: a reinforced concrete box (RCB) for Evans Creek, and a 66 inch culvert located between the Evans Creek RCB and the Dry Creek RCB. No storage routing was required for the Dry Creek crossing under the interstate because the storage within the channel is negligible. The stage-discharge relationships at the culverts were calculated using the methods and equations in the Federal Highway Administration report "Hydraulic Design of Highway Culverts" (Reference 12). The stage-storage relationship for each culvert was developed using a 1 inch = 400 feet scale topographic map (4 foot contour interval) developed by Kenney Aerial Mapping, Inc. (Reference 13). A topographic map, 1" = 100' scale (2 foot contour interval), from the Nevada Department of Transportation (NDOT) was used to supplement the Kenney map (Reference 14). The Modified Puls routing method was also used to route flow through Dant Dam. The stage-storage-discharge table developed by Kennedy/Jenks/Chilton (Reference 18) for the dam was used in the model RNWSHYD.901 .

Flow from southwest Reno must pass through highly urbanized areas and is attenuated by Virginia Street, the freeway, the airport, Virginia Lake and other obstructions. For the purpose and scope of this analysis, a detailed analysis of these obstructions was not attempted. To model the attenuation, an overland flow velocity was used to determine the travel time and a low X value for the Muskingum routing (0.1 to 0.15) was used to simulate the overland storage.

## Diversions

At certain locations within the subbasins, a portion of the flow during a 100-year event will exceed the capacity of the channel. Flow that does exceed the capacity of the channel can leave the subbasin permanently or temporarily. To quantify these diverted flows, the diversion card option in the HEC-1 model was used. The discharge tables developed to model the diversion of flow at the box culverts located at Evans Creek at I-580, Dry Creek at I-580, and Dry Creek at South McCarran Boulevard were determined using the weir equation, Manning's equation, and the culvert equations from the Federal Highway Administration report on culvert design (Reference 12).

The diversion cards were used at two other locations along Evans Creek: the reach of Evans Creek from Lakeside Drive to approximately 60 feet above it, and the reach extending from Lake Ditch to Lakeside Drive. For these reaches the discharge tables to model the diversion were developed using HEC-2 models (Reference 15) and weir flow equations.

Parameters for each basin are set forth in Tables 2 thru 4.

## Results

Table 5 contains discharges at key concentration points.

**TABLE 2**  
**WATERSHED PARAMETERS FOR THOMAS CREEK**

SUBBASIN	BASIN AREA sq. mi.	CURVE NUMBER	HYDRAULIC LENGTH ft.	LAG TIME hr.	100 Yr., 24 Hr. RAINFALL in.	AVERAGE VELOCITY for entire hydraulic length ft/sec
T1	2.50	69	12,200	0.35	5.44	5.8
T2	1.82	58	11,400	0.29	4.92	6.6
T3	0.82	59	8,000	0.30	4.73	4.4
T4	2.16	58	18,450	0.54	4.20	5.7
T5	1.19	71	16,000	0.49	3.40	5.4
T6A	0.65	75	8,700	0.21	2.80	6.9
T6B	2.40	75	16,400	0.66	2.80	4.1

TABLE 3  
WATERSHED PARAMETERS FOR DRY CREEK

SUBBASIN	BASIN AREA sq. mi.	CURVE NUMBER	HYDRAULIC LENGTH ft.	LAG TIME hr.	100 Yr., 24 Hr. RAINFALL in.	AVERAGE VELOCITY for entire hydraulic length ft/sec
D1	0.78	65	9,900	0.29	4.0	5.7
D2	1.66	77	16,400	0.43	3.7	6.4
D3	1.10	79	12,400	0.38	3.2	5.4
D4	0.19	76	4,900	0.25	2.9	3.3
D5	1.70	75	11,300	0.31	3.7	6.1
D6	1.60	80	17,200	0.57	3.1	5.0
D7	1.20	80	19,800	0.85	3.1	3.9
D8	0.07	80	4,000	0.33	2.8	2.0
D9	1.53	77	15,200	0.45	3.1	5.6
D10	0.63	78	9,000	0.45	2.8	3.3
D11	1.40	80	20,800	0.85	3.0	4.1
D12	0.08	80	2,800	0.23	2.8	2.0
D13	0.44	80	9,500	0.68	2.8	2.3
D14	1.20	80	13,400	0.74	2.8	3.0

TABLE 4  
Watershed Parameters for Evans Creek and Southwest Watersheds

SUBBASIN	BASIN AREA sq. mi.	CURVE NUMBER	HYDRAULIC LENGTH ft.	LAG TIME hr.	100 Yr., 24 Hr. RAINFALL in.	AVERAGE VELOCITY for entire hydraulic length ft/sec
EV1	8.60	72	43,300	1.04	4.2	6.9
EV2	1.00	78	5,800	0.74	2.8	3.6
EV3	0.52	76	5,600	0.70	2.8	3.7
EV4	0.40	78	5,800	0.48	2.8	2.0
SK1	2.20	85	19,100	0.48	2.8	6.6
DT1	1.21	85	16,000	0.42	2.8	6.3
DT2	0.94	85	9,900	0.33	2.8	5.3
R1	5.50	82	23,700	2.40	2.8	1.6
R2	4.10	85	24,600	1.8	2.8	2.3
B1	1.70	80	11,800	1.20	2.8	1.6
B2	0.69	89	7,800	0.70	2.8	2.0

**TABLE 5**  
**Summary of Discharges (cfs)**  
**(Nimbus Models)**

<b>DRY CREEK</b>			100-year
South Branch			
at Panorama Drive (PT) (from D11)			386,
South Middle Branch			
just above confluence with main branch (PTD) (from D7)			332,
North Middle Branch			
just above confluence with (middle branch PTC)			1346,
North Branch			
at Steamboat Ditch (from D9)			524
Main Branch (middle branch)			
at Steamboat Ditch (PTB)			1343,
below confluence with north middle branch (PTC)			2711,
at Panorama Drive (PTE)			3536,
at Huffaker Lane (PTF)			3874,
just below I-580 (PTH)			3997,
at confluence with Evans Creek (PTI)			4647 <sub>2</sub>
at South McCarran Blvd. (PTJ)			4724 <sub>3</sub>
at Peckham Lane (PTK)			3571 <sub>3</sub>
<b>DRY CREEK/BOYNTON SLOUGH</b>			100-Year
at confluence of Southside ditch (PTL)			4080 <sub>3</sub>
at Longley Lane (CBALL)			5759 <sub>4</sub>
<b>THOMAS CREEK</b>	<b>2-Year</b>	<b>10-Year</b>	<b>100-Year</b>
at apex (APEX1)	102	694	2640
at Virginia Street (T6A&B)	95	618	2544

1, DRYCR.901  
 2, DREV.901  
 3, WSHYD.901  
 4, RNWSHYD.901

IDEALLY 100 YR. FLOW WOULD BE  
 THROTTLED DOWN TO CAPACITY OF 18  
 10 YR. PIPED & DETENTION  
 IMPROVEMENTS @ I-580 INTERCHANGE,  
 AS WELL AS FUTURE IMPROVEMENTS  
 THROUGH HUFFAKER SUBDIVISION.

A SIGNIFICANT BENEFIT  
 TO FUTURE DETENTION WOULD  
 BE TO THROTTLE THIS FLOW  
 DOWN TO 400 CFS EXIST.  
 CHANNEL CAPACITY IN  
 FLATTER AREA BELOW  
 THE APEX.

## 4.0 OTHER STUDIES

### Tudor Study for FEMA

The original flood insurance study for Washoe County and the City of Reno was completed by Tudor Engineering in July 1979 (Reference 16 and 17). Part of that study developed hydrology for Dry Creek and Thomas Creek. Discharges of Dry Creek and Thomas Creek from the Tudor study are in shown in Table 6. To develop the hydrology for these creeks, Tudor Engineering used a regional analysis based on 306 flood peaks in 18 moderate sized, natural drainage basins in the Truckee and Carson River Watersheds. The equation is a function of mean annual precipitation and drainage area.

In their analysis (Reference 7), Tudor indicated that the regional equation approach was the most appropriate "because it is based on frequency of actual observed floods and all the diverse characteristics of rainfall-runoff and snowmelt relations are included in this methodology." Tudor indicated that the hydrologic computer models (such as HEC-1), on the other hand, are based on methods that must assume or ignore many hydrologic characteristics. The discharges developed by the Tudor study, however, were much lower than the COE's 1980 report and previous studies completed by the COE and the SCS. The COE and local officials had objections to the lower discharges developed in the Tudor study.

### The COE 1980 Report

In 1980, the Sacramento District of the Corps of Engineers published a report titled, Truckee River, California and Nevada, Hydrology (Reference 8). In this report, 100-year discharges were determined for Dry, Thomas, and Evans Creeks using a hydrologic model (HEC-1) combined with the results of a statistical analysis. A more detailed explanation regarding how this hydrology is developed can be found in the COE's report. Discharges for Dry and Thomas Creeks from this study are presented in Table 6. These discharges are significantly higher than the corresponding discharges in the original FEMA study.

The COE addresses the difference between the Tudor study and their study in a January 28, 1980, letter to FEMA (Reference 9). In this letter the COE expressed concern in Tudor's regional equation that was developed for estimating floodflows on Steamboat, Thomas, Evans, and Dry Creeks. Their major concerns were that only three of the 18 stream gages used to develop the regional relationship were representative of the study area and that this method does not recognize cloudburst potential because the mean annual precipitation is used instead of a short duration precipitation parameter. Specifically, this letter expressed concern regarding the low values of Dry Creek in comparison to the COE report. The COE stated that the flood potential estimated using the regional equation is understated, and they would not revise their discharges for Dry Creek.

TABLE 6  
100-YEAR DISCHARGES (cfs)  
from previous studies

MAJOR CONCENTRATION POINTS	CURRENT		COE		SCS		NIMBUS VALUES 1990 STUDY
	FEMA VALUES (Ref. 16 and 17)	1974 STUDY (Ref. 10)	1980 STUDY (Ref. 8)	1980 STUDY (Ref. 11)	1990 STUDY		
Dry Creek	-----	-----	1180	-----	-----	1343	
@ Steamboat Ditch	1000	4300	4900	6550	6550	3997	
@ I-580/Virginia Street <sup>1</sup>	1880	-----	-----	-----	-----	4647	
below confluence w/Evans Creek							
Boynton Slough	-----	-----	5000 <sup>2</sup>	-----	-----	5759	
@ Longley Lane							
Thomas Creek	1500	-----	-----	-----	-----	2640	
@ Apex of	-----	3500	2500	-----	-----	-----	
@ Steamboat Ditch	-----	3900	-----	3400	3400	2544	
@ HWY 395	-----						

*SEE NOTE  
Pg. 18*

<sup>1</sup>The hydrology by the COE, SCS, and FEMA were developed before I-580 was built across Evans Creek and Dry Creek.  
<sup>2</sup>Based on the combined event curve in Chart 27 of the COE 1980 report

### Other Studies By Agencies

In 1974, the COE published a floodplain information study that included discharges for Dry and Thomas Creeks (Reference 10). These discharges were higher than the discharges in the COE's 1980 report. The 1980 report superceded the previous COE's studies for these watersheds. In 1980, the SCS conducted a study on Dry and Thomas Creeks (Reference 11). Their discharges were up to 33% higher than the COE's values.

### **5.0 CONCLUSION**

As stated in the introduction, the purpose of this hydrologic study was to establish 100-year discharges at key concentration points on Thomas Creek, Dry Creek, and the Boynton Slough for the flood insurance study. The five hydrologic models were developed to provide discharges at these key concentration points. A detailed hydrologic analysis which would attempt to quantify the effects of the flow due to Virginia Lake, the freeway and the airport was not generated for the Southwest Reno watershed. This type of detailed study is beyond the scope of work for this study.

Assumptions were made regarding travel time and storage through the urbanized areas based on field investigations, information regarding the location of flooding in 1986, and topography from USGS 7.5 minute quadrangles. The 100 year discharges by Nimbus for this restudy compare favorably to those developed by the Corps of Engineers. Due to the lack of data available for calibration of the models, differences between values can most likely be attributed to differences in methodology.

## 6.0 REFERENCES

1. U.S. Department of the Army, Corps of Engineers, Hydrologic Engineering Center, Flood Hydrograph Package, February 1981, revised June 1988.
2. U.S. Department of the Interior, Geological Survey, 7.5-Minute Series Topographic Maps, Scale 1:24,000, Contour Intervals 10, 20, and 40 feet: Mount Rose NE (1982) Steamboat (1982) Mount Rose NW (1982) Mount Rose (1982).
3. U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Washoe County Nevada, South Part, August 1983.
4. U.S. Department of Agriculture, Soil Conservation Service, Engineering Division, Urban Hydrology for Small Watersheds, Technical Release 55, June 1986.
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6. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service, NOAA Atlas 2, Precipitation - Frequency Atlas of the Western United States, Volume VII - Nevada, 1973.
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8. U.S. Department of the Army, Corps of Engineers, Sacramento District, Truckee River, California and Nevada. Hydrology, February 1980.
9. U.S. Department of the Army, Corps of Engineers, Sacramento District, a letter to FEMA regarding the regional equations developed by Tudor Engineering for Washoe County, January 1980.
10. U.S. Department of the Army, Corps of Engineers, Sacramento District, Floodplain Information, Southwest Foothills Streams (Evans, Thomas and Whites Creek & Skyline Wash ): Reno, Nevada, June 1974.
11. U.S. Department of Agriculture, Soil Conservation Service - Reno office, Stormwater Hydrology and Conservation Treatments in Southwest Reno, February 1980.
12. U.S. Department of Transportation, Federal Highway Administration, Office of Engineering, Bridge Division, Hydraulic Branch, Hydraulic Charts for the Selection of Highway Culverts, Hydraulic Engineering Circular No. 5, June 1980.
13. Kenney Aerial, Topography Map, Dry Creek and Thomas Creeks, Washoe County, Nevada, 1:4800, Contour Interval 4 feet: 1989.

14. SEA Engineers/Planners Incorporated, Construction Plans for U.S. 395 - Del Monte Lane to South Virginia, Reno, Nevada, July 1986.
15. Nimbus Engineers, Request for Letter of Map Revision for Evans Creek, Reno, Nevada, October 1988.
16. Federal Emergency Management Agency, Flood Insurance Study: Washoe County, Nevada, Unincorporated Areas, April 1990.
17. Federal Emergency Management Agency, Flood Insurance Study: City of Reno, April 1990.
18. Kennedy/Jenks/Chilton, Supplemental Report for Plumas Moana Storm Drain, March 1989.
19. U.S Department of the Army, Corps of Engineers Hydrologic Engineering Center, Computer Program 723-X6-LZ02A, HEC II Water Surface Profiles, September 1988 updated June 1990.

# APPENDIX



## APPENDIX

### HEC-1 MODELS

- |   |   |
|---|---|
| THOM02.901<br>THOM10.901<br>THOM100.901 | - Thomas Creek (2, 10, and 100-year, 24 hour)                                     |
| DRYCR.901                               | - Dry Creek (100-year, 24 hour)   |
| DREV.901                                | - Evans Creek combined with Dry Creek (100-year, 24-hour)                         |
| WSHYD.901                               | - Dry, Evans, and Thomas Creeks with subbasins B1, B2, and E4 (100-year, 24 hour) |
| RNWSHYD.901                             | - WSHYD combined with Southwest Reno watershed (100-year, 24 hour)                |

THOM02.901

```
*****  
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *  
* FEBRUARY 1981 *  
* REVISED 01 JUN 88 *  
* RUN DATE 11/20/1990 TIME 12:44:55 *  
*****
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*****  
* U.S. ARMY CORPS OF ENGINEERS *  
* THE HYDROLOGIC ENGINEERING CENTER *  
* 609 SECOND STREET *  
* DAVIS, CALIFORNIA 95616 *  
* (916) 551-1748 *  
*****
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X X XXXXXXXX XXXXX X  
X X X X X XX  
X X X X X  
XXXXXXXX XXXX X XXXXX X  
X X X X X  
X X X X X X  
X X XXXXXXXX XXXXX XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KH.

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



LINE	ID	1	2	3	4	5	6	7	8	9	10
46	KK CP-C	COMBINE ROUTED T1-T3 W/ T4									
47	HC	2									
48	KK RCP-D	ROUTE COMBINED T1-T4 TO CONCENTRATION PT D									
49	RM	4	.3492	.4							
50	KK T5	THOMAS CREEK WATERSHED T5									
51	BA	1.19									
52	PH	50	11.54	.13	.25	.44	.57	.69	.98	1.30	1.70
53	LS		71	0							
54	UD	.49									
55	KK CP-D	COMBINE ROUTED T1-T4 W/ T5									
56	HC	2									
57	KD	1									
58	KK RAPEX	ROUTE COMBINED T1-T5 TO APEX									
59	RM	4	.37	.4							
60	KK T6A	THOMAS CREEK WATERSHED T6 @ fan APEX									
61	BA	.65									
62	PH	50	11.54	.13	.26	.46	.56	.66	.88	1.09	1.3
63	LS		75								
64	UD	.21									
65	KK APEX1	COMBINE FLOWS AT APEX									
66	HC	2									
67	KD	22									
68	KK RT-395	ROUTE FLOWS FROM APEX TO 395									
69	RM	5	1.02	.2							
70	KK T6B	THOMAS CREEK WATERSHED T6 FROM APEX TO 395									
71	BA	2.4									
72	PH	50	11.54	.13	.26	.46	.56	.66	.88	1.09	1.3
73	LS		75								
74	UD	.66									
75	KK T6A&B	COMBINE ALL FLOWS									
76	HC	2									
77	ZZ										

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE	(V) ROUTING	(--->) DIVERSION OR PUMP FLOW
NO.	(.) CONNECTOR	(<---) RETURN OF DIVERTED OR PUMPED FLOW
20	T1 V	
	V	
25	RT1-B	
	.	
27	.	T2
	.	.
	.	.
32	.	T3
	.	.
	.	.
37	CP-B.....	
	V	
	V	
39	RCP-C	
	.	
41	.	T4
	.	.
	.	.
46	CP-C.....	
	V	
	V	
48	RCP-D	
	.	
50	.	T5
	.	.
	.	.
55	CP-D.....	
	V	
	V	
58	RAPEX	
	.	
60	.	T6A
	.	.
	.	.
65	APEX1.....	
	V	
	V	
68	RT-395	
	.	
70	.	T6B
	.	.
	.	.
75	T6A&B .....	

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

```
*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* FEBRUARY 1981 *
* REVISED 01 JUN 88 *
*
* RUN DATE 11/20/1990 TIME 12:44:55 *
*
*****

*****
*
* U.S. ARMY CORPS OF ENGINEERS *
* THE HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 551-1748 *
*
*****
```

\*\*\*\*\*

Filename : THDM02.901  
 2-Year Hydrology Model For : FEMA Contract No. : EMW-89-C-2841  
 Date : November 20, 1990 Nimbus Job No. : B901

THIS MODEL IS BASED ON DATA GENERATED BY NIMBUS ENGINEERS DURING SUMMER 1989  
 THE PARAMETERS FOR THIS MODEL ARE BASED ON THE 100 YEAR RAIN FALL PATTERN OF  
 THE NOAA 2 ATLAS. LOSSES ARE BASED ON THE SCS CURVE NUMBER METHOD OUTLINED IN  
 NEH-4 AND TR-55. THE MUSKINGHAM METHOD IS USED FOR ROUTING. THE UPLAND  
 METHOD IS USED FOR THE DETERMINATION OF LAG TIME.  
 CURVE NUMBERS ESTIMATED FROM USFS PHOTOGRAPHS.  
 AERIAL REDUCTION FOR TOTAL AREA (11.54 sq.mi.) OF THOMAS CREEK

))))))))) 2-Year, 24 Hour Event (((((((((((((((((((((((((((

\*\*\*\*\*

19 IO

OUTPUT CONTROL VARIABLES

IPRNT 3 PRINT CONTROL  
 IPLOT 1 PLOT CONTROL  
 QSCAL 0. HYDROGRAPH PLOT SCALE

IT

HYDROGRAPH TIME DATA

NMIN 5 MINUTES IN COMPUTATION INTERVAL  
 IDATE 1 0 STARTING DATE  
 ITIME 0000 STARTING TIME  
 NQ 269 NUMBER OF HYDROGRAPH ORDINATES  
 NDDATE 2 0 ENDING DATE  
 NDTIME 0000 ENDING TIME  
 ICENT 19 CENTURY MARK

COMPUTATION INTERVAL .08 HOURS  
 TOTAL TIME BASE 24.00 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

\*\*\*\*\*  
 \* \*  
 \* T1 \* THOMAS CREEK WATERSHED T1  
 \* \*  
 \*\*\*\*\*

20 KK

SUBBASIN RUNOFF DATA

21 BA SUBBASIN CHARACTERISTICS  
 TAREA 2.50 SUBBASIN AREA

PRECIPITATION DATA

22 FH DEPTHS FOR 50-PERCENT HYPOTHETICAL STORM

..... HYDRO-35 .....			..... TP-40 .....				..... TP-49 .....				
5-MIN	15-MIN	60-MIN	2-HR	3-HR	6-HR	12-HR	24-HR	2-DAY	4-DAY	7-DAY	10-DAY
.16	.31	.55	.76	.96	1.42	2.05	2.67	.00	.00	.00	.00

STORM AREA = 11.54

23 LS SCS LOSS RATE

STRTL	.90	INITIAL ABSTRACTION
CRVNR	69.00	CURVE NUMBER
RTIMP	.00	PERCENT IMPERVIOUS AREA

24 UD SCS DIMENSIONLESS UNITGRAPH  
 TLAG .35 LAG

\*\*\*

UNIT HYDROGRAPH  
 23 END-OF-PERIOD ORDINATES

344.	1063.	2226.	2965.	3067.	2705.	2132.	1415.	996.	720.
509.	359.	253.	177.	125.	89.	63.	44.	32.	24.
17.	10.	3.							

\*\*\*                    \*\*\*                    \*\*\*                    \*\*\*                    \*\*\*

HYDROGRAPH AT STATION T1

TOTAL RAINFALL = 2.32, TOTAL LOSS = 1.98, TOTAL EXCESS = .34

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.00-HR
107.	12.50	(CFS) 59.	22.	22.	22.
		(INCHES) .220	.332	.332	.332
		(AC-FT) 29.	44.	44.	44.

CUMULATIVE AREA = 2.50 SQ MI

\*\*\* \*\*

\*\*\*\*\*  
 \* \*  
 \* RT1-B \* ROUTE T1 TO CONCENTRATION POINT B  
 \* \*  
 \*\*\*\*\*

25 KK

HYDROGRAPH ROUTING DATA

26 RM

MUSKINGUM ROUTING

NSTPS 1 NUMBER OF SUBREACHES  
AMSKK .20 MUSKINGUM K  
X .40 MUSKINGUM X

\*\*\*

\*\*\* \*\*\* \*\*\* \*\*\* \*\*\*

HYDROGRAPH AT STATION RT1-B

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.00-HR
102.	12.67	(CFS) 59.	22.	22.	22.
		(INCHES) .219	.329	.329	.329
		(AC-FT) 29.	44.	44.	44.

CUMULATIVE AREA = 2.50 SQ MI

\*\*\* \*\*

\*\*\*\*\*

27 KK \* T2 \* THOMAS CREEK WATERSHED T2

\*\*\*\*\*

SUBBASIN RUNOFF DATA

28 BA SUBBASIN CHARACTERISTICS  
TAREA 1.92 SUBBASIN AREA

PRECIPITATION DATA

29 PH DEPTHS FOR 50-PERCENT HYPOTHETICAL STORM

HYDRG-35			TP-40				TP-49				
5-MIN	15-MIN	60-MIN	2-HR	3-HR	6-HR	12-HR	24-HR	2-DAY	4-DAY	7-DAY	10-DAY
.15	.29	.51	.69	.87	1.27	1.82	2.36	.00	.00	.00	.00

STORM AREA = 11.54

30 LS SCS LOSS RATE  
STRTL 1.45 INITIAL ABSTRACTION  
CRVNBR 58.00 CURVE NUMBER  
RTIMP .00 PERCENT IMPERVIOUS AREA

31 UD SCS DIMENSIONLESS UNITGRAPH  
TLAG .29 LAG

\*\*\*

UNIT HYDROGRAPH

19 END-OF-PERIOD ORDINATES

388.	1261.	2334.	2654.	2365.	1782.	1112.	734.	501.	331.
219.	143.	97.	65.	42.	29.	21.	13.	6.	

\*\*\* \*\*\* \*\*\* \*\*\* \*\*\*

HYDROGRAPH AT STATION T2

TOTAL RAINFALL = 2.05, TOTAL LOSS = 2.00, TOTAL EXCESS = .05

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
(CFS)	(HR)		6-HR	24-HR	72-HR	24.00-HR
7.	18.08	(CFS)	6.	2.	2.	2.
		(INCHES)	.030	.044	.044	.044
		(AC-FT)	3.	4.	4.	4.

CUMULATIVE AREA = 1.82 SQ MI

\*\*\* \*\* \*\* \*\* \*\*

\*\*\*\*\*

32 KK \* \*  
 \* T3 \* THOMAS CREEK WATERSHED T3  
 \* \*  
 \*\*\*\*\*

SUBBASIN RUNOFF DATA

33 BA SUBBASIN CHARACTERISTICS  
 TAREA .82 SUBBASIN AREA

PRECIPITATION DATA

34 PH DEPTHS FOR 50-PERCENT HYPOTHETICAL STORM

.....	HYDRG-35	.....	.....	TP-40	.....	.....	TP-49	.....	.....	.....	.....
5-MIN	15-MIN	60-MIN	2-HR	3-HR	6-HR	12-HR	24-HR	2-DAY	4-DAY	7-DAY	10-DAY
.15	.30	.53	.71	.87	1.26	1.73	2.19	.00	.00	.00	.00

STORM AREA = 11.54

35 LS SCS LOSS RATE  
 STRTL 1.39 INITIAL ABSTRACTION  
 CRVNR 59.00 CURVE NUMBER  
 RTIMP .00 PERCENT IMPERVIOUS AREA

36 UD SCS DIMENSIONLESS UNITGRAPH  
 TLAG .30 LAG

\*\*\*

UNIT HYDROGRAPH  
 20 END-OF-PERIOD ORDINATES

162.	524.	994.	1159.	1065.	833.	529.	354.	243.	162.
110.	73.	49.	33.	22.	15.	11.	7.	4.	1.

\*\*\* \*\* \*\* \*\* \*

HYDROGRAPH AT STATION T3

TOTAL RAINFALL = 1.90, TOTAL LOSS = 1.86, TOTAL EXCESS = .03

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
(CFS)	(HR)		6-HR	24-HR	72-HR	24.00-HR
2.	18.08	(CFS)	2.	1.	1.	1.
		(INCHES)	.023	.033	.033	.033
		(AC-FT)	1.	1.	1.	1.

CUMULATIVE AREA = .82 SQ MI

\*\*\* \*\*

\*\*\*\*\*

37 KK \* CP-B \* COMBINE ROUTED WATERSHED T1 W/ T2 AND T3 AT CONCENTRATION PT B

\*\*\*\*\*

38 HC HYDROGRAPH COMBINATION  
ICOMP 3 NUMBER OF HYDROGRAPHS TO COMBINE

\*\*\*

\*\*\* \*\*

HYDROGRAPH AT STATION CP-B

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.00-HR
102.	12.67	(CFS) 63.	25.	25.	25.
		(INCHES) .115	.181	.181	.181
		(AC-FT) 31.	50.	50.	50.

CUMULATIVE AREA = 5.14 SQ MI

\*\*\* \*\*

\*\*\*\*\*

39 KK \* RCP-C \* ROUTE COMBINED T1-T3 TO CONCENTRATION PT C

\*\*\*\*\*

HYDROGRAPH ROUTING DATA

40 RM MUSKINGUM ROUTING  
NSTPS 4 NUMBER OF SUBREACHES  
ANSKK .35 MUSKINGUM K  
X .40 MUSKINGUM X

\*\*\*

\*\*\* \*\*

HYDROGRAPH AT STATION RCP-C

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.00-HR
98.	13.00	(CFS) 63.	25.	25.	25.
		(INCHES) .114	.177	.177	.177
		(AC-FT) 31.	49.	49.	49.

CUMULATIVE AREA = 5.14 SQ MI

\*\*\* \*\*

\*\*\*\*\*

41 KK \* \* THOMAS CREEK WATERSHED T4  
 \* \*  
 \*\*\*\*\*

SUBBASIN RUNOFF DATA

42 BA SUBBASIN CHARACTERISTICS  
 TAREA 2.16 SUBBASIN AREA

PRECIPITATION DATA

43 PH DEPTHS FOR 50-PERCENT HYPOTHETICAL STORM

HYDRO-35			TP-40				TP-49				
5-MIN	15-MIN	60-MIN	2-HR	3-HR	6-HR	12-HR	24-HR	2-DAY	4-DAY	7-DAY	10-DAY
.16	.31	.55	.72	.88	1.25	1.65	2.05	.00	.00	.00	.00

STORM AREA = 11.54

44 LS SCS LOSS RATE

STRTL	1.45	INITIAL ABSTRACTION
CRVNR	58.00	CURVE NUMBER
RTIMP	.00	PERCENT IMPERVIOUS AREA

45 UD SCS DIMENSIONLESS UNITGRAPH  
 TLAG .54 LAG

\*\*\*

UNIT HYDROGRAPH  
 34 END-OF-PERIOD ORDINATES

108.	319.	642.	1093.	1504.	1733.	1794.	1727.	1557.	1341.
1057.	801.	633.	499.	405.	322.	251.	200.	159.	125.
98.	78.	62.	49.	39.	31.	24.	19.	16.	13.
10.	7.	5.	2.						

\*\*\* \*\*\* \*\*\* \*\*\* \*\*\*

HYDROGRAPH AT STATION T4

TOTAL RAINFALL = 1.78, TOTAL LOSS = 1.76, TOTAL EXCESS = .01

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.00-HR
3.	24.00	(CFS) 3.	1.	1.	1.
		(INCHES) .011	.013	.013	.013
		(AC-FT) 1.	1.	1.	1.

CUMULATIVE AREA = 2.16 SQ MI

\*\*\* \*\*

\*\*\*\*\*

46 KK \* \* CP-C \* COMBINE ROUTED T1-T3 W/ T4  
 \* \*  
 \*\*\*\*\*

47 HC HYDROGRAPH COMBINATION  
 ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

\*\*\*

\*\*\* \*\*

HYDROGRAPH AT STATION CP-C

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.00-HR
98.	13.00	(CFS) 64.	25.	25.	25.
		(INCHES) .081	.129	.129	.129
		(AC-FT) 32.	50.	50.	50.

CUMULATIVE AREA = 7.30 SQ MI

\*\*\* \*\*

\*\*\*\*\*

48 KK \* RCP-D \* ROUTE COMBINED T1-T4 TO CONCENTRATION PT D

\*\*\*\*\*

HYDROGRAPH ROUTING DATA

49 RM MUSKINGUM ROUTING

HSTPS	4 NUMBER OF SUBREACHES
AMSKK	.35 MUSKINGUM K
X	.40 MUSKINGUM X

\*\*\*

\*\*\* \*\*

HYDROGRAPH AT STATION RCP-D

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.00-HR
95.	13.42	(CFS) 64.	25.	25.	25.
		(INCHES) .081	.126	.126	.126
		(AC-FT) 32.	49.	49.	49.

CUMULATIVE AREA = 7.30 SQ MI

\*\*\* \*\*

\*\*\*\*\*

50 KK \* T5 \* THOMAS CREEK WATERSHED T5

\*\*\*\*\*

SUBBASIN RUNOFF DATA

51 BA SUBBASIN CHARACTERISTICS

TAREA	1.19 SUBBASIN AREA
-------	--------------------

PRECIPITATION DATA

52 PM DEPTHS FOR 50-PERCENT HYPOTHETICAL STORM

..... HYDR0-35 ..... TF-40 ..... TP-49 .....  
 5-MIN 15-MIN 60-MIN 2-HR 3-HR 6-HR 12-HR 24-HR 2-DAY 4-DAY 7-DAY 10-DAY  
 .13 .25 .44 .57 .69 .98 1.30 1.70 .00 .00 .00 .00

STORM AREA = 11.54

53 LS SCS LOSS RATE  
 STRTL .02 INITIAL ABSTRACTION  
 CRVNR 71.00 CURVE NUMBER  
 RTIMP .00 PERCENT IMPERVIOUS AREA

54 UD SCS DIMENSIONLESS UNITGRAPH  
 TLAG .49 LAG

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UNIT HYDROGRAPH  
 31 END-OF-PERIOD ORDINATES

75.	223.	457.	760.	986.	1075.	1070.	965.	832.	648.
479.	369.	288.	226.	175.	136.	105.	81.	62.	49.
38.	29.	23.	17.	14.	11.	9.	7.	5.	3.
2.									

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HYDROGRAPH AT STATION T5

TOTAL RAINFALL = 1.47, TOTAL LOSS = 1.38, TOTAL EXCESS = .09

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.00-HR
8.	15.08	(CFS) 7.	3.	3.	3.
		(INCHES) .052	.087	.087	.087
		(AC-FT) 3.	6.	6.	6.

CUMULATIVE AREA = 1.19 SQ MI

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 \* \*  
 \* CP-D \*  
 \* \*  
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55 KK COMBINE ROUTED T1-T4 W/ T5

57 KO OUTPUT CONTROL VARIABLES  
 IPRT 1 PRINT CONTROL  
 IPLT 1 PLOT CONTROL  
 QSCAL 0. HYDROGRAPH PLOT SCALE

56 HC HYDROGRAPH COMBINATION  
 ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

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HYDROGRAPH AT STATION CP-D  
 SUM OF 2 HYDROGRAPHS

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DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*
1		0000	1	0.	*	1		0605	74	0.	*	1		1210	147	0.	*	1		1815	220	66.	
1		0005	2	0.	*	1		0610	75	0.	*	1		1215	148	0.	*	1		1820	221	66.	
1		0010	3	0.	*	1		0615	76	0.	*	1		1220	149	0.	*	1		1825	222	66.	
1		0015	4	0.	*	1		0620	77	0.	*	1		1225	150	1.	*	1		1830	223	66.	
1		0020	5	0.	*	1		0625	78	0.	*	1		1230	151	2.	*	1		1835	224	66.	
1		0025	6	0.	*	1		0630	79	0.	*	1		1235	152	3.	*	1		1840	225	66.	
1		0030	7	0.	*	1		0635	80	0.	*	1		1240	153	5.	*	1		1845	226	66.	
1		0035	8	0.	*	1		0640	81	0.	*	1		1245	154	8.	*	1		1850	227	65.	
1		0040	9	0.	*	1		0645	82	0.	*	1		1250	155	13.	*	1		1855	228	65.	
1		0045	10	0.	*	1		0650	83	0.	*	1		1255	156	24.	*	1		1900	229	63.	
1		0050	11	0.	*	1		0655	84	0.	*	1		1300	157	40.	*	1		1905	230	62.	
1		0055	12	0.	*	1		0700	85	0.	*	1		1305	158	60.	*	1		1910	231	60.	
1		0100	13	0.	*	1		0705	86	0.	*	1		1310	159	78.	*	1		1915	232	58.	
1		0105	14	0.	*	1		0710	87	0.	*	1		1315	160	92.	*	1		1920	233	56.	
1		0110	15	0.	*	1		0715	88	0.	*	1		1320	161	100.	*	1		1925	234	54.	
1		0115	16	0.	*	1		0720	89	0.	*	1		1325	162	101.	*	1		1930	235	52.	
1		0120	17	0.	*	1		0725	90	0.	*	1		1330	163	98.	*	1		1935	236	51.	
1		0125	18	0.	*	1		0730	91	0.	*	1		1335	164	93.	*	1		1940	237	50.	
1		0130	19	0.	*	1		0735	92	0.	*	1		1340	165	88.	*	1		1945	238	50.	
1		0135	20	0.	*	1		0740	93	0.	*	1		1345	166	83.	*	1		1950	239	49.	
1		0140	21	0.	*	1		0745	94	0.	*	1		1350	167	79.	*	1		1955	240	49.	
1		0145	22	0.	*	1		0750	95	0.	*	1		1355	168	76.	*	1		2000	241	48.	
1		0150	23	0.	*	1		0755	96	0.	*	1		1400	169	74.	*	1		2005	242	48.	
1		0155	24	0.	*	1		0800	97	0.	*	1		1405	170	72.	*	1		2010	243	48.	
1		0200	25	0.	*	1		0805	98	0.	*	1		1410	171	72.	*	1		2015	244	47.	
1		0205	26	0.	*	1		0810	99	0.	*	1		1415	172	71.	*	1		2020	245	47.	
1		0210	27	0.	*	1		0815	100	0.	*	1		1420	173	71.	*	1		2025	246	47.	
1		0215	28	0.	*	1		0820	101	0.	*	1		1425	174	71.	*	1		2030	247	47.	
1		0220	29	0.	*	1		0825	102	0.	*	1		1430	175	71.	*	1		2035	248	47.	
1		0225	30	0.	*	1		0830	103	0.	*	1		1435	176	71.	*	1		2040	249	47.	
1		0230	31	0.	*	1		0835	104	0.	*	1		1440	177	71.	*	1		2045	250	46.	
1		0235	32	0.	*	1		0840	105	0.	*	1		1445	178	70.	*	1		2050	251	46.	
1		0240	33	0.	*	1		0845	106	0.	*	1		1450	179	70.	*	1		2055	252	46.	
1		0245	34	0.	*	1		0850	107	0.	*	1		1455	180	70.	*	1		2100	253	46.	
1		0250	35	0.	*	1		0855	108	0.	*	1		1500	181	69.	*	1		2105	254	46.	
1		0255	36	0.	*	1		0900	109	0.	*	1		1505	182	69.	*	1		2110	255	46.	
1		0300	37	0.	*	1		0905	110	0.	*	1		1510	183	69.	*	1		2115	256	46.	
1		0305	38	0.	*	1		0910	111	0.	*	1		1515	184	69.	*	1		2120	257	46.	
1		0310	39	0.	*	1		0915	112	0.	*	1		1520	185	69.	*	1		2125	258	45.	
1		0315	40	0.	*	1		0920	113	0.	*	1		1525	186	69.	*	1		2130	259	45.	
1		0320	41	0.	*	1		0925	114	0.	*	1		1530	187	69.	*	1		2135	260	45.	
1		0325	42	0.	*	1		0930	115	0.	*	1		1535	188	69.	*	1		2140	261	45.	
1		0330	43	0.	*	1		0935	116	0.	*	1		1540	189	69.	*	1		2145	262	45.	
1		0335	44	0.	*	1		0940	117	0.	*	1		1545	190	69.	*	1		2150	263	45.	
1		0340	45	0.	*	1		0945	118	0.	*	1		1550	191	69.	*	1		2155	264	45.	
1		0345	46	0.	*	1		0950	119	0.	*	1		1555	192	68.	*	1		2200	265	45.	
1		0350	47	0.	*	1		0955	120	0.	*	1		1600	193	68.	*	1		2205	266	44.	
1		0355	48	0.	*	1		1000	121	0.	*	1		1605	194	68.	*	1		2210	267	44.	
1		0400	49	0.	*	1		1005	122	0.	*	1		1610	195	68.	*	1		2215	268	44.	
1		0405	50	0.	*	1		1010	123	0.	*	1		1615	196	67.	*	1		2220	269	44.	
1		0410	51	0.	*	1		1015	124	0.	*	1		1620	197	67.	*	1		2225	270	44.	
1		0415	52	0.	*	1		1020	125	0.	*	1		1625	198	66.	*	1		2230	271	44.	
1		0420	53	0.	*	1		1025	126	0.	*	1		1630	199	66.	*	1		2235	272	44.	
1		0425	54	0.	*	1		1030	127	0.	*	1		1635	200	66.	*	1		2240	273	44.	
1		0430	55	0.	*	1		1035	128	0.	*	1		1640	201	66.	*	1		2245	274	44.	
1		0435	56	0.	*	1		1040	129	0.	*	1		1645	202	66.	*	1		2250	275	44.	
1		0440	57	0.	*	1		1045	130	0.	*	1		1650	203	66.	*	1		2255	276	43.	
1		0445	58	0.	*	1		1050	131	0.	*	1		1655	204	66.	*	1		2300	277	43.	
1		0450	59	0.	*	1		1055	132	0.	*	1		1700	205	66.	*	1		2305	278	43.	
1		0455	60	0.	*	1		1100	133	0.	*	1		1705	206	66.	*	1		2310	279	43.	
1		0500	61	0.	*	1		1105	134	0.	*	1		1710	207	66.	*	1		2315	280	43.	
1		0505	62	0.	*	1		1110	135	0.	*	1		1715	208	66.	*	1		2320	281	43.	
1		0510	63	0.	*	1		1115	136	0.	*	1		1720	209	66.	*	1		2325	282	43.	
1		0515	64	0.	*	1		1120	137	0.	*	1		1725	210	66.	*	1		2330	283	43.	

1	0520	65	0.	*	1	1125	138	0.	*	1	1730	211	66.	*	1	2335	284	43.
1	0525	66	0.	*	1	1130	139	0.	*	1	1735	212	66.	*	1	2340	285	43.
1	0530	67	0.	*	1	1135	140	0.	*	1	1740	213	66.	*	1	2345	286	42.
1	0535	68	0.	*	1	1140	141	0.	*	1	1745	214	66.	*	1	2350	287	42.
1	0540	69	0.	*	1	1145	142	0.	*	1	1750	215	66.	*	1	2355	288	42.
1	0545	70	0.	*	1	1150	143	0.	*	1	1755	216	66.	*	2	0000	289	42.
1	0550	71	0.	*	1	1155	144	0.	*	1	1800	217	66.	*				
1	0555	72	0.	*	1	1200	145	0.	*	1	1805	218	66.	*				
1	0600	73	0.	*	1	1205	146	0.	*	1	1810	219	66.	*				

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PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.00-HR
101.	13.42	(CFS) 70.	28.	28.	28.
		(INCHES) .077	.121	.121	.121
		(AC-FT) 35.	55.	55.	55.

CUMULATIVE AREA = 8.49 SQ MI

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 \* \*  
 58 KK \* RAPEX \* ROUTE COMBINED T1-T5 TO APEX  
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HYDROGRAPH ROUTING DATA

59 RM MUSKINGUM ROUTING  
 NSTPS 4 NUMBER OF SUBREACHES  
 AMSKK .37 MUSKINGUM K  
 X .40 MUSKINGUM X

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HYDROGRAPH AT STATION RAPEX

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.00-HR
98.	13.75	(CFS) 70.	27.	27.	27.
		(INCHES) .077	.118	.118	.118
		(AC-FT) 35.	53.	53.	53.

CUMULATIVE AREA = 8.49 SQ MI

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 \* \*  
 60 KK \* T6A \* THOMAS CREEK WATERSHED T6 @ fan APEX  
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SUBBASIN RUNOFF DATA

61 BA SUBBASIN CHARACTERISTICS  
TAREA .65 SUBBASIN AREA

PRECIPITATION DATA

62 PH DEPTHS FOR 50-PERCENT HYPOTHETICAL STORM  
..... HYDRQ-35 ..... TP-40 ..... TP-49 .....  
5-MIN 15-MIN 60-MIN 2-HR 3-HR 6-HR 12-HR 24-HR 2-DAY 4-DAY 7-DAY 10-DAY  
.13 .26 .46 .56 .66 .88 1.09 1.30 .00 .00 .00 .00

STORM AREA = 11.54

63 LS SCS LOSS RATE  
STRTL .67 INITIAL ABSTRACTION  
CRVNB 75.00 CURVE NUMBER  
RTIMP .00 PERCENT IMPERVIOUS AREA

64 UD SCS DIMENSIONLESS UNITGRAPH  
TLAG .21 LAG

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UNIT HYDROGRAPH  
15 END-OF-PERIOD ORDINATES

284. 951. 1250. 1052. 631. 359. 215. 125. 72. 42.  
25. 14. 9. 5. 0.

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HYDROGRAPH AT STATION T6A

TOTAL RAINFALL = 1.13, TOTAL LOSS = 1.07, TOTAL EXCESS = .06

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.00-HR
3.	14.25	(CFS) 3.	1.	1.	1.
		(INCHES) .037	.055	.055	.055
		(AC-FT) 1.	2.	2.	2.

CUMULATIVE AREA = .65 SQ MI

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65 KK \* APEX1 \* COMBINE FLOWS AT APEX  
\* \*  
\*\*\*\*\*

67 KO OUTPUT CONTROL VARIABLES  
IPRNT 3 PRINT CONTROL  
IPLOT 1 PLOT CONTROL  
OSCAL 0. HYDROGRAPH PLOT SCALE  
IPNCH 0 PUNCH COMPUTED HYDROGRAPH  
IOUT 22 SAVE HYDROGRAPH ON THIS UNIT  
ISAV1 1 FIRST ORDINATE PUNCHED OR SAVED  
ISAV2 289 LAST ORDINATE PUNCHED OR SAVED  
TIMINT .083 TIME INTERVAL IN HOURS

66 HC HYDROGRAPH COMBINATION

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HYDROGRAPH AT STATION APEX1

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.00-HR
102.	13.75	(CFS) 73.	28.	28.	28.
		(INCHES) .074	.113	.113	.113
		(AC-FT) 36.	55.	55.	55.

CUMULATIVE AREA = 9.14 SQ MI

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68 KK \* RT-395 \* ROUTE FLOWS FROM APEX TO 395

\*\*\*\*\*

HYDROGRAPH ROUTING DATA

69 RM MUSKINGUM ROUTING  
 NSTPS 5 NUMBER OF SUBREACHES  
 ANSKK 1.02 MUSKINGUM K  
 X .20 MUSKINGUM X

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HYDROGRAPH AT STATION RT-395

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.00-HR
83.	15.00	(CFS) 71.	26.	26.	26.
		(INCHES) .072	.106	.106	.106
		(AC-FT) 35.	51.	51.	51.

CUMULATIVE AREA = 9.14 SQ MI

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70 KK \* T&B \* THOMAS CREEK WATERSHED T6 FROM APEX TO 395

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SUBBASIN RUNOFF DATA

71 BA SUBBASIN CHARACTERISTICS  
 TAREA 2.40 SUBBASIN AREA

72 PH

DEPTHS FOR 50-PERCENT HYPOTHETICAL STORM

..... HYDRG-35 .....			..... TP-40 .....				..... TP-49 .....				
5-MIN	15-MIN	60-MIN	2-HR	3-HR	6-HR	12-HR	24-HR	2-DAY	4-DAY	7-DAY	10-DAY
.13	.20	.46	.56	.66	.88	1.09	1.30	.00	.00	.00	.00

STORM AREA = 11.54

73 LS

SCS LOSS RATE

STRTL .67 INITIAL ABSTRACTION  
 CRVNR 75.00 CURVE NUMBER  
 RTIMP .00 PERCENT IMPERVIOUS AREA

74 UD

SCS DIMENSIONLESS UNITGRAPH

TLAS .66 LAG

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UNIT HYDROGRAPH

42 END-OF-PERIOD ORDINATES

71.	221.	426.	711.	1071.	1378.	1568.	1644.	1641.	1549.
1412.	1247.	1036.	822.	666.	545.	451.	380.	314.	255.
212.	174.	144.	118.	96.	80.	65.	55.	45.	37.
31.	25.	21.	17.	15.	13.	10.	8.	6.	4.
2.	0.								

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HYDROGRAPH AT STATION T6B

TOTAL RAINFALL = 1.13, TOTAL LOSS = 1.07, TOTAL EXCESS = .06

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW				
12.	15.08	6-HR	24-HR	72-HR	24.00-HR	
		(CFS)	9.	3.	3.	3.
		(INCHES)	.036	.054	.054	.054
		(AC-FT)	5.	7.	7.	7.

CUMULATIVE AREA = 2.40 SQ MI

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75 KK

\* \*  
 \* T6A&B \* COMBINE ALL FLOWS  
 \* \*  
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76 HC

HYDROGRAPH COMBINATION

ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

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HYDROGRAPH AT STATION T6A&B

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW				
95.	15.00	6-HR	24-HR	72-HR	24.00-HR	
		(CFS)	80.	29.	29.	29.
		(INCHES)	.064	.095	.095	.095

CUMULATIVE AREA = 11.54 SQ MI

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	T1	107.	12.50	59.	22.	22.	2.50		
ROUTED TO	RT1-B	102.	12.67	59.	22.	22.	2.50		
HYDROGRAPH AT	T2	7.	18.08	6.	2.	2.	1.82		
HYDROGRAPH AT	T3	2.	18.08	2.	1.	1.	.82		
3 COMBINED AT	CP-B	102.	12.67	63.	25.	25.	5.14		
ROUTED TO	RCP-C	98.	13.00	63.	25.	25.	5.14		
HYDROGRAPH AT	T4	3.	24.00	3.	1.	1.	2.16		
2 COMBINED AT	CP-C	98.	13.00	64.	25.	25.	7.30		
ROUTED TO	RCP-D	95.	13.42	64.	25.	25.	7.30		
HYDROGRAPH AT	T5	8.	15.08	7.	3.	3.	1.19		
2 COMBINED AT	CP-D	101.	13.42	70.	28.	28.	8.49		
ROUTED TO	RAPEX	98.	13.75	70.	27.	27.	8.49		
HYDROGRAPH AT	T6A	3.	14.25	3.	1.	1.	.65		
2 COMBINED AT	APEXI	102.	13.75	73.	28.	28.	9.14		
ROUTED TO	RT-395	83.	15.00	71.	26.	26.	9.14		
HYDROGRAPH AT	T6B	12.	15.08	9.	3.	3.	2.40		
2 COMBINED AT	T6A&B	95.	15.00	80.	29.	29.	11.54		

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

THOM10.901

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\* FLOOD HYDROGRAPH PACKAGE (HEC-1) \*  
\* FEBRUARY 1981 \*  
\* REVISED 01 JUN 88 \*  
\* RUN DATE 11/20/1990 TIME 12:45:36 \*  
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\* U.S. ARMY CORPS OF ENGINEERS \*  
\* THE HYDROLOGIC ENGINEERING CENTER \*  
\* 609 SECOND STREET \*  
\* DAVIS, CALIFORNIA 95616 \*  
\* (916) 551-1748 \*  
\*\*\*\*\*

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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1G, HEC1DB, AND HEC1KW.

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

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LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
*DIAGRAM
1         ID *****
2         ID
3         ID      Filename : THOM10.901
4         ID      10-Year Hydrology Model   For : FEMA   Contract No. : EMW-89-C-2841
5         ID      Date : November 20, 1990   Nimbus Job No. : 8901
6         ID
7         ID      THIS MODEL IS BASED ON DATA GENERATED BY NIMBUS ENGINEERS DURING SUMMER 1989
8         ID      THE PARAMETERS FOR THIS MODEL ARE BASED ON THE 100 YEAR RAIN FALL PATTERN OF
9         ID      THE NOAA 2 ATLAS. LOSSES ARE BASED ON THE SCS CURVE NUMBER METHOD OUTLINED IN
10        ID      NEH-4 AND TR-55. THE MUSKINGHAM METHOD IS USED FOR ROUTING. THE UPLAND
11        ID      METHOD IS USED FOR THE DETERMINATION OF LAG TIME.
12        ID      CURVE NUMBERS ESTIMATED FROM USFS PHOTOGRAPHS.
13        ID      AERIAL REDUCTION FOR TOTAL AREA (11.54 sq.mi.) OF THOMAS CREEK
14        ID
15        ID      ))))))))))) 10 Year, 24 Hour Event {((((((((((((((((((((
16        ID
17        ID *****
18        IT      5          289
19        IO      4          1

20        KK      T1      THOMAS CREEK WATERSHED T1
21        BA      2.5
22        PH      10      11.54      .26      .51      .90      1.23      1.50      2.12      2.73      3.35
23        LS              69
24        UD      .35

25        KK      RT1-B   ROUTE T1 TO CONCENTRATION POINT B
26        RM      1      .13025      .4

27        KK      T2      THOMAS CREEK WATERSHED T2
28        BA      1.82
29        PH      10      11.54      .28      .54      .95      1.19      1.42      1.95      2.69      3.42
30        LS              58
31        UD      .29

32        KK      T3      THOMAS CREEK WATERSHED T3
33        BA      .82
34        PH      10      11.54      .26      .51      .89      1.13      1.35      1.88      2.56      3.24
35        LS              59
36        UD      .3

37        KK      CP-B   COMBINE ROUTED WATERSHED T1 W/ T2 AND T3 AT CONCENTRATION PT B
38        HC      3

39        KK      RCP-C   ROUTE COMBINED T1-T3 TO CONCENTRATION PT C
40        RM      2      .20487      .4

41        KK      T4      THOMAS CREEK WATERSHED T4
42        BA      2.16
43        PH      10      11.54      .26      .50      .88      1.09      1.29      1.75      2.35      2.94
44        LS              58
45        UD      .54
    
```

LINE	ID	1	2	3	4	5	6	7	8	9	10
46	KK CP-C	COMBINE ROUTED T1-T3 W/ T4									
47	HC	2									
48	KK RCP-D	ROUTE COMBINED T1-T4 TO CONCENTRATION PT D									
49	RM	2	.19881	.4							
50	KK T5	THOMAS CREEK WATERSHED T5									
51	BA	1.19									
52	PH	10	11.54	.22	.43	.75	.95	1.15	1.40	1.90	2.40
53	LS		71	0							
54	UD	.49									
55	KK CP-D	COMBINE ROUTED T1-T4 W/ T5									
56	HC	2									
57	KO	1									
58	KK RAPEX	ROUTE COMBINED T1-T5 TO APEX									
59	RM	3	0.23	.4							
60	KK T6A	THOMAS CREEK WATERSHED T6 @ fan APEX									
61	BA	.65									
62	PH	10	11.54	.26	.51	.90	1.00	1.10	1.25	1.6	1.95
63	LS		75								
64	UD	.21									
65	KK APEX1	COMBINE FLOWS AT APEX									
66	HC	2									
67	KO	22									
68	KK RT-395	ROUTE FLOWS FROM APEX TO 395									
69	RM	5	0.88	.2							
70	KK T6B	THOMAS CREEK WATERSHED T6 FROM APEX TO 395									
71	BA	2.4									
72	PH	10	11.54	.26	.51	.90	1.00	1.10	1.25	1.6	1.9
73	LS		75								
74	UD	.66									
75	KK T6A&B	COMBINE ALL FLOWS									
76	HC	2									
77	ZZ										

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE NO.	(V) ROUTING	(--->) DIVERSION OR PUMP FLOW
NO.	(.) CONNECTOR	(<---) RETURN OF DIVERTED OR PUMPED FLOW
20	T1 V	
	V	
25	RT1-B	
	.	
27	.	T2
	.	.
32	.	T3
	.	.
	.	.
37	CP-B.....	
	V	
	V	
39	RCP-C	
	.	
41	.	T4
	.	.
	.	.
46	CP-C.....	
	V	
	V	
48	RCP-D	
	.	
50	.	T5
	.	.
	.	.
55	CP-D.....	
	V	
	V	
58	RAPEX	
	.	
60	.	T6A
	.	.
	.	.
65	APEX1.....	
	V	
	V	
68	RT-395	
	.	
70	.	T6B
	.	.
	.	.
75	T6A&B.....	

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

```
*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* FEBRUARY 1981
* REVISED 01 JUN 88
*
* RUN DATE 11/20/1990 TIME 12:45:36
*
*****
```

```
*****
*
* U.S. ARMY CORPS OF ENGINEERS
* THE HYDROLOGIC ENGINEERING CENTER
* 609 SECOND STREET
* DAVIS, CALIFORNIA 95616
* (916) 551-1748
*
*****
```

\*\*\*\*\*

```
Filename : THOM10.901
10-Year Hydrology Model For : FEMA Contract No. : EMW-89-C-2841
Date : November 20, 1990 Nimbus Job No. : 8901
```

THIS MODEL IS BASED ON DATA GENERATED BY NIMBUS ENGINEERS DURING SUMMER 1989  
 THE PARAMETERS FOR THIS MODEL ARE BASED ON THE 100 YEAR RAIN FALL PATTERN OF  
 THE NOAA 2 ATLAS. LOSSES ARE BASED ON THE SCS CURVE NUMBER METHOD OUTLINED IN  
 NEH-4 AND TR-55. THE MUSKINGHAM METHOD IS USED FOR ROUTING. THE UPLAND  
 METHOD IS USED FOR THE DETERMINATION OF LAG TIME.  
 CURVE NUMBERS ESTIMATED FROM USFS PHOTOGRAPHS.  
 AERIAL REDUCTION FOR TOTAL AREA (11.54 sq.mi.) OF THOMAS CREEK

))))))))) 10 Year, 24 Hour Event (((((((((((((((((((((((((((((((

\*\*\*\*\*

19 IO

OUTPUT CONTROL VARIABLES

```
IPRNT      4 PRINT CONTROL
IPLGT      1 PLOT CONTROL
QSCAL      0. HYDROGRAPH PLOT SCALE
```

IT

HYDROGRAPH TIME DATA

```
HMIN      5 MINUTES IN COMPUTATION INTERVAL
IDATE     1 0 STARTING DATE
ITIME     0000 STARTING TIME
NQ        289 NUMBER OF HYDROGRAPH ORDINATES
NDDATE    2 0 ENDING DATE
NDTIME    0000 ENDING TIME
ICENT     19 CENTURY MARK
```

```
COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 24.00 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
```

```

*****
*           *
20 KK      *   T1   *   THOMAS CREEK WATERSHED T1
*           *
*****

```

SUBBASIN RUNOFF DATA

```

21 BA      SUBBASIN CHARACTERISTICS
           TAREA      2.50 SUBBASIN AREA

```

PRECIPITATION DATA

```

22 PH      DEPTHS FOR 10-PERCENT HYPOTHETICAL STORM
           ..... HYDRO-35 ..... TP-40 ..... TP-49 .....
           5-MIN 15-MIN 60-MIN 2-HR 3-HR 6-HR 12-HR 24-HR 2-DAY 4-DAY 7-DAY 10-DAY
           .26   .51   .90   1.23 1.50 2.12 2.73 3.35 .00 .00 .00 .00

```

STORM AREA = 11.54

```

23 LS      SCS LOSS RATE
           STRTL      .90 INITIAL ABSTRACTION
           CRVNR      69.00 CURVE NUMBER
           RTIMP      .00 PERCENT IMPERVIOUS AREA

```

```

24 UD      SCS DIMENSIONLESS UNITGRAPH
           TLAG      .35 LAG

```

\*\*\*

UNIT HYDROGRAPH  
23 END-OF-PERIOD ORDINATES

344.	1083.	2226.	2965.	3067.	2705.	2132.	1415.	996.	720.
509.	359.	253.	177.	125.	89.	63.	44.	32.	24.
17.	10.	3.							

\*\*\*\*\*

```

*****
*           *
25 KK      *   RT1-B *   ROUTE T1 TO CONCENTRATION POINT B
*           *
*****

```

HYDROGRAPH ROUTING DATA

```

26 RM      MUSKINGUM ROUTING
           NSTPS      1 NUMBER OF SUBREACHES
           AMSKK      .13 MUSKINGUM K
           X          .40 MUSKINGUM X

```

\*\*\*

\*\*\*\*\*

```

*****
*           *
27 KK      *   T2   *   THOMAS CREEK WATERSHED T2

```

\*\*\*\*\*

SUBBASIN RUNOFF DATA

28 BA SUBBASIN CHARACTERISTICS  
TAREA 1.82 SUBBASIN AREA

PRECIPITATION DATA

29 PH DEPTHS FOR 10-PERCENT HYPOTHETICAL STORM  
..... HYDRO-35 ..... TP-40 ..... TP-49 .....  
5-MIN 15-MIN 60-MIN 2-HR 3-HR 6-HR 12-HR 24-HR 2-DAY 4-DAY 7-DAY 10-DAY  
.28 .54 .95 1.19 1.42 1.95 2.69 3.42 .00 .00 .00 .00

STORM AREA = 11.54

30 LS SCS LOSS RATE  
STRTL 1.45 INITIAL ABSTRACTION  
CRVNR 58.00 CURVE NUMBER  
RTIMP .00 PERCENT IMPERVIOUS AREA

31 UD SCS DIMENSIONLESS UNITGRAPH  
TLAG .29 LAG

\*\*\*

UNIT HYDROGRAPH  
19 END-OF-PERIOD ORDINATES

388. 1261. 2334. 2654. 2365. 1782. 1112. 734. 501. 331.  
219. 143. 97. 65. 42. 29. 21. 13. 6.

\*\*\* \*\*

\*\*\*\*\*

32 KK \* \*  
\* T3 \* THOMAS CREEK WATERSHED T3  
\* \*  
\*\*\*\*\*

SUBBASIN RUNOFF DATA

33 BA SUBBASIN CHARACTERISTICS  
TAREA .82 SUBBASIN AREA

PRECIPITATION DATA

34 PH DEPTHS FOR 10-PERCENT HYPOTHETICAL STORM  
..... HYDRO-35 ..... TP-40 ..... TP-49 .....  
5-MIN 15-MIN 60-MIN 2-HR 3-HR 6-HR 12-HR 24-HR 2-DAY 4-DAY 7-DAY 10-DAY  
.26 .51 .89 1.13 1.35 1.88 2.56 3.24 .00 .00 .00 .00

STORM AREA = 11.54

35 LS SCS LOSS RATE  
STRTL 1.39 INITIAL ABSTRACTION  
CRVNR 59.00 CURVE NUMBER  
RTIMP .00 PERCENT IMPERVIOUS AREA

36 UD SCS DIMENSIONLESS UNITGRAPH  
TLAG .30 LAG

\*\*\*

UNIT HYDROGRAPH  
20 END-OF-PERIOD ORDINATES

162. 524. 994. 1159. 1065. 833. 529. 354. 243. 162.  
110. 73. 49. 33. 22. 15. 11. 7. 4. 1.

\*\*\* \*\*

\*\*\*\*\*

37 KK \* CP-B \* COMBINE ROUTED WATERSHED T1 W/ T2 AND T3 AT CONCENTRATION PT B

\*\*\*\*\*

38 HC HYDROGRAPH COMBINATION  
ICOMP 3 NUMBER OF HYDROGRAPHS TO COMBINE

\*\*\*

\*\*\* \*\*

\*\*\*\*\*

39 KK \* RCP-C \* ROUTE COMBINED T1-T3 TO CONCENTRATION PT C

\*\*\*\*\*

HYDROGRAPH ROUTING DATA

40 RM MUSKINGUM ROUTING  
NSTPS 2 NUMBER OF SUBREACHES  
AMSKK .20 MUSKINGUM K  
X .40 MUSKINGUM X

\*\*\*

\*\*\* \*\*

\*\*\*\*\*

41 KK \* T4 \* THOMAS CREEK WATERSHED T4

\*\*\*\*\*

SUBBASIN RUNOFF DATA

42 BA SUBBASIN CHARACTERISTICS  
TAREA 2.16 SUBBASIN AREA

PRECIPITATION DATA

43 PH DEPTHS FOR 10-PERCENT HYPOTHETICAL STORM  
..... HYDRO-35 ..... TP-40 ..... TP-49 .....  
5-MIN 15-MIN 60-MIN 2-HR 3-HR 6-HR 12-HR 24-HR 2-DAY 4-DAY 7-DAY 10-DAY  
.26 .50 .88 1.09 1.29 1.75 2.35 2.94 .00 .00 .00 .00

STORM AREA = 11.54

44 LS SCS LOSS RATE  
 STRTL 1.45 INITIAL ABSTRACTION  
 CRVNR 58.00 CURVE NUMBER  
 RTIMP .00 PERCENT IMPERVIOUS AREA

45 UD SCS DIMENSIONLESS UNITGRAPH  
 TLAG .54 LAG

\*\*\*

UNIT HYDROGRAPH  
 34 END-OF-PERIOD ORDINATES

108.	319.	642.	1093.	1504.	1733.	1794.	1727.	1557.	1341.
1057.	801.	633.	499.	405.	322.	251.	200.	159.	125.
98.	78.	62.	49.	39.	31.	24.	19.	16.	13.
10.	7.	5.	2.						

\*\*\* \*\*

\*\*\*\*\*  
 \* \*  
 46 KK \* CP-C \* COMBINE ROUTED T1-T3 W/ T4  
 \* \*  
 \*\*\*\*\*

47 HC HYDROGRAPH COMBINATION  
 ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

\*\*\*

\*\*\* \*\*

\*\*\*\*\*  
 \* \*  
 48 KK \* RCP-D \* ROUTE COMBINED T1-T4 TO CONCENTRATION PT D  
 \* \*  
 \*\*\*\*\*

HYDROGRAPH ROUTING DATA

49 RM MUSKINGUM ROUTING  
 NSTPS 2 NUMBER OF SUBREACHES  
 AMSKK .20 MUSKINGUM K  
 X .40 MUSKINGUM X

\*\*\*

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\*\*\*\*\*  
 \* \*  
 50 KK \* T5 \* THOMAS CREEK WATERSHED T5  
 \* \*  
 \*\*\*\*\*

SUBBASIN RUNOFF DATA

51 BA SUBBASIN CHARACTERISTICS  
 TAREA 1.19 SUBBASIN AREA

PRECIPITATION DATA

52 PH DEPTHS FOR 10-PERCENT HYPOTHETICAL STORM

HYDRO-35			TP-40					TP-49			
5-MIN	15-MIN	60-MIN	2-HR	3-HR	6-HR	12-HR	24-HR	2-DAY	4-DAY	7-DAY	10-DAY
.22	.43	.75	.95	1.15	1.40	1.90	2.40	.00	.00	.00	.00

STORM AREA = 11.54

53 LS SCS LOSS RATE  
 STRTL .82 INITIAL ABSTRACTION  
 CRVNR 71.00 CURVE NUMBER  
 RTIMP .00 PERCENT IMPERVIOUS AREA

54 UD SCS DIMENSIONLESS UNITGRAPH  
 TLAG .49 LAG

\*\*\*

UNIT HYDROGRAPH  
 31 END-OF-PERIOD ORDINATES

75.	223.	457.	760.	986.	1075.	1070.	965.	832.	648.
479.	369.	288.	226.	175.	136.	105.	81.	62.	49.
38.	29.	23.	17.	14.	11.	9.	7.	5.	3.
2.									

\*\*\* \*\* \*\* \*\* \*\*

\*\*\*\*\*  
 \* \*  
 55 KK \* CP-D \* COMBINE ROUTED T1-T4 W/ T5  
 \* \*  
 \*\*\*\*\*

57 KB OUTPUT CONTROL VARIABLES  
 IPRNT 1 PRINT CONTROL  
 IPLIT 1 PLOT CONTROL  
 ESCAL 0. HYDROGRAPH PLOT SCALE

56 HC HYDROGRAPH COMBINATION  
 ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

\*\*\*

HYDROGRAPH AT STATION CP-D  
 SUM OF 2 HYDROGRAPHS

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1	0000	1	0.	*	1	0605	74	0.	*	1	1210	147	64.	*	1	1815	220	184.	
1	0005	2	0.	*	1	0610	75	0.	*	1	1215	148	88.	*	1	1820	221	182.	
1	0010	3	0.	*	1	0615	76	0.	*	1	1220	149	118.	*	1	1825	222	180.	
1	0015	4	0.	*	1	0620	77	0.	*	1	1225	150	158.	*	1	1830	223	178.	
1	0020	5	0.	*	1	0625	78	0.	*	1	1230	151	220.	*	1	1835	224	174.	
1	0025	6	0.	*	1	0630	79	0.	*	1	1235	152	315.	*	1	1840	225	169.	

1	0030	7	0.	*	1	0635	80	0.	*	1	1240	153	435.	*	1	1845	222	163.
1	0035	8	0.	*	1	0640	81	0.	*	1	1245	154	554.	*	1	1850	227	157.
1	0040	9	0.	*	1	0645	82	0.	*	1	1250	155	643.	*	1	1855	228	152.
1	0045	10	0.	*	1	0650	83	0.	*	1	1255	156	685.	*	1	1900	229	147.
1	0050	11	0.	*	1	0655	84	0.	*	1	1300	157	683.	*	1	1905	230	143.
1	0055	12	0.	*	1	0700	85	0.	*	1	1305	158	648.	*	1	1910	231	140.
1	0100	13	0.	*	1	0705	86	0.	*	1	1310	159	597.	*	1	1915	232	138.
1	0105	14	0.	*	1	0710	87	0.	*	1	1315	160	546.	*	1	1920	233	136.
1	0110	15	0.	*	1	0715	88	0.	*	1	1320	161	500.	*	1	1925	234	134.
1	0115	16	0.	*	1	0720	89	0.	*	1	1325	162	463.	*	1	1930	235	133.
1	0120	17	0.	*	1	0725	90	0.	*	1	1330	163	433.	*	1	1935	236	131.
1	0125	18	0.	*	1	0730	91	0.	*	1	1335	164	410.	*	1	1940	237	130.
1	0130	19	0.	*	1	0735	92	0.	*	1	1340	165	393.	*	1	1945	238	129.
1	0135	20	0.	*	1	0740	93	0.	*	1	1345	166	379.	*	1	1950	239	128.
1	0140	21	0.	*	1	0745	94	0.	*	1	1350	167	368.	*	1	1955	240	127.
1	0145	22	0.	*	1	0750	95	0.	*	1	1355	168	357.	*	1	2000	241	127.
1	0150	23	0.	*	1	0755	96	0.	*	1	1400	169	348.	*	1	2005	242	126.
1	0155	24	0.	*	1	0800	97	0.	*	1	1405	170	340.	*	1	2010	243	125.
1	0200	25	0.	*	1	0805	98	0.	*	1	1410	171	332.	*	1	2015	244	124.
1	0205	26	0.	*	1	0810	99	0.	*	1	1415	172	325.	*	1	2020	245	123.
1	0210	27	0.	*	1	0815	100	0.	*	1	1420	173	319.	*	1	2025	246	123.
1	0215	28	0.	*	1	0820	101	0.	*	1	1425	174	313.	*	1	2030	247	122.
1	0220	29	0.	*	1	0825	102	0.	*	1	1430	175	308.	*	1	2035	248	121.
1	0225	30	0.	*	1	0830	103	0.	*	1	1435	176	303.	*	1	2040	249	121.
1	0230	31	0.	*	1	0835	104	0.	*	1	1440	177	298.	*	1	2045	250	120.
1	0235	32	0.	*	1	0840	105	0.	*	1	1445	178	294.	*	1	2050	251	119.
1	0240	33	0.	*	1	0845	106	0.	*	1	1450	179	290.	*	1	2055	252	119.
1	0245	34	0.	*	1	0850	107	0.	*	1	1455	180	286.	*	1	2100	253	118.
1	0250	35	0.	*	1	0855	108	0.	*	1	1500	181	283.	*	1	2105	254	118.
1	0255	36	0.	*	1	0900	109	0.	*	1	1505	182	279.	*	1	2110	255	117.
1	0300	37	0.	*	1	0905	110	0.	*	1	1510	183	277.	*	1	2115	256	116.
1	0305	38	0.	*	1	0910	111	0.	*	1	1515	184	274.	*	1	2120	257	116.
1	0310	39	0.	*	1	0915	112	0.	*	1	1520	185	272.	*	1	2125	258	115.
1	0315	40	0.	*	1	0920	113	0.	*	1	1525	186	270.	*	1	2130	259	115.
1	0320	41	0.	*	1	0925	114	0.	*	1	1530	187	269.	*	1	2135	260	114.
1	0325	42	0.	*	1	0930	115	0.	*	1	1535	188	266.	*	1	2140	261	114.
1	0330	43	0.	*	1	0935	116	0.	*	1	1540	189	263.	*	1	2145	262	113.
1	0335	44	0.	*	1	0940	117	0.	*	1	1545	190	258.	*	1	2150	263	113.
1	0340	45	0.	*	1	0945	118	0.	*	1	1550	191	251.	*	1	2155	264	112.
1	0345	46	0.	*	1	0950	119	0.	*	1	1555	192	244.	*	1	2200	265	112.
1	0350	47	0.	*	1	0955	120	0.	*	1	1600	193	238.	*	1	2205	266	111.
1	0355	48	0.	*	1	1000	121	0.	*	1	1605	194	232.	*	1	2210	267	111.
1	0400	49	0.	*	1	1005	122	0.	*	1	1610	195	227.	*	1	2215	268	110.
1	0405	50	0.	*	1	1010	123	0.	*	1	1615	196	223.	*	1	2220	269	110.
1	0410	51	0.	*	1	1015	124	0.	*	1	1620	197	219.	*	1	2225	270	109.
1	0415	52	0.	*	1	1020	125	0.	*	1	1625	198	216.	*	1	2230	271	109.
1	0420	53	0.	*	1	1025	126	0.	*	1	1630	199	214.	*	1	2235	272	108.
1	0425	54	0.	*	1	1030	127	0.	*	1	1635	200	211.	*	1	2240	273	108.
1	0430	55	0.	*	1	1035	128	0.	*	1	1640	201	209.	*	1	2245	274	107.
1	0435	56	0.	*	1	1040	129	0.	*	1	1645	202	207.	*	1	2250	275	107.
1	0440	57	0.	*	1	1045	130	0.	*	1	1650	203	206.	*	1	2255	276	106.
1	0445	58	0.	*	1	1050	131	0.	*	1	1655	204	204.	*	1	2300	277	106.
1	0450	59	0.	*	1	1055	132	0.	*	1	1700	205	202.	*	1	2305	278	106.
1	0455	60	0.	*	1	1100	133	0.	*	1	1705	206	201.	*	1	2310	279	105.
1	0500	61	0.	*	1	1105	134	0.	*	1	1710	207	200.	*	1	2315	280	105.
1	0505	62	0.	*	1	1110	135	1.	*	1	1715	208	198.	*	1	2320	281	104.
1	0510	63	0.	*	1	1115	136	1.	*	1	1720	209	197.	*	1	2325	282	104.
1	0515	64	0.	*	1	1120	137	3.	*	1	1725	210	195.	*	1	2330	283	103.
1	0520	65	0.	*	1	1125	138	5.	*	1	1730	211	194.	*	1	2335	284	103.
1	0525	66	0.	*	1	1130	139	7.	*	1	1735	212	193.	*	1	2340	285	103.
1	0530	67	0.	*	1	1135	140	10.	*	1	1740	213	192.	*	1	2345	286	102.
1	0535	68	0.	*	1	1140	141	13.	*	1	1745	214	191.	*	1	2350	287	102.
1	0540	69	0.	*	1	1145	142	17.	*	1	1750	215	190.	*	1	2355	288	101.
1	0545	70	0.	*	1	1150	143	22.	*	1	1755	216	188.	*	2	0000	289	101.
1	0550	71	0.	*	1	1155	144	28.	*	1	1800	217	187.	*				
1	0555	72	0.	*	1	1200	145	35.	*	1	1805	218	186.	*				

```

*****
PEAK FLOW      TIME      MAXIMUM AVERAGE FLOW
(CFS)         (HR)
685.         12.92      (CFS)      6-HR      24-HR      72-HR      24.00-HR
              (INCHES)  .329       .461       .461       .461
              (AC-FT)  149.       209.       209.       209.
  
```

CUMULATIVE AREA = 8.49 SQ MI

\*\*\* \*\*

```

*****
*           *
58 KK      *   RAPEX *   ROUTE COMBINED T1-T5 TO APEX
*           *
*****
  
```

HYDROGRAPH ROUTING DATA

```

59 RM      MUSKINGUM ROUTING
           NSTPS      3 NUMBER OF SUBREACHES
           ANSKK     .23 MUSKINGUM K
           X         .40 MUSKINGUM X
  
```

\*\*\*

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```

*****
*           *
60 KK      *   T6A *   THOMAS CREEK WATERSHED T6 @ fan APEX
*           *
*****
  
```

SUBBASIN RUNOFF DATA

```

61 BA      SUBBASIN CHARACTERISTICS
           TAREA     .65 SUBBASIN AREA
  
```

PRECIPITATION DATA

```

62 PH      DEPTHS FOR 10-PERCENT HYPOTHETICAL STORM
           ..... HYDRG-35 ..... TP-40 ..... TP-49 .....
           5-MIN 15-MIN 60-MIN 2-HR 3-HR 6-HR 12-HR 24-HR 2-DAY 4-DAY 7-DAY 10-DAY
           .26 .51 .90 1.00 1.10 1.25 1.60 1.95 .00 .00 .00 .00
  
```

STORM AREA = 11.54

```

63 LS      SCS LOSS RATE
           STRTL     .67 INITIAL ABSTRACTION
           CRVNR     75.00 CURVE NUMBER
           RTIMP     .00 PERCENT IMPERVIOUS AREA
  
```

```

64 UD      SCS DIMENSIONLESS UNITGRAPH
           TLAG     .21 LAG
  
```

\*\*\*

UNIT HYDROGRAPH  
15 END-OF-PERIOD ORDINATES

284. 951. 1250. 1052. 631. 359. 215. 125. 72. 42.  
25. 14. 9. 5. 0.

\*\*\* \*\*

\*\*\*\*\*  
\* \*  
\* \*  
\* \*  
\*\*\*\*\*

65 KK \* APEX1 \* COMBINE FLOWS AT APEX

67 KD OUTPUT CONTROL VARIABLES  
IPRNT 4 PRINT CONTROL  
IPLOT 1 PLOT CONTROL  
QSCAL 0. HYDROGRAPH PLOT SCALE  
IPNCH 0 PUNCH COMPUTED HYDROGRAPH  
IOUT 22 SAVE HYDROGRAPH ON THIS UNIT  
ISAV1 1 FIRST ORDINATE PUNCHED OR SAVED  
ISAV2 289 LAST ORDINATE PUNCHED OR SAVED  
TIMINT .083 TIME INTERVAL IN HOURS

66 HC HYDROGRAPH COMBINATION  
ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

\*\*\*

\*\*\* \*\*

\*\*\*\*\*  
\* \*  
\* \*  
\* \*  
\*\*\*\*\*

68 KK \* RT-395 \* ROUTE FLOWS FROM APEX TO 395

HYDROGRAPH ROUTING DATA

69 RN MUSKINGSUM ROUTING  
NSTPS 5 NUMBER OF SUBREACHES  
ANSKK .88 MUSKINGSUM K  
X .20 MUSKINGSUM Y

\*\*\*

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\*\*\*\*\*  
\* \*  
\* \*  
\* \*  
\*\*\*\*\*

70 KK \* T6B \* THOMAS CREEK WATERSHED T6 FROM APEX TO 395

SUBBASIN RUNOFF DATA

71 BA SUBBASIN CHARACTERISTICS  
TAREA 2.40 SUBBASIN AREA

PRECIPITATION DATA

72 PH DEPTHS FOR 10-PERCENT HYPOTHETICAL STORM

..... HYDRO-35 .....			..... TP-40 .....					..... TP-49 .....			
5-MIN	15-MIN	60-MIN	2-HR	3-HR	6-HR	12-HR	24-HR	2-DAY	4-DAY	7-DAY	10-DAY
.26	.51	.90	1.00	1.10	1.25	1.60	1.90	.00	.00	.00	.00

STORM AREA = 11.54

73 LS SCS LOSS RATE

STRTL	.67	INITIAL ABSTRACTION
CRVNR	75.00	CURVE NUMBER
RTIMP	.00	PERCENT IMPERVIOUS AREA

74 UD SCS DIMENSIONLESS UNITGRAPH

TLAG	.66	LAG
------	-----	-----

\*\*\*

UNIT HYDROGRAPH  
42 END-OF-PERIOD ORDINATES

71.	221.	426.	711.	1071.	1378.	1568.	1644.	1641.	1549.
1412.	1247.	1036.	822.	666.	545.	451.	380.	314.	255.
212.	174.	144.	118.	96.	80.	65.	55.	45.	37.
31.	25.	21.	17.	15.	13.	10.	8.	6.	4.
2.	0.								

\*\*\* \*\*

\*\*\*\*\*

75 KK \* T6A&B \* COMBINE ALL FLOWS

\*\*\*\*\*

76 HC HYDROGRAPH COMBINATION

ICOMP	2	NUMBER OF HYDROGRAPHS TO COMBINE
-------	---	----------------------------------

\*\*\*

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	T1	481.	12.42	162.	54.	54.	2.50		
ROUTED TO	RT1-B	469.	12.58	162.	54.	54.	2.50		
HYDROGRAPH AT	T2	103.	12.50	50.	19.	19.	1.82		
HYDROGRAPH AT	T3	40.	12.50	21.	8.	8.	.82		
3 COMBINED AT	CP-B	602.	12.58	233.	81.	81.	5.14		
ROUTED TO	RCP-C	592.	12.75	232.	80.	80.	5.14		
HYDROGRAPH AT	T4	39.	13.00	34.	13.	13.	2.16		
2 COMBINED AT	CP-C	626.	12.75	266.	93.	93.	7.30		
ROUTED TO	RCP-D	611.	13.00	265.	92.	92.	7.30		
HYDROGRAPH AT	T5	94.	12.67	37.	13.	13.	1.19		
2 COMBINED AT	CP-D	685.	12.92	300.	105.	105.	8.49		
ROUTED TO	RAPEX	678.	13.17	300.	104.	104.	8.49		
HYDROGRAPH AT	T6A	96.	12.33	17.	6.	6.	.65		
2 COMBINED AT	APEX1	694.	13.17	312.	110.	110.	9.14		
ROUTED TO	RT-395	559.	14.08	309.	106.	106.	9.14		
HYDROGRAPH AT	T6B	178.	12.92	60.	20.	20.	2.40		
2 COMBINED AT	T6A&B	618.	14.08	353.	126.	126.	11.54		

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

THOM100.901

```
*****  
*  
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *  
* FEBRUARY 1981 *  
* REVISED 01 JUN 88 *  
*  
* RUN DATE 11/20/1990 TIME 12:46:17 *  
*  
*****
```

```
*****  
*  
* U.S. ARMY CORPS OF ENGINEERS *  
* THE HYDROLOGIC ENGINEERING CENTER *  
* 609 SECOND STREET *  
* DAVIS, CALIFORNIA 95616 *  
* (916) 551-1748 *  
*  
*****
```

```
  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 29 SEP 81. THIS IS THE FORTRAN77 VERSION  
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,  
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION  
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM



LINE	ID	1	2	3	4	5	6	7	8	9	10
46	KK CP-C	COMBINE ROUTED T1-T3 W/ T4									
47	HC	2									
48	KK RCP-D	ROUTE COMBINED T1-T4 TO CONCENTRATION PT D									
49	RM	2	.1408	.4							
50	KK T5	THOMAS CREEK WATERSHED T5									
51	BA	1.19									
52	PH	1	11.54	.35	.68	1.2	1.4	1.59	2.04	2.75	3.4
53	LS		71	0							
54	UD	.49									
55	KK CP-D	COMBINE ROUTED T1-T4 W/ T5									
56	HC	2									
57	KO	1									
58	KK RAPEX	ROUTE COMBINED T1-T5 TO APEX									
59	RM	2	.18	.4							
60	KK T6A	THOMAS CREEK WATERSHED T6 @ fan APEX									
61	BA	.65									
62	PH	1	11.54	.35	.69	1.21	1.34	1.48	1.8	2.3	2.8
63	LS		75								
64	UD	.21									
65	KK APEX1	COMBINE FLOWS AT APEX									
66	HC	2									
67	KO	22									
68	KK RT-395	ROUTE FLOWS FROM APEX TO 395									
69	RM	3	.462	.2							
70	KK T6B	THOMAS CREEK WATERSHED T6 FROM APEX TO 395									
71	BA	2.4									
72	PH	1	11.54	.35	.69	1.21	1.34	1.48	1.8	2.3	2.8
73	LS		75								
74	UD	.66									
75	KK T6A&B	COMBINE ALL FLOWS									
76	HC	2									
77	ZZ										

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE NO.	(V) ROUTING (.) CONNECTOR	(---) DIVERSION OR PUMP FLOW (<---) RETURN OF DIVERTED OR PUMPED FLOW
20	T1 V V	
25	RT1-B .	
27	. T2 .	
32	. .	T3 .
37	CP-B V V	.....
39	RCP-C .	
41	. T4 .	
46	CP-C V V	.....
48	RCP-D .	
50	. T5 .	
55	CP-D V V	.....
58	RAPEX .	
60	. T6A .	
65	APEX1 V V	.....
68	RT-395 .	
70	. T6B .	
75	T6A&B .....	

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



\*\*\*\*\*  
\* \*  
\* T1 \*  
\* \*  
\*\*\*\*\*

20 KK THOMAS CREEK WATERSHED T1

SUBBASIN RUNOFF DATA

21 BA SUBBASIN CHARACTERISTICS  
TAREA 2.50 SUBBASIN AREA

PRECIPITATION DATA

22 PH DEPTHS FOR 1-PERCENT HYPOTHETICAL STORM  
..... HYDR0-35 ..... TP-40 ..... TP-49 .....  
5-MIN 15-MIN 60-MIN 2-HR 3-HR 6-HR 12-HR 24-HR 2-DAY 4-DAY 7-DAY 10-DAY  
.42 .33 1.45 1.87 2.26 3.18 4.31 5.44 .00 .00 .00 .00

STORN AREA = 11.54

23 LS SCS LOSS RATE  
STRTL .90 INITIAL ABSTRACTION  
CRVNB 69.00 CURVE NUMBER  
RTIMP .00 PERCENT IMPERVIOUS AREA

24 UD SCS DIMENSIONLESS UNITGRAPH  
TLAG .35 LAG

\*\*\*

UNIT HYDROGRAPH  
23 END-OF-PERIOD ORDINATES

344.	1083.	2224.	2965.	3067.	2705.	2132.	1415.	994.	720.
509.	359.	253.	177.	125.	89.	63.	44.	32.	24.
17.	10.	3.							

\*\*\* \*\*

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\* \*  
\* RT1-B \*  
\* \*  
\*\*\*\*\*

25 KK ROUTE T1 TO CONCENTRATION POINT B

HYDROGRAPH ROUTING DATA

26 RM MUSKINGUM ROUTING  
NSTPS 1 NUMBER OF SUBREACHES  
AMSKK .10 MUSKINGUM K  
X .40 MUSKINGUM X

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\*\*\*\*\*  
\* \*  
\* T2 \*  
\* \*  
\*\*\*\*\*

27 KK THOMAS CREEK WATERSHED T2

\* \*  
\*\*\*\*\*

SUBBASIN RUNOFF DATA

28 BA SUBBASIN CHARACTERISTICS  
TAREA 1.82 SUBBASIN AREA

PRECIPITATION DATA

29 PH DEPTHS FOR 1-PERCENT HYPOTHETICAL STORM

..... HYDRO-35 .....			..... TP-40 .....				..... TP-49 .....				
5-MIN	15-MIN	60-MIN	2-HR	3-HR	6-HR	12-HR	24-HR	2-DAY	4-DAY	7-DAY	10-DAY
.40	.79	1.39	1.75	2.10	2.90	3.91	4.92	.00	.00	.00	.00

STORM AREA = 11.54

30 LS SCS LOSS RATE  
STRTL 1.45 INITIAL ABSTRACTION  
CRVNR 58.00 CURVE NUMBER  
RTIMP .00 PERCENT IMPERVIOUS AREA

31 UD SCS DIMENSIONLESS UNITGRAPH  
TLAG .29 LAG

\*\*\*

UNIT HYDROGRAPH  
19 END-OF-PERIOD ORDINATES

388.	1261.	2334.	2654.	2365.	1782.	1112.	734.	501.	331.
219.	143.	97.	65.	42.	29.	21.	13.	6.	

\*\*\* \*\* \*\* \*\* \*\*

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\* \*  
\* \*  
\* \*  
\*\*\*\*\*

32 KK \* T3 \* THOMAS CREEK WATERSHED T3

SUBBASIN RUNOFF DATA

33 BA SUBBASIN CHARACTERISTICS  
TAREA .82 SUBBASIN AREA

PRECIPITATION DATA

34 PH DEPTHS FOR 1-PERCENT HYPOTHETICAL STORM

..... HYDRO-35 .....			..... TP-40 .....				..... TP-49 .....				
5-MIN	15-MIN	60-MIN	2-HR	3-HR	6-HR	12-HR	24-HR	2-DAY	4-DAY	7-DAY	10-DAY
.41	.80	1.40	1.73	2.04	2.76	3.75	4.73	.00	.00	.00	.00

STORM AREA = 11.54

35 LS SCS LOSS RATE  
STRTL 1.39 INITIAL ABSTRACTION  
CRVNR 59.00 CURVE NUMBER  
RTIMP .00 PERCENT IMPERVIOUS AREA

36 UD SCS DIMENSIONLESS UNITGRAPH  
TLAG .30 LAG

\*\*\*

UNIT HYDROGRAPH  
20 END-OF-PERIOD ORDINATES

162. 524. 994. 1159. 1065. 833. 529. 354. 243. 162.  
110. 73. 49. 33. 22. 15. 11. 7. 4. 1.

\*\*\* \*\*

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\* \*  
37 KK \* CP-B \* COMBINE ROUTED WATERSHED T1 W/ T2 AND T3 AT CONCENTRATION PT B  
\* \*  
\*\*\*\*\*

38 HC HYDROGRAPH COMBINATION  
ICOMP 3 NUMBER OF HYDROGRAPHS TO COMBINE  
  
\*\*\*

\*\*\* \*\*

\*\*\*\*\*  
\* \*  
39 KK \* RCP-C \* ROUTE COMBINED T1-T3 TO CONCENTRATION PT C  
\* \*  
\*\*\*\*\*

HYDROGRAPH ROUTING DATA

40 RM MUSKINGUM ROUTING  
NSTPS 2 NUMBER OF SUBREACHES  
AMSKK .15 MUSKINGUM K  
X .40 MUSKINGUM X  
  
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\*\*\*\*\*  
\* \*  
41 KK \* T4 \* THOMAS CREEK WATERSHED T4  
\* \*  
\*\*\*\*\*

SUBBASIN RUNOFF DATA

42 BA SUBBASIN CHARACTERISTICS  
TAREA 2.16 SUBBASIN AREA

PRECIPITATION DATA

43 PH DEPTHS FOR 1-PERCENT HYPOTHETICAL STORM  
..... HYDRO-35 ..... TP-40 ..... TP-49 .....  
5-MIN 15-MIN 60-MIN 2-HR 3-HR 6-HR 12-HR 24-HR 2-DAY 4-DAY 7-DAY 10-DAY  
.39 .77 1.35 1.64 1.91 2.55 3.38 4.20 .00 .00 .00 .00

44 LB SCS LOSS RATE  
 STRTL 1.45 INITIAL ABSTRACTION  
 CRVNR 58.00 CURVE NUMBER  
 RTIMP .00 PERCENT IMPERVIOUS AREA

45 UD SCS DIMENSIONLESS UNITGRAPH  
 TLAG .54 LAG

\*\*\*

UNIT HYDROGRAPH  
 34 END-OF-PERIOD ORDINATES

108.	319.	642.	1093.	1504.	1733.	1794.	1727.	1557.	1341.
1057.	801.	633.	499.	405.	322.	251.	200.	159.	125.
98.	78.	62.	49.	39.	31.	24.	19.	16.	13.
10.	7.	5.	2.						

\*\*\* \*\*

\*\*\*\*\*  
 \* \*  
 46 KK \* CP-C \* COMBINE ROUTED T1-T3 W/ T4  
 \* \*  
 \*\*\*\*\*

47 HC HYDROGRAPH COMBINATION  
 ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

\*\*\*

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\*\*\*\*\*  
 \* \*  
 48 KK \* RCP-D \* ROUTE COMBINED T1-T4 TO CONCENTRATION PT D  
 \* \*  
 \*\*\*\*\*

HYDROGRAPH ROUTING DATA

49 RM MUSKINGUM ROUTINE  
 NSTPS 2 NUMBER OF SUBREACHES  
 AMSKK .14 MUSKINGUM K  
 X .40 MUSKINGUM X

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\*\*\*\*\*  
 \* \*  
 50 KK \* T5 \* THOMAS CREEK WATERSHED T5  
 \* \*  
 \*\*\*\*\*

51 BA SUBBASIN CHARACTERISTICS  
TAREA 1.19 SUBBASIN AREA

PRECIPITATION DATA

52 PH DEPTHS FOR 1-PERCENT HYPOTHETICAL STORM

HYDRO-35			TP-40					TP-49			
5-MIN	15-MIN	60-MIN	2-HR	3-HR	6-HR	12-HR	24-HR	2-DAY	4-DAY	7-DAY	10-DAY
.35	.68	1.20	1.40	1.59	2.04	2.75	3.40	.00	.00	.00	.00

STORM AREA = 11.54

53 LS SCS LOSS RATE

STRTL	.82	INITIAL ABSTRACTION
CRVNR	71.00	CURVE NUMBER
RTIMP	.00	PERCENT IMPERVIOUS AREA

54 UD SCS DIMENSIONLESS UNITGRAPH

TLAG	.49	LAG
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UNIT HYDROGRAPH  
31 END-OF-PERIOD ORDINATES

75.	223.	457.	760.	986.	1075.	1070.	965.	832.	648.
479.	369.	288.	226.	175.	136.	105.	81.	62.	49.
38.	29.	23.	17.	14.	11.	9.	7.	5.	3.
2.									

\*\*\* \*\*

\*\*\*\*\*  
\* \*  
55 KK \* CP-D \* COMBINE ROUTED T1-T4 W/ T5  
\* \*  
\*\*\*\*\*

57 KO OUTPUT CONTROL VARIABLES

IPRNT	1	PRINT CONTROL
IPLOT	1	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

56 HC HYDROGRAPH COMBINATION

ICOMP	2	NUMBER OF HYDROGRAPHS TO COMBINE
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HYDROGRAPH AT STATION CP-D  
SUM OF 2 HYDROGRAPHS

\*\*\*\*\*

DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	
1	0000	1	0.	*	1	0605	74	0.	*	1	1210	147	463.	*	1	1815	220	427.
1	0005	2	0.	*	1	0610	75	0.	*	1	1215	148	618.	*	1	1820	221	422.
1	0010	3	0.	*	1	0615	76	0.	*	1	1220	149	863.	*	1	1825	222	415.
1	0015	4	0.	*	1	0620	77	0.	*	1	1225	150	1229.	*	1	1830	223	405.
1	0020	5	0.	*	1	0625	78	0.	*	1	1230	151	1697.	*	1	1835	224	391.
1	0025	6	0.	*	1	0630	79	0.	*	1	1235	152	2170.	*	1	1840	225	374.

1	0030	7	0.	*	1	0635	80	0.	*	1	1240	153	2514.	*	1	1845	226	360.
1	0035	8	0.	*	1	0640	81	0.	*	1	1245	154	2646.	*	1	1850	227	346.
1	0040	9	0.	*	1	0645	82	0.	*	1	1250	155	2570.	*	1	1855	228	335.
1	0045	10	0.	*	1	0650	83	0.	*	1	1255	156	2357.	*	1	1900	229	325.
1	0050	11	0.	*	1	0655	84	0.	*	1	1300	157	2087.	*	1	1905	230	318.
1	0055	12	0.	*	1	0700	85	0.	*	1	1305	158	1815.	*	1	1910	231	312.
1	0100	13	0.	*	1	0705	86	0.	*	1	1310	159	1581.	*	1	1915	232	307.
1	0105	14	0.	*	1	0710	87	0.	*	1	1315	160	1389.	*	1	1920	233	303.
1	0110	15	0.	*	1	0715	88	0.	*	1	1320	161	1236.	*	1	1925	234	300.
1	0115	16	0.	*	1	0720	89	0.	*	1	1325	162	1117.	*	1	1930	235	297.
1	0120	17	0.	*	1	0725	90	0.	*	1	1330	163	1028.	*	1	1935	236	294.
1	0125	18	0.	*	1	0730	91	0.	*	1	1335	164	964.	*	1	1940	237	291.
1	0130	19	0.	*	1	0735	92	0.	*	1	1340	165	919.	*	1	1945	238	289.
1	0135	20	0.	*	1	0740	93	0.	*	1	1345	166	886.	*	1	1950	239	287.
1	0140	21	0.	*	1	0745	94	0.	*	1	1350	167	860.	*	1	1955	240	285.
1	0145	22	0.	*	1	0750	95	0.	*	1	1355	168	838.	*	1	2000	241	283.
1	0150	23	0.	*	1	0755	96	0.	*	1	1400	169	818.	*	1	2005	242	281.
1	0155	24	0.	*	1	0800	97	0.	*	1	1405	170	801.	*	1	2010	243	279.
1	0200	25	0.	*	1	0805	98	0.	*	1	1410	171	785.	*	1	2015	244	277.
1	0205	26	0.	*	1	0810	99	0.	*	1	1415	172	770.	*	1	2020	245	275.
1	0210	27	0.	*	1	0815	100	0.	*	1	1420	173	756.	*	1	2025	246	274.
1	0215	28	0.	*	1	0820	101	0.	*	1	1425	174	743.	*	1	2030	247	272.
1	0220	29	0.	*	1	0825	102	0.	*	1	1430	175	730.	*	1	2035	248	270.
1	0225	30	0.	*	1	0830	103	0.	*	1	1435	176	717.	*	1	2040	249	269.
1	0230	31	0.	*	1	0835	104	1.	*	1	1440	177	705.	*	1	2045	250	267.
1	0235	32	0.	*	1	0840	105	2.	*	1	1445	178	694.	*	1	2050	251	266.
1	0240	33	0.	*	1	0845	106	3.	*	1	1450	179	682.	*	1	2055	252	264.
1	0245	34	0.	*	1	0850	107	5.	*	1	1455	180	672.	*	1	2100	253	262.
1	0250	35	0.	*	1	0855	108	6.	*	1	1500	181	662.	*	1	2105	254	261.
1	0255	36	0.	*	1	0900	109	8.	*	1	1505	182	652.	*	1	2110	255	260.
1	0300	37	0.	*	1	0905	110	11.	*	1	1510	183	643.	*	1	2115	256	258.
1	0305	38	0.	*	1	0910	111	13.	*	1	1515	184	634.	*	1	2120	257	257.
1	0310	39	0.	*	1	0915	112	15.	*	1	1520	185	627.	*	1	2125	258	255.
1	0315	40	0.	*	1	0920	113	18.	*	1	1525	186	619.	*	1	2130	259	254.
1	0320	41	0.	*	1	0925	114	21.	*	1	1530	187	610.	*	1	2135	260	253.
1	0325	42	0.	*	1	0930	115	24.	*	1	1535	188	599.	*	1	2140	261	251.
1	0330	43	0.	*	1	0935	116	27.	*	1	1540	189	588.	*	1	2145	262	250.
1	0335	44	0.	*	1	0940	117	31.	*	1	1545	190	576.	*	1	2150	263	249.
1	0340	45	0.	*	1	0945	118	35.	*	1	1550	191	564.	*	1	2155	264	247.
1	0345	46	0.	*	1	0950	119	39.	*	1	1555	192	554.	*	1	2200	265	246.
1	0350	47	0.	*	1	0955	120	44.	*	1	1600	193	545.	*	1	2205	266	245.
1	0355	48	0.	*	1	1000	121	48.	*	1	1605	194	537.	*	1	2210	267	244.
1	0400	49	0.	*	1	1005	122	52.	*	1	1610	195	530.	*	1	2215	268	242.
1	0405	50	0.	*	1	1010	123	57.	*	1	1615	196	523.	*	1	2220	269	241.
1	0410	51	0.	*	1	1015	124	62.	*	1	1620	197	517.	*	1	2225	270	240.
1	0415	52	0.	*	1	1020	125	67.	*	1	1625	198	511.	*	1	2230	271	239.
1	0420	53	0.	*	1	1025	126	72.	*	1	1630	199	506.	*	1	2235	272	238.
1	0425	54	0.	*	1	1030	127	78.	*	1	1635	200	501.	*	1	2240	273	237.
1	0430	55	0.	*	1	1035	128	84.	*	1	1640	201	496.	*	1	2245	274	236.
1	0435	56	0.	*	1	1040	129	90.	*	1	1645	202	492.	*	1	2250	275	234.
1	0440	57	0.	*	1	1045	130	97.	*	1	1650	203	487.	*	1	2255	276	233.
1	0445	58	0.	*	1	1050	131	104.	*	1	1655	204	483.	*	1	2300	277	232.
1	0450	59	0.	*	1	1055	132	111.	*	1	1700	205	479.	*	1	2305	278	231.
1	0455	60	0.	*	1	1100	133	119.	*	1	1705	206	475.	*	1	2310	279	230.
1	0500	61	0.	*	1	1105	134	127.	*	1	1710	207	471.	*	1	2315	280	229.
1	0505	62	0.	*	1	1110	135	136.	*	1	1715	208	467.	*	1	2320	281	228.
1	0510	63	0.	*	1	1115	136	146.	*	1	1720	209	463.	*	1	2325	282	227.
1	0515	64	0.	*	1	1120	137	157.	*	1	1725	210	460.	*	1	2330	283	226.
1	0520	65	0.	*	1	1125	138	169.	*	1	1730	211	456.	*	1	2335	284	225.
1	0525	66	0.	*	1	1130	139	182.	*	1	1735	212	453.	*	1	2340	285	224.
1	0530	67	0.	*	1	1135	140	194.	*	1	1740	213	450.	*	1	2345	286	223.
1	0535	68	0.	*	1	1140	141	206.	*	1	1745	214	446.	*	1	2350	287	222.
1	0540	69	0.	*	1	1145	142	221.	*	1	1750	215	443.	*	1	2355	288	221.
1	0545	70	0.	*	1	1150	143	239.	*	1	1755	216	440.	*	2	0000	289	220.
1	0550	71	0.	*	1	1155	144	255.	*	1	1800	217	437.	*				
1	0555	72	0.	*	1	1200	145	284.	*	1	1805	218	434.	*				

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.00-HR
2646.	12.75	(CFS) 841.	292.	292.	292.
		(INCHES) .921	1.280	1.280	1.280
		(AC-FT) 417.	580.	580.	580.

CUMULATIVE AREA = 8.49 SQ MI

\*\*\*\*\*

\*\*\*\*\*  
 \* \*  
 58 KK \* RAPEX \* ROUTE COMBINED T1-T5 TO APEX  
 \* \*  
 \*\*\*\*\*

HYDROGRAPH ROUTING DATA

59 RM MUSKINGUM ROUTING  
 NSTPS 2 NUMBER OF SUBREACHES  
 ANSKK .18 MUSKINGUM K  
 Y .40 MUSKINGUM Y

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 \* \*  
 60 KK \* T6A \* THOMAS CREEK WATERSHED T6 @ fan APEX  
 \* \*  
 \*\*\*\*\*

SUBBASIN RUNOFF DATA

61 BA SUBBASIN CHARACTERISTICS  
 TAREA .65 SUBBASIN AREA

PRECIPITATION DATA

62 PH DEPTHS FOR 1-PERCENT HYPOTHETICAL STORM

HYDRO-35			TP-40				TP-49				
5-MIN	15-MIN	60-MIN	2-HR	3-HR	6-HR	12-HR	24-HR	2-DAY	4-DAY	7-DAY	10-DAY
.35	.69	1.21	1.34	1.48	1.80	2.30	2.80	.00	.00	.00	.00

STORM AREA = 11.54

63 LS SCS LOSS RATE  
 STRL .67 INITIAL ABSTRACTION  
 CRVNR 75.00 CURVE NUMBER  
 RTIMP .00 PERCENT IMPERVIOUS AREA

64 UD SCS DIMENSIONLESS UNITGRAPH  
 TLAG .21 LAG

\*\*\*

UNIT HYDROGRAPH  
15 END-OF-PERIOD ORDINATES

284.	951.	1250.	1052.	631.	359.	215.	125.	72.	42.
25.	14.	9.	5.	0.					

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*           *
65 KK *   APEX1 *   COMBINE FLOWS AT APEX
*           *
*****

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67 KD   OUTPUT CONTROL VARIABLES
        IPRNT      4  PRINT CONTROL
        IPLOT      1  PLOT CONTROL
        QSCAL      0. HYDROGRAPH PLOT SCALE
        IPNCH      0  PUNCH COMPUTED HYDROGRAPH
        IDUT       22 SAVE HYDROGRAPH ON THIS UNIT
        ISAV1      1  FIRST ORDINATE PUNCHED OR SAVED
        ISAV2     289 LAST ORDINATE PUNCHED OR SAVED
        TIMINT     .083 TIME INTERVAL IN HOURS

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66 HC   HYDROGRAPH COMBINATION
        ICOMP      2  NUMBER OF HYDROGRAPHS TO COMBINE

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*           *
68 KK *   RT-395 *   ROUTE FLOWS FROM APEX TO 395
*           *
*****

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HYDROGRAPH ROUTING DATA

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69 RM   MUSKINGUM ROUTING
        NSTPS      3  NUMBER OF SUBREACHES
        ANSKK      .46 MUSKINGUM K
        X          .20 MUSKINGUM X

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*           *
70 KK *   T6B *   THOMAS CREEK WATERSHED T6 FROM APEX TO 395
*           *
*****

```

71 BA SUBBASIN CHARACTERISTICS  
TAREA 2.40 SUBBASIN AREA

PRECIPITATION DATA

72 PH DEPTHS FOR 1-PERCENT HYPOTHETICAL STORM  
..... HYDRO-35 ..... TP-40 ..... TP-49 .....  
5-MIN 15-MIN 60-MIN 2-HR 3-HR 6-HR 12-HR 24-HR 2-DAY 4-DAY 7-DAY 10-DAY  
.35 .69 1.21 1.34 1.48 1.80 2.30 2.80 .00 .00 .00 .00

STORM AREA = 11.54

73 LS SCS LOSS RATE  
STRTL .67 INITIAL ABSTRACTION  
CRVNBR 75.00 CURVE NUMBER  
RTIMP .00 PERCENT IMPERVIOUS AREA

74 UD SCS DIMENSIONLESS UNITGRAPH  
TLAG .66 LAG

\*\*\*

UNIT HYDROGRAPH  
42 END-OF-PERIOD ORDINATES

71.	221.	426.	711.	1071.	1378.	1568.	1644.	1641.	1549.
1412.	1247.	1036.	822.	666.	545.	451.	380.	314.	255.
212.	174.	144.	118.	96.	80.	65.	55.	45.	37.
31.	25.	21.	17.	15.	13.	10.	8.	6.	4.
2.	0.								

\*\*\* \*\*

\*\*\*\*\*

\* \*  
75 KK \* T6A&B \* COMBINE ALL FLOWS  
\* \*  
\*\*\*\*\*

76 HC HYDROGRAPH COMBINATION  
ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

\*\*\*

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	T1	1472.	12.42	415.	148.	148.	2.50		
ROUTED TO	RT1-B	1452.	12.50	415.	147.	147.	2.50		
HYDROGRAPH AT	T2	507.	12.42	152.	52.	52.	1.82		
HYDROGRAPH AT	T3	230.	12.42	66.	23.	23.	.82		
3 COMBINED AT	CP-B	2122.	12.50	632.	223.	223.	5.14		
ROUTED TO	RCP-C	2092.	12.58	632.	222.	222.	5.14		
HYDROGRAPH AT	T4	290.	12.75	119.	41.	41.	2.16		
2 COMBINED AT	CP-C	2367.	12.67	750.	263.	263.	7.30		
ROUTED TO	RCP-D	2360.	12.75	750.	262.	262.	7.30		
HYDROGRAPH AT	T5	309.	12.58	92.	30.	30.	1.19		
2 COMBINED AT	CP-D	2646.	12.75	841.	292.	292.	8.49		
ROUTED TO	RAPEX	2591.	12.92	840.	291.	291.	8.49		
HYDROGRAPH AT	T6A	263.	12.25	44.	14.	14.	.65		
2 COMBINED AT	APEX1	2640.	12.92	879.	305.	305.	9.14		
ROUTED TO	RT-395	2269.	13.42	875.	300.	300.	9.14		
HYDROGRAPH AT	T6B	519.	12.83	159.	51.	51.	2.40		
2 COMBINED AT	T6A&B	2544.	13.33	1027.	351.	351.	11.54		

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

```

*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* FEBRUARY 1981 *
* REVISED 01 JUN 88 *
* RUN DATE 11/20/1990 TIME 13:33:46 *
*****
    
```

```

*****
* U.S. ARMY CORPS OF ENGINEERS *
* THE HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 551-1748 *
*****
    
```

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X X XXXXXX XXXX X
X X X X X XX
X X X X X
XXXXXX XXXX X XXXX X
X X X X X
X X X X X
X X XXXXXX XXXX XXX
    
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

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

HEC-1 INPUT

```

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
#DIAGRAM
1 ID *****
2 ID
3 ID FEMA FLOOD INSURANCE STUDY - DRY AND EVANS CREEKS, WASHOE CO.,NV
4 ID NOVEMBER 1990
5 ID
6 ID BY: NIMBUS ENGINEERS, RENO, NEVADA FILE NAME: DRYCR.901
7 ID NIMBUS JOB NO. 8901 WASHOE CO & CITY OF RENO CONTRACT NO. EMW-89-2841
8 ID
9 ID RAINFALL DATA FROM NOAA ATLAS 2, VOLUME VII
10 ID RAINFALL DISTRIBUTION: 24 HOUR HYPOTHETICAL STORM AERIAL REDUCTION
11 ID WAS ESTIMATED FOR 100-YEAR STORM OCCURRING OVER DRY CREEK
12 ID WATERSHEDS AT THE SAME TIME (APPOX. 14 SQ. MILES)
13 ID
14 ID LAG TIME COMPUTED WITH UPLAND METHOD AND THE PROCEDURES DESCRIBED IN TR-55
15 ID CURVE NUMBER FROM TR-55 AND NEH-4
16 ID ROUTING PERFORMED WITH MUSKINGUM METHOD AND MODIFIED PULS
17 ID
18 ID ===== 100 YEAR, 24 HOUR EVENT =====
19 ID
20 ID 1989 MODEL REVISED TO REFLECT KEY CONCENTRATION POINTS
21 ID (APRIL AND JULY 1990)
22 ID *****
23 ID 5 300
24 ID 5 0
    
```

25	KK	D1	RUNOFF FROM DRAINAGE AREA D1								
26	BA	.78									
27	PH	1	14	.27	.53	1.27	1.55	1.82	2.45	3.23	4.00
28	LS	0	65	0							
29	UD	.29									
30	KK	RT PTA	ROUTE FLOW FROM DRAINAGE AREA D1 TO OUTLET OF DRAINAGE AREA D2								
31	RM	3	.26	.40							
32	KK	D2	RUNOFF FROM DRAINAGE AREA D2								
33	BA	1.66									
34	PH	1	14	.36	.70	1.23	1.46	1.68	2.19	2.83	3.70
35	LS	0	77	0							
36	UD	.43									
37	KK	PTA	COMBINE RUNOFF FROM D1 & D2 AT OUTLET OF D2								
38	HC	2									
39	KK	RT PTB	ROUTE COMBINED FLOW FROM DRAINAGE AREAS D1 AND D2 TO OUTLET OF D3								
40	RM	1	.10	.40							
41	KK	D3	RUNOFF FROM DRAINAGE AREA D3								
42	BA	1.10									
43	PH	1	14	.35	.70	1.20	1.37	1.56	2.00	2.65	3.20
44	LS	0	79	0							
45	UD	.38									

HEC-1 INPUT

1

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

46	KK	D	PTB	COMBINE FLOWS FROM DRAINAGE AREAS D1, D2 & D3 AT STEAMBOAT DITCH							
47	HC	2									
48	KK	RT	PTC	ROUTE FLOWS FROM STEAMBOAT DITCH TO POINT C							
49	RM	1	.11	.40							
50	KK	D4	DRAINAGE AREA D4								
51	BA	.19									
52	PH	1	14	.35	.70	1.20	1.36	1.50	1.8	2.35	2.9
53	LS	0	76								
54	UD	.25									
55	KK	PTC	COMBINE D4 AND ROUTED FLOWS FROM D3								
56	HC	2									
57	KK	D5	RUNOFF FROM DRAINAGE AREA D5								
58	BA	1.7									
59	PH	1	14	.35	.70	1.22	1.47	1.70	2.25	2.90	3.70
60	LS	0	75	0							
61	UD	.31									
62	KK	RTPT	C	ROUTE COMBINED FLOWS FROM D5 TO OUTLET OF D6 (STEAMBOAT DITCH)							
63	RM	3	.25	.40							
64	KK	D6	RUNOFF FROM DRAINAGE AREA D6								
65	BA	1.60									
66	PH	1	14	.34	.67	1.17	1.37	1.56	2.00	2.55	3.10
67	LS	0	80	0							
68	UD	.57									
69	KK	PT	C	COMBINE ROUTED D5 AND D6							
70	HC	2									
71	KK	PTC	COMBINE ALL FLOWS ABOVE THIS CONCENTRATION POINT								

72 HC 2

73 KK RT PTD ROUTE FLOW TO LAKE DITCH

74 RM 1 .1 .3

75 KK D7 RUNOFF FROM DRAINAGE AREA D7

76 BA 1.20

77 PH 1 14 .34 .67 1.17 1.37 1.56 2.0 2.55 3.10

78 LS 80

79 UD .85

80 KK PTD COMBINE FLOW AT LAKE DITCH

81 HC 2

82 KK RT PTE ROUTE FLOW TO PANORMA DRIVE (POINT E)

83 RM 1 .1 .3

HEC-1 INPUT

PAGE 3

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

84 KK D8 DRAINAGE AREA D8

85 BA .07

86 PH 1 14 .32 .70 1.10 1.30 1.43 1.80 2.30 2.8

87 LS 80

88 UD .33

89 KK D9 DRAINAGE AREA 9

90 BA 1.53

91 PH 1 14 .34 .67 1.17 1.37 1.56 2.0 2.55 3.1

92 LS 77

93 UD .45

94 KK RTE ROUTE FLOWS TO PANORAMA DRIVE (POINT E)

95 RM 3 .32 .2

96 KK D10 DRAINAGE AREA 10

97 BA .63

98 PH 1 14 .32 .70 1.10 1.30 1.43 1.80 2.30 2.8

99 LS 78

100 UD .45

101 KK PTE COMBINE D9 AND D10

102 HC 2

103 KK PTE COMBINE HYDROGRAPHS JUST BELOW PANORAMA DRIVE

104 HC 3

105 KK RT PTF ROUTE FLOW TO F

106 RM 1 .1 .3

107 KK D11 RUNOFF FROM DRAINAGE AREA D11

108 BA 1.40

109 PH 1 14 .35 .70 1.22 1.38 1.54 1.90 2.50 3.00

110 LS 80 0

111 UD .85

112 KK RT PTF ROUTE FLOW TO POINT F

113 RM 1 .1 .4

114 KK D12 DRAINAGE AREA D12

115 BA .08

116 PH 1 14 .32 .7 1.10 1.30 1.43 1.8 2.30 2.8

117 LS 80

118 UD .23

119 KK PTF COMBINE HYDROGRAPHS AT POINT F

120 HC 3

121 KK RT PTG ROUTE FLOW TO POINT G

122 RM 1 .08 .4

HEC-1 INPUT

PAGE 4

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

123 KK D13 DRAINAGE AREA 13

124 BA .44

125 PH 1 14 .32 .7 1.10 1.30 1.43 1.8 2.30 2.8

126 LS 80

127 UD .68

128 KK PTG COMBINE HYDROGRAPHS AT FREEWAY

129 HC 2

130 KK ISBODR FLOW THAT DOES NOT GO UNDER FREEWAY WILL GO TO PONDING AREA

131 KM BETWEEN EVANS AND DRY CREEK

132 DT DVDRY

133 DI 2800 3950

134 DQ 0 115

135 KK RT PTH ROUTE FLOW TO INTERSECTION WITH PIPE

136 RM 1 .08 .4

137 KK FRDRY FLOW FROM DRY CREEK

138 DR DVDRY

139 KK D14 RUNOFF FROM DRAINAGE AREA D14 (DRAINS THROUGH 66" PIPE UNDER I-580

140 KM PIPE LOCATED NORTH OF DRY CREEK CROSSING @ FREEWAY

141 BA 1.20

142 PH 1 14 .32 .7 1.10 1.30 1.43 1.8 2.30 2.8

143 LS 80

144 UD .740

145 KK ATPIPE

146 HC 2

147 KK RES2 ROUTE FLOWS THROUGH 60 INCH CULVERT UNDER FREEWAY

148 RS 1 STOR -1

149 SV 0 1.4 4.4 23 55 170 389

150 SE 4462.5 4466 4468 4470 4472 4476 4480

151 SQ 0 50 80 100 200 300 380

152 KK PTH COMBINE FLOWS AT POINT H, JUST BELOW FREEWAY

153 HC 2

154 ZZ

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT

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

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

25 D1

V

V

30 RT PTA

.

32 D2

.

.

37	PIA.....			
	V			
	V			
39	RT PTB			
	.			
41	.	D3		
	.			
	.			
46	D PTB.....			
	V			
	V			
48	RT PTC			
	.			
	.			
50	.	D4		
	.			
	.			
55	PTC.....			
	.			
	.			
57	.	D5		
	.	V		
	.	V		
62	.	RTPT C		
	.			
	.			
64	.		D6	
	.		.	
	.		.	
69	.	PT C.....		
	.			
	.			
71	PTC.....			
	V			
	V			
73	RT PTD			
	.			
	.			
75	.	D7		
	.			
	.			
80	PTD.....			
	V			
	V			
82	RT PTE			
	.			
	.			
84	.	D8		
	.			
	.			
89	.		D9	
	.		V	
	.		V	
94	.		RTE	
	.		.	
	.		.	
96	.			D10
	.			.
	.			.
101	.		PTE.....	
	.		.	
	.		.	
103	PTE.....			
	V			
	V			

```

105 RT PTF
.
.
107 . D11
. V
. V
112 . RT PTF
.
.
114 . D12
.
.
119 PTF.....
.
.
121 RT PTG
.
.
123 . D13
.
.
128 PTG.....
.
.
132 .-----> DVDRY
130 1580DR
.
.
135 RT PTH
.
.
138 .<----- DVDRY
137 FRDRY
.
.
139 . D14
.
.
145 . ATPIPE.....
.
.
147 . RES2
.
.
152 PTH.....

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

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*****
#
# FLOOD HYDROGRAPH PACKAGE (HEC-1) #
# FEBRUARY 1981 #
# REVISED 01 JUN 88 #
#
# RUN DATE 11/20/1990 TIME 13:33:46 #
#
*****

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*****
#
# U.S. ARMY CORPS OF ENGINEERS #
# THE HYDROLOGIC ENGINEERING CENTER #
# 609 SECOND STREET #
# DAVIS, CALIFORNIA 95616 #
# (916) 551-1748 #
#
*****

```

RAINFALL DATA FROM NOAA ATLAS 2, VOLUME VII  
 RAINFALL DISTRIBUTION: 24 HOUR HYPOTHETICAL STORM AERIAL REDUCTION  
 WAS ESTIMATED FOR 100-YEAR STORM OCCURRING OVER THE EVANS AND DRY CREEKS  
 WATERSHEDS AT THE SAME TIME (APPOX. 14 SQ. MILES)

LAG TIME COMPUTED WITH UPLAND METHOD AND THE PROCEDURES DESCRIBED IN TR-55  
 CURVE NUMBER FROM TR-55 AND NEH-4  
 ROUTING PERFORMED WITH MUSKINGUM METHOD AND MODIFIED PULS

===== 100 YEAR, 24 HOUR EVENT =====

1989 MODEL REVISED TO REFLECT KEY CONCENTRATION POINTS  
 (APRIL AND JULY 1990)

\*\*\*\*\*

24 IO OUTPUT CONTROL VARIABLES  
 IPRNT 5 PRINT CONTROL  
 IPLOT 0 PLOT CONTROL  
 OSCAL 0. HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA  
 NMIN 5 MINUTES IN COMPUTATION INTERVAL  
 IDATE 1 0 STARTING DATE  
 ITIME 0000 STARTING TIME  
 NO 300 NUMBER OF HYDROGRAPH ORDINATES  
 NDDATE 2 0 ENDING DATE  
 NDTIME 0055 ENDING TIME  
 ICENT 19 CENTURY MARK

COMPUTATION INTERVAL .08 HOURS  
 TOTAL TIME BASE 24.92 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

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	D1	204.	12.42	61.	21.	20.	.78		
ROUTED TO	RT PTA	199.	12.67	61.	21.	20.	.78		
HYDROGRAPH AT	D2	737.	12.50	190.	68.	66.	1.66		
2 COMBINED AT	PTA	907.	12.58	250.	89.	86.	2.44		
ROUTED TO	RT PTB	903.	12.67	250.	89.	86.	2.44		

HYDROGRAPH AT	D3	494.	12.42	116.	38.	37.	1.10
2 COMBINED AT	D PTB	1343.	12.58	366.	127.	123.	3.54
ROUTED TO	RT PTC	1324.	12.67	366.	127.	123.	3.54
HYDROGRAPH AT	D4	80.	12.33	14.	5.	5.	.19
2 COMBINED AT	PTC	1364.	12.67	380.	132.	127.	3.73
HYDROGRAPH AT	D5	797.	12.42	183.	64.	62.	1.70
ROUTED TO	RTPT C	774.	12.67	183.	64.	62.	1.70
HYDROGRAPH AT	D6	573.	12.67	167.	55.	53.	1.60
2 COMBINED AT	PT C	1346.	12.67	350.	119.	115.	3.30
2 COMBINED AT	PTC	2711.	12.67	730.	251.	242.	7.03
ROUTED TO	RT PTD	2657.	12.75	730.	251.	242.	7.03
HYDROGRAPH AT	D7	332.	13.00	125.	41.	40.	1.20
2 COMBINED AT	PTD	2963.	12.75	855.	292.	281.	8.23
ROUTED TO	RT PTE	2900.	12.92	855.	292.	281.	8.23
HYDROGRAPH AT	D8	30.	12.42	6.	2.	2.	.07
HYDROGRAPH AT	D9	524.	12.58	138.	45.	44.	1.53
ROUTED TO	RTE	481.	12.83	138.	45.	44.	1.53
HYDROGRAPH AT	D10	198.	12.50	50.	16.	16.	.63
2 COMBINED AT	PTE	624.	12.83	187.	61.	59.	2.16
3 COMBINED AT	PTE	3536.	12.83	1048.	355.	342.	10.46
ROUTED TO	RT PTF	3484.	13.00	1048.	355.	342.	10.46
HYDROGRAPH AT	D11	386.	13.00	138.	45.	44.	1.40

ROUTED TO	RT PTF	385.	13.08	138.	45.	44.	1.40		
HYDROGRAPH AT	D12	41.	12.33	7.	2.	2.	.08		
3 COMBINED AT	PTF	3874.	13.00	1192.	402.	387.	11.94		
ROUTED TO	RT PTG	3856.	13.08	1192.	402.	387.	11.94		
HYDROGRAPH AT	D13	122.	12.75	38.	13.	12.	.44		
2 COMBINED AT	PTG	3958.	13.08	1230.	414.	399.	12.38		
DIVERSION TO	DVDRY	36.	13.08	3.	1.	1.	12.38		
HYDROGRAPH AT	I580DR	3922.	13.08	1228.	414.	398.	12.38		
ROUTED TO	RT PTH	3904.	13.17	1228.	413.	398.	12.38		
HYDROGRAPH AT	FRDRY	36.	13.08	3.	1.	1.	.00		
HYDROGRAPH AT	D14	314.	12.83	104.	34.	33.	1.20		
2 COMBINED AT	ATPIPE	341.	12.92	107.	35.	34.	1.20		
ROUTED TO	RES2	98.	14.17	92.	35.	33.	1.20		
								4469.80	14.17
2 COMBINED AT	PTH	3997.	13.17	1318.	448.	431.	13.58		

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

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*****
#
# FLOOD HYDROGRAPH PACKAGE (HEC-1) #
#   FEBRUARY 1981                   #
#   REVISED 01 JUN 88               #
#
# RUN DATE 11/20/1990 TIME 13:36:13 #
#
*****
    
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*****
#
# U.S. ARMY CORPS OF ENGINEERS      #
# THE HYDROLOGIC ENGINEERING CENTER #
#   609 SECOND STREET               #
#   DAVIS, CALIFORNIA 95616        #
#   (916) 551-1748                 #
#
*****
    
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X   X XXXXXXX XXXXX   X
X   X X   X   X   X   XX
X   X X   X   X   X   X
XXXXXX XXXX   X   XXXXX X
X   X X   X   X   X   X
X   X X   X   X   X   X
X   X XXXXXXX XXXXX   XXX
    
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

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

```

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

#DIAGRAM
1         ID *****
2         ID
3         ID FEMA FLOOD INSURANCE STUDY - DRY AND EVANS CREEKS, WASHOE CO.,NV
4         ID NOVEMBER 1990
5         ID
6         ID BY: NIMBUS ENGINEERS, RENO, NEVADA FILE NAME: DREV.901
7         ID NIMBUS JOB NO. 8901 WASHOE CO & CITY OF RENO CONTRACT NO. EMW-89-2841
8         ID
9         ID RAINFALL DATA FROM NOAA ATLAS 2, VOLUME VII
10        ID RAINFALL DISTRIBUTION: 24 HOUR HYPOTHETICAL STORM AERIAL REDUCTION
11        ID WAS ESTIMATED FOR 100-YEAR STORM OCCURING OVER THE EVANS AND DRY CREEKS
12        ID WATERSHEDS AT THE SAME TIME (APPOX. 24 SQ. MILES)
13        ID
14        ID LAG TIME COMPUTED WITH UPLAND METHOD AND THE PROCEDURES DESCRIBED IN TR-55
15        ID CURVE NUMBER FROM TR-55 AND NEH-4
16        ID ROUTING PERFORMED WITH MUSKINGUM METHOD AND MODIFIED PULS
17        ID
18        ID ===== 100 YEAR. 24 HOUR EVENT =====
19        ID
20        ID 1989 MODEL REVISED TO REFLECT KEY CONCENTRATION POINTS
21        ID (APRIL AND JULY 1990)
22        ID *****
23        IT 5 300
24        ID 5 0
    
```

25 KK EV 1 EVANS CREEK WATERSHED NO.1  
 26 BA 8.60  
 27 PH 1 24 .4 .7 1.3 1.6 1.9 2.6 3.4 4.2  
 28 LS 72  
 29 UD 1.04

30 KK EVANCK FLOW WITHIN CHANNEL CONTINUING DOWN TOWARDS I-580  
 \* THE MAJORITY OF THE DIVERTED FLOW WILL DRAIN DOWN LAKESIDE  
 31 DT OUT  
 32 DI 0 1521 1988 2200  
 33 DQ 0 00 467 475

34 KK EVANS FLOW THAT CONTINUES IN CHANNEL OR RIGHTBANK  
 \* DIVERTED FLOW THAT LEAVES EVANS CREEK ALONG THE LEFTBANK BETWEEN LAKESIDE AND  
 \* LAKE DITCH. THESE FLOWS WILL NOT GET TO THE EVANS CREEK BOX AT I-580  
 35 DT OUT2  
 36 DI 0 450 700 1000 1300 1600  
 37 DQ 0 0 80 250 250 250

38 KK PTE1 ROUTE FLOWS FROM LAKESIDE ROAD TO I-580  
 39 RM 5 .43 .20

40 KK EV 2 EVANS CREEK WATERSHED NO.2  
 41 BA 1.00  
 42 PH 1 24 .32 .7 1.10 1.30 1.43 1.8 2.30 2.8  
 43 LS 78  
 44 UD .74

HEC-1 INPUT

PAGE 2

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

45 KK PTE2 COMBINE WATERSHEDS AT FREEWAY  
 46 HC 2

47 KK RESE2 STORAGE AT I-395  
 48 KM FLOWS THAT DO NOT GO IN THE BOX CULVERT WILL ASSUME GO TO LOW AREA BETWEEN  
 49 KM DRY AND EVANS CREEK  
 50 RS 1 STOR -1  
 51 SV 0 .01 .02 3 11 16 21.  
 52 SE 4467 4468 4474 4476 4478 4479 4480.  
 53 SQ 0 80 700 900 950 1125 1810

54 KK I-580 AT CULVERT UNDER FREEWAY  
 55 DT DWPOND  
 56 DI 500 900 950 1125 1810  
 57 DQ 0 0 0 150 810

58 KK RIPTI ROUTE FLOWS IN CULVERT THRU CONCRETE CHANNEL TO DRY CREEK CONFLUENCE  
 59 RM 1 .1 .4

60 KK D1 RUNOFF FROM DRAINAGE AREA D1  
 61 BA .78  
 62 PH 1 24 .27 .53 1.27 1.55 1.82 2.45 3.23 4.00  
 63 LS 0 65 0  
 64 UD .29

65 KK RT PTA ROUTE FLOW FROM DRAINAGE AREA D1 TO OUTLET OF DRAINAGE AREA D2  
 66 RM 3 .26 .40

67 KK D2 RUNOFF FROM DRAINAGE AREA D2  
 68 BA 1.66  
 69 PH 1 24 .36 .70 1.23 1.46 1.68 2.19 2.83 3.70  
 70 LS 0 77 0  
 71 UD .43

72	KK	PTA	COMBINE RUNOFF FROM D1 & D2 AT OUTLET OF D2									
73	HC	2										
74	KK	RT PTB	ROUTE COMBINED FLOW FROM DRAINAGE AREAS D1 AND D2 TO OUTLET OF D3									
75	RM	1	.10	.40								
76	KK	D3	RUNOFF FROM DRAINAGE AREA D3									
77	BA	1.10										
78	PH	1	24	.35	.70	1.20	1.37	1.56	2.00	2.65	3.20	
79	LS	0	79	0								
80	UD	.38										
81	KK	D PTB	COMBINE FLOWS FROM DRAINAGE AREAS D1, D2 & D3 AT STEAMBOAT DITCH									
82	HC	2										

HEC-1 INPUT

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

83	KK	RT PTC	ROUTE FLOWS FROM STEAMBOAT DITCH TO POINT C									
84	RM	1	.11	.40								
85	KK	D4	DRAINAGE AREA D4									
86	BA	.19										
87	PH	1	24	.35	.70	1.20	1.36	1.50	1.8	2.35	2.9	
88	LS	0	76									
89	UD	.25										
90	KK	PTC	COMBINE D4 AND ROUTED FLOWS FROM D3									
91	HC	2										
92	KK	D5	RUNOFF FROM DRAINAGE AREA D5									
93	BA	1.7										
94	PH	1	24	.35	.70	1.22	1.47	1.70	2.25	2.90	3.70	
95	LS	0	75	0								
96	UD	.31										
97	KK	RTPT C	ROUTE COMBINED FLOWS FROM D5 TO OUTLET OF D6 (STEAMBOAT DITCH)									
98	RM	3	.25	.40								
99	KK	D6	RUNOFF FROM DRAINAGE AREA D6									
100	BA	1.60										
101	PH	1	24	.34	.67	1.17	1.37	1.56	2.00	2.55	3.10	
102	LS	0	80	0								
103	UD	.57										
104	KK	PT C	COMBINE ROUTED D5 AND D6									
105	HC	2										
106	KK	PTC	COMBINE ALL FLOWS ABOVE THIS CONCENTRATION POINT									
107	HC	2										
108	KK	RT PTD	ROUTE FLOW TO LAKE DITCH									
109	RM	1	.1	.3								
110	KK	D7	RUNOFF FROM DRAINAGE AREA D7									
111	BA	1.20										
112	PH	1	24	.34	.67	1.17	1.37	1.56	2.0	2.55	3.10	
113	LS	0	80									
114	UD	.85										
115	KK	PTD	COMBINE FLOW AT LAKE DITCH									
116	HC	2										
117	KK	RT PTE	ROUTE FLOW TO PANDORA DRIVE (POINT E)									

118	RM	1	.1	.3							
119	KK	D8	DRAINAGE AREA D8								
120	BA	.07									
121	PH	1	24	.32	.70	1.10	1.30	1.43	1.80	2.30 2.8	
122	LS		80								
123	UD	.33									

HEC-1 INPUT

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

124	KK	D9	DRAINAGE AREA 9								
125	BA	1.53									
126	PH	1	24	.34	.67	1.17	1.37	1.56	2.0	2.55 3.1	
127	LS		77								
128	UD	.45									

129	KK	RTE	ROUTE FLOWS TO PANORAMA DRIVE (POINT E)								
130	RM	3	.32	.2							

131	KK	D10	DRAINAGE AREA 10								
132	BA	.63									
133	PH	1	24	.32	.70	1.10	1.30	1.43	1.80	2.30 2.8	
134	LS		78								
135	UD	.45									

136	KK	PTE	COMBINE D9 AND D10								
137	HC	2									

138	KK	PTE	COMBINE HYDROGRAPHS JUST BELOW PANORAMA DRIVE								
139	HC	3									

140	KK	RT PTF	ROUTE FLOW TO F								
141	RM	1	.1	.3							

142	KK	D11	RUNOFF FROM DRAINAGE AREA D11								
143	BA	1.40									
144	PH	1	24	.35	.70	1.22	1.38	1.54	1.90	2.50 3.00	
145	LS	0	80	0							
146	UD	.85									

147	KK	RT PTF	ROUTE FLOW TO POINT F								
148	RM	1	.1	.4							

149	KK	D12	DRAINAGE AREA D12								
150	BA	.08									
151	PH	1	24	.32	.7	1.10	1.30	1.43	1.8	2.30 2.8	
152	LS		80								
153	UD	.23									

154	KK	PTF	COMBINE HYDROGRAPHS AT POINT F								
155	HC	3									

156	KK	RT PTG	ROUTE FLOW TO POINT G								
157	RM	1	.08	.4							

158	KK	D13	DRAINAGE AREA 13								
159	BA	.44									
160	PH	1	24	.32	.7	1.10	1.30	1.43	1.8	2.30 2.8	
161	LS		80								
162	UD	.68									

HEC-1 INPUT

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

163	KK	PTG	COMBINE HYDROGRAPHS AT FREEWAY									
164	HC	2										
165	KK	I580DR	I-580 FLOW THAT DOES NOT GO UNDER FREEWAY WILL GO TO PONDING AREA									
166	KN		BETWEEN EVANS AND DRY CREEK									
167	DT	DVDRY										
168	DI	2800	3950									
169	DR	0	115									
170	KK	RT PTH	ROUTE FLOW TO INTERSECTION WITH PIPE									
171	RM	1	.08	.4								
172	KK	FRDRY	FLOW FROM DRY CREEK									
173	DR	DVDRY										
174	KK	DVEVAN	FLOW FROM EVANS CREEK									
175	DR	DVPOND										
176	KK	D14	RUNOFF FROM DRAINAGE AREA D14 (DRAINS THROUGH 66" PIPE UNDER I-580									
177	KN	PIPE	LOCATED IN LOW AREA BETWEEN THE EVANS AND DRY CREEKS BOXES									
178	BA	1.20										
179	PH	1	24	.32	.7	1.10	1.30	1.43	1.8	2.30	2.8	
180	LS		80									
181	UD	.740										
182	KK	ATPIPE										
183	HC	3										
184	KK	RES2	ROUTE FLOWS THROUGH 60 INCH CULVERT UNDER FREEWAY									
185	RS	1	STOR	-1								
186	SV	0	1.4	4.4	23	55	170	389				
187	SE	4462.5	4466	4468	4470	4472	4476	4480				
188	SQ	0	50	80	100	200	300	380				
189	KK	PTH	COMBINE FLOWS AT POINT H, JUST BELOW FREEWAY									
190	HC	2										
191	KK	RTPTI	ROUTE FLOWS TO CONFLUENCE WITH EVANS CREEK									
192	RM	2	.23	.2								
193	KK	EV3	EVANS CREEK WATERSHED NO. 3									
194	BA	.52										
195	PH	1	24.	.32	.7	1.1	1.3	1.43	1.8	2.3	2.8	
196	LS		76.	8.								
197	UD	.7										
198	KK	PTI	CONFLUENCE OF EVANS CREEK AND DRY CREEK									
199	HC	3										
200	ZZ											

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

25 EV 1

31 .-----> OUT

30 EVANCH

35 .-----> OUT2

34 EVANS

```

V
F 38 PTE1
.
.
F 40 . EV 2
.
.
F 45 PTE2.....
.
V
V
F 47 RESE2
.
.
F 55 .-----> DVPOND
F 54 I-580
.
V
V
F 58 RTPTI
.
.
F 60 . D1
.
V
V
F 65 . RT PTA
.
.
F 67 . . D2
.
.
F 72 . PTA.....
.
V
V
F 74 . RT PTB
.
.
F 76 . . D3
.
.
F 81 . D PTB.....
.
V
V
F 83 . RT PIC
.
.
F 85 . . D4
.
.
F 90 . PTC.....
.
.
F 92 . . D5
.
V
V
F 97 . . RTPT C
.
.
F 99 . . D6
.
.
F 104 . . PT C.....
.
.
F 106 . PTC.....
.
V
V

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174 . . . DVEVAN
. . . . .
176 . . . . . B14
. . . . .
182 . . . ATPIPE.....
. . . . .
. . . . .
184 . . . RES2
. . . . .
. . . . .
189 . . . PTH.....
. . . . .
. . . . .
191 . . . RTPTI
. . . . .
. . . . .
193 . . . EV3
. . . . .
. . . . .
198 . . . PTI.....

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

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*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* FEBRUARY 1981 *
* REVISED 01 JUN 88 *
* RUN DATE 11/20/1990 TIME 13:36:13 *
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*****
* U.S. ARMY CORPS OF ENGINEERS *
* THE HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 551-1748 *
*****

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FEMA FLOOD INSURANCE STUDY - DRY AND EVANS CREEKS, WASHOE CO., NV  
NOVEMBER 1990

BY: NIMBUS ENGINEERS, RENO, NEVADA FILE NAME: DREV.901  
NIMBUS JOB NO. 8901 WASHOE CO & CITY OF RENO CONTRACT NO. EMW-89-2841

RAINFALL DATA FROM NOAA ATLAS 2, VOLUME VII  
RAINFALL DISTRIBUTION: 24 HOUR HYPOTHETICAL STORM AERIAL REDUCTION  
WAS ESTIMATED FOR 100-YEAR STORM OCCURRING OVER THE EVANS AND DRY CREEKS  
WATERSHEDS AT THE SAME TIME (APPOX. 24 SQ. MILES)

LAG TIME COMPUTED WITH UPLAND METHOD AND THE PROCEDURES DESCRIBED IN TR-55  
CURVE NUMBER FROM TR-55 AND NEH-4  
ROUTING PERFORMED WITH MUSKINGUM METHOD AND MODIFIED PULS

===== 100 YEAR, 24 HOUR EVENT =====

1989 MODEL REVISED TO REFLECT KEY CONCENTRATION POINTS  
(APRIL AND JULY 1990)

\*\*\*\*\*

24 10 OUTPUT CONTROL VARIABLES  
IPRNT 5 PRINT CONTROL  
IPLOT 0 PLOT CONTROL  
OSCAL 0. HYDROGRAPH PLOT SCALE

## HYDROGRAPH TIME DATA

NMIN 5 MINUTES IN COMPUTATION INTERVAL  
 IDATE 1 0 STARTING DATE  
 ITIME 0000 STARTING TIME  
 ND 300 NUMBER OF HYDROGRAPH ORDINATES  
 NDDATE 2 0 ENDING DATE  
 NDTIME 0055 ENDING TIME  
 ICENT 19 CENTURY MARK

COMPUTATION INTERVAL .08 HOURS  
 TOTAL TIME BASE 24.92 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

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	EV 1	1988.	13.17	999.	347.	334.	8.60		
DIVERSION TO	OUT	467.	13.17	55.	14.	13.	8.60		
HYDROGRAPH AT	EVANCH	1521.	13.17	944.	333.	321.	8.60		
DIVERSION TO	OUT2	250.	13.17	149.	37.	36.	8.60		
HYDROGRAPH AT	EVANS	1271.	13.17	794.	296.	285.	8.60		
ROUTED TO	PTE1	1271.	13.92	793.	292.	281.	8.60		
HYDROGRAPH AT	EV 2	217.	12.83	76.	25.	24.	1.00		
2 COMBINED AT	PTE2	1401.	13.42	865.	317.	306.	9.60		
ROUTED TO	RESE2	1375.	13.67	865.	317.	306.	9.60	4479.36	13.67
DIVERSION TO	DVPOND	391.	13.67	78.	19.	19.	9.60		
HYDROGRAPH AT	I-580	984.	13.67	787.	298.	287.	9.60		
ROUTED TO	RTPTI	984.	13.83	787.	297.	286.	9.60		

HYDROGRAPH AT	D1	189.	12.42	59.	20.	20.	.78
ROUTED TO	RT PTA	185.	12.67	59.	20.	20.	.78
HYDROGRAPH AT	D2	693.	12.50	105.	67.	65.	1.66
2 COMBINED AT	PTA	852.	12.58	243.	87.	84.	2.44
ROUTED TO	RT PTB	848.	12.67	243.	87.	84.	2.44
HYDROGRAPH AT	D3	464.	12.50	113.	38.	36.	1.10
2 COMBINED AT	D PTB	1263.	12.58	356.	125.	120.	3.54
ROUTED TO	RT PTC	1245.	12.67	356.	125.	120.	3.54
HYDROGRAPH AT	D4	74.	12.33	14.	5.	4.	.19
2 COMBINED AT	PTC	1284.	12.67	370.	129.	125.	3.73
HYDROGRAPH AT	D5	745.	12.42	178.	63.	60.	1.70
ROUTED TO	RTPT C	724.	12.67	178.	63.	60.	1.70
HYDROGRAPH AT	D6	541.	12.67	163.	54.	52.	1.60
2 COMBINED AT	PT C	1265.	12.67	341.	117.	113.	3.30
2 COMBINED AT	PTC	2549.	12.67	710.	246.	237.	7.03
ROUTED TO	RT PTD	2500.	12.75	710.	246.	237.	7.03
HYDROGRAPH AT	D7	316.	13.00	121.	40.	39.	1.20
2 COMBINED AT	PTD	2790.	12.75	831.	286.	276.	8.23
ROUTED TO	RT PTE	2736.	12.92	831.	286.	276.	8.23
HYDROGRAPH AT	D8	28.	12.42	6.	2.	2.	.07
HYDROGRAPH AT	D9	492.	12.58	134.	44.	43.	1.53
ROUTED TO	RT E	453.	12.92	134.	44.	43.	1.53

HYDROGRAPH AT	D10	186.	12.58	48.	16.	15.	.63		
2 COMBINED AT	PTE	589.	12.83	182.	60.	58.	2.16		
3 COMBINED AT	PTE	3333.	12.83	1019.	348.	336.	10.46		
ROUTED TO	RT PTF	3289.	13.00	1019.	348.	335.	10.46		
HYDROGRAPH AT	D11	367.	13.00	135.	44.	43.	1.40		
ROUTED TO	RT PTF	366.	13.08	135.	44.	43.	1.40		
HYDROGRAPH AT	D12	38.	12.33	7.	2.	2.	.08		
3 COMBINED AT	PTF	3660.	13.00	1160.	394.	380.	11.94		
ROUTED TO	RT PTG	3644.	13.08	1160.	394.	379.	11.94		
HYDROGRAPH AT	D13	115.	12.75	37.	12.	12.	.44		
2 COMBINED AT	PTG	3741.	13.08	1197.	406.	391.	12.38		
DIVERSION TO	DVDRY	29.	13.08	2.	1.	0.	12.38		
HYDROGRAPH AT	1580DR	3712.	13.08	1195.	406.	391.	12.38		
ROUTED TO	RT PTH	3696.	13.17	1195.	405.	390.	12.38		
HYDROGRAPH AT	FRDRY	29.	13.08	2.	1.	0.	.00		
HYDROGRAPH AT	DVEVAN	391.	13.67	78.	19.	19.	.00		
HYDROGRAPH AT	D14	298.	12.83	102.	34.	32.	1.20		
3 COMBINED AT	ATPIPE	535.	13.67	181.	53.	52.	1.20		
ROUTED TO	RES2	182.	14.83	136.	53.	51.	1.20		
								4471.65	14.83
2 COMBINED AT	PTH	3787.	13.17	1327.	458.	442.	13.58		
ROUTED TO	RTPTI	3620.	13.33	1325.	456.	439.	13.58		
HYDROGRAPH AT	EV3	118.	12.83	39.	14.	13.	.52		

3 COMBINED AT

PTI	4647.	13.42	2149.	767.	739.	23.70
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\*\*\* NORMAL END OF HEC-1 \*\*\*

WSHYD.901

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*****  
*  
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *  
* FEBRUARY 1981 *  
* REVISED 01 JUN 88 *  
*  
* RUN DATE 11/20/1990 TIME 13:41:56 *  
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*  
* U.S. ARMY CORPS OF ENGINEERS *  
* THE HYDROLOGIC ENGINEERING CENTER *  
* 609 SECOND STREET *  
* DAVIS, CALIFORNIA 95616 *  
* (916) 551-1748 *  
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X X XXXXXXX XXXXX X  
X X X X X XX  
X X X X X  
XXXXXXXX XXXX X XXXXX X  
X X X X X  
X X X X X  
X X XXXXXXX XXXXX XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC16S, HEC1DB, AND HEC1KH.

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

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

\*DIAGRAM

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1 ID *****
2 ID
3 ID FEMA FLOOD INSURANCE STUDY -THOMAS, DRY AND EVANS CREEKS, WASHOE CO.,NV
4 ID NOVEMBER 1990
5 ID
6 ID BY: NIMBUS ENGINEERS, RENO, NEVADA FILE NAME: WSHYD .901
7 ID NIMBUS JOB NO. 8901 WASHOE CO & CITY OF RENO CONTRACT NO. EMW-89-2841
8 ID
9 ID RAINFALL DATA FROM NOAA ATLAS 2, VOLUME VII (AERIAL REDUCTION FOR 38 SQ.
10 ID MILES, COMBINED AREAS OF THE WATERSHEDS)
11 ID
12 ID LAG TIME COMPUTED WITH UPLAND METHOD AND THE PROCEDURES DESCRIBED IN TR-55
13 ID CURVE NUMBER FROM TR-55 AND NEH-4
14 ID ROUTING PERFORMED WITH MUSKINGUM METHOD AND MODIFIED PULS
15 ID
16 ID ===== 100 YEAR, 24 HOUR EVENT =====
17 ID
18 ID 1989 MODEL REVISED TO REFLECT KEY CONCENTRATION POINTS
19 ID (APRIL AND JULY 1990)
20 ID *****
21 IT 5 300
22 IO 5

23 KK EV 1 EVANS CREEK WATERSHED NO.1
24 BA 8.60
25 PH 1 38 .4 .7 1.3 1.6 1.9 2.6 3.4 4.2
26 LS 72
27 UD 1.04

28 KK EVANCH FLOW WITHIN CHANNEL CONTINUING DOWN TOWARDS I-580
* THE MAJORITY OF THE DIVERTED FLOW WILL DRAIN DOWN LAKESIDE
29 DT OUT
30 DI 0 1521 1988 2200
31 DQ 0 00 467 475

32 KK EVANS FLOW THAT CONTINUES IN CHANNEL OR RIGHTBANK
* DIVERTED FLOW THAT LEAVES EVANS CREEK ALONG THE LEFTBANK BETWEEN LAKESIDE AND
* LAKE DITCH. THESE FLOW WILL NOT GET TO THE EVANS CREEK BOX AT I-580
33 DT OUT2
34 DI 0 450 700 1000 1300 1600
35 DQ 0 0 80 250 250 250

36 KK PTE1 ROUTE FLOWS FROM LAKESIDE ROAD TO I-580
37 RM 5 .43 .20

38 KK EV 2 EVANS CREEK WATERSHED NO.2
39 BA 1.00
40 PH 1 38 .32 .7 1.10 1.30 1.43 1.8 2.30 2.8
41 LS 78
42 UD .74
    
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LINE	ID	1	2	3	4	5	6	7	8	9	10
43	KK	PTE2 COMBINE WATERSHEDS AT FREEWAY									
44	HC	2									
45	KK	RESE2 STORAGE AT I-395									
46	KM	FLOWS THAT DO NOT GO IN THE BOX CULVERT WILL ASSUME GO TO LOW AREA BETWEEN									
47	KM	DRY AND EVANS CREEK									
48	RS	1	STOR	-1							
49	SV	0	.01	.02	3	11	16	21.			
50	SE	4467	4468	4474	4476	4478	4479	4480.			
51	SQ	0	80	700	900	950	1125	1810			
52	KK	I-580 AT CULVERT UNDER FREEWAY									
53	DT	DVPOND									
54	DI	500	900	950	1125	1810					
55	DQ	0	0	0	150	810					
56	KK	RTPT1 ROUTE FLOWS IN CULVERT THRU CONCRETE CHANNEL TO DRY CREEK CONFLUENCE									
57	RM	1	.1	.4							
58	KK	D1 RUNOFF FROM DRAINAGE AREA D1									
59	BA	.78									
60	PH	1	38	.27	.53	1.27	1.55	1.82	2.45	3.23	4.00
61	LS	0	65	0							
62	UD	.29									
63	KK	RT PTA ROUTE FLOW FROM DRAINAGE AREA D1 TO OUTLET OF DRAINAGE AREA D2									
64	RM	3	.26	.40							
65	KK	D2 RUNOFF FROM DRAINAGE AREA D2									
66	BA	1.66									
67	PH	1	38	.36	.70	1.23	1.46	1.68	2.19	2.83	3.70
68	LS	0	77	0							
69	UD	.43									
70	KK	PTA COMBINE RUNOFF FROM D1 & D2 AT OUTLET OF D2									
71	HC	2									
72	KK	RT PTB ROUTE COMBINED FLOW FROM DRAINAGE AREAS D1 AND D2 TO OUTLET OF D3									
73	RM	1	.10	.40							
74	KK	D3 RUNOFF FROM DRAINAGE AREA D3									
75	BA	1.10									
76	PH	1	38	.35	.70	1.20	1.37	1.56	2.00	2.65	3.20
77	LS	0	79	0							
78	UD	.38									
79	KK	D PTB COMBINE FLOWS FROM DRAINAGE AREAS D1, D2 & D3 AT STEAMBOAT DITCH									
80	HC	2									



LINE	ID	1	2	3	4	5	6	7	8	9	10	
122	KK	D9	DRAINAGE AREA 9									
123	BA	1.53										
124	PH	1	.24	.34	.67	1.17	1.37	1.56	2.0	2.55	3.1	
125	LS		77									
126	UD	.45										
127	KK	RTE	ROUTE FLOWS TO PANORAMA DRIVE (POINT E)									
128	RM	3	.32	.2								
129	KK	D10	DRAINAGE AREA 10									
130	BA	.63										
131	PH	1	.38	.32	.70	1.10	1.30	1.43	1.80	2.30	2.8	
132	LS		78									
133	UD	.45										
134	KK	PTE	COMBINE D9 AND D10									
135	HC	2										
136	KK	PTE	COMBINE HYDROGRAPHS JUST BELOW PANORAMA DRIVE									
137	HC	3										
138	KK	RT PTF	ROUTE FLOW TO F									
139	RM	1	.1	.3								
140	KK	D11	RUNOFF FROM DRAINAGE AREA D11									
141	BA	1.40										
142	PH	1	.38	.35	.70	1.22	1.38	1.54	1.90	2.50	3.00	
143	LS	0	80	0								
144	UD	.85										
145	KK	RT PTF	ROUTE FLOW TO POINT F									
146	RM	1	.1	.4								
147	KK	D12	DRAINAGE AREA D12									
148	BA	.08										
149	PH	1	.38	.32	.7	1.10	1.30	1.43	1.8	2.30	2.8	
150	LS		80									
151	UD	.23										
152	KK	PTF	COMBINE HYDROGRAPHS AT POINT F									
153	HC	3										
154	KK	RT PTF	ROUTE FLOW TO POINT G									
155	RM	1	.08	.4								
156	KK	D13	DRAINAGE AREA 13									
157	BA	.44										
158	PH	1	.38	.32	.7	1.10	1.30	1.43	1.8	2.30	2.8	
159	LS		80									
160	UD	.68										

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

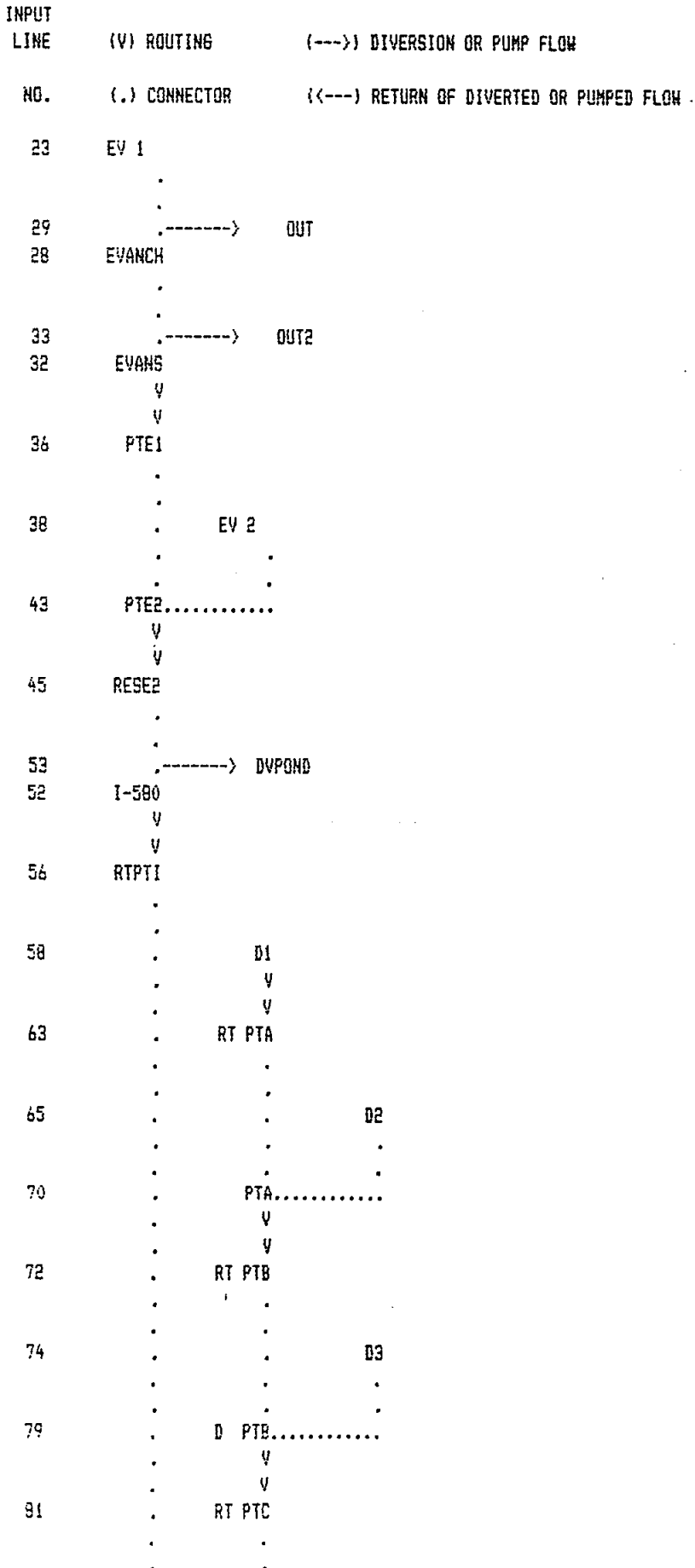
161	KK	PTG	COMBINE HYDROGRAPHS AT FREEWAY									
162	HC	2										
163	KK	I580DR	FLOW THAT DOES NOT GO UNDER FREEWAY WILL GO TO PONDING AREA									
164	KM	BETWEEN EVANS AND DRY CREEK BOX										
165	DT	DVDRY										
166	DI	2800	3950									
167	DQ	0	115									
168	KK	RT PTH	ROUTE FLOW TO INTERSECTION WITH PIPE									
169	RM	1	.08	.4								
170	KK	FRDRY	FLOW FROM DRY CREEK									
171	DR	DVDRY										
172	KK	DVEVAN	FLOW FROM EVANS CREEK									
173	DR	DVPOND										
174	KK	D14	RUNOFF FROM DRAINAGE AREA D14 (DRAINS THROUGH 66" PIPE UNDER I-580									
175	KM	PIPE LOCATED NORTH OF DRY CREEK CROSSING @ FREEWAY										
176	BA	1.20										
177	PH	1	38	.32	.7	1.10	1.30	1.43	1.8	2.30	2.8	
178	LS		80									
179	UD	.740										
180	KK	ATPIPE										
181	HC	3										
182	KK	RES2	ROUTE FLOWS THROUGH 60 INCH CULVERT UNDER FREEWAY									
183	RS	1	STOR	-1								
184	SV	0	1.4	4.4	23	55	170	389				
185	SE	4462.5	4466	4468	4470	4472	4476	4480				
186	SQ	0	50	80	100	200	300	380				
187	KK	PTH	COMBINE FLOWS AT POINT H, JUST BELOW FREEWAY									
188	HC	2										
189	KK	RTPTI	ROUTE FLOWS TO CONFLUENCE WITH EVANS CREEK									
190	RM	2	.23	.2								
191	KK	EV3	EVANS CREEK WATERSHED NO. 3									
192	BA	.52										
193	PH	1	38.	.32	.7	1.1	1.3	1.43	1.8	2.3	2.8	
194	LS		76.	8.								
195	UD	.7										
196	KK	PTI	CONFLUENCE OF EVANS CREEK AND DRY CREEK									
197	HC	3										



LINE	ID	1	2	3	4	5	6	7	8	9	10
239	KK CP-D	COMBINE ROUTED T1-T4 W/ T5									
240	HC	2									
241	KK RAPEX	ROUTE COMBINED T1-T5 TO APEX									
242	RM	2	.18	.4							
243	KK T6A	THOMAS CREEK WATERSHED T6 @ fan APEX									
244	BA	.65									
245	PH	1	38	.35	.69	1.21	1.34	1.48	1.8	2.3	2.8
246	LS	75									
247	UD	.21									
248	KK APEX1	COMBINE FLOWS AT APEX									
249	HC	2									
250	KK RT-395	ROUTE FLOWS FROM APEX TO 395									
251	RM	3	.462	.2							
252	KK T6B	THOMAS CREEK WATERSHED T6 FROM APEX TO 395									
253	BA	2.4									
254	PH	1	38	.32	.7	1.1	1.3	1.43	1.8	2.3	2.8
255	LS	75									
256	UD	.66									
257	KK T6A&B	COMBINE ALL FLOWS									
258	HC	2									
259	KK THOUT	DIVERT FLOW FROM SYSTEM THAT DRAIN BEHIND HUFFACKER NARROWS									
260	DT DVTH										
261	DI	0	650.	1500.	2000	2600					
262	DQ	0	650.	750.	1135	1573					
263	KK RTPTJ	ROUTE THOMAS CREEK FLOW TO MCCARRAN BLVD									
264	RM	20	1.6	.1							
265	KK CB PTJ	COMBINE B1 AND DIVERTED FLOW FROM THOMAS CREEK AT MCCARRAN BLVD									
266	HC	2									
267	KK CB PTJ	COMBINE DRY AND THOMAS CREEK FLOW AT MCCARRAN BLVD									
268	HC	2									
269	KK MCDV										
270	DT DVMC										
271	DI	0	2700	3500	4700						
272	DQ	0	0	600	1350						
273	KK EVOUT2	OVERFLOW FROM EVANS CREEK REACH BETWEEN LAKESIDE DRIVE AND LAKE DITCH									
274	DR	OUT2									



SCHEMATIC DIAGRAM OF STREAM NETWORK



83	.	.	D4	
	.	.	.	
88	.	PTC.....	.	
	.	.	.	
90	.	.	D5	
	.	.	V	
	.	.	V	
95	.	RTPT C	.	
	.	.	.	
97	.	.	.	D6
	.	.	.	.
102	.	PT C.....	.	
	.	.	.	
104	.	PTC.....	.	
	.	V	.	
	.	V	.	
106	.	RT PTD	.	
	.	.	.	
108	.	.	D7	
	.	.	.	
113	.	PTD.....	.	
	.	V	.	
	.	V	.	
115	.	RT PTE	.	
	.	.	.	
117	.	.	D8	
	.	.	.	
122	.	.	.	D9
	.	.	V	
	.	.	V	
127	.	.	RTE	
	.	.	.	
129	.	.	.	D10
	.	.	.	.
134	.	.	PTE.....	
	.	.	.	
136	.	PTE.....	.	
	.	V	.	
	.	V	.	
138	.	RT PTF	.	
	.	.	.	
140	.	.	D11	
	.	.	V	
	.	.	V	
145	.	RT PTF	.	
	.	.	.	
147	.	.	.	D12
	.	.	.	.
152	.	PTF.....	.	
	.	V	.	
	.	V	.	

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154 . . . . . RT PTH
    . . . . .
    . . . . .
156 . . . . . D13
    . . . . .
    . . . . .
161 . . . . . PTH.....
    . . . . .
    . . . . .
165 . . . . . -----> DVDRY
163 . . . . . I580DR
    . . . . . V
    . . . . . V
168 . . . . . RT PTH
    . . . . .
    . . . . .
171 . . . . . <----- DVDRY
170 . . . . . FRDRY
    . . . . .
    . . . . .
173 . . . . . <----- DVPGND
172 . . . . . DVEVAN
    . . . . .
    . . . . .
174 . . . . . D14
    . . . . .
    . . . . .
180 . . . . . ATPIPE.....
    . . . . . V
    . . . . . V
182 . . . . . RES2
    . . . . .
    . . . . .
187 . . . . . PTH.....
    . . . . . V
    . . . . . V
189 . . . . . RTPTI
    . . . . .
    . . . . .
191 . . . . . EV3
    . . . . .
    . . . . .
196 . . . . . PTI.....
    . . . . . V
    . . . . . V
198 . . . . . RTPTJ
    . . . . .
    . . . . .
200 . . . . . B1
    . . . . .
    . . . . .
204 . . . . . T1
    . . . . . V
    . . . . . V
209 . . . . . RT1-B
    . . . . .
    . . . . .
211 . . . . . T2
    . . . . .
    . . . . .
216 . . . . . T3
    . . . . .
    . . . . .
221 . . . . . CP-B.....
    . . . . . V
    . . . . . V

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223	.	.	RCP-C	.
	.	.	.	.
225	.	.	.	T4
	.	.	.	.
230	.	.	CP-C.....	.
	.	.	V	.
	.	.	V	.
232	.	.	RCP-D	.
	.	.	.	.
234	.	.	.	T5
	.	.	.	.
239	.	.	CP-D.....	.
	.	.	V	.
	.	.	V	.
241	.	.	RAPEX	.
	.	.	.	.
243	.	.	.	T6A
	.	.	.	.
248	.	.	APEX1.....	.
	.	.	V	.
	.	.	V	.
250	.	.	RT-395	.
	.	.	.	.
252	.	.	.	T6B
	.	.	.	.
257	.	.	T6A&B .....	.
	.	.	.	.
260	.	.	.	-----> DVTH
259	.	.	THOUT	.
	.	.	V	.
	.	.	V	.
263	.	.	RTPTJ	.
	.	.	.	.
265	.	.	CB PTJ.....	.
	.	.	.	.
267	.	.	CB PTJ.....	.
	.	.	.	.
270	.	.	-----> DVMC	.
269	.	.	MCDV	.
	.	.	.	.
274	.	.	.	-----< OUT2
273	.	.	EVOUT2	.
	.	.	V	.
	.	.	V	.
275	.	.	RTE4	.
	.	.	.	.
277	.	.	.	E4
	.	.	.	.
282	.	.	PTE4.....	.
	.	.	V	.
	.	.	V	.

284

RTPTK

286

B2 DR

291

CBPTK .....

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

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*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
*   FEBRUARY 1981 *
*   REVISED 01 JUN 88 *
*
* RUN DATE 11/20/1990 TIME 13:41:56 *
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*
* U.S. ARMY CORPS OF ENGINEERS *
* THE HYDROLOGIC ENGINEERING CENTER *
*   609 SECOND STREET *
*   DAVIS, CALIFORNIA 95616 *
*   (916) 551-1748 *
*
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FEMA FLOOD INSURANCE STUDY -THOMAS, DRY AND EVANS CREEKS, WASHOE CO.,NV  
NOVEMBER 1990

BY: NIMBUS ENGINEERS, RENO, NEVADA                      FILE NAME: WSHYD2.901  
NIMBUS JOB NO. 8901 WASHOE CO & CITY OF RENO            CONTRACT NO. EMW-89-2841

RAINFALL DATA FROM NOAA ATLAS 2, VOLUME VII (AERIAL REDUCTION FOR 38 SQ.  
MILES, COMBINED AREAS OF THE WATERSHEDS)

LAG TIME COMPUTED WITH UPLAND METHOD AND THE PROCEDURES DESCRIBED IN TR-55  
CURVE NUMBER FROM TR-55 AND NEH-4  
ROUTING PERFORMED WITH MUSKINGUM METHOD AND MODIFIED PULS

===== 100 YEAR, 24 HOUR EVENT =====

1989 MODEL REVISED TO REFLECT KEY CONCENTRATION POINTS  
(APRIL AND JULY 1990)

\*\*\*\*\*

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

IT                HYDROGRAPH TIME DATA  
                  NMIN            5 MINUTES IN COMPUTATION INTERVAL  
                  IDATE           1 0 STARTING DATE  
                  ITIME           0000 STARTING TIME  
                  NQ               300 NUMBER OF HYDROGRAPH ORDINATES  
                  NDDATE          2 0 ENDING DATE  
                  NDTIME          0055 ENDING TIME  
                  ICENT           19 CENTURY MARK

COMPUTATION INTERVAL    .08 HOURS  
TOTAL TIME BASE        24.92 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

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	EV 1	1873.	13.17	966.	339.	326.	8.60		
DIVERSION TO	OUT	352.	12.83	38.	10.	9.	8.60		
HYDROGRAPH AT	EVANCH	1521.	12.83	928.	329.	317.	8.60		
DIVERSION TO	OUT2	250.	12.83	146.	37.	35.	8.60		
HYDROGRAPH AT	EVANS	1271.	12.83	782.	292.	282.	8.60		
ROUTED TO	PTE1	1271.	13.83	780.	289.	278.	8.60		
HYDROGRAPH AT	EV 2	203.	12.83	73.	24.	24.	1.00		
2 COMBINED AT	PTE2	1391.	13.42	850.	314.	302.	9.60		
ROUTED TO	RESE2	1367.	13.75	850.	314.	302.	9.60	4479.35	13.75
DIVERSION TO	DVPOND	383.	13.75	70.	17.	17.	9.60		
HYDROGRAPH AT	I-580	984.	13.75	780.	296.	285.	9.60		
ROUTED TO	RTPTI	984.	13.92	780.	295.	284.	9.60		
HYDROGRAPH AT	D1	172.	12.42	57.	20.	19.	.78		
ROUTED TO	RT PTA	168.	12.67	57.	20.	19.	.78		
HYDROGRAPH AT	D2	642.	12.50	179.	66.	63.	1.66		
2 COMBINED AT	PTA	789.	12.58	235.	85.	82.	2.44		
ROUTED TO	RT PTB	785.	12.67	235.	85.	82.	2.44		
HYDROGRAPH AT	D3	429.	12.50	109.	37.	35.	1.10		
2 COMBINED AT	D PTB	1170.	12.58	344.	122.	118.	3.54		
ROUTED TO	RT PTC	1154.	12.67	344.	122.	117.	3.54		
HYDROGRAPH AT	D4	68.	12.33	13.	4.	4.	.19		
2 COMBINED AT	PTC	1191.	12.67	358.	126.	122.	3.73		
HYDROGRAPH AT	D5	686.	12.42	172.	61.	59.	1.70		
ROUTED TO	RTPT C	668.	12.67	172.	61.	59.	1.70		
HYDROGRAPH AT	D6	504.	12.67	158.	53.	51.	1.60		
2 COMBINED AT	PT C	1172.	12.67	330.	114.	110.	3.30		
2 COMBINED AT	PTC	2363.	12.67	887.	241.	232.	7.03		

ROUTED TO	RT PTD	2319.	12.75	687.	240.	232.	7.03		
HYDROGRAPH AT	D7	297.	13.00	117.	40.	38.	1.20		
2 COMBINED AT	PTD	2590.	12.75	804.	280.	270.	8.23		
ROUTED TO	RT PTE	2546.	12.92	804.	280.	269.	8.23		
HYDROGRAPH AT	D8	26.	12.42	6.	2.	2.	.07		
HYDROGRAPH AT	D9	492.	12.58	134.	44.	43.	1.53		
ROUTED TO	RTE	453.	12.92	134.	44.	43.	1.53		
HYDROGRAPH AT	D10	172.	12.58	47.	15.	15.	.63		
2 COMBINED AT	PTE	582.	12.83	181.	60.	58.	2.16		
3 COMBINED AT	PTE	3131.	12.83	990.	341.	329.	10.46		
ROUTED TO	RT PTF	3095.	13.00	990.	341.	328.	10.46		
HYDROGRAPH AT	D11	345.	13.00	130.	43.	42.	1.40		
ROUTED TO	RT PTF	345.	13.08	130.	43.	42.	1.40		
HYDROGRAPH AT	D12	35.	12.33	7.	2.	2.	.08		
3 COMBINED AT	PTF	3444.	13.00	1126.	386.	372.	11.94		
ROUTED TO	RT PTG	3430.	13.08	1126.	386.	372.	11.94		
HYDROGRAPH AT	D13	107.	12.83	36.	12.	12.	.44		
2 COMBINED AT	PTG	3522.	13.08	1162.	398.	383.	12.38		
DIVERSION TO	DVDRY	23.	13.08	1.	0.	0.	12.38		
HYDROGRAPH AT	1580DR	3499.	13.08	1161.	398.	383.	12.38		
ROUTED TO	RT PTH	3485.	13.17	1161.	397.	382.	12.38		
HYDROGRAPH AT	FRDRY	23.	13.08	1.	0.	0.	.00		
HYDROGRAPH AT	DVEVAN	383.	13.75	70.	17.	17.	.00		
HYDROGRAPH AT	D14	279.	12.83	98.	33.	32.	1.20		
3 COMBINED AT	ATPIPE	516.	13.67	169.	51.	49.	1.20		
ROUTED TO	RES2	170.	14.83	128.	50.	49.	1.20	4471.40	14.83
2 COMBINED AT	PTH	3574.	13.17	1285.	447.	431.	13.58		
ROUTED TO	RTPTI	3418.	13.42	1284.	445.	429.	13.58		
HYDROGRAPH AT	EV3	110.	12.83	38.	13.	13.	.52		
3 COMBINED AT	PTI	4441.	13.42	2099.	754.	726.	23.70		
ROUTED TO	RTPTJ	4437.	13.50	2099.	751.	723.	23.70		
HYDROGRAPH AT	B1	287.	13.33	136.	46.	44.	1.70		
HYDROGRAPH AT	T1	1251.	12.42	389.	143.	137.	2.50		

ROUTED TO	RT1-B	1235.	12.50	389.	143.	137.	2.50
HYDROGRAPH AT	T2	417.	12.42	140.	50.	48.	1.82
HYDROGRAPH AT	T3	189.	12.42	61.	22.	21.	.82
3 COMBINED AT	CP-B	1794.	12.50	588.	214.	207.	5.14
ROUTED TO	RCP-C	1764.	12.58	587.	214.	206.	5.14
HYDROGRAPH AT	T4	240.	12.75	109.	39.	38.	2.16
2 COMBINED AT	CP-C	1998.	12.67	695.	254.	244.	7.30
ROUTED TO	RCP-D	1966.	12.75	695.	254.	244.	7.30
HYDROGRAPH AT	T5	262.	12.58	85.	29.	28.	1.19
2 COMBINED AT	CP-D	2232.	12.75	780.	283.	272.	8.49
ROUTED TO	RAPEX	2188.	12.92	779.	282.	272.	8.49
HYDROGRAPH AT	T6A	218.	12.25	41.	13.	13.	.65
2 COMBINED AT	APEX1	2237.	12.92	815.	296.	285.	9.14
ROUTED TO	RT-395	1951.	13.42	812.	292.	281.	9.14
HYDROGRAPH AT	T6B	419.	12.83	147.	49.	47.	2.40
2 COMBINED AT	T6A&B	2198.	13.42	952.	341.	329.	11.54
DIVERSION TO	DVTH	1279.	13.42	706.	280.	269.	11.54
HYDROGRAPH AT	THOUT	918.	13.42	247.	62.	59.	11.54
ROUTED TO	RTPTJ	816.	15.08	247.	62.	59.	11.54
2 COMBINED AT	CB PTJ	943.	15.00	383.	108.	104.	13.24
2 COMBINED AT	CB PTJ	4724.	13.50	2479.	859.	827.	36.94
DIVERSION TO	DVNC	1365.	13.50	251.	63.	61.	36.94
HYDROGRAPH AT	MCOV	3359.	13.50	2228.	796.	766.	36.94
HYDROGRAPH AT	EVDUT2	250.	12.58	146.	37.	35.	.00
ROUTED TO	RTE4	250.	14.75	146.	37.	35.	.00
HYDROGRAPH AT	E4	106.	12.58	30.	10.	9.	.40
2 COMBINED AT	PTE4	275.	13.58	174.	46.	45.	.40
ROUTED TO	RTPTK	273.	15.00	174.	46.	45.	.40
HYDROGRAPH AT	B2 DR	274.	12.75	87.	30.	29.	.69
3 COMBINED AT	CBPTK	3571.	13.50	2474.	872.	840.	38.03

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

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*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* FEBRUARY 1981 *
* REVISED 01 JUN 88 *
*
* RUN DATE 11/20/1990 TIME 10:28:50 *
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* U.S. ARMY CORPS OF ENGINEERS *
* THE HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 551-1748 *
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X   X  XXXXXXX  XXXX      X
X   X  X      X   X      XX
X   X  X      X           X
XXXXXXXX XXXX  X          XXXX  X
X   X  X      X           X
X   X  X      X   X      X
X   X  XXXXXXX  XXXX      XXX

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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KN.

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

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

\*DIAGRAM

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1 ID *****
2 ID
3 ID PURPOSE:
4 ID HYDROLOGIC MODEL TO EVALUATE THE EFFECT THE RENO AREA WASTERSHEDS HAVE ON
5 ID THE 100-YEAR DISCHARGE OF THE BOYTON SLOUGH AT EAST MCCARRAN BLVD (WHERE
6 ID THE 100-YEAR BACKWATER FROM THE TRUCKEE RIVER ENDS)
7 ID
8 ID THE PARAMETERS WERE DETERMINED FROM THE SCS SOIL SURVEY FOR WASHOE COUNTY,
9 ID PREVIOUS REPORTS FOR THE AREA (SUMMIT REPORT, 1985 AND KJC REPORT 1989) AND
10 ID FROM FIELD INVESTIGATIONS. DURING A 100-YEAR EVENT, RUNOFF WILL DRAIN
11 ID MAINLY AS OVERLAND FLOW THROUGH THE STREETS. THE RUNOFF'S PATH TOWARDS THE
12 ID SLOUGH CONTAINS SIGNIFICANT OBSTRUCTIONS THAT WILL STORE RUNOFF & DELAY THE
13 ID THE TIME IT TAKES FOR THE PEAK TO REACH THE SLOUGH. THE MAJOR OBSTRUCTIONS
14 ID INCLUDES VIRGINIA STREET, THE INTERSTATE, AND THE AIRPORT. THIS MODEL DID
15 ID NOT ATTEMPT TO QUANTIFY THE EFFECT THESE OBSTRUCTIONS WILL HAVE ON THE
16 ID DISCHARGE. TO MODEL THE OVERLAND FLOW, THE CHART IN TR-55 FOR SHALLOW
17 ID CONCENTRATED FLOW (PAVED) WAS USED TO DETERMINE THE LAG TIMES AND THE
18 ID ROUTING OF FLOW THROUGH RENO TO THE SLOUGH.
19 ID
20 ID NOVEMBER 1990
21 ID
22 ID BY: NIMBUS ENGINEERS, RENO, NEVADA FILE NAME: RNWSHYD.901
23 ID NIMBUS JOB NO. 8901 WASHOE CO & CITY OF RENO CONTRACT NO. EMW-89-2841
24 ID
25 ID RAINFALL DATA FROM NOAA ATLAS 2, VOLUME VII
26 ID RAINFALL DISTRIBUTION: 24 HOUR HYPOTHETICAL STORM AERIAL REDUCTION
27 ID WAS ESTIMATED FOR 100-YEAR STORM OCCURING OVER THE ENTIRE WATERSHEDS
28 ID AT THE SAME TIME (52 SQ. MILES)
29 ID
30 ID LAG TIME COMPUTED WITH UPLAND METHOD AND THE PROCEDURES DESCRIBED IN TR-55
31 ID CURVE NUMBER FROM TR-55 AND NEH-4
32 ID ROUTING PERFORMED WITH MUSKINGUM METHOD (USED A LOW X VALUE FOR THE ROUTING
33 ID REACHES THROUGH RENO TO MODEL THE STORAGE EFFECT OF THE OVERLAND FLOW)
34 ID
35 ID ===== 100 YEAR, 24 HOUR EVENT =====
36 ID
37 ID
38 ID
39 ID *****
40 ID IT 5 300
41 ID IO 5 0
42 KK EV 1 EVANS CREEK WATERSHED NO.1
43 BA 8.60
44 PH 1 52 .4 .7 1.3 1.6 1.9 2.6 3.4 4.2
45 LS 72
46 UD 1.04
47 KK EVANCH FLOW WITHIN CHANNEL CONTINUING DOWN TOWARDS I-580
* THE MAJORITY OF THE DIVERTED FLOW WILL DRAIN DOWN LAKESIDE
48 DT OUT
49 DI 0 1521 1988 2200
50 DG 0 00 467 475
    
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LINE	ID	1	2	3	4	5	6	7	8	9	10
51	KK	EVANS FLOW THAT CONTINUES IN CHANNEL OR RIGHTBANK * DIVERTED FLOW THAT LEAVES EVANS CREEK ALONG THE LEFTBANK BETWEEN LAKESIDE AND * LAKE DITCH. THESE FLOW WILL NOT GET TO THE EVANS CREEK BOX AT I-580									
52	DT	OUT2									
53	DI	0	450	700	1000	1300	1600				
54	DQ	0	0	80	250	250	250				
55	KK	PTE1 ROUTE FLOWS FROM LAKESIDE ROAD TO I-580									
56	RM	5	.43	.20							
57	KK	EV 2 EVANS CREEK WATERSHED NO.2									
58	BA	1.00									
59	PH	1	52	.32	.7	1.10	1.30	1.43	1.8	2.30	2.8
60	LS	78									
61	UD	.74									
62	KK	PTE2 COMBINE WATERSHEDS AT FREEWAY									
63	HC	2									
64	KK	RESE2 STORAGE AT I-395									
65	KM	FLOWS THAT DO NOT GO IN THE BOX CULVERT WILL ASSUME GO TO LOW AREA BETWEEN									
66	KM	DRY AND EVANS CREEK									
67	RS	1	STOR	-1							
68	SV	0	.01	.02	3	11	16	21.			
69	SE	4467	4468	4474	4476	4478	4479	4480.			
70	SB	0	80	700	900	950	1125	1810			
71	KK	I-580 AT CULVERT UNDER FREEWAY									
72	DT	DVPOND									
73	DI	500	900	950	1125	1810					
74	DQ	0	0	0	150	810					
75	KK	RTPT1 ROUTE FLOWS IN CULVERT THRU CONCRETE CHANNEL TO DRY CREEK CONFLUENCE									
76	RM	1	.1	.4							
77	KK	D1 RUNOFF FROM DRAINAGE AREA D1									
78	BA	.78									
79	PH	1	52	.27	.53	1.27	1.55	1.82	2.45	3.23	4.00
80	LS	0	65	0							
81	UD	.29									
82	KK	RT PTA ROUTE FLOW FROM DRAINAGE AREA D1 TO OUTLET OF DRAINAGE AREA D2									
83	RM	3	.26	.40							
84	KK	D2 RUNOFF FROM DRAINAGE AREA D2									
85	BA	1.66									
86	PH	1	52	.36	.70	1.23	1.46	1.68	2.19	2.83	3.70
87	LS	0	77	0							
88	UD	.43									

LINE	ID	1	2	3	4	5	6	7	8	9	10
89	KK	PTA	COMBINE RUNOFF FROM D1 & D2 AT OUTLET OF D2								
90	HC	2									
91	KK	RT PTB	ROUTE COMBINED FLOW FROM DRAINAGE AREAS D1 AND D2 TO OUTLET OF D3								
92	RM	1	.10	.40							
93	KK	D3	RUNOFF FROM DRAINAGE AREA D3								
94	BA	1.10									
95	PH	1	52	.35	.70	1.20	1.37	1.56	2.00	2.65	3.20
96	LS	0	79	0							
97	UD	.38									
98	KK	D PTB	COMBINE FLOWS FROM DRAINAGE AREAS D1, D2 & D3 AT STEAMBOAT DITCH								
99	HC	2									
100	KK	RT PTC	ROUTE FLOWS FROM STEAMBOAT DITCH TO POINT C								
101	RM	1	.11	.40							
102	KK	D4	DRAINAGE AREA D4								
103	BA	.19									
104	PH	1	52	.35	.70	1.20	1.36	1.50	1.8	2.35	2.9
105	LS	0	76								
106	UD	.25									
107	KK	PTC	COMBINE D4 AND ROUTED FLOWS FROM D3								
108	HC	2									
109	KK	D5	RUNOFF FROM DRAINAGE AREA D5								
110	BA	1.7									
111	PH	1	52	.35	.70	1.22	1.47	1.70	2.25	2.90	3.70
112	LS	0	75	0							
113	UD	.31									
114	KK	RTPT C	ROUTE COMBINED FLOWS FROM D5 TO OUTLET OF D6 (STEAMBOAT DITCH)								
115	RM	3	.25	.40							
116	KK	D6	RUNOFF FROM DRAINAGE AREA D6								
117	BA	1.60									
118	PH	1	52	.34	.67	1.17	1.37	1.56	2.00	2.55	3.10
119	LS	0	80	0							
120	UD	.57									
121	KK	PT C	COMBINE ROUTED D5 AND D6								
122	HC	2									
123	KK	PTC	COMBINE ALL FLOWS ABOVE THIS CONCENTRATION POINT								
124	HC	2									
125	KK	RT PTD	ROUTE FLOW TO LAKE DITCH								
126	RM	1	.1	.3							

LINE	ID	1	2	3	4	5	6	7	8	9	10	
127	KK	D7	RUNOFF FROM DRAINAGE AREA D7									
128	BA	1.20										
129	PH	1	52	.34	.67	1.17	1.37	1.56	2.0	2.55	3.10	
130	LS		80									
131	UD	.85										
132	KK	PTD	COMBINE FLOW AT LAKE DITCH									
133	HC	2										
134	KK	RT PTE	ROUTE FLOW TO PANORAMA DRIVE (POINT E)									
135	RM	1	.1	.3								
136	KK	D8	DRAINAGE AREA D8									
137	BA	.07										
138	PH	1	52	.32	.70	1.10	1.30	1.43	1.80	2.30	2.8	
139	LS		80									
140	UD	.33										
141	KK	D9	DRAINAGE AREA 9									
142	BA	1.53										
143	PH	1	52	.34	.67	1.17	1.37	1.56	2.0	2.55	3.1	
144	LS		77									
145	UD	.45										
146	KK	RTE	ROUTE FLOWS TO PANORAMA DRIVE (POINT E)									
147	RM	3	.32	.2								
148	KK	D10	DRAINAGE AREA 10									
149	BA	.63										
150	PH	1	52	.32	.70	1.10	1.30	1.43	1.80	2.30	2.8	
151	LS		78									
152	UD	.45										
153	KK	PTE	COMBINE D9 AND D10									
154	HC	2										
155	KK	PTE	COMBINE HYDROGRAPHS JUST BELOW PANORAMA DRIVE									
156	HC	3										
157	KK	RT PTF	ROUTE FLOW TO F									
158	RM	1	.1	.3								
159	KK	D11	RUNOFF FROM DRAINAGE AREA D11									
160	BA	1.40										
161	PH	1	52	.35	.70	1.22	1.38	1.54	1.90	2.50	3.00	
162	LS	0	80	0								
163	UD	.85										
164	KK	RT PTF	ROUTE FLOW TO POINT F									
165	RM	1	.1	.4								

LINE	ID	1	2	3	4	5	6	7	8	9	10	
166	KK	D12	DRAINAGE AREA D12									
167	BA	.08										
168	PH	1	52	.32	.7	1.10	1.30	1.43	1.8	2.30	2.8	
169	LS		80									
170	UD	.23										
171	KK	PTF	COMBINE HYDROGRAPHS AT POINT F									
172	HC	3										
173	KK	RT PT6	ROUTE FLOW TO POINT 6									
174	RM	1	.08	.4								
175	KK	D13	DRAINAGE AREA 13									
176	BA	.44										
177	PH	1	52	.32	.7	1.10	1.30	1.43	1.8	2.30	2.8	
178	LS		80									
179	UD	.68										
180	KK	PT6	COMBINE HYDROGRAPHS AT FREEWAY									
181	HC	2										
182	KK	I580DR	FLOW THAT DOES NOT GO UNDER FREEWAY WILL GO TO PONDING AREA									
183	KM		BETWEEN EVANS AND DRY CREEK BOXES									
184	DT	DVDRY										
185	DI	2800	3950									
186	DQ	0	115									
187	KK	RT PTH	ROUTE FLOW TO INTERSECTION WITH PIPE									
188	RM	1	.08	.4								
189	KK	FRDRY	FLOW FROM DRY CREEK									
190	DR	DVDRY										
191	KK	DVEVAN	FLOW FROM EVANS CREEK									
192	DR	DVPOND										
193	KK	D14	RUNOFF FROM DRAINAGE AREA D14 (DRAINS THROUGH 66" PIPE UNDER I-580									
194	KM		PIPE LOCATED NORTH OF DRY CREEK CROSSING A FREEWAY									
195	BA	1.20										
196	PH	1	52	.32	.7	1.10	1.30	1.43	1.8	2.30	2.8	
197	LS		80									
198	UD	.740										
199	KK	ATPIPE										
200	HC	3										
201	KK	RES2	ROUTE FLOWS THROUGH 60 INCH CULVERT UNDER FREEWAY									
202	RS	1	STOR	-1								
203	SV	0	1.4	4.4	23	55	170	389				
204	SE	4462.5	4466	4468	4470	4472	4476	4480				
205	SE	0	50	80	100	200	300	380				

LINE	ID	1	2	3	4	5	6	7	8	9	10
206	KK	PTH COMBINE FLOWS AT POINT H, JUST BELOW FREEWAY									
207	HC	2									
208	KK	RTPT1 ROUTE FLOWS TO CONFLUENCE WITH EVANS CREEK									
209	RM	2	.23	.2							
210	KK	EV3 EVANS CREEK WATERSHED NO. 3									
211	BA	.52									
212	PH	1	52.	.32	.7	1.1	1.3	1.43	1.8	2.3	2.8
213	LS	76. 8.									
214	UD	.7									
215	KK	PT1 CONFLUENCE OF EVANS CREEK AND DRY CREEK									
216	HC	3									
217	KK	RTPTJ ROUTE TO POINT J									
218	RM	1	.13	.4							
219	KK	B1 AREA BELOW FREEWAY AND ABOVE MCCARRAN BLVD									
220	BA	1.7									
221	PH	1	52	.32	.7	1.1	1.3	1.43	1.8	2.3	2.8
222	LS	80.									
223	UD	1.2									
224	KK	T1 THOMAS CREEK WATERSHED T1									
225	BA	2.5									
226	PH	1	52	.42	.83	1.45	1.87	2.26	3.18	4.31	5.44
227	LS	69									
228	UD	.35									
229	KK	RT1-B ROUTE T1 TO CONCENTRATION POINT B									
230	RM	1	.09568	.4							
231	KK	T2 THOMAS CREEK WATERSHED T2									
232	BA	1.82									
233	PH	1	52	.4	.79	1.39	1.75	2.1	2.9	3.91	4.92
234	LS	58									
235	UD	.29									
236	KK	T3 THOMAS CREEK WATERSHED T3									
237	BA	.82									
238	PH	1	52	.41	.8	1.4	1.73	2.04	2.76	3.75	4.73
239	LS	59									
240	UD	.3									
241	KK	CP-B COMBINE ROUTED WATERSHED T1 W/ T2 AND T3 AT CONCENTRATION PT B									
242	HC	3									
243	KK	RCP-C ROUTE COMBINED T1-T3 TO CONCENTRATION PT C									
244	RM	2	.14576	.4							

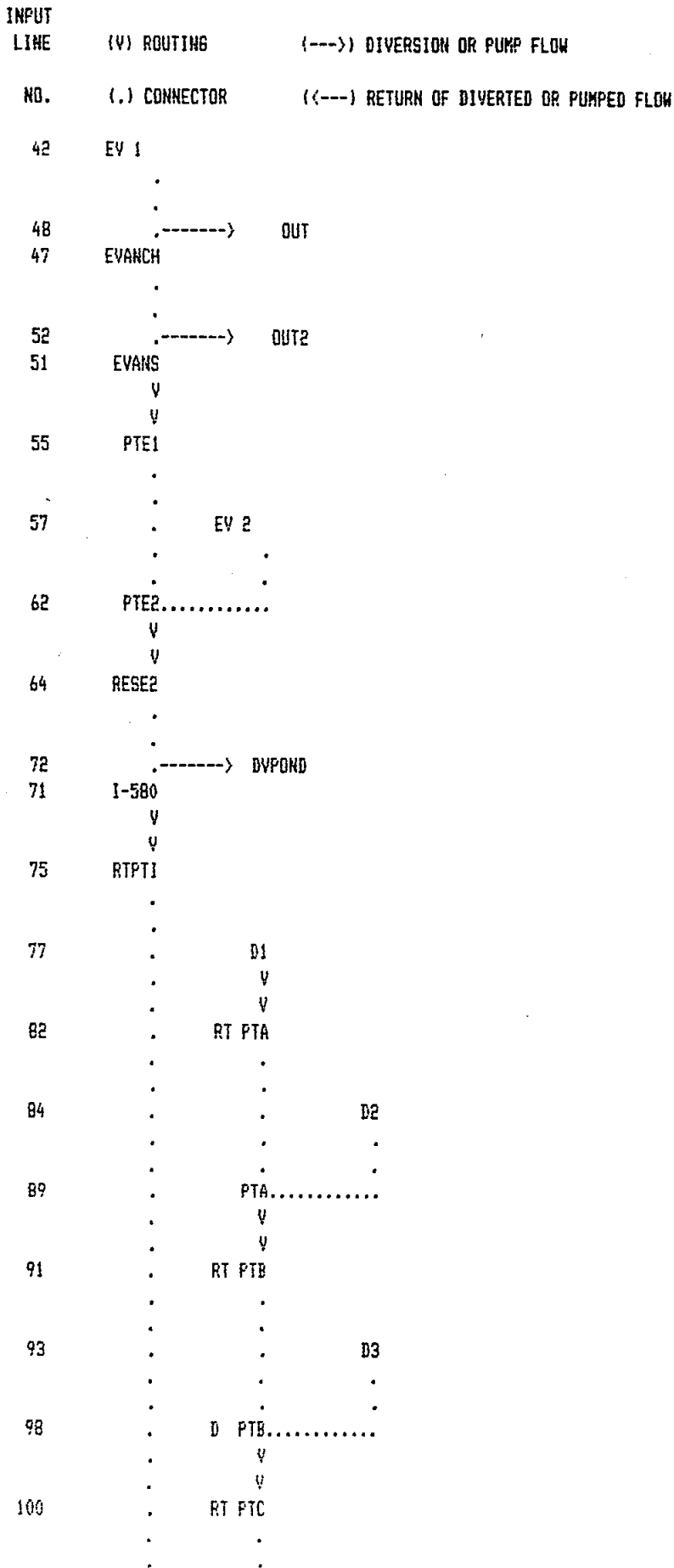
LINE	ID	1	2	3	4	5	6	7	8	9	10
245	KK	T4	THOMAS CREEK WATERSHED T4								
246	BA	2.16									
247	PH	1	52	.39	.77	1.35	1.64	1.91	2.55	3.38	4.2
248	LS		58								
249	UD	.54									
250	KK	CP-C	COMBINE ROUTED T1-T3 W/ T4								
251	HC	2									
252	KK	RCP-D	ROUTE COMBINED T1-T4 TO CONCENTRATION PT D								
253	RM	2	.1408	.4							
254	KK	T5	THOMAS CREEK WATERSHED T5								
255	BA	1.19									
256	PH	1.	52	.35	.68	1.2	1.4	1.59	2.04	2.75	3.4
257	LS		71	0							
258	UD	.49									
259	KK	CP-D	COMBINE ROUTED T1-T4 W/ T5								
260	HC	2									
261	KK	RAPEX	ROUTE COMBINED T1-T5 TO APEX								
262	RM	2	.18	.4							
263	KK	T6A	THOMAS CREEK WATERSHED T6 @ fan APEX								
264	BA	.65									
265	PH	1	52	.32	.70	1.10	1.30	1.43	1.8	2.3	2.8
266	LS		75								
267	UD	.21									
268	KK	APEX1	COMBINE FLOWS AT APEX								
269	HC	2									
270	KK	RT-395	ROUTE FLOWS FROM APEX TO 395								
271	RM	3	.462	.2							
272	KK	T6B	THOMAS CREEK WATERSHED T6 FROM APEX TO 395								
273	BA	2.4									
274	PH	1	52	.35	.70	1.10	1.30	1.43	1.8	2.3	2.8
275	LS		75								
276	UD	.66									
277	KK	T6A&B	COMBINE ALL FLOWS								
278	HC	2									
279	KK	THOUT	DIVERT FLOW FROM SYSTEM THAT DRAIN BEHIND HUFFACKER NARROWS								
280	BT	DVTH									
281	DI	0	650.	1500.	2000	2600					
282	DO	0	650.	750.	1135	1573					

LINE	ID	1	2	3	4	5	6	7	8	9	10
283	KK	RTPTJ	ROUTE THOMAS CREEK FLOW TO MCCARRAN BLVD								
284	RM	20	1.6	.1							
285	KK	CB PTJ	COMBINE B1 AND DIVERTED FLOW FROM THOMAS CREEK AT MCCARRAN BLVD								
286	HC	2									
287	KK	CB PTJ	COMBINE DRY AND THOMAS CREEK FLOW AT MCCARRAN BLVD								
288	HC	2									
289	KK	MCDV									
290	DT	DVMC									
291	DI	0	2700	3500	4700						
292	DB	0	0	600	1350						
293	KK	EVDU2	OVERTOPPING OF EVANS CREEK (LEFT BANK BETWEEN LAKESIDE AND LAKE DITCH)								
294	DR	OUT2									
295	KK	RTEV4	ROUTE FLOW TO FREEWAY AND COMBINE WITH E4								
296	RM	4	.55	.05							
297	KK	E4	EVANS 4								
298	BA	.4									
299	PH	1	52	.32	.7	1.1	1.3	1.43	1.8	2.3	2.8
300	LS		78								
301	UD	.48									
302	KK	PTE4	COMBINE E4 WITH FLOW FROM EVANS CREEK								
303	HC	2									
304	KK	RTPTK	ROUTE FLOW TO POINT K								
305	RM	15	1.21	.20							
306	KK	B2	DRAINAGE AREA B2 (INCLUDES MEADOWOOD HALL AREA)								
307	BA	.69									
308	PH	1	52	.32	.7	1.1	1.3	1.43	1.8	2.3	2.8
309	LS		89.								
310	UD	.7									
311	KK	CBPTK	COMBINE FLOW AT PECKHAM								
312	HC	3									
313	KK	RTPTL	ROUTE FLOW TO CONFLUENCE WITH SOUTHSIDE DRAIN								
314	RM	1	.2	.3							
315	KK	EVDV	FLOW FROM EVANS CREEK								
316	DR	OUT									
317	KK	RTPTL	ROUTE FLOW TO BOYTON SLOUGH AT SS DRAIN AND SLOUGH								
318	RM	20	1.9	.1							

LINE	ID	1	2	3	4	5	6	7	8	9	10	
319	KK	R2	WATERSHED R2									
320	BA	4.1										
321	PH	1	52	.32	.7	1.1	1.3	1.43	1.8	2.3	2.8	
322	LS		85									
323	UD	1.80										
324	KK	CBPTL	COMBINE DIVERTED FLOW FROM EVANS,R2, AND (DRY CREEK) AT SS DRAIN									
325	HC	3										
326	KK	RTPTM	ROUTE FLOW TO LONGLEY LANE									
327	RM	1	.1	.3								
328	KK	SK1	SKYLINE WASH									
329	BA	2.2										
330	PH	1	52	.32	.7	1.1	1.3	1.43	1.8	2.3	2.8	
331	LS		85									
332	UD	.48										
333	KK	RTPTL	ROUTE TO LONGLEY LANE									
334	RM	35	3.4	.10								
335	KK	R1	RENO 1									
336	BA	5.50										
337	PH	1	52	.32	.7	1.1	1.3	1.43	1.8	2.3	2.8	
338	LS		82									
339	UD	2.40										
340	KK	CBPTH	COMBINE FLOW AT LONGLEY LANE									
341	HC	2										
342	KK	DT1	WATERSHED ABOVE DENT DAM									
343	BA	1.21										
344	PH	1	52	.32	.7	1.1	1.3	1.43	1.8	2.3	2.8	
345	LS		85									
346	UD	.42										
347	KK	DETEH	* ROUTE ALL COMBINED FLOWS THROUGH DETENTION BASIN WITH 24" OUTLET * STORAGE FROM KJC HEC-1 MODEL 1989 FOR DENT DAM									
348	RS	1	STOR	0								
349	SV	0	.04	.28	.77	1.57	2.66	4	5.6	7.58	10.1	
350	SV	13.2	17.1	21.7	32.9	39.5	46.8	54.9	73.1	83.4	94.6	
351	SE	4668	4670	4672	4674	4676	4678	4680	4682	4684	4686	
352	SE	4688	4690	4692	4696	4698	4700	4702	4706	4708	4710	
353	SS	4700	23.3	3.1	1.5							
354	SL	4667	2.43	.9	.5							
355	KK	RTVL	ROUTE FLOW FROM DAM TO VIRGINIA LAKE									
356	RM	2	.3	.3								

LINE	ID	1	2	3	4	5	6	7	8	9	10	
357	KK	DT2 WATERSHED BELOW DAM (CONCENTRATION PT AT LAKE)										
358	BA	.94										
359	PH	1	52	.32	.7	1.1	1.3	1.43	1.8	2.3	2.8	
360	LS	85										
361	UD	.33										
362	KK	CBDT COMBINE WATERSHED WITH DAM AT VIRGINIA LAKE										
363	HC	2										
364	KK	RTPTM ROUTE FLOW TO BOYTON SLOUGH AT LONGLEY LANE										
365	RM	35	3.2	.10								
366	KK	CB PTM COMBINE DENT WATERSHED WITH R1 AT LONGLEY LANE										
367	HC	2										
368	KK	OVFLOW OVERFLOW FROM RIGHT OVERBANK BOYTON SLOUGH										
369	DR	DVNC										
370	KK	RT PTM ROUTE FLOW TO LONGELY LANE										
371	RM	20	1.42	.15								
372	KK	CBALL COMBINE ALL WATERSHEDS AT LONGELY LANE										
373	HC	3										
374	ZZ											

SCHMATIC DIAGRAM OF STREAM NETWORK



102	.	.	D4	.
	.	.	.	.
107	.	PTC.....	.	.
	.	.	.	.
109	.	.	D5	.
	.	.	V	.
	.	.	V	.
114	.	RTPT C	.	.
	.	.	.	.
116	.	.	D6	.
	.	.	.	.
121	.	PT C.....	.	.
	.	.	.	.
123	.	PTC.....	.	.
	.	V	.	.
	.	V	.	.
125	.	RT PTD	.	.
	.	.	.	.
127	.	.	D7	.
	.	.	.	.
132	.	PTD.....	.	.
	.	V	.	.
	.	V	.	.
134	.	RT PTE	.	.
	.	.	.	.
136	.	.	D8	.
	.	.	.	.
141	.	.	D9	.
	.	.	V	.
	.	.	V	.
146	.	.	RTE	.
	.	.	.	.
148	.	.	.	D10
	.	.	.	.
153	.	.	PTE.....	.
	.	.	.	.
155	.	PTE.....	.	.
	.	V	.	.
	.	V	.	.
157	.	RT PTF	.	.
	.	.	.	.
159	.	.	D11	.
	.	.	V	.
	.	.	V	.
164	.	RT PTF	.	.
	.	.	.	.
166	.	.	D12	.
	.	.	.	.
171	.	PTF.....	.	.
	.	V	.	.
	.	V	.	.

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173 . RT PTG
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175 . D13
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. .
180 . PTG.....
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184 . -----> DVDRY
182 . I580DR
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. .
187 . RT PTH
. .
. .
190 . .<----- DVDRY
189 . FRDRY
. .
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192 . .<----- DVPOND
191 . DVEVAN
. .
. .
193 . . D14
. .
. .
199 . ATPIPE.....
. .
. .
201 . RES2
. .
. .
206 . PTH.....
. .
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208 . RTPTI
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210 . EV3
. .
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215 . PTI.....
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217 . RTPTJ
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219 . B1
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224 . T1
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229 . RT1-B
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231 . T2
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236 . T3
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241 . CP-B.....
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243 . . . . . RCP-C
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      . . . . .
245 . . . . . T4
      . . . . .
      . . . . .
250 . . . . . CP-C.....
      . . . . . V
      . . . . . V
252 . . . . . RCP-D
      . . . . .
      . . . . .
254 . . . . . T5
      . . . . .
      . . . . .
259 . . . . . CP-D.....
      . . . . . V
      . . . . . V
261 . . . . . RAPEX
      . . . . .
      . . . . .
263 . . . . . T6A
      . . . . .
      . . . . .
268 . . . . . APEX1.....
      . . . . . V
      . . . . . V
270 . . . . . RT-395
      . . . . .
      . . . . .
272 . . . . . T6B
      . . . . .
      . . . . .
277 . . . . . T6A&B.....
      . . . . .
      . . . . .
280 . . . . . -----> DVTH
279 . . . . . THOUT
      . . . . . V
      . . . . . V
283 . . . . . RTPTJ
      . . . . .
      . . . . .
285 . . . . . CB PTJ.....
      . . . . .
      . . . . .
287 . . . . . CB PTJ.....
      . . . . .
      . . . . .
290 . . . . . -----> DVMC
289 . . . . . MCDV
      . . . . .
      . . . . .
294 . . . . . <----- OUT2
293 . . . . . EVOUT2
      . . . . . V
      . . . . . V
295 . . . . . RTEV4
      . . . . .
      . . . . .
297 . . . . . E4
      . . . . .
      . . . . .
302 . . . . . PTE4.....
      . . . . . V
      . . . . . V

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304 . RTPTK
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306 . B2 DR
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. .
311 CBPTK .....
. V
. V
313 RTPTL
. .
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316 . <----- OUT
315 . EVDV F
. V
. V
317 . RTPTL
. .
. .
319 . R2
. .
. .
324 CBPTL .....
. V
. V
326 RTPTM
. .
. .
328 . SK1
. V
. V
333 RTPTL
. .
. .
335 . R1
. .
. .
340 CBPTM .....
. .
. .
342 . DT1 W
. V
. V
347 . DETE
. V
. V
355 . RTVL
. .
. .
357 . DT2 WA
. .
. .
362 . CBDT .....
. V
. V
364 . RTPTM
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. .
366 . CB PTH.....
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. .
369 . <----- DVMC
368 . OVFLOW
. V
. V
370 . RT PTH

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

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*****
*
* FLOOD HYDROGRAPH PACKASE (HEC-1) *
* FEBRUARY 1981 *
* REVISED 01 JUN 88 *
*
* RUN DATE 11/20/1990 TIME 10:28:50 *
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*
* U.S. ARMY CORPS OF ENGINEERS *
* THE HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 551-1748 *
*
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PURPOSE:  
 HYDROLOGIC MODEL TO EVALUATE THE EFFECT THE RENO AREA WATERSHEDS HAVE ON  
 THE 100-YEAR DISCHARGE OF THE BOYTON SLOUGH AT EAST MCCARRAN BLVD (WHERE  
 THE 100-YEAR BACKWATER FROM THE TRUCKEE RIVER ENDS)

THE PARAMETERS WERE DETERMINED FROM THE SCS SOIL SURVEY FOR WASHOE COUNTY,  
 PREVIOUS REPORTS FOR THE AREA (SUMMIT REPORT, 1985 AND KJC REPORT 1989) AND  
 FROM FIELD INVESTIGATIONS. DURING A 100-YEAR EVENT, RUNOFF WILL DRAIN  
 MAINLY AS OVERLAND FLOW THROUGH THE STREETS. THE RUNOFF'S PATH TOWARDS THE  
 SLOUGH CONTAINS SIGNIFICANT OBSTRUCTIONS THAT WILL STORE RUNOFF & DELAY THE  
 THE TIME IT TAKES FOR THE PEAK TO REACH THE SLOUGH. THE MAJOR OBSTRUCTIONS  
 INCLUDES VIRGINIA STREET, THE INTERSTATE, AND THE AIRPORT. THIS MODEL DID  
 NOT ATTEMPT TO QUANTIFY THE EFFECT THESE OBSTRUCTIONS WILL HAVE ON THE  
 DISCHARGE. TO MODEL THE OVERLAND FLOW, THE CHART IN TR-55 FOR SHALLOW  
 CONCENTRATED FLOW (PAVED) WAS USED TO DETERMINE THE LAG TIMES AND THE  
 ROUTING OF FLOW THROUGH RENO TO THE SLOUGH.

NOVEMBER 1990

BY: NIMBUS ENGINEERS, RENO, NEVADA                      FILE NAME: RNWSHYD.901  
 NIMBUS JOB NO. 8901 WASHOE CO & CITY OF RENO            CONTRACT NO. EMW-89-2B41

RAINFALL DATA FROM NOAA ATLAS 2, VOLUME VII  
 RAINFALL DISTRIBUTION: 24 HOUR HYPOTHETICAL STORM AERIAL REDUCTION  
 WAS ESTIMATED FOR 100-YEAR STORM OCCURING OVER THE ENTIRE WATERSHEDS  
 AT THE SAME TIME (52 SQ. MILES)

LAG TIME COMPUTED WITH UPLAND METHOD AND THE PROCEDURES DESCRIBED IN TR-55  
 CURVE NUMBER FROM TR-55 AND NEH-4  
 ROUTING PERFORMED WITH MUSKINGUM METHOD (USED A LOW X VALUE FOR THE ROUTING  
 REACHES THROUGH RENO TO MODEL THE STORAGE EFFECT OF THE OVERLAND FLOW)

===== 100 YEAR, 24 HOUR EVENT =====

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41 IO      OUTPUT CONTROL VARIABLES
           IPRNT      5 PRINT CONTROL
           IPILOT     0 PLOT CONTROL
           QSCAL      0. HYDROGRAPH PLOT SCALE

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IT      HYDROGRAPH TIME DATA
        NMTH      5 MINUTES IN COMPUTATION INTERVAL

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IDATE	1	0	STARTING DATE
ITIME		0000	STARTING TIME
NO		300	NUMBER OF HYDROGRAPH ORDINATES
NDDATE	2	0	ENDING DATE
NDTIME		0055	ENDING TIME
ICENT		19	CENTURY MARK

COMPUTATION INTERVAL	.08 HOURS
TOTAL TIME BASE	24.92 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

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	EV 1	1782.	13.25	939.	332.	320.	8.60		
DIVERSION TO	OUT	261.	12.83	25.	6.	6.	8.60		
HYDROGRAPH AT	EVANCH	1521.	12.83	914.	326.	314.	8.60		
DIVERSION TO	OUT2	250.	12.83	144.	36.	35.	8.60		
HYDROGRAPH AT	EVANS	1271.	12.83	771.	290.	279.	8.60		
ROUTED TO	PTE1	1271.	13.83	769.	286.	276.	8.60		
HYDROGRAPH AT	EV 2	192.	12.92	71.	24.	23.	1.00		
2 COMBINED AT	PTE2	1382.	13.50	837.	310.	299.	9.60		
ROUTED TO	RESE2	1361.	13.83	837.	310.	299.	9.60	4479.35	13.83
DIVERSION TO	DVPOND	378.	13.83	63.	16.	15.	9.60		
HYDROGRAPH AT	I-580	984.	13.83	774.	295.	284.	9.60		
ROUTED TO	RTPTI	984.	13.92	774.	294.	283.	9.60		
HYDROGRAPH AT	D1	159.	12.42	55.	19.	19.	.78		
ROUTED TO	RT PTA	156.	12.67	55.	19.	19.	.78		
HYDROGRAPH AT	D2	601.	12.50	175.	64.	62.	1.66		
2 COMBINED AT	PTA	739.	12.58	229.	84.	81.	2.44		
ROUTED TO	RT PTB	735.	12.67	229.	84.	81.	2.44		
HYDROGRAPH AT	D3	401.	12.50	106.	36.	35.	1.10		
2 COMBINED AT	D PTB	1096.	12.58	335.	120.	115.	3.54		
ROUTED TO	RT PTC	1081.	12.67	335.	120.	115.	3.54		
HYDROGRAPH AT	D4	63.	12.33	13.	4.	4.	.19		
2 COMBINED AT	PTC	1117.	12.67	348.	124.	119.	3.73		
HYDROGRAPH AT	D5	639.	12.42	167.	60.	58.	1.70		
ROUTED TO	RTPT C	623.	12.67	167.	60.	58.	1.70		
HYDROGRAPH AT	D6	475.	12.67	153.	52.	50.	1.60		
2 COMBINED AT	PT C	1098.	12.67	321.	112.	108.	3.30		
2 COMBINED AT	PTC	2214.	12.67	668.	236.	227.	7.03		

ROUTED TO	RT PTD	2173.	12.75	668.	236.	227.	7.03		
HYDROGRAPH AT	D7	282.	13.00	114.	39.	37.	1.20		
2 COMBINED AT	PTD	2431.	12.75	782.	275.	265.	8.23		
ROUTED TO	RT PTE	2394.	12.92	782.	274.	264.	8.23		
HYDROGRAPH AT	D8	24.	12.42	6.	2.	2.	.07		
HYDROGRAPH AT	D9	428.	12.58	126.	43.	41.	1.53		
ROUTED TO	RTE	396.	12.92	126.	42.	41.	1.53		
HYDROGRAPH AT	D10	161.	12.58	45.	15.	15.	.63		
2 COMBINED AT	PTE	517.	12.83	171.	58.	56.	2.16		
3 COMBINED AT	PTE	2911.	12.83	959.	334.	322.	10.46		
ROUTED TO	RT PTF	2883.	13.00	959.	333.	321.	10.46		
HYDROGRAPH AT	D11	328.	13.00	127.	43.	41.	1.40		
ROUTED TO	RT PTF	327.	13.08	127.	43.	41.	1.40		
HYDROGRAPH AT	D12	33.	12.33	6.	2.	2.	.08		
3 COMBINED AT	PTF	3215.	13.00	1092.	378.	364.	11.94		
ROUTED TO	RT PTG	3202.	13.08	1092.	378.	364.	11.94		
HYDROGRAPH AT	D13	102.	12.83	35.	12.	11.	.44		
2 COMBINED AT	PTG	3290.	13.08	1126.	389.	375.	12.38		
DIVERSION TO	DVDRY	15.	13.08	1.	0.	0.	12.38		
HYDROGRAPH AT	I5800R	3275.	13.08	1126.	389.	375.	12.38		
ROUTED TO	RT PTH	3262.	13.17	1126.	389.	374.	12.38		
HYDROGRAPH AT	FRDRY	15.	13.08	1.	0.	0.	.00		
HYDROGRAPH AT	DVEVAN	378.	13.83	63.	14.	15.	.00		
HYDROGRAPH AT	D14	263.	12.83	96.	32.	31.	1.20		
3 COMBINED AT	ATPIPE	503.	13.75	159.	48.	46.	1.20		
ROUTED TO	RES2	159.	14.75	121.	48.	46.	1.20	4471.19	14.75
2 COMBINED AT	PTH	3351.	13.17	1243.	437.	421.	13.58		
ROUTED TO	RTPTI	3212.	13.42	1242.	434.	418.	13.58		
HYDROGRAPH AT	EV3	104.	12.83	37.	13.	13.	.52		
3 COMBINED AT	PTI	4226.	13.42	2050.	741.	714.	23.70		
ROUTED TO	RTPTJ	4203.	13.50	2050.	738.	711.	23.70		
HYDROGRAPH AT	B1	274.	13.42	133.	45.	43.	1.70		
HYDROGRAPH AT	T1	1167.	12.42	379.	140.	135.	2.50		

ROUTED TO	RT1-B	1153.	12.50	378.	140.	135.	2.50
HYDROGRAPH AT	T2	383.	12.42	135.	49.	47.	1.82
HYDROGRAPH AT	T3	174.	12.42	59.	21.	20.	.82
2 COMBINED AT	CP-B	1670.	12.50	571.	210.	202.	5.14
ROUTED TO	RCP-C	1642.	12.67	570.	210.	202.	5.14
HYDROGRAPH AT	T4	222.	12.75	105.	38.	37.	2.16
2 COMBINED AT	CP-C	1860.	12.67	674.	248.	239.	7.30
ROUTED TO	RCP-D	1845.	12.75	674.	248.	239.	7.30
HYDROGRAPH AT	T5	244.	12.58	82.	29.	28.	1.19
2 COMBINED AT	CP-D	2077.	12.75	756.	277.	267.	8.49
ROUTED TO	RAPEX	2037.	12.92	756.	276.	266.	8.49
HYDROGRAPH AT	T6A	196.	12.25	39.	13.	13.	.65
2 COMBINED AT	APEX1	2091.	12.92	791.	289.	279.	9.14
ROUTED TO	RT-395	1834.	13.42	788.	286.	275.	9.14
HYDROGRAPH AT	T6B	394.	12.83	142.	48.	46.	2.40
2 COMBINED AT	T6A&B	2073.	13.42	924.	334.	322.	11.54
DIVERSION TO	DVTH	1189.	13.42	691.	276.	266.	11.54
HYDROGRAPH AT	THOUT	885.	13.42	233.	58.	56.	11.54
ROUTED TO	RTPTJ	787.	15.08	233.	58.	56.	11.54
2 COMBINED AT	CB PTJ	911.	15.00	366.	103.	100.	13.24
2 COMBINED AT	CB PTJ	4477.	13.50	2414.	842.	811.	36.94
DIVERSION TO	DVMC	1211.	13.50	219.	55.	53.	36.94
HYDROGRAPH AT	MCDV	3267.	13.50	2195.	787.	758.	36.94
HYDROGRAPH AT	EVOUT2	250.	12.58	144.	36.	35.	.00
ROUTED TO	RTEV4	250.	14.67	143.	36.	35.	.00
HYDROGRAPH AT	E4	99.	12.58	29.	10.	9.	.40
2 COMBINED AT	PTE4	275.	13.58	171.	46.	44.	.40
ROUTED TO	RTPTK	273.	15.08	170.	45.	44.	.40
HYDROGRAPH AT	B2 DR	202.	12.83	77.	28.	27.	.69
3 COMBINED AT	CBPTK	3457.	13.50	2428.	860.	828.	38.03
ROUTED TO	RTPTL	3418.	13.75	2426.	855.	824.	38.03
HYDROGRAPH AT	EVDV F	261.	13.25	25.	6.	6.	.00
ROUTED TO	PTPTL	142.	15.08	25.	6.	6.	.00

HYDROGRAPH AT	R2	590.	14.00	403.	140.	134.	4.10		
3 COMBINED AT	CBPTL	4080.	13.75	2853.	1001.	964.	42.13		
ROUTED TO	RTPTM	4068.	13.83	2852.	999.	962.	42.13		
HYDROGRAPH AT	SK1	840.	12.58	227.	77.	75.	2.20		
ROUTED TO	RTPTL	520.	16.00	225.	72.	69.	2.20		
HYDROGRAPH AT	R1	628.	14.75	439.	156.	150.	5.50		
2 COMBINED AT	CBPTM	1027.	15.92	651.	228.	219.	7.70		
HYDROGRAPH AT	DT1 W	499.	12.50	125.	43.	41.	1.21		
ROUTED TO	DETE	92.	13.92	89.	49.	48.	1.21	4694.42	13.92
ROUTED TO	RTVL	92.	14.25	89.	49.	48.	1.21		
HYDROGRAPH AT	DT2 WA	440.	12.42	97.	33.	32.	.94		
2 COMBINED AT	CBDT	498.	12.42	180.	82.	79.	2.15		
ROUTED TO	RTPTM	305.	15.75	176.	76.	74.	2.15		
2 COMBINED AT	CB PTM	1329.	15.83	812.	304.	293.	9.85		
HYDROGRAPH AT	OVFLOW	1211.	13.50	219.	55.	53.	.00		
ROUTED TO	RT PTM	973.	15.00	219.	55.	53.	.00		
3 COMBINED AT	CBALL	5759.	15.08	3867.	1357.	1308.	51.98		

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