RETURN TO ~~CHARLES~~ BRYNN ~~PETERSON~~ ASHTON

ecology and environment, inc.

International Specialists in the Environment

[redacted]

ecology and environment, inc.
195 SUGG ROAD, P.O. BOX D, BUFFALO, NEW YORK 14225, TEL. 716-632-4491, TELEX 91-9183
International Specialists in the Environment Lowcastle 684-8060

May 7, 1986

Marine Corps Base
Camp Lejeune
Asst. Chief of Staff
Facilities
Camp Lejeune, NC 28542-5001

Attn: Robert Alexander

Dear Bob:

Enclosed please find four (4) copies of the draft report on peak runoff in Cogdels Creek watershed, Marine Corps Base, Camp Lejeune.

We are awaiting development of a schedule and cost estimates for recommended measures pending your review of the recommendations.

If you have any questions, please do not hesitate to call me at (716) 632-4491.

Sincerely,

Craig

Craig R. Ferris, Ph.D.
Project Manager

oio

Enclosures

UNITED STATES MARINE CORPS
Marine Corps Base
Camp Lejeune, North Carolina 28542-5001

6280/4
FAC
11 MAR 1985

From: Assistant Chief of Staff, Facilities, Marine Corps Base, Camp Lejeune
To: Public Works Officer

Subj: REQUEST FOR ENGINEERING STUDY OF COGDELL'S CREEK WATERSHED

Encl: (1) Draft Scope of Work

1. Request the stormwater management and erosion control requirements be identified for the affected area through completion of the subject study. The study should be conducted in association with P-257, Field Maintenance Complex, Increment 1, and should be developed prior to or concurrent with completion of 35% design for P-257.

2. Funds for this study will be forwarded on request. Point of contact for this study prior to consultant selection will be Mr. Alexander, ext. 3034. Request a POC be assigned by PWO upon consultant selection.

M. G. LILLEY

Copy to:
NREA
MAIN
EnvEngr
ConstrCoord

DRAFT

SCOPE OF WORK

21 Feb 1985

PROJECT TITLE: Cogdell's Creek Watershed Study

PURPOSE OF STUDY: To provide stormwater management and erosion control measures for use in MCON project design and watershed planning which address impacts of construction and military training on the stream discharge and natural environment of Cogell's Creek.

I. Problem Description:

A. Describe the problems to include:

1. Non-point source pollution impacts on Cogell's Creek and New River.

2. Sedimentation effects on wetland habitat.

3. Urbanization of the watershed.

4. Erosion induced by military operations.

B. Location of study area is shown on attached map.

II. Existing Land Cover:

A. Provide an aerial photo, black and white, scale: 1"=500'.

B. Provide a topographic map of the Cogdell's Creek watershed for the project area boundaries shown on the attached map.

C. Prepare a land cover map at a scale of 1"=500' of existing uses to include the following, or other acceptable classifications:

Developed - Impervious Surface

Developed - Pervious Surface

Mature Forest

Immature Forest

Paved Roads and Parking Areas

Unpaved Roads/Trails

Wetlands

Surface Water

Flood-Prone Areas

Drainage Structures

D. Estimate the acreage of land cover areas.

III. Existing Hydrology:

A. Determine existing hydrology to include baseflow and calculated peak rates of run-off from a 10-year storm using the USDA Soil Conservation Service's "National Engineering Field Manual for Conservation Practices," or other acceptable calculation procedures.

B. Discuss the flood transport capacity of the existing channel.

IV. Location of Critically Eroding Areas:

A. Provide map at a scale of 1"=500' indicating:

1. Minimal, moderate, and severe erosion.

2. Types of erosion such as sheet erosion, gully erosion, roadside ditches, etc.

B. Estimate extent in acreage of eroding areas in IV.A.1. above.

V. Future Land use and Hydrologic Changes:

A. Provide a map at a scale of 1"=500' indicating proposed construction projects through FY-91 per the Camp Lejeune Master Plan.

B. Estimate the acreage of the proposed construction

projects.

C. Determine the change in the peak rates of run-off from a 10-year storm for each year, 1985-1995, per procedures stated in III.A.

D. Evaluate the flood transport capacity of the existing channel to carry the future flows if left unimproved.

E. Evaluate the effects of MCON project, Field Maintenance Complex (P-257, P-803, P-804 and P-805) upon the future peak rate of runoff.

F. For P-257, determine the required drainage control structures to ocntrol stormwater runoff following construciton to the approximate rates of runoff which exist before construction.

G. Evaluate impacts of proposed development on the boundaries of the flood plain.

VI. Watershed Management Measures:

A. Recommend stormwater management measures for use in project design of proposed MCON projects.

B. Recommend vegetative and/or structural erosion measures to be employed in correcting existing and future erosion problems.

C. Recommend stream channel restoration measures as needed.

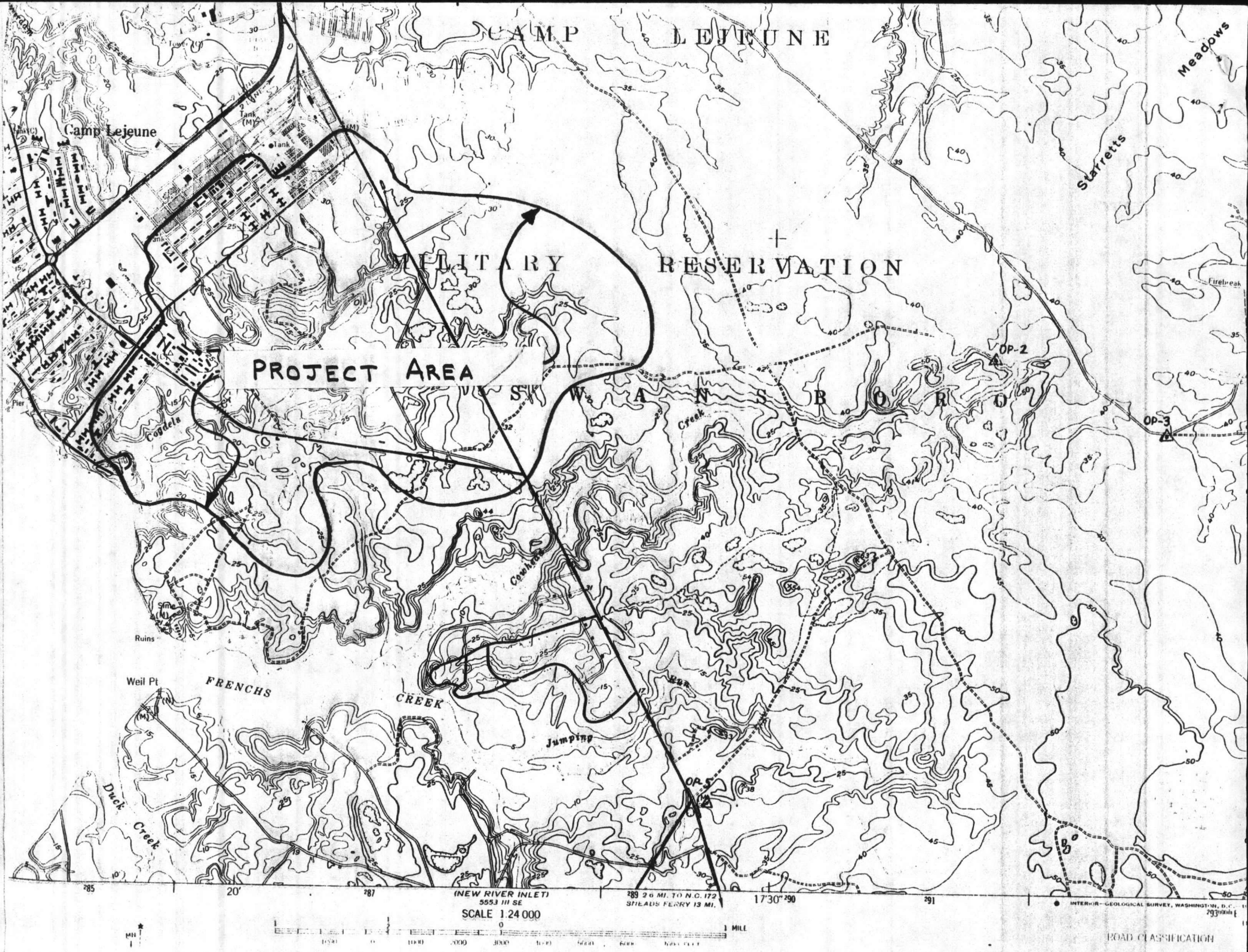
VII. Implementation:

A. Provide a cost estimate for construction of watershed management measures.

B. Recommend a schedule of implementation of measures for each fiscal year 1985-1995.

DELIVERABLES: Final report with all information and maps as described herein, with 25 printed copies. All original maps and reproducible manuscripts will be forwarded to MCB for further printing as needed.

Prepared by: Bob Alexander, FAC
Al Austin, FAC
Larry Brant, PWO
Gene Jones, PWO


CAMP LEJEUNE
MILITARY RESERVATION
PROJECT AREA
SWANSBORO
Camp Lejeune
Meadows
Starretts
Firebreak
OP-2
OP-3
OP-5
Tank
Pier
Ruins
Weil Pt
FRENCHS CREEK
Duck Creek
Cowhead Creek
Jumping Run
285
20'
287
(NEW RIVER INLET)
5553 III SE
289
2.6 MI. TO N.C. 172
SNEADS FERRY 13 MI.
17'30"
290
291
INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D.C.
SCALE 1:24 000
1 MILE
ROAD CLASSIFICATION

NV-5900-D1228

EVALUATION OF PEAK STORM WATER RUNOFF IN COGDELS CREEK WATERSHED MARINE CORPS BASE CAMP LEJEUNE JACKSONVILLE, NORTH CAROLINA

September 1986

Prepared for:

DEPARTMENT OF THE NAVY
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511

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LIST OF ILLUSTRATIONS

LIST OF TABLES

1. INTRODUCTION

The purpose of this report is to address the potential effects on peak storm water runoff in the Cogdels Creek Watershed resulting from the development of military facilities on Marine Corps Base Camp Lejeune which are proposed for construction during the period 1986 through 1992. This report also recommends storm water management and erosion control measures to alleviate existing and potential impacts resulting from enhanced storm water runoff due to the development in the watershed.

The area under consideration is the portion of the Cogdels Creek Watershed located generally west and south of Snead's Ferry Road (Figure 1-1). Military facilities within the watershed include portions of the Hadnot Point Administrative and Industrial Area, the French Creek Force Troops Complex, and the 1800 Area. These areas encompass administrative, residential, industrial, and military training facilities.

The remainder of this section includes a brief history of Marine Corps Base Camp Lejeune (Section 1.1) and a description of the problem under study (Section 1.2). General information on the existing environment in the Cogdels Creek Watershed is presented in Section 2. Section 3 presents information on existing hydrologic conditions in the watershed; Section 4 is a discussion of the potential impacts of proposed development on watershed hydrology; and Section 5 presents recommendations to remediate existing problems and to manage projected changes in surface hydrology in the watershed resulting from proposed

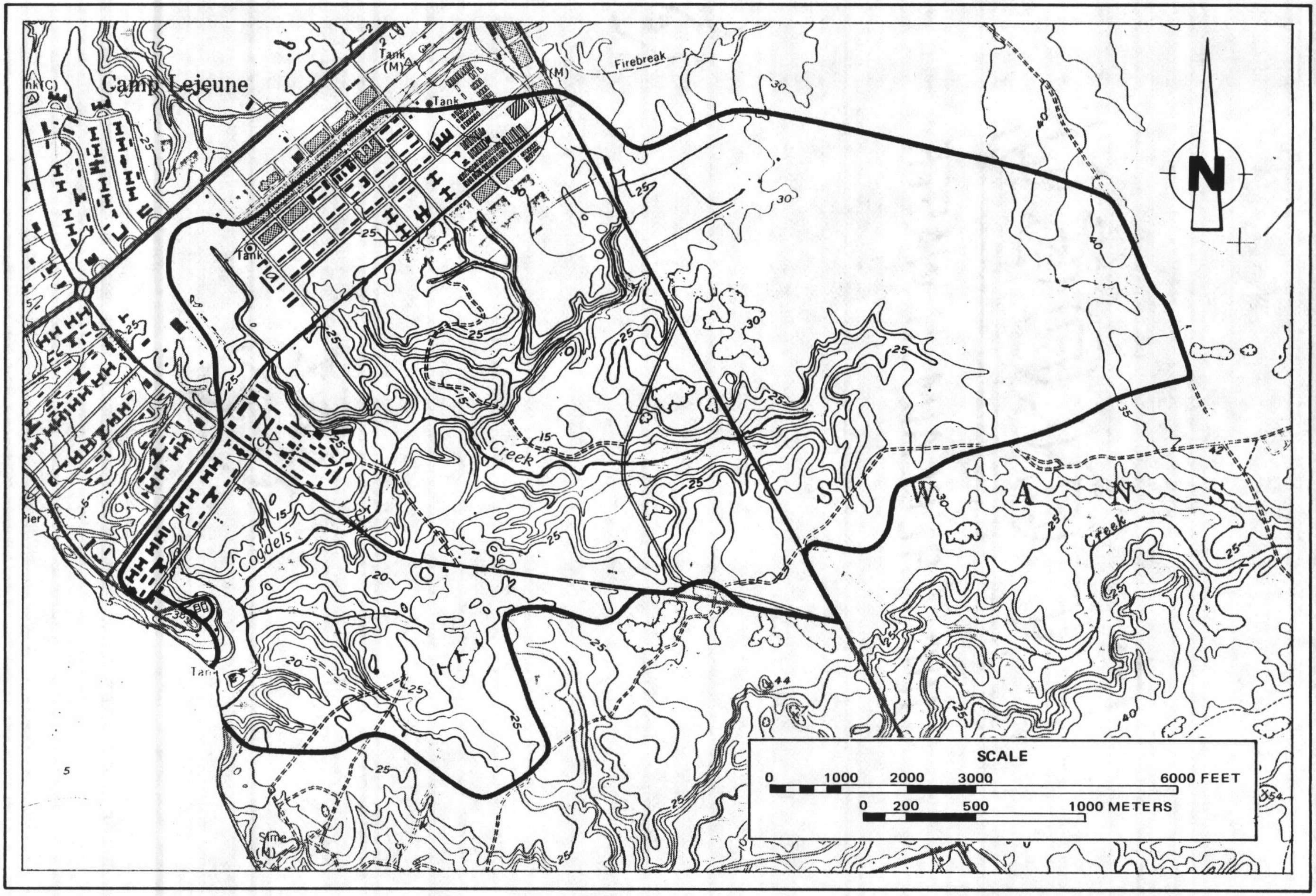

Figure 1—1 LOCATION OF COGDELS CREEK WATERSHED ON CAMP LEJEUNE, JACKSONVILLE, NORTH CAROLINA

development. A proposed schedule and estimated costs to implement the recommended measures are presented in Section 6.

1.1 STATION BACKGROUND

Marine Corps Base Camp Lejeune is located near Jacksonville in Onslow County on the southeastern coast of North Carolina. The base encompasses more than 170 square miles on both sides of the New River, and has over 11 miles of frontage on the Atlantic Ocean and a perimeter of 68 miles.

Camp Lejeune is known as "The World's Most Complete Amphibious Training Base." The base came into existence in the late 1930s when the Marine Corps realized that its existing bases in Washington, DC, and Quantico, Virginia, were inadequate for its growing size and training requirements. After careful study, a selection board recommended that a base be established in the New River area of North Carolina. Construction of the new camp, named in honor of the Corps' 13th commandant, Lieutenant General John A. Lejeune, began in April 1941. The companion Cherry Point Air Station, conceived at about the same time, placed air support agencies in close proximity to ground units based in Camp Lejeune. The region provides access to deep-water ports and suitable areas for amphibious training.

Also located in the same general area is the United States Marine Corps (USMC) Air Station, New River, located on the northwest side of Camp Lejeune and south of Jacksonville. The Air Station encompasses approximately 2,672 acres. Originally a part of Camp Lejeune, USMC Air Facility, Peterfield Point, was surveyed and set up as a separate command in 1951. It was used as a helicopter training base and as a touch-and-go training field for jet fighters during the Korean War. The base underwent a name change in 1968 and is now known as the Marine Corps Air Station, New River.

1.2 DESCRIPTION OF THE PROBLEM

Marine Corps Base Camp Lejeune provides facilities for approximately 40,000 military personnel and approximately 60,000 civilians, and there are several areas on the base which have been developed extensively to provide such facilities. The Cogdels Creek Watershed

is one area which has been developed in the past, and which is scheduled to be further developed in the future.

Permanent development or temporary disturbances must be carefully planned so that they do not result in significant adverse impacts to water quality, aquatic biota, or the riparian environments in general. The impacts which may result from development in the watershed include accelerated soil erosion and sedimentation; increased storm water runoff and subsequent flooding or streambed scour; and non-point source pollution from maintained lawns (fertilizers, pesticides) or paved surfaces (oil, grease, heavy metals).

For the most part, development in the watershed has occurred on upland areas around the perimeter of the watershed boundary, and not within the stream channel or floodplain itself. However, stream channels and floodplains have been affected by temporary disturbances such as tank and heavy equipment movements through stream channels and clearing vegetation along stream channels. In addition, there are several existing and/or potential problems in Cogdels Creek Watershed resulting from past development activities and ongoing military activities. These are discussed in Section 3.2, and primarily include impacts resulting from accelerated soil erosion in areas where vegetation has been disturbed and soils have been destabilized; gully erosion and channel scour in areas where enhanced surface runoff from developed upland areas has been diverted either through storm drains or open channels to natural stream channels without adequately protecting the discharge areas from the erosive forces of high energy flows; and obstruction of normal stream flows at locations of unimproved tank and heavy equipment crossings.

Remediation of existing problems and adequate planning for future development or military training activities will insure that adverse impacts such as accelerated soil erosion and sedimentation in watercourses and riparian wetlands, or adverse effects on watershed hydrology resulting in excess flows during peak runoff and/or reduction in base flow, do not occur. This report analyzes existing hydrologic conditions in Cogdels Creek Watershed to determine whether the existing channel is adequate to handle peak storm water runoff, and identifies existing critical erosion problems. This report also evaluates

the potential effects on future peak runoff conditions which will result from development of proposed facilities, and recommends measures to alleviate existing and potential flooding and/or erosion problems.

2. EXISTING ENVIRONMENT

This section discusses the existing environmental conditions on Camp Lejeune in general, and in the Cogdels Creek Watershed in particular. Special emphasis is placed on those environmental features which influence the hydrologic regime of surface waters in the study area.

2.1 GEOLOGY AND TOPOGRAPHY

Camp Lejeune is in the lower Coastal Plain of eastern North Carolina. This land originated in a marine or coastal environment similar to that along the present Atlantic Coast. Changes in sea level due to glacial fluctuations and/or slight crustal movements have caused the alternating emergence and submergence of portions of this surface at irregular intervals. When submerged, the area collected deposits of continental and marine sediments. Each successive emergence resulted in shoreline modifications upon the newly emerged coastal area and the development of surface drainage on the previously emerged lands further inland.

In the vicinity of Camp Lejeune, the Coastal Plain is underlain by hundreds of feet of unconsolidated to weakly consolidated sediments ranging from Cretaceous to Miocene age. Generally, these formations are covered with 5 to 30 feet of Pleistocene sediments. The sediments are mostly clean sand and clayey sand, interlayered with deposits of clay and marine shells. Outcroppings of the Miocene Yorktown Formation occur on the banks of large streams. The Yorktown Formation

consists of clay, sand, and shell marl beds similar to the younger surficial deposits.

The topography of the base area is mostly upland plains which include parts of three topographic surfaces representing three periods of geologically recent land emergence. The Pamlico surface lies at elevations of 2 to 25 feet in a 2-mile strip near the coast and along New River and other streams. The inland boundary of the Pamlico surface is a gentle scarp (Suffolk) that can be traced on aerial topographic maps. The majority of the base is on the Talbot surface which lies at elevations of about 25 to 45 feet. The Wicomico surface may be represented by a few areas south of Jacksonville at elevations of 45 to 70 feet.

The topography of Camp Lejeune is largely the result of the dissection of about two-thirds of the original, nearly level coastal plains by the New and White Oak rivers, their tributaries, and drainageways to the Atlantic Ocean. Dissection of the landscape affects the formation of soils by influencing the depth of the water table and the geologic removal of soil material by slope retreat.

2.2 SOILS

The soils in Camp Lejeune formed in surficial sediment of the Wicomico, Talbot, and Pamlico marine terraces, in alluvium recently deposited on drainageways, and in accumulations of organic material on the broad, undissected interstream areas. Many of the differences in the soils of Camp Lejeune are attributed to differences in the parent material from which the soils were formed, and to topographic relief and drainage (USDA, SCS 1984).

As discussed above, most of Camp Lejeune is nearly level with wide, undissected divides. These areas have minimal relief and water movement is slow. Consequently, the soils are somewhat poorly drained, poorly drained, or very poorly drained. The major soils of these areas are Torhunta, Murville, Woodington, Leon, Rains, and Stallings. A few small oval depressions have developed thick mantles of organic matter. The soil in these depressions is Croatan.

Soils found on side slopes near drainageways include the well-drained Baymeade and the moderately well-drained Marvyn soils.

The major soils along the main streams draining Camp Lejeune are Muckalee loam and Dorovan. In addition to the major streams, there are several short creeks that drain directly into the Intracoastal Waterway. These coastal creeks have wide estuarial floodplains. High tides back saltwater up into these streams. These floodplains are flooded with brackish water from 1 mile to 3 miles inland. The major soil along these streams is Bohicket.

The Cogdels Creek Watershed contains many of the above soil series (Figure 2-1). In general, upland soils are sandy and very well-drained, whereas soils found in bottomlands and depressions are loamy and less well-drained. Soils found immediately adjacent to Cogdels Creek and its tributaries are Muckalee loam. This nearly level, poorly drained soil generally occurs in narrow areas along floodplains. The soil is frequently flooded for brief periods, and water ponds in low areas for long periods during the winter.

Adjacent to and upslope from the Muckalee soils are Marvyn loamy fine sands. These well-drained soils generally occur on short side slopes (6 to 15%) near large drainageways. This soil is very susceptible to accelerated erosion if vegetative cover is not maintained.

Upland areas between the major drainages are occupied primarily by Baymeade fine sand. Baymeade fine sand, which is the predominant soil in the watershed, is a well-drained soil which occurs on moderately convex slopes (0 to 6%) near major drainageways. The seasonal high water table is 4 to 5 feet below the surface. If vegetative cover is disturbed, this soil is susceptible to accelerated erosion, although, because of the low slope and high permeability, it is not likely that erosion would be extensive.

Other soils occurring in the Cogdels Creek Watershed to a lesser extent include Onslow loamy fine sand, Kureb fine sand, Torhunta fine sandy loam, Murville fine sand, Croatan muck, Woodington loamy fine sand, and Newhan fine sand. These soils are described briefly below:

- Croatan muck is nearly level, very poorly drained soil found in oval depressions on broad interstream areas in uplands. The seasonal high water table is at or near the surface, although flooding is rare. Limitations of these soils are wetness, flooding, and low strength.

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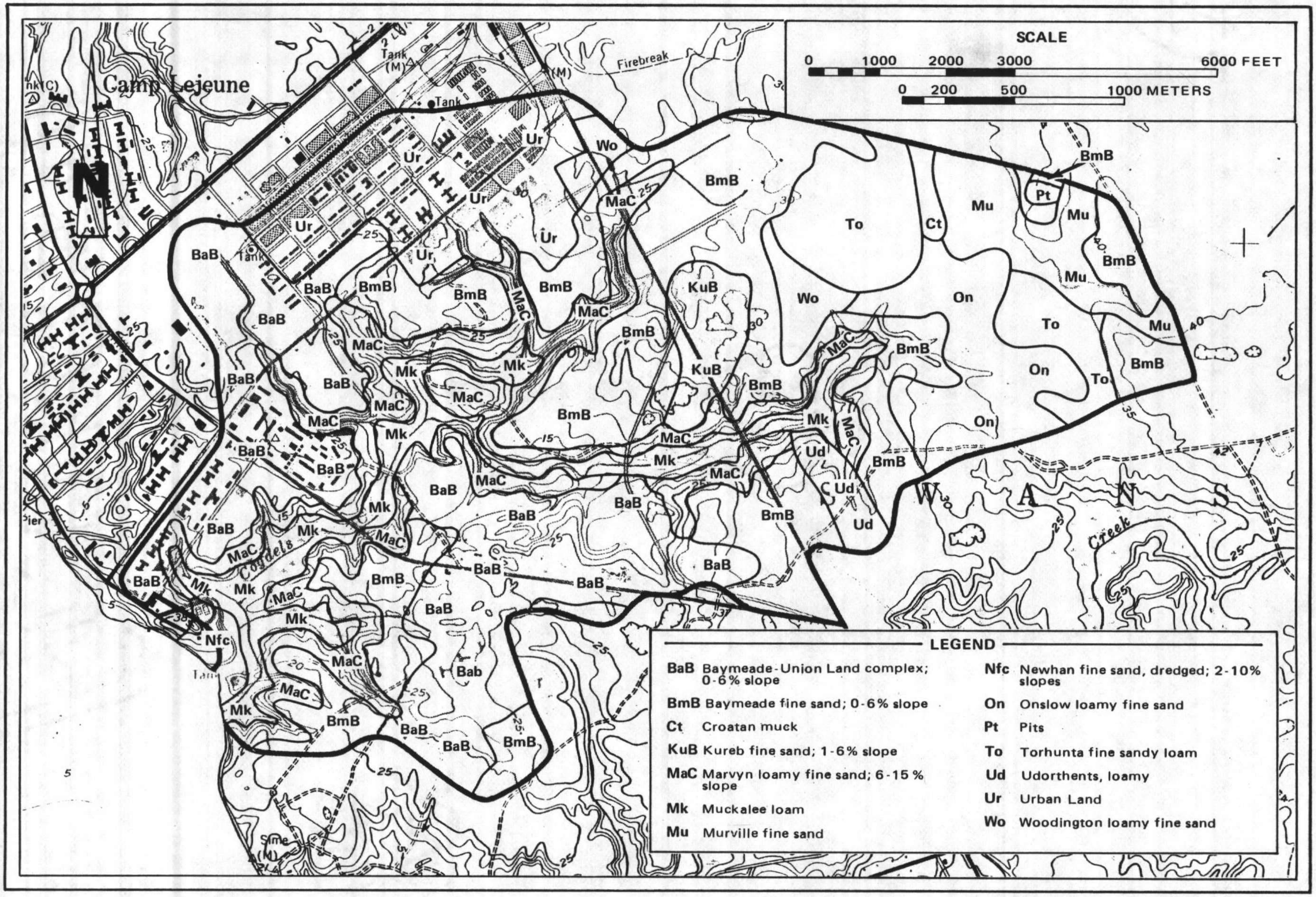

Figure 2–1 MAJOR SOIL TYPES IN THE COGDELS CREEK WATERSHED

- Kureb fine sand (1 to 6% slopes) is found near large drainageways and on undulating convex divides in upland areas. The soil is excessively well-drained and the seasonal high water table is below 6 feet. If unprotected by vegetative cover, this soil is very susceptible to erosion by wind and water, although because of droughtiness, vegetation can be difficult to establish.

- Murville fine sand is nearly level, very poorly drained soil found in depressions on upland interstream areas. Although infiltration is rapid, the seasonal high water table is at or near the surface, and water ponds on the surface during winter. Major limitations of this soil are wetness, seepage, and caving of ditch banks.

- Newhan fine sand, dredged, is excessively drained soil deposited on uplands by dredging operations along the Intracoastal Waterway. Infiltration is rapid and the water table is below 6 feet. These soils are subject to severe erosion by wind and water if vegetation is not maintained. However, like Kureb fine sand, vegetation may be difficult to establish because of droughtiness.

- Onslow loamy fine sand is nearly level, moderately well drained to somewhat poorly drained soil found near shallow drainageways on uplands. Infiltration is moderate, and the seasonal high water table ranges from 1.5 to 3 feet below the surface. Compaction of the soil makes it nearly impervious, and subsequent surface runoff and erosion can result.

- Torhunta fine sandy loam is nearly level, very poorly drained soil on broad interstream upland areas. This soil has moderately rapid permeability and high organic matter content. The seasonal high water table is at or near the surface, and water ponds on the surface during the winter. Limitations of Torhunta soils include wetness, caving of cut banks, and seepage.

- Woodington loamy fine sand is nearly level, poorly drained soil found on broad, smooth interstream uplands. Infiltration is moderate, and the seasonal high water table ranges from 0.5 to 1 foot below the surface. The soil is subject to compaction if developed, and wetness is the major limitation.

In addition to the soils listed above, a major portion of the watershed has soils which have been modified as a result of the development of military facilities. Soils on these areas are identified as Urban Land or Baymeade-Urban Land complex. Urban Land consists of areas where the original soil has been cut, filled, graded, or paved so that most soil properties have been altered to the extent that a soil series is not recognizable.

2.3 CLIMATE

The climate of Camp Lejeune is generally warm and humid. In the summer, Camp Lejeune is hot and humid, but the coast is frequently cooled by sea breezes. Winter is cool, with occasional brief cold spells. Rains occur throughout the year and are fairly heavy; snowfall is rare. Annual precipitation is adequate for all crops.

Table 2-1 presents data on temperature and precipitation for the Camp Lejeune area for the period 1951 to 1979. In winter, the average temperature is 45°F and the average daily minimum temperature is 32°F. The lowest temperature on record, which occurred at Camp Lejuene on February 1, 1965, is 2°F. In summer, the average temperature is 76°F and the average daily maximum temperature is 87°F. The highest recorded temperature, which occurred on June 28, 1954, is 103°F. The total annual precipitation is 56 inches. Of this, 60% usually falls in April through September.

The intensity and duration of rainfall events at Camp Lejeune is shown in Table 2-2. Information on rainfall intensity is necessary for predicting the potential volume of surface runoff which can be expected to occur with a certain return periodicity. For example, based on the data, it can be expected that each year there is a one in ten chance that a rainstorm will occur which will result in 3.25 inches of rain in a 2-hour period. For the purposes of this report, the design storm of interest is the 10-year, 24-hour storm. For the

Table 2-1

TEMPERATURE AND PRECIPITATION DATA FOR CAMP LEJEUNE*

Month	Temperature			Precipitation				
					2 Years in 10 Will Have:			
	Average Daily Maximum (°F)	Average Daily Minimum (°F)	Average (°F)	Average (in)	Less than (in)	More than (in)	Average Number of Days with 0.10 Inch or More	Average snowfall (in)
January	56.3	31.0	43.7	4.10	2.36	5.64	8	1.2
February	58.3	32.2	45.3	4.01	2.38	5.46	7	.8
March	65.5	38.3	51.9	3.96	2.37	5.38	8	.5
April	74.7	46.0	60.4	3.11	1.66	4.36	5	.0
May	80.8	54.5	67.7	4.80	3.23	6.24	8	.0
June	85.5	61.7	73.6	6.00	3.18	8.47	8	.0
July	88.6	66.4	77.5	7.01	4.64	9.17	10	.0
August	87.9	65.7	76.8	6.87	4.03	9.39	9	.0
September	83.8	59.9	71.9	5.96	2.80	8.67	7	.0
October	75.2	48.9	62.1	3.34	1.30	5.04	5	.0
November	67.4	39.3	53.4	3.11	1.58	4.43	5	.0
December	59.1	32.8	46.0	3.69	1.91	5.23	6	.4
Yearly								
Average	73.6	48.1	60.9	--	--	--	--	--
Extreme	--	--	--	--	--	--	--	--
Total	--	--	--	55.96	47.23	64.30	86	2.9

*Data were recorded in the period 1951 through 1979 at Maysville, North Carolina.

Table 2-2

RAINFALL INTENSITY AND FREQUENCY
FOR CAMP LEJEUNE AREA

(Precipitation in Inches for Time Intervals)

Frequency	5 Min.	10 Min.	15 Min.	30 Min.	60 Min.	120 Min.
2-year	.48	.80	1.00	1.35	1.75	1.90
5-year	.53	.95	1.20	1.75	2.25	2.50
10-year	.60	1.05	1.38	2.00	2.60	3.25
25-year	.72	1.15	1.55	2.30	3.10	4.00
50-year	.80	1.30	1.75	2.50	3.60	4.50
100-year	.85	1.42	1.92	2.80	4.10	5.25

Source: U.S. Department of Agriculture, Miscellaneous Publication No. 204.

area of North Carolina which encompasses Camp Lejeune, the 10-year storm can be expected to result in approximately 7 inches of rain over the 24-hour period. These storms are most likely to occur during late summer (United States Department of Commerce 1961).

2.4 VEGETATION

The existing vegetation on Camp Lejeune is typical of the coastal lowlands of North Carolina in general. Variations in soils is the main cause of variations in vegetation. In areas with loamy soils, the vegetation is dominated by dense stands of loblolly pine. Where the soils are sandy and have hardpan subsoils, the vegetation is sparse, consisting mostly of longleaf pine and scrub oaks.

Vegetation in undeveloped portions of the Cogdels Creek Watershed is primarily forested (Figure 2-2). The upland areas between stream channels are dominated by loblolly pine, either in fairly pure stands or more commonly in association with various species of hardwoods, including red oak, white oak, sweet gum, black gum, or maple. Other species of pine which are found only in the extreme upper portions of the watershed, adjacent to Lyman Road, include longleaf pine and pond pine.

Deciduous forests dominate the bottomlands along the stream channels and drainageways. These deciduous forest associations include maple, sweet gum, black gum, and red and white oak, among others. Hardwoods are also found on uplands in two areas of the Cogdels Creek Watershed. One large area is located north of Cogdels Creek and east of Snead's Ferry Road; the other is located north of the creek and south of Duncan and "O" streets. According to the Natural Resources Management Plan, these two areas were predominantly covered in pine in 1975, but have been managed to encourage hardwoods. The latest timber stand inventory (Black 1986) indicates these areas are now predominantly red and white oak. The characteristic species found in the major forest types are described below.

Loblolly pine represents the main forest type on upland areas of the watershed. Many loblolly stands on Camp Lejeune in general grow on sites which were once old farm homesteads. Persimmon, black cherry, red cedar, holly, dogwood, and scrub oak are the associated

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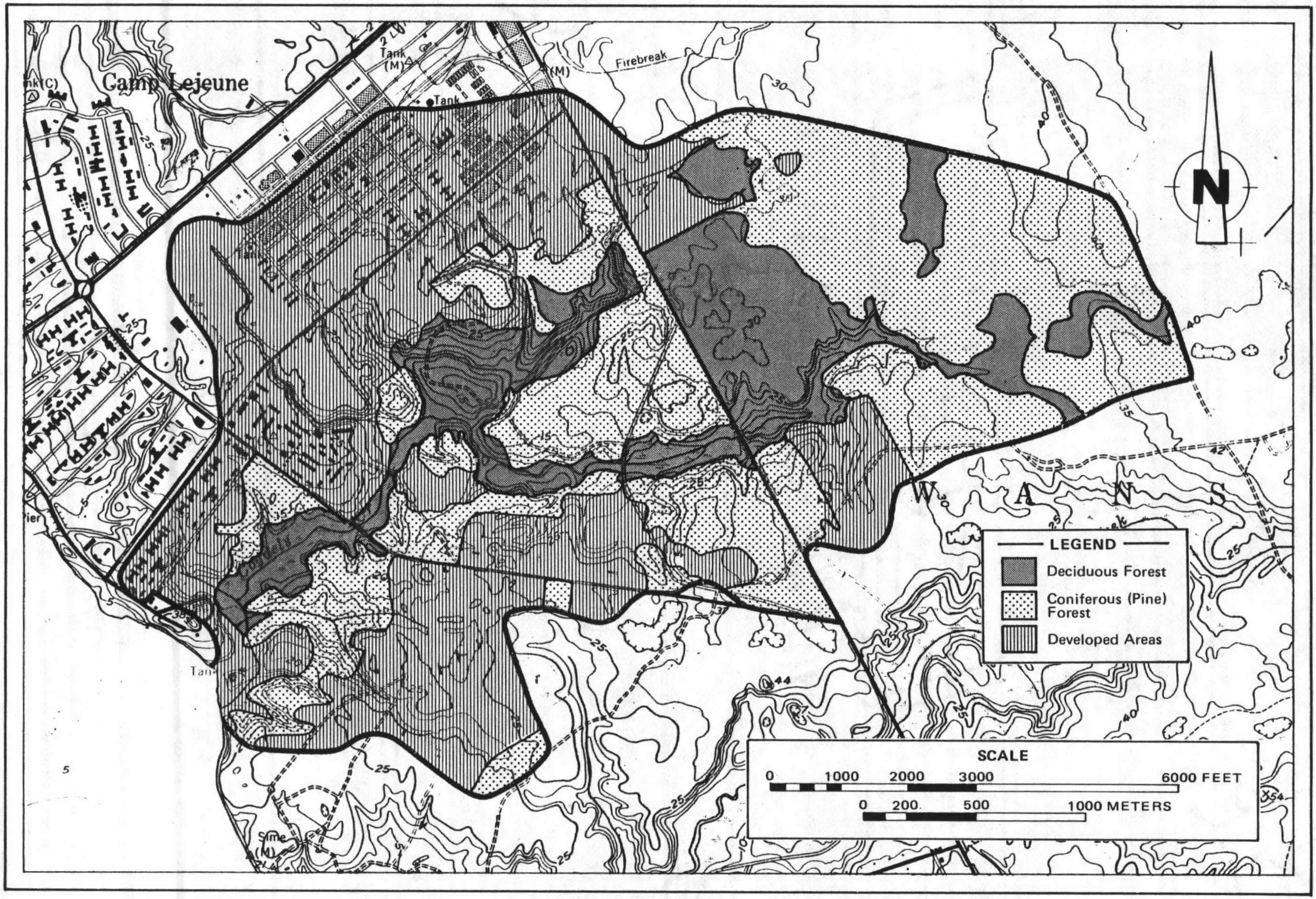

Figure 2–2 MAJOR VEGETATION IN THE COGDELS CREEK WATERSHED

species, while highbush huckleberry, chinquapin, gallberry, beautyberry, and wax myrtle make up the understory. Associated upland weeds and herbs are pokeweed, ragweed, smartweed, beggarweed, and partridge pea.

Loblolly pine-hardwood forests occur just below the pure stands of loblolly pine on higher upland sites but above the hardwood slopes. Sweet gum, black cherry, red cedar, holly, sweet bay, and dogwood are the associated species, while highbush huckleberry, gallberry, and wax myrtle comprise the understory. Associated upland weeds and herbs are panic grass, broomsedge, pokeweed, partridge pea, and beggarweed.

Oak-hickory occurs on slopes below the mixed stands of loblolly-hardwood and above bottomland hardwoods. Principal species are white oak and southern red oak. Black, post, chestnut, and scrub oak; yellow poplar; sweet gum; black gum; persimmon; black cherry; maple; and dogwood are the associated species, while blueberry, chinquapin, and beauty-berry make up the understory. Associated plants are ferns, teaberry, paspalums, and sedges.

Floodplains along streams, creeks, and swamps, downslope from mixed hardwoods, are dominated by sweet bay/swamp black gum and red maple. Swamp tupelo, ash, and elm are the associated species, while greenbrier, rattan-vine, grape, and rose make up the understory vegetation. Associated aquatic plants are wild millet, coontail, swamp smartweed, and arrowhead.

Pond pine forest types are composed of what is commonly known as "pocosins" or upland swamps. This group occurs on the poorly drained peat soils which are underlain by hardpan marine sands. Red maple, black gum, sweet bay, and red bay are the associated species, while greenbrier, cyrilla, fetter bush, and sheep laurel comprise the understory. Associated marsh and aquatic plants are moss, fern, pitcher plant, venus fly trap, and sundew.

2.5 LAND USE

Camp Lejeune, including the Marine Corps Air Station, New River, encompasses approximately 86,695 acres. Of this, 13,376 acres or 15% is improved or semi-improved grounds, and the remaining 73,319 acres are unimproved. Improved grounds include areas of troop and family

housing buildings, hospital and medical buildings, administrative buildings, warehouses, community buildings, and all other buildings associated with the official functions of the base. Intensively maintained cantonment areas such as lawns, parade grounds, drill fields, recreational fields, and major road berms together with the less intensively maintained areas such as firing ranges, magazine areas, and utility rights-of-way are also included in improved areas.

Unimproved areas include forestland, which is the predominant land use on the base as a whole, occupying some 60,093 acres or 69% of the land area, as well as roadsides and stream channels (2,523 acres or 3%); impact areas (5,447 acres or 6%); coastal beaches (1,645 acres or 2%); tidal marshes (3,326 acres or 4%); and wildlife food plots (285 acres or less than 1%).

Land use in the Cogdels Creek Watershed is also predominantly forestland. Of the 2,200 acres in the watershed, forestland occupies approximately 70% of the area. The remaining land uses in the watershed include the intensively developed industrial, commercial, and residential areas of Hadnot Point, the French Creek Complex, and the 1800 Area, as well as semi-improved areas, including the landfill and the tank and heavy equipment training area. These areas occupy approximately 700 acres, or 30% of the watershed.

Much of the area along Cogdels Creek which is identified as forestland can also be classified as wetland. The distribution of wetland along the floodplain can generally be delineated by soil type, which reflects seasonal saturation. Wetlands within the Cogdels Creek Watershed are shown on Figure 2-3.

Figure 2-4 shows the location of the designated 100-year-floodplain along Cogdels Creek. The floodplain boundaries reflect the extent to which tidal surge during the 100-year storm would inundate the stream valley.

Land use in Cogdels Creek Watershed was also characterized by categories which reflect the potential effects of land cover on surface runoff. Five land cover categories were delineated, including:

- Fully developed areas which include areas occupied by buildings, parking areas, and road surfaces;

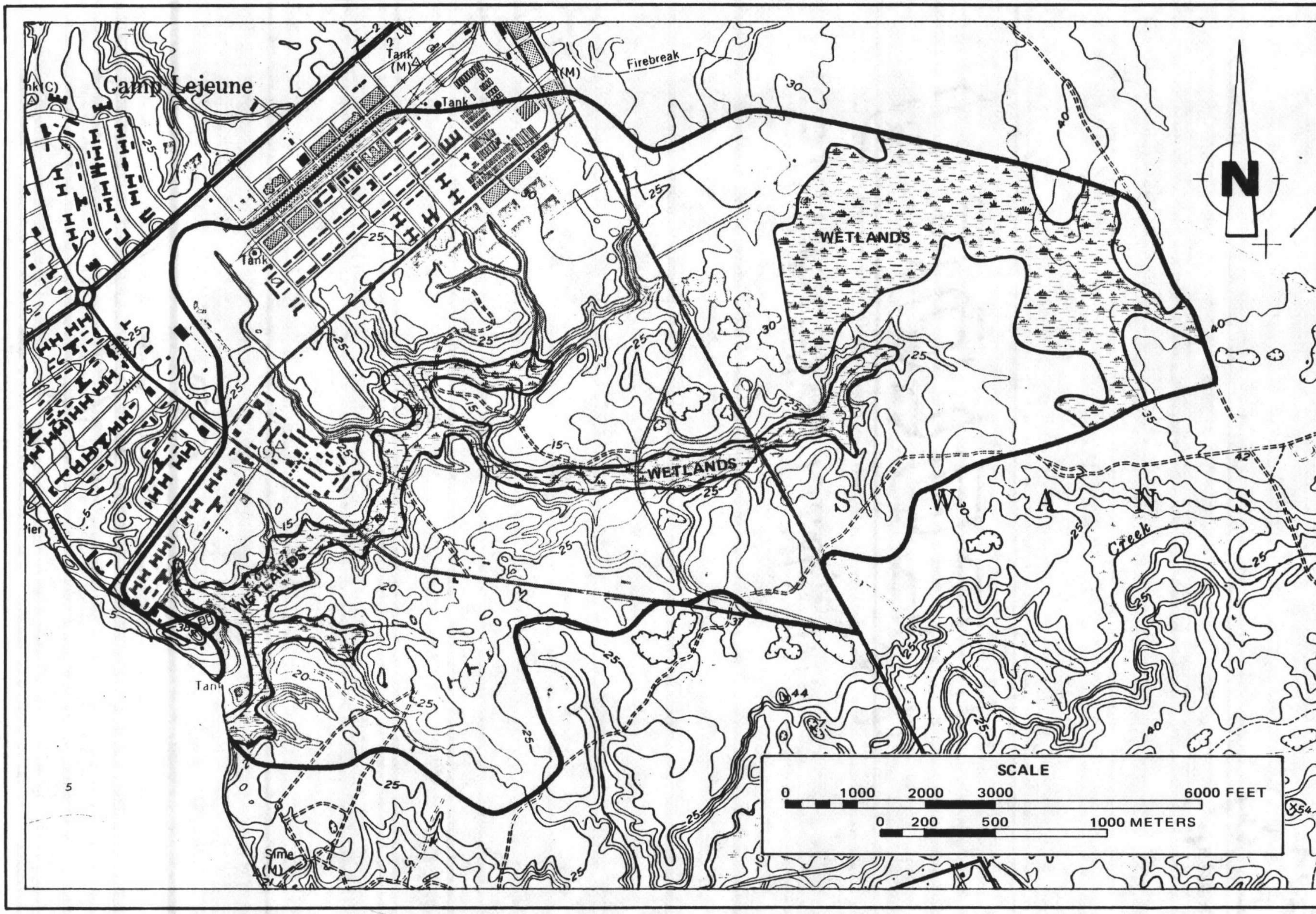

Figure 2–3 WETLANDS WITHIN THE COGDELS CREEK WATERSHED

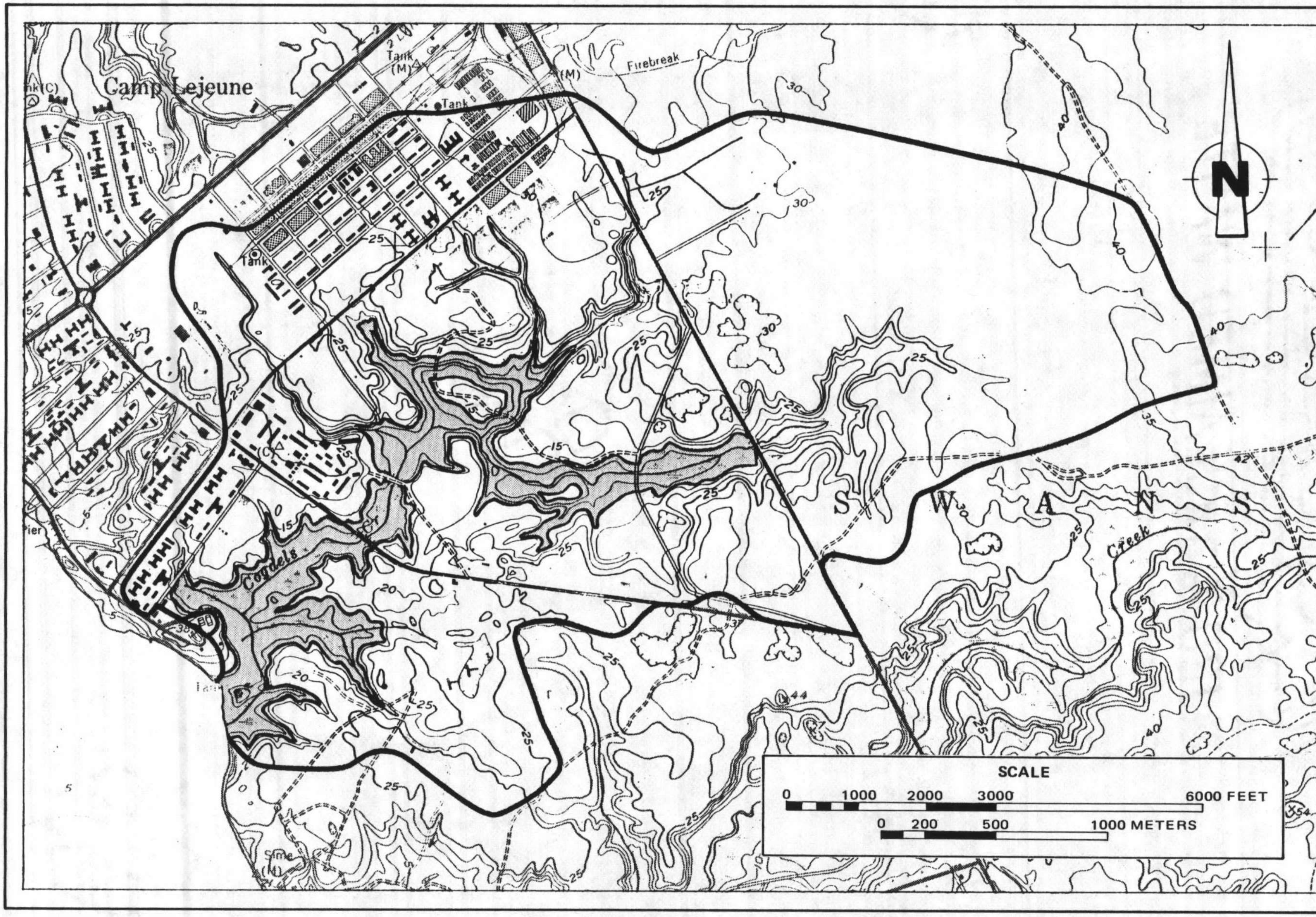

Figure 2–4 100-YEAR FLOODPLAINS WITHIN THE COGDELS CREEK WATERSHED

- Partially developed areas in which buildings and other paved surfaces are interspersed with lawns, athletic fields, and other vegetated areas;

- Undeveloped areas which are occupied by undisturbed native forest vegetation;

- Semi-undeveloped areas which are occupied by forested vegetation which has been thinned or in which the understory has been removed or disturbed (park-like); and

- Disturbed areas in which vegetation has been removed exposing soils but which have not been developed.

Figure 2-5 shows the distribution of these land cover types in the Cogdels Creek Watershed; the extent of each is shown in Table 2-3.

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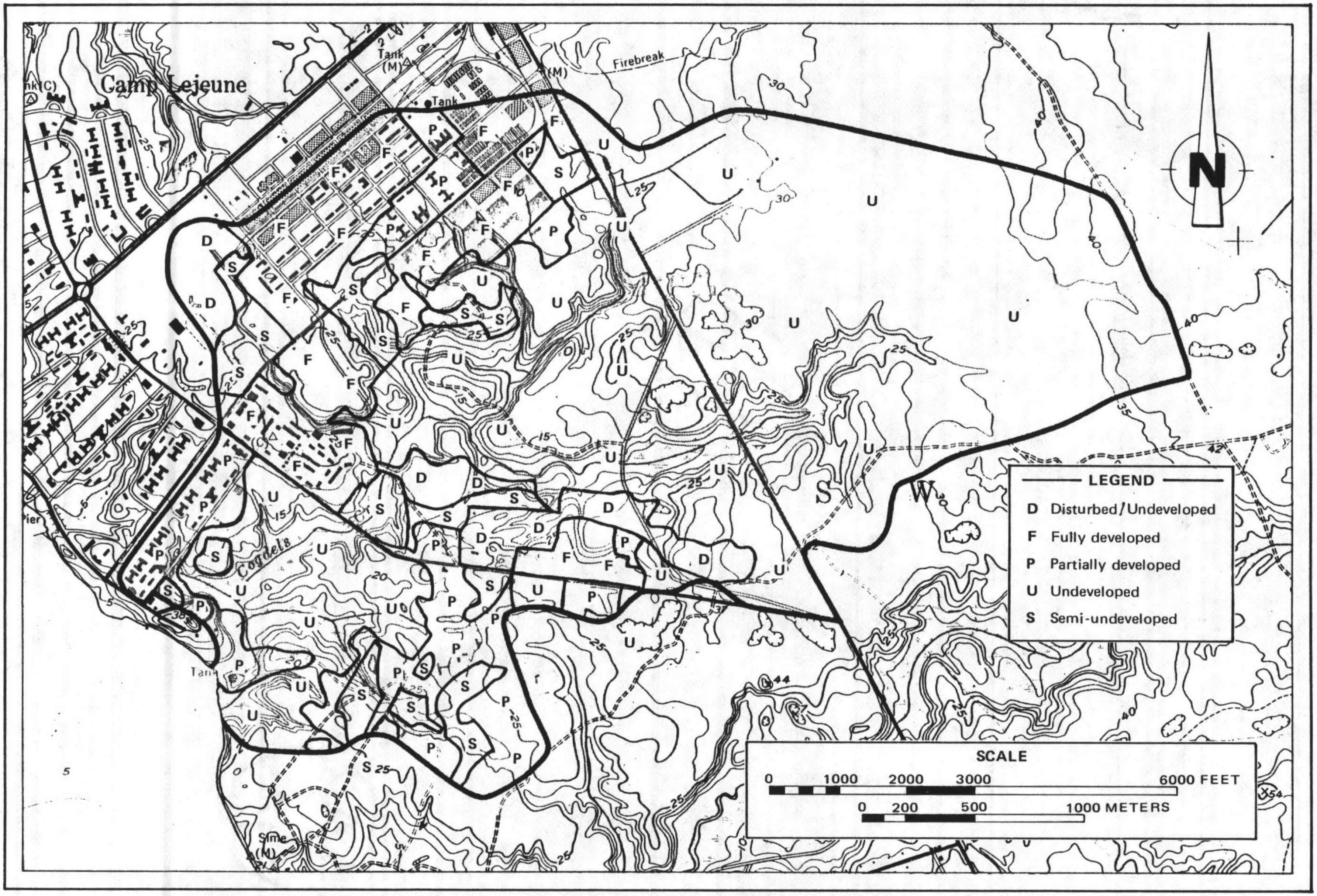

Figure 2–5 MAJOR LAND USES IN THE COGDELS CREEK WATERSHED

Table 2-3

DISTRIBUTION OF MAJOR LAND COVER TYPES
IN COGDELS CREEK WATERSHED

Land Cover	Area (acres)	Percent of Total Watershed
Fully developed	358	16
Partially developed	238	11
Semi-undeveloped	67	3
Undeveloped	1,464	66
Disturbed	97	4
Total	2,218	100

Source: Ecology and Environment, Inc., 1986.

3. EXISTING HYDROLOGY

This section discusses the existing hydrology of the Cogdels Creek Watershed under the present conditions of development and land cover, taking into account soils, vegetation, and in-place water control structures. This section also discusses areas on the base which are presently experiencing accelerated soil erosion.

3.1 WATERSHED HYDROLOGY

The Cogdels Creek Watershed encompasses approximately 3.98 square miles (Meikle 1986). Approximately 14% of this area is located north and west of Lyman Road. Drainage from the area northeast of Lyman Road has been interrupted and modified by the road, and for the purposes of this report, the watershed is considered to encompass 3.43 square miles, or 2,200 acres.

Figure 3-1 (map pocket inside back cover) shows the approximate boundaries of the watershed. The watershed is primarily drained by the main branch of Cogdels Creek and a major unnamed tributary to Cogdels Creek, as well as numerous minor tributaries. The main branch of Cogdels Creek is approximately 3.4 miles long. The main tributary, which is 1.5 miles long, joins the main branch approximately 1.4 miles from the mouth of Cogdels Creek.

There is no gauging station on Cogdels Creek, and thus there are no data on normal or peak stream flow volumes. A general indication of the range of stream flows which might be expected in Cogdels Creek can be determined from other watersheds in the general geographic area of Camp Lejeune which are gauged. Using data provided by the United

States Geological Survey (USGS 1984), five watersheds ranging in size from less than 2 to over 5,000 square miles were identified within the coastal lowland areas of North Carolina (Table 3-1). Average annual flows in these five watersheds range from 0.9 to 2.7 cubic feet per second per square mile (cfsm), and average 1.6 cfsm. Based on these figures, the average annual stream flow in Cogdels Creek can be expected to be in the range of 3 to 10 cfs, with an average stream flow of 6 cfs.

Base flow is defined as that portion of stream flow which results from groundwater discharge. Without actual measurements of stream flow and precipitation, it is not possible to determine base flow in Cogdels Creek. However, again using the existing data from the five gauged watersheds, a rough approximation of base flow can be determined.

Although there are several methods of determining base flow from gauged watersheds, one method is to average the minimum monthly flow over the year under the assumption that these minimums will exclude stream flows resulting from surface runoff during storm events. This was done for the five gauged watersheds in the general vicinity of Camp Lejeune, and the average minimum monthly flow was found to range from 0.1 to 0.7 cfsm, with an average of 0.5 cfsm. Based on these figures, base flow in Cogdels Creek can be expected to range from 0.4 to 2.8 cfs, with 1.8 cfs as an average.

Crude stream flow measurements were made at two locations in Cogdels Creek on February 4, 1986. Stream flow through a 5-foot, 6-inch diameter oval corrugated steel culvert located near the Wastewater Treatment Plant (Structure 80 in Figure 3-1) was approximately 3.5 cfs. Stream flow immediately upstream from the main tank tract crossing ranged from 4 to 5 cfs. These stream flow measurements are in general agreement with the calculated base flow approximation, since rainfall had occurred a few days prior to the field inspection and it is likely that stream flows had not reached base flow levels. From the above averages and estimates, for the purposes of this report, base flow was assumed to be 3 cfs.

There are several structures along the main branch and the major tributary of Cogdels Creek which can affect the flow of water in the stream channel. These structures are primarily culverts and are located where the streams pass beneath roadways. Table 3-2 lists the

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Table 3-1

BASE FLOW FOR GAUGED STREAMS ALONG
COASTAL LOWLANDS OF NORTH CAROLINA

USGS Gauge No.	Stream Name/Location	Drainage (Square Miles)	Average Annual Flow Per Square Mile (cfsm)	Average Monthly Min. Flow (cfs)	Min. Flow Per Square Mile
2093229	Hewletts Creek/Wilmington	1.98	2.7	1.36	0.7
2105769	Cape Fear River/Kelly	5,255	1.6	3,133	0.6
210800	Northeast Cape Fear River/Chinquapin	599	1.4	316	0.5
2108548	Little Rockfish Creek/Wallace	7.8	1.4	1.04	0.1
2109500	Waccamaw River/Freeland	680	0.9	301	0.4
Average			1.6		0.5

Source: USGS 1984.

Table 3-2

MAJOR CULVERTS LOCATED WITHIN THE
COGDELS CREEK WATERSHED

Structure Number*	Description**	Location
10	2 x 66" diameter CMP	Main Branch Cogdels Creek at Sneads Ferry Road
20	1 x 48" diameter CMP	Main Branch Cogdels Creek at Tank Crossing
30	1 x 30" diameter CP	Main Tributary Cogdels Creek at Sneads Ferry Road
40	1 x 48" diameter CMP	Main Tributary Cogdels Creek at Tank Crossing
50	2 x 48" diameter CP	Main Branch Cogdels Creek at Major Tank Crossing
60	3 x 48" diameter CP	Main Branch Cogdels Creek at Main Service Road
70	1 x 66" diameter CMP	Main Branch Cogdels Creek at Wastewater Treatment Plant
80	1 x 66" diameter CMP	Main Branch Cogdels Creek at Wastewater Treatment Plant

*Refers to map identification number in Figure 3-1 (in map pocket inside back cover) and Structure Number in Appendix A.

**CMP = Corrugated metal pipe
CP = Concrete pipe

Source: Ecology and Environment, Inc., 1986.

major culverts which influence peak flow in the watershed. Also listed are their sizes and approximate locations along the main branch or main tributary. Their locations are shown on Figure 3-1. The numerous other minor culverts were not found to have a major influence on flood transport capacity in Cogdels Creek. However, several of these culverts were in poor repair and should receive some remedial maintenance. They are discussed in Section 3.2.

Within the Cogdels Creek watershed, 19 minor watersheds (subwatersheds) were delineated to facilitate determination of peak runoff and stream flow. These subwatersheds are shown on Figure 3-1. They range in size from 0.01 acres to 0.84 square miles.

The hydrology of the watershed is determined largely by land cover, soil types, and slope, which combine to determine the volume and rate of surface runoff resulting from precipitation events. Section 2 discusses these conditions on the base in general and in the watershed in particular. The following section interprets these conditions as they influence surface runoff.

3.1.1 Development of Curve Numbers

The general characteristics of the soils found in Cogdels Creek Watershed are discussed in Section 2.1. Table 3-3 lists these soils and the area of the watershed occupied by each. Also shown in Table 3-3 is the hydrologic soil group for each soil type. Hydrologic soil groups are used to estimate runoff from precipitation for soils not protected by vegetation. Soils are assigned to one of four groups which are related to the rate of water uptake when the soils are thoroughly wet and are receiving precipitation from long duration storms.

The four hydrologic soil groups are:

- Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well-drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

- Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or

Table 3-3

SUMMARY OF SOIL TYPE AND LAND COVER IN COGDELS CREEK WATERSHED

Soil Type	Area	% of Total	Hydrologic Soil Group	Description of Land Cover	Slope (%)
Ur - Urban	0.34	10	--	Fully developed urban area	0-6
BaB - Baymeade-Urban Land Complex	0.48	14	A	50% Forestland 30% Urban 20% Disturbed but undeveloped	0-6
BmB - Baymeade	0.99	29	A	Forestland (upland)	0-6
MaC - Marvyn	0.48	14	B	Forestland (slopes along stream channels)	6-15
Mk - Muckalee	0.21	6	D	Forestland (floodplains)	Nearly level
On - Onslow	0.24	7	B	Forestland near shallow drainageways	Nearly level
Wo - Woodington	0.07	2	D	Forestland in poorly drained uplands	Nearly level
Mu - Murville	0.14	4	D	Forestland in poorly drained uplands	Nearly level
Kub - Kureb	0.10	3	A	Sparse forestland on uplands	1-6
Ct - Croatan	0.03	1	D	Forestland in poorly drained upland depressions	Nearly level
To - Torhunta	0.21	6	C	Forestland in very poorly drained uplands	Nearly level
Pt - Pits	0.02	0.5	--	Gravel pits	Variable
Nfc - Newhan	0.03	1	A	Maintained vegetation and urban development	2-10
Ud - Landfill	0.07	2	--	Sanitary landfill - disturbed	--

Source: Adapted from USDA SCS 1984.

deep, moderately well-drained or well-drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

- Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water, or soils of moderately fine or fine texture. These soils have a slow rate of water transmission.

- Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a clay pan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

In the Cogdels Creek Watershed, approximately 40% of the area is occupied by soils in group A, 21% by soils in group B, 6% by soils in group C, and 13% by soils in group D (see Figure 3-2). There are no soils in group C. Approximately 2% of the area is occupied by pits and the landfill, for which there is no hydrologic soil group. The remaining 14% of the watershed is occupied by Urban Land, which is defined as areas that are more than 85% covered by buildings, streets, parking lots, airports, railroad yards, and other urban uses. Because of extensive urbanization, the natural soil has been altered and the topography and original landscape have been changed. As a result, these areas are not assigned to a hydrologic soil group. It should be noted that the area identified as urban land includes the areas mapped by the Soil Conservation Service (SCS) as Urban Land (10%), as well as 30% of the areas mapped as Baymeade-Urban Land complex. According to the soil survey, within the Baymeade-Urban Land complex, 50% of the area is Baymeade soil, 20% comprises areas disturbed during urbanization but not fully developed (both of these areas are considered to belong to hydrologic group A), and 30% is Urban Land.

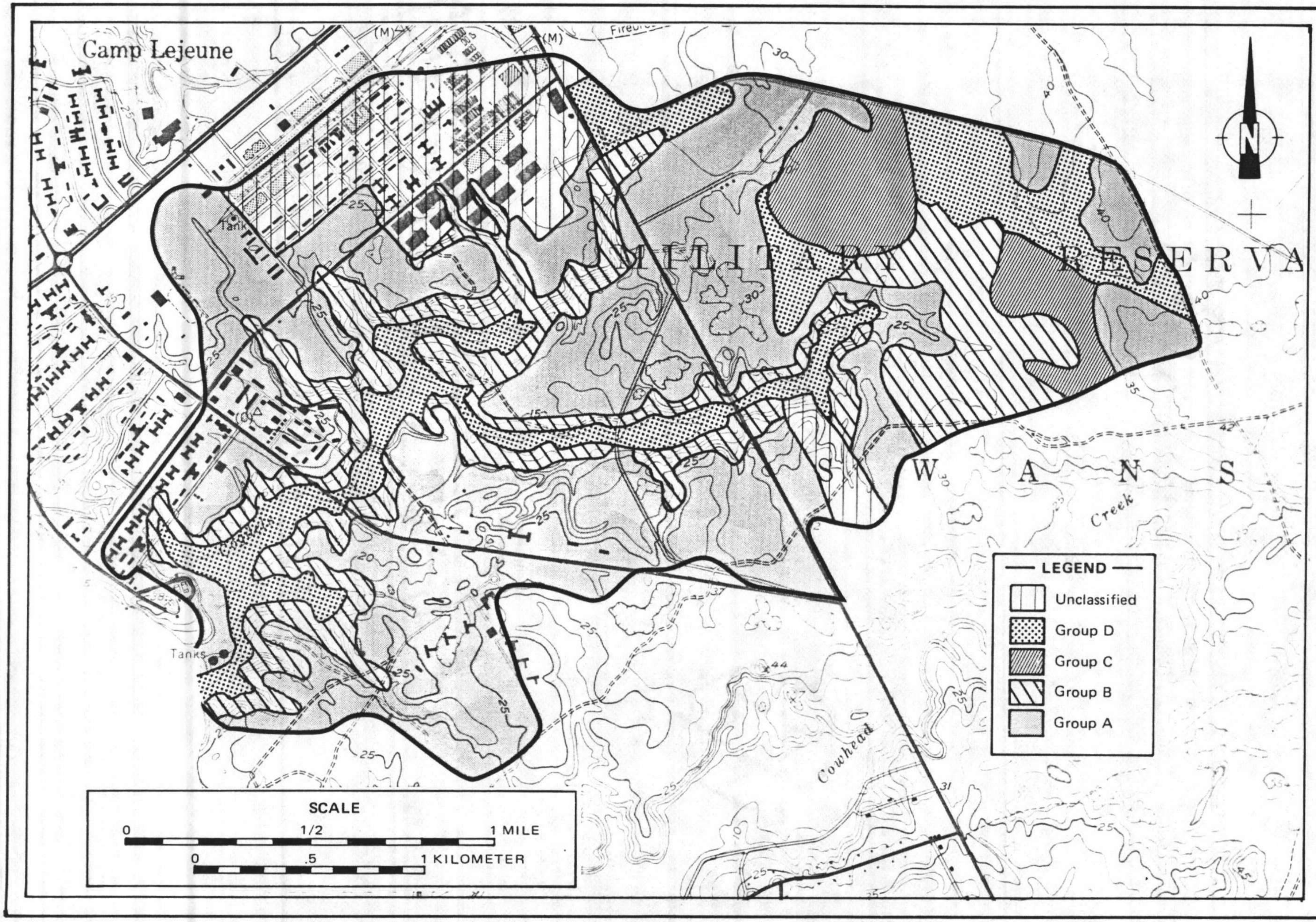

Figure 3–2 DISTRIBUTION OF HYDROLOGIC SOIL GROUPS IN THE COGDELS CREEK WATERSHED

Another factor which influences the amount of surface runoff is land cover. Dense vegetation cover and deep layers of undecomposed organic matter intercept precipitation and reduce the amount of surface runoff, as well as the rate at which it runs off. On the other hand, developed areas with minimal vegetation cover or paved surfaces trap very little precipitation, most of which becomes surface runoff. Table 3-3 lists the predominant land cover for each of the major soil types in the watershed. As discussed in Section 2.4, approximately 70% of the area is dominated by undisturbed forest vegetation, and the remaining areas are either disturbed (4%) or developed (27%) to some degree.

The combination of soil hydrologic groups and land cover is used to determine a curve number (CN) which is used in the calculation of surface runoff.

As discussed in Section 2.5, five major land cover types were identified within the Cogdels Creek Watershed. These land cover types were selected based on their relevance to storm water runoff, and include: undeveloped forestland; semi-undeveloped forestland; partially developed (urbanized) areas; fully developed (urbanized) areas; and disturbed areas in which native vegetation has been removed but which have not been developed. The characteristics of these land cover types are described more fully in Section 2.5.

Curve numbers for the various combinations of land cover and soil hydrologic groups were selected using similar land cover categories for which curve numbers had been determined by the SCS in Technical Release No. 55 (TR 55; 1975). Table 3-4 is reproduced from TR 55, and the land use descriptions corresponding to the five land use types in Cogdels Creek Watershed are indicated. Using these curve numbers for each combination of land cover and soil group, a weighted curve number for each of the 19 subwatersheds was determined based on the percent of each subwatershed which was occupied by each land cover-soil group type. These curve numbers are shown in Table 3-5, and the calculations are presented in Appendix A. The higher numbers reflect a greater amount of direct runoff from a storm.

Also shown in Table 3-5 are the time of concentration (Tc) values for each subwatershed. The Tc consists of the travel time of water from the hydraulically most distant point in the watershed to the point of interest. The Tc is estimated by combining the water travel

Table 3-4

RUNOFF CURVE NUMBERS FOR SELECTED FORESTED, AGRICULTURAL, SUBURBAN, AND URBAN LAND USE REPRODUCED FROM TR No. 55 (USDA SCS 1975) AND CORRESPONDING LAND USE TYPES IN COGDELS CREEK WATERSHED

Land Use Description		Hydrologic Soil Group A	B	C	D	Cogdels Creek Land Use Type
Cultivated Land*: Without conservation treatment		72	81	88	91	D
: With conservation treatment		62	71	78	81	--
Pasture or Range Land: Poor condition		68	79	86	89	--
Good condition		39	61	74	80	--
Meadow: good condition		30	58	71	78	--
Wood or Forestland: Thin stand, poor cover, no mulch		45	66	77	83	S
Good cover**		25	55	70	77	U
Open Spaces, Lawns, Parks, Golf Courses, Cemeteries, etc.						
Good condition: grass cover on 75% or more of the area		39	61	74	80	P
Fair condition: grass cover on 50% to 75% of the area		49	69	79	84	P
Commercial and Business Areas (85% impervious)		89	92	94	95	F/P
Industrial Districts (72% impervious).		81	88	91	93	F
Residential:†						
Average Lot Size	Average % Impervious††					
1/8 acre or less	65	77	85	90	92	P
1/4 acre	38	61	75	83	87	P
1/3 acre	30	57	72	81	86	P
1/2 acre	25	54	70	80	85	P
1 acre	20	51	68	79	84	P
Paved Parking Lots, Roofs, Driveways, etc***		98	98	98	98	F
Streets and Roads:						
Paved with curbs and storm sewers***		98	98	98	98	F
Gravel		76	85	89	91	F
Dirt		72	82	87	89	F

*For a more detailed description of agricultural land use curve numbers, refer to National Engineering Handbook, Section 4, Hydrology, Chapter 9, August 1972.
**Good cover is protected from grazing and litter and brush cover soil.
***In some warmer climates of the country, a curve number of 95 may be used.

†Curve numbers are computed assuming the runoff from the house and driveway is directed toward the street with a minimum of roof water directed to lawns where additional infiltration could occur.
††The remaining pervious areas (lawn) are considered to be in good pasture condition for these curve numbers.

Key:

D = Disturbed
S = Semi-undeveloped
U = Undeveloped
P = Partially developed
F = Fully developed

Source: Adapted from USDA SCS 1975.

Table 3-5

HYDROLOGIC CHARACTERISTICS OF
SUBWATERSHEDS IN COGDELS CREEK WATERSHED

Subwatershed Number*	Drainage Area Square Mile	Drainage Area Acre	Weighted Curve Number (CN)	Time of Concentration (T_c) (Hours)
1	0.08	51	50	0.42
2	0.01	4	40	0.15
3	0.11	72	41	0.48
4	0.28	176	50	0.61
5	0.20	125	66	1.15
6, 8, 9	0.19	120	56	0.74
7	0.05	33	74	0.19
10	0.02	16	64	0.12
11	0.24	155	73	0.62
12	0.36	230	85	0.42
13	0.05	34	45	0.90
14	0.28	183	53	1.02
15	0.20	132	42	0.19
16	0.11	69	40**	1.67
17	0.06	36	40**	1.00
18	0.37	237	49	3.90
19	0.84	539	51	7.50

*See Figure 3-1 (map pocket inside back cover) for location of subwatershed.

**Calculated CN less than 40; minimum CN 40 used in calculations
Source: Ecology and Environment, Inc., 1986.

Total 2,080

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Source: Ecology and Environment, Inc., 1986.

Total 2,080

time which usually occurs as overland flow, storm sewer, and/or channel flow. The travel times for overland flow and channel flow were estimated from information obtained from the topographic map of the watershed, and the travel time for sewer flow was estimated from design drawings. For channel flow, the estimates are based on slope and an assumed water depth of approximately 1 foot. For sewer flow, the estimates are based on slope and an assumed depth in the pipe of one-half full to full. These values of CN and Tc provide the data necessary to determine the existing peak runoff in Cogdels Creek as discussed in the following subsection.

3.1.2 Existing Storm Water Runoff and Flood Transport Capacity of Cogdels Creek

3.1.2.1 Methods

The existing hydrology of the Cogdels Creek Watershed was determined using the TR-20 Computer Program for Project Formulation Hydrology, dated May 1983. The program was developed by the SCS and is patterned after procedures described in Section 4 of the SCS National Engineering Handbook, usually referred to as NEH-4.

The TR-20 Program requires various input data to characterize the watershed and factors within the watershed which influence rate of runoff from storm events. These input data, some of which have been described in previous sections, include: curve numbers for each subwatershed, time of concentration, structure (culverts) characteristics, slope and length of various stream reaches, base flow, design rainfall data, characteristics of subwatersheds, etc. In addition, certain information is provided by the program, and requires only that the user select relevant information. This information includes synthetic rainfall distributions, dimensionless unit hydrographs, antecedent moisture condition, etc. The program is described more fully in USDA SCS (1983). The following paragraphs briefly describe the input data and assumptions used in developing the estimate of peak runoff under existing and proposed conditions in Cogdels Creek. A copy of the program printout showing input and output data is reproduced in Appendix B.

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The existing hydrology of the Cogdels Creek Watershed was determined using the TR-20 Computer Program for Project Formulation Hydrology, dated May 1983. The program was developed by the SCS and is patterned after procedures described in Section 4 of the SCS National Engineering Handbook, usually referred to as NEH-4.

The TR-20 Program requires various input data to characterize the watershed and factors within the watershed which influence rate of runoff from storm events. These input data, some of which have been described in previous sections, include: curve numbers for each subwatershed, time of concentration, structure (culverts) characteristics, slope and length of various stream reaches, base flow, design rainfall data, characteristics of subwatersheds, etc. In addition, certain information is provided by the program, and requires only that the user select relevant information. This information includes synthetic rainfall distributions, dimensionless unit hydrographs, antecedent moisture condition, etc. The program is described more fully in USDA SCS (1983). The following paragraphs briefly describe the input data and assumptions used in developing the estimate of peak runoff under existing and proposed conditions in Cogdels Creek. A copy of the program printout showing input and output data is reproduced in Appendix B.

The limits of the Cogdels Creek Watershed and subwatersheds were defined by field inspection, existing storm drainage drawings, topographic maps, and aerial photographs. This information is shown on Figure 3-1. The subwatersheds were located to define hydrologic and structural effects, i.e., the entrance of tributaries and existing culverts. The watershed is divided into 19 subwatersheds. Three of these subwatersheds (6, 8, and 9) were combined so that 17 subwatersheds were used in the computer program.

The average design rainfall is 7 inches, representing the 24-hour 10-year frequency storm. The computer program contains six standard synthetic rainfall distributions. These distributions are listed in the printout (Appendix B) as Table No. 5, RAINFL 1 through 6. Rainfall Table 2, which contains the 24-hour type II standard distribution generally used east of the Cascade and Sierra Nevada Mountains, was selected for this study. The standard SCS dimensionless unit hydrograph also is contained in the program and was utilized for the analysis. The antecedent moisture condition (AMC), which is an index of the watershed wetness, is selected by the user. The average conditions of AMC-II is used in this program. The base flow was determined in the field by measuring the velocity of the stream and the cross sectional area at several locations. This was compared to calculations of approximate base flow from five gauged watersheds in the coastal area of North Carolina. Based on these methods, a base flow of 3 cfs was assumed for Cogdels Creek.

The hydrologic study recognizes six structures (10 through 60 in Table 3-2). Although there are other structures within the watershed, these were not judged to be major factors controlling flow, and thus were not modeled. To evaluate each structure, a table is provided as input relating discharge to water surface elevation. Complete data are not available for each of the structures, such as slope, culvert length, construction details, and site-specific topography. To arrive at flow, the slope is estimated based on field inspection and average conditions. Also, the headwater depth is taken into account whenever the possibility of inlet submergence occurs. However, there was not sufficient information to evaluate the probable submergence of the outlet, and this item was not considered. This limitation does not exert a major influence on the ultimate runoff calculations, but the

effect of outlet submergence should be considered in the final design of water control structures.

The movement of the flood hydrograph through a valley reach is dependent upon such information as the length of the reach and a cross section of the valley including the stream channel. The cross section of the stream channel would have to be obtained by survey for input into the computer program. The computer program incorporates a power curve to describe the valley reach that can be used where valley cross sections are not available. The power curve requires as input the coefficients X and m from the equation $Q = XA^m$, where Q = discharge and A = cross section end-area representative of the reach. The coefficients X and m were selected based on a trapezoidal channel cross section.

The relationships of subwatersheds, structures, reaches, and tributaries is shown on Figure 3-3 (map pocket inside back cover). This drawing contains the information upon which the input data is structured for the computer program, including the length of stream reaches, values of X and m for each reach as described above, subwatershed areas, CNs and Tcs for each subwatershed, and structure characteristics.

3.1.2.2 Results

The results of the peak runoff modeling in Cogdels Creek Watershed under existing conditions are shown in Table 3-6. Information in this table was summarized from the computer output, which is contained in Appendix B. The table shows peak flow (in cfs) which is contributed by each subwatershed and stream reach, and incrementally adds the contributed runoff as the flood moves down the watershed. The flow at each of the six major structures is also calculated and, if the structure is inadequate to handle the peak flow, the elevation of the resulting reservoir is shown in parentheses.

Total volume of runoff for the entire watershed for the 10-year 24-hour storm is approximately 350 acre-feet. Peak flow at the mouth of Cogdels Creek is 406 cfs, although upstream of the Tank Crossing Area peak flows reach nearly 1,700 cfs.

As expected, runoff from the undeveloped portions of the watershed north and east of Sneads Ferry Road (subwatersheds 18 and 19) is

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Table 3-6

PEAK RUNOFF IN COGDELS CREEK UNDER EXISTING CONDITIONS

		Identification					
Operation*	No.	Cross-Section Number	Structure Number	Peak Flow Existing 1985 (cfs)	Sub-Water-Shed	Drainage Area (square mile)	Description - Remarks
Runoff	1	--	10	97	19	0.84	Undeveloped area east of Sneads Ferry Road
Resvor	2	--	10	97(9.5)	19	--	Two 66" diameter CMP culvert at Sneads Ferry Road
Reach	3	010	--	99	--	--	Stream travel to cross section 010
Runoff	2	010	--	122	15	0.20	Incremental runoff
Addhyd	4	010	--	125	--	1.04	Combines hydrographs from subwatersheds 15 and 19
Resvor	2	--	20	93(9.2)	--	--	48" diameter CMP at Tank Crossing Road
Reach	3	020	--	93	--	--	Stream travel to cross section 020
Runoff	1	020	--	158	14	0.28	Incremental runoff
Addhyd	4	020	--	181	--	1.32	Combine hydrographs from subwatersheds (15, 19) and 14
Runoff	1	--	30	61	18	0.37	Undeveloped area east of Sneads Ferry Road
Resvor	2	--	30	48(25.9)	--	--	30" diameter culvert at Sneads Ferry Road
Reach	3	040	--	48	--	--	Stream travel to cross section 040
Runoff	1	040	--	10	17	0.06	Incremental runoff
Addhyd	4	040	--	50	--	0.43	Combine hydrographs from subwatersheds 18 and 17
Resvor	2	--	40	50(10.9)	--	--	48" diameter CMP culvert at Tank Crossing Road
Reach	3	050	--	50	--	--	Stream travel to cross section 050
Runoff	1	049	--	14	16	0.11	Incremental runoff

Table 3-6 (Cont.)

Operation*	No.	Identification: Cross-Section Number	Identification: Structure Number	Peak Flow Existing 1985 (cfs)	Sub-Water-Shed	Drainage Area (square mile)	Description - Remarks
Addhyd	4	050	--	54	--	0.54	Combine hydrographs for subwatersheds (18, 17) and 16
Runoff	1	050	--	1079	12	0.36	Tributary runoff (industrial area) severe erosion - brig
Addhyd	4	050	--	1080	--	0.90	Combine hydrographs for subwatersheds (18, 17, 16) and 12
Reach	3	060	--	1080	--	--	Stream travel to cross section 060
Runoff	1	060	--	17	13	0.05	Incremental runoff
Addhyd	4	060	--	1086	--	0.95	Combine hydrographs for subwatersheds (18, 17, 16, 12) and 13
Addhyd	4	070	--	1159	--	2.27	Combine hydrographs for subwatersheds (15, 19, 14) and (18, 17, 16, 12, 13)
Reach	3	080	--	1159	--	--	Stream travel to cross Section 080
Runoff	1	080	--	55	10	0.02	Incremental runoff
Addhyd	4	080	--	1178	--	2.29	Combine hydrographs for subwatersheds (15, 19, 14, 18, 17, 16, 12, 13) and 10
Runoff	1	090	--	435	11	0.24	Tributary runoff (industrial area)
Addhyd	4	100	--	1568	--	2.53	Combine hydrographs for subwatersheds (15, 19, 14, 18, 17, 16, 12, 13, 10) and 11
Reach	3	110	--	1568	--	--	Stream travel to cross section 110
Reach	3	120	--	1568	--	--	Stream travel to cross section 120
Runoff	1	120	--	159	6,8,9	0.19	Tributary and incremental runoff
Addhyd	4	120	--	1694	--	2.72	Combine hydrographs for subwatersheds (15, 19, 14, 18, 17, 16, 12, 13, 10, 11) and (6, 8, 9)
Resvor	2	--	50	351(10.9)	--	--	Two 48" diameter CP culvert for tank crossing
Reach	3	130	--	351	--	--	Stream travel to cross section 130

Table 3-6 (Cont.)

Operation*	Identification No.	Identification Cross-Section Number	Identification Structure Number	Peak Flow Existing 1985 (cfs)	Sub-Water-Shed	Drainage Area (square mile)	Description - Remarks
Runoff	1	130	--	160	7	0.05	Incremental runoff
Addhyd	4	130	--	362	--	2.77	Combine hydrographs for subwatersheds (15, 19, 14, 18, 17, 16, 12, 13, 10, 11, 6, 8, 9) and 7
Resvor	2	--	60	272(6.7)	--	--	Three 48" diameter culvert at main service road
Reach	3	140	--	271	--	--	Stream travel to cross section 140
Runoff	1	140	--	191	5	0.20	Incremental runoff
Addhyd	4	140	--	288	--	2.97	Combine hydrographs for subwatersheds (15, 19, 14, 18, 17, 16, 12, 13, 10, 11, 6, 8, 9, 7) and 5
Runoff	1	149	--	68	1	0.08	Tributary runoff
Addhyd	4	150	--	292	--	3.05	Combine hydrographs for subwatersheds (15, 19, 14, 18, 17, 16, 12, 13, 10, 11, 6, 8, 9, 7, 5) and 1
Reach	3	150	--	292	--	--	Stream travel to cross section 150
Runoff	1	150	--	5	2	0.01	Incremental runoff
Addhyd	4	150	--	292	--	3.06	Combine hydrographs for subwatersheds (15, 19, 14, 18, 17, 16, 12, 13, 10, 11, 6, 8, 9, 7, 5, 1) and 2
Runoff	1	180	--	185	4	0.28	Tributary runoff
Addhyd	4	180	--	402	--	3.34	Combine hydrographs for subwatersheds (15, 19, 14, 18, 17, 16, 12, 13, 10, 11, 6, 8, 9, 7, 5, 1, 2) and 4
Reach	3	180	--	386	--	--	Stream travel to cross section 180
Runoff	1	180	--	35	3	0.11	Incremental runoff
Addhyd	4	180	--	406	--	3.45	Combine hydrographs for subwatersheds (15, 19, 14, 18, 17, 16, 12, 13, 10, 11, 6, 8, 9, 7, 5, 1, 2, 4) and 3 (Complete watershed)
Vol.				350 AF			Total Vol., AF = Acre-ft.

*See Appendix B for description of these terms.

Source: Ecology and Environment, Inc., 1986.

minimal, although together these two subwatersheds comprise 35% of the area of the watershed.

The most notable feature of the watershed study is the severe impact of the storm sewer discharges from the Hadnot Point Industrial Area. The computed peak discharge from this subwatershed (12) is 1,079 cfs. This peak exceeds the capacity of the 48-inch diameter storm sewer, and flooding within the area serviced by this storm sewer system would not be unexpected. The discharge velocity will be exceedingly high, creating downstream erosion problems. This was evident during the field inspection, as discussed in Section 3.2.

This peak flow passes downstream to the first obstruction, structure 50 at the main tank crossing. Structure 50 consists of two 48-inch diameter culverts with 6 feet or more of cover over the culverts. The culverts restrict the downstream discharge to approximately 351 cfs from the peak flow of 1,694 cfs entering the area. This effectively creates a damming effect, resulting in a reservoir or detention basin. The reservoir created stores the excess water to an elevation of 10.9 feet (approximately 8.5 feet above the streambed), and this reservoir floods practically the entire stream channel to Sneads Ferry Road, as shown on Figure 3-2.

The next structure downstream is structure 60 at the Main Service Road. This structure consists of three 48-inch diameter culverts. A slight damming effect also occurs at this location, restricting the incoming flow of 362 cfs to a downstream flow of 272 cfs. The reservoir created by this structure reaches an elevation of 6.7 feet, or 4.7 feet above the streambed.

Although peak flow in the Cogdels Creek Watershed reaches high levels as a result of runoff from the Industrial Area, flooding within the stream channel is not a major problem because there is adequate capacity to store floodwaters within the stream channel. The creek floodplain is fairly wide and the adjacent side slopes are high enough to provide an adequate storage reservoir, as shown on Figure 3-2. It is apparent, however, that storms in excess of the 10-year 24-hour storm could result in flooding along the watercourse.

3.2 CRITICALLY ERODING AREAS

There are several areas in the Cogdels Creek Watershed which are presently eroding, generally resulting in sedimentation and siltation,

and adversely affecting water quality. Soil erosion results from a number of factors including unstable soil conditions, steep slopes, poor vegetative cover, and inadequate water management facilities. This section briefly discusses the critically eroding areas within the Cogdels Creek Watershed. The locations of critically eroding areas are shown on Figure 3-1; the areas are keyed by number, which refers to the following discussion. Recommended measures to remediate these critical erosion problems are discussed in Section 5.

3.2.1 1800 Area (Area 1)

A tributary to Cogdels Creek traverses generally from northwest to southeast north of the 1800 Area. The tributary receives surface runoff from the area generally bounded by Main Service Road, Duncan Street, and Gum Street. Severe erosion is occurring along this tributary in the area between Duncan Street (south) and Louis Road, and north of Buildings 1870, 1871, and 1872.

This area is a large open field with very sparse vegetation cover. From Louis Road downstream to Buildings 1870, 1871, and 1872, the tributary has been directed through a 30-inch culvert and the channel has been filled. At a point directly north of these buildings, the tributary emerges from the culvert. The stream channel is approximately 4 to 6 feet below grade at this point, and the soil is the easily erodable Baymeade fine sand. The channel banks are being under cut and are eroding into the stream channel. In addition, surface runoff from the open field north of the tributary is resulting in severe gully erosion. To prevent further erosion and downstream sedimentation, the stream banks and gullies should be graded back to stable slopes and stabilized with riprap and critical area vegetation management practices as described in Section 5.

3.2.2 Duncan Street (North) - Brig Area (Area 2)

A tributary to Cogdels Creek receives surface and storm water discharge from the industrial areas near the intersections of Duncan and Ash streets, Duncan and Birch streets, and "O" and Dogwood streets. In addition, surface runoff from the brig exercise yard is diverted to this drainage. These discharges are resulting in severe channel and gully erosion. In particular, at the southeast end of Ash

Street, a 48-inch storm drain discharges to the tributary. On the 1954 storm drainage maps, this drain is shown to discharge at a point immediately adjacent to Duncan Street. Since that time, however, the head of the tributary channel has been filled, and the storm drain presently discharges at a point about 200 feet from Duncan Street. At this point, the channel is confined to a deep gully (20 to 30 feet deep), and discharges from the storm drainage system are eroding the channel and the gully headwall where the culvert discharges.

A short distance downstream, this tributary is joined by another drainage which receives storm water discharge from the southeastern ends of Birch and Dogwood streets. Both of these tributaries are high-energy channels with fairly steep gradients. Judging by the size of cement and other debris in the channels, it is apparent that flows in the channels are high at times. The valley walls along both channels are very steep and are eroding in places.

Immediately downstream from the junction of the two tributaries described above, a large gully has recently begun eroding into the tributary channel from the northeast side. This gully is the result of surface runoff from the brig's exercise yard. Apparently to alleviate poor drainage on the southwest side of the exercise yard, a small (1-foot by 1-foot) channel was excavated to direct surface water into the wooded area southwest of the yard. This channel intersects the natural tributary to Cogdels Creek approximately 200 feet into the woods. Flow in this channel initiated erosion of the natural valley wall, and presently a gully approximately 15 feet deep and 30 to 50 feet long extends away from the natural channel toward the yard. Soils along this gully are highly erodible, and the erosion is undermining trees which have subsequently fallen into the channel. This particular problem seems to be relatively recent, as it is not evident on the 1983 aerial photographs.

3.2.3 Tank Crossing (Area 3)

A third area which, although not a problem during the field inspection, will likely result in accelerated erosion and sedimentation, is the tank crossing area east of the 1800 Area. Immediately prior to the field inspection in February, vegetation along Cogdels Creek stream channel had been cleared and the channel widened and/or

straightened along approximately 800 feet of stream immediately upstream from the improved tank crossing (i.e., bridge with culverts). The purpose of the channel modification activities was to restore the normal flow of water in the channel. The channel had been restricted as a result of fill pushed into the channel at an unimproved tank crossing. Restriction of the channel caused the stream to back up, flooding a large area immediately upstream from the unimproved tank crossing. The stream channel modifications resulted in complete removal of the stream-side vegetation, exposing the bottomland soils to potential erosion during high flows. Although such erosion had not occurred at the time of the field investigation, it can be anticipated if vegetative cover is not restored before a major rainfall event.

3.2.4 Tank and Heavy Equipment Training Area (Area 4)

The tank and heavy equipment training area comprises a large area which is continually disturbed. There is almost no vegetative cover on the area, although the areas surrounding the site are well- vegetated. Although the training area appears to have the potential to result in serious erosion and sedimentation problems, such problems do not seem to occur. There are several reasons for this. The soils are primarily Baymeade, which has a very high infiltration capacity and low runoff. The entire area is relatively level and, due to the earth-moving activities most, drainage seems to be internal and runoff is trapped on the site until it percolates into the ground or evaporates. In general, the only potential problems with this site are along the perimeter, where sediment could be deposited in adjacent undisturbed areas, and along the main access roads to and from the site. In particular the access roads (or tank trails) which lead to Cogdels Creek could serve as conduits for surface runoff and sedimentation.

3.2.5 2nd Bulk Terminal Storage (Area 5)

There is a large parking/storage area south of the 2nd Bulk Terminal Storage Building (746 and 739), part of which is paved, but part of which is also sand. The sand is eroding southeast to H.M. Smith Boulevard, and washing into the street. Sand bags have been placed along H.M. Smith Boulevard to trap the sand, but these are not effective, and sand continues to travel past this barrier.

3.2.6 Miscellaneous Erosion Problems (Area 6)

In addition to the areas described above, there are several areas where minor erosion problems are occurring. A foot path parallels the south side of Main Service Road between "O" Street and Gonzalez Boulevard (Area 6A). Just east of Cogdels Creek, the foot path traverses a small rise. Foot traffic on the path has killed the vegetation, there is minor rill erosion occurring along the path, and the eroded sediment is being deposited into the roadside drainage system which subsequently discharges to Cogdels Creek.

Along "O" Street, just north of Building 521, there is a drainage swale which is the head of a minor tributary to Cogdels Creek (Area 6B). This drainage swale is vegetated with grass and scattered large trees, and has a park-like appearance. The area appears to receive a lot of foot traffic, and the grass is sparse. There is some sheet erosion and minor rill erosion in this swale, which drains to a grated manhole, and discharges through a 24-inch pipe under "O" Street to a short tributary to Cogdels Creek.

There are several large (36 to 54 inch) storm drain outlets which discharge to the upper headwaters of tributaries to Cogdels Creek (Area 6C). These outlets collect storm drainage from the heavily developed industrial areas on the western side of the watershed. The channels at many of these outlets are eroding from the force of high flows discharging from these culverts.

An existing 30-inch culvert transports flows from the major tributary to Cogdels Creek beneath Sneads Ferry Road. No provisions were made to de-energize the flow at the outlet of this culvert, and the head wall is eroding severely (Area 6D).

An existing drainage channel located east of Building FC115 carries surface runoff from the Main Service Road north to the vegetated area adjacent to the Tank and Heavy Equipment Training Area. This channel is eroding severely, particularly immediately adjacent to the Main Service Road (Area 6E).

Immediately southwest of the Enlisted Mens Club (Building FC-330) a 24-inch culvert discharges to a minor tributary just upstream of Gonzalez Boulevard (Area 6F). The culvert head wall has eroded and the terminal section of culvert has subsided approximately one-half its diameter. In addition, runoff from the adjacent parking lot has

resulted in some rill erosion on the slope immediately above the culvert.

Runoff from the parking lot associated with Building 1450 is allowed to discharge to a partially unvegetated slope at the south corner of the parking area (Area 6G). The discharge occurs along an unimproved tank trail which accesses the parking lot at the south corner. The associated runoff is carrying sediments from the parking area, and is causing erosion to the side slope of a minor tributary to Cogdels Creek. In addition, erosion and sedimentation due to surface runoff is occurring along the channel side slope on the south side of the tributary along Duncan Street, southeast of Building 1771.

4. FUTURE CONDITIONS

This section discusses the potential effects on peak storm water runoff which would result from the construction of all facilities proposed for development in Cogdels Creek watershed during FY86 through FY92 as outlined on the General Development Maps.

4.1 FUTURE LAND USE

Approximately 45 projects totaling approximately 63 acres are proposed for development in Cogdels Creek watershed during FY86 through FY92. These projects range in size from the French Creek Self-service Gas Station and Car Wash (P-840), which is approximately 2,100 square feet, to the Bachelor Enlisted Quarters (P-627), which is estimated to encompass approximately 341,300 square feet. These projects are listed in Table 4-1, grouped according to the fiscal year in which they are to be constructed, along with their size and the subwatershed in which they are located. The extent of development in any one fiscal year ranges from 171,156 square feet (or 3.9 acres) in FY91 to 775,160 square feet (or 17.8 acres) in FY92.

Development of these projects will alter the pattern and intensity of storm water runoff by increasing the area of the watershed which is impervious. To determine the effects of these projects on future peak runoff from the 10-year 24-hour storm, the weighted CNs for each subwatershed were recalculated for each fiscal year in which proposed project development was scheduled. The CN for each of these projects was assumed to be 98, which is indicative of a completely

Table 4-1

SUMMARY OF MCON PROJECTS
SCHEDULED FOR COGDELS CREEK WATERSHED
DURING FY86 THROUGH FY92

Project	Description	Size of Project (sq ft)	Subwatershed in Which Project Is Located	% of Sub-Watershed Affected
FY86				
P-840	French Creek Self-Service Gas Station and Car Wash	2,100	3	0.07
P-631	Unaccompanied Enlisted Personnel Housing	179,062	5	3.29
P-806	Light Armored Vehicle Shop	76,902	5	1.41
P-565 P-527 P-505	Electrical Communication Maintenance Shop	29,775	5	0.55
P-517	Combat Vehicle Maintenance Shop	23,460	14	0.23
	Subtotal	311,299		
FY87				
P-627	Bachelor Enlisted Quarters	341,296*	1	15.43
P-257	Field Maintenance Complex (Incr. 1)	60,540	14/15	0.80
P-027	Combat Vehicle Maintenance Shop	16,120	4	0.21
P-259	French Creek Bowling Alley	18,325	4	0.24
P-701	Medical/Dental Clinic; French Creek	28,700	4	0.38
	Subtotal	464,981		
FY88				
P-626	Bachelor Enlisted Quarters	89,408*	5/1	1.76
P-803	Field Maintenance Complex (Incr. 2)	48,000	15	1.13
P-678	Combat Vehicle Maintenance Shop	76,210	11/12	1.06
P-256	Field Maintenance Shop	13,760	15	0.32
P-065	Gymnasium	21,000	4	0.29
	Subtotal	248,378		
FY89				
P-804	Field Maintenance Complex (Incr. 3)	210,300	14/15	3.50
P-853	Vehicle Ready Fuel Storage	125,664*	12	1.26

Table 4-1 (Cont.)

Project	Description	Size of Project (sq ft)	Subwatershed in Which Project Is Located	% of Sub-Watershed Affected
P-679	Electrical/Communication Field Maintenance Shop	19,912	15	0.47
P-564	Electrical/Communication Maintenance Shop	6,100	14	0.06
P-229	Electrical/Communication Maintenance Shop	44,524	6	0.94
P-837	Hand Ball/Racquet Ball Courts	6,000	3	0.19
	Subtotal	412,500		
FY90				
P-773	Hobby Shop Complex; Hadnot Point	40,104	6	0.85
P-794	Roof and Light Handball Courts	42,000*	6	0.88
P-805	Field Maintenance Complex (Incr. 4)	110,000	15/14	2.42
P-843	Road Improvements (Main Service Road)	66,080	5	1.21
P-266	Combat Vehicle Maintenance Shop	49,818	14	0.49
P-541	Electrical/Communication Maintenance Shop	3,300	15	0.08
P-542	Electrical/Communication Maintenance Shop	4,760	14	0.05
P-445	Combat Vehicle Maintenance Shop	23,621	5	0.43
	Subtotal	339,683		
FY91				
P-786	Cold Storage Plant	36,096	12	0.36
P-510	Storage/Out of Stores	85,438	6	1.80
P-227	Armory (Small Arms/Ammo Emergency Gear)	12,527	4	0.16
P-844	Combat Training Pad/Tank	12,735*	4	0.17
P-567	Storage/Out of Stores	24,360	5	0.45
	Subtotal	171,156		
FY92				
P-533	Storage/Out of Storage	43,560	6/5	0.89
P-511	Storage/Out of Storage/Armory	61,400	6/5	1.24
P-550	Storage/Out of Storage/Armory	38,800	15	0.91

Table 4-1 (Cont.)

Project	Description	Size of Project (sq ft)	Subwatershed in Which Project Is Located	% of Sub-Watershed Affected
P-551	Storage/Out of Storage/Armory	53,160	16	1.77
P-552	Storage/Out of Storage/ (Fleet/OPS)	104,000	14	1.02
P-553	Storage/Out of Storage/ (Fleet Stock, Med, Flammable)	104,000	15	2.44
P-121	Storage/Out of Storage	75,120	14/7	1.86
P-548	Storage/Out of Storage	43,560	14	0.43
P-512	Storage/Out of Storage (Fleet Mount Out)	104,000	16/15	3.20
P-513	Storage/Out of Storage (Fleet Stock)	104,000	15	2.44
P-859	Storage/Out of Storage	43,560	5	0.80
	Subtotal	775,160		
	Grand Total	2,723,157		

*Area of Project Measured from General Development Maps.

Source: Alexander, unpublished information.

impervious surface. The calculations involved in reanalyzing the weighted CNs for each subwatershed are contained in Appendix A.

Table 4-2 summarizes the changes in CN and Tc for each subwatershed resulting from proposed project development. For the most part, the proposed development does not alter the CNs significantly, particularly for the larger subwatersheds since the area to be developed constitutes only a small portion of the subwatershed. For small watersheds, however, such as 1, 5, 6, 8, and 9, the weighted CNs do show marked increases. The Tc is not changed by the development because this represents the time required for water falling on the farthest point in the subwatershed to reach the stream, and unless the farthest point is to be developed, which did not occur, the Tc will not change substantially.

It should be noted that Tc actually increased in subwatershed 14. This is because of the proposed construction of a road parallel to Cogdels Creek through this watershed. This road will serve as a small dike, and block the flow of surface runoff, diverting it to points where it can be discharged to the creek via a culvert and reinforced channel. To account for this damming effect of the proposed roadway, the Tc was increased from 1.02 to 2.00 hours.

4.2 FUTURE STORM WATER RUNOFF

The TR-20 Program was run for each fiscal year from FY86 through FY92, incorporating the modifications to watershed hydrology each year resulting from the proposed development of each subwatershed as identified in Table 4-2. The input and program output for each fiscal year is presented in Appendix B; the major results are summarized in Table 4-3.

Total runoff volume increases from 350 acre-feet under existing conditions, to 399 acre-feet in FY90, but declines again to 362 acre-feet in FY92. Peak flow at the mouth of the stream increases from 406 cfs under existing conditions to 680 cfs in FY92. The largest increase occurs from FY85 to FY86 where the peak flow increases approximately 40% to 566 cfs. This increase in flow at the mouth of the stream is due primarily to a nearly three-fold increase in runoff

Table 4-2

FISCAL YEAR SUMMARY OF CURVE NUMBERS (CN) AND
TIME OF CONCENTRATION (Tc) FOR MAJOR SUBWATERSHEDS
AS AFFECTED BY PROPOSED DEVELOPMENT

Subwatershed Number	CN/ Tc	Present FY 85	FY 86	FY 87	FY 88	FY 89	FY 90	FY 91	FY 92
1	CN	50	--	65	65	--	--	--	--
	Tc	0.42	--	0.42	0.42	--	--	--	--
2	CN	40	--	--	--	--	--	--	--
	Tc	0.15	--	--	--	--	--	--	--
3	CN	41	42	--	--	42	--	--	--
	Tc	0.48	0.48	--	--	0.48	--	--	--
4	CN	50	--	50	50	--	--	50	--
	Tc	0.61	--	0.61	0.61	--	--	0.61	--
5	CN	66	68	--	69	--	70	70	71
	Tc	1.15	0.19	--	0.19	--	0.19	0.19	0.19
6, 8, 9	CN	56	--	--	--	57	58	62	66
	Tc	0.74	--	--	--	0.74	0.74	0.74	0.74
7	CN	74	--	--	--	--	--	--	74
	Tc	0.19	--	--	--	--	--	--	0.19
10	CN	64	--	--	--	--	--	--	--
	Tc	0.12	--	--	--	--	--	--	--
11	CN	73	--	--	78	--	--	--	--
	Tc	0.62	--	--	0.62	--	--	--	--
12	CN	85	--	--	85	85	--	85	--
	Tc	0.42	--	--	0.42	0.42	--	0.42	--
13	CN	45	--	--	--	--	--	--	--
	Tc	0.90	--	--	--	--	--	--	--

Table 4-2 (Cont.)

Subwatershed Number	CN/ Tc	Present FY 85	FY 86	FY 87	FY 88	FY 89	FY 90	FY 91	FY 92
14	CN	53	54	54	--	54	54	--	55
	Tc	1.02	1.02	2.00	--	2.00	2.00	--	2.00
15	CN	42	--	42	43	44	44	--	48
	Tc	0.19	--	0.19	0.19	0.19	0.19	--	0.19
16	CN	40*	--	--	--	--	--	--	40
	Tc	1.67	--	--	--	--	--	--	1.67
17	CN	40*	--	--	--	--	--	--	--
	Tc	1.00	--	--	--	--	--	--	--
18	CN	49	--	--	--	--	--	--	--
	Tc	3.90	--	--	--	--	--	--	--
19	CN	51	--	--	--	--	--	--	--
	Tc	1.50	--	--	--	--	--	--	-

Source: Ecology and Environment, Inc., 1986.

Table 4-3

PEAK RUNOFF IN COGDELS CREEK UNDER EXISTING AND PROPOSED CONDITIONS

		Identification		Peak Discharge, cfs (Resvor Peak El.)										
Operation*	No.	Cross-Section Number	Structure Number	Peak Flow Existing 1985 (cfs)	FY86	FY87	FY88	FY89	FY90	FY91	FY92	Sub-Water-Shed	Drainage Area (square mile)	Description - Remarks
Runoff	1	--	10	97	97	97	97	97	97	97	97	19	0.84	Undeveloped area east of Sneads Ferry Road
Resvor	2	--	10	97(9.5)	96(9.5)	96(9.5)	96(9.5)	96(9.5)	96(9.5)	96(9.5)	96(9.5)	19	--	Two 66" diameter CMP culvert at Sneads Ferry Road
Reach	3	010	--	99	99	99	99	99	99	99	99	--	--	Stream travel to cross section 010
Runoff	2	010	--	122	122	122	136	151	151	151	211	15	0.20	Incremental runoff
Addhyd	4	010	--	125	125	125	139	154	154	154	215	--	1.04	Combines hydrographs from subwatersheds 15 and 19
Resvor	2	--	20	93(9.2)	93(9.2)	93(9.2)	93(9.2)	94(9.2)	94(9.2)	94(9.2)	95(9.3)	--	--	48" diameter CMP at Tank Crossing Road
Reach	3	020	--	93	93	93	93	94	94	94	95	--	--	Stream travel to cross section 020
Runoff	1	020	--	158	168	103	103	103	103	103	109	14	0.28	Incremental runoff
Addhyd	4	020	--	181	191	127	129	132	132	132	150	--	1.32	Combine hydrographs from subwatersheds (15, 19) and 14
Runoff	1	--	30	61	61	61	61	61	61	61	61	18	0.37	Undeveloped area east of Sneads Ferry Road
Resvor	2	--	30	48(25.9)	48(25.9)	48(25.9)	48(25.9)	48(25.9)	48(25.9)	48(25.9)	48(25.9)	--	--	30" diameter culvert at Sneads Ferry Road
Reach	3	040	--	48	48	48	48	48	48	48	48	--	--	Stream travel to cross section 040
Runoff	1	040	--	10	10	10	10	10	10	10	10	17	0.06	Incremental runoff
Addhyd	4	040	--	50	50	50	50	50	50	50	50	--	0.43	Combine hydrographs from subwatersheds 18 and 17
Resvor	2	--	40	50(10.9)	50(10.9)	50(10.9)	50(10.9)	50(10.9)	50(10.9)	50(10.9)	50(10.9)	--	--	48" diameter CMP culvert at Tank Crossing Road
Reach	3	050	--	50	50	50	50	50	50	50	50	--	--	Stream travel to cross section 050
Runoff	1	049	--	14	14	14	14	14	14	14	14	16	0.11	Incremental runoff
Addhyd	4	050	--	54	54	54	54	54	54	54	54	--	0.54	Combine hydrographs for subwatersheds (18, 17) and 16
Runoff	1	050	--	1079	1079	1079	1079	1079	1079	1079	1079	12	0.36	Tributary runoff (industrial area) severe erosion - brig
Addhyd	4	050	--	1080	1080	1080	1080	1080	1080	1080	1080	--	0.90	Combine hydrographs for subwatersheds (18, 17 16) and 12
Reach	3	060	--	1080	1080	1080	1080	1080	1080	1080	1080	--	--	Stream travel to cross section 060
Runoff	1	060	--	17	17	17	17	17	17	17	17	13	0.05	Incremental runoff
Adhyd	4	060	--	1086	1086	1086	1086	1086	1086	1086	1086	--	0.95	Combine hydrographs for subwatersheds (18, 17, 16, 12) and 13
Addhyd	4	070	--	1159	1165	1106	1107	1108	1108	1108	1116	--	2.27	Combine hydrographs for subwatersheds (15, 19, 14) and (18, 17, 16, 12, 13)
Reach	3	080	--	1159	1165	1106	1107	1108	1108	1108	1116	--	--	Stream travel to cross Section 080
Runoff	1	080	--	55	55	55	55	55	55	55	55	10	0.02	Incremental runoff
Addhyd	4	080	--	1178	1185	1127	1128	1129	1129	1129	1137	--	2.29	Combine hydrographs for subwatersheds (15, 19, 14, 18, 17, 16, 12, 13) and 10
Runoff	1	090	--	435	435	435	458	458	458	458	458	11	0.24	Tributary runoff (industrial area)
Addhyd	4	100	--	1568	1575	1509	1535	1536	1536	1536	1547	--	2.53	Combine hydrographs for subwatersheds (15, 19, 14, 18, 17, 16, 12, 13, 10) and 11
Reach	3	110	--	1568	1575	1509	1535	1536	1536	1536	1547	--	--	Stream travel to cross section 110
Reach	3	120	--	1568	1575	1509	1535	1536	1536	1536	1547	--	--	Stream travel to cross section 120

Table 4-3 (Cont.)

		Identification		Peak Discharge, cfs (Resvor Peak El.)										
Operation*	No.	Cross-Section Number	Structure Number	Peak Flow Existing 1985 (cfs)	FY86	FY87	FY88	FY89	FY90	FY91	FY92	Sub-Water-Shed	Drainage Area (square mile)	Description - Remarks
Runoff	1	120	--	159	159	159	159	168	176	210	245	6,8,9	0.19	Tributary and incremental runoff
Addhyd	4	120	--	1694	1701	1632	1657	1667	1675	1707	1751	--	2.72	Combine hydrographs for subwatersheds (15, 19, 14, 18, 17, 16, 12, 13, 10, 11) and (6, 8, 9)
Resvor	2	--	50	351(10.9)	353(11.0)	339(10.5)	344(10.7)	346(10.8)	347(10.8)	353(11.0)	365(11.3)	--	--	Two 48" diameter CP culvert for tank crossing
Reach	3	130	--	351	353	339	344	346	347	353	365	--	--	Stream travel to cross section 130
Runoff	1	130	--	160	160	160	160	160	160	160	160	7	0.05	Incremental runoff
Addhyd	4	130	--	362	364	349	354	356	357	363	375	--	2.77	Combine hydrographs for subwatersheds (15, 19, 14, 18, 17, 16, 12, 13, 10, 11, 6, 8, 9) and 7
Resvor	2	--	60	272(6.7)	274(6.7)	271(6.7)	277(6.7)	279(6.7)	281(6.7)	287(6.8)	300(6.9)	--	--	Three 48" diameter culvert at main service road
Reach	3	140	--	271	273	271	276	279	280	286	299	--	--	Stream travel to cross section 140
Runoff	1	140	--	191	544	544	560	560	577	577	593	5	0.20	Incremental runoff
Addhyd	4	140	--	288	549	549	566	566	582	583	599	--	2.97	Combine hydrographs for subwatersheds (15, 19, 14, 18, 17, 16, 12, 13, 10, 11, 6, 8, 9, 7) and 5
Runoff	1	149	--	68	68	142	142	142	142	142	142	1	0.08	Tributary runoff
Addhyd	4	150	--	292	592	660	676	676	692	693	709	--	3.05	Combine hydrographs for subwatersheds (15, 19, 14, 18, 17, 16, 12, 13, 10, 11, 6, 8, 9, 7, 5) and 1
Reach	3	150	--	292	592	660	676	676	692	693	709	--	--	Stream travel to cross section 150
Runoff	1	150	--	5	5	5	5	5	5	5	5	2	0.01	Incremental runoff
Addhyd	4	150	--	292	597	665	681	681	697	697	714	--	3.06	Combine hydrographs for subwatersheds (15, 19, 14, 18, 17, 16, 12, 13, 10, 11, 6, 8, 9, 7, 5, 1) and 2
Runoff	1	180	--	185	40	40	40	40	40	40	40	4	0.28	Tributary runoff
Addhyd	4	180	--	402	614	682	698	698	714	714	730	--	3.34	Combine hydrographs for subwatersheds (15, 19, 14, 18, 17, 16, 12, 13, 10, 11, 6, 8, 9, 7, 5, 1, 2) and 4
Reach	3	180	--	386	534	603	618	618	633	633	648	--	--	Stream travel to cross section 180
Runoff	1	180	--	35	35	35	35	35	35	35	35	3	0.11	Incremental runoff
Addhyd	4	180	--	406	566	635	650	650	665	665	680	--	3.45	Combine hydrographs for subwatersheds (15, 19, 14, 18, 17, 16, 12, 13, 10, 11, 6, 8, 9, 7, 5, 1, 2, 4) and 3 (Complete watershed)
Vol.				350 AF	335 AF	340 AF	345 AF	347 AF	399 AF	352 AF	362 AF			Total Vol., AF = Acre-ft.

*See Appendix B for description of these items.

Source: Ecology and Environment, Inc., 1986.

in subwatershed 5, resulting from development of P-631, P-806, and the P-565/527/505 complex.

Peak runoff at the mouth of the stream increases another 12% between FY86 and FY87 due to development of P-627 in subwatershed 1. This project increases runoff in this subwatershed from 68 cfs to 142 cfs--an increase of 52%.

Other subwatersheds which exhibit increased runoff resulting from proposed development include: subwatershed 15, which increases 73% from 122 cfs in FY87 to 211 cfs in FY92; and subwatersheds 6, 8, and 9, which increase 54% from 159 cfs in FY88 to 245 cfs in FY92. The other subwatersheds do not exhibit any increase or only increase slightly.

Peak runoff in watershed 14 reflects the construction of the proposed road parallel to Cogdels Creek. Peak runoff decreases 39% from 168 cfs in FY86 to 103 cfs in FY87 as a result of the damming effect of the roadway on surface runoff.

Runoff from the industrialized areas within subwatershed 12 do not change because additional development is limited, and runoff from this area is limited by the capacity of the storm sewers. However, incremental increases in runoff from subwatersheds 6, 8, and 9 result in even higher peak reaching structure 50, the twin 48-inch culverts at the Main Tank Crossing. These higher flows cause the reservoir which forms upstream of structure 50 to reach elevation 11.3 feet, or 0.4 feet higher than under existing conditions. However, the flood storage capacity of the upstream floodplain is adequate to store these peak flows without causing excessive flooding.

4.3 IMPACT OF PROPOSED DEVELOPMENT ON FLOODPLAIN BOUNDARIES

As discussed in Section 3.1.2, under existing conditions, the structure at the Main Tank Crossing effectively serves as a dam since the twin 48-inch culverts cannot convey the peak flows of nearly 1700 cfs. The resulting reservoir which is created behind this structure is calculated to have a maximum elevation during a 10-year 24-hour storm of 10.9 feet. At this elevation much of the watershed upstream to and just above Sneads Ferry Road is innundated.

As peak flows increase as a result of development in the watershed, the calculated elevation of this reservoir also increases slightly to 11.3 feet; an increase of 0.4 feet. The configuration and

size of the resulting reservoir would not appear substantially different from that shown on Figure 4-1 because of the scale and contour interval of the base map. Because the floodplain along Cogdels Creek is fairly wide and is bordered by fairly steep side slopes, the channel capacity is more than adequate to handle and store these flows. In fact, it is recommended (Section 5) that the Main Tank Crossing be redesigned and engineered with an emergency overflow to serve as a water control structure, protecting downstream areas from the extremely high flows generated in the industrial area.

5. RECOMMENDATIONS

This section provides recommendations to alleviate existing problems in Cogdels Creek Watershed as described in Section 3.2, and recommends general measures to provide adequate storm water management associated with future development. The locations of these recommendations are shown on Figure 4-1. The exact specifications for each structure would have to be determined during final design, and is beyond the scope of this report.

5.1 REQUIRED DRAINAGE FOR MCON P-257

Preliminary drainage plans for the Field Maintenance Complex (P-257), which were recently provided (Olsen Associates, Inc., 1985, A/E contract No. N62470-85-C-7922), indicate that a subsurface storm drain system will be constructed with outlets extending north of the complex and discharging toward Cogdels Creek. One outlet will be at the west end of the complex and the other will be at the east end.

The report by Olsen Associates, Inc., (1985) analyzed the storm drainage problems associated with MCON P-257 in greater detail than is possible within the scope of the present study. Since the results of the hydrologic modeling indicate that the flood transport capacity of Cogdels Creek is not limiting, there is no reason not to accept the subsurface storm drainage system proposed in the above-referenced report. However, it is recommended that surface runoff be minimized by utilizing porous surfaces where possible, such as in parking areas and other low volume traffic areas, as well as pedestrian walkways. Because of the high permeability of the underlying soils, the use of surfaces such as concrete grid or modular pavement and porous asphalt pavement can reduce surface runoff as much as 75%.

5. RECOMMENDATIONS

This section provides recommendations to alleviate existing problems in Cogdels Creek Watershed as described in Section 3.2, and recommends general measures to provide adequate storm water management associated with future development. The locations of these recommendations are shown on Figure 4-1. The exact specifications for each structure would have to be determined during final design, and is beyond the scope of this report.

5.1 REQUIRED DRAINAGE FOR MCON P-257

Preliminary drainage plans for the Field Maintenance Complex (P-257), which were recently provided (Olsen Associates, Inc., 1985, A/E contract No. N62470-85-C-7922), indicate that a subsurface storm drain system will be constructed with outlets extending north of the complex and discharging toward Cogdels Creek. One outlet will be at the west end of the complex and the other will be at the east end.

The report by Olsen Associates, Inc., (1985) analyzed the storm drainage problems associated with MCON P-257 in greater detail than is possible within the scope of the present study. Since the results of the hydrologic modeling indicate that the flood transport capacity of Cogdels Creek is not limiting, there is no reason not to accept the subsurface storm drainage system proposed in the above-referenced report. However, it is recommended that surface runoff be minimized by utilizing porous surfaces where possible, such as in parking areas and other low volume traffic areas, as well as pedestrian walkways. Because of the high permeability of the underlying soils, the use of surfaces such as concrete grid or modular pavement and porous asphalt pavement can reduce surface runoff as much as 75%.

A further recommendation for the proposed drainage system of MCON P-257 is the incorporation of concrete stilling basins at the end of each of the two outlets to slow the discharge to nonerosive velocities (see locations K and X in Figure 4-1). The necessity for special erosion protection downstream from the stilling basins cannot be assessed without further details concerning the grade of the storm drains and detailed topographic information. In general, however, it is recommended that the stilling basins be constructed so that, if possible, discharge from the basins will be at the floodplain elevation rather than to the sideslope or uplands adjacent to the sideslopes. This will eliminate the need for additional channel protection downstream from the stilling basins.

5.2 TANK AND HEAVY EQUIPMENT TRAINING AREA

To minimize potential sedimentation and erosion from the Tank and Heavy Equipment Training Area, which is continually disturbed, a combination new tank trail and interceptor ditch is proposed as shown at W in Figure 4-1. The new tank trail will act as a mini-dike and prevent overland flow from discharging directly to Cogdels Creek. The interceptor ditch, which would extend along the south side of the tank trail, will intercept the overland flow and convey it to small culverts extending beneath the tank trail. This will effectively increase the time of concentration (Tc) for this watershed and reduce peak discharge. This increase in Tc has been assumed in the analysis of the hydrology for future conditions. The actual increase in Tc will depend upon the size of the culverts, the grade of the interceptor ditch, and the availability of ponding areas (detention basins) upstream from each culvert and along the interceptor ditch. These items should be determined during design of the system, when more detailed topographic information is available.

The proposed tank trail will generally extend about 0.5 foot above existing grade. It is not recommended that the trail extend farther above grade because of the possibility of flooding structures upstream from the tank trail during floods that exceed the design flood.

The portion of the proposed tank trail from the western boundary of P-257 to the Main Tank Crossing is not presently part of any existing MCON project. However, the portion of the tank trail adjacent to the western and southern boundaries of the Field Maintenance Complex is incorporated into P-257. The proposed extension of the tank trail west to the Main Tank Crossing would serve two purposes. It would provide a permanent mode of access for tanks from the Main Tank Crossing to the Field Maintenance Complex and the artillery ranges northeast of Sneads Ferry Road. In addition, the tank trail would serve as a small dike to retain surface runoff and minimize erosion from the tank and heavy equipment area, which is continually disturbed, exposing soils to erosion. A similar dike was proposed in the Natural Resources Management Plan (1975) to prevent erosion and sedimentation from this area.

5.3 MAIN TANK CROSSING

The existing main tank crossing of Cogdels Creek effectively acts as a dam. It is recommended that this structure be redesigned as a small dam, with the ability to withstand overtopping (see I in Figure 4-1). This would require construction of an impervious cutoff beneath the structure, encasing the culverts in concrete, and providing erosion protection on the "shell" and at the downstream toe of the structure. The top of the structure should be set at elevation 11.3 feet, which is the peak elevation of the design (10-year return period) storm. Thus, the structure could be expected to overtop, on the average, one day in every 10 years. The top of the structure would act as an emergency spillway. Although the structure would be able to withstand nominal overtopping, the structure could possibly fail during severe and remote storms.

Although designed as a dam, the structure will be functionally nothing more than a reinforced culvert crossing. No special approvals for its construction should be required. If the top elevation of the structure were to be increased significantly above elevation 11.3, the hypothetical failure of the structure could threaten the sewage treatment plant downstream. The structure would then be required to be designed as a formal dam. This would increase costs very significantly and is not recommended.

5.4 DUNCAN STREET - BRIG AREA

As discussed in Section 3.2, there are critical problems in the tributary channel which receives storm water flows from the industrial area and the brig exercise yard. The major 48-inch storm drain outlet is eroding the channel and there is no reinforced head wall. This structure should be reconstructed and provided with an energy dissipating device such as a stilling basin (see N in Figure 4-1). The channel immediately downstream should also be reinforced to prevent further stream bed scour and channel erosion. The other storm drain outlets to this system should be reconstructed in a similar manner.

Runoff from the brig exercise yard should either be diverted to the storm drain system along Duncan Street and discharged through the above structures, or the channel which presently conveys surface flows to the creek tributary should be repaired and constructed to adequately handle the apparently high flows which have caused considerable erosion of the creek channel (see P in Figure 4-1). To repair the channel, the side slopes should be graded to no more than 3:1 slope, and the channel reinforced with medium to large stone fill. A third alternative is to construct a new storm sewer in the approximate location of the surface channel, and allow the storm drain to discharge directly into a stilling basin at the intersection with the creek. Within the main tributary channel downstream, a gabion sediment dam should be placed across the stream valley, as shown at Q in Figure 4-1, to trap sediments and prevent adverse effects on water quality farther downstream.

5.5 1800 AREA

The severe channel and upland erosion in the 1800 area described in Section 3.2 should be remedied by installing a stilling basin at the culvert outlet, regrading the downstream channel and side slopes, and reinforcing the channel with large riprap (see J and R in Figure 4-1). The upland areas north of the channel which are experiencing severe gully erosion also should be regraded. The entire upland area and channel side slopes should be revegetated following critical area stabilization procedures developed by the SCS. If surface runoff from the upland area requires a channel, a grassed waterway should be constructed to the existing stream channel, with a stone reinforced area

at the intersection to dissipate flows and prevent future gully erosion.

5.6 PROPOSED P-631 COMPLEX

Construction of the proposed P-631 complex (Unaccompanied Enlisted Personnel Housing) along "O" Street will result in substantial increases in runoff and peak storm flows in lower Cogdels Creek (see B in Figure 4-1). During the design of these facilities, the project should be provided with a detention basin to receive and store surface runoff, and discharge it to the creek in a controlled fashion. The detention basin should be designed to adequately handle anticipated runoff, and should be provided with a water control outlet structure. The basin should discharge to a riprap-lined channel which will traverse the steep vegetated side slopes of the floodplain and safely convey runoff to the stream without eroding channel side slopes. The riprap channel should discharge at the elevation of the floodplain, either into the creek channel itself or onto a well-vegetated or stone reinforced area.

5.7 2ND BULK TERMINAL STORAGE

The existing erosion and sedimentation from the large parking/storage area at the above facility, as described in Section 3.2, can be remedied by constructing a grassed waterway parallel to H.M. Smith Boulevard, which would discharge to the existing tributary south of the fuel storage area. The terminal portion of the channel should be reinforced with riprap to prevent channel erosion, and the discharge to the tributary should be over an energy dissipator (see F and G in Figure 4-1). A gabion sediment dam should be constructed downstream as shown at E in Figure 4-1 to trap sediments washed from the parking/storage area.

5.8 MISCELLANEOUS RECOMMENDATIONS

- Energy dissipators such as stilling basins should be constructed at the storm drain outlets along Louis Road, "O" Street (north) and Duncan Street; in particular at the end of Cedar, Birch and Ash streets (see T, L, M in Figure 4-1). In

addition, the culvert identified as structure 30 should have a stilling basin constructed on the downstream side of Sneads Ferry Road (see O in Figure 4-1).

- The footpath along the south side of Main Service Road near Cogdels Creek should be paved and the slope regraded and revegetated following critical area stabilization recommendations (see C in Figure 4-1).

- The runoff channel east of Building FC-115 should be regraded and reconstructed of medium stone fill riprap. The channel should be allowed to discharge to a well-vegetated or stone reinforced area northeast of FC-115 where it can be allowed to infiltrate (see H in Figure 4-1). Although this channel appears to discharge onto an unprotected hillside, (see Figure 4-1), the point of discharge is actually a large well-vegetated depression with no obvious surface outlet. As discussed in Section 2, the flat upland areas of Camp Lejeune contain numerous such small to large depressions which have no external surface drainage; runoff into these areas simply ponds until it can infiltrate or evaporate. Internal drainage systems such as this can be used to advantage where the anticipated runoff will not exceed the storage capacity/infiltration rate of the depression. The area at H on Figure 4-1 is such an area.

Similarly surface runoff from the portion of the French Creek Industrial Area north of Main Service Road (Buildings FC120, FC100, FC200, etc.) can be safely discharged onto the ground and allowed to infiltrate. The highly permeable soils in this area, the lack of well-defined surface drainage channels, and the presence of a vegetational buffer strip north of the development area will accommodate the surface runoff without adverse impacts. However, it is recommended that stilling basins be constructed at the outlets for the two major storm drains, to dissipate energy prior to discharge (see U and V in Figure 4-1).

- The culvert head wall and discharge point south of the Enlisted Mens Club (Building FC-330) should be reconstructed. The culvert should have a cement head wall and the discharge point and channel should be protected with medium stone fill riprap. In addition the area upslope from the culvert outfall should be graded and revegetated following critical area stabilization recommendations (see D in Figure 4-1).

- The parklike drainage swale along "O" Street northeast of Building 521 should be regraded and revegetated according to critical area stabilization procedures. If foot traffic through this area is to be permitted, paved foot paths should be provided to prevent disturbance to vegetation and resultant erosion (see A in Figure 4-1).

- Surface runoff from the parking lot associated with Building 1450 should be discharged from the southwest corner of the lot and allowed to flow down the side slope to the stream via a riprapped channel (see Y in Figure 4-1). The channel should terminate in a riprap energy dissipator which should be constructed at the approximate elevation of the channel floodplain. Although the surface runoff from the parking lot presently transports sediment (which is apparently brought in by tanks from the unimproved tank trails), the source of sediment will be eliminated with construction of the concrete tank trail associated with MCON P-678.

  On the tributary side slope opposite Building 1450 (i.e. north of Building 1771 and 1775) the side slope should be restored with critical area stabilization plantings. In addition, at the outlet of the existing 54-inch stormwater drain, a stilling basin should be constructed to dissipate high flows from the heavily industrialized area serviced by this system (see S and T in Figure 4-1).

- There are a number of additional recommendations which can be made, but which are not associated with any specific project

or existing problem area. To minimize surface runoff from developed areas, porous pavement should be used for low traffic volume road surfaces, parking areas, and pedestrian walkways. Because the majority of soils in the watershed are highly permeable, use of porous pavement surfaces can reduce surface runoff considerably.

Runoff can also be reduced by incorporating runoff detention facilities into the design of buildings within large flat rooftops. Rooftop detention facilities will trap and hold precipitation that would otherwise run off until it can evaporate or be discharged in a more controlled manner.

Erosion and sedimentation can also be controlled in the watershed by protecting the floodplain and adjacent side slopes from disturbance, and insuring that natural vegetation is maintained on the floodplain and side slopes, as well as in a buffer strip on the upland area adjacent to the side slope. Existing disturbed areas should be allowed to revegetate naturally if they are not active erosion areas; otherwise, critical area stabilization measures should be implemented to restore vegetation and stabilize soils. Unimproved tank trails, which presently traverse the undeveloped portions of the watershed, including the creek and floodplain, will not be required after construction of P-678 and the proposed tank trail discussed in Section 5.1. These unimproved trails do not presently contribute substantially to erosion or sedimentation, and because their use will only be necessary for the short term, remedial measures are not required. However, where those trails cross Cogdels Creek or its tributaries, periodic maintenance is needed to insure that stream-bank sediments are not pushed into the stream channel, blocking normal flow and raising water levels upstream from tank crossings. Regular maintenance of these areas will prevent the long-term flooding which leads to the creation of the large wetland area upstream from the main tank crossing. Although this wetland was subsequently drained, eliminating many of the

values associated with wetland areas, the preferred management recommendation is to prevent such flooding in the future by maintaining the natural stream channel configuration.

6. IMPLEMENTATION

This section provides approximate cost estimates for each of the measures recommended in Section 5 and discusses the schedule by which the recommendations should be implemented.

6.1 ESTIMATED COSTS

Estimated costs for the proposed work were developed for each area shown on Figure 4-1, except as noted hereafter. A cost was not developed for the recommended detention basin associated with the P-631 construction. This basin should be designed to limit runoff during the design storm to no more than that which would have occurred prior to the construction. However, sufficient details of the P-631 complex were not available to assess if this could be constructed in a cost-efficient manner. As a minimum, erosion and sedimentation control measures should be provided during construction to mitigate any change in impacts due to erosion.

For all other areas, costs were developed for the proposed type of construction. Earthwork quantities were based on estimated typical sections. Concrete stilling basin and stone energy dissipator quantities were based upon structure configurations derived from Hydraulic Design Criteria (HDC) developed by the U.S. Army Corps of Engineers, Vicksburg. Quantities for other structures were derived from similar work performed on other projects. In most cases it was necessary to assume flow rates or typical sizes.

Unit costs were taken from Means Site Work Cost Data (1986) and from bids for similar work on other projects. The unit costs were

adjusted in a few instances based on engineering judgment. The unit costs and estimated quantities were combined to estimate costs for the various features. These costs are presented in Table 6-1. Details of how these costs were developed are provided in Appendix C. Approximately 25% contingency is included in the total estimated construction cost of $852,125. These costs do not include design, supervision, administration, or construction inspection costs. Because of the assumed data, the cost estimate should be considered of prefeasibility level accuracy.

For final design, the actual topographic conditions and design discharges at each site should be determined. In some cases, acquisition of subsurface data will also be necessary. These data will result in a more refined cost determination.

6.2 SCHEDULE

The recommendations for runoff and erosion control generally can be categorized as those which address existing critical erosion problems and those associated with proposed MCON projects. Remedial measures to alleviate existing problems should be implemented as soon as possible, because these areas will continue to result in accelerated erosion and sedimentation and will require more remedial action the longer they are allowed to deteriorate. Recommendations associated with specific MCON projects should be implemented in conjunction with those projects, and construction should be staged so that runoff/ erosion control measures are in place at the time the project is sufficiently completed to be contributing to enhanced runoff. In addition, standard temporary soil erosion control measures should be implemented during construction to prevent erosion during the time the soils are disturbed, and until permanent control measures are functioning adequately.

Table 6-1

SUMMARY OF ESTIMATED CONSTRUCTION COSTS
FOR RECOMMENDED MEASURES

Recommendation*	Summary of Work	Estimated Cost
A	Grass-Lined Channel and Area Stabilization	$ 8,800
B	Detention Basin Provided with P-631 Construction	Part of P-631
C	Footpath	$ 1,500
D	Riprap Channel and Area Stabilization	$ 17,300
E	Sediment Dam	$ 16,100
F	Stone Energy Dissipator	$ 2,200
G	Grass-lined Channel	$ 30,000
H	Riprap Channel and Stone Energy Dissipator	$ 53,800
I	Tank Crossing of Cogdels Creek	$108,000
J	Concrete Stilling Basin	$ 8,700
K	Concrete Stilling Basin	$ 11,600
L	Concrete Stilling Basin	$ 11,600
M	Concrete Stilling Basin	$ 11,600
N	Concrete Stilling Basin	$ 18,700
O	Concrete Stilling Basin	$ 8,700
P	Riprap Channel, Stabilization, and Stone Energy Dissipator	$ 56,600
Q	Sediment Dam	$ 16,100
R	Riprap Channel and Area Stabilization	$ 34,500
S	Riprap Channel, Stabilization, and Stone Energy Dissipator	$ 92,400
T	Concrete Stilling Basin	$ 22,800
V	Concrete Stilling Basin	$ 4,100
V	Concrete Stilling Basin	$ 4,100
W	New Tank Road and Interceptor Ditch	$ 61,200
X	Concrete Stilling Basin	$ 27,500
Y	Riprap Channel and Stone Energy Dissipator	$ 53,800
	Subtotal	$681,700
	Contingencies 25% +/-	$170,425
	Total Estimated Construction Cost	$852,125

*Letters refer to Section 5 and Figure 4-1.

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Appendix A

DEVELOPMENT OF WEIGHTED CURVE NUMBERS FOR SUBWATERSHEDS UNDER EXISTING AND PROPOSED CONDITIONS

WEIGHTED CURVE NUMBERS
UNDER EXISTING CONDITIONS

(1) S SOIL TYPE BaB

AREA → 2227/22112 = 0.1007

U 5% MK, 10% MaC, 85% BaB

AREA → 5197/22112 = .2350

P 5% MK, 10% MaC, 85% BaB

AREA → 14688/22112 = .6643

AREA	%	CN	PRODUCT
S	.1007	45	4.532
U	.2350 × .05	77	0.905
	.2350 × .10	55	1.293
	.2350 × .85	25	4.994
P	.6643 × .05	85	2.823
	.6643 × .10	70	4.650
	.6643 × .85	54	30.491

WATERSHED WEIGHTED CN, = 49.688

(2) P SOIL TYPE BaB AREA 832/1568 = .5306

S 10% PAVED ALL NfC 736/1568 = .4694 × .1 = .0465

90% 70% NfC 30% BaB → .4225

AREA	%	CN	PRODUCT
P	.5306	39	20.693
S	.0469 × .10	98	0.4596
	.4225 × .70 × .90	49	18.632
	.4225 × .30 × .90	49	

WEIGHTED CN = 39.785

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Calculation of Weighted CN's - Existing

(3) U 21440/31584 = 0.6788

10% NfC, 10% MK, 60% BmB, 20% MaC

P 10144/31584 = .3212

90% Z- 20% MK, 10% MaC, 60% BmB, 10% NfC

10% Z- 100% Nfc

AREA	%	CN	PRODUCT
U	.6788 × .10	25	1.697
	.6788 × .10	77	5.227
	.6788 × .60	25	10.182
	.6788 × .20	55	7.467
P	.3212 × .90 × .20	80	4.625
	.3212 × .90 × .10	61	1.763
	.3212 × .90 × .10	39	1.127
	.3212 × .90 × .60	39	6.765
	.3212 × .10	81	2.602

$CN_3 = 41.455$

(4) U 15% MK 70% BaB 15% MaC 45952/76576 = 0.600

P 30624/76576 = 0.3999 20% → 100% BaB

30% → 100% BaB 50% → 20/80%

AREA	%	CN	Product
U	.15 × .6001	77	6.931
	.70 × .6001	25	10.502
	.15 × .6001	55	4.951
P	.2 × .3999	98	7.838
	.3 × .3999	68	8.158
	.5 × .3999 × .2	70	2.799
	.5 × .3999 × .8	54	8.638

$CN_4 = 49.817$

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Calculation of Weighted CN's - Existing

(5) F 12736/54496 = 0.2337

U 33888/54496 = 0.6218 40% MK 30% BaB 30% MaC

P .9 × 7872/54496 = 0.130 100% BaB

.1 × 7872/54496 = 0.0145

AREA	%	CN	Product
F	.2337	98	22.903
P	.0145	98	1.421
	.130	57	7.410
U	.6218 × .40	77	19.151
	.6218 × .30	25	4.664
	.6218 × .30	55	10.260

$CN_5 = 65.809$

(6) U 17309/47488 = .3645 10% MaC 90% BaB

S 1923/47488 = 0.0405 95% BaB 5% MaC

P 12096/47488 = 0.2547 100% BaB

F 16160/47488 = 0.3403 5% MaC 95% BaB

AREA	%	CN	PRODUCT
U	.3645 × .10	55	2.005
	.3645 × .90	25	8.201
S	.0405 × .95	45	1.731
	.0405 × .05	66	0.134
P	.2547	39	9.933
F	.3403 × .05	> 98	33.349
	.3403 × .95		

SEE (8)

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$CN_6 = 55.353$

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(7) F $1312/14368 = 0.0913$

P $1440/14368 = 0.1002$ 50% BaB 50% MaC

U $9184/14368 = 0.6392$ 5% BaB 65% MK 30% MaC

D $2432/14368 = 0.1693$ 85% BaB 10% MK 5% Ma

AREA	%	CN	PRODUCT
F	0.0913	98	8.947
P	0.1002 x .5	89	4.459
	0.1002 x .5	92	4.609
U	0.6392 x .05	25	0.799
	0.6392 x .65	77	31.992
	0.6392 x .30	55	10.547
D	0.1693 x 0.85	72	10.361
	0.1693 x .10	91	1.541
	0.1693 x 05	81	0.686

$CN_7 = 73.941$

(8) D $960/2240 = .4286$ 100% BaB

U $1280/2240 = 0.5714$ 5% MaC 10% BaB 85% MK

AREA	%	CN	PRODUCT
D	.4286	72	30.859
U	.5714 x .05	55	1.571
	.5714 x .10	25	1.429
	.5714 x .85	77	37.398

$CN_8 = 71.257$

COMBINE 6, 8, 9

6	.170 MI^2	55	9.35
8	.008	71	.568
9	.009	62	.558
	.187		10.476

$10.476 / .187 = CN = 56$

9 D 96/2560 = 0.0375 100% BaB

U 2464/2560 = 0.9625 10% BaB, 45% MK, 45% MaC

AREA	%	CN	PRODUCT
D	0.0375	72	2.700
U	.9625 × .10	25	2.406
	.9625 × .45	55	23.822
	.9625 × .45	77	33.351

SEE 8

$CN_9 = 62.279$

10 U 6816/7072 = 0.9638 60% MaC 40% MK

D 256/7072 0.0362 100% BaB

AREA	%	CN	PRODUCT
U	.9638 × .6	55	31.805
	.9638 × .4	77	29.685
D	.0362	68	2.462

$CN_{10} = 63.952$

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Calculation of Weighted CN's - Existing PAGE 6 OF 9

(11)

F	43104/67488 = 0.6387	60% Ur 40% BaB
U	14246/67488 = 0.2111	25% MaC, 75% BaB
S	9498/67488 = 0.1407	100% BaB
P	640/67488 = 0.0095	10% Ur

AREA	%	CN	PRODUCT
F	0.6387 × .6	95	36.406
	0.6387 × .4	89	22.738
U	.2111 × .25	55	2.903
	.2111 × .75	25	3.958
S	.1407	45	6.332
P	.0095 × .90	98	0.8364
	.0095 × .10	89	0.0846

$CN_{11} = 73.258$

(12)

F	60320/99968 = 0.6034	20% Ur 20% Ur
P	16512/99968 = 0.1652	15% 10% 55% } Ur 20% } 5% BaB 95% Ur
U	13882/99968 = 0.1389	
S	9254/99968 = 0.0926	100% Wo

AREA	%	CN	PRODUCT
F	.6034 × .60	98	35.479
	.6034 × .20	95	11.465
	.6034 × .20	93	11.223
P	.1652 × .15	98	2.428
	.1652 × .10	80	1.322
	.1652 × .55	89	8.087
	.1652 × .2 × .95	95	2.982
	.1652 × .2 × .05	68	0.1123

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SUBJECT Cogdels Creek Watershed Study

Calculation of Weighted CNs - Existing

(2) cont

Area	%	CN	Product
U	.1389 × .10	55	0.7640
–	.1389 × .90	25	3.125
S	.0926 × .70	83	5.380
	.0926 × .30	80	2.222

$CN_{12} = 84.589$

(13) U → 15% MK, 45% BmB, 40% MaC

AREA	%	CN	PRODUCT
U	.15	77	11.550
	.45	25	11.250
	.40	55	22.00

$CN_{13} = 44.80$

(14) U 45184/101760 = 0.444 10% MK, 10% MaC, 80% BaB

F 18496/101760 = 0.1818 100% BaB

D 29856/101760 = 0.2934 15% MK, 60% BaB, 25% MaC

P 8224/101760 = 0.0808 100% BaB

AREA	%	CN	Product
U	.444 × .10	77	3.419
	.444 × .10	55	2.442
	.444 × .80	25	8.880
F	.1818 × .40	81	5.890
	.1818 × .60	68	7.417
D	.2934 × .15	89	3.917
	.2934 × .25	79	5.795
	.2934 × .60	68	11.971
P	.0808	45	3.636

$\boxed{CN_{14} = 53.367}$

(15) D 4032/42560 = .0947 10% Mc 90% MaC

U 34592/42560 = 0.8128 10% MaC, 5% MK, 35% KmB, 50% BaB

F 3936/42560 = 0.0925 100% BaB

AREA	%	CN	Product
D	.0947 × .10	91	0.8618
	.0947 × .90	81	6.904
U	.8128 × .10	55	4.470
	.8128 × .05	77	3.129
	.8128 × .35	25	7.112
	.8128 × .50	25	10.160
F	.0925	98	9.063

$CN_{15} = 41.699$

(16) P 800/30112 = 0.0266 20% Ur 80% BaB

U 29312/30112 = 0.9734 30% MaC, 70% BaB

AREA	%	CN	Product
P	.0266 × .20	95	0.5054
	.0266 × .80	68	1.447
U	.9734 × .30	55	16.061
	.9734 × .70	25	17.035

$CN_{16} = 35.048$

(17) U 20% MaC 80% BmB

AREA	%	CN	Product
U	.20	55	11.00
	.80	25	20.00

$CN_{17} = 31.00$

(18) U 43% BmB, 22% To, 12% On, 21% Mu, 2% Pt

AREA	%	CN	Product
U	.43	25	10.75
	.22	70	15.40
	.12	55	6.60
	.21	77	16.17
	.02	25	0.50

$CN_{18} = 49.42$

(19) U = .9397 40% BmB, 15% To, 25% On, 20% Mu

D = .0603 60% BmB, 30% On, 10% Mu

AREA	%	CN	Product
U	.9397 × .40	25	9.397
	.9397 × .15	70	9.867
	.9397 × .25	55	12.921
	.9397 × .20	77	14.471
D	.0603 × .60 .0603 × .30 .0603 × .10	72	4.342

$CN_{19} = 50.998$

WEIGHTED CURVE NUMBERS
UNDER PROPOSED CONDITIONS

WATERSHED

1 PRESENT CN = 49.688

YR '86 → 0
YR '87 → P627
YR '88 → P626
ALL REMAINING YRS → 0

FY '87 P627 COVERS 15.43% OF
WHOLE ~~new~~ AREA ⇒ 10% IS U, 90% IS P

1 U WEIGHTED CN = 30.60
(77×.05)+(55×.1)+(25×.85)
3.85 + 5.5 + 21.25

1 P CN = (85×.05)+(70×.10)+(54×.85
4.25 + 7 + 45.9 = 57.15

U = 23.50% of WATERSHED
P = 66.43% OF WATERSHED

for U 34129.6 new Area / 519700 old area = 6.57%
∴ 6.57% × 98 = 6.44
93.43% × 30.60 = 28.59
new CN_U = 35.03

for P 307166 new Area / 1468800 old Area = 20.91
∴ 20.91% × 98 = 20.49
79.09% × 57.15 = 57.94
CN_P = 78.43

for 87 CN_1 = (.235)(35.03) + (.6643)(78.43)
+ 4.532

CN_1 = 64.86

for 88 P626 5% goes to 1P = 4470 sqft

CN_p in '87 = 78.43

AREA new 4470 / 1468800 total area = 0.304 %

CN_p = .304% × 98 = 0.2983

99.696% × 78.43 = 78.19

CN_p = 78.49

CN_1 for 88 = (78.49)(.6643) + 8.23 + 4.532

CN_1 = 64.91

WATERSHED 2 REMAINS THE SAME

WATERSHED 3

FY '86 P840

FY '89 P837

CN_p = 52.56

FY '86 P840 → 3u

WEIGHTED CN_u = 2.5 + 7.7 + 11.0 + 15 = 36.20

new area 2100 / 2144000 = 0.0979%

.0979% × 98 = 0.0959

99.902 × 36.2 = 36.16

CN_u = 36.26

CN_3 = (36.26)(.6788) + (52.56)(.3212)

in 86 CN_3 = 41.50

FY 89 P837 → 3P = 6000 sqft 6000 / 1014400 = 0.592

0.592% × 98 = 0.5797

99.408 × 52.56 = 52.2488

$\Big\}$ CN_p = 52.829

for '89 CN_3 = (36.26)(.6788) + (52.829)(.3212) = 41.58

WATERSHED 4

FY '87 P259 P027 — 4U

FY '88 P065 → 4U

FY '91 P227 — 4P

P844 < 3/4 U, 1/4 P

$CN_U = 37.3$ $CN_P = 68.6$

FY '87 P027 = 16120 ft² ; P259 = 18325 ft² } 34445 ft² / 4595200 = 0.750

CN_u = 0.750% × 98 = 0.7346 ; 99.25% × 37.3 = 37.02 } 37.755

'87 $CN_4 = (68.6)(0.3999) + (37.76)(.6001)$ = 50.09

FY '88 => P065 = 21000 ft²/4595200 = 0.457%

CN_u = 98 × .457% = 0.4479 ; 99.543% × 37.76 = 37.587 } 38.035

'88 $CN_4 = (38.035)(.6001) + (68.6)(.3999) = 50.26$

FY '91 P { P227 = 12527 ft² ; 1/4 P844 = 3183.75 ft² } 15710.75/3062400 = 0.513

u — 3/4 P844 = 9551.25/4595200 = 0.208%

CN_P = .513% × 98 = .5027 ; 99.487% × 68.6 = 68.248 } 68.751

CN_u = 0.208% × 98 = .2038 ; 99.792% × 38.035 = 37.956 } 38.160

'91 $CN_4 = (38.160)(.6001) + (.3999)(68.751)$

$CN_4 = 50.39$

WATERSHED 5

FY 86 P631 = 95% 5U, 5% 5P

P806 - 5U

P527 - 5P

FY 88 P626 - 95% 5P

FY 90 P843 70% 5F, 30% 5U

P445 5F

FY 91 P567 5F

FY 92 P859 5F

P511 30% 5F

P533 20% 5F

FY '86 $CN_F = 22.903$ (-93) $CN_P = 61.1$ $CN_u = 54$

U: P631 $179062 ft^2 \times .95 =$ } 247010.9 ; $\frac{247010.9}{3388300}$

P806 $76902 ft^2 =$ }

new u = 7.289%

P: P631 $.05 \times 179062 ft^2$ } $\frac{38728.1}{787200}$

P527 $29775 ft^2$

new P = 4.9197%

new u = $7.289\% \times 98 = 7.1432$ } 57.949

$54.8 \times 92.711 = 50.806$

new P = $4.9197\% \times 93 = 4.8213$ } 62.92

$61.1 \times 95.08\% = 58.094$

'86 $CN_5 = (22.903) + (62.92)(.145) + (57.95)(.6218)$

$CN_5 = 68.06$

Calculation of Weighted CN's - Proposed

FY 88 P 626 $89408 \times .95 = 84937.6\, ft^2 / 787200$

new P $= 10.79\%$

new $CN_p = 10.79\% \times 98 = 10.574$

$89.21\% \times 62.92 = 56.131$ > 66.705

$CN_5 = 22.903 + (66.705)(.145) + (57.95)(.6218)$

'88 $CN_5 = 68.61$

FY '90

F { P843 $.7 \times 66080$; P445 $23621\, ft^2$ } > $\frac{69877}{5449600} = 1.28$

u P843 $.3 \times 66080 = 19824 / 33888 = 0.5$

$CN_F = 1.282\% \times 98 = 1.256$

$22.903 \times 98.712 = 22.609$ > 23.865

$CN_u = .585\% \times 98 = .5733$

$57.95 \times 99.415\% = 57.611$ > 58.18

'90 $CN_5 = 23.865 + .6218(58.18) + .145(66.705)$

$CN_5 = 69.71$

FY '91 P 567 $24360/5449600 = 0.447\%$

new $CN_F = .447\% \times 98 + 23.865 = 24.303$

'91 new $CN_5 = 24.303 + (.6218)(58.18) + .145(66.70$

$CN_5 = 70.15$

FY '92 P 859 $43560\, ft^2$

P 511 $.3 \times 61400\, ft^2$

P533 $.2 \times 43560\, ft^2$ } > $70692\, ft^2 / 5449600$

$= 1.297$

$CN_F = 1.297 \times 98 + 24.303 = 25.574$

'92 $CN_5 = 25.574 + .6218(58.18) + .145(66.705)$

$CN_5 = 71.42$

WATERSHED 6

FY '89	P 229	– 6S
FY 90	P 773	6P
	P 794	6P
FY '91	P510 –	10% 6F 90% 6S
FY 92	P 533	30% 6F
	P511	70% 6F

$CN_u = 28.0$ $CN_S = 46.05$ $CN_p = 39$ $CN_F = 98$

FY '89 P.229 $44524\, ft^2 / 192300 = 23.15\hat{3}$

$CN_S = 23.153\% \times 98 = 22.69$
$76.847\% \times 46.05 = 35.388$ $\}$ 58.08

'89 $CN_6 = (58.08)(.0405) + 33.349 + 9.933 + (28.0)(.364$

$CN_6 = 55.84$

FY '90 P 773 $= 40104\, ft^2$
P 794 $= 42000\, ft^2$ $\}$ $82104\, ft^2 / 1209600 = 6.79$

$CN_P = 6.79\% \times 98 = 6.652$
$93.21 \times 39 = 36.35$ $\}$ 43.00

'90 $CN_6 = 33.349 + 10.206 + (58.08)(.0405) + (43.00)(.254$

$CN_6 = 56.91$

FY '91 P 510 $85438 \times .9 = 76894.2 / 1616000 = 4.76$
$85438 \times .1 = 8543.8 / 192300 = 4.44$

$CN_F = 4.76\% \times 98 + 33.349 = 38.01$

$CN_S = 4.44 \times 98 = 4.354$
$95.56 \times 58.08 = 55.50$ $\}$ 59.86

'91 $CN_6 = (59.86)(.0405) + 38.01 + (10.206) + (43.00)(.25$

$CN_6 = 61.59$

FY '92 P533 .8 × 43560 ft² 〉 77828 ft² / 1616000 ft² = 4.82

P511 .7 × 61400 ft²

$CN_F = 4.82\% \times 98 + 38.01 = 42.73$

'92 $CN_6 = 42.73 + 10.206 + (43.00)(.2547) + (59.86)(.040$

$CN_6 = 66.31$

WATERSHED 7 FY '92 P121 25% D

$CN_D = 74.35$

P121 75120 ft² × .25 = 18780 ft² / 243200 = 7.72%

$CN_D = 7.72\% \times 98 = 7.57$

$= 74.35 \times 92.28\% = 68.61$ 〉 76.18

'92 $CN_7 = (76.18)(.1693) + 8.947 + 43.34 + 9.008$

$CN_7 = 74.25$

WATERSHEDS 8, 9, 10 R.T.S

WATERSHED 11 FY 88 P 678 2 - 80% 11 F

$CN_F = 59.144$

P 678 76210 ft² × .8 = 60968 / 4310400 = 1.4

$CN_F = 1.414\% \times 98 + 59.144 = 60.53$

$CN_{11} = 60.53 + 6.332 + .9210 + 6.861$

'88 $CN_{11} = 74.64$

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WATERSHED 12 FY 88 P678 20% 12U

FY 89 P853 12 < 50% P, 50% F

FY 91 P786 12 < 90% S, 10% F

$CN_F = 96.40$ $CN_P = 90.38$

$CN_u = 28$ $CN_S = 82.1$

FY '88 P678 $76210\, ft^2 \times .2 = 15242 / 1388200 = \%$

$CN_u = 1.098\% \times 98 = 1.076$
$= 98.902\% \times 28 = 27.693$ > 28.77

'88 $CN_{12} = (28.77).1389 + (96.40).6034 + (90.38).16 + 82.1 (0.0926) = 84.70$

FY '89 P853 $125664\, ft^2 \times .5 = 62832$

$P = 62832 / 1651200 = 3.81\%$ $F = 62832 / 6032000 = 1.0$

$CN_P = 3.81\% \times 98 = 3.73$
$90.38 \times 96.19\% = 86.94$ > 90.67

$CN_F = 1.042 \times 98 = 1.021$
$98.958 \times 96.40 = 95.396$ > 96.42

89 $CN_{12} = (90.67).1652 + (96.42)(.6034) + 28.77(.1389) + 82.1(.0926) = 84.76$

FY 91 P786 S $36096\, ft^2 \times .9 = 32486.4 / 925400 = 3$

F $36096 \times .1 = 3609.6 / 4310400 = 0.08$

$CN_S = 3.51\% \times 98 = 3.44$
$82.1 \times 96.49\% = 79.22$ > 82.66

$CN_F = 0.084\% \times 98 = .0823$
$96.42 \times 99.916\% = 96.339$ > 96.

'91 $CN_{12} = (82.66).0926 + (96.42)(.6034) + 28.77(.1389) + 90.67(.1652) = 84.81$

WATERSHED 13 – RTS

WATERSHED 14 FY '86 P517 < 14 1/4 D, 3/4 U

$CN_D = 73.9$ FY '87 P257 3/4 14D

$CN_F = 73.2$ FY '89 P804 37.5% 14D

$CN_u = 33.2$ P564 14U

$CN_P = 45 - 3.636$ FY '90 P805 10% 14D

P266 14D

P542 14F

FY '92 P552 14U

P121 3/4 14D

P548 14F

FY '86 P517 23460 ft² × .25 = 5865 / 2985600 = .1

× .75 = 17595 / 4518400 = 0.38

$CN_D = .196\% \times 98 = .193$ > 73.95

$99.804\% \times 73.9 = 73.76$

$CN_u = .389\% \times 98 = .3812$ > 33.45

$99.611\% \times 33.2 = 33.071$

'86 $CN_{14} = (73.95).2934 + (33.45).444 + 3.636 + (73.2)(.1818) = 53.49$

FY '87 P257 60540 × .75 = 45405 ft² / 2985600 = 1.5:

$CN_D = 1.521\% \times 98 = 1.49$ > 74.32

$73.95 \times 98.479\% = 72.83$

'87 $CN_{14} = (74.32).2934 + (33.45).444 + 3.636 + 73.2 (.1818) = 53.60$

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Calculation of Weighted CN's - Proposed PAGE 10 OF 13

FY '89 D P804 210300 ft² × .375 = 78862.5 / 298560 2.6

u P564 6100 ft² / 4518400 = 0.135%

CN_D = 2.64% × 98 = 2.587

74.32 × 97.36% = 72.36 > 74.95

CN_u = .135% × 98 = .1323

99.865 × 33.45 = 33.40 > 33.53

'89 CN_{14} = (33.53) .444 + (74.95) .2934 + 3.636

(73.2) .1818

= 53.82

FY '90 D P805 110,000 ft² × .1 = 11,000 / 298560 = } 2.0

D P266 49818 ft² 49818 / 298560 =

F P542 4760 ft² / 184960 ft² = .257%

CN_D = 2.04% × 98 = 1.999

97.96% × 74.95 = 73.421 > 75.42

CN_F = .257% × 98 = .252

73.2 × 99.743 = 73.012 > 73.26

'90 CN_{14} = (75.42) .2934 + 73.26 (.1818) +

(33.53) .444 + 3.636

= 53.97

FY '92 P552 u 104000 ft² / 4518400 = 2.30%

P121 D 75120 ft² × .75 / 298560 = 1.887%

P548 F 43560 ft² / 1849600 = 2.355%

CN_u = 2.30% × 98 = 2.254

97.7% × 33.53 = 32.759 > 35.013

CN_D = 1.887% × 98 = 1.849

75.42 × 98.113% = 73.997 > 75.85

$CN_F = 2.355\% \times 98 = 2.308$ > 73.84

$73.26 \times 97.645\% = 71.535$

'92 $CN_{14} = (35.01).444 + (75.85).2934 + (73.84).1818$

$+ 3.636 = 54.86$

WATERSHED 15

FY 87	P257	¼ 15 < 95% D, 5% u	
FY 88	P803	15U	
	P256	15U	
FY89	P804	½ 15 < ½ D, ½ u	
	P679	15U	
FY 90	P541	15U	
FY 92	550	15U	
	553	15U	
	512	¼ 15U	
	513	15U	

FY 87 P 257 $60540\,ft^2 \times .25 = 15135\,ft^2$

$CN_D = 82$ D $15135 \times .95 = 14378.25 / 403200 = 3.57$

$CN_u = 30.6$ u $= 15135 \times .05 = 756.75 / 3459200 = 0.02$

$CN_F = 98$ → 9.063

$CN_D = 3.57\% \times 98 = 3.499$ > 82.57

$82 \times 96.43\% = 79.073$

$CN_u = 0.022\% \times 98 = 0.0216$ > 30.6

$30.6 \times 99.978\% = 30.593$

'87 $CN_{15} = (82.57).0947 + (30.61).8128 + 9.063$

$= 41.76$

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Calculation of Weighted CN's - Proposed PAGE 12 OF 13

FY '88 P 803 48 000 ft²/3459200

P256 13760 ft²/3459200 = 1.79%

CN_u = 1.79% × 98 = 1.75

98.21% × 30.61 = 30.06 → 31.81

'88 CN_{15} = (31.81).8128 + (82.57)(.0947) + 9.063

CN_{15} = 42.74

FY '89 P 804 210,300 × .5 = 105150 ft²

D 105150 × ½ = 52575/403200 = 13.0

u = 105150 × ½ = 52575/3459200

P 679 19912 ft²/3459200 → 2.096

CN_D = 13.04% × 98 = 12.78

82.57 × 86.96% = 71.80 → 84.58

CN_u = 2.096% × 98 = 2.054

31.81 × 97.904% = 31.143 → 33.197

'89 CN_{15} = (33.197).8128 + (84.58).0947 + 9.063

= 44.06

FY '90 P541 u → 3300 ft²/3459200 = 0.095%

CN_u = .095% × 98 = 0.0935

33.197 × 99.905% = 33.166 → 33.26

'90 CN_{15} = (33.26)(.8128) + (84.58).0947 + 9.063

= 44.11

FY '92 u → P550 = 38800 ft²/3459200

P553 = 104000 ft²/3459200

P512 = ¼ × 104000 ft²/3459200

P513 = 104000 ft²/3459200

→ 7.89%

CN_u = 7.89% × 98 = 7.729 > 38.365

33.26 × 92.11% = 30.636

'92 CN_{15} = (38.365).8128 + (84.58).0947 + 9.063

CN_{15} = 48.26

WATERSHED 16 FY '92 P551 16u

P512 3/4 16u

CN_p = 73.4 CN_u = 34.0

FY'92 u→P 551 53160 ft² / 2931200 > 4.475%

P 512 3/4 × 104000 ft² / 2931200

CN_u = 4.475% × 98 = 4.385 > 36.86

34.0 × 95.525% = 32.479

'92 CN_{16} = (36.86).9734 + (73.4).0266

= 37.84

Appendix B

COMPUTER PRINTOUT FROM TR-20
HYDROGEOLOGY ANALYSES FOR
FY85 THROUGH FY92

Appendix B

COMPUTER PRINTOUT FROM TR-20
HYDROGEOLOGY ANALYSES FOR
FY85 THROUGH FY92

FISCAL YEAR 85

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

JOB TR-20                     FULLPRINT PASS=001  SUMMARY                    10
TITLE 002 COGDELL'S CREEK WATERSHED STUDY NV5010 24 HR 10YR TYPE 2 STORM     20
TITLE       ALT  85                                                          30
 3 STRUCT     10                                                             40
 8                  7.00         0.00         4.33                           50
 8                  7.4          2.5          5.01                           60
 8                  7.6          5.0          5.36                           70
 8                  7.8          10.0         5.70                           80
 8                  8.2          22.0         6.38                           90
 8                  8.6          52.0         7.07                           100
 8                  9.0          62.0         7.75                           110
 8                  9.5          96.0         8.61                           120
 8                  10.0         126.0        9.47                           130
 8                  11.0         198.0        11.18                          140
 8                  12.0         280.0        12.89                          150
 8                  13.00        360.0        14.79                          160
 8                  14.00        440.0        16.68                          170
 8          16.6    15.00    x   500.0        18.58                          180
 8                  15.1         600.00       18.60                          190
 9 ENDTBL                                                                    200
 3 STRUCT     20                                                             210
 8                  4.5          0.00         6.80                           220
 8                  4.9          1.5          7.88                           230
 8                  5.1          3.7          8.42                           240
 8                  5.5          11.0         9.51                           250
 8                  5.7          15.0         10.13                          260
 8                  6.1          25.0         11.13                          270
 8                  6.5          40.0         12.21                          280
 8                  7.1          60.0         13.84                          290
 8                  7.9          78.0         16.01                          300
 8                  8.5          79.0         17.63                          310
 8                  9.5          100.0        20.34                          320
 8                  10.5         126.0        23.06                          330
 8          11.4    11.5     x   150.0        25.76                          340
 8                  11.6         300.0        26.04                          350
 9 ENDTBL                                                                    360
 3 STRUCT     30                                                             370
 8                  21.0         0.00         0.10                           380
 8                  21.4         0.6          0.61                           390
 8                  21.6         1.5          0.86                           400
 8                  21.8         2.5          1.12                           410
 8                  22.2         5.2          1.62                           420
 8                  22.6         8.2          2.13                           430
 8                  23.0         11.0         2.64                           440
 8                  23.5         20.0         3.27                           450
 8                  24.0         27.0         3.91                           460
```

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

8			25.0	39.0	5.18	470
8			26.0	49.0	6.45	480
8			27.0	57.0	7.72	490
8			27.1	200.00	7.74	500
9	ENDTBL					510
3	STRUCT	40				520
8			9.0	0.0	0.38	530
8			9.4	2.2	0.47	540
8			9.6	5.0	0.52	550
8			10.0	14.0	0.62	560
8			10.2	21.0	0.67	570
8			10.6	36.0	0.77	580
8			11.0	55.0	0.86	590
8			11.6	82.0	1.01	600
8			12.4	120.0	1.21	610
8			13.0	121.0	1.35	620
8			14.0	122.0	1.60	630
8			15.0	126.0	1.84	640
8			16.0	150.00	2.08	650
8			16.1	300.0	2.11	660
9	ENDTBL					670
3	STRUCT	50				680
8			2.4	0.00	22.00	690
8			2.8	2.0	26.86	700
8			3.0	7.0	29.29	710
8			3.4	16.0	34.16	720
8			3.6	24.0	36.59	730
8			4.0	40.0	41.46	740
8			4.4	60.0	46.32	750
8			5.0	90.0	53.62	760
8			5.8	120.0	63.35	770
8			6.4	121.0	70.65	780
8			7.4	210.0	82.81	790
8			8.4	250.00	94.98	800
8			10.4	334.0	119.31	810
8		10.9	12.4 +	400.0	143.63	820
8			12.5	800.0	143.70	830
9	ENDTBL					840
3	STRUCT	60				850
8			2.0	0.0	22.20	860
8			2.4	3.0	27.41	870
8			2.6	10.5	30.02	880
8			3.0	22.5	35.24	890
8			3.2	36.0	37.85	900
8			3.6	60.0	43.06	910
8			4.0	90.0	48.28	920

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

8              4.6       135.0      56.11                    930
8              5.4       180.0      66.55                    940
8              6.0       181.0      74.38                    950
8              7.0       315.0      87.42                    960
8       9.0    8.0       375.0      100.47                   970
8              8.1       700.0      100.50                   980
9 ENDTBL                                                     990
6 RUNOFF 1    10      6 0.84     51.         7.50      1     1000
6 RESVOR 2    10 6    7 7.0                            1     1010
6 REACH  3 010    7   5 1750.    1.2         1.10      1     1020
6 RUNOFF 1 010        6 0.20     42.         0.19      1     1030
6 ADDHYD 4 010    5 6 7                                1 1   1040
6 SAVMOV 5 010    7   6                                      1050
6 RESVOR 2    20 6    7 4.5                            1     1060
6 REACH  3 020    7   5 2900.    0.28        1.94      1     1070
6 RUNOFF 1 020        6 0.28     53.         1.02      1     1080
6 ADDHYD 4 020    5 6 7                                1 1   1090
6 SAVMOV 5 020    7   1                                      1100
6 RUNOFF 1    30      6 0.37     49.         3.90      1     1110
6 RESVOR 2    30 6    7 21.0                           1     1120
6 REACH  3 040    7   5 1300.    0.88        1.10      1     1130
6 RUNOFF 1 040        6 0.06     40.         1.00      1     1140
6 ADDHYD 4 040    5 6 7                                1     1150
6 SAVMOV 5 040    7   6                                      1160
6 RESVOR 2    40 6    7 9.0                            1     1170
6 REACH  3 050    7   5 1700.    1.6         1.45      1     1180
6 RUNOFF 1 049        6 0.11     40.         1.67      1     1190
6 ADDHYD 4 050    5 6 7                                1     1200
6 SAVMOV 5 050    7   5                                      1210
6 RUNOFF 1 050        6 0.36     85.         0.42      1     1220
6 ADDHYD 4 050    5 6 7                                1     1230
6 REACH  3 060    7   5 1400.    0.44        1.94      1     1240
6 RUNOFF 1 060        6 0.05     45.         0.90      1     1250
6 ADDHYD 4 060    5 6 7                                1 1   1260
6 SAVMOV 5 070    7   5                                      1270
6 SAVMOV 5 070    1   6                                      1280
6 ADDHYD 4 070    5 6 7                                1 1   1290
6 REACH  3 080    7   5 700.     0.30        1.94      1     1300
6 RUNOFF 1 080        6 0.02     64.         0.12      1     1310
6 ADDHYD 4 080    5 6 7                                1     1320
6 SAVMOV 5 100    7   5                                      1330
6 RUNOFF 1 090        6 0.24     73.         0.62      1     1340
6 ADDHYD 4 100    5 6 7                                1     1350
6 REACH  3 110    7   5 500.     0.30        1.94      1     1360
6 SAVMOV 5 120    5   7                                      1370
6 REACH  3 120    7   5 500.     0.30        1.94      1     1380
```

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

 6 RUNOFF 1 120       6 0.19       56.        0.74        1                1390
 6 ADDHYD 4 120    5 6 7                                  1 1              1400
 6 SAVMOV 5     50 7   6                                                   1410
 6 RESVOR 2     50 6   7 2.4                              1 1 1            1420
 6 REACH  3 130    7   5 1000.     0.30       1.94        1                1430
 6 RUNOFF 1 130        6 0.05      74.        0.19        1                1440
 6 ADDHYD 4 130    5 6 7                                  1                1450
 6 SAVMOV 5 130    7   6                                                   1460
 6 RESVOR 2     60 6   7 2.0                              1 1 1            1470
 6 REACH  3 140    7   5 2500.     0.21       1.48        1                1480
 6 RUNOFF 1 140        6 0.20      66.        1.15        1                1490
 6 ADDHYD 4 140    5 6 7                                  1                1500
 6 SAVMOV 5 150    7   5                                                   1510
 6 RUNOFF 1 149        6 0.08      50.        0.42        1                1520
 6 ADDHYD 4 150    5 6 7                                                   1530
 6 REACH  3 150    7   5 300.      0.21       1.48        1                1540
 6 RUNOFF 1 150        6 0.01      40.        0.15        1                1550
 6 ADDHYD 4 150    5 6 7                                  1                1560
 6 SAVMOV 5 180    7   5                                                   1570
 6 RUNOFF 1 180        6 0.28      50.        0.61        1                1580
 6 ADDHYD 4 180    5 6 7                                  1                1590
 6 REACH  3 180    7   5 1700.0    0.21       1.48        1                1600
 6 RUNOFF 1 180        6 0.11      41.        0.48        1                1610
 6 ADDHYD 4 180    5 6 7                                  1 1   1   1      1620
   ENDATA                                                                  1630
 7 LIST                                                                    1640
 7 BASFLO 5              3.0                                               1650
 7 INCREM 6              0.1                                               1660
 7 COMPUT 7     10 180   0.0       7.0        1.0         2 2  85  01      1670
   ENDCMP 1                                                                1680
   ENDJOB 2                                                                1690
0*********************************END OF 80-80 LIST*********************************
```

EXECUTIVE CONTROL OPERATION LIST RECORD ID 1640

LISTING OF CURRENT DATA

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	10			
8		7.00	.00	4.33
8		7.40	2.50	5.01
8		7.60	5.00	5.36
8		7.80	10.00	5.70
8		8.20	22.00	6.38
8		8.60	52.00	7.07
8		9.00	62.00	7.75
8		9.50	96.00	8.61
8		10.00	126.00	9.47
8		11.00	198.00	11.18
8		12.00	280.00	12.89
8		13.00	360.00	14.79
8		14.00	440.00	16.68
8		15.00	500.00	18.58
8		15.10	600.00	18.60
9 ENDTBL				

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	20			
8		4.50	.00	6.80
8		4.90	1.50	7.88
8		5.10	3.70	8.42
8		5.50	11.00	9.51
8		5.70	15.00	10.13
8		6.10	25.00	11.13
8		6.50	40.00	12.21
8		7.10	60.00	13.84
8		7.90	78.00	16.01
8		8.50	79.00	17.63
8		9.50	100.00	20.34
8		10.50	126.00	23.06
8		11.50	150.00	25.76
8		11.60	300.00	26.04
9 ENDTBL				

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	30			
8		21.00	.00	.10
8		21.40	.60	.61
8		21.60	1.50	.86
8		21.80	2.50	1.12
8		22.20	5.20	1.62
8		22.60	8.20	2.13
8		23.00	11.00	2.64
8		23.50	20.00	3.27
8		24.00	27.00	3.91
8		25.00	39.00	5.18
8		26.00	49.00	6.45
8		27.00	57.00	7.72
8		27.10	200.00	7.74
9 ENDTBL				

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	40			
8		9.00	.00	.38
8		9.40	2.20	.47
8		9.60	5.00	.52
8		10.00	14.00	.62
8		10.20	21.00	.67
8		10.60	36.00	.77
8		11.00	55.00	.86
8		11.60	82.00	1.01
8		12.40	120.00	1.21
8		13.00	121.00	1.35
8		14.00	122.00	1.60
8		15.00	126.00	1.84
8		16.00	150.00	2.08
8		16.10	300.00	2.11
9 ENDTBL				

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	50			
8		2.40	.00	22.00
8		2.80	2.00	26.86
8		3.00	7.00	29.29
8		3.40	16.00	34.16
8		3.60	24.00	36.59
8		4.00	40.00	41.46
8		4.40	60.00	46.32
8		5.00	90.00	53.62

```
8                       5.80    120.00     63.35
8                       6.40    121.00     70.65
8                       7.40    210.00     82.81
8                       8.40    250.00     94.98
8                      10.40    334.00    119.31
8                      12.40    400.00    143.63
8                      12.50    800.00    143.70
9 ENDTBL

          STRUCT NO.   ELEVATION  DISCHARGE   STORAGE
3 STRUCT      60

8                       2.00       .00     22.20
8                       2.40      3.00     27.41
8                       2.60     10.50     30.02
8                       3.00     22.50     35.24
8                       3.20     36.00     37.85
8                       3.60     60.00     43.06
8                       4.00     90.00     48.28
8                       4.60    135.00     56.11
8                       5.40    180.00     66.55
8                       6.00    181.00     74.38
8                       7.00    315.00     87.42
8                       8.00    375.00    100.47
8                       8.10    700.00    100.50
9 ENDTBL

                 TIME INCREMENT
4 DIMHYD                 .0200

8                .0000     .0300     .1000     .1900     .3100
8                .4700     .6600     .8200     .9300     .9900
8               1.0000     .9900     .9300     .8600     .7800
8                .6800     .5600     .4600     .3900     .3300
8                .2800     .2410     .2070     .1740     .1470
8                .1260     .1070     .0910     .0770     .0660
8                .0550     .0470     .0400     .0340     .0290
8                .0250     .0210     .0180     .0150     .0130
8                .0110     .0090     .0080     .0070     .0060
8                .0050     .0040     .0030     .0020     .0010
8                .0000     .0000     .0000     .0000     .0000
9 ENDTBL

  COMPUTED PEAK RATE FACTOR =  484.00
```

TABLE NO.	TIME INCREMENT				
5 RAINFL 1	.5000				
8	.0000	.0080	.0170	.0260	.0350
8	.0450	.0550	.0650	.0760	.0870
8	.0990	.1120	.1260	.1400	.1560
8	.1740	.1940	.2190	.2540	.3030
8	.5150	.5830	.6240	.6550	.6820
8	.7060	.7280	.7480	.7660	.7830
8	.7990	.8150	.8300	.8440	.8570
8	.8700	.8820	.8930	.9050	.9160
8	.9260	.9360	.9460	.9560	.9650
8	.9740	.9830	.9920	1.0000	1.0000
9 ENDTBL					

TABLE NO.	TIME INCREMENT				
5 RAINFL 2	.2500				
8	.0000	.0020	.0050	.0080	.0110
8	.0140	.0170	.0200	.0230	.0260
8	.0290	.0320	.0350	.0380	.0410
8	.0440	.0480	.0520	.0560	.0600
8	.0640	.0680	.0720	.0760	.0800
8	.0850	.0900	.0950	.1000	.1050
8	.1100	.1150	.1200	.1260	.1330
8	.1400	.1470	.1550	.1630	.1720
8	.1810	.1910	.2030	.2180	.2360
8	.2570	.2830	.3870	.6630	.7070
8	.7350	.7580	.7760	.7910	.8040
8	.8150	.8250	.8340	.8420	.8490
8	.8560	.8630	.8690	.8750	.8810
8	.8870	.8930	.8980	.9030	.9080
8	.9130	.9180	.9220	.9260	.9300
8	.9340	.9380	.9420	.9460	.9500
8	.9530	.9560	.9590	.9620	.9650
8	.9680	.9710	.9740	.9770	.9800
8	.9830	.9860	.9890	.9920	.9950
8	.9980	1.0000	1.0000	1.0000	1.0000
9 ENDTBL					

TABLE NO.	TIME INCREMENT				
5 RAINFL 3	.5000				
8	.0000	.0100	.0220	.0360	.0510
8	.0670	.0830	.0990	.1160	.1350

8	.1560	.1790	.2040	.2330	.2680
8	.3100	.4250	.4800	.5200	.5500
8	.5770	.6010	.6230	.6440	.6640
8	.6830	.7010	.7190	.7360	.7530
8	.7690	.7850	.8000	.8150	.8300
8	.8440	.8580	.8710	.8840	.8960
8	.9080	.9200	.9320	.9440	.9560
8	.9670	.9780	.9890	1.0000	1.0000

9 ENDTBL

TABLE NO.	TIME INCREMENT
5 RAINFL 4	.5000

8	.0000	.0040	.0080	.0120	.0160
8	.0200	.0250	.0300	.0350	.0400
8	.0450	.0500	.0550	.0600	.0650
8	.0700	.0750	.0810	.0870	.0930
8	.0990	.1050	.1110	.1180	.1250
8	.1320	.1400	.1480	.1560	.1650
8	.1740	.1840	.1950	.2070	.2200
8	.2360	.2550	.2770	.3030	.4090
8	.5150	.5490	.5830	.6050	.6240
8	.6400	.6550	.6690	.6820	.6940
8	.7050	.7160	.7270	.7380	.7480
8	.7580	.7670	.7760	.7840	.7920
8	.8000	.8080	.8160	.8230	.8300
8	.8370	.8440	.8510	.8580	.8640
8	.8700	.8760	.8820	.8880	.8940
8	.9000	.9060	.9110	.9160	.9210
8	.9260	.9310	.9360	.9410	.9460
8	.9510	.9560	.9610	.9660	.9710
8	.9760	.9800	.9840	.9880	.9920
8	.9960	1.0000	1.0000	1.0000	1.0000

9 ENDTBL

TABLE NO.	TIME INCREMENT
5 RAINFL 5	.5000

8	.0000	.0020	.0050	.0080	.0110
8	.0140	.0170	.0200	.0230	.0260
8	.0290	.0320	.0350	.0380	.0410
8	.0440	.0470	.0510	.0550	.0590
8	.0630	.0670	.0710	.0750	.0790
8	.0840	.0890	.0940	.0990	.1040
8	.1090	.1140	.1200	.1260	.1330
8	.1400	.1470	.1540	.1620	.1710
8	.1810	.1920	.2040	.2170	.2330

8	.2520	.2770	.3180	.6380	.6980
8	.7290	.7520	.7700	.7850	.7980
8	.8090	.8190	.8290	.8380	.8460
8	.8540	.8610	.8680	.8740	.8800
8	.8860	.8920	.8970	.9020	.9070
8	.9120	.9170	.9210	.9250	.9290
8	.9330	.9370	.9410	.9450	.9490
8	.9530	.9570	.9600	.9630	.9660
8	.9690	.9720	.9750	.9780	.9810
8	.9840	.9870	.9900	.9930	.9960
8	.9980	1.0000	1.0000	1.0000	1.0000

9 ENDTBL

TABLE NO.	TIME INCREMENT
5 RAINFL 6	.0200

8	.0000	.0080	.0162	.0246	.0333
8	.0425	.0524	.0630	.0743	.0863
8	.0990	.1124	.1265	.1420	.1595
8	.1800	.2050	.2550	.3450	.4370
8	.5300	.6030	.6330	.6600	.6840
8	.7050	.7240	.7420	.7590	.7750
8	.7900	.8043	.8180	.8312	.8439
8	.8561	.8678	.8790	.8898	.9002
8	.9103	.9201	.9297	.9391	.9483
8	.9573	.9661	.9747	.9832	.9916
8	1.0000	1.0000	1.0000	1.0000	1.0000

9 ENDTBL

```
0                 STANDARD CONTROL INSTRUCTIONS

 6 RUNOFF 1     10     6        .8400     51.0000     7.50001 0 0 1 0 1
 6 RESVOR 2     10 6   7       7.0000                       1 0 0 1 0 1
 6 REACH  3  10    7   5    1750.0000      1.2000     1.10001 0 0 1 0 1
 6 RUNOFF 1  10        6        .2000     42.0000      .19001 0 0 1 0 1
 6 ADDHYD 4  10    5 6 7                                    1 1 0 1 0 1
 6 SAVMOV 5  10    7   6
 6 RESVOR 2     20 6   7       4.5000                       1 0 0 1 0 1
 6 REACH  3  20    7   5    2900.0000       .2800     1.94001 0 0 1 0 1
 6 RUNOFF 1  20        6        .2800     53.0000     1.02001 0 0 1 0 1
 6 ADDHYD 4  20    5 6 7                                    1 1 0 1 0 1
 6 SAVMOV 5  20    7   1
 6 RUNOFF 1     30     6        .3700     49.0000     3.90001 0 0 1 0 1
 6 RESVOR 2     30 6   7      21.0000                       1 0 0 1 0 1
 6 REACH  3  40    7   5    1300.0000       .8800     1.10001 0 0 1 0 1
 6 RUNOFF 1  40        6        .0600     40.0000     1.00001 0 0 1 0 1
 6 ADDHYD 4  40    5 6 7                                    1 0 0 1 0 1
 6 SAVMOV 5  40    7   6
 6 RESVOR 2     40 6   7       9.0000                       1 0 0 1 0 1
 6 REACH  3  50    7   5    1700.0000      1.6000     1.45001 0 0 1 0 1
 6 RUNOFF 1  49        6        .1100     40.0000     1.67001 0 0 1 0 1
 6 ADDHYD 4  50    5 6 7                                    1 0 0 1 0 1
 6 SAVMOV 5  50    7   5
 6 RUNOFF 1  50        6        .3600     85.0000      .42001 0 0 1 0 1
 6 ADDHYD 4  50    5 6 7                                    1 0 0 1 0 1
 6 REACH  3  60    7   5    1400.0000       .4400     1.94001 0 0 1 0 1
 6 RUNOFF 1  60        6        .0500     45.0000      .90001 0 0 1 0 1
 6 ADDHYD 4  60    5 6 7                                    1 1 0 1 0 1
 6 SAVMOV 5  70    7   5
 6 SAVMOV 5  70    1   6
 6 ADDHYD 4  70    5 6 7                                    1 1 0 1 0 1
 6 REACH  3  80    7   5     700.0000       .3000     1.94001 0 0 1 0 1
 6 RUNOFF 1  80        6        .0200     64.0000      .12001 0 0 1 0 1
 6 ADDHYD 4  80    5 6 7                                    1 0 0 1 0 1
 6 SAVMOV 5 100    7   5
 6 RUNOFF 1  90        6        .2400     73.0000      .62001 0 0 1 0 1
 6 ADDHYD 4 100    5 6 7                                    1 0 0 1 0 1
 6 REACH  3 110    7   5     500.0000       .3000     1.94001 0 0 1 0 1
 6 SAVMOV 5 120    5   7
 6 REACH  3 120    7   5     500.0000       .3000     1.94001 0 0 1 0 1
 6 RUNOFF 1 120        6        .1900     56.0000      .74001 0 0 1 0 1
 6 ADDHYD 4 120    5 6 7                                    1 1 0 1 0 1
 6 SAVMOV 5     50 7   6
 6 RESVOR 2     50 6   7       2.4000                       1 1 1 1 0 1
 6 REACH  3 130    7   5    1000.0000       .3000     1.94001 0 0 1 0 1
 6 RUNOFF 1 130        6        .0500     74.0000      .19001 0 0 1 0 1
```

```
6 ADDHYD 4 130    5 6 7                                    1 0 0 1 0 1
6 SAVMOV 5 130    7   6
6 RESVOR 2     60 6   7      2.0000                        1 1 1 1 0 1
6 REACH  3 140    7   5   2500.0000       .2100      1.48001 0 0 1 0 1
6 RUNOFF 1 140        6       .2000     66.0000      1.15001 0 0 1 0 1
6 ADDHYD 4 140    5 6 7                                    1 0 0 1 0 1
6 SAVMOV 5 150    7   5
6 RUNOFF 1 149        6       .0800     50.0000       .42001 0 0 1 0 1
6 ADDHYD 4 150    5 6 7                                    1 0 0 1 0 1
6 REACH  3 150    7   5    300.0000       .2100      1.48001 0 0 1 0 1
6 RUNOFF 1 150        6       .0100     40.0000       .15001 0 0 1 0 1
6 ADDHYD 4 150    5 6 7                                    1 0 0 1 0 1
6 SAVMOV 5 180    7   5
6 RUNOFF 1 180        6       .2800     50.0000       .61001 0 0 1 0 1
6 ADDHYD 4 180    5 6 7                                    1 0 0 1 0 1
6 REACH  3 180    7   5   1700.0000       .2100      1.48001 0 0 1 0 1
6 RUNOFF 1 180        6       .1100     41.0000       .48001 0 0 1 0 1
6 ADDHYD 4 180    5 6 7                                    1 1 0 1 0 1
  ENDATA
```

END OF LISTING

```
EXECUTIVE CONTROL OPERATION BASFLO                                                        RECORD ID    1650
+                                  NEW BASEFLOW =   3.00 CFS

EXECUTIVE CONTROL OPERATION INCREM                                                        RECORD ID    1660
+                                  MAIN TIME INCREMENT =   .10 HOURS

EXECUTIVE CONTROL OPERATION COMPUT                                                        RECORD ID    1670
+                                  FROM STRUCTURE 10
+                                                 TO XSECTION 180
      STARTING TIME =   .00    RAIN DEPTH =  7.00    RAIN DURATION=  1.00    RAIN TABLE NO.= 2    ANT. MOIST. COND= 2
      ALTERNATE NO.=85         STORM NO.= 1    MAIN TIME INCREMENT =   .10 HOURS

OPERATION RUNOFF   STRUCTURE 10
        OUTPUT HYDROGRAPH=  6
        AREA=    .84 SQ MI   INPUT RUNOFF CURVE= 51.    TIME OF CONCENTRATION=  7.50 HOURS
        INTERNAL HYDROGRAPH TIME INCREMENT=  .1000 HOURS

        PEAK TIME(HRS)              PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
          17.80                           96.56                       (RUNOFF)

  RUNOFF VOLUME ABOVE BASEFLOW =  1.67 WATERSHED INCHES,     906.24 CFS-HRS,     74.89 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION RESVOR   STRUCTURE 10
        INPUT HYDROGRAPH= 6     OUTPUT HYDROGRAPH= 7
        SURFACE ELEVATION=     7.00

        PEAK TIME(HRS)              PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
          18.14                           96.09                       9.50

  RUNOFF VOLUME ABOVE BASEFLOW =  1.63 WATERSHED INCHES,     884.09 CFS-HRS,     73.06 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION REACH    CROSS SECTION  10
        INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 5
        LENGTH =    1750.00 FEET       INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA,  X=  1.20,    M= 1.10
0       MODIFIED ATT-KIN ROUTING COEFFICIENT =  .34      PEAK TRAVEL TIME =     .40 HOURS
0    *** WARNING - REACH  10 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT      18.15 CFS,  18.88 % OF PEAK.

        PEAK TIME(HRS)              PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
          18.47                           98.84                       (NULL)

  RUNOFF VOLUME ABOVE BASEFLOW =  1.62 WATERSHED INCHES,     878.37 CFS-HRS,     72.59 ACRE-FEET;   BASEFLOW =   3.00 CFS
```

```
OPERATION RUNOFF   CROSS SECTION  10
          OUTPUT HYDROGRAPH=  6
          AREA=    .20 SQ MI   INPUT RUNOFF CURVE= 42.    TIME OF CONCENTRATION=   .19 HOURS
          INTERNAL HYDROGRAPH TIME INCREMENT=  .0253 HOURS
```

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.08	121.81	(RUNOFF)
15.20	8.69	(RUNOFF)
16.46	7.85	(RUNOFF)
17.67	6.75	(RUNOFF)
19.66	5.63	(RUNOFF)
23.66	4.48	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 1.00 WATERSHED INCHES, 128.54 CFS-HRS, 10.62 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 10
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.08	124.81	(NULL)
18.48	104.33	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 1.04 SQ.MI.

11.00	DISCHG	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.92	32.22
12.00	DISCHG	103.79	122.67	68.37	48.48	36.93	31.73	29.33	27.26	26.59	24.26
13.00	DISCHG	23.05	22.09	20.81	20.53	19.65	19.34	18.92	18.32	18.54	18.63
14.00	DISCHG	19.37	20.36	21.44	23.10	24.57	26.43	28.32	30.58	34.13	38.16
15.00	DISCHG	42.29	46.34	50.23	53.88	56.65	58.95	61.10	63.08	64.97	66.81
16.00	DISCHG	68.65	71.17	74.19	77.35	80.46	83.41	85.78	87.66	89.73	91.75
17.00	DISCHG	93.63	95.35	96.91	98.34	99.64	100.81	101.85	102.75	103.42	103.37
18.00	DISCHG	103.47	103.75	104.01	104.19	104.30	104.32	104.27	104.13	103.93	103.65
19.00	DISCHG	103.31	102.89	102.39	101.82	101.18	100.46	99.66	98.79	97.73	95.99
20.00	DISCHG	94.45	93.18	91.97	90.75	89.51	88.27	87.03	85.81	84.61	83.43
21.00	DISCHG	82.27	81.14	80.03	78.94	77.87	76.82	75.80	74.79	73.81	72.84
22.00	DISCHG	71.90	71.02	70.32	69.71	69.16	68.63	68.11	67.58	67.04	66.49
23.00	DISCHG	65.93	65.36	64.77	64.17	63.56	62.94	62.32	61.69	60.95	59.41
24.00	DISCHG	57.89	55.77	53.21	51.69	50.62	49.72	48.91	48.18	47.50	46.85
25.00	DISCHG	46.24	45.66	45.10	44.55	44.02	43.50	42.98	42.48	41.98	41.49
26.00	DISCHG	41.00	40.51	40.03	39.55	39.07	38.60	38.12	37.63	37.15	36.66
27.00	DISCHG	36.16	35.66	35.15	34.64	34.13	33.61	33.09	32.57	32.04	31.51
28.00	DISCHG	30.97	30.44	29.90	29.36	28.82	28.28	27.74	27.21	26.67	26.13
29.00	DISCHG	25.68	25.30	24.94	24.59	24.24	23.89	23.52	23.14	22.75	22.35

RUNOFF VOLUME ABOVE BASEFLOW = 1.50 WATERSHED INCHES, 1006.91 CFS-HRS, 83.21 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 10
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 6

OPERATION RESVOR STRUCTURE 20
INPUT HYDROGRAPH= 6 OUTPUT HYDROGRAPH= 7
SURFACE ELEVATION= 4.50

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.90	24.55	6.08
20.10	93.18	9.18

RUNOFF VOLUME ABOVE BASEFLOW = 1.45 WATERSHED INCHES, 970.12 CFS-HRS, 80.17 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 20
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 2900.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .28, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = .72 PEAK TRAVEL TIME = .10 HOURS

*** WARNING REACH 20 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***
0 *** WARNING - REACH 20 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT 23.17 CFS, 25.69 % OF PEAK.

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.04	24.51	(NULL)
20.25	93.15	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 1.44 WATERSHED INCHES, 966.86 CFS-HRS, 79.90 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 20
OUTPUT HYDROGRAPH= 6
AREA= .28 SQ MI INPUT RUNOFF CURVE= 53. TIME OF CONCENTRATION= 1.02 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0971 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.61	158.20	(RUNOFF)
23.72	9.09	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 1.94 WATERSHED INCHES, 349.97 CFS-HRS, 28.92 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 20
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.62	181.14	(NULL)
20.06	104.53	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 1.32 SQ.MI.

11.00	DISCHG	3.00	3.00	3.00	3.01	3.04	3.18	3.66	4.96	8.46	16.82
12.00	DISCHG	32.71	58.78	93.52	129.45	157.98	175.05	181.01	178.06	168.44	154.55
13.00	DISCHG	139.59	126.35	115.40	106.04	97.88	90.63	84.33	78.80	73.90	69.58
14.00	DISCHG	65.79	62.51	59.66	57.22	55.16	53.43	52.00	50.86	49.97	49.33
15.00	DISCHG	49.00	49.28	50.11	51.39	53.03	54.89	56.83	58.77	60.51	62.20
16.00	DISCHG	63.90	65.63	67.41	69.31	71.35	73.52	75.77	77.59	79.19	80.69
17.00	DISCHG	82.13	83.56	84.99	86.44	87.91	89.41	90.93	92.19	92.57	92.70

18.00	DISCHG	92.72	92.66	92.54	92.37	92.18	92.40	93.37	94.52	95.68	96.81
19.00	DISCHG	97.89	98.91	99.86	100.73	101.53	102.25	102.90	103.46	103.93	104.29
20.00	DISCHG	104.50	104.52	104.37	104.07	103.68	103.22	102.72	102.19	101.65	101.11
21.00	DISCHG	100.55	99.97	99.37	98.75	98.11	97.45	96.77	96.07	95.35	94.62
22.00	DISCHG	93.88	93.13	92.36	91.60	90.84	90.09	89.35	88.62	88.17	88.01
23.00	DISCHG	87.92	87.85	87.79	87.73	87.67	87.60	87.53	87.46	87.38	87.26
24.00	DISCHG	87.08	86.61	85.17	83.27	81.07	78.71	76.31	73.97	71.75	69.69
25.00	DISCHG	67.80	66.08	64.52	63.07	61.72	60.26	58.69	57.18	55.76	54.44
26.00	DISCHG	53.20	52.04	50.95	49.93	48.95	48.03	47.15	46.32	45.51	44.74
27.00	DISCHG	44.00	43.28	42.59	41.91	41.26	40.61	39.96	39.28	38.60	37.94
28.00	DISCHG	37.29	36.66	36.04	35.42	34.82	34.22	33.63	33.04	32.46	31.88
29.00	DISCHG	31.31	30.74	30.19	29.66	29.14	28.64	28.16	27.69	27.23	26.78

RUNOFF VOLUME ABOVE BASEFLOW = 1.55 WATERSHED INCHES, 1316.83 CFS-HRS, 108.82 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 20
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 1

OPERATION RUNOFF STRUCTURE 30
OUTPUT HYDROGRAPH= 6
AREA= .37 SQ MI INPUT RUNOFF CURVE= 49. TIME OF CONCENTRATION= 3.90 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .1000 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
14.95	60.58	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 1.57 WATERSHED INCHES, 375.61 CFS-HRS, 31.04 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION RESVOR STRUCTURE 30
INPUT HYDROGRAPH= 6 OUTPUT HYDROGRAPH= 7
SURFACE ELEVATION= 21.00

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
16.21	48.05	25.91

RUNOFF VOLUME ABOVE BASEFLOW = 1.51 WATERSHED INCHES, 360.28 CFS-HRS, 29.77 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION REACH CROSS SECTION 40
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 1300.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .88, M= 1.10
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = .32 PEAK TRAVEL TIME = .30 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
16.55	47.70	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 1.50 WATERSHED INCHES, 358.97 CFS-HRS, 29.67 ACRE-FEET; BASEFLOW = .00 CFS

```
OPERATION RUNOFF   CROSS SECTION  40
          OUTPUT HYDROGRAPH=  6
          AREA=    .06 SQ MI   INPUT RUNOFF CURVE= 40.    TIME OF CONCENTRATION=  1.00 HOURS
          INTERNAL HYDROGRAPH TIME INCREMENT=  .0952 HOURS

          PEAK TIME(HRS)            PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
             12.72                       10.21                        (RUNOFF)
             23.76                        1.21                        (RUNOFF)

  RUNOFF VOLUME ABOVE BASEFLOW =   .84 WATERSHED INCHES,     32.57 CFS-HRS,     2.69 ACRE-FEET;   BASEFLOW =    .00 CFS


OPERATION ADDHYD   CROSS SECTION  40
          INPUT HYDROGRAPHS= 5,6     OUTPUT HYDROGRAPH= 7

          PEAK TIME(HRS)            PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
             12.73                       10.35                        (NULL)
             16.54                       49.80                        (NULL)

  RUNOFF VOLUME ABOVE BASEFLOW =  1.41 WATERSHED INCHES,    391.54 CFS-HRS,    32.36 ACRE-FEET;   BASEFLOW =    .00 CFS


OPERATION SAVMOV   CROSS SECTION  40
          INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 6


OPERATION RESVOR   STRUCTURE 40
          INPUT HYDROGRAPH= 6     OUTPUT HYDROGRAPH= 7
          SURFACE ELEVATION=    9.00

          PEAK TIME(HRS)            PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
             12.90                        9.83                         9.81
             16.60                       49.78                        10.89

  RUNOFF VOLUME ABOVE BASEFLOW =  1.41 WATERSHED INCHES,    389.94 CFS-HRS,    32.22 ACRE-FEET;   BASEFLOW =    .00 CFS


OPERATION REACH    CROSS SECTION  50
          INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 5
          LENGTH =    1700.00 FEET      INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA,  X=  1.60,    M= 1.45
0         MODIFIED ATT-KIN ROUTING COEFFICIENT =  .83      PEAK TRAVEL TIME =     .10 HOURS

    *** WARNING  REACH  50 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***

          PEAK TIME(HRS)            PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
             13.02                        9.78                        (NULL)
             16.72                       49.77                        (NULL)

  RUNOFF VOLUME ABOVE BASEFLOW =  1.40 WATERSHED INCHES,    389.36 CFS-HRS,    32.18 ACRE-FEET;   BASEFLOW =    .00 CFS
```

OPERATION RUNOFF CROSS SECTION 49
OUTPUT HYDROGRAPH= 6
AREA= .11 SQ MI INPUT RUNOFF CURVE= 40. TIME OF CONCENTRATION= 1.67 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .1012 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.33	13.76	(RUNOFF)
23.80	2.20	(RUNOFF)
+	‡	‡ FIRST POINT OF FLAT PEAK

RUNOFF VOLUME ABOVE BASEFLOW = .84 WATERSHED INCHES, 59.78 CFS-HRS, 4.94 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 50
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.16	22.91	(NULL)
16.65	53.98	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 1.29 WATERSHED INCHES, 449.14 CFS-HRS, 37.12 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION SAVMOV CROSS SECTION 50
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5

OPERATION RUNOFF CROSS SECTION 50
OUTPUT HYDROGRAPH= 6
AREA= .36 SQ MI INPUT RUNOFF CURVE= 85. TIME OF CONCENTRATION= .42 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0560 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.13	1078.73	(RUNOFF)
19.65	24.75	(RUNOFF)
23.65	18.64	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 5.25 WATERSHED INCHES, 1220.14 CFS-HRS, 100.83 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 50
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.13	1079.95	(NULL)
16.49	90.76	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.87 WATERSHED INCHES, 1669.27 CFS-HRS, 137.95 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION REACH CROSS SECTION 60
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 1400.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .44, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 60 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.13	1079.95	(NULL)
16.49	90.76	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.87 WATERSHED INCHES, 1669.27 CFS-HRS, 137.95 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION RUNOFF CROSS SECTION 60
OUTPUT HYDROGRAPH= 6
AREA= .05 SQ MI INPUT RUNOFF CURVE= 45. TIME OF CONCENTRATION= .90 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .1000 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.56	16.56	(RUNOFF)
23.72	1.26	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 1.24 WATERSHED INCHES, 39.88 CFS-HRS, 3.30 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 60
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.14	1086.21	(NULL)
16.49	93.02	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = .95 SQ.MI.

4.00	DISCHG	.00	.00	.00	.02	.10	.26	.49	.75	1.04	1.33
5.00	DISCHG	1.62	1.91	2.20	2.49	2.77	3.04	3.32	3.58	3.84	4.10
6.00	DISCHG	4.36	4.67	5.18	5.80	6.40	6.89	7.32	7.71	8.07	8.41
7.00	DISCHG	8.75	9.07	9.38	9.69	9.99	10.29	10.58	10.86	11.14	11.41
8.00	DISCHG	11.68	12.08	12.82	13.80	14.96	16.27	17.48	18.44	19.17	19.76
9.00	DISCHG	20.27	20.91	21.91	23.16	24.29	25.16	26.02	27.23	28.66	29.92
10.00	DISCHG	30.90	31.86	33.18	34.84	37.10	40.08	43.57	47.95	52.84	58.21
11.00	DISCHG	64.10	70.07	76.45	83.02	90.75	101.27	130.10	208.30	333.15	539.50
12.00	DISCHG	836.25	1068.68	1030.91	805.58	576.69	421.03	324.82	265.51	227.09	199.69
13.00	DISCHG	178.52	161.72	147.53	136.12	127.20	119.75	113.25	107.02	101.45	96.86
14.00	DISCHG	93.29	90.54	88.31	86.99	86.63	86.30	86.13	85.74	85.37	85.47
15.00	DISCHG	86.26	87.42	88.85	90.29	90.92	90.62	90.19	90.11	90.41	90.86
16.00	DISCHG	91.35	91.83	92.25	92.60	92.86	93.02	92.76	91.64	89.95	88.43
17.00	DISCHG	87.35	86.55	85.87	85.24	84.63	84.03	83.43	82.82	82.11	80.76
18.00	DISCHG	78.62	76.40	74.60	73.30	72.20	71.21	70.27	69.38	68.51	67.67

19.00	DISCHG	66.86	66.07	65.33	64.68	63.99	63.30	62.62	61.96	61.19	59.85
20.00	DISCHG	57.76	55.58	53.88	52.62	51.60	50.72	49.94	49.23	48.56	47.93
21.00	DISCHG	47.34	46.79	46.26	45.76	45.28	44.83	44.40	43.97	43.53	43.10
22.00	DISCHG	42.70	42.29	41.89	41.51	41.15	40.80	40.46	40.14	39.84	39.55
23.00	DISCHG	39.27	39.01	38.75	38.51	38.28	38.06	37.85	37.65	37.37	36.46
24.00	DISCHG	34.72	32.26	28.67	24.55	21.18	18.97	17.56	16.54	15.77	15.13
25.00	DISCHG	14.59	14.12	13.71	13.34	13.02	12.72	12.45	12.20	11.96	11.76
26.00	DISCHG	11.57	11.41	11.25	11.11	10.97	10.84	10.71	10.57	10.42	10.28
27.00	DISCHG	10.13	9.97	9.81	9.64	9.47	9.29	9.11	8.93	8.74	8.54
28.00	DISCHG	8.34	8.13	7.93	7.72	7.51	7.29	7.08	6.87	6.67	6.46
29.00	DISCHG	6.26	6.06	5.87	5.68	5.49	5.32	5.14	4.99	4.87	4.74

RUNOFF VOLUME ABOVE BASEFLOW = 2.79 WATERSHED INCHES, 1709.15 CFS-HRS, 141.24 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION SAVMOV CROSS SECTION 70
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5

OPERATION SAVMOV CROSS SECTION 70
INPUT HYDROGRAPH= 1 OUTPUT HYDROGRAPH= 6

OPERATION ADDHYD CROSS SECTION 70
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.15	1158.66	(NULL)
17.72	175.02	(NULL)
19.49	165.55	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 2.27 SQ.MI.

4.00	DISCHG	3.00	3.00	3.00	3.02	3.10	3.26	3.49	3.75	4.04	4.33
5.00	DISCHG	4.62	4.91	5.20	5.49	5.77	6.04	6.32	6.58	6.84	7.10
6.00	DISCHG	7.36	7.67	8.18	8.80	9.40	9.89	10.32	10.71	11.07	11.41
7.00	DISCHG	11.75	12.07	12.38	12.69	12.99	13.29	13.58	13.86	14.14	14.41
8.00	DISCHG	14.68	15.08	15.82	16.80	17.96	19.27	20.48	21.44	22.17	22.76
9.00	DISCHG	23.27	23.91	24.91	26.16	27.29	28.16	29.02	30.23	31.66	32.92
10.00	DISCHG	33.90	34.86	36.18	37.84	40.10	43.08	46.57	50.95	55.84	61.21
11.00	DISCHG	67.10	73.07	79.45	86.03	93.79	104.45	133.75	213.27	341.60	556.32
12.00	DISCHG	868.96	1127.46	1124.43	935.03	734.67	596.08	505.83	443.57	395.53	354.25
13.00	DISCHG	318.11	288.08	262.93	242.15	225.08	210.38	197.58	185.82	175.35	166.44
14.00	DISCHG	159.07	153.05	147.97	144.21	141.78	139.73	138.13	136.60	135.34	134.80
15.00	DISCHG	135.26	136.70	138.96	141.68	143.95	145.50	147.02	148.88	150.91	153.06
16.00	DISCHG	155.25	157.46	159.66	161.91	164.21	166.54	168.53	169.24	169.14	169.11
17.00	DISCHG	169.48	170.11	170.86	171.68	172.55	173.45	174.36	175.01	174.68	173.45
18.00	DISCHG	171.34	169.06	167.14	165.67	164.38	163.61	163.65	163.90	164.19	164.49
19.00	DISCHG	164.75	164.98	165.19	165.41	165.52	165.55	165.52	165.42	165.13	164.14
20.00	DISCHG	162.26	160.11	158.25	156.69	155.28	153.94	152.66	151.42	150.21	149.04

21.00	DISCHG	147.89	146.76	145.63	144.51	143.39	142.28	141.16	140.03	138.89	137.73
22.00	DISCHG	136.58	135.42	134.26	133.11	131.98	130.88	129.81	128.77	128.01	127.55
23.00	DISCHG	127.19	126.86	126.55	126.24	125.95	125.66	125.39	125.11	124.75	123.71
24.00	DISCHG	121.79	118.87	113.84	107.82	102.25	97.68	93.87	90.52	87.52	84.82
25.00	DISCHG	82.39	80.20	78.23	76.41	74.74	72.98	71.14	69.38	67.73	66.20
26.00	DISCHG	64.77	63.45	62.21	61.03	59.93	58.87	57.86	56.88	55.94	55.02
27.00	DISCHG	54.13	53.25	52.40	51.56	50.73	49.91	49.07	48.20	47.34	46.48
28.00	DISCHG	45.63	44.79	43.96	43.14	42.32	41.51	40.71	39.91	39.12	38.34
29.00	DISCHG	37.57	36.81	36.06	35.34	34.64	33.96	33.31	32.68	32.10	31.52

RUNOFF VOLUME ABOVE BASEFLOW = 2.07 WATERSHED INCHES, 3025.98 CFS-HRS, 250.07 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 80
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 700.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .30, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 80 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.15	1158.66	(NULL)
17.72	175.02	(NULL)
19.49	165.55	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.07 WATERSHED INCHES, 3025.98 CFS-HRS, 250.07 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 80
OUTPUT HYDROGRAPH= 6
AREA= .02 SQ MI INPUT RUNOFF CURVE= 64. TIME OF CONCENTRATION= .12 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0160 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
11.98	54.99	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 2.98 WATERSHED INCHES, 38.49 CFS-HRS, 3.18 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 80
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.14	1178.53	(NULL)
17.71	176.34	(NULL)
19.50	166.63	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.07 WATERSHED INCHES, 3064.46 CFS-HRS, 253.25 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 100

INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5

OPERATION RUNOFF CROSS SECTION 90
OUTPUT HYDROGRAPH= 6
AREA= .24 SQ MI INPUT RUNOFF CURVE= 73. TIME OF CONCENTRATION= .62 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0827 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.27	434.61	(RUNOFF)
19.66	14.73	(RUNOFF)
23.66	11.19	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 3.93 WATERSHED INCHES, 608.63 CFS-HRS, 50.30 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 100
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.17	1568.41	(NULL)
16.68	191.99	(NULL)
17.71	194.67	(NULL)
19.50	181.35	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.25 WATERSHED INCHES, 3673.10 CFS-HRS, 303.54 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 110
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 500.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .30, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 110 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.17	1568.41	(NULL)
16.68	191.99	(NULL)
17.71	194.67	(NULL)
19.50	181.35	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.25 WATERSHED INCHES, 3673.10 CFS-HRS, 303.54 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 120
INPUT HYDROGRAPH= 5 OUTPUT HYDROGRAPH= 7

OPERATION REACH CROSS SECTION 120
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 500.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .30, M= 1.94

0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 120 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.17	1568.41	(NULL)
16.68	191.99	(NULL)
17.71	194.67	(NULL)
19.50	181.35	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.25 WATERSHED INCHES, 3673.10 CFS-HRS, 303.54 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 120
OUTPUT HYDROGRAPH= 6
AREA= .19 SQ MI INPUT RUNOFF CURVE= 56. TIME OF CONCENTRATION= .74 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0987 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.38	159.29	(RUNOFF)
19.68	8.61	(RUNOFF)
23.67	6.65	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 2.22 WATERSHED INCHES, 271.72 CFS-HRS, 22.45 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 120
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.19	1694.07	(NULL)
16.67	204.32	(NULL)
17.71	205.28	(NULL)
19.50	189.95	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 2.72 SQ.MI.

4.00	DISCHG	3.00	3.00	3.00	3.02	3.10	3.26	3.49	3.75	4.04	4.33
5.00	DISCHG	4.62	4.91	5.20	5.49	5.77	6.04	6.32	6.58	6.84	7.10
6.00	DISCHG	7.36	7.67	8.18	8.80	9.40	9.89	10.32	10.71	11.07	11.41
7.00	DISCHG	11.75	12.07	12.38	12.69	12.99	13.30	13.62	13.96	14.33	14.71
8.00	DISCHG	15.11	15.65	16.55	17.73	19.11	20.68	22.18	23.45	24.48	25.36
9.00	DISCHG	26.17	27.10	28.43	30.05	31.57	32.84	34.14	35.80	37.74	39.53
10.00	DISCHG	41.03	42.53	44.41	46.70	49.75	53.63	58.32	64.09	70.62	77.95
11.00	DISCHG	85.99	94.52	103.69	113.46	125.12	140.52	184.35	288.39	464.76	777.16
12.00	DISCHG	1225.66	1602.56	1691.52	1531.24	1289.14	1069.33	892.07	758.07	655.62	572.79
13.00	DISCHG	505.98	451.24	406.61	370.12	340.17	315.27	293.67	274.49	257.50	242.87
14.00	DISCHG	230.84	220.76	212.19	205.36	200.07	195.53	191.41	187.52	184.04	181.53
15.00	DISCHG	180.37	180.56	181.94	183.98	185.44	186.16	186.68	187.52	188.66	190.12
16.00	DISCHG	191.85	193.74	195.74	197.87	200.09	202.36	204.05	204.28	203.45	202.52
17.00	DISCHG	202.00	201.87	202.07	202.53	203.16	203.89	204.70	205.28	204.81	203.14
18.00	DISCHG	200.42	197.28	194.42	192.09	190.14	188.90	188.62	188.66	188.81	189.01

19.00	DISCHG	189.22	189.41	189.60	189.81	189.92	189.95	189.92	189.83	189.45	188.06
20.00	DISCHG	185.58	182.55	179.74	177.32	175.23	173.41	171.81	170.35	168.99	167.72
21.00	DISCHG	166.50	165.32	164.17	163.03	161.90	160.78	159.67	158.54	157.40	156.25
22.00	DISCHG	155.10	153.95	152.80	151.66	150.54	149.45	148.38	147.35	146.60	146.15
23.00	DISCHG	145.80	145.48	145.17	144.87	144.59	144.31	144.04	143.77	143.31	141.85
24.00	DISCHG	139.27	134.85	127.84	119.41	111.23	104.26	98.51	93.72	89.73	86.36
25.00	DISCHG	83.46	80.94	78.74	76.76	74.98	73.14	71.24	69.45	67.77	66.22
26.00	DISCHG	64.79	63.46	62.21	61.03	59.93	58.87	57.86	56.88	55.94	55.02
27.00	DISCHG	54.13	53.25	52.40	51.56	50.73	49.91	49.07	48.20	47.34	46.48
28.00	DISCHG	45.63	44.79	43.96	43.14	42.32	41.51	40.71	39.91	39.12	38.34
29.00	DISCHG	37.57	36.81	36.06	35.34	34.64	33.96	33.31	32.68	32.10	31.52

RUNOFF VOLUME ABOVE BASEFLOW = 2.25 WATERSHED INCHES, 3944.82 CFS-HRS, 326.00 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV STRUCTURE 50
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 6

OPERATION RESVOR STRUCTURE 50
INPUT HYDROGRAPH= 6 OUTPUT HYDROGRAPH= 7
SURFACE ELEVATION= 2.40

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.36	351.28	10.92

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 2.72 SQ.MI.

9.00	DISCHG	3.00	3.00	3.00	3.43	3.89	4.37	4.86	5.37	5.90	6.45
9.00	ELEV	2.84	2.84	2.84	2.86	2.88	2.89	2.91	2.93	2.96	2.98
10.00	DISCHG	7.02	7.55	8.09	8.66	9.26	9.90	10.60	11.37	12.21	13.16
10.00	ELEV	3.00	3.02	3.05	3.07	3.10	3.13	3.16	3.19	3.23	3.27
11.00	DISCHG	14.20	15.35	17.10	19.55	22.23	25.20	28.87	34.43	44.49	63.77
11.00	ELEV	3.32	3.37	3.43	3.49	3.56	3.63	3.72	3.86	4.09	4.48
12.00	DISCHG	93.83	120.32	175.19	232.60	264.86	290.59	310.00	324.49	334.98	341.18
12.00	ELEV	5.10	5.99	7.01	7.96	8.75	9.37	9.83	10.17	10.43	10.62
13.00	DISCHG	345.57	348.52	350.31	351.15	351.24	350.72	349.69	348.24	346.41	344.28
13.00	ELEV	10.75	10.84	10.89	10.92	10.92	10.91	10.88	10.83	10.78	10.71
14.00	DISCHG	341.89	339.32	336.60	333.70	330.01	326.29	322.56	318.81	315.07	311.35
14.00	ELEV	10.64	10.56	10.48	10.39	10.31	10.22	10.13	10.04	9.95	9.86
15.00	DISCHG	307.68	304.10	300.64	297.33	294.17	291.12	288.17	285.33	282.59	279.97
15.00	ELEV	9.77	9.69	9.61	9.53	9.45	9.38	9.31	9.24	9.18	9.11
16.00	DISCHG	277.47	275.09	272.83	270.69	268.67	266.77	264.98	263.27	261.60	259.95
16.00	ELEV	9.05	9.00	8.94	8.89	8.84	8.80	8.76	8.72	8.68	8.64
17.00	DISCHG	258.33	256.74	255.20	253.71	252.28	250.91	249.62	248.42	247.26	246.10
17.00	ELEV	8.60	8.56	8.52	8.49	8.45	8.42	8.39	8.36	8.33	8.30
18.00	DISCHG	244.91	243.68	242.40	241.08	239.74	238.39	237.06	235.77	234.51	233.28
18.00	ELEV	8.27	8.24	8.21	8.18	8.14	8.11	8.08	8.04	8.01	7.98
19.00	DISCHG	232.10	230.95	229.84	228.77	227.72	226.71	225.73	224.77	223.82	222.88
19.00	ELEV	7.95	7.92	7.90	7.87	7.84	7.82	7.79	7.77	7.75	7.72
20.00	DISCHG	221.92	220.90	219.84	218.73	217.59	216.43	215.26	214.08	212.89	211.69

20.00	ELEV	7.70	7.67	7.65	7.62	7.59	7.56	7.53	7.50	7.47	7.44
21.00	DISCHG	210.50	208.47	205.90	203.42	201.02	198.69	196.43	194.24	192.11	190.04
21.00	ELEV	7.41	7.38	7.35	7.33	7.30	7.27	7.25	7.22	7.20	7.18
22.00	DISCHG	188.02	186.05	184.13	182.26	180.43	178.64	176.90	175.19	173.54	171.94
22.00	ELEV	7.15	7.13	7.11	7.09	7.07	7.05	7.03	7.01	6.99	6.97
23.00	DISCHG	170.42	168.96	167.57	166.25	164.99	163.78	162.63	161.53	160.47	159.42
23.00	ELEV	6.96	6.94	6.92	6.91	6.89	6.88	6.87	6.86	6.84	6.83
24.00	DISCHG	158.32	157.07	155.56	153.68	151.43	148.87	146.08	143.14	140.13	137.07
24.00	ELEV	6.82	6.81	6.79	6.77	6.74	6.71	6.68	6.65	6.61	6.58
25.00	DISCHG	134.01	130.96	127.96	125.01	122.13	120.97	120.91	120.85	120.80	120.73
25.00	ELEV	6.55	6.51	6.48	6.45	6.41	6.38	6.35	6.31	6.28	6.24
26.00	DISCHG	120.67	120.61	120.54	120.48	120.41	120.34	120.27	120.20	120.13	120.05
26.00	ELEV	6.20	6.17	6.13	6.09	6.05	6.00	5.96	5.92	5.88	5.83
27.00	DISCHG	119.53	117.87	116.24	114.62	113.02	111.44	109.89	108.34	106.82	105.31
27.00	ELEV	5.79	5.74	5.70	5.66	5.61	5.57	5.53	5.49	5.45	5.41
28.00	DISCHG	103.82	102.35	100.89	99.45	98.02	96.61	95.21	93.83	92.46	91.11
28.00	ELEV	5.37	5.33	5.29	5.25	5.21	5.18	5.14	5.10	5.07	5.03
29.00	DISCHG	89.70	87.95	86.23	84.54	82.88	81.26	79.67	78.11	76.58	75.09
29.00	ELEV	4.99	4.96	4.92	4.89	4.86	4.83	4.79	4.76	4.73	4.70

RUNOFF VOLUME ABOVE BASEFLOW = 2.07 WATERSHED INCHES, 3627.56 CFS-HRS, 299.78 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 130
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 1000.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .30, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 130 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***
0 *** WARNING - REACH 130 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT 72.09 CFS, 20.70 % OF PEAK.

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.36	351.28	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.07 WATERSHED INCHES, 3627.56 CFS-HRS, 299.78 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 130
OUTPUT HYDROGRAPH= 6
AREA= .05 SQ MI INPUT RUNOFF CURVE= 74. TIME OF CONCENTRATION= .19 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0253 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.01	160.37	(RUNOFF)
23.65	2.37	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 4.05 WATERSHED INCHES, 130.79 CFS-HRS, 10.81 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 130

INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.06	256.05	(NULL)
13.28	362.33	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.10 WATERSHED INCHES, 3758.35 CFS-HRS, 310.59 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 130
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 6

OPERATION RESVOR STRUCTURE 60
INPUT HYDROGRAPH= 6 OUTPUT HYDROGRAPH= 7
SURFACE ELEVATION= 2.00

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
16.49	271.55	6.68

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 2.77 SQ.MI.

11.00	DISCHG	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	4.63	7.79
11.00	ELEV	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.44	2.53
12.00	DISCHG	12.25	16.80	21.13	29.28	39.45	49.28	59.43	72.12	84.87	97.35
12.00	ELEV	2.66	2.81	2.95	3.10	3.26	3.42	3.59	3.76	3.93	4.10
13.00	DISCHG	109.43	121.07	132.22	140.95	148.69	156.12	163.25	170.06	176.56	180.08
13.00	ELEV	4.26	4.41	4.56	4.71	4.84	4.98	5.10	5.22	5.34	5.45
14.00	DISCHG	180.26	180.44	180.61	180.78	180.95	189.65	201.12	211.32	220.36	228.36
14.00	ELEV	5.56	5.66	5.77	5.87	5.97	6.06	6.15	6.23	6.29	6.35
15.00	DISCHG	235.41	241.58	246.97	251.63	255.64	259.05	261.91	264.31	266.29	267.88
15.00	ELEV	6.41	6.45	6.49	6.53	6.56	6.58	6.60	6.62	6.64	6.65
16.00	DISCHG	269.14	270.09	270.78	271.23	271.48	271.55	271.45	271.20	270.80	270.30
16.00	ELEV	6.66	6.66	6.67	6.67	6.68	6.68	6.68	6.67	6.67	6.67
17.00	DISCHG	269.71	269.03	268.28	267.47	266.60	265.69	264.75	263.78	262.80	261.78
17.00	ELEV	6.66	6.66	6.65	6.65	6.64	6.63	6.62	6.62	6.61	6.60
18.00	DISCHG	260.72	259.64	258.54	257.42	256.29	255.14	253.97	252.79	251.61	250.42
18.00	ELEV	6.59	6.59	6.58	6.57	6.56	6.55	6.54	6.54	6.53	6.52
19.00	DISCHG	249.23	248.04	246.85	245.68	244.51	243.35	242.21	241.08	239.97	238.85
19.00	ELEV	6.51	6.50	6.49	6.48	6.47	6.47	6.46	6.45	6.44	6.43
20.00	DISCHG	237.71	236.58	235.45	234.33	233.20	232.07	230.94	229.80	228.67	227.52
20.00	ELEV	6.42	6.41	6.41	6.40	6.39	6.38	6.37	6.36	6.36	6.35
21.00	DISCHG	226.37	225.19	223.91	222.54	221.07	219.53	217.93	216.28	214.59	212.87
21.00	ELEV	6.34	6.33	6.32	6.31	6.30	6.29	6.28	6.26	6.25	6.24
22.00	DISCHG	211.12	209.35	207.56	205.77	203.97	202.17	200.37	198.58	196.80	195.03
22.00	ELEV	6.22	6.21	6.20	6.18	6.17	6.16	6.14	6.13	6.12	6.10
23.00	DISCHG	193.28	191.55	189.85	188.17	186.53	184.91	183.34	181.80	180.99	180.97
23.00	ELEV	6.09	6.08	6.07	6.05	6.04	6.03	6.02	6.01	5.99	5.98
24.00	DISCHG	180.95	180.93	180.90	180.87	180.84	180.81	180.78	180.74	180.70	180.65
24.00	ELEV	5.97	5.96	5.94	5.92	5.91	5.89	5.87	5.84	5.82	5.79
25.00	DISCHG	180.60	180.55	180.50	180.44	180.38	180.32	180.26	180.20	180.13	180.07

25.00	ELEV	5.76	5.73	5.70	5.67	5.63	5.59	5.56	5.52	5.48	5.44
26.00	DISCHG	180.01	178.19	176.17	174.23	172.34	170.52	168.77	167.07	165.43	163.84
26.00	ELEV	5.40	5.37	5.33	5.30	5.26	5.23	5.20	5.17	5.14	5.11
27.00	DISCHG	162.30	160.77	159.24	157.71	156.17	154.63	153.10	151.56	150.02	148.48
27.00	ELEV	5.09	5.06	5.03	5.00	4.98	4.95	4.92	4.89	4.87	4.84
28.00	DISCHG	146.94	145.41	143.87	142.34	140.82	139.30	137.78	136.26	134.67	132.68
28.00	ELEV	4.81	4.79	4.76	4.73	4.70	4.68	4.65	4.62	4.60	4.57
29.00	DISCHG	130.72	128.78	126.84	124.92	123.01	121.11	119.22	117.35	115.50	113.66
29.00	ELEV	4.54	4.52	4.49	4.47	4.44	4.41	4.39	4.36	4.34	4.32

RUNOFF VOLUME ABOVE BASEFLOW = 1.91 WATERSHED INCHES, 3418.29 CFS-HRS, 282.49 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 140
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 2500.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .21, M= 1.48
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = .37 PEAK TRAVEL TIME = .30 HOURS
0 *** WARNING - REACH 140 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT 110.66 CFS, 41.21 % OF PEAK.

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
16.79	271.09	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 1.89 WATERSHED INCHES, 3387.38 CFS-HRS, 279.93 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 140
OUTPUT HYDROGRAPH= 6
AREA= .20 SQ MI INPUT RUNOFF CURVE= 66. TIME OF CONCENTRATION= 1.15 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0958 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.64	190.96	(RUNOFF)
23.69	8.47	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 3.20 WATERSHED INCHES, 413.16 CFS-HRS, 34.14 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 140
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.81	236.37	(NULL)
14.02	222.79	(NULL)
16.70	287.70	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 1.98 WATERSHED INCHES, 3800.54 CFS-HRS, 314.08 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 150
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5

OPERATION RUNOFF CROSS SECTION 149
OUTPUT HYDROGRAPH= 6
AREA= .08 SQ MI INPUT RUNOFF CURVE= 50. TIME OF CONCENTRATION= .42 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0560 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.19	67.90	(RUNOFF)
23.67	2.40	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 1.67 WATERSHED INCHES, 86.04 CFS-HRS, 7.11 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 150
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.74	255.42	(NULL)
13.99	230.18	(NULL)
16.64	291.96	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 1.97 WATERSHED INCHES, 3886.58 CFS-HRS, 321.19 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 150
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 300.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .21, M= 1.48
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 150 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***
0 *** WARNING - REACH 150 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT 115.66 CFS, 40.03 % OF PEAK.

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.74	255.42	(NULL)
13.99	230.18	(NULL)
16.64	291.96	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 1.97 WATERSHED INCHES, 3886.58 CFS-HRS, 321.19 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 150
OUTPUT HYDROGRAPH= 6
AREA= .01 SQ MI INPUT RUNOFF CURVE= 40. TIME OF CONCENTRATION= .15 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0200 HOURS

*** WARNING-MAIN TIME INCREMENT MAY BE TOO LARGE.
COMPUTED PEAK(4.99) AT EXCEEDS MAX. ADJACENT HYDROGRAPH COORDINATE BY 8 %.
+ XSECTION 150

PEAK TIME(HRS) PEAK DISCHARGE(CFS) PEAK ELEVATION(FEET)

12.05 4.99 (RUNOFF)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = .01 SQ.MI.

11.00	DISCHG	.00	.00	.00	.00	.00	.00	.00	.00	.00	1.05
12.00	DISCHG	4.60	4.46	2.17	1.71	1.28	1.17	1.09	1.02	1.00	.87
13.00	DISCHG	.84	.78	.73	.71	.66	.64	.60	.56	.55	.52
14.00	DISCHG	.52	.50	.48	.47	.44	.43	.41	.38	.38	.38
15.00	DISCHG	.38	.39	.39	.38	.35	.34	.34	.34	.34	.34
16.00	DISCHG	.34	.34	.35	.35	.35	.35	.32	.30	.30	.30
17.00	DISCHG	.30	.30	.30	.30	.30	.30	.30	.30	.30	.26
18.00	DISCHG	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25
19.00	DISCHG	.25	.25	.25	.25	.25	.25	.25	.25	.25	.21
20.00	DISCHG	.19	.19	.19	.19	.19	.19	.19	.19	.19	.19
21.00	DISCHG	.19	.20	.20	.20	.20	.20	.20	.20	.20	.20
22.00	DISCHG	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20
23.00	DISCHG	.20	.20	.20	.20	.20	.20	.20	.20	.20	.15
24.00	DISCHG	.14	.08	.01	.00						

RUNOFF VOLUME ABOVE BASEFLOW = .84 WATERSHED INCHES, 5.41 CFS-HRS, .45 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 150
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.74	256.43	(NULL)
13.99	230.70	(NULL)
16.63	292.27	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 1.97 WATERSHED INCHES, 3891.99 CFS-HRS, 321.63 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 180
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5

OPERATION RUNOFF CROSS SECTION 180
OUTPUT HYDROGRAPH= 6
AREA= .28 SQ MI INPUT RUNOFF CURVE= 50. TIME OF CONCENTRATION= .61 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0813 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.31	185.48	(RUNOFF)
16.46	15.27	(RUNOFF)
19.69	10.72	(RUNOFF)
23.68	8.37	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 1.67 WATERSHED INCHES, 301.04 CFS-HRS, 24.88 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 180

INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.40	402.41	(NULL)
16.59	307.48	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 1.95 WATERSHED INCHES, 4193.03 CFS-HRS, 346.51 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 180
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 1700.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .21, M= 1.48
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = .55 PEAK TRAVEL TIME = .20 HOURS
0 *** WARNING - REACH 180 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT 115.66 CFS, 28.96 % OF PEAK.

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.61	385.65	(NULL)
16.76	307.22	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 1.94 WATERSHED INCHES, 4171.69 CFS-HRS, 344.75 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 180
OUTPUT HYDROGRAPH= 6
AREA= .11 SQ MI INPUT RUNOFF CURVE= 41. TIME OF CONCENTRATION= .48 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0640 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.28	34.74	(RUNOFF)
23.69	2.34	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = .92 WATERSHED INCHES, 65.08 CFS-HRS, 5.38 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 180
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.58	406.20	(NULL)
16.73	311.11	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 3.45 SQ.MI.

9.00	DISCHG	3.00	3.00	3.00	3.00	3.01	3.02	3.04	3.08	3.14	3.23
10.00	DISCHG	3.34	3.48	3.64	3.83	4.05	4.29	4.56	4.87	5.23	5.64
11.00	DISCHG	6.13	6.69	7.36	8.12	9.01	10.03	11.22	13.08	17.23	29.29
12.00	DISCHG	65.60	138.39	233.33	319.90	375.64	401.45	406.02	397.09	382.75	366.99
13.00	DISCHG	350.58	334.12	318.32	304.76	294.23	286.21	280.24	275.68	272.19	269.61
14.00	DISCHG	267.87	266.41	264.42	261.87	258.96	255.83	252.66	251.24	252.36	255.53
15.00	DISCHG	260.08	265.43	271.13	276.82	282.22	287.07	291.25	294.81	297.86	300.53
16.00	DISCHG	302.85	304.86	306.57	307.99	309.16	310.08	310.75	311.09	311.00	310.53

17.00	DISCHG	309.80	308.91	307.95	306.96	305.97	304.97	303.97	302.96	301.94	300.84
18.00	DISCHG	299.54	297.98	296.25	294.45	292.66	290.93	289.29	287.73	286.22	284.76
19.00	DISCHG	283.36	282.00	280.68	279.40	278.14	276.90	275.69	274.49	273.30	272.05
20.00	DISCHG	270.60	268.91	267.05	265.15	263.27	261.48	259.79	258.19	256.67	255.22
21.00	DISCHG	253.82	252.49	251.19	249.93	248.66	247.37	246.03	244.63	243.18	241.67
22.00	DISCHG	240.11	238.51	236.86	235.17	233.46	231.73	229.98	228.22	226.45	224.68
23.00	DISCHG	222.91	221.14	219.38	217.63	215.90	214.18	212.49	210.83	209.18	207.48
24.00	DISCHG	205.73	203.98	202.03	199.75	197.22	194.66	192.30	190.20	188.42	186.92
25.00	DISCHG	185.67	184.64	183.79	183.09	182.54	182.09	181.73	181.43	181.17	180.96
26.00	DISCHG	180.77	180.61	180.48	179.99	179.09	177.85	176.38	174.77	173.09	171.39
27.00	DISCHG	169.68	168.01	166.36	164.75	163.17	161.60	160.04	158.49	156.95	155.40
28.00	DISCHG	153.86	152.32	150.78	149.24	147.71	146.17	144.64	143.11	141.58	140.06
29.00	DISCHG	138.52	136.89	135.16	133.37	131.52	129.64	127.75	125.85	123.96	122.07

RUNOFF VOLUME ABOVE BASEFLOW = 1.90 WATERSHED INCHES, 4236.78 CFS-HRS, 350.13 ACRE-FEET; BASEFLOW = 3.00 CFS

EXECUTIVE CONTROL OPERATION ENDCMP RECORD ID 1680

+ COMPUTATIONS COMPLETED FOR PASS 1

EXECUTIVE CONTROL OPERATION ENDJOB RECORD ID 1690

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

SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RAIN TABLE #	ANTEC MOIST COND	MAIN TIME INCREM (HR)	PRECIPITATION BEGIN (HR)	PRECIPITATION AMOUNT (IN)	PRECIPITATION DURATION (HR)	RUNOFF AMOUNT (IN)	PEAK DISCHARGE ELEVATION (FT)	PEAK DISCHARGE TIME (HR)	PEAK DISCHARGE RATE (CFS)	PEAK DISCHARGE RATE (CSM)
ALTERNATE 85 STORM 1													
STRUCTURE 10	RUNOFF	.84	2	2	.10	.0	7.00	24.00	1.67	---	17.80	96.56	114.9
STRUCTURE 10	RESVOR	.84	2	2	.10	.0	7.00	24.00	1.63	9.50	18.14	96.09	114.4
XSECTION 10	REACH	.84	2	2	.10	.0	7.00	24.00	1.62	---	18.47	98.84	117.7
XSECTION 10	RUNOFF	.20	2	2	.10	.0	7.00	24.00	1.00	---	12.08	121.81	609.0
XSECTION 10	ADDHYD	1.04	2	2	.10	.0	7.00	24.00	1.50	---	12.08	124.81	120.0
STRUCTURE 20	RESVOR	1.04	2	2	.10	.0	7.00	24.00	1.45	9.18	20.10	93.18	89.6
XSECTION 20	REACH	1.04	2	2	.10	.0	7.00	24.00	1.44	---	20.25	93.15	89.6
XSECTION 20	RUNOFF	.28	2	2	.10	.0	7.00	24.00	1.94	---	12.61	158.20	565.0
XSECTION 20	ADDHYD	1.32	2	2	.10	.0	7.00	24.00	1.55	---	12.62	181.14	137.2
STRUCTURE 30	RUNOFF	.37	2	2	.10	.0	7.00	24.00	1.57	---	14.95	60.58	163.7
STRUCTURE 30	RESVOR	.37	2	2	.10	.0	7.00	24.00	1.51	25.91	16.21	48.05	129.9
XSECTION 40	REACH	.37	2	2	.10	.0	7.00	24.00	1.50	---	16.55	47.70	128.9
XSECTION 40	RUNOFF	.06	2	2	.10	.0	7.00	24.00	.84	---	12.72	10.21	170.2
XSECTION 40	ADDHYD	.43	2	2	.10	.0	7.00	24.00	1.41	---	16.54	49.80	115.8
STRUCTURE 40	RESVOR	.43	2	2	.10	.0	7.00	24.00	1.41	10.89	16.60	49.78	115.8
XSECTION 50	REACH	.43	2	2	.10	.0	7.00	24.00	1.40	---	16.72	49.77	115.7
XSECTION 49	RUNOFF	.11	2	2	.10	.0	7.00	24.00	.84	---	13.33	13.76	125.1
XSECTION 50	ADDHYD	.54	2	2	.10	.0	7.00	24.00	1.29	---	16.65	53.98	100.0
XSECTION 50	RUNOFF	.36	2	2	.10	.0	7.00	24.00	5.25	---	12.13	1078.73	2996.5
XSECTION 50	ADDHYD	.90	2	2	.10	.0	7.00	24.00	2.87	---	12.13	1079.95	1199.9
XSECTION 60	REACH	.90	2	2	.10	.0	7.00	24.00	2.87	---	12.13	1079.95	1199.9
XSECTION 60	RUNOFF	.05	2	2	.10	.0	7.00	24.00	1.24	---	12.56	16.56	331.2
XSECTION 60	ADDHYD	.95	2	2	.10	.0	7.00	24.00	2.79	---	12.14	1086.21	1143.4
XSECTION 70	ADDHYD	2.27	2	2	.10	.0	7.00	24.00	2.07	---	12.15	1158.66	510.4
XSECTION 80	REACH	2.27	2	2	.10	.0	7.00	24.00	2.07	---	12.15	1158.66	510.4
XSECTION 80	RUNOFF	.02	2	2	.10	.0	7.00	24.00	2.98	---	11.98	54.99	2749.6
XSECTION 80	ADDHYD	2.29	2	2	.10	.0	7.00	24.00	2.07	---	12.14	1178.53	514.6
XSECTION 90	RUNOFF	.24	2	2	.10	.0	7.00	24.00	3.93	---	12.27	434.61	1810.9
XSECTION 100	ADDHYD	2.53	2	2	.10	.0	7.00	24.00	2.25	---	12.17	1568.41	619.9
XSECTION 110	REACH	2.53	2	2	.10	.0	7.00	24.00	2.25	---	12.17	1568.41	619.9
XSECTION 120	REACH	2.53	2	2	.10	.0	7.00	24.00	2.25	---	12.17	1568.41	619.9
XSECTION 120	RUNOFF	.19	2	2	.10	.0	7.00	24.00	2.22	[illegible]	12.38	159.29	838.4

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

SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RAIN TABLE #	ANTEC MOIST COND	MAIN TIME INCREM (HR)	PRECIPITATION BEGIN (HR)	PRECIPITATION AMOUNT (IN)	PRECIPITATION DURATION (HR)	RUNOFF AMOUNT (IN)	PEAK DISCHARGE ELEVATION (FT)	PEAK DISCHARGE TIME (HR)	PEAK DISCHARGE RATE (CFS)	PEAK DISCHARGE RATE (CSM)
ALTERNATE 85 STORM 1													
XSECTION 120	ADDHYD	2.72	2	2	.10	.0	7.00	24.00	2.25	---	12.19	1694.07	622.8
STRUCTURE 50	RESVOR	2.72	2	2	.10	.0	7.00	24.00	2.07	10.92	13.36	351.28	129.1
XSECTION 130	REACH	2.72	2	2	.10	.0	7.00	24.00	2.07	---	13.36	351.28	129.1
XSECTION 130	RUNOFF	.05	2	2	.10	.0	7.00	24.00	4.05	---	12.01	160.37	3207.4
XSECTION 130	ADDHYD	2.77	2	2	.10	.0	7.00	24.00	2.10	---	13.28	362.33	130.8
STRUCTURE 60	RESVOR	2.77	2	2	.10	.0	7.00	24.00	1.91	6.68	16.49	271.55	98.0
XSECTION 140	REACH	2.77	2	2	.10	.0	7.00	24.00	1.89	---	16.79	271.09	97.9
XSECTION 140	RUNOFF	.20	2	2	.10	.0	7.00	24.00	3.20	---	12.64	190.96	954.8
XSECTION 140	ADDHYD	2.97	2	2	.10	.0	7.00	24.00	1.98	---	16.70	287.70	96.9
XSECTION 149	RUNOFF	.08	2	2	.10	.0	7.00	24.00	1.67	---	12.19	67.90	848.7
XSECTION 150	ADDHYD	3.05	2	2	.10	.0	7.00	24.00	1.97	---	16.64	291.96	95.7
XSECTION 150	REACH	3.05	2	2	.10	.0	7.00	24.00	1.97	---	16.64	291.96	95.7
XSECTION 150	RUNOFF	.01	2	2	.10	.0	7.00	24.00	.84	---	12.05	4.99	499.3
XSECTION 150	ADDHYD	3.06	2	2	.10	.0	7.00	24.00	1.97	---	16.63	292.27	95.5
XSECTION 180	RUNOFF	.28	2	2	.10	.0	7.00	24.00	1.67	---	12.31	185.48	662.4
XSECTION 180	ADDHYD	3.34	2	2	.10	.0	7.00	24.00	1.95	---	12.40	402.41	120.5
XSECTION 180	REACH	3.34	2	2	.10	.0	7.00	24.00	1.94	---	12.61	385.65	115.5
XSECTION 180	RUNOFF	.11	2	2	.10	.0	7.00	24.00	.92	---	12.28	34.74	315.8
XSECTION 180	ADDHYD	3.45	2	2	.10	.0	7.00	24.00	1.90	---	12.58	406.20	117.7

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

	HYDROGRAPH INFORMATION									ROUTING PARAMETERS								PEAK	
						OUTFLOW+			VOLUME	MAIN	ITER-	Q AND A			PEAK	S/Q	ATT-	TRAVEL TIME	
XSEC	REACH	INFLOW		OUTFLOW		INTERV.AREA		BASE-	ABOVE	TIME	ATION	EQUATION		LENGTH	RATIO	@PEAK	KIN	STOR-	KINE-
ID	LENGTH	PEAK	TIME	PEAK	TIME	PEAK	TIME	FLOW	BASE	INCR	#	COEFF	POWER	FACTOR	O/I	(K)	COEFF	AGE	MATIC
	(FT)	(CFS)	(HR)	(CFS)	(HR)	(CFS)	(HR)	(CFS)	(IN)	(HR)		(X)	(M)	(K*)	(Q*)	(SEC)	(C)	(HR)	(HR)
ALTERNATE 85 STORM 1																			
+ 10	1750	99	18.1	99	18.5			3	1.63*	.10	1	1.20	1.10	.021	.997	888	.34	.40	.25
+						123	12.1												
+ 20	2900	93	20.1	93	20.2			3	1.45*	.10	1	.280	1.94	.000	1.000	320	.72?	.10	.09
+						181	12.6												
+ 40	1300	48	16.2	48	16.5			0	1.51	.10	1	.880	1.10	.027	.992	934	.32	.30	.26
+						50	16.5												
+ 50	1700	50	16.6	50	16.7			0	1.41	.10	1	1.60	1.45	.002	1.000	252	.83?	.10	.07
+						54	16.6												
+ 60	1400	1064	12.1	1064	12.1			0	2.87	.10	0	.440	1.94	.000	1.000	38	1.00?	.00	.00
+						1069	12.1												
+ 80	700	1127	12.1	1127	12.1			3	2.07	.10	0	.300	1.94	.000	1.000	22	1.00?	.00	.00
+						1156	12.1												
+110	500	1559	12.2	1559	12.2			3	2.25	.10	0	.300	1.94	.000	1.000	14	1.00?	.00	.00
+						---	---												
												.300							

+120	500	1559	12.2	1559	12.2			3	2.25	.10	0		1.94	.000	1.000	14	1.00?	.00	.00
+						1692	12.2												
												.300							
+130	1000	351	13.4	351	13.4			3	2.07‡	.10	0		1.94	.000	1.000	56	1.00?	.00	.00
+						362	13.3												
												.210							
+140	2500	272	16.5	271	16.8			3	1.91‡	.10	1		1.48	.004	.998	788	.37	.30	.22
+						288	16.7												
												.210							
+150	300	292	16.6	292	16.6			3	1.97‡	.10	0		1.48	.000	1.000	92	1.00?	.00	.00
+						292	16.6												
												.210							
+180	1700	402	12.4	386	12.6			3	1.95‡	.10	1		1.48	.003	.958	471	.55	.20	.13
+						406	12.6												

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

XSECTION/ STRUCTURE ID	DRAINAGE AREA (SQ MI)	STORM NUMBERS......... 1
0 STRUCTURE 60	2.77	
ALTERNATE 85		271.55
0 STRUCTURE 50	2.72	
ALTERNATE 85		351.28
0 STRUCTURE 40	.43	
ALTERNATE 85		49.78
0 STRUCTURE 30	.37	
ALTERNATE 85		48.05
0 STRUCTURE 20	1.04	
ALTERNATE 85		93.18
0 STRUCTURE 10	.84	
ALTERNATE 85		96.09
0 XSECTION 10	1.04	
ALTERNATE 85		124.81
0 XSECTION 20	1.32	
ALTERNATE 85		181.14
0 XSECTION 40	.43	
ALTERNATE 85		49.80
0 XSECTION 49	.11	
ALTERNATE 85		13.76
0 XSECTION 50	.90	
ALTERNATE 85		1079.95
0 XSECTION 60	.95	
ALTERNATE 85		1086.21
0 XSECTION 70	2.27	
ALTERNATE 85		1158.66
0 XSECTION 80	2.29	
ALTERNATE 85		1178.53

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

XSECTION/ STRUCTURE ID	DRAINAGE AREA (SQ MI)	STORM NUMBERS.......... 1
0 XSECTION 90	.24	
+ ALTERNATE 85		434.61
0 XSECTION 100	2.53	
+ ALTERNATE 85		1568.41
0 XSECTION 110	2.53	
+ ALTERNATE 85		1568.41
0 XSECTION 120	2.72	
+ ALTERNATE 85		1694.07
0 XSECTION 130	2.77	
+ ALTERNATE 85		362.33
0 XSECTION 140	2.97	
+ ALTERNATE 85		287.70
0 XSECTION 149	.08	
+ ALTERNATE 85		67.90
0 XSECTION 150	3.06	
+ ALTERNATE 85		292.27
0 XSECTION 180	3.45	
+ ALTERNATE 85		406.20

FISCAL YEAR 86

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

JOB TR-20                    FULLPRINT PASS=001  SUMMARY                        10
TITLE 002 COGDELL'S CREEK WATERSHED STUDY NV5010 24 HR 10YR TYPE 2 STORM        20
TITLE       ALT  86                                                             30
 3 STRUCT       10                                                              40
 8                      7.00        0.00         4.33                           50
 8                      7.4         2.5          5.01                           60
 8                      7.6         5.0          5.36                           70
 8                      7.8         10.0         5.70                           80
 8                      8.2         22.0         6.38                           90
 8                      8.6         52.0         7.07                          100
 8                      9.0         62.0         7.75                          110
 8                      9.5         96.0         8.61                          120
 8                      10.0        126.0        9.47                          130
 8                      11.0        198.0        11.18                         140
 8                      12.0        280.0        12.89                         150
 8                      13.00       360.0        14.79                         160
 8                      14.00       440.0        16.68                         170
 8                      15.00       500.0        18.58                         180
 8                      15.1        600.00       18.60                         190
 9 ENDTBL                                                                      200
 3 STRUCT       20                                                             210
 8                      4.5         0.00         6.80                          220
 8                      4.9         1.5          7.88                          230
 8                      5.1         3.7          8.42                          240
 8                      5.5         11.0         9.51                          250
 8                      5.7         15.0         10.13                         260
 8                      6.1         25.0         11.13                         270
 8                      6.5         40.0         12.21                         280
 8                      7.1         60.0         13.84                         290
 8                      7.9         78.0         16.01                         300
 8                      8.5         79.0         17.63                         310
 8                      9.5         100.0        20.34                         320
 8                      10.5        126.0        23.06                         330
 8                      11.5        150.0        25.76                         340
 8                      11.6        300.0        26.04                         350
 9 ENDTBL                                                                      360
 3 STRUCT       30                                                             370
 8                      21.0        0.00         0.10                          380
 8                      21.4        0.6          0.61                          390
 8                      21.6        1.5          0.86                          400
 8                      21.8        2.5          1.12                          410
 8                      22.2        5.2          1.62                          420
 8                      22.6        8.2          2.13                          430
 8                      23.0        11.0         2.64                          440
 8                      23.5        20.0         3.27                          450
 8                      24.0        27.0         3.91                          460
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**********************BO-BO LIST OF INPUT DATA (CONTINUED)**********************

8			25.0	39.0	5.18	470
8			26.0	49.0	6.45	480
8			27.0	57.0	7.72	490
8			27.1	200.00	7.74	500
9	ENDTBL					510
3	STRUCT	40				520
8			9.0	0.0	0.38	530
8			9.4	2.2	0.47	540
8			9.6	5.0	0.52	550
8			10.0	14.0	0.62	560
8			10.2	21.0	0.67	570
8			10.6	36.0	0.77	580
8			11.0	55.0	0.86	590
8			11.6	82.0	1.01	600
8			12.4	120.0	1.21	610
8			13.0	121.0	1.35	620
8			14.0	122.0	1.60	630
8			15.0	126.0	1.84	640
8			16.0	150.00	2.08	650
8			16.1	300.0	2.11	660
9	ENDTBL					670
3	STRUCT	50				680
8			2.4	0.00	22.00	690
8			2.8	2.0	26.86	700
8			3.0	7.0	29.29	710
8			3.4	16.0	34.16	720
8			3.6	24.0	36.59	730
8			4.0	40.0	41.46	740
8			4.4	60.0	46.32	750
8			5.0	90.0	53.62	760
8			5.8	120.0	63.35	770
8			6.4	121.0	70.65	780
8			7.4	210.0	82.81	790
8			8.4	250.00	94.98	800
8			10.4	334.0	119.31	810
8			12.4	400.0	143.63	820
8			12.5	800.0	143.70	830
9	ENDTBL					840
3	STRUCT	60				850
8			2.0	0.0	22.20	860
8			2.4	3.0	27.41	870
8			2.6	10.5	30.02	880
8			3.0	22.5	35.24	890
8			3.2	36.0	37.85	900
8			3.6	60.0	43.06	910
8			4.0	90.0	48.28	920

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

8                    4.6         135.0       56.11                         930
8                    5.4         180.0       66.55                         940
8                    6.0         181.0       74.38                         950
8                    7.0         315.0       87.42                         960
8                    8.0         375.0       100.47                        970
8                    8.1         700.0       100.50                        980
9 ENDTBL                                                                   990
6 RUNOFF 1     10      6 0.84    51.         7.50        1                1000
6 RESVOR 2     10 6    7 7.0                             1                1010
6 REACH  3 010    7    5 1750.   1.2         1.10        1                1020
6 RUNOFF 1 010         6 0.20    42.         0.19        1                1030
6 ADDHYD 4 010    5 6 7                                  1 1              1040
6 SAVMOV 5 010    7    6                                                  1050
6 RESVOR 2     20 6    7 4.5                             1                1060
6 REACH  3 020    7    5 2900.   0.28        1.94        1                1070
6 RUNOFF 1 020         6 0.28    53.         1.02        1                1080
6 ADDHYD 4 020    5 6 7                                  1 1              1090
6 SAVMOV 5 020    7    1                                                  1100
6 RUNOFF 1     30      6 0.37    49.         3.90        1                1110
6 RESVOR 2     30 6    7 21.0                            1                1120
6 REACH  3 040    7    5 1300.   0.88        1.10        1                1130
6 RUNOFF 1 040         6 0.06    40.         1.00        1                1140
6 ADDHYD 4 040    5 6 7                                  1                1150
6 SAVMOV 5 040    7    6                                                  1160
6 RESVOR 2     40 6    7 9.0                             1                1170
6 REACH  3 050    7    5 1700.   1.6         1.45        1                1180
6 RUNOFF 1 049         6 0.11    40.         1.67        1                1190
6 ADDHYD 4 050    5 6 7                                  1                1200
6 SAVMOV 5 050    7    5                                                  1210
6 RUNOFF 1 050         6 0.36    85.         0.42        1                1220
6 ADDHYD 4 050    5 6 7                                  1                1230
6 REACH  3 060    7    5 1400.   0.44        1.94        1                1240
6 RUNOFF 1 060         6 0.05    45.         0.90        1                1250
6 ADDHYD 4 060    5 6 7                                  1 1              1260
6 SAVMOV 5 070    7    5                                                  1270
6 SAVMOV 5 070    1    6                                                  1280
6 ADDHYD 4 070    5 6 7                                  1 1              1290
6 REACH  3 080    7    5 700.    0.30        1.94        1                1300
6 RUNOFF 1 080         6 0.02    64.         0.12        1                1310
6 ADDHYD 4 080    5 6 7                                  1                1320
6 SAVMOV 5 100    7    5                                                  1330
6 RUNOFF 1 090         6 0.24    73.         0.62        1                1340
6 ADDHYD 4 100    5 6 7                                  1                1350
6 REACH  3 110    7    5 500.    0.30        1.94        1                1360
6 SAVMOV 5 120    5    7                                                  1370
6 REACH  3 120    7    5 500.    0.30        1.94        1                1380
```

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

 6 RUNOFF 1 120       6 0.19     56.        0.74      1               1390
 6 ADDHYD 4 120    5 6 7                              1 1             1400
 6 SAVMOV 5    50 7   6                                               1410
 6 RESVOR 2    50 6   7 2.4                           1 1 1           1420
 6 REACH  3 130   7   5 1000.    0.30       1.94      1               1430
 6 RUNOFF 1 130       6 0.05     74.        0.19      1               1440
 6 ADDHYD 4 130    5 6 7                              1               1450
 6 SAVMOV 5 130   7   6                                               1460
 6 RESVOR 2    60 6   7 2.0                           1 1 1           1470
 6 REACH  3 140   7   5 2500.    0.21       1.48      1               1480
 6 RUNOFF 1 140       6 0.20     66.        1.15      1               1490
 6 ADDHYD 4 140    5 6 7                              1               1500
 6 SAVMOV 5 150   7   5                                               1510
 6 RUNOFF 1 149       6 0.08     50.        0.42      1               1520
 6 ADDHYD 4 150    5 6 7                                              1530
 6 REACH  3 150   7   5 300.     0.21       1.48      1               1540
 6 RUNOFF 1 150       6 0.01     40.        0.15      1               1550
 6 ADDHYD 4 150    5 6 7                              1               1560
 6 SAVMOV 5 180   7   5                                               1570
 6 RUNOFF 1 180       6 0.28     50.        0.61      1               1580
 6 ADDHYD 4 180    5 6 7                              1               1590
 6 REACH  3 180   7   5 1700.0   0.21       1.48      1               1600
 6 RUNOFF 1 180       6 0.11     41.        0.48      1               1610
 6 ADDHYD 4 180    5 6 7                              1 1   1   1     1620
   ENDATA                                                             1630
 7 ALTER  3                                                           1690
 6 RUNOFF 1 020       6 0.28     54.0       1.02                      1700
 6 RUNOFF 1 140       6 0.20     68.0       0.19                      1710
 6 RUNOFF 1 180       6 0.11     42.0       0.48                      1720
 7 LIST                                                               1730
 7 BASFLO 5             3.0                                           1740
 7 INCREM 6             0.1                                           1750
 7 COMPUT 7    10 180   0.0      7.0        1.0       2 2  86  01     1760
   ENDCMP 1                                                           1770
   ENDJOB 2                                                           1690
0*********************************END OF 80-80 LIST*********************************
```

OCHANGES TO STANDARD CONTROL LIST FOLLOW

EXECUTIVE CONTROL OPERATION ALTER RECORD ID 1690

STANDARD CONTROL OPERATION RUNOFF CROSS SECTION 20 RECORD ID 1700

OUTPUT HYDROGRAPH = 6 DATA FIELD VALUES = .2800 54.0000 1.0200

OUTPUT OPTIONS IN EFFECT PEAK VOL SUM

STANDARD CONTROL OPERATION RUNOFF CROSS SECTION 140 RECORD ID 1710

OUTPUT HYDROGRAPH = 6 DATA FIELD VALUES = .2000 68.0000 .1900

OUTPUT OPTIONS IN EFFECT PEAK VOL SUM

STANDARD CONTROL OPERATION RUNOFF CROSS SECTION 180 RECORD ID 1720

OUTPUT HYDROGRAPH = 6 DATA FIELD VALUES = .1100 42.0000 .4800

OUTPUT OPTIONS IN EFFECT PEAK VOL SUM

EXECUTIVE CONTROL OPERATION LIST RECORD ID 1730

LISTING OF CURRENT DATA

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	10			
8		7.00	.00	4.33
8		7.40	2.50	5.01
8		7.60	5.00	5.36
8		7.80	10.00	5.70
8		8.20	22.00	6.38
8		8.60	52.00	7.07
8		9.00	62.00	7.75
8		9.50	96.00	8.61
8		10.00	126.00	9.47
8		11.00	198.00	11.18
8		12.00	280.00	12.89
8		13.00	360.00	14.79
8		14.00	440.00	16.68
8		15.00	500.00	18.58
8		15.10	600.00	18.60
9 ENDTBL				

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	20			
8		4.50	.00	6.80
8		4.90	1.50	7.88
8		5.10	3.70	8.42
8		5.50	11.00	9.51
8		5.70	15.00	10.13
8		6.10	25.00	11.13
8		6.50	40.00	12.21
8		7.10	60.00	13.84
8		7.90	78.00	16.01
8		8.50	79.00	17.63
8		9.50	100.00	20.34
8		10.50	126.00	23.06
8		11.50	150.00	25.76
8		11.60	300.00	26.04
9 ENDTBL				

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	30			
8		21.00	.00	.10
8		21.40	.60	.61
8		21.60	1.50	.86
8		21.80	2.50	1.12
8		22.20	5.20	1.62
8		22.60	8.20	2.13
8		23.00	11.00	2.64
8		23.50	20.00	3.27
8		24.00	27.00	3.91
8		25.00	39.00	5.18
8		26.00	49.00	6.45
8		27.00	57.00	7.72
8		27.10	200.00	7.74
9 ENDTBL				

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	40			
8		9.00	.00	.38
8		9.40	2.20	.47
8		9.60	5.00	.52
8		10.00	14.00	.62
8		10.20	21.00	.67
8		10.60	36.00	.77
8		11.00	55.00	.86
8		11.60	82.00	1.01
8		12.40	120.00	1.21
8		13.00	121.00	1.35
8		14.00	122.00	1.60
8		15.00	126.00	1.84
8		16.00	150.00	2.08
8		16.10	300.00	2.11
9 ENDTBL				

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	50			
8		2.40	.00	22.00
8		2.80	2.00	26.86
8		3.00	7.00	29.29
8		3.40	16.00	34.16
8		3.60	24.00	36.59
8		4.00	40.00	41.46
8		4.40	60.00	46.32
8		5.00	90.00	53.62

8		5.80	120.00	63.35
8		6.40	121.00	70.65
8		7.40	210.00	82.81
8		8.40	250.00	94.98
8		10.40	334.00	119.31
8		12.40	400.00	143.63
8		12.50	800.00	143.70
9 ENDTBL				

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	60			
8		2.00	.00	22.20
8		2.40	3.00	27.41
8		2.60	10.50	30.02
8		3.00	22.50	35.24
8		3.20	36.00	37.85
8		3.60	60.00	43.06
8		4.00	90.00	48.28
8		4.60	135.00	56.11
8		5.40	180.00	66.55
8		6.00	181.00	74.38
8		7.00	315.00	87.42
8		8.00	375.00	100.47
8		8.10	700.00	100.50
9 ENDTBL				

		TIME INCREMENT			
4 DIMHYD		.0200			
8	.0000	.0300	.1000	.1900	.3100
8	.4700	.6600	.8200	.9300	.9900
8	1.0000	.9900	.9300	.8600	.7800
8	.6800	.5600	.4600	.3900	.3300
8	.2800	.2410	.2070	.1740	.1470
8	.1260	.1070	.0910	.0770	.0660
8	.0550	.0470	.0400	.0340	.0290
8	.0250	.0210	.0180	.0150	.0130
8	.0110	.0090	.0080	.0070	.0060
8	.0050	.0040	.0030	.0020	.0010
8	.0000	.0000	.0000	.0000	.0000
9 ENDTBL					

COMPUTED PEAK RATE FACTOR = 484.00

```
    TABLE NO.       TIME INCREMENT
5 RAINFL 1                .5000

8              .0000      .0080      .0170      .0260      .0350
8              .0450      .0550      .0650      .0760      .0870
8              .0990      .1120      .1260      .1400      .1560
8              .1740      .1940      .2190      .2540      .3030
8              .5150      .5830      .6240      .6550      .6820
8              .7060      .7280      .7480      .7660      .7830
8              .7990      .8150      .8300      .8440      .8570
8              .8700      .8820      .8930      .9050      .9160
8              .9260      .9360      .9460      .9560      .9650
8              .9740      .9830      .9920     1.0000     1.0000
9 ENDTBL

    TABLE NO.       TIME INCREMENT
5 RAINFL 2                .2500

8              .0000      .0020      .0050      .0080      .0110
8              .0140      .0170      .0200      .0230      .0260
8              .0290      .0320      .0350      .0380      .0410
8              .0440      .0480      .0520      .0560      .0600
8              .0640      .0680      .0720      .0760      .0800
8              .0850      .0900      .0950      .1000      .1050
8              .1100      .1150      .1200      .1260      .1330
8              .1400      .1470      .1550      .1630      .1720
8              .1810      .1910      .2030      .2180      .2360
8              .2570      .2830      .3870      .6630      .7070
8              .7350      .7580      .7760      .7910      .8040
8              .8150      .8250      .8340      .8420      .8490
8              .8560      .8630      .8690      .8750      .8810
8              .8870      .8930      .8980      .9030      .9080
8              .9130      .9180      .9220      .9260      .9300
8              .9340      .9380      .9420      .9460      .9500
8              .9530      .9560      .9590      .9620      .9650
8              .9680      .9710      .9740      .9770      .9800
8              .9830      .9860      .9890      .9920      .9950
8              .9980     1.0000     1.0000     1.0000     1.0000
9 ENDTBL

    TABLE NO.       TIME INCREMENT
5 RAINFL 3                .5000

8              .0000      .0100      .0220      .0360      .0510
8              .0670      .0830      .0990      .1160      .1350
```

8	.1560	.1790	.2040	.2330	.2680
8	.3100	.4250	.4800	.5200	.5500
8	.5770	.6010	.6230	.6440	.6640
8	.6830	.7010	.7190	.7360	.7530
8	.7690	.7850	.8000	.8150	.8300
8	.8440	.8580	.8710	.8840	.8960
8	.9080	.9200	.9320	.9440	.9560
8	.9670	.9780	.9890	1.0000	1.0000

9 ENDTBL

TABLE NO. TIME INCREMENT
5 RAINFL 4 .5000

8	.0000	.0040	.0080	.0120	.0160
8	.0200	.0250	.0300	.0350	.0400
8	.0450	.0500	.0550	.0600	.0650
8	.0700	.0750	.0810	.0870	.0930
8	.0990	.1050	.1110	.1180	.1250
8	.1320	.1400	.1480	.1560	.1650
8	.1740	.1840	.1950	.2070	.2200
8	.2360	.2550	.2770	.3030	.4090
8	.5150	.5490	.5830	.6050	.6240
8	.6400	.6550	.6690	.6820	.6940
8	.7050	.7160	.7270	.7380	.7480
8	.7580	.7670	.7760	.7840	.7920
8	.8000	.8080	.8160	.8230	.8300
8	.8370	.8440	.8510	.8580	.8640
8	.8700	.8760	.8820	.8880	.8940
8	.9000	.9060	.9110	.9160	.9210
8	.9260	.9310	.9360	.9410	.9460
8	.9510	.9560	.9610	.9660	.9710
8	.9760	.9800	.9840	.9880	.9920
8	.9960	1.0000	1.0000	1.0000	1.0000

9 ENDTBL

TABLE NO. TIME INCREMENT
5 RAINFL 5 .5000

8	.0000	.0020	.0050	.0080	.0110
8	.0140	.0170	.0200	.0230	.0260
8	.0290	.0320	.0350	.0380	.0410
8	.0440	.0470	.0510	.0550	.0590
8	.0630	.0670	.0710	.0750	.0790
8	.0840	.0890	.0940	.0990	.1040
8	.1090	.1140	.1200	.1260	.1330
8	.1400	.1470	.1540	.1620	.1710
8	.1810	.1920	.2040	.2170	.2330

8	.2520	.2770	.3180	.6380	.6980
8	.7290	.7520	.7700	.7850	.7980
8	.8090	.8190	.8290	.8380	.8460
8	.8540	.8610	.8680	.8740	.8800
8	.8860	.8920	.8970	.9020	.9070
8	.9120	.9170	.9210	.9250	.9290
8	.9330	.9370	.9410	.9450	.9490
8	.9530	.9570	.9600	.9630	.9660
8	.9690	.9720	.9750	.9780	.9810
8	.9840	.9870	.9900	.9930	.9960
8	.9980	1.0000	1.0000	1.0000	1.0000

9 ENDTBL

TABLE NO. TIME INCREMENT
5 RAINFL 6 .0200

8	.0000	.0080	.0162	.0246	.0333
8	.0425	.0524	.0630	.0743	.0863
8	.0990	.1124	.1265	.1420	.1595
8	.1800	.2050	.2550	.3450	.4370
8	.5300	.6030	.6330	.6600	.6840
8	.7050	.7240	.7420	.7590	.7750
8	.7900	.8043	.8180	.8312	.8439
8	.8561	.8678	.8790	.8898	.9002
8	.9103	.9201	.9297	.9391	.9483
8	.9573	.9661	.9747	.9832	.9916
8	1.0000	1.0000	1.0000	1.0000	1.0000

9 ENDTBL

0 STANDARD CONTROL INSTRUCTIONS

```
6 RUNOFF 1    10      6         .8400     51.0000     7.50001 0 0 1 0 1
6 RESVOR 2    10 6    7        7.0000                       1 0 0 1 0 1
6 REACH  3  10    7   5    1750.0000      1.2000     1.10001 0 0 1 0 1
6 RUNOFF 1  10        6         .2000     42.0000      .19001 0 0 1 0 1
6 ADDHYD 4  10    5 6 7                                     1 1 0 1 0 1
6 SAVMOV 5  10    7   6
6 RESVOR 2    20 6    7        4.5000                       1 0 0 1 0 1
6 REACH  3  20    7   5    2900.0000       .2800     1.94001 0 0 1 0 1
6 RUNOFF 1  20        6         .2800     54.0000     1.02001 0 0 1 0 1
6 ADDHYD 4  20    5 6 7                                     1 1 0 1 0 1
6 SAVMOV 5  20    7   1
6 RUNOFF 1    30      6         .3700     49.0000     3.90001 0 0 1 0 1
6 RESVOR 2    30 6    7       21.0000                       1 0 0 1 0 1
6 REACH  3  40    7   5    1300.0000       .8800     1.10001 0 0 1 0 1
6 RUNOFF 1  40        6         .0600     40.0000     1.00001 0 0 1 0 1
6 ADDHYD 4  40    5 6 7                                     1 0 0 1 0 1
6 SAVMOV 5  40    7   6
6 RESVOR 2    40 6    7        9.0000                       1 0 0 1 0 1
6 REACH  3  50    7   5    1700.0000      1.6000     1.45001 0 0 1 0 1
6 RUNOFF 1  49        6         .1100     40.0000     1.67001 0 0 1 0 1
6 ADDHYD 4  50    5 6 7                                     1 0 0 1 0 1
6 SAVMOV 5  50    7   5
6 RUNOFF 1  50        6         .3600     85.0000      .42001 0 0 1 0 1
6 ADDHYD 4  50    5 6 7                                     1 0 0 1 0 1
6 REACH  3  60    7   5    1400.0000       .4400     1.94001 0 0 1 0 1
6 RUNOFF 1  60        6         .0500     45.0000      .90001 0 0 1 0 1
6 ADDHYD 4  60    5 6 7                                     1 1 0 1 0 1
6 SAVMOV 5  70    7   5
6 SAVMOV 5  70    1   6
6 ADDHYD 4  70    5 6 7                                     1 1 0 1 0 1
6 REACH  3  80    7   5     700.0000       .3000     1.94001 0 0 1 0 1
6 RUNOFF 1  80        6         .0200     64.0000      .12001 0 0 1 0 1
6 ADDHYD 4  80    5 6 7                                     1 0 0 1 0 1
6 SAVMOV 5 100    7   5
6 RUNOFF 1  90        6         .2400     73.0000      .62001 0 0 1 0 1
6 ADDHYD 4 100    5 6 7                                     1 0 0 1 0 1
6 REACH  3 110    7   5     500.0000       .3000     1.94001 0 0 1 0 1
6 SAVMOV 5 120    5   7
6 REACH  3 120    7   5     500.0000       .3000     1.94001 0 0 1 0 1
6 RUNOFF 1 120        6         .1900     56.0000      .74001 0 0 1 0 1
6 ADDHYD 4 120    5 6 7                                     1 1 0 1 0 1
6 SAVMOV 5    50 7    6
6 RESVOR 2    50 6    7        2.4000                       1 1 1 1 0 1
6 REACH  3 130    7   5    1000.0000       .3000     1.94001 0 0 1 0 1
6 RUNOFF 1 130        6         .0500     74.0000      .19001 0 0 1 0 1
```

```
6 ADDHYD 4 130    5 6 7                                      1 0 0 1 0 1
6 SAVMOV 5 130    7   6
6 RESVOR 2     60 6   7        2.0000                        1 1 1 1 0 1
6 REACH  3 140    7   5     2500.0000       .2100     1.48001 0 0 1 0 1
6 RUNOFF 1 140        6         .2000     68.0000      .19001 0 0 1 0 1
6 ADDHYD 4 140    5 6 7                                      1 0 0 1 0 1
6 SAVMOV 5 150    7   5
6 RUNOFF 1 149        6         .0800     50.0000      .42001 0 0 1 0 1
6 ADDHYD 4 150    5 6 7                                      1 0 0 1 0 1
6 REACH  3 150    7   5      300.0000       .2100     1.48001 0 0 1 0 1
6 RUNOFF 1 150        6         .0100     40.0000      .15001 0 0 1 0 1
6 ADDHYD 4 150    5 6 7                                      1 0 0 1 0 1
6 SAVMOV 5 180    7   5
6 RUNOFF 1 180        6         .1100     42.0000      .48001 0 0 1 0 1
6 ADDHYD 4 180    5 6 7                                      1 0 0 1 0 1
6 REACH  3 180    7   5     1700.0000       .2100     1.48001 0 0 1 0 1
6 RUNOFF 1 180        6         .1100     41.0000      .48001 0 0 1 0 1
6 ADDHYD 4 180    5 6 7                                      1 1 0 1 0 1
  ENDATA

END OF LISTING
```

```
EXECUTIVE CONTROL OPERATION BASFLO                                                              RECORD ID    1740
+                                  NEW BASEFLOW =   3.00 CFS

EXECUTIVE CONTROL OPERATION INCREM                                                              RECORD ID    1750
+                                  MAIN TIME INCREMENT =    .10 HOURS

EXECUTIVE CONTROL OPERATION COMPUT                                                              RECORD ID    1760
+                                  FROM STRUCTURE 10
+                                                 TO XSECTION 180
      STARTING TIME =   .00    RAIN DEPTH =  7.00    RAIN DURATION=  1.00    RAIN TABLE NO.= 2    ANT. MOIST. COND= 2
      ALTERNATE NO.=86         STORM NO.= 1    MAIN TIME INCREMENT =   .10 HOURS

OPERATION RUNOFF    STRUCTURE 10
        OUTPUT HYDROGRAPH=  6
        AREA=     .84 SQ MI   INPUT RUNOFF CURVE= 51.    TIME OF CONCENTRATION=  7.50 HOURS
        INTERNAL HYDROGRAPH TIME INCREMENT=  .1000 HOURS

        PEAK TIME(HRS)              PEAK DISCHARGE(CFS)            PEAK ELEVATION(FEET)
          17.80                          96.56                           (RUNOFF)

  RUNOFF VOLUME ABOVE BASEFLOW =  1.67 WATERSHED INCHES,    906.24 CFS-HRS,    74.89 ACRE-FEET;   BASEFLOW =     .00 CFS

OPERATION RESVOR    STRUCTURE 10
        INPUT HYDROGRAPH= 6     OUTPUT HYDROGRAPH= 7
        SURFACE ELEVATION=     7.00

        PEAK TIME(HRS)              PEAK DISCHARGE(CFS)            PEAK ELEVATION(FEET)
          18.14                          96.09                             9.50

  RUNOFF VOLUME ABOVE BASEFLOW =  1.63 WATERSHED INCHES,    884.09 CFS-HRS,    73.06 ACRE-FEET;   BASEFLOW =     .00 CFS

OPERATION REACH     CROSS SECTION  10
        INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 5
        LENGTH =   1750.00 FEET      INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA,  X=  1.20,    M= 1.10
0       MODIFIED ATT-KIN ROUTING COEFFICIENT =  .34      PEAK TRAVEL TIME =   .40 HOURS
0    *** WARNING - REACH  10 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT      18.15 CFS,  18.88 % OF PEAK.

        PEAK TIME(HRS)              PEAK DISCHARGE(CFS)            PEAK ELEVATION(FEET)
          18.47                          98.84                            (NULL)

  RUNOFF VOLUME ABOVE BASEFLOW =  1.62 WATERSHED INCHES,    878.37 CFS-HRS,    72.59 ACRE-FEET;   BASEFLOW =   3.00 CFS

OPERATION RUNOFF    CROSS SECTION  10
        OUTPUT HYDROGRAPH=  6
```

OUTPUT HYDROGRAPH= 6
AREA= .20 SQ MI INPUT RUNOFF CURVE= 42. TIME OF CONCENTRATION= .19 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0253 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.08	121.81	(RUNOFF)
15.20	8.69	(RUNOFF)
16.46	7.85	(RUNOFF)
17.67	6.75	(RUNOFF)
19.66	5.63	(RUNOFF)
23.66	4.48	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 1.00 WATERSHED INCHES, 128.54 CFS-HRS, 10.62 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 10
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.08	124.81	(NULL)
18.48	104.33	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 1.04 SQ.MI.

11.00	DISCHG	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.92	32.22
12.00	DISCHG	103.79	122.67	68.37	48.48	36.93	31.73	29.33	27.26	26.59	24.26
13.00	DISCHG	23.05	22.09	20.81	20.53	19.65	19.34	18.92	18.32	18.54	18.63
14.00	DISCHG	19.37	20.36	21.44	23.10	24.57	26.43	28.32	30.58	34.13	38.16
15.00	DISCHG	42.29	46.34	50.23	53.88	56.65	58.95	61.10	63.08	64.97	66.81
16.00	DISCHG	68.65	71.17	74.19	77.35	80.46	83.41	85.78	87.66	89.73	91.75
17.00	DISCHG	93.63	95.35	96.91	98.34	99.64	100.81	101.85	102.75	103.42	103.37
18.00	DISCHG	103.47	103.75	104.01	104.19	104.30	104.32	104.27	104.13	103.93	103.65
19.00	DISCHG	103.31	102.89	102.39	101.82	101.18	100.46	99.66	98.79	97.73	95.99
20.00	DISCHG	94.45	93.18	91.97	90.75	89.51	88.27	87.03	85.81	84.61	83.43
21.00	DISCHG	82.27	81.14	80.03	78.94	77.87	76.82	75.80	74.79	73.81	72.84
22.00	DISCHG	71.90	71.02	70.32	69.71	69.16	68.63	68.11	67.58	67.04	66.49
23.00	DISCHG	65.93	65.36	64.77	64.17	63.56	62.94	62.32	61.69	60.95	59.41
24.00	DISCHG	57.89	55.77	53.21	51.69	50.62	49.72	48.91	48.18	47.50	46.85
25.00	DISCHG	46.24	45.66	45.10	44.55	44.02	43.50	42.98	42.48	41.98	41.49
26.00	DISCHG	41.00	40.51	40.03	39.55	39.07	38.60	38.12	37.63	37.15	36.66
27.00	DISCHG	36.16	35.66	35.15	34.64	34.13	33.61	33.09	32.57	32.04	31.51
28.00	DISCHG	30.97	30.44	29.90	29.36	28.82	28.28	27.74	27.21	26.67	26.13
29.00	DISCHG	25.68	25.30	24.94	24.59	24.24	23.89	23.52	23.14	22.75	22.35

RUNOFF VOLUME ABOVE BASEFLOW = 1.50 WATERSHED INCHES, 1006.91 CFS-HRS, 83.21 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 10
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 6

OPERATION RESVOR STRUCTURE 20
INPUT HYDROGRAPH= 6 OUTPUT HYDROGRAPH= 7
SURFACE ELEVATION= 4.50

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.90	24.55	6.08
20.10	93.18	9.18

RUNOFF VOLUME ABOVE BASEFLOW = 1.45 WATERSHED INCHES, 970.12 CFS-HRS, 80.17 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 20
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 2900.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .28, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = .72 PEAK TRAVEL TIME = .10 HOURS

*** WARNING REACH 20 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***
0 *** WARNING - REACH 20 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT 23.17 CFS, 25.69 % OF PEAK.

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.04	24.51	(NULL)
20.25	93.15	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 1.44 WATERSHED INCHES, 966.86 CFS-HRS, 79.90 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 20
OUTPUT HYDROGRAPH= 6
AREA= .28 SQ MI INPUT RUNOFF CURVE= 54. TIME OF CONCENTRATION= 1.02 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0971 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.60	168.04	(RUNOFF)
23.72	9.33	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 2.03 WATERSHED INCHES, 366.66 CFS-HRS, 30.30 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 20
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.61	190.93	(NULL)
20.06	104.86	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 1.32 SQ.MI.

11.00	DISCHG	3.00	3.00	3.01	3.04	3.14	3.39	4.10	5.77	9.85	19.17
12.00	DISCHG	36.40	64.15	100.69	138.20	167.76	185.17	190.87	187.22	176.62	161.62
13.00	DISCHG	145.61	131.49	119.84	109.90	101.25	93.59	86.94	81.13	75.98	71.45
14.00	DISCHG	67.48	64.04	61.07	58.52	56.36	54.54	53.05	51.84	50.88	50.19
15.00	DISCHG	49.81	50.04	50.84	52.09	53.70	55.54	57.46	59.38	61.10	62.78
16.00	DISCHG	64.47	66.18	67.96	69.85	71.88	74.04	76.29	78.11	79.70	81.18
17.00	DISCHG	82.62	84.03	85.46	86.90	88.36	89.85	91.37	92.62	93.00	93.12

18.00	DISCHG	93.13	93.07	92.94	92.76	92.56	92.77	93.74	94.87	96.03	97.16
19.00	DISCHG	98.24	99.25	100.20	101.07	101.86	102.58	103.23	103.79	104.26	104.62
20.00	DISCHG	104.82	104.84	104.68	104.38	103.97	103.50	102.99	102.46	101.92	101.37
21.00	DISCHG	100.81	100.23	99.62	99.00	98.36	97.69	97.01	96.31	95.60	94.87
22.00	DISCHG	94.12	93.37	92.61	91.84	91.08	90.33	89.59	88.87	88.41	88.25
23.00	DISCHG	88.16	88.09	88.03	87.97	87.91	87.84	87.77	87.70	87.61	87.49
24.00	DISCHG	87.31	86.84	85.39	83.47	81.26	78.87	76.45	74.08	71.84	69.76
25.00	DISCHG	67.86	66.13	64.55	63.10	61.74	60.27	58.70	57.19	55.77	54.45
26.00	DISCHG	53.21	52.05	50.96	49.93	48.95	48.03	47.15	46.32	45.51	44.74
27.00	DISCHG	44.00	43.28	42.59	41.91	41.26	40.61	39.96	39.28	38.60	37.94
28.00	DISCHG	37.29	36.66	36.04	35.42	34.82	34.22	33.63	33.04	32.46	31.88
29.00	DISCHG	31.31	30.74	30.19	29.66	29.14	28.64	28.16	27.69	27.23	26.78

RUNOFF VOLUME ABOVE BASEFLOW = 1.57 WATERSHED INCHES, 1333.52 CFS-HRS, 110.20 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 20
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 1

OPERATION RUNOFF STRUCTURE 30
OUTPUT HYDROGRAPH= 6
AREA= .37 SQ MI INPUT RUNOFF CURVE= 49. TIME OF CONCENTRATION= 3.90 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .1000 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
14.95	60.58	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 1.57 WATERSHED INCHES, 375.61 CFS-HRS, 31.04 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION RESVOR STRUCTURE 30
INPUT HYDROGRAPH= 6 OUTPUT HYDROGRAPH= 7
SURFACE ELEVATION= 21.00

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
16.21	48.05	25.91

RUNOFF VOLUME ABOVE BASEFLOW = 1.51 WATERSHED INCHES, 360.28 CFS-HRS, 29.77 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION REACH CROSS SECTION 40
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 1300.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .88, M= 1.10
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = .32 PEAK TRAVEL TIME = .30 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
16.55	47.70	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 1.50 WATERSHED INCHES, 358.97 CFS-HRS, 29.67 ACRE-FEET; BASEFLOW = .00 CFS

```
OPERATION RUNOFF   CROSS SECTION  40
         OUTPUT HYDROGRAPH=  6
         AREA=    .06 SQ MI   INPUT RUNOFF CURVE= 40.    TIME OF CONCENTRATION=  1.00 HOURS
         INTERNAL HYDROGRAPH TIME INCREMENT=  .0952 HOURS

         PEAK TIME(HRS)            PEAK DISCHARGE(CFS)         PEAK ELEVATION(FEET)
            12.72                        10.21                      (RUNOFF)
            23.76                         1.21                      (RUNOFF)

  RUNOFF VOLUME ABOVE BASEFLOW =   .84 WATERSHED INCHES,     32.57 CFS-HRS,     2.69 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION ADDHYD   CROSS SECTION  40
         INPUT HYDROGRAPHS= 5,6     OUTPUT HYDROGRAPH= 7

         PEAK TIME(HRS)            PEAK DISCHARGE(CFS)         PEAK ELEVATION(FEET)
            12.73                        10.35                      (NULL)
            16.54                        49.80                      (NULL)

  RUNOFF VOLUME ABOVE BASEFLOW =  1.41 WATERSHED INCHES,    391.54 CFS-HRS,    32.36 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION SAVMOV   CROSS SECTION  40
         INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 6

OPERATION RESVOR   STRUCTURE 40
         INPUT HYDROGRAPH= 6     OUTPUT HYDROGRAPH= 7
         SURFACE ELEVATION=     9.00

         PEAK TIME(HRS)            PEAK DISCHARGE(CFS)         PEAK ELEVATION(FEET)
            12.90                         9.83                        9.81
            16.60                        49.78                       10.89

  RUNOFF VOLUME ABOVE BASEFLOW =  1.41 WATERSHED INCHES,    389.94 CFS-HRS,    32.22 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION REACH    CROSS SECTION  50
         INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 5
         LENGTH =    1700.00 FEET      INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA,  X=  1.60,    M= 1.45
0        MODIFIED ATT-KIN ROUTING COEFFICIENT =  .83      PEAK TRAVEL TIME =     .10 HOURS

     ***  WARNING  REACH  50 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***

         PEAK TIME(HRS)            PEAK DISCHARGE(CFS)         PEAK ELEVATION(FEET)
            13.02                         9.78                      (NULL)
            16.72                        49.77                      (NULL)

  RUNOFF VOLUME ABOVE BASEFLOW =  1.40 WATERSHED INCHES,    389.36 CFS-HRS,    32.18 ACRE-FEET;   BASEFLOW =    .00 CFS
```

OPERATION RUNOFF CROSS SECTION 49
OUTPUT HYDROGRAPH= 6
AREA= .11 SQ MI INPUT RUNOFF CURVE= 40. TIME OF CONCENTRATION= 1.67 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .1012 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.33	13.76	(RUNOFF)
23.80	2.20	(RUNOFF)
+	*	* FIRST POINT OF FLAT PEAK

RUNOFF VOLUME ABOVE BASEFLOW = .84 WATERSHED INCHES, 59.78 CFS-HRS, 4.94 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 50
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.16	22.91	(NULL)
16.65	53.98	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 1.29 WATERSHED INCHES, 449.14 CFS-HRS, 37.12 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION SAVMOV CROSS SECTION 50
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5

OPERATION RUNOFF CROSS SECTION 50
OUTPUT HYDROGRAPH= 6
AREA= .36 SQ MI INPUT RUNOFF CURVE= 85. TIME OF CONCENTRATION= .42 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0560 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.13	1078.73	(RUNOFF)
19.65	24.75	(RUNOFF)
23.65	18.64	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 5.25 WATERSHED INCHES, 1220.14 CFS-HRS, 100.83 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 50
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.13	1079.95	(NULL)
16.49	90.76	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.87 WATERSHED INCHES, 1669.27 CFS-HRS, 137.95 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION REACH CROSS SECTION 60
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 1400.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .44, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 60 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.13	1079.95	(NULL)
16.49	90.76	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.87 WATERSHED INCHES, 1669.27 CFS-HRS, 137.95 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION RUNOFF CROSS SECTION 60
OUTPUT HYDROGRAPH= 6
AREA= .05 SQ MI INPUT RUNOFF CURVE= 45. TIME OF CONCENTRATION= .90 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .1000 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.56	16.56	(RUNOFF)
23.72	1.26	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 1.24 WATERSHED INCHES, 39.88 CFS-HRS, 3.30 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 60
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.14	1086.21	(NULL)
16.49	93.02	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = .95 SQ.MI.

4.00	DISCHG	.00	.00	.00	.02	.10	.26	.49	.75	1.04	1.33
5.00	DISCHG	1.62	1.91	2.20	2.49	2.77	3.04	3.32	3.58	3.84	4.10
6.00	DISCHG	4.36	4.67	5.18	5.80	6.40	6.89	7.32	7.71	8.07	8.41
7.00	DISCHG	8.75	9.07	9.38	9.69	9.99	10.29	10.58	10.86	11.14	11.41
8.00	DISCHG	11.68	12.08	12.82	13.80	14.96	16.27	17.48	18.44	19.17	19.76
9.00	DISCHG	20.27	20.91	21.91	23.16	24.29	25.16	26.02	27.23	28.66	29.92
10.00	DISCHG	30.90	31.86	33.18	34.84	37.10	40.08	43.57	47.95	52.84	58.21
11.00	DISCHG	64.10	70.07	76.45	83.02	90.75	101.27	130.10	208.30	333.15	539.50
12.00	DISCHG	836.25	1068.68	1030.91	805.58	576.69	421.03	324.82	265.51	227.09	199.69
13.00	DISCHG	178.52	161.72	147.53	136.12	127.20	119.75	113.25	107.02	101.45	96.86
14.00	DISCHG	93.29	90.54	88.31	86.99	86.63	86.30	86.13	85.74	85.37	85.47
15.00	DISCHG	86.26	87.42	88.85	90.29	90.92	90.62	90.19	90.11	90.41	90.86
16.00	DISCHG	91.35	91.83	92.25	92.60	92.86	93.02	92.76	91.64	89.95	88.43
17.00	DISCHG	87.35	86.55	85.87	85.24	84.63	84.03	83.43	82.82	82.11	80.76
18.00	DISCHG	78.62	76.40	74.60	73.30	72.20	71.21	70.27	69.38	68.51	67.67

19.00	DISCHG	66.86	66.07	65.33	64.68	63.99	63.30	62.62	61.96	61.19	59.85
20.00	DISCHG	57.76	55.58	53.88	52.62	51.60	50.72	49.94	49.23	48.56	47.93
21.00	DISCHG	47.34	46.79	46.26	45.76	45.28	44.83	44.40	43.97	43.53	43.10
22.00	DISCHG	42.70	42.29	41.89	41.51	41.15	40.80	40.46	40.14	39.84	39.55
23.00	DISCHG	39.27	39.01	38.75	38.51	38.28	38.06	37.85	37.65	37.37	36.46
24.00	DISCHG	34.72	32.26	28.67	24.55	21.18	18.97	17.56	16.54	15.77	15.13
25.00	DISCHG	14.59	14.12	13.71	13.34	13.02	12.72	12.45	12.20	11.96	11.76
26.00	DISCHG	11.57	11.41	11.25	11.11	10.97	10.84	10.71	10.57	10.42	10.28
27.00	DISCHG	10.13	9.97	9.81	9.64	9.47	9.29	9.11	8.93	8.74	8.54
28.00	DISCHG	8.34	8.13	7.93	7.72	7.51	7.29	7.08	6.87	6.67	6.46
29.00	DISCHG	6.26	6.06	5.87	5.68	5.49	5.32	5.14	4.99	4.87	4.74

RUNOFF VOLUME ABOVE BASEFLOW = 2.79 WATERSHED INCHES, 1709.15 CFS-HRS, 141.24 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION SAVMOV CROSS SECTION 70
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5

OPERATION SAVMOV CROSS SECTION 70
INPUT HYDROGRAPH= 1 OUTPUT HYDROGRAPH= 6

OPERATION ADDHYD CROSS SECTION 70
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.15	1164.89	(NULL)
17.72	175.45	(NULL)
19.49	165.88	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 2.27 SQ.MI.

4.00	DISCHG	3.00	3.00	3.00	3.02	3.10	3.26	3.49	3.75	4.04	4.33
5.00	DISCHG	4.62	4.91	5.20	5.49	5.77	6.04	6.32	6.58	6.84	7.10
6.00	DISCHG	7.36	7.67	8.18	8.80	9.40	9.89	10.32	10.71	11.07	11.41
7.00	DISCHG	11.75	12.07	12.38	12.69	12.99	13.29	13.58	13.86	14.14	14.41
8.00	DISCHG	14.68	15.08	15.82	16.80	17.96	19.27	20.48	21.44	22.17	22.76
9.00	DISCHG	23.27	23.91	24.91	26.16	27.29	28.16	29.02	30.23	31.66	32.92
10.00	DISCHG	33.90	34.86	36.18	37.84	40.10	43.08	46.57	50.95	55.84	61.21
11.00	DISCHG	67.10	73.07	79.46	86.06	93.89	104.67	134.20	214.07	343.00	558.67
12.00	DISCHG	872.65	1132.82	1131.60	943.78	744.44	606.20	515.69	452.73	403.70	361.31
13.00	DISCHG	324.13	293.22	267.37	246.01	228.46	213.34	200.20	188.14	177.42	168.31
14.00	DISCHG	160.76	154.59	149.38	145.51	142.98	140.84	139.17	137.58	136.25	135.66
15.00	DISCHG	136.07	137.46	139.69	142.38	144.62	146.15	147.65	149.50	151.51	153.64
16.00	DISCHG	155.82	158.01	160.21	162.45	164.74	167.06	169.05	169.75	169.64	169.61
17.00	DISCHG	169.97	170.58	171.32	172.14	173.00	173.89	174.80	175.44	175.11	173.88
18.00	DISCHG	171.75	169.47	167.54	166.06	164.76	163.98	164.01	164.25	164.54	164.83
19.00	DISCHG	165.09	165.32	165.52	165.74	165.85	165.88	165.84	165.75	165.45	164.47
20.00	DISCHG	162.58	160.42	158.56	157.00	155.57	154.23	152.94	151.68	150.47	149.30

21.00	DISCHG	148.15	147.01	145.88	144.76	143.64	142.52	141.41	140.28	139.13	137.97
22.00	DISCHG	136.82	135.66	134.50	133.35	132.22	131.12	130.05	129.01	128.25	127.79
23.00	DISCHG	127.43	127.10	126.79	126.48	126.19	125.90	125.62	125.35	124.99	123.95
24.00	DISCHG	122.03	119.10	114.06	108.02	102.44	97.84	94.01	90.63	87.61	84.89
25.00	DISCHG	82.45	80.25	78.26	76.44	74.76	72.99	71.15	69.39	67.74	66.20
26.00	DISCHG	64.78	63.45	62.21	61.04	59.93	58.87	57.86	56.88	55.94	55.02
27.00	DISCHG	54.13	53.25	52.40	51.56	50.73	49.91	49.07	48.20	47.34	46.48
28.00	DISCHG	45.63	44.79	43.96	43.14	42.32	41.51	40.71	39.91	39.12	38.34
29.00	DISCHG	37.57	36.81	36.06	35.34	34.64	33.96	33.31	32.68	32.10	31.52

RUNOFF VOLUME ABOVE BASEFLOW = 2.08 WATERSHED INCHES, 3042.67 CFS-HRS, 251.45 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 80
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 700.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .30, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 80 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.15	1164.89	(NULL)
17.72	175.45	(NULL)
19.49	165.88	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.08 WATERSHED INCHES, 3042.67 CFS-HRS, 251.45 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 80
OUTPUT HYDROGRAPH= 6
AREA= .02 SQ MI INPUT RUNOFF CURVE= 64. TIME OF CONCENTRATION= .12 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0160 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
11.98	54.99	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 2.98 WATERSHED INCHES, 38.49 CFS-HRS, 3.18 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 80
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.14	1184.64	(NULL)
17.71	176.77	(NULL)
19.49	166.96	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.08 WATERSHED INCHES, 3081.15 CFS-HRS, 254.63 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 100

```
          INPUT HYDROGRAPH= 7    OUTPUT HYDROGRAPH= 5


 OPERATION RUNOFF   CROSS SECTION  90
          OUTPUT HYDROGRAPH=  6
          AREA=    .24 SQ MI   INPUT RUNOFF CURVE= 73.    TIME OF CONCENTRATION=    .62 HOURS
          INTERNAL HYDROGRAPH TIME INCREMENT=  .0827 HOURS

          PEAK TIME(HRS)              PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
             12.27                        434.61                        (RUNOFF)
             19.66                         14.73                        (RUNOFF)
             23.66                         11.19                        (RUNOFF)

  RUNOFF VOLUME ABOVE BASEFLOW =  3.93 WATERSHED INCHES,    608.63 CFS-HRS,    50.30 ACRE-FEET;  BASEFLOW =     .00 CFS


 OPERATION ADDHYD   CROSS SECTION 100
          INPUT HYDROGRAPHS= 5,6     OUTPUT HYDROGRAPH= 7

          PEAK TIME(HRS)              PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
             12.17                       1575.11                        (NULL)
             16.68                        192.50                        (NULL)
             17.71                        195.10                        (NULL)
             19.50                        181.68                        (NULL)

  RUNOFF VOLUME ABOVE BASEFLOW =  2.26 WATERSHED INCHES,   3689.79 CFS-HRS,   304.92 ACRE-FEET;  BASEFLOW =    3.00 CFS


 OPERATION REACH    CROSS SECTION 110
          INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 5
          LENGTH =     500.00 FEET      INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA,  X=   .30,   M= 1.94
0         MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00      PEAK TRAVEL TIME =     .00 HOURS

    ***  WARNING  REACH 110 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***

          PEAK TIME(HRS)              PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
             12.17                       1575.11                        (NULL)
             16.68                        192.50                        (NULL)
             17.71                        195.10                        (NULL)
             19.50                        181.68                        (NULL)

  RUNOFF VOLUME ABOVE BASEFLOW =  2.26 WATERSHED INCHES,   3689.79 CFS-HRS,   304.92 ACRE-FEET;  BASEFLOW =    3.00 CFS


 OPERATION SAVMOV   CROSS SECTION 120
          INPUT HYDROGRAPH= 5     OUTPUT HYDROGRAPH= 7


 OPERATION REACH    CROSS SECTION 120
          INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 5
          LENGTH =     500.00 FEET      INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA,  X=   .30,   M= 1.94
0         MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00      PEAK TRAVEL TIME =     .00 HOURS
```

*** WARNING REACH 120 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.17	1575.11	(NULL)
16.68	192.50	(NULL)
17.71	195.10	(NULL)
19.50	181.68	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.26 WATERSHED INCHES, 3689.79 CFS-HRS, 304.92 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 120
OUTPUT HYDROGRAPH= 6
AREA= .19 SQ MI INPUT RUNOFF CURVE= 56. TIME OF CONCENTRATION= .74 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0987 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.38	159.29	(RUNOFF)
19.68	8.61	(RUNOFF)
23.67	6.65	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 2.22 WATERSHED INCHES, 271.72 CFS-HRS, 22.45 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 120
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.19	1701.00	(NULL)
16.67	204.84	(NULL)
17.70	205.71	(NULL)
19.50	190.28	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 2.72 SQ.MI.

4.00	DISCHG	3.00	3.00	3.00	3.02	3.10	3.26	3.49	3.75	4.04	4.33
5.00	DISCHG	4.62	4.91	5.20	5.49	5.77	6.04	6.32	6.58	6.84	7.10
6.00	DISCHG	7.36	7.67	8.18	8.80	9.40	9.89	10.32	10.71	11.07	11.41
7.00	DISCHG	11.75	12.07	12.38	12.69	12.99	13.30	13.62	13.96	14.33	14.71
8.00	DISCHG	15.11	15.65	16.55	17.73	19.11	20.68	22.18	23.45	24.48	25.36
9.00	DISCHG	26.17	27.10	28.43	30.05	31.57	32.84	34.14	35.80	37.74	39.53
10.00	DISCHG	41.03	42.53	44.41	46.70	49.75	53.63	58.32	64.09	70.62	77.95
11.00	DISCHG	85.99	94.52	103.70	113.50	125.22	140.74	184.79	289.19	466.16	779.51
12.00	DISCHG	1229.34	1607.92	1698.69	1539.99	1298.92	1079.45	901.93	767.23	663.80	579.86
13.00	DISCHG	512.00	456.38	411.05	373.98	343.54	318.23	296.28	276.82	259.58	244.73
14.00	DISCHG	232.53	222.30	213.60	206.65	201.28	196.65	192.46	188.50	184.96	182.39
15.00	DISCHG	181.17	181.32	182.67	184.68	186.11	186.81	187.31	188.14	189.26	190.70
16.00	DISCHG	192.41	194.29	196.29	198.40	200.62	202.88	204.57	204.79	203.95	203.02
17.00	DISCHG	202.48	202.34	202.54	202.99	203.61	204.33	205.14	205.71	205.23	203.56
18.00	DISCHG	200.84	197.69	194.82	192.49	190.52	189.27	188.98	189.02	189.16	189.36

19.00	DISCHG	189.56	189.75	189.93	190.14	190.25	190.28	190.25	190.16	189.78	188.38
20.00	DISCHG	185.91	182.87	180.05	177.62	175.52	173.70	172.09	170.62	169.25	167.98
21.00	DISCHG	166.76	165.57	164.42	163.28	162.15	161.03	159.91	158.78	157.64	156.49
22.00	DISCHG	155.34	154.19	153.04	151.90	150.78	149.69	148.62	147.59	146.84	146.39
23.00	DISCHG	146.04	145.72	145.41	145.11	144.83	144.55	144.28	144.01	143.55	142.08
24.00	DISCHG	139.50	135.08	128.06	119.61	111.41	104.43	98.65	93.83	89.82	86.43
25.00	DISCHG	83.51	80.99	78.77	76.79	75.00	73.16	71.26	69.46	67.78	66.22
26.00	DISCHG	64.79	63.46	62.21	61.04	59.93	58.87	57.86	56.88	55.94	55.02
27.00	DISCHG	54.13	53.25	52.40	51.56	50.73	49.91	49.07	48.20	47.34	46.48
28.00	DISCHG	45.63	44.79	43.96	43.14	42.32	41.51	40.71	39.91	39.12	38.34
29.00	DISCHG	37.57	36.81	36.06	35.34	34.64	33.96	33.31	32.68	32.10	31.52

RUNOFF VOLUME ABOVE BASEFLOW = 2.26 WATERSHED INCHES, 3961.51 CFS-HRS, 327.38 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV STRUCTURE 50
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 6

OPERATION RESVOR STRUCTURE 50
INPUT HYDROGRAPH= 6 OUTPUT HYDROGRAPH= 7
SURFACE ELEVATION= 2.40

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.37	353.22	10.98

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 2.72 SQ.MI.

9.00	DISCHG	3.00	3.00	3.00	3.43	3.89	4.37	4.86	5.37	5.90	6.45
9.00	ELEV	2.84	2.84	2.84	2.86	2.88	2.89	2.91	2.93	2.96	2.98
10.00	DISCHG	7.02	7.55	8.09	8.66	9.26	9.90	10.60	11.37	12.21	13.16
10.00	ELEV	3.00	3.02	3.05	3.07	3.10	3.13	3.16	3.19	3.23	3.27
11.00	DISCHG	14.20	15.35	17.10	19.56	22.23	25.21	28.89	34.46	44.57	63.90
11.00	ELEV	3.32	3.37	3.43	3.49	3.56	3.63	3.72	3.86	4.09	4.48
12.00	DISCHG	94.00	120.33	176.22	233.26	265.79	291.77	311.43	326.15	336.45	342.78
12.00	ELEV	5.11	6.00	7.02	7.98	8.78	9.39	9.86	10.21	10.47	10.67
13.00	DISCHG	347.28	350.32	352.17	353.06	353.19	352.69	351.69	350.24	348.42	346.29
13.00	ELEV	10.80	10.89	10.95	10.98	10.98	10.97	10.94	10.89	10.84	10.77
14.00	DISCHG	343.90	341.32	338.58	335.73	332.49	328.73	324.96	321.17	317.39	313.63
14.00	ELEV	10.70	10.62	10.54	10.45	10.36	10.27	10.18	10.09	10.00	9.91
15.00	DISCHG	309.92	306.30	302.80	299.45	296.24	293.16	290.17	287.29	284.52	281.86
15.00	ELEV	9.83	9.74	9.66	9.58	9.50	9.43	9.36	9.29	9.22	9.16
16.00	DISCHG	279.32	276.90	274.60	272.43	270.38	268.45	266.63	264.88	263.18	261.50
16.00	ELEV	9.10	9.04	8.99	8.93	8.89	8.84	8.80	8.75	8.71	8.67
17.00	DISCHG	259.85	258.23	256.66	255.15	253.69	252.29	250.95	249.69	248.50	247.32
17.00	ELEV	8.63	8.60	8.56	8.52	8.49	8.45	8.42	8.39	8.36	8.33
18.00	DISCHG	246.11	244.85	243.55	242.22	240.86	239.49	238.14	236.82	235.54	234.30
18.00	ELEV	8.30	8.27	8.24	8.21	8.17	8.14	8.10	8.07	8.04	8.01
19.00	DISCHG	233.10	231.94	230.81	229.72	228.66	227.63	226.63	225.65	224.70	223.74
19.00	ELEV	7.98	7.95	7.92	7.89	7.87	7.84	7.82	7.79	7.77	7.74
20.00	DISCHG	222.76	221.73	220.65	219.53	218.38	217.21	216.02	214.82	213.62	212.41

20.00	ELEV	7.72	7.69	7.67	7.64	7.61	7.58	7.55	7.52	7.49	7.46
21.00	DISCHG	211.21	210.00	207.36	204.80	202.33	199.94	197.62	195.37	193.19	191.07
21.00	ELEV	7.43	7.40	7.37	7.34	7.31	7.29	7.26	7.24	7.21	7.19
22.00	DISCHG	189.01	187.00	185.04	183.12	181.26	179.44	177.66	175.92	174.24	172.62
22.00	ELEV	7.16	7.14	7.12	7.10	7.08	7.06	7.04	7.02	7.00	6.98
23.00	DISCHG	171.07	169.59	168.18	166.83	165.55	164.32	163.15	162.04	160.97	159.90
23.00	ELEV	6.96	6.95	6.93	6.91	6.90	6.89	6.87	6.86	6.85	6.84
24.00	DISCHG	158.78	157.52	155.99	154.11	151.84	149.26	146.46	143.51	140.48	137.40
24.00	ELEV	6.82	6.81	6.79	6.77	6.75	6.72	6.69	6.65	6.62	6.58
25.00	DISCHG	134.32	131.27	128.25	125.29	122.39	120.97	120.92	120.86	120.80	120.74
25.00	ELEV	6.55	6.52	6.48	6.45	6.42	6.38	6.35	6.32	6.28	6.24
26.00	DISCHG	120.68	120.61	120.55	120.48	120.41	120.34	120.27	120.20	120.13	120.06
26.00	ELEV	6.21	6.17	6.13	6.09	6.05	6.01	5.96	5.92	5.88	5.83
27.00	DISCHG	119.63	117.97	116.33	114.72	113.12	111.54	109.97	108.43	106.91	105.40
27.00	ELEV	5.79	5.75	5.70	5.66	5.62	5.57	5.53	5.49	5.45	5.41
28.00	DISCHG	103.90	102.43	100.97	99.52	98.09	96.68	95.28	93.90	92.53	91.18
28.00	ELEV	5.37	5.33	5.29	5.25	5.22	5.18	5.14	5.10	5.07	5.03
29.00	DISCHG	89.78	88.03	86.30	84.61	82.96	81.33	79.74	78.18	76.65	75.15
29.00	ELEV	5.00	4.96	4.93	4.89	4.86	4.83	4.79	4.76	4.73	4.70

RUNOFF VOLUME ABOVE BASEFLOW = 2.08 WATERSHED INCHES, 3644.05 CFS-HRS, 301.14 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 130
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 1000.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .30, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 130 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***
0 *** WARNING - REACH 130 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT 72.15 CFS, 20.60 % OF PEAK.

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.37	353.22	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.08 WATERSHED INCHES, 3644.05 CFS-HRS, 301.14 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 130
OUTPUT HYDROGRAPH= 6
AREA= .05 SQ MI INPUT RUNOFF CURVE= 74. TIME OF CONCENTRATION= .19 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0253 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.01	160.37	(RUNOFF)
23.65	2.37	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 4.05 WATERSHED INCHES, 130.79 CFS-HRS, 10.81 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 130

INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.06	255.99	(NULL)
13.29	364.23	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.11 WATERSHED INCHES, 3774.84 CFS-HRS, 311.95 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 130
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 6

OPERATION RESVOR STRUCTURE 60
INPUT HYDROGRAPH= 6 OUTPUT HYDROGRAPH= 7
SURFACE ELEVATION= 2.00

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
16.47	273.66	6.69

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 2.77 SQ.MI.

11.00	DISCHG	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	4.63	7.80
11.00	ELEV	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.44	2.53
12.00	DISCHG	12.26	16.81	21.15	29.36	39.55	49.41	59.61	72.40	85.21	97.75
12.00	ELEV	2.66	2.81	2.95	3.10	3.26	3.42	3.59	3.77	3.94	4.10
13.00	DISCHG	109.88	121.58	132.80	141.43	149.22	156.70	163.88	170.74	177.28	180.11
13.00	ELEV	4.27	4.42	4.57	4.71	4.85	4.99	5.11	5.24	5.35	5.46
14.00	DISCHG	180.29	180.47	180.64	180.82	180.98	192.46	203.90	214.07	223.08	231.04
14.00	ELEV	5.57	5.68	5.79	5.89	5.99	6.09	6.17	6.25	6.31	6.37
15.00	DISCHG	238.05	244.19	249.54	254.18	258.15	261.51	264.35	266.71	268.64	270.20
15.00	ELEV	6.43	6.47	6.51	6.55	6.58	6.60	6.62	6.64	6.65	6.67
16.00	DISCHG	271.42	272.34	272.99	273.41	273.62	273.65	273.52	273.23	272.80	272.26
16.00	ELEV	6.67	6.68	6.69	6.69	6.69	6.69	6.69	6.69	6.69	6.68
17.00	DISCHG	271.63	270.92	270.13	269.29	268.39	267.45	266.47	265.47	264.45	263.40
17.00	ELEV	6.68	6.67	6.67	6.66	6.65	6.65	6.64	6.63	6.62	6.61
18.00	DISCHG	262.31	261.19	260.06	258.91	257.75	256.57	255.38	254.17	252.96	251.74
18.00	ELEV	6.61	6.60	6.59	6.58	6.57	6.56	6.56	6.55	6.54	6.53
19.00	DISCHG	250.52	249.31	248.10	246.90	245.71	244.53	243.37	242.22	241.08	239.94
19.00	ELEV	6.52	6.51	6.50	6.49	6.48	6.47	6.47	6.46	6.45	6.44
20.00	DISCHG	238.79	237.64	236.49	235.34	234.20	233.05	231.90	230.75	229.60	228.44
20.00	ELEV	6.43	6.42	6.41	6.41	6.40	6.39	6.38	6.37	6.36	6.35
21.00	DISCHG	227.27	226.11	224.88	223.54	222.10	220.58	219.00	217.36	215.67	213.94
21.00	ELEV	6.35	6.34	6.33	6.32	6.31	6.30	6.28	6.27	6.26	6.25
22.00	DISCHG	212.19	210.41	208.61	206.80	204.99	203.17	201.36	199.55	197.75	195.96
22.00	ELEV	6.23	6.22	6.21	6.19	6.18	6.17	6.15	6.14	6.12	6.11
23.00	DISCHG	194.19	192.43	190.71	189.01	187.34	185.71	184.11	182.55	181.03	180.98
23.00	ELEV	6.10	6.09	6.07	6.06	6.05	6.04	6.02	6.01	6.00	5.99
24.00	DISCHG	180.96	180.94	180.91	180.89	180.86	180.82	180.79	180.75	180.71	180.67
24.00	ELEV	5.98	5.96	5.95	5.93	5.91	5.89	5.87	5.85	5.83	5.80
25.00	DISCHG	180.62	180.57	180.52	180.46	180.40	180.34	180.27	180.21	180.15	180.09

25.00	ELEV	5.77	5.74	5.71	5.68	5.64	5.60	5.56	5.53	5.49	5.45
26.00	DISCHG	180.02	178.71	176.68	174.71	172.81	170.98	169.20	167.49	165.83	164.23
26.00	ELEV	5.41	5.38	5.34	5.31	5.27	5.24	5.21	5.18	5.15	5.12
27.00	DISCHG	162.68	161.14	159.60	158.06	156.52	154.97	153.42	151.87	150.33	148.78
27.00	ELEV	5.09	5.06	5.04	5.01	4.98	4.95	4.93	4.90	4.87	4.84
28.00	DISCHG	147.24	145.69	144.15	142.62	141.08	139.55	138.03	136.51	134.99	132.99
28.00	ELEV	4.82	4.79	4.76	4.74	4.71	4.68	4.65	4.63	4.60	4.57
29.00	DISCHG	131.02	129.06	127.12	125.19	123.27	121.36	119.46	117.58	115.72	113.87
29.00	ELEV	4.55	4.52	4.49	4.47	4.44	4.42	4.39	4.37	4.34	4.32

RUNOFF VOLUME ABOVE BASEFLOW = 1.92 WATERSHED INCHES, 3434.39 CFS-HRS, 283.82 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 140
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 2500.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .21, M= 1.48
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = .37 PEAK TRAVEL TIME = .30 HOURS
0 *** WARNING - REACH 140 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT 110.87 CFS, 40.97 % OF PEAK.

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
16.77	273.19	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 1.90 WATERSHED INCHES, 3403.42 CFS-HRS, 281.26 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 140
OUTPUT HYDROGRAPH= 6
AREA= .20 SQ MI INPUT RUNOFF CURVE= 68. TIME OF CONCENTRATION= .19 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0253 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.02	543.51	(RUNOFF)
15.16	19.42	(RUNOFF)
16.45	16.95	(RUNOFF)
17.66	14.20	(RUNOFF)
19.65	11.51	(RUNOFF)
23.65	8.78	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 3.42 WATERSHED INCHES, 441.34 CFS-HRS, 36.47 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 140
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.02	549.11	(NULL)
16.51	289.38	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.01 WATERSHED INCHES, 3844.76 CFS-HRS, 317.73 ACRE-FEET; BASEFLOW = 3.00 CFS

```
OPERATION SAVMOV   CROSS SECTION 150
          INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 5


OPERATION RUNOFF   CROSS SECTION 149
          OUTPUT HYDROGRAPH=  6
          AREA=     .08 SQ MI   INPUT RUNOFF CURVE= 50.    TIME OF CONCENTRATION=    .42 HOURS
          INTERNAL HYDROGRAPH TIME INCREMENT=  .0560 HOURS

          PEAK TIME(HRS)              PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
             12.19                          67.90                       (RUNOFF)
             23.67                           2.40                       (RUNOFF)

  RUNOFF VOLUME ABOVE BASEFLOW =  1.67 WATERSHED INCHES,     86.04 CFS-HRS,     7.11 ACRE-FEET;   BASEFLOW =     .00 CFS


OPERATION ADDHYD   CROSS SECTION 150
          INPUT HYDROGRAPHS= 5,6     OUTPUT HYDROGRAPH= 7

          PEAK TIME(HRS)              PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
             12.03                         592.40                       (NULL)
             14.30                         209.30                       (NULL)
             16.51                         293.74                       (NULL)

  RUNOFF VOLUME ABOVE BASEFLOW =  2.00 WATERSHED INCHES,   3930.79 CFS-HRS,   324.84 ACRE-FEET;   BASEFLOW =   3.00 CFS


OPERATION REACH    CROSS SECTION 150
          INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 5
          LENGTH =     300.00 FEET       INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA,  X=   .21,   M= 1.48
0         MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00       PEAK TRAVEL TIME =     .00 HOURS

     *** WARNING  REACH 150 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
0    *** WARNING - REACH 150 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT      115.89 CFS,  20.01 % OF PEAK.

          PEAK TIME(HRS)              PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
             12.03                         592.40                       (NULL)
             14.30                         209.30                       (NULL)
             16.51                         293.74                       (NULL)

  RUNOFF VOLUME ABOVE BASEFLOW =  2.00 WATERSHED INCHES,   3930.79 CFS-HRS,   324.84 ACRE-FEET;   BASEFLOW =   3.00 CFS


OPERATION RUNOFF   CROSS SECTION 150
          OUTPUT HYDROGRAPH=  6
          AREA=     .01 SQ MI   INPUT RUNOFF CURVE= 40.    TIME OF CONCENTRATION=    .15 HOURS
          INTERNAL HYDROGRAPH TIME INCREMENT=  .0200 HOURS
```

*** WARNING-MAIN TIME INCREMENT MAY BE TOO LARGE.
COMPUTED PEAK(4.99) AT EXCEEDS MAX. ADJACENT HYDROGRAPH COORDINATE BY 8 %.
\+ XSECTION 150

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.05	4.99	(RUNOFF)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = .01 SQ.MI.

11.00	DISCHG	.00	.00	.00	.00	.00	.00	.00	.00	.00	1.05
12.00	DISCHG	4.60	4.46	2.17	1.71	1.28	1.17	1.09	1.02	1.00	.87
13.00	DISCHG	.84	.78	.73	.71	.66	.64	.60	.56	.55	.52
14.00	DISCHG	.52	.50	.48	.47	.44	.43	.41	.38	.38	.38
15.00	DISCHG	.38	.39	.39	.38	.35	.34	.34	.34	.34	.34
16.00	DISCHG	.34	.34	.35	.35	.35	.35	.32	.30	.30	.30
17.00	DISCHG	.30	.30	.30	.30	.30	.30	.30	.30	.30	.26
18.00	DISCHG	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25
19.00	DISCHG	.25	.25	.25	.25	.25	.25	.25	.25	.25	.21
20.00	DISCHG	.19	.19	.19	.19	.19	.19	.19	.19	.19	.19
21.00	DISCHG	.19	.20	.20	.20	.20	.20	.20	.20	.20	.20
22.00	DISCHG	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20
23.00	DISCHG	.20	.20	.20	.20	.20	.20	.20	.20	.20	.15
24.00	DISCHG	.14	.08	.01	.00						

RUNOFF VOLUME ABOVE BASEFLOW = .84 WATERSHED INCHES, 5.41 CFS-HRS, .45 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 150
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.03	597.34	(NULL)
14.30	209.77	(NULL)
16.51	294.09	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 1.99 WATERSHED INCHES, 3936.21 CFS-HRS, 325.29 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 180
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5

OPERATION RUNOFF CROSS SECTION 180
OUTPUT HYDROGRAPH= 6
AREA= .11 SQ MI INPUT RUNOFF CURVE= 42. TIME OF CONCENTRATION= .48 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0640 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.27	39.64	(RUNOFF)
23.68	2.45	(RUNOFF)

```
 RUNOFF VOLUME ABOVE BASEFLOW =   .99 WATERSHED INCHES,     70.57 CFS-HRS,     5.83 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION ADDHYD   CROSS SECTION 180
         INPUT HYDROGRAPHS= 5,6     OUTPUT HYDROGRAPH= 7

         PEAK TIME(HRS)            PEAK DISCHARGE(CFS)            PEAK ELEVATION(FEET)
            12.04                        613.61                         (NULL)
            14.28                        216.15                         (NULL)
            16.51                        298.35                         (NULL)

 RUNOFF VOLUME ABOVE BASEFLOW =  1.96 WATERSHED INCHES,   4006.78 CFS-HRS,   331.12 ACRE-FEET;   BASEFLOW =   3.00 CFS

OPERATION REACH    CROSS SECTION 180
         INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 5
         LENGTH =   1700.00 FEET     INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA,  X=   .21,   M= 1.48
0        MODIFIED ATT-KIN ROUTING COEFFICIENT =  .61      PEAK TRAVEL TIME =     .20 HOURS
0    *** WARNING - REACH 180 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT     115.89 CFS,  19.46 % OF PEAK.

         PEAK TIME(HRS)            PEAK DISCHARGE(CFS)            PEAK ELEVATION(FEET)
            12.18                        534.07                         (NULL)
            16.66                        297.92                         (NULL)

 RUNOFF VOLUME ABOVE BASEFLOW =  1.95 WATERSHED INCHES,   3984.65 CFS-HRS,   329.29 ACRE-FEET;   BASEFLOW =   3.00 CFS

OPERATION RUNOFF    CROSS SECTION 180
         OUTPUT HYDROGRAPH=  6
         AREA=    .11 SQ MI   INPUT RUNOFF CURVE= 41.    TIME OF CONCENTRATION=    .48 HOURS
         INTERNAL HYDROGRAPH TIME INCREMENT=  .0640 HOURS

         PEAK TIME(HRS)            PEAK DISCHARGE(CFS)            PEAK ELEVATION(FEET)
            12.28                         34.74                         (RUNOFF)
            23.69                          2.34                         (RUNOFF)

 RUNOFF VOLUME ABOVE BASEFLOW =   .92 WATERSHED INCHES,     65.08 CFS-HRS,     5.38 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION ADDHYD   CROSS SECTION 180
         INPUT HYDROGRAPHS= 5,6     OUTPUT HYDROGRAPH= 7

         PEAK TIME(HRS)            PEAK DISCHARGE(CFS)            PEAK ELEVATION(FEET)
            12.19                        565.85                         (NULL)
            14.40                        221.36                         (NULL)
            16.65                        301.91                         (NULL)

TIME(HRS)       FIRST HYDROGRAPH POINT =    .00 HOURS      TIME INCREMENT =  .10 HOURS      DRAINAGE AREA =   3.28 SQ.MI.
  8.00    DISCHG       3.00      3.00      3.00      3.00      3.00      3.00      3.00      3.00      3.04      3.15
```

9.00	DISCHG	3.31	3.49	3.71	3.98	4.25	4.51	4.77	5.07	5.45	5.80
10.00	DISCHG	6.13	6.43	6.82	7.29	7.78	8.54	9.32	10.32	11.65	12.87
11.00	DISCHG	14.56	16.21	18.03	20.22	22.25	25.54	28.79	49.17	93.79	148.44
12.00	DISCHG	307.01	502.59	564.02	452.13	347.88	268.19	217.61	189.10	173.40	167.79
13.00	DISCHG	165.12	166.29	169.90	174.31	180.69	186.50	192.54	198.12	202.77	207.86
14.00	DISCHG	212.64	216.84	219.57	220.78	221.36	220.87	220.15	221.67	225.38	231.24
15.00	DISCHG	238.42	246.16	253.91	261.31	268.02	273.14	277.49	281.54	285.29	288.68
16.00	DISCHG	291.68	294.28	296.48	298.30	299.79	300.95	301.81	301.79	300.85	299.95
17.00	DISCHG	299.22	298.62	298.06	297.50	296.89	296.23	295.52	294.74	293.91	292.84
18.00	DISCHG	290.77	288.52	286.60	284.97	283.56	282.28	281.07	279.89	278.72	277.55
19.00	DISCHG	276.37	275.19	274.01	272.82	271.64	270.45	269.28	268.10	266.93	265.57
20.00	DISCHG	263.24	260.77	258.67	256.91	255.39	254.04	252.78	251.57	250.39	249.23
21.00	DISCHG	248.08	246.93	245.78	244.63	243.47	242.27	241.00	239.67	238.26	236.79
22.00	DISCHG	235.26	233.66	232.03	230.35	228.63	226.89	225.13	223.36	221.57	219.78
23.00	DISCHG	217.99	216.20	214.42	212.65	210.90	209.16	207.45	205.76	204.10	202.26
24.00	DISCHG	199.45	196.77	193.51	189.40	186.23	184.10	182.78	181.98	181.50	181.20
25.00	DISCHG	181.01	180.88	180.79	180.71	180.64	180.58	180.53	180.47	180.41	180.35
26.00	DISCHG	180.29	180.23	180.17	179.82	179.03	177.85	176.43	174.84	173.18	171.48
27.00	DISCHG	169.78	168.11	166.47	164.86	163.27	161.71	160.14	158.59	157.04	155.49
28.00	DISCHG	153.94	152.39	150.84	149.30	147.75	146.21	144.67	143.13	141.60	140.07
29.00	DISCHG	138.54	136.91	135.18	133.37	131.51	129.62	127.72	125.81	123.91	122.01

RUNOFF VOLUME ABOVE BASEFLOW = 1.91 WATERSHED INCHES, 4049.73 CFS-HRS, 334.67 ACRE-FEET; BASEFLOW = 3.00 CFS

EXECUTIVE CONTROL OPERATION ENDCMP RECORD ID 1770

+ COMPUTATIONS COMPLETED FOR PASS 1

EXECUTIVE CONTROL OPERATION ENDJOB RECORD ID 1690

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

SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RAIN TABLE #	ANTEC MOIST COND	MAIN TIME INCREM (HR)	PRECIPITATION BEGIN (HR)	PRECIPITATION AMOUNT (IN)	PRECIPITATION DURATION (HR)	RUNOFF AMOUNT (IN)	PEAK DISCHARGE ELEVATION (FT)	PEAK DISCHARGE TIME (HR)	PEAK DISCHARGE RATE (CFS)	PEAK DISCHARGE RATE (CSM)
ALTERNATE 86 STORM 1													
STRUCTURE 10	RUNOFF	.84	2	2	.10	.0	7.00	24.00	1.67	---	17.80	96.56	114.9
STRUCTURE 10	RESVOR	.84	2	2	.10	.0	7.00	24.00	1.63	9.50	18.14	96.09	114.4
XSECTION 10	REACH	.84	2	2	.10	.0	7.00	24.00	1.62	---	18.47	98.84	117.7
XSECTION 10	RUNOFF	.20	2	2	.10	.0	7.00	24.00	1.00	---	12.08	121.81	609.0
XSECTION 10	ADDHYD	1.04	2	2	.10	.0	7.00	24.00	1.50	---	12.08	124.81	120.0
STRUCTURE 20	RESVOR	1.04	2	2	.10	.0	7.00	24.00	1.45	9.18	20.10	93.18	89.6
XSECTION 20	REACH	1.04	2	2	.10	.0	7.00	24.00	1.44	---	20.25	93.15	89.6
XSECTION 20	RUNOFF	.28	2	2	.10	.0	7.00	24.00	2.03	---	12.60	168.04	600.2
XSECTION 20	ADDHYD	1.32	2	2	.10	.0	7.00	24.00	1.57	---	12.61	190.93	144.6
STRUCTURE 30	RUNOFF	.37	2	2	.10	.0	7.00	24.00	1.57	---	14.95	60.58	163.7
STRUCTURE 30	RESVOR	.37	2	2	.10	.0	7.00	24.00	1.51	25.91	16.21	48.05	129.9
XSECTION 40	REACH	.37	2	2	.10	.0	7.00	24.00	1.50	---	16.55	47.70	128.9
XSECTION 40	RUNOFF	.06	2	2	.10	.0	7.00	24.00	.84	---	12.72	10.21	170.2
XSECTION 40	ADDHYD	.43	2	2	.10	.0	7.00	24.00	1.41	---	16.54	49.80	115.8
STRUCTURE 40	RESVOR	.43	2	2	.10	.0	7.00	24.00	1.41	10.89	16.60	49.78	115.8
XSECTION 50	REACH	.43	2	2	.10	.0	7.00	24.00	1.40	---	16.72	49.77	115.7
XSECTION 49	RUNOFF	.11	2	2	.10	.0	7.00	24.00	.84	---	13.33	13.76	125.1
XSECTION 50	ADDHYD	.54	2	2	.10	.0	7.00	24.00	1.29	---	16.65	53.98	100.0
XSECTION 50	RUNOFF	.36	2	2	.10	.0	7.00	24.00	5.25	---	12.13	1078.73	2996.5
XSECTION 50	ADDHYD	.90	2	2	.10	.0	7.00	24.00	2.87	---	12.13	1079.95	1199.9
XSECTION 60	REACH	.90	2	2	.10	.0	7.00	24.00	2.87	---	12.13	1079.95	1199.9
XSECTION 60	RUNOFF	.05	2	2	.10	.0	7.00	24.00	1.24	---	12.56	16.56	331.2
XSECTION 60	ADDHYD	.95	2	2	.10	.0	7.00	24.00	2.79	---	12.14	1086.21	1143.4
XSECTION 70	ADDHYD	2.27	2	2	.10	.0	7.00	24.00	2.08	---	12.15	1164.89	513.2
XSECTION 80	REACH	2.27	2	2	.10	.0	7.00	24.00	2.08	---	12.15	1164.89	513.2
XSECTION 80	RUNOFF	.02	2	2	.10	.0	7.00	24.00	2.98	---	11.98	54.99	2749.6
XSECTION 80	ADDHYD	2.29	2	2	.10	.0	7.00	24.00	2.08	---	12.14	1184.64	517.3
XSECTION 90	RUNOFF	.24	2	2	.10	.0	7.00	24.00	3.93	---	12.27	434.61	1810.9
XSECTION 100	ADDHYD	2.53	2	2	.10	.0	7.00	24.00	2.26	---	12.17	1575.11	622.6
XSECTION 110	REACH	2.53	2	2	.10	.0	7.00	24.00	2.26	---	12.17	1575.11	622.6
XSECTION 120	REACH	2.53	2	2	.10	.0	7.00	24.00	2.26	---	12.17	1575.11	622.6
XSECTION 120	RUNOFF	.19	2	2	.10	.0	7.00	24.00	2.22	---	12.38	159.29	838.4

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

SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RAIN TABLE #	ANTEC MOIST COND	MAIN TIME INCREM (HR)	PRECIPITATION BEGIN (HR)	PRECIPITATION AMOUNT (IN)	PRECIPITATION DURATION (HR)	RUNOFF AMOUNT (IN)	PEAK DISCHARGE ELEVATION (FT)	PEAK DISCHARGE TIME (HR)	PEAK DISCHARGE RATE (CFS)	PEAK DISCHARGE RATE (CSM)
ALTERNATE 86 STORM 1													
XSECTION 120	ADDHYD	2.72	2	2	.10	.0	7.00	24.00	2.26	---	12.19	1701.00	625.4
STRUCTURE 50	RESVOR	2.72	2	2	.10	.0	7.00	24.00	2.08	10.98	13.37	353.22	129.9
XSECTION 130	REACH	2.72	2	2	.10	.0	7.00	24.00	2.08	---	13.37	353.22	129.9
XSECTION 130	RUNOFF	.05	2	2	.10	.0	7.00	24.00	4.05	---	12.01	160.37	3207.4
XSECTION 130	ADDHYD	2.77	2	2	.10	.0	7.00	24.00	2.11	---	13.29	364.23	131.5
STRUCTURE 60	RESVOR	2.77	2	2	.10	.0	7.00	24.00	1.92	6.69	16.47	273.66	98.8
XSECTION 140	REACH	2.77	2	2	.10	.0	7.00	24.00	1.90	---	16.77	273.19	98.6
XSECTION 140	RUNOFF	.20	2	2	.10	.0	7.00	24.00	3.42	---	12.02	543.51	2717.6
XSECTION 140	ADDHYD	2.97	2	2	.10	.0	7.00	24.00	2.01	---	12.02	549.11	184.9
XSECTION 149	RUNOFF	.08	2	2	.10	.0	7.00	24.00	1.67	---	12.19	67.90	848.7
XSECTION 150	ADDHYD	3.05	2	2	.10	.0	7.00	24.00	2.00	---	12.03	592.40	194.2
XSECTION 150	REACH	3.05	2	2	.10	.0	7.00	24.00	2.00	---	12.03	592.40	194.2
XSECTION 150	RUNOFF	.01	2	2	.10	.0	7.00	24.00	.84	---	12.05	4.99	499.3
XSECTION 150	ADDHYD	3.06	2	2	.10	.0	7.00	24.00	1.99	---	12.03	597.34	195.2
XSECTION 180	RUNOFF	.11	2	2	.10	.0	7.00	24.00	.99	---	12.27	39.64	360.4
XSECTION 180	ADDHYD	3.17	2	2	.10	.0	7.00	24.00	1.96	---	12.04	613.61	193.6
XSECTION 180	REACH	3.17	2	2	.10	.0	7.00	24.00	1.95	---	12.18	534.07	168.5
XSECTION 180	RUNOFF	.11	2	2	.10	.0	7.00	24.00	.92	---	12.28	34.74	315.8
XSECTION 180	ADDHYD	3.28	2	2	.10	.0	7.00	24.00	1.91	---	12.19	565.85	172.5

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

	HYDROGRAPH INFORMATION									ROUTING PARAMETERS									PEAK	
						OUTFLOW+			VOLUME	MAIN	ITER-	Q AND A			PEAK	S/Q	ATT-	TRAVEL TIME	
XSEC	REACH	INFLOW		OUTFLOW		INTERV.AREA		BASE-	ABOVE	TIME	ATION	EQUATION		LENGTH	RATIO	@PEAK	KIN	STOR-	KINE-
ID	LENGTH	PEAK	TIME	PEAK	TIME	PEAK	TIME	FLOW	BASE	INCR	#	COEFF	POWER	FACTOR	O/I	(K)	COEFF	AGE	MATIC
	(FT)	(CFS)	(HR)	(CFS)	(HR)	(CFS)	(HR)	(CFS)	(IN)	(HR)		(X)	(M)	(K*)	(Q*)	(SEC)	(C)	(HR)	(HR)
ALTERNATE 86 STORM 1																			
+ 10	1750	99	18.1	99	18.5	123	12.1	3	1.63*	.10	1	1.20	1.10	.021	.997	888	.34	.40	.25
+ 20	2900	93	20.1	93	20.2	191	12.6	3	1.45*	.10	1	.280	1.94	.000	1.000	320	.72?	.10	.09
+ 40	1300	48	16.2	48	16.5	50	16.5	0	1.51	.10	1	.880	1.10	.027	.992	934	.32	.30	.26
+ 50	1700	50	16.6	50	16.7	54	16.6	0	1.41	.10	1	1.60	1.45	.002	1.000	252	.83?	.10	.07
+ 60	1400	1064	12.1	1064	12.1	1069	12.1	0	2.87	.10	0	.440	1.94	.000	1.000	38	1.00?	.00	.00
+ 80	700	1133	12.1	1133	12.1	1161	12.1	3	2.08	.10	0	.300	1.94	.000	1.000	22	1.00?	.00	.00
+110	500	1567	12.2	1567	12.2	---	---	3	2.26	.10	0	.300	1.94	.000	1.000	14	1.00?	.00	.00
+120	500	1567	12.2	1567	12.2	1699	12.2	3	2.26	.10	0	.300	1.94	.000	1.000	14	1.00?	.00	.00

.300

												[illegible]							
+130	1000	353	13.4	353	13.4			3	2.08*	.10	0		1.94	.000	1.000	56	1.00?	.00	.00
+						364	13.3												
												.210							
+140	2500	274	16.5	273	16.8			3	1.92*	.10	1		1.48	.004	.998	786	.37	.30	.22
+						544	12.0												
												.210							
+150	300	582	12.0	582	12.0			3	2.00*	.10	0		1.48	.000	1.000	74	1.00?	.00	.00
+						587	12.0												
												.210							
+180	1700	599	12.0	531	12.2			3	1.96*	.10	1		1.48	.004	.887	414	.61	.20	.12
+						564	12.2												

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

XSECTION/ STRUCTURE ID	DRAINAGE AREA (SQ MI)	STORM NUMBERS.......... 1
0 STRUCTURE 60	2.77	
+ ALTERNATE 86		273.66
0 STRUCTURE 50	2.72	
+ ALTERNATE 86		353.22
0 STRUCTURE 40	.43	
+ ALTERNATE 86		49.78
0 STRUCTURE 30	.37	
+ ALTERNATE 86		48.05
0 STRUCTURE 20	1.04	
+ ALTERNATE 86		93.18
0 STRUCTURE 10	.84	
+ ALTERNATE 86		96.09
0 XSECTION 10	1.04	
+ ALTERNATE 86		124.81
0 XSECTION 20	1.32	
+ ALTERNATE 86		190.93
0 XSECTION 40	.43	
+ ALTERNATE 86		49.80
0 XSECTION 49	.11	
+ ALTERNATE 86		13.76
0 XSECTION 50	.90	
+ ALTERNATE 86		1079.95
0 XSECTION 60	.95	
+ ALTERNATE 86		1086.21
0 XSECTION 70	2.27	
+ ALTERNATE 86		1164.89
0 XSECTION 80	2.29	
+ ALTERNATE 86		1184.64

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

XSECTION/ STRUCTURE ID	DRAINAGE AREA (SQ MI)	STORM NUMBERS.......... 1
0 XSECTION 90	.24	
ALTERNATE 86		434.61
0 XSECTION 100	2.53	
ALTERNATE 86		1575.11
0 XSECTION 110	2.53	
ALTERNATE 86		1575.11
0 XSECTION 120	2.72	
ALTERNATE 86		1701.00
0 XSECTION 130	2.77	
ALTERNATE 86		364.23
0 XSECTION 140	2.97	
ALTERNATE 86		549.11
0 XSECTION 149	.08	
ALTERNATE 86		67.90
0 XSECTION 150	3.06	
ALTERNATE 86		597.34
0 XSECTION 180	3.28	
ALTERNATE 86		565.85

FISCAL YEAR 87

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

JOB TR-20                    FULLPRINT PASS=001   SUMMARY                     10
TITLE 002 COGDELL'S CREEK WATERSHED STUDY NV5010 24 HR 10YR TYPE 2 STORM      20
TITLE     ALT  87                                                       30
 3 STRUCT     10                                                              40
 8                    7.00        0.00        4.33                            50
 8                    7.4         2.5         5.01                            60
 8                    7.6         5.0         5.36                            70
 8                    7.8         10.0        5.70                            80
 8                    8.2         22.0        6.38                            90
 8                    8.6         52.0        7.07                           100
 8                    9.0         62.0        7.75                           110
 8                    9.5         96.0        8.61                           120
 8                    10.0        126.0       9.47                           130
 8                    11.0        198.0       11.18                          140
 8                    12.0        280.0       12.89                          150
 8                    13.00       360.0       14.79                          160
 8                    14.00       440.0       16.68                          170
 8                    15.00       500.0       18.58                          180
 8                    15.1        600.00      18.60                          190
 9 ENDTBL                                                                    200
 3 STRUCT     20                                                             210
 8                    4.5         0.00        6.80                           220
 8                    4.9         1.5         7.88                           230
 8                    5.1         3.7         8.42                           240
 8                    5.5         11.0        9.51                           250
 8                    5.7         15.0        10.13                          260
 8                    6.1         25.0        11.13                          270
 8                    6.5         40.0        12.21                          280
 8                    7.1         60.0        13.84                          290
 8                    7.9         78.0        16.01                          300
 8                    8.5         79.0        17.63                          310
 8                    9.5         100.0       20.34                          320
 8                    10.5        126.0       23.06                          330
 8                    11.5        150.0       25.76                          340
 8                    11.6        300.0       26.04                          350
 9 ENDTBL                                                                    360
 3 STRUCT     30                                                             370
 8                    21.0        0.00        0.10                           380
 8                    21.4        0.6         0.61                           390
 8                    21.6        1.5         0.86                           400
 8                    21.8        2.5         1.12                           410
 8                    22.2        5.2         1.62                           420
 8                    22.6        8.2         2.13                           430
 8                    23.0        11.0        2.64                           440
 8                    23.5        20.0        3.27                           450
 8                    24.0        27.0        3.91                           460
```

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

8		25.0	39.0	5.18	470
8		26.0	49.0	6.45	480
8		27.0	57.0	7.72	490
8		27.1	200.00	7.74	500
9 ENDTBL					510
3 STRUCT	40				520
8		9.0	0.0	0.38	530
8		9.4	2.2	0.47	540
8		9.6	5.0	0.52	550
8		10.0	14.0	0.62	560
8		10.2	21.0	0.67	570
8		10.6	36.0	0.77	580
8		11.0	55.0	0.86	590
8		11.6	82.0	1.01	600
8		12.4	120.0	1.21	610
8		13.0	121.0	1.35	620
8		14.0	122.0	1.60	630
8		15.0	126.0	1.84	640
8		16.0	150.00	2.08	650
8		16.1	300.0	2.11	660
9 ENDTBL					670
3 STRUCT	50				680
8		2.4	0.00	22.00	690
8		2.8	2.0	26.86	700
8		3.0	7.0	29.29	710
8		3.4	16.0	34.16	720
8		3.6	24.0	36.59	730
8		4.0	40.0	41.46	740
8		4.4	60.0	46.32	750
8		5.0	90.0	53.62	760
8		5.8	120.0	63.35	770
8		6.4	121.0	70.65	780
8		7.4	210.0	82.81	790
8		8.4	250.00	94.98	800
8		10.4	334.0	119.31	810
8		12.4	400.0	143.63	820
8		12.5	800.0	143.70	830
9 ENDTBL					840
3 STRUCT	60				850
8		2.0	0.0	22.20	860
8		2.4	3.0	27.41	870
8		2.6	10.5	30.02	880
8		3.0	22.5	35.24	890
8		3.2	36.0	37.85	900
8		3.6	60.0	43.06	910
8		4.0	90.0	48.28	920

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

8                 4.6        135.0      56.11                       930
8                 5.4        180.0      66.55                       940
8                 6.0        181.0      74.38                       950
8                 7.0        315.0      87.42                       960
8                 8.0        375.0      100.47                      970
8                 8.1        700.0      100.50                      980
9 ENDTBL                                                            990
6 RUNOFF 1   10     6 0.84   51.        7.50        1               1000
6 RESVOR 2   10 6   7 7.0                           1               1010
6 REACH  3 010   7  5 1750.  1.2        1.10        1               1020
6 RUNOFF 1 010      6 0.20   42.        0.19        1               1030
6 ADDHYD 4 010   5 6 7                              1 1             1040
6 SAVMOV 5 010   7  6                                               1050
6 RESVOR 2   20 6   7 4.5                           1               1060
6 REACH  3 020   7  5 2900.  0.28       1.94        1               1070
6 RUNOFF 1 020      6 0.28   53.        1.02        1               1080
6 ADDHYD 4 020   5 6 7                              1 1             1090
6 SAVMOV 5 020   7  1                                               1100
6 RUNOFF 1   30     6 0.37   49.        3.90        1               1110
6 RESVOR 2   30 6   7 21.0                          1               1120
6 REACH  3 040   7  5 1300.  0.88       1.10        1               1130
6 RUNOFF 1 040      6 0.06   40.        1.00        1               1140
6 ADDHYD 4 040   5 6 7                              1               1150
6 SAVMOV 5 040   7  6                                               1160
6 RESVOR 2   40 6   7 9.0                           1               1170
6 REACH  3 050   7  5 1700.  1.6        1.45        1               1180
6 RUNOFF 1 049      6 0.11   40.        1.67        1               1190
6 ADDHYD 4 050   5 6 7                              1               1200
6 SAVMOV 5 050   7  5                                               1210
6 RUNOFF 1 050      6 0.36   85.        0.42        1               1220
6 ADDHYD 4 050   5 6 7                              1               1230
6 REACH  3 060   7  5 1400.  0.44       1.94        1               1240
6 RUNOFF 1 060      6 0.05   45.        0.90        1               1250
6 ADDHYD 4 060   5 6 7                              1 1             1260
6 SAVMOV 5 070   7  5                                               1270
6 SAVMOV 5 070   1  6                                               1280
6 ADDHYD 4 070   5 6 7                              1 1             1290
6 REACH  3 080   7  5 700.   0.30       1.94        1               1300
6 RUNOFF 1 080      6 0.02   64.        0.12        1               1310
6 ADDHYD 4 080   5 6 7                              1               1320
6 SAVMOV 5 100   7  5                                               1330
6 RUNOFF 1 090      6 0.24   73.        0.62        1               1340
6 ADDHYD 4 100   5 6 7                              1               1350
6 REACH  3 110   7  5 500.   0.30       1.94        1               1360
6 SAVMOV 5 120   5  7                                               1370
6 REACH  3 120   7  5 500.   0.30       1.94        1               1380
```

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

 6 RUNOFF 1 120       6 0.19        56.         0.74        1                1390
 6 ADDHYD 4 120    5 6 7                                    1 1              1400
 6 SAVMOV 5    50 7   6                                                      1410
 6 RESVOR 2    50 6   7 2.4                                 1 1 1            1420
 6 REACH  3 130    7  5 1000.       0.30        1.94        1                1430
 6 RUNOFF 1 130       6 0.05        74.         0.19        1                1440
 6 ADDHYD 4 130    5 6 7                                    1                1450
 6 SAVMOV 5 130    7  6                                                      1460
 6 RESVOR 2    60 6   7 2.0                                 1 1 1            1470
 6 REACH  3 140    7  5 2500.       0.21        1.48        1                1480
 6 RUNOFF 1 140       6 0.20        66.         1.15        1                1490
 6 ADDHYD 4 140    5 6 7                                    1                1500
 6 SAVMOV 5 150    7  5                                                      1510
 6 RUNOFF 1 149       6 0.08        50.         0.42        1                1520
 6 ADDHYD 4 150    5 6 7                                                     1530
 6 REACH  3 150    7  5 300.        0.21        1.48        1                1540
 6 RUNOFF 1 150       6 0.01        40.         0.15        1                1550
 6 ADDHYD 4 150    5 6 7                                    1                1560
 6 SAVMOV 5 180    7  5                                                      1570
 6 RUNOFF 1 180       6 0.28        50.         0.61        1                1580
 6 ADDHYD 4 180    5 6 7                                    1                1590
 6 REACH  3 180    7  5 1700.0      0.21        1.48        1                1600
 6 RUNOFF 1 180       6 0.11        41.         0.48        1                1610
 6 ADDHYD 4 180    5 6 7                                    1 1   1   1      1620
   ENDATA                                                                    1630
 7 ALTER  3                                                                  1640
 6 RUNOFF 1 010       6 0.20        42.0        0.19                         1650
 6 RUNOFF 1 020       6 0.28        54.0        2.00                         1660
 6 RUNOFF 1 140       6 0.20        68.0        0.19                         1670
 6 RUNOFF 1 149       6 0.08        65.0        0.42                         1680
 6 RUNOFF 1 180       6 0.11        42.0        0.48                         1690
 7 LIST                                                                      1700
 7 BASFLO 5             3.0                                                  1710
 7 INCREM 6             0.1                                                  1720
 7 COMPUT 7     10 180  0.0         7.0         1.0         2 2  B7  01      1730
   ENDCMP 1                                                                  1740
   ENDJOB 2                                                                  1750
0********************************END OF 80-80 LIST*******************************
```

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0CHANGES TO STANDARD CONTROL LIST FOLLOW

EXECUTIVE CONTROL OPERATION ALTER                                                            RECORD ID    1640

   STANDARD CONTROL OPERATION RUNOFF   CROSS SECTION  10                                     RECORD ID    1650

        OUTPUT HYDROGRAPH = 6                          DATA FIELD VALUES =      .2000     42.0000      .1900

        OUTPUT OPTIONS IN EFFECT  PEAK  VOL   SUM

   STANDARD CONTROL OPERATION RUNOFF   CROSS SECTION  20                                     RECORD ID    1660

        OUTPUT HYDROGRAPH = 6                          DATA FIELD VALUES =      .2800     54.0000     2.0000

        OUTPUT OPTIONS IN EFFECT  PEAK  VOL   SUM

   STANDARD CONTROL OPERATION RUNOFF   CROSS SECTION 140                                     RECORD ID    1670

        OUTPUT HYDROGRAPH = 6                          DATA FIELD VALUES =      .2000     68.0000      .1900

        OUTPUT OPTIONS IN EFFECT  PEAK  VOL   SUM

   STANDARD CONTROL OPERATION RUNOFF   CROSS SECTION 149                                     RECORD ID    1680

        OUTPUT HYDROGRAPH = 6                          DATA FIELD VALUES =      .0800     65.0000      .4200

        OUTPUT OPTIONS IN EFFECT  PEAK  VOL   SUM

   STANDARD CONTROL OPERATION RUNOFF   CROSS SECTION 180                                     RECORD ID    1690

        OUTPUT HYDROGRAPH = 6                          DATA FIELD VALUES =      .1100     42.0000      .4800

        OUTPUT OPTIONS IN EFFECT  PEAK  VOL   SUM
```

EXECUTIVE CONTROL OPERATION LIST RECORD ID 1700

LISTING OF CURRENT DATA

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	10			
8		7.00	.00	4.33
8		7.40	2.50	5.01
8		7.60	5.00	5.36
8		7.80	10.00	5.70
8		8.20	22.00	6.38
8		8.60	52.00	7.07
8		9.00	62.00	7.75
8		9.50	96.00	8.61
8		10.00	126.00	9.47
8		11.00	198.00	11.18
8		12.00	280.00	12.89
8		13.00	360.00	14.79
8		14.00	440.00	16.68
8		15.00	500.00	18.58
8		15.10	600.00	18.60
9 ENDTBL				

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	20			
8		4.50	.00	6.80
8		4.90	1.50	7.88
8		5.10	3.70	8.42
8		5.50	11.00	9.51
8		5.70	15.00	10.13
8		6.10	25.00	11.13
8		6.50	40.00	12.21
8		7.10	60.00	13.84
8		7.90	78.00	16.01
8		8.50	79.00	17.63
8		9.50	100.00	20.34
8		10.50	126.00	23.06
8		11.50	150.00	25.76
8		11.60	300.00	26.04
9 ENDTBL				

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	30			
8		21.00	.00	.10
8		21.40	.60	.61
8		21.60	1.50	.86
8		21.80	2.50	1.12
8		22.20	5.20	1.62
8		22.60	8.20	2.13
8		23.00	11.00	2.64
8		23.50	20.00	3.27
8		24.00	27.00	3.91
8		25.00	39.00	5.18
8		26.00	49.00	6.45
8		27.00	57.00	7.72
8		27.10	200.00	7.74
9 ENDTBL				

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	40			
8		9.00	.00	.38
8		9.40	2.20	.47
8		9.60	5.00	.52
8		10.00	14.00	.62
8		10.20	21.00	.67
8		10.60	36.00	.77
8		11.00	55.00	.86
8		11.60	82.00	1.01
8		12.40	120.00	1.21
8		13.00	121.00	1.35
8		14.00	122.00	1.60
8		15.00	126.00	1.84
8		16.00	150.00	2.08
8		16.10	300.00	2.11
9 ENDTBL				

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	50			
8		2.40	.00	22.00
8		2.80	2.00	26.86
8		3.00	7.00	29.29
8		3.40	16.00	34.16
8		3.60	24.00	36.59
8		4.00	40.00	41.46
8		4.40	60.00	46.32
8		5.00	90.00	53.62

8	5.80	120.00	63.35
8	6.40	121.00	70.65
8	7.40	210.00	82.81
8	8.40	250.00	94.98
8	10.40	334.00	119.31
8	12.40	400.00	143.63
8	12.50	800.00	143.70

9 ENDTBL

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	60			
8		2.00	.00	22.20
8		2.40	3.00	27.41
8		2.60	10.50	30.02
8		3.00	22.50	35.24
8		3.20	36.00	37.85
8		3.60	60.00	43.06
8		4.00	90.00	48.28
8		4.60	135.00	56.11
8		5.40	180.00	66.55
8		6.00	181.00	74.38
8		7.00	315.00	87.42
8		8.00	375.00	100.47
8		8.10	700.00	100.50

9 ENDTBL

		TIME INCREMENT			
4 DIMHYD		.0200			
8	.0000	.0300	.1000	.1900	.3100
8	.4700	.6600	.8200	.9300	.9900
8	1.0000	.9900	.9300	.8600	.7800
8	.6800	.5600	.4600	.3900	.3300
8	.2800	.2410	.2070	.1740	.1470
8	.1260	.1070	.0910	.0770	.0660
8	.0550	.0470	.0400	.0340	.0290
8	.0250	.0210	.0180	.0150	.0130
8	.0110	.0090	.0080	.0070	.0060
8	.0050	.0040	.0030	.0020	.0010
8	.0000	.0000	.0000	.0000	.0000

9 ENDTBL

COMPUTED PEAK RATE FACTOR = 484.00

TABLE NO.	TIME INCREMENT				
5 RAINFL 1		.5000			
8	.0000	.0080	.0170	.0260	.0350
8	.0450	.0550	.0650	.0760	.0870
8	.0990	.1120	.1260	.1400	.1560
8	.1740	.1940	.2190	.2540	.3030
8	.5150	.5830	.6240	.6550	.6820
8	.7060	.7280	.7480	.7660	.7830
8	.7990	.8150	.8300	.8440	.8570
8	.8700	.8820	.8930	.9050	.9160
8	.9260	.9360	.9460	.9560	.9650
8	.9740	.9830	.9920	1.0000	1.0000
9 ENDTBL					

TABLE NO.	TIME INCREMENT				
5 RAINFL 2		.2500			
8	.0000	.0020	.0050	.0080	.0110
8	.0140	.0170	.0200	.0230	.0260
8	.0290	.0320	.0350	.0380	.0410
8	.0440	.0480	.0520	.0560	.0600
8	.0640	.0680	.0720	.0760	.0800
8	.0850	.0900	.0950	.1000	.1050
8	.1100	.1150	.1200	.1260	.1330
8	.1400	.1470	.1550	.1630	.1720
8	.1810	.1910	.2030	.2180	.2360
8	.2570	.2830	.3870	.6630	.7070
8	.7350	.7580	.7760	.7910	.8040
8	.8150	.8250	.8340	.8420	.8490
8	.8560	.8630	.8690	.8750	.8810
8	.8870	.8930	.8980	.9030	.9080
8	.9130	.9180	.9220	.9260	.9300
8	.9340	.9380	.9420	.9460	.9500
8	.9530	.9560	.9590	.9620	.9650
8	.9680	.9710	.9740	.9770	.9800
8	.9830	.9860	.9890	.9920	.9950
8	.9980	1.0000	1.0000	1.0000	1.0000
9 ENDTBL					

TABLE NO.	TIME INCREMENT				
5 RAINFL 3		.5000			
8	.0000	.0100	.0220	.0360	.0510
8	.0670	.0830	.0990	.1160	.1350

8	.1560	.1790	.2040	.2330	.2680
8	.3100	.4250	.4800	.5200	.5500
8	.5770	.6010	.6230	.6440	.6640
8	.6830	.7010	.7190	.7360	.7530
8	.7690	.7850	.8000	.8150	.8300
8	.8440	.8580	.8710	.8840	.8960
8	.9080	.9200	.9320	.9440	.9560
8	.9670	.9780	.9890	1.0000	1.0000

9 ENDTBL

TABLE NO. TIME INCREMENT
5 RAINFL 4 .5000

8	.0000	.0040	.0080	.0120	.0160
8	.0200	.0250	.0300	.0350	.0400
8	.0450	.0500	.0550	.0600	.0650
8	.0700	.0750	.0810	.0870	.0930
8	.0990	.1050	.1110	.1180	.1250
8	.1320	.1400	.1480	.1560	.1650
8	.1740	.1840	.1950	.2070	.2200
8	.2360	.2550	.2770	.3030	.4090
8	.5150	.5490	.5830	.6050	.6240
8	.6400	.6550	.6690	.6820	.6940
8	.7050	.7160	.7270	.7380	.7480
8	.7580	.7670	.7760	.7840	.7920
8	.8000	.8080	.8160	.8230	.8300
8	.8370	.8440	.8510	.8580	.8640
8	.8700	.8760	.8820	.8880	.8940
8	.9000	.9060	.9110	.9160	.9210
8	.9260	.9310	.9360	.9410	.9460
8	.9510	.9560	.9610	.9660	.9710
8	.9760	.9800	.9840	.9880	.9920
8	.9960	1.0000	1.0000	1.0000	1.0000

9 ENDTBL

TABLE NO. TIME INCREMENT
5 RAINFL 5 .5000

8	.0000	.0020	.0050	.0080	.0110
8	.0140	.0170	.0200	.0230	.0260
8	.0290	.0320	.0350	.0380	.0410
8	.0440	.0470	.0510	.0550	.0590
8	.0630	.0670	.0710	.0750	.0790
8	.0840	.0890	.0940	.0990	.1040
8	.1090	.1140	.1200	.1260	.1330
8	.1400	.1470	.1540	.1620	.1710
8	.1810	.1920	.2040	.2170	.2330

8	.2520	.2770	.3180	.6380	.6980
8	.7290	.7520	.7700	.7850	.7980
8	.8090	.8190	.8290	.8380	.8460
8	.8540	.8610	.8680	.8740	.8800
8	.8860	.8920	.8970	.9020	.9070
8	.9120	.9170	.9210	.9250	.9290
8	.9330	.9370	.9410	.9450	.9490
8	.9530	.9570	.9600	.9630	.9660
8	.9690	.9720	.9750	.9780	.9810
8	.9840	.9870	.9900	.9930	.9960
8	.9980	1.0000	1.0000	1.0000	1.0000

9 ENDTBL

TABLE NO.	TIME INCREMENT
5 RAINFL 6	.0200

8	.0000	.0080	.0162	.0246	.0333
8	.0425	.0524	.0630	.0743	.0863
8	.0990	.1124	.1265	.1420	.1595
8	.1800	.2050	.2550	.3450	.4370
8	.5300	.6030	.6330	.6600	.6840
8	.7050	.7240	.7420	.7590	.7750
8	.7900	.8043	.8180	.8312	.8439
8	.8561	.8678	.8790	.8898	.9002
8	.9103	.9201	.9297	.9391	.9483
8	.9573	.9661	.9747	.9832	.9916
8	1.0000	1.0000	1.0000	1.0000	1.0000

9 ENDTBL

0 STANDARD CONTROL INSTRUCTIONS

```
6 RUNOFF 1   10     6       .8400    51.0000     7.50001 0 0 1 0 1
6 RESVOR 2   10 6   7      7.0000                      1 0 0 1 0 1
6 REACH  3  10   7  5   1750.0000     1.2000     1.10001 0 0 1 0 1
6 RUNOFF 1  10      6       .2000    42.0000      .19001 0 0 1 0 1
6 ADDHYD 4  10   5 6 7                                 1 1 0 1 0 1
6 SAVMOV 5  10   7  6
6 RESVOR 2   20 6   7      4.5000                      1 0 0 1 0 1
6 REACH  3  20   7  5   2900.0000      .2800     1.94001 0 0 1 0 1
6 RUNOFF 1  20      6       .2800    54.0000     2.00001 0 0 1 0 1
6 ADDHYD 4  20   5 6 7                                 1 1 0 1 0 1
6 SAVMOV 5  20   7  1
6 RUNOFF 1   30     6       .3700    49.0000     3.90001 0 0 1 0 1
6 RESVOR 2   30 6   7     21.0000                      1 0 0 1 0 1
6 REACH  3  40   7  5   1300.0000      .8800     1.10001 0 0 1 0 1
6 RUNOFF 1  40      6       .0600    40.0000     1.00001 0 0 1 0 1
6 ADDHYD 4  40   5 6 7                                 1 0 0 1 0 1
6 SAVMOV 5  40   7  6
6 RESVOR 2   40 6   7      9.0000                      1 0 0 1 0 1
6 REACH  3  50   7  5   1700.0000     1.6000     1.45001 0 0 1 0 1
6 RUNOFF 1  49      6       .1100    40.0000     1.67001 0 0 1 0 1
6 ADDHYD 4  50   5 6 7                                 1 0 0 1 0 1
6 SAVMOV 5  50   7  5
6 RUNOFF 1  50      6       .3600    85.0000      .42001 0 0 1 0 1
6 ADDHYD 4  50   5 6 7                                 1 0 0 1 0 1
6 REACH  3  60   7  5   1400.0000      .4400     1.94001 0 0 1 0 1
6 RUNOFF 1  60      6       .0500    45.0000      .90001 0 0 1 0 1
6 ADDHYD 4  60   5 6 7                                 1 1 0 1 0 1
6 SAVMOV 5  70   7  5
6 SAVMOV 5  70   1  6
6 ADDHYD 4  70   5 6 7                                 1 1 0 1 0 1
6 REACH  3  80   7  5    700.0000      .3000     1.94001 0 0 1 0 1
6 RUNOFF 1  80      6       .0200    64.0000      .12001 0 0 1 0 1
6 ADDHYD 4  80   5 6 7                                 1 0 0 1 0 1
6 SAVMOV 5 100   7  5
6 RUNOFF 1  90      6       .2400    73.0000      .62001 0 0 1 0 1
6 ADDHYD 4 100   5 6 7                                 1 0 0 1 0 1
6 REACH  3 110   7  5    500.0000      .3000     1.94001 0 0 1 0 1
6 SAVMOV 5 120   5  7
6 REACH  3 120   7  5    500.0000      .3000     1.94001 0 0 1 0 1
6 RUNOFF 1 120      6       .1900    56.0000      .74001 0 0 1 0 1
6 ADDHYD 4 120   5 6 7                                 1 1 0 1 0 1
6 SAVMOV 5   50 7   6
6 RESVOR 2   50 6   7      2.4000                      1 1 1 1 0 1
6 REACH  3 130   7  5   1000.0000      .3000     1.94001 0 0 1 0 1
6 RUNOFF 1 130      6       .0500    74.0000      .19001 0 0 1 0 1
```

```
6 ADDHYD 4 130    5 6 7                                           1 0 0 1 0 1
6 SAVMOV 5 130    7   6
6 RESVOR 2     60 6   7       2.0000                              1 1 1 1 0 1
6 REACH  3 140    7   5    2500.0000        .2100        1.48001 0 0 1 0 1
6 RUNOFF 1 140        6        .2000      68.0000         .19001 0 0 1 0 1
6 ADDHYD 4 140    5 6 7                                           1 0 0 1 0 1
6 SAVMOV 5 150    7   5
6 RUNOFF 1 149        6        .0800      65.0000         .42001 0 0 1 0 1
6 ADDHYD 4 150    5 6 7                                           1 0 0 1 0 1
6 REACH  3 150    7   5     300.0000        .2100        1.48001 0 0 1 0 1
6 RUNOFF 1 150        6        .0100      40.0000         .15001 0 0 1 0 1
6 ADDHYD 4 150    5 6 7                                           1 0 0 1 0 1
6 SAVMOV 5 180    7   5
6 RUNOFF 1 180        6        .1100      42.0000         .48001 0 0 1 0 1
6 ADDHYD 4 180    5 6 7                                           1 0 0 1 0 1
6 REACH  3 180    7   5    1700.0000        .2100        1.48001 0 0 1 0 1
6 RUNOFF 1 180        6        .1100      41.0000         .48001 0 0 1 0 1
6 ADDHYD 4 180    5 6 7                                           1 1 0 1 0 1
  ENDATA

END OF LISTING
```

```
EXECUTIVE CONTROL OPERATION BASFLO                                                     RECORD ID    1710
+                                      NEW BASEFLOW =   3.00 CFS

EXECUTIVE CONTROL OPERATION INCREM                                                     RECORD ID    1720
+                                      MAIN TIME INCREMENT =   .10 HOURS

EXECUTIVE CONTROL OPERATION COMPUT                                                     RECORD ID    1730
+                                      FROM STRUCTURE 10
+                                                     TO XSECTION 180
      STARTING TIME =   .00    RAIN DEPTH =  7.00    RAIN DURATION=  1.00    RAIN TABLE NO.= 2    ANT. MOIST. COND= 2
      ALTERNATE NO.=87         STORM NO.= 1    MAIN TIME INCREMENT =   .10 HOURS

OPERATION RUNOFF    STRUCTURE 10
        OUTPUT HYDROGRAPH=  6
        AREA=    .84 SQ MI   INPUT RUNOFF CURVE= 51.    TIME OF CONCENTRATION=  7.50 HOURS
        INTERNAL HYDROGRAPH TIME INCREMENT=  .1000 HOURS

        PEAK TIME(HRS)           PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
          17.80                        96.56                        (RUNOFF)

  RUNOFF VOLUME ABOVE BASEFLOW =  1.67 WATERSHED INCHES,    906.24 CFS-HRS,    74.89 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION RESVOR    STRUCTURE 10
        INPUT HYDROGRAPH= 6     OUTPUT HYDROGRAPH= 7
        SURFACE ELEVATION=    7.00

        PEAK TIME(HRS)           PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
          18.14                        96.09                        9.50

  RUNOFF VOLUME ABOVE BASEFLOW =  1.63 WATERSHED INCHES,    884.09 CFS-HRS,    73.06 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION REACH     CROSS SECTION  10
        INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 5
        LENGTH =   1750.00 FEET      INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA,  X=  1.20,   M= 1.10
0       MODIFIED ATT-KIN ROUTING COEFFICIENT =  .34      PEAK TRAVEL TIME =     .40 HOURS
0    *** WARNING - REACH  10 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT      18.15 CFS,  18.88 % OF PEAK.

        PEAK TIME(HRS)           PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
          18.47                        98.84                        (NULL)

  RUNOFF VOLUME ABOVE BASEFLOW =  1.62 WATERSHED INCHES,    878.37 CFS-HRS,    72.59 ACRE-FEET;   BASEFLOW =   3.00 CFS

OPERATION RUNOFF    CROSS SECTION  10
        OUTPUT HYDROGRAPH=  6
```

AREA=   .20 SQ MI   INPUT RUNOFF CURVE= 42.   TIME OF CONCENTRATION=   .19 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0253 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.08	121.81	(RUNOFF)
15.20	8.69	(RUNOFF)
16.46	7.85	(RUNOFF)
17.67	6.75	(RUNOFF)
19.66	5.63	(RUNOFF)
23.66	4.48	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 1.00 WATERSHED INCHES, 128.54 CFS-HRS, 10.62 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 10
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.08	124.81	(NULL)
18.48	104.33	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 1.04 SQ.MI.

11.00	DISCHG	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.92	32.22
12.00	DISCHG	103.79	122.67	68.37	48.48	36.93	31.73	29.33	27.26	26.59	24.26
13.00	DISCHG	23.05	22.09	20.81	20.53	19.65	19.34	18.92	18.32	18.54	18.63
14.00	DISCHG	19.37	20.36	21.44	23.10	24.57	26.43	28.32	30.58	34.13	38.16
15.00	DISCHG	42.29	46.34	50.23	53.88	56.65	58.95	61.10	63.08	64.97	66.81
16.00	DISCHG	68.65	71.17	74.19	77.35	80.46	83.41	85.78	87.66	89.73	91.75
17.00	DISCHG	93.63	95.35	96.91	98.34	99.64	100.81	101.85	102.75	103.42	103.37
18.00	DISCHG	103.47	103.75	104.01	104.19	104.30	104.32	104.27	104.13	103.93	103.65
19.00	DISCHG	103.31	102.89	102.39	101.82	101.18	100.46	99.66	98.79	97.73	95.99
20.00	DISCHG	94.45	93.18	91.97	90.75	89.51	88.27	87.03	85.81	84.61	83.43
21.00	DISCHG	82.27	81.14	80.03	78.94	77.87	76.82	75.80	74.79	73.81	72.84
22.00	DISCHG	71.90	71.02	70.32	69.71	69.16	68.63	68.11	67.58	67.04	66.49
23.00	DISCHG	65.93	65.36	64.77	64.17	63.56	62.94	62.32	61.69	60.95	59.41
24.00	DISCHG	57.89	55.77	53.21	51.69	50.62	49.72	48.91	48.18	47.50	46.85
25.00	DISCHG	46.24	45.66	45.10	44.55	44.02	43.50	42.98	42.48	41.98	41.49
26.00	DISCHG	41.00	40.51	40.03	39.55	39.07	38.60	38.12	37.63	37.15	36.66
27.00	DISCHG	36.16	35.66	35.15	34.64	34.13	33.61	33.09	32.57	32.04	31.51
28.00	DISCHG	30.97	30.44	29.90	29.36	28.82	28.28	27.74	27.21	26.67	26.13
29.00	DISCHG	25.68	25.30	24.94	24.59	24.24	23.89	23.52	23.14	22.75	22.35

RUNOFF VOLUME ABOVE BASEFLOW = 1.50 WATERSHED INCHES, 1006.91 CFS-HRS, 83.21 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 10
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 6

OPERATION RESVOR STRUCTURE 20
INPUT HYDROGRAPH= 6 OUTPUT HYDROGRAPH= 7
SURFACE ELEVATION= 4.50

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.90	24.55	6.08
20.10	93.18	9.18

RUNOFF VOLUME ABOVE BASEFLOW = 1.45 WATERSHED INCHES, 970.12 CFS-HRS, 80.17 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 20
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 2900.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .28, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = .72 PEAK TRAVEL TIME = .10 HOURS

*** WARNING REACH 20 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***
0 *** WARNING - REACH 20 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT 23.17 CFS, 25.69 % OF PEAK.

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.04	24.51	(NULL)
20.25	93.15	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 1.44 WATERSHED INCHES, 966.86 CFS-HRS, 79.90 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 20
OUTPUT HYDROGRAPH= 6
AREA= .28 SQ MI INPUT RUNOFF CURVE= 54. TIME OF CONCENTRATION= 2.00 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .1026 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.36	102.66	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 2.03 WATERSHED INCHES, 366.74 CFS-HRS, 30.31 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 20
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.34	126.76	(NULL)
20.13	105.62	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 1.32 SQ.MI.

11.00	DISCHG	3.00	3.00	3.00	3.01	3.02	3.06	3.18	3.47	4.17	5.78
12.00	DISCHG	9.10	16.05	26.75	39.22	52.10	65.05	77.90	90.13	100.91	109.81
13.00	DISCHG	116.82	121.88	125.10	126.62	126.46	124.97	122.41	118.83	114.22	108.81
14.00	DISCHG	103.10	97.68	92.90	88.65	84.78	81.32	78.28	75.61	73.20	71.10
15.00	DISCHG	69.41	68.44	68.06	68.08	68.45	69.09	69.91	70.85	71.67	72.53
16.00	DISCHG	73.48	74.49	75.59	76.82	78.21	79.76	81.45	82.78	83.97	85.16
17.00	DISCHG	86.41	87.69	89.00	90.33	91.67	93.02	94.35	95.39	95.55	95.46
18.00	DISCHG	95.31	95.15	94.99	94.83	94.67	94.92	95.91	97.04	98.15	99.18

19.00	DISCHG	100.14	101.02	101.81	102.53	103.18	103.75	104.26	104.69	105.06	105.35
20.00	DISCHG	105.54	105.62	105.60	105.48	105.27	104.98	104.61	104.15	103.63	103.05
21.00	DISCHG	102.42	101.74	101.03	100.29	99.53	98.74	97.95	97.14	96.33	95.51
22.00	DISCHG	94.69	93.87	93.04	92.22	91.41	90.62	89.84	89.08	88.59	88.40
23.00	DISCHG	88.29	88.20	88.12	88.04	87.96	87.88	87.80	87.72	87.63	87.54
24.00	DISCHG	87.43	87.14	86.01	84.56	82.97	81.30	79.58	77.84	76.07	74.29
25.00	DISCHG	72.52	70.77	69.04	67.36	65.73	63.95	62.06	60.23	58.50	56.88
26.00	DISCHG	55.38	53.98	52.68	51.47	50.33	49.26	48.24	47.29	46.38	45.51
27.00	DISCHG	44.68	43.89	43.12	42.39	41.67	40.98	40.28	39.56	38.85	38.16
28.00	DISCHG	37.49	36.83	36.19	35.55	34.93	34.32	33.71	33.12	32.52	31.94
29.00	DISCHG	31.36	30.79	30.23	29.69	29.17	28.67	28.18	27.71	27.24	26.79

RUNOFF VOLUME ABOVE BASEFLOW = 1.57 WATERSHED INCHES, 1333.60 CFS-HRS, 110.21 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 20
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 1

OPERATION RUNOFF STRUCTURE 30
OUTPUT HYDROGRAPH= 6
AREA= .37 SQ MI INPUT RUNOFF CURVE= 49. TIME OF CONCENTRATION= 3.90 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .1000 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
14.95	60.58	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 1.57 WATERSHED INCHES, 375.61 CFS-HRS, 31.04 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION RESVOR STRUCTURE 30
INPUT HYDROGRAPH= 6 OUTPUT HYDROGRAPH= 7
SURFACE ELEVATION= 21.00

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
16.21	48.05	25.91

RUNOFF VOLUME ABOVE BASEFLOW = 1.51 WATERSHED INCHES, 360.28 CFS-HRS, 29.77 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION REACH CROSS SECTION 40
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 1300.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .88, M= 1.10
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = .32 PEAK TRAVEL TIME = .30 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
16.55	47.70	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 1.50 WATERSHED INCHES, 358.97 CFS-HRS, 29.67 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION RUNOFF CROSS SECTION 40

```
          OUTPUT HYDROGRAPH=  6
          AREA=    .06 SQ MI   INPUT RUNOFF CURVE= 40.    TIME OF CONCENTRATION=  1.00 HOURS
          INTERNAL HYDROGRAPH TIME INCREMENT=  .0952 HOURS

          PEAK TIME(HRS)              PEAK DISCHARGE(CFS)        PEAK ELEVATION(FEET)
             12.72                          10.21                    (RUNOFF)
             23.76                           1.21                    (RUNOFF)

  RUNOFF VOLUME ABOVE BASEFLOW =   .84 WATERSHED INCHES,     32.57 CFS-HRS,     2.69 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION ADDHYD   CROSS SECTION  40
          INPUT HYDROGRAPHS= 5,6     OUTPUT HYDROGRAPH= 7

          PEAK TIME(HRS)              PEAK DISCHARGE(CFS)        PEAK ELEVATION(FEET)
             12.73                          10.35                    (NULL)
             16.54                          49.80                    (NULL)

  RUNOFF VOLUME ABOVE BASEFLOW =  1.41 WATERSHED INCHES,    391.54 CFS-HRS,    32.36 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION SAVMOV   CROSS SECTION  40
          INPUT HYDROGRAPH= 7    OUTPUT HYDROGRAPH= 6

OPERATION RESVOR   STRUCTURE 40
          INPUT HYDROGRAPH= 6    OUTPUT HYDROGRAPH= 7
          SURFACE ELEVATION=     9.00

          PEAK TIME(HRS)              PEAK DISCHARGE(CFS)        PEAK ELEVATION(FEET)
             12.90                           9.83                     9.81
             16.60                          49.78                    10.89

  RUNOFF VOLUME ABOVE BASEFLOW =  1.41 WATERSHED INCHES,    389.94 CFS-HRS,    32.22 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION REACH    CROSS SECTION  50
          INPUT HYDROGRAPH= 7    OUTPUT HYDROGRAPH= 5
          LENGTH =    1700.00 FEET      INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA,  X=  1.60,    M= 1.45
0         MODIFIED ATT-KIN ROUTING COEFFICIENT =  .83      PEAK TRAVEL TIME =     .10 HOURS

     ***  WARNING  REACH  50 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***

          PEAK TIME(HRS)              PEAK DISCHARGE(CFS)        PEAK ELEVATION(FEET)
             13.02                           9.78                    (NULL)
             16.72                          49.77                    (NULL)

  RUNOFF VOLUME ABOVE BASEFLOW =  1.40 WATERSHED INCHES,    389.36 CFS-HRS,    32.18 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION RUNOFF   CROSS SECTION  49
          OUTPUT HYDROGRAPH=  6
          AREA=    .11 SQ MI   INPUT RUNOFF CURVE= 40.    TIME OF CONCENTRATION=  1.67 HOURS
```

INTERNAL HYDROGRAPH TIME INCREMENT= .1012 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.33	13.76	(RUNOFF)
23.80	2.20	(RUNOFF)
+	*	* FIRST POINT OF FLAT PEAK

RUNOFF VOLUME ABOVE BASEFLOW = .84 WATERSHED INCHES, 59.78 CFS-HRS, 4.94 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 50
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.16	22.91	(NULL)
16.65	53.98	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 1.29 WATERSHED INCHES, 449.14 CFS-HRS, 37.12 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION SAVMOV CROSS SECTION 50
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5

OPERATION RUNOFF CROSS SECTION 50
OUTPUT HYDROGRAPH= 6
AREA= .36 SQ MI INPUT RUNOFF CURVE= 85. TIME OF CONCENTRATION= .42 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0560 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.13	1078.73	(RUNOFF)
19.65	24.75	(RUNOFF)
23.65	18.64	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 5.25 WATERSHED INCHES, 1220.14 CFS-HRS, 100.83 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 50
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.13	1079.95	(NULL)
16.49	90.76	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.87 WATERSHED INCHES, 1669.27 CFS-HRS, 137.95 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION REACH CROSS SECTION 60
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 1400.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .44, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 60 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.13	1079.95	(NULL)
16.49	90.76	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.87 WATERSHED INCHES, 1669.27 CFS-HRS, 137.95 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION RUNOFF CROSS SECTION 60
OUTPUT HYDROGRAPH= 6
AREA= .05 SQ MI INPUT RUNOFF CURVE= 45. TIME OF CONCENTRATION= .90 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .1000 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.56	16.56	(RUNOFF)
23.72	1.26	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 1.24 WATERSHED INCHES, 39.88 CFS-HRS, 3.30 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 60
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.14	1086.21	(NULL)
16.49	93.02	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = .95 SQ.MI.

4.00	DISCHG	.00	.00	.00	.02	.10	.26	.49	.75	1.04	1.33
5.00	DISCHG	1.62	1.91	2.20	2.49	2.77	3.04	3.32	3.58	3.84	4.10
6.00	DISCHG	4.36	4.67	5.18	5.80	6.40	6.89	7.32	7.71	8.07	8.41
7.00	DISCHG	8.75	9.07	9.38	9.69	9.99	10.29	10.58	10.86	11.14	11.41
8.00	DISCHG	11.68	12.08	12.82	13.80	14.96	16.27	17.48	18.44	19.17	19.76
9.00	DISCHG	20.27	20.91	21.91	23.16	24.29	25.16	26.02	27.23	28.66	29.92
10.00	DISCHG	30.90	31.86	33.18	34.84	37.10	40.08	43.57	47.95	52.84	58.21
11.00	DISCHG	64.10	70.07	76.45	83.02	90.75	101.27	130.10	208.30	333.15	539.50
12.00	DISCHG	836.25	1068.68	1030.91	805.58	576.69	421.03	324.82	265.51	227.09	199.69
13.00	DISCHG	178.52	161.72	147.53	136.12	127.20	119.75	113.25	107.02	101.45	96.86
14.00	DISCHG	93.29	90.54	88.31	86.99	86.63	86.30	86.13	85.74	85.37	85.47
15.00	DISCHG	86.26	87.42	88.85	90.29	90.92	90.62	90.19	90.11	90.41	90.86
16.00	DISCHG	91.35	91.83	92.25	92.60	92.86	93.02	92.76	91.64	89.95	88.43
17.00	DISCHG	87.35	86.55	85.87	85.24	84.63	84.03	83.43	82.82	82.11	80.76
18.00	DISCHG	78.62	76.40	74.60	73.30	72.20	71.21	70.27	69.38	68.51	67.67
19.00	DISCHG	66.86	66.07	65.33	64.68	63.99	63.30	62.62	61.96	61.19	59.85
20.00	DISCHG	57.76	55.58	53.88	52.62	51.60	50.72	49.94	49.23	48.56	47.93
21.00	DISCHG	47.34	46.79	46.26	45.76	45.28	44.83	44.40	43.97	43.53	43.10
22.00	DISCHG	42.70	42.29	41.89	41.51	41.15	40.80	40.46	40.14	39.84	39.55
23.00	DISCHG	39.27	39.01	38.75	38.51	38.28	38.06	37.85	37.65	37.37	36.46

24.00	DISCHG	34.72	32.26	28.67	24.55	21.18	18.97	17.56	16.54	15.77	15.13
25.00	DISCHG	14.59	14.12	13.71	13.34	13.02	12.72	12.45	12.20	11.96	11.76
26.00	DISCHG	11.57	11.41	11.25	11.11	10.97	10.84	10.71	10.57	10.42	10.28
27.00	DISCHG	10.13	9.97	9.81	9.64	9.47	9.29	9.11	8.93	8.74	8.54
28.00	DISCHG	8.34	8.13	7.93	7.72	7.51	7.29	7.08	6.87	6.67	6.46
29.00	DISCHG	6.26	6.06	5.87	5.68	5.49	5.32	5.14	4.99	4.87	4.74

RUNOFF VOLUME ABOVE BASEFLOW = 2.79 WATERSHED INCHES, 1709.15 CFS-HRS, 141.24 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION SAVMOV CROSS SECTION 70
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5

OPERATION SAVMOV CROSS SECTION 70
INPUT HYDROGRAPH= 1 OUTPUT HYDROGRAPH= 6

OPERATION ADDHYD CROSS SECTION 70
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.14	1105.88	(NULL)
17.69	178.21	(NULL)
19.31	167.21	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 2.27 SQ.MI.

4.00	DISCHG	3.00	3.00	3.00	3.02	3.10	3.26	3.49	3.75	4.04	4.33
5.00	DISCHG	4.62	4.91	5.20	5.49	5.77	6.04	6.32	6.58	6.84	7.10
6.00	DISCHG	7.36	7.67	8.18	8.80	9.40	9.89	10.32	10.71	11.07	11.41
7.00	DISCHG	11.75	12.07	12.38	12.69	12.99	13.29	13.58	13.86	14.14	14.41
8.00	DISCHG	14.68	15.08	15.82	16.80	17.96	19.27	20.48	21.44	22.17	22.76
9.00	DISCHG	23.27	23.91	24.91	26.16	27.29	28.16	29.02	30.23	31.66	32.92
10.00	DISCHG	33.90	34.86	36.18	37.84	40.10	43.08	46.57	50.95	55.84	61.21
11.00	DISCHG	67.10	73.07	79.45	86.03	93.78	104.34	133.28	211.78	337.32	545.28
12.00	DISCHG	845.34	1084.73	1057.66	844.80	628.79	486.08	402.72	355.64	327.99	309.50
13.00	DISCHG	295.33	283.60	272.63	262.73	253.67	244.72	235.66	225.85	215.67	205.68
14.00	DISCHG	196.38	188.23	181.21	175.63	171.40	167.62	164.41	161.35	158.57	156.57
15.00	DISCHG	155.67	155.86	156.90	158.38	159.37	159.71	160.10	160.96	162.08	163.39
16.00	DISCHG	164.83	166.32	167.84	169.42	171.07	172.78	174.21	174.42	173.91	173.59
17.00	DISCHG	173.76	174.24	174.87	175.57	176.31	177.05	177.78	178.21	177.66	176.22
18.00	DISCHG	173.93	171.55	169.59	168.13	166.87	166.13	166.18	166.42	166.66	166.86
19.00	DISCHG	167.00	167.09	167.14	167.21	167.17	167.05	166.88	166.65	166.25	165.20
20.00	DISCHG	163.30	161.20	159.47	158.10	156.88	155.71	154.55	153.38	152.19	150.98
21.00	DISCHG	149.76	148.53	147.29	146.05	144.81	143.57	142.34	141.10	139.86	138.61
22.00	DISCHG	137.38	136.16	134.93	133.73	132.56	131.41	130.30	129.22	128.43	127.95
23.00	DISCHG	127.56	127.21	126.88	126.55	126.24	125.94	125.65	125.37	125.01	124.00
24.00	DISCHG	122.15	119.40	114.67	109.11	104.15	100.27	97.14	94.38	91.84	89.42
25.00	DISCHG	87.11	84.89	82.75	80.71	78.75	76.68	74.51	72.43	70.46	68.64

26.00	DISCHG	66.95	65.39	63.94	62.58	61.30	60.10	58.95	57.85	56.80	55.79
27.00	DISCHG	54.81	53.86	52.93	52.03	51.14	50.27	49.39	48.49	47.59	46.70
28.00	DISCHG	45.83	44.97	44.11	43.27	42.44	41.61	40.79	39.99	39.19	38.40
29.00	DISCHG	37.62	36.85	36.10	35.37	34.66	33.98	33.32	32.70	32.11	31.53

RUNOFF VOLUME ABOVE BASEFLOW = 2.08 WATERSHED INCHES, 3042.75 CFS-HRS, 251.45 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 80
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 700.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .30, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 80 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.14	1105.88	(NULL)
17.69	178.21	(NULL)
19.31	167.21	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.08 WATERSHED INCHES, 3042.75 CFS-HRS, 251.45 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 80
OUTPUT HYDROGRAPH= 6
AREA= .02 SQ MI INPUT RUNOFF CURVE= 64. TIME OF CONCENTRATION= .12 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0160 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
11.98	54.99	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 2.98 WATERSHED INCHES, 38.49 CFS-HRS, 3.18 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 80
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.13	1127.29	(NULL)
17.69	179.54	(NULL)
19.31	168.28	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.08 WATERSHED INCHES, 3081.23 CFS-HRS, 254.63 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 100
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5

OPERATION RUNOFF CROSS SECTION 90
OUTPUT HYDROGRAPH= 6
AREA= .24 SQ MI INPUT RUNOFF CURVE= 73. TIME OF CONCENTRATION= .62 HOURS

INTERNAL HYDROGRAPH TIME INCREMENT= .0827 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.27	434.61	(RUNOFF)
19.66	14.73	(RUNOFF)
23.66	11.19	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 3.93 WATERSHED INCHES, 608.63 CFS-HRS, 50.30 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 100
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.16	1509.45	(NULL)
16.64	197.41	(NULL)
17.69	197.88	(NULL)
19.31	183.01	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.26 WATERSHED INCHES, 3689.87 CFS-HRS, 304.93 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 110
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 500.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .30, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 110 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.16	1509.45	(NULL)
16.64	197.41	(NULL)
17.69	197.88	(NULL)
19.31	183.01	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.26 WATERSHED INCHES, 3689.87 CFS-HRS, 304.93 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 120
INPUT HYDROGRAPH= 5 OUTPUT HYDROGRAPH= 7

OPERATION REACH CROSS SECTION 120
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 500.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .30, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 120 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.16	1509.45	(NULL)
16.64	197.41	(NULL)
17.69	197.88	(NULL)
19.31	183.01	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.26 WATERSHED INCHES, 3689.87 CFS-HRS, 304.93 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 120
OUTPUT HYDROGRAPH= 6
AREA= .19 SQ MI INPUT RUNOFF CURVE= 56. TIME OF CONCENTRATION= .74 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0987 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.38	159.29	(RUNOFF)
19.68	8.61	(RUNOFF)
23.67	6.65	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 2.22 WATERSHED INCHES, 271.72 CFS-HRS, 22.45 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 120
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.18	1631.85	(NULL)
15.38	200.88	(NULL)
16.63	209.79	(NULL)
17.68	208.50	(NULL)
19.31	191.61	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 2.72 SQ.MI.

4.00	DISCHG	3.00	3.00	3.00	3.02	3.10	3.26	3.49	3.75	4.04	4.33
5.00	DISCHG	4.62	4.91	5.20	5.49	5.77	6.04	6.32	6.58	6.84	7.10
6.00	DISCHG	7.36	7.67	8.18	8.80	9.40	9.89	10.32	10.71	11.07	11.41
7.00	DISCHG	11.75	12.07	12.38	12.69	12.99	13.30	13.62	13.96	14.33	14.71
8.00	DISCHG	15.11	15.65	16.55	17.73	19.11	20.68	22.18	23.45	24.48	25.36
9.00	DISCHG	26.17	27.10	28.43	30.05	31.57	32.84	34.14	35.80	37.74	39.53
10.00	DISCHG	41.03	42.53	44.41	46.70	49.75	53.63	58.32	64.09	70.62	77.95
11.00	DISCHG	85.99	94.52	103.69	113.46	125.10	140.41	183.87	286.90	460.48	766.12
12.00	DISCHG	1202.04	1559.83	1624.75	1441.00	1183.26	959.33	788.96	670.15	588.09	528.05
13.00	DISCHG	483.20	446.76	416.31	390.69	368.75	349.61	331.75	314.52	297.83	282.10
14.00	DISCHG	268.15	255.94	245.43	236.78	229.69	223.42	217.69	212.27	207.28	203.30
15.00	DISCHG	200.77	199.72	199.88	200.67	200.87	200.37	199.77	199.60	199.82	200.45
16.00	DISCHG	201.43	202.60	203.92	205.37	206.95	208.60	209.73	209.46	208.22	207.00
17.00	DISCHG	206.27	206.00	206.08	206.42	206.92	207.50	208.12	208.48	207.78	205.91
18.00	DISCHG	203.02	199.77	196.87	194.55	192.63	191.42	191.15	191.18	191.28	191.38
19.00	DISCHG	191.47	191.52	191.55	191.61	191.57	191.45	191.28	191.07	190.57	189.11

20.00	DISCHG	186.62	183.65	180.97	178.73	176.82	175.17	173.70	172.31	170.97	169.66
21.00	DISCHG	168.37	167.09	165.83	164.57	163.32	162.08	160.84	159.61	158.37	157.13
22.00	DISCHG	155.91	154.69	153.47	152.28	151.11	149.98	148.87	147.80	147.02	146.55
23.00	DISCHG	146.17	145.82	145.50	145.18	144.88	144.59	144.31	144.03	143.57	142.13
24.00	DISCHG	139.62	135.38	128.68	120.70	113.12	106.85	101.78	97.59	94.05	90.96
25.00	DISCHG	88.18	85.63	83.26	81.05	78.99	76.84	74.62	72.49	70.51	68.66
26.00	DISCHG	66.96	65.39	63.94	62.58	61.30	60.10	58.95	57.85	56.80	55.79
27.00	DISCHG	54.81	53.86	52.93	52.03	51.14	50.27	49.39	48.49	47.59	46.70
28.00	DISCHG	45.83	44.97	44.11	43.27	42.44	41.61	40.79	39.99	39.19	38.40
29.00	DISCHG	37.62	36.85	36.10	35.37	34.66	33.98	33.32	32.70	32.11	31.53

RUNOFF VOLUME ABOVE BASEFLOW = 2.26 WATERSHED INCHES, 3961.59 CFS-HRS, 327.39 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV STRUCTURE 50
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 6

OPERATION RESVOR STRUCTURE 50
INPUT HYDROGRAPH= 6 OUTPUT HYDROGRAPH= 7
SURFACE ELEVATION= 2.40

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.56	338.73	10.54

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 2.72 SQ.MI.

9.00	DISCHG	3.00	3.00	3.00	3.43	3.89	4.37	4.86	5.37	5.90	6.45
9.00	ELEV	2.84	2.84	2.84	2.86	2.88	2.89	2.91	2.93	2.96	2.98
10.00	DISCHG	7.02	7.55	8.09	8.66	9.26	9.90	10.60	11.37	12.21	13.16
10.00	ELEV	3.00	3.02	3.05	3.07	3.10	3.13	3.16	3.19	3.23	3.27
11.00	DISCHG	14.20	15.35	17.10	19.55	22.23	25.20	28.86	34.40	44.35	63.37
11.00	ELEV	3.32	3.37	3.43	3.49	3.56	3.63	3.72	3.86	4.09	4.47
12.00	DISCHG	93.11	120.25	168.39	227.57	256.97	279.88	296.60	308.78	317.79	324.55
12.00	ELEV	5.08	5.95	6.93	7.84	8.57	9.11	9.51	9.80	10.01	10.17
13.00	DISCHG	329.64	333.45	335.74	337.24	338.19	338.65	338.70	338.35	337.64	336.58
13.00	ELEV	10.30	10.39	10.45	10.50	10.53	10.54	10.54	10.53	10.51	10.48
14.00	DISCHG	335.22	333.49	331.16	328.62	325.94	323.14	320.26	317.30	314.27	311.21
14.00	ELEV	10.44	10.39	10.33	10.27	10.21	10.14	10.07	10.00	9.93	9.86
15.00	DISCHG	308.14	305.10	302.14	299.27	296.50	293.80	291.17	288.59	286.09	283.67
15.00	ELEV	9.78	9.71	9.64	9.57	9.51	9.44	9.38	9.32	9.26	9.20
16.00	DISCHG	281.35	279.12	276.98	274.95	273.01	271.18	269.43	267.75	266.09	264.45
16.00	ELEV	9.15	9.09	9.04	8.99	8.95	8.90	8.86	8.82	8.78	8.74
17.00	DISCHG	262.82	261.23	259.67	258.17	256.72	255.33	253.99	252.71	251.45	250.20
17.00	ELEV	8.71	8.67	8.63	8.59	8.56	8.53	8.50	8.46	8.43	8.40
18.00	DISCHG	248.96	247.69	246.36	245.01	243.63	242.25	240.88	239.55	238.25	237.00
18.00	ELEV	8.37	8.34	8.31	8.28	8.24	8.21	8.17	8.14	8.11	8.07
19.00	DISCHG	235.77	234.59	233.43	232.31	231.22	230.16	229.12	228.10	227.10	226.10
19.00	ELEV	8.04	8.01	7.99	7.96	7.93	7.90	7.88	7.85	7.83	7.80
20.00	DISCHG	225.08	224.01	222.89	221.74	220.56	219.36	218.16	216.95	215.74	214.52
20.00	ELEV	7.78	7.75	7.72	7.69	7.66	7.63	7.60	7.57	7.54	7.51

21.00	DISCHG	213.30	212.08	210.86	209.19	206.54	203.96	201.47	199.05	196.69	194.41
21.00	ELEV	7.48	7.45	7.42	7.39	7.36	7.33	7.30	7.28	7.25	7.22
22.00	DISCHG	192.18	190.02	187.91	185.85	183.85	181.89	179.98	178.13	176.32	174.59
22.00	ELEV	7.20	7.18	7.15	7.13	7.11	7.08	7.06	7.04	7.02	7.00
23.00	DISCHG	172.93	171.35	169.84	168.40	167.03	165.72	164.47	163.28	162.14	161.00
23.00	ELEV	6.98	6.97	6.95	6.93	6.92	6.90	6.89	6.88	6.86	6.85
24.00	DISCHG	159.82	158.51	156.96	155.06	152.82	150.31	147.61	144.79	141.92	139.02
24.00	ELEV	6.84	6.82	6.80	6.78	6.76	6.73	6.70	6.67	6.64	6.60
25.00	DISCHG	136.11	133.22	130.36	127.53	124.74	121.99	120.97	120.91	120.86	120.80
25.00	ELEV	6.57	6.54	6.51	6.47	6.44	6.41	6.38	6.35	6.31	6.28
26.00	DISCHG	120.74	120.68	120.61	120.55	120.48	120.42	120.35	120.28	120.21	120.13
26.00	ELEV	6.24	6.21	6.17	6.13	6.09	6.05	6.01	5.97	5.92	5.88
27.00	DISCHG	120.06	119.67	118.00	116.35	114.72	113.11	111.52	109.94	108.39	106.85
27.00	ELEV	5.84	5.79	5.75	5.70	5.66	5.62	5.57	5.53	5.49	5.45
28.00	DISCHG	105.32	103.81	102.32	100.85	99.39	97.94	96.52	95.10	93.71	92.33
28.00	ELEV	5.41	5.37	5.33	5.29	5.25	5.21	5.17	5.14	5.10	5.06
29.00	DISCHG	90.96	89.48	87.71	85.97	84.27	82.60	80.97	79.37	77.80	76.26
29.00	ELEV	5.03	4.99	4.95	4.92	4.89	4.85	4.82	4.79	4.76	4.73

RUNOFF VOLUME ABOVE BASEFLOW = 2.07 WATERSHED INCHES, 3641.08 CFS-HRS, 300.90 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 130
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 1000.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .30, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 130 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***
0 *** WARNING - REACH 130 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT 73.26 CFS, 21.82 % OF PEAK.

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.56	338.73	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.07 WATERSHED INCHES, 3641.08 CFS-HRS, 300.90 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 130
OUTPUT HYDROGRAPH= 6
AREA= .05 SQ MI INPUT RUNOFF CURVE= 74. TIME OF CONCENTRATION= .19 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0253 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.01	160.37	(RUNOFF)
23.65	2.37	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 4.05 WATERSHED INCHES, 130.79 CFS-HRS, 10.81 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 130
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.06	256.61	(NULL)
13.45	348.57	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.11 WATERSHED INCHES, 3771.87 CFS-HRS, 311.71 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 130
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 6

OPERATION RESVOR STRUCTURE 60
INPUT HYDROGRAPH= 6 OUTPUT HYDROGRAPH= 7
SURFACE ELEVATION= 2.00

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
16.72	271.48	6.68

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 2.77 SQ.MI.

11.00	DISCHG	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	4.63	7.79
11.00	ELEV	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.44	2.53
12.00	DISCHG	12.23	16.78	21.04	28.84	38.83	48.34	58.08	69.82	81.92	93.75
12.00	ELEV	2.66	2.81	2.95	3.09	3.25	3.41	3.57	3.73	3.89	4.05
13.00	DISCHG	105.24	116.35	127.04	136.72	144.13	151.29	158.18	164.81	171.16	177.25
13.00	ELEV	4.20	4.35	4.49	4.63	4.76	4.89	5.01	5.13	5.24	5.35
14.00	DISCHG	180.09	180.26	180.43	180.60	180.76	180.92	186.47	197.71	207.77	216.75
14.00	ELEV	5.46	5.56	5.66	5.76	5.85	5.95	6.04	6.12	6.20	6.27
15.00	DISCHG	224.76	231.86	238.14	243.67	248.50	252.69	256.30	259.41	262.06	264.29
15.00	ELEV	6.33	6.38	6.43	6.47	6.50	6.53	6.56	6.59	6.60	6.62
16.00	DISCHG	266.15	267.67	268.89	269.84	270.55	271.05	271.36	271.47	271.42	271.24
16.00	ELEV	6.64	6.65	6.66	6.66	6.67	6.67	6.67	6.68	6.67	6.67
17.00	DISCHG	270.93	270.52	270.01	269.42	268.76	268.04	267.26	266.44	265.58	264.67
17.00	ELEV	6.67	6.67	6.66	6.66	6.65	6.65	6.64	6.64	6.63	6.62
18.00	DISCHG	263.71	262.72	261.69	260.64	259.56	258.46	257.34	256.19	255.04	253.87
18.00	ELEV	6.62	6.61	6.60	6.59	6.59	6.58	6.57	6.56	6.55	6.54
19.00	DISCHG	252.70	251.52	250.35	249.18	248.01	246.86	245.71	244.57	243.44	242.30
19.00	ELEV	6.54	6.53	6.52	6.51	6.50	6.49	6.48	6.47	6.47	6.46
20.00	DISCHG	241.14	239.99	238.83	237.68	236.52	235.36	234.20	233.03	231.87	230.69
20.00	ELEV	6.45	6.44	6.43	6.42	6.41	6.41	6.40	6.39	6.38	6.37
21.00	DISCHG	229.52	228.34	227.15	225.95	224.67	223.27	221.79	220.23	218.60	216.91
21.00	ELEV	6.36	6.35	6.34	6.34	6.33	6.32	6.30	6.29	6.28	6.27
22.00	DISCHG	215.18	213.41	211.61	209.78	207.94	206.09	204.24	202.38	200.52	198.67
22.00	ELEV	6.26	6.24	6.23	6.21	6.20	6.19	6.17	6.16	6.15	6.13
23.00	DISCHG	196.83	195.01	193.21	191.44	189.70	187.99	186.32	184.68	183.08	181.50
23.00	ELEV	6.12	6.10	6.09	6.08	6.06	6.05	6.04	6.03	6.02	6.00
24.00	DISCHG	180.99	180.96	180.94	180.91	180.89	180.86	180.82	180.79	180.75	180.70
24.00	ELEV	5.99	5.98	5.96	5.95	5.93	5.91	5.89	5.87	5.85	5.82
25.00	DISCHG	180.66	180.61	180.56	180.50	180.45	180.39	180.32	180.26	180.20	180.14
25.00	ELEV	5.79	5.77	5.73	5.70	5.67	5.63	5.59	5.56	5.52	5.48

26.00	DISCHG	180.07	180.01	178.27	176.25	174.30	172.42	170.60	168.84	167.13	165.49
26.00	ELEV	5.44	5.41	5.37	5.33	5.30	5.27	5.23	5.20	5.17	5.14
27.00	DISCHG	163.90	162.36	160.84	159.31	157.78	156.24	154.70	153.17	151.63	150.09
27.00	ELEV	5.11	5.09	5.06	5.03	5.00	4.98	4.95	4.92	4.90	4.87
28.00	DISCHG	148.55	147.01	145.47	143.93	142.40	140.87	139.34	137.82	136.30	134.71
28.00	ELEV	4.84	4.81	4.79	4.76	4.73	4.70	4.68	4.65	4.62	4.60
29.00	DISCHG	132.71	130.74	128.79	126.84	124.91	122.98	121.07	119.17	117.29	115.42
29.00	ELEV	4.57	4.54	4.52	4.49	4.47	4.44	4.41	4.39	4.36	4.34

RUNOFF VOLUME ABOVE BASEFLOW = 1.92 WATERSHED INCHES, 3427.89 CFS-HRS, 283.28 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 140
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 2500.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .21, M= 1.48
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = .37 PEAK TRAVEL TIME = .30 HOURS
0 *** WARNING - REACH 140 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT 112.42 CFS, 41.87 % OF PEAK.

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
17.02	271.05	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 1.90 WATERSHED INCHES, 3396.49 CFS-HRS, 280.69 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 140
OUTPUT HYDROGRAPH= 6
AREA= .20 SQ MI INPUT RUNOFF CURVE= 68. TIME OF CONCENTRATION= .19 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0253 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.02	543.51	(RUNOFF)
15.16	19.42	(RUNOFF)
16.45	16.95	(RUNOFF)
17.66	14.20	(RUNOFF)
19.65	11.51	(RUNOFF)
23.65	8.78	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 3.42 WATERSHED INCHES, 441.34 CFS-HRS, 36.47 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 140
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.02	549.09	(NULL)
17.02	285.17	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.00 WATERSHED INCHES, 3837.82 CFS-HRS, 317.16 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 150
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5

OPERATION RUNOFF CROSS SECTION 149
OUTPUT HYDROGRAPH= 6
AREA= .08 SQ MI INPUT RUNOFF CURVE= 65. TIME OF CONCENTRATION= .42 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0560 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.15	142.32	(RUNOFF)
16.45	6.39	(RUNOFF)
17.67	5.39	(RUNOFF)
19.66	4.37	(RUNOFF)
23.66	3.34	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 3.10 WATERSHED INCHES, 160.17 CFS-HRS, 13.24 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 150
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.04	659.91	(NULL)
14.32	211.38	(NULL)
16.56	291.90	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.03 WATERSHED INCHES, 3997.99 CFS-HRS, 330.39 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 150
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 300.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .21, M= 1.48
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 150 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***
0 *** WARNING - REACH 150 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT 117.49 CFS, 18.32 % OF PEAK.

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.04	659.91	(NULL)
14.32	211.38	(NULL)
16.56	291.90	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.03 WATERSHED INCHES, 3997.99 CFS-HRS, 330.39 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 150
OUTPUT HYDROGRAPH= 6
AREA= .01 SQ MI INPUT RUNOFF CURVE= 40. TIME OF CONCENTRATION= .15 HOURS

INTERNAL HYDROGRAPH TIME INCREMENT= .0200 HOURS

*** WARNING-MAIN TIME INCREMENT MAY BE TOO LARGE.
COMPUTED PEAK(4.99) AT EXCEEDS MAX. ADJACENT HYDROGRAPH COORDINATE BY 8 %.
+ XSECTION 150

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.05	4.99	(RUNOFF)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = .01 SQ.MI.

11.00	DISCHG	.00	.00	.00	.00	.00	.00	.00	.00	.00	1.05
12.00	DISCHG	4.60	4.46	2.17	1.71	1.28	1.17	1.09	1.02	1.00	.87
13.00	DISCHG	.84	.78	.73	.71	.66	.64	.60	.56	.55	.52
14.00	DISCHG	.52	.50	.48	.47	.44	.43	.41	.38	.38	.38
15.00	DISCHG	.38	.39	.39	.38	.35	.34	.34	.34	.34	.34
16.00	DISCHG	.34	.34	.35	.35	.35	.35	.32	.30	.30	.30
17.00	DISCHG	.30	.30	.30	.30	.30	.30	.30	.30	.30	.26
18.00	DISCHG	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25
19.00	DISCHG	.25	.25	.25	.25	.25	.25	.25	.25	.25	.21
20.00	DISCHG	.19	.19	.19	.19	.19	.19	.19	.19	.19	.19
21.00	DISCHG	.19	.20	.20	.20	.20	.20	.20	.20	.20	.20
22.00	DISCHG	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20
23.00	DISCHG	.20	.20	.20	.20	.20	.20	.20	.20	.20	.15
24.00	DISCHG	.14	.08	.01	.00						

RUNOFF VOLUME ABOVE BASEFLOW = .84 WATERSHED INCHES, 5.41 CFS-HRS, .45 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 150
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.04	664.89	(NULL)
14.32	211.85	(NULL)
16.56	292.24	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.03 WATERSHED INCHES, 4003.40 CFS-HRS, 330.84 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 180
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5

OPERATION RUNOFF CROSS SECTION 180
OUTPUT HYDROGRAPH= 6
AREA= .11 SQ MI INPUT RUNOFF CURVE= 42. TIME OF CONCENTRATION= .48 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0640 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.27	39.64	(RUNOFF)
23.68	2.45	(RUNOFF)

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   RUNOFF VOLUME ABOVE BASEFLOW =   .99 WATERSHED INCHES,     70.57 CFS-HRS,      5.83 ACRE-FEET;   BASEFLOW =    .00 CFS

  OPERATION ADDHYD   CROSS SECTION 180
           INPUT HYDROGRAPHS= 5,6     OUTPUT HYDROGRAPH= 7

           PEAK TIME(HRS)              PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
              12.04                         682.06                       (NULL)
              14.31                         218.17                       (NULL)
              16.55                         296.50                       (NULL)

   RUNOFF VOLUME ABOVE BASEFLOW = 1.99 WATERSHED INCHES,   4073.98 CFS-HRS,    336.67 ACRE-FEET;   BASEFLOW =   3.00 CFS

  OPERATION REACH    CROSS SECTION 180
           INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 5
           LENGTH =   1700.00 FEET     INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA,  X=   .21,    M= 1.48
 0         MODIFIED ATT-KIN ROUTING COEFFICIENT =  .62      PEAK TRAVEL TIME =     .20 HOURS
 0     *** WARNING - REACH 180 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT     117.49 CFS,  17.86 % OF PEAK.

           PEAK TIME(HRS)              PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
              12.19                         603.16                       (NULL)
              14.48                         217.40                       (NULL)
              16.71                         296.06                       (NULL)

   RUNOFF VOLUME ABOVE BASEFLOW = 1.98 WATERSHED INCHES,   4051.95 CFS-HRS,    334.85 ACRE-FEET;   BASEFLOW =   3.00 CFS

  OPERATION RUNOFF   CROSS SECTION 180
           OUTPUT HYDROGRAPH=  6
           AREA=    .11 SQ MI   INPUT RUNOFF CURVE= 41.    TIME OF CONCENTRATION=    .48 HOURS
           INTERNAL HYDROGRAPH TIME INCREMENT=  .0640 HOURS

           PEAK TIME(HRS)              PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
              12.28                          34.74                       (RUNOFF)
              23.69                           2.34                       (RUNOFF)

   RUNOFF VOLUME ABOVE BASEFLOW =   .92 WATERSHED INCHES,     65.08 CFS-HRS,      5.38 ACRE-FEET;   BASEFLOW =    .00 CFS

  OPERATION ADDHYD   CROSS SECTION 180
           INPUT HYDROGRAPHS= 5,6     OUTPUT HYDROGRAPH= 7

           PEAK TIME(HRS)              PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
              12.19                         635.26                       (NULL)
              14.44                         223.16                       (NULL)
              16.70                         300.00                       (NULL)

  TIME(HRS)        FIRST HYDROGRAPH POINT =    .00 HOURS      TIME INCREMENT =  .10 HOURS      DRAINAGE AREA =    3.28 SQ.MI.
```

8.00	DISCHG	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.04	3.15
9.00	DISCHG	3.31	3.50	3.72	3.99	4.26	4.53	4.81	5.16	5.60	6.04
10.00	DISCHG	6.47	6.88	7.38	7.98	8.61	9.54	10.52	11.76	13.39	14.95
11.00	DISCHG	17.06	19.17	21.51	24.30	26.99	31.07	35.31	58.09	108.28	171.42
12.00	DISCHG	344.93	559.62	634.25	520.58	405.23	311.45	249.04	212.02	190.45	180.74
13.00	DISCHG	174.98	173.76	175.45	178.20	183.22	188.19	193.59	198.58	202.64	207.18
14.00	DISCHG	211.44	215.97	219.72	221.83	223.05	222.94	222.42	221.47	221.25	223.98
15.00	DISCHG	229.18	235.89	243.30	250.82	257.93	263.59	268.55	273.27	277.71	281.83
16.00	DISCHG	285.54	288.84	291.73	294.21	296.32	298.08	299.50	300.00	299.50	298.99
17.00	DISCHG	298.64	298.40	298.20	297.97	297.69	297.33	296.90	296.38	295.79	294.94
18.00	DISCHG	293.02	290.89	289.06	287.53	286.23	285.05	283.93	282.84	281.76	280.67
19.00	DISCHG	279.57	278.45	277.33	276.19	275.05	273.91	272.77	271.63	270.48	269.13
20.00	DISCHG	266.77	264.25	262.08	260.27	258.72	257.34	256.07	254.84	253.65	252.48
21.00	DISCHG	251.31	250.15	248.99	247.82	246.66	245.49	244.29	243.05	241.74	240.36
22.00	DISCHG	238.91	237.39	235.81	234.17	232.49	230.76	229.00	227.21	225.41	223.59
23.00	DISCHG	221.76	219.92	218.09	216.26	214.45	212.65	210.87	209.11	207.37	205.45
24.00	DISCHG	202.52	199.37	195.49	190.81	187.17	184.71	183.17	182.23	181.66	181.31
25.00	DISCHG	181.09	180.94	180.84	180.75	180.68	180.63	180.57	180.51	180.46	180.40
26.00	DISCHG	180.34	180.27	180.21	180.15	179.70	178.80	177.55	176.07	174.45	172.77
27.00	DISCHG	171.07	169.38	167.71	166.08	164.48	162.91	161.35	159.80	158.25	156.71
28.00	DISCHG	155.17	153.63	152.09	150.55	149.01	147.47	145.93	144.40	142.87	141.34
29.00	DISCHG	139.81	138.27	136.62	134.87	133.05	131.18	129.29	127.39	125.47	123.56

RUNOFF VOLUME ABOVE BASEFLOW = 1.94 WATERSHED INCHES, 4117.03 CFS-HRS, 340.23 ACRE-FEET; BASEFLOW = 3.00 CFS

EXECUTIVE CONTROL OPERATION ENDCMP RECORD ID 1740

\+ COMPUTATIONS COMPLETED FOR PASS 1

EXECUTIVE CONTROL OPERATION ENDJOB RECORD ID 1750

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

SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RAIN TABLE #	ANTEC MOIST COND	MAIN TIME INCREM (HR)	PRECIPITATION BEGIN (HR)	PRECIPITATION AMOUNT (IN)	PRECIPITATION DURATION (HR)	RUNOFF AMOUNT (IN)	PEAK DISCHARGE ELEVATION (FT)	PEAK DISCHARGE TIME (HR)	PEAK DISCHARGE RATE (CFS)	PEAK DISCHARGE RATE (CSM)
ALTERNATE 87 STORM 1													
STRUCTURE 10	RUNOFF	.84	2	2	.10	.0	7.00	24.00	1.67	---	17.80	96.56	114.9
STRUCTURE 10	RESVOR	.84	2	2	.10	.0	7.00	24.00	1.63	9.50	18.14	96.09	114.4
XSECTION 10	REACH	.84	2	2	.10	.0	7.00	24.00	1.62	---	18.47	98.84	117.7
XSECTION 10	RUNOFF	.20	2	2	.10	.0	7.00	24.00	1.00	---	12.08	121.81	609.0
XSECTION 10	ADDHYD	1.04	2	2	.10	.0	7.00	24.00	1.50	---	12.08	124.81	120.0
STRUCTURE 20	RESVOR	1.04	2	2	.10	.0	7.00	24.00	1.45	9.18	20.10	93.18	89.6
XSECTION 20	REACH	1.04	2	2	.10	.0	7.00	24.00	1.44	---	20.25	93.15	89.6
XSECTION 20	RUNOFF	.28	2	2	.10	.0	7.00	24.00	2.03	---	13.36	102.66	366.6
XSECTION 20	ADDHYD	1.32	2	2	.10	.0	7.00	24.00	1.57	---	13.34	126.76	96.0
STRUCTURE 30	RUNOFF	.37	2	2	.10	.0	7.00	24.00	1.57	---	14.95	60.58	163.7
STRUCTURE 30	RESVOR	.37	2	2	.10	.0	7.00	24.00	1.51	25.91	16.21	48.05	129.9
XSECTION 40	REACH	.37	2	2	.10	.0	7.00	24.00	1.50	---	16.55	47.70	128.9
XSECTION 40	RUNOFF	.06	2	2	.10	.0	7.00	24.00	.84	---	12.72	10.21	170.2
XSECTION 40	ADDHYD	.43	2	2	.10	.0	7.00	24.00	1.41	---	16.54	49.80	115.8
STRUCTURE 40	RESVOR	.43	2	2	.10	.0	7.00	24.00	1.41	10.89	16.60	49.78	115.8
XSECTION 50	REACH	.43	2	2	.10	.0	7.00	24.00	1.40	---	16.72	49.77	115.7
XSECTION 49	RUNOFF	.11	2	2	.10	.0	7.00	24.00	.84	---	13.33	13.76	125.1
XSECTION 50	ADDHYD	.54	2	2	.10	.0	7.00	24.00	1.29	---	16.65	53.98	100.0
XSECTION 50	RUNOFF	.36	2	2	.10	.0	7.00	24.00	5.25	---	12.13	1078.73	2996.5
XSECTION 50	ADDHYD	.90	2	2	.10	.0	7.00	24.00	2.87	---	12.13	1079.95	1199.9
XSECTION 60	REACH	.90	2	2	.10	.0	7.00	24.00	2.87	---	12.13	1079.95	1199.9
XSECTION 60	RUNOFF	.05	2	2	.10	.0	7.00	24.00	1.24	---	12.56	16.56	331.2
XSECTION 60	ADDHYD	.95	2	2	.10	.0	7.00	24.00	2.79	---	12.14	1086.21	1143.4
XSECTION 70	ADDHYD	2.27	2	2	.10	.0	7.00	24.00	2.08	---	12.14	1105.88	487.2
XSECTION 80	REACH	2.27	2	2	.10	.0	7.00	24.00	2.08	---	12.14	1105.88	487.2
XSECTION 80	RUNOFF	.02	2	2	.10	.0	7.00	24.00	2.98	---	11.98	54.99	2749.6
XSECTION 80	ADDHYD	2.29	2	2	.10	.0	7.00	24.00	2.08	---	12.13	1127.29	492.3
XSECTION 90	RUNOFF	.24	2	2	.10	.0	7.00	24.00	3.93	---	12.27	434.61	1810.9
XSECTION 100	ADDHYD	2.53	2	2	.10	.0	7.00	24.00	2.26	---	12.16	1509.45	596.6
XSECTION 110	REACH	2.53	2	2	.10	.0	7.00	24.00	2.26	---	12.16	1509.45	596.6
XSECTION 120	REACH	2.53	2	2	.10	.0	7.00	24.00	2.26	---	12.16	1509.45	596.6
XSECTION 120	RUNOFF	.19	2	2	.10	.0	7.00	24.00	2.22	---	12.38	159.29	838.4

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

SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RAIN TABLE #	ANTEC MOIST COND	MAIN TIME INCREM (HR)	PRECIPITATION BEGIN (HR)	AMOUNT (IN)	DURATION (HR)	RUNOFF AMOUNT (IN)	PEAK DISCHARGE ELEVATION (FT)	TIME (HR)	RATE (CFS)	RATE (CSM)
ALTERNATE 87 STORM 1													
XSECTION 120	ADDHYD	2.72	2	2	.10	.0	7.00	24.00	2.26	---	12.18	1631.85	599.9
STRUCTURE 50	RESVOR	2.72	2	2	.10	.0	7.00	24.00	2.07	10.54	13.56	338.73	124.5
XSECTION 130	REACH	2.72	2	2	.10	.0	7.00	24.00	2.07	---	13.56	338.73	124.5
XSECTION 130	RUNOFF	.05	2	2	.10	.0	7.00	24.00	4.05	---	12.01	160.37	3207.4
XSECTION 130	ADDHYD	2.77	2	2	.10	.0	7.00	24.00	2.11	---	13.45	348.57	125.8
STRUCTURE 60	RESVOR	2.77	2	2	.10	.0	7.00	24.00	1.92	6.68	16.72	271.48	98.0
XSECTION 140	REACH	2.77	2	2	.10	.0	7.00	24.00	1.90	---	17.02	271.05	97.9
XSECTION 140	RUNOFF	.20	2	2	.10	.0	7.00	24.00	3.42	---	12.02	543.51	2717.6
XSECTION 140	ADDHYD	2.97	2	2	.10	.0	7.00	24.00	2.00	---	12.02	549.09	184.9
XSECTION 149	RUNOFF	.08	2	2	.10	.0	7.00	24.00	3.10	---	12.15	142.32	1779.0
XSECTION 150	ADDHYD	3.05	2	2	.10	.0	7.00	24.00	2.03	---	12.04	659.91	216.4
XSECTION 150	REACH	3.05	2	2	.10	.0	7.00	24.00	2.03	---	12.04	659.91	216.4
XSECTION 150	RUNOFF	.01	2	2	.10	.0	7.00	24.00	.84	---	12.05	4.99	499.3
XSECTION 150	ADDHYD	3.06	2	2	.10	.0	7.00	24.00	2.03	---	12.04	664.89	217.3
XSECTION 180	RUNOFF	.11	2	2	.10	.0	7.00	24.00	.99	---	12.27	39.64	360.4
XSECTION 180	ADDHYD	3.17	2	2	.10	.0	7.00	24.00	1.99	---	12.04	682.06	215.2
XSECTION 180	REACH	3.17	2	2	.10	.0	7.00	24.00	1.98	---	12.19	603.16	190.3
XSECTION 180	RUNOFF	.11	2	2	.10	.0	7.00	24.00	.92	---	12.28	34.74	315.8
XSECTION 180	ADDHYD	3.28	2	2	.10	.0	7.00	24.00	1.94	---	12.19	635.26	193.7

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

	HYDROGRAPH INFORMATION									ROUTING PARAMETERS									PEAK	
						OUTFLOW+			VOLUME	MAIN	ITER-	Q AND A			PEAK	S/Q	ATT-	TRAVEL TIME	
XSEC	REACH	INFLOW		OUTFLOW		INTERV.AREA		BASE-	ABOVE	TIME	ATION	EQUATION		LENGTH	RATIO	@PEAK	KIN	STOR-	KINE-
ID	LENGTH	PEAK	TIME	PEAK	TIME	PEAK	TIME	FLOW	BASE	INCR	#	COEFF	POWER	FACTOR	O/I	(K)	COEFF	AGE	MATIC
	(FT)	(CFS)	(HR)	(CFS)	(HR)	(CFS)	(HR)	(CFS)	(IN)	(HR)		(X)	(M)	(K*)	(Q*)	(SEC)	(C)	(HR)	(HR)
ALTERNATE 87 STORM 1																			
												1.20							
+ 10	1750	99	18.1	99	18.5			3	1.63*	.10	1		1.10	.021	.997	888	.34	.40	.25
+						123	12.1												
												.280							
+ 20	2900	93	20.1	93	20.2			3	1.45*	.10	1		1.94	.000	1.000	320	.72?	.10	.09
+						127	13.3												
												.880							
+ 40	1300	48	16.2	48	16.5			0	1.51	.10	1		1.10	.027	.992	934	.32	.30	.26
+						50	16.5												
												1.60							
+ 50	1700	50	16.6	50	16.7			0	1.41	.10	1		1.45	.002	1.000	252	.83?	.10	.07
+						54	16.6												
												.440							
+ 60	1400	1064	12.1	1064	12.1			0	2.87	.10	0		1.94	.000	1.000	38	1.00?	.00	.00
+						1069	12.1												
												.300							
+ 80	700	1085	12.1	1085	12.1			3	2.08	.10	0		1.94	.000	1.000	23	1.00?	.00	.00
+						1113	12.1												
												.300							
+110	500	1493	12.2	1493	12.2			3	2.26	.10	0		1.94	.000	1.000	14	1.00?	.00	.00
+						---	---												
												.300							
+120	500	1493	12.2	1493	12.2			3	2.26	.10	0		1.94	.000	1.000	14	1.00?	.00	.00
+						1625	12.2												
												.300							

+130	1000	339	13.6	339	13.6			3	2.07*	.10	0		1.94	.000	1.000	57	1.00?	.00	.00
+						349	13.5												
												.210							
+140	2500	271	16.7	271	17.0			3	1.92*	.10	1		1.48	.004	.998	788	.37	.30	.22
+						544	12.0												
												.210							
+150	300	644	12.0	644	12.0			3	2.03*	.10	0		1.48	.000	1.000	71	1.00?	.00	.00
+						649	12.0												
												.210							
+180	1700	661	12.0	601	12.2			3	1.99*	.10	1		1.48	.005	.910	401	.62	.20	.11
+						634	12.2												

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

XSECTION/ STRUCTURE ID	DRAINAGE AREA (SQ MI)	STORM NUMBERS.......... 1
0 STRUCTURE 60	2.77	
ALTERNATE 87		271.48
0 STRUCTURE 50	2.72	
ALTERNATE 87		338.73
0 STRUCTURE 40	.43	
ALTERNATE 87		49.78
0 STRUCTURE 30	.37	
ALTERNATE 87		48.05
0 STRUCTURE 20	1.04	
ALTERNATE 87		93.18
0 STRUCTURE 10	.84	
ALTERNATE 87		96.09
0 XSECTION 10	1.04	
ALTERNATE 87		124.81
0 XSECTION 20	1.32	
ALTERNATE 87		126.76
0 XSECTION 40	.43	
ALTERNATE 87		49.80
0 XSECTION 49	.11	
ALTERNATE 87		13.76
0 XSECTION 50	.90	
ALTERNATE 87		1079.95
0 XSECTION 60	.95	
ALTERNATE 87		1086.21
0 XSECTION 70	2.27	
ALTERNATE 87		1105.88
0 XSECTION 80	2.29	
ALTERNATE 87		1127.29

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

```
 XSECTION/          DRAINAGE
 STRUCTURE            AREA      STORM NUMBERS..........
   ID               (SQ MI)         1

0 XSECTION   90         .24
+___________________________
    ALTERNATE   87                434.61
0 XSECTION  100        2.53
+___________________________
    ALTERNATE   87               1509.45
0 XSECTION  110        2.53
+___________________________
    ALTERNATE   87               1509.45
0 XSECTION  120        2.72
+___________________________
    ALTERNATE   87               1631.85
0 XSECTION  130        2.77
+___________________________
    ALTERNATE   87                348.57
0 XSECTION  140        2.97
+___________________________
    ALTERNATE   87                549.09
0 XSECTION  149         .08
+___________________________
    ALTERNATE   87                142.32
0 XSECTION  150        3.06
+___________________________
    ALTERNATE   87                664.89
0 XSECTION  180        3.28
+___________________________
    ALTERNATE   87                635.26
```

FISCAL YEAR 88

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

JOB TR-20                    FULLPRINT PASS=001   SUMMARY                       10
TITLE 002 COGDELL'S CREEK WATERSHED STUDY NV5010 24 HR 10YR TYPE 2 STORM        20
TITLE      ALT  88                                                    30
 3 STRUCT       10                                                              40
 8                     7.00         0.00         4.33                           50
 8                     7.4          2.5          5.01                           60
 8                     7.6          5.0          5.36                           70
 8                     7.8          10.0         5.70                           80
 8                     8.2          22.0         6.38                           90
 8                     8.6          52.0         7.07                          100
 8                     9.0          62.0         7.75                          110
 8                     9.5          96.0         8.61                          120
 8                     10.0         126.0        9.47                          130
 8                     11.0         198.0        11.18                         140
 8                     12.0         280.0        12.89                         150
 8                     13.00        360.0        14.79                         160
 8                     14.00        440.0        16.68                         170
 8                     15.00        500.0        18.58                         180
 8                     15.1         600.00       18.60                         190
 9 ENDTBL                                                                      200
 3 STRUCT       20                                                             210
 8                     4.5          0.00         6.80                          220
 8                     4.9          1.5          7.88                          230
 8                     5.1          3.7          8.42                          240
 8                     5.5          11.0         9.51                          250
 8                     5.7          15.0         10.13                         260
 8                     6.1          25.0         11.13                         270
 8                     6.5          40.0         12.21                         280
 8                     7.1          60.0         13.84                         290
 8                     7.9          78.0         16.01                         300
 8                     8.5          79.0         17.63                         310
 8                     9.5          100.0        20.34                         320
 8                     10.5         126.0        23.06                         330
 8                     11.5         150.0        25.76                         340
 8                     11.6         300.0        26.04                         350
 9 ENDTBL                                                                      360
 3 STRUCT       30                                                             370
 8                     21.0         0.00         0.10                          380
 8                     21.4         0.6          0.61                          390
 8                     21.6         1.5          0.86                          400
 8                     21.8         2.5          1.12                          410
 8                     22.2         5.2          1.62                          420
 8                     22.6         8.2          2.13                          430
 8                     23.0         11.0         2.64                          440
 8                     23.5         20.0         3.27                          450
 8                     24.0         27.0         3.91                          460
```

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

8		25.0	39.0	5.18	470
8		26.0	49.0	6.45	480
8		27.0	57.0	7.72	490
8		27.1	200.00	7.74	500
9 ENDTBL					510
3 STRUCT	40				520
8		9.0	0.0	0.38	530
8		9.4	2.2	0.47	540
8		9.6	5.0	0.52	550
8		10.0	14.0	0.62	560
8		10.2	21.0	0.67	570
8		10.6	36.0	0.77	580
8		11.0	55.0	0.86	590
8		11.6	82.0	1.01	600
8		12.4	120.0	1.21	610
8		13.0	121.0	1.35	620
8		14.0	122.0	1.60	630
8		15.0	126.0	1.84	640
8		16.0	150.00	2.08	650
8		16.1	300.0	2.11	660
9 ENDTBL					670
3 STRUCT	50				680
8		2.4	0.00	22.00	690
8		2.8	2.0	26.86	700
8		3.0	7.0	29.29	710
8		3.4	16.0	34.16	720
8		3.6	24.0	36.59	730
8		4.0	40.0	41.46	740
8		4.4	60.0	46.32	750
8		5.0	90.0	53.62	760
8		5.8	120.0	63.35	770
8		6.4	121.0	70.65	780
8		7.4	210.0	82.81	790
8		8.4	250.00	94.98	800
8		10.4	334.0	119.31	810
8		12.4	400.0	143.63	820
8		12.5	800.0	143.70	830
9 ENDTBL					840
3 STRUCT	60				850
8		2.0	0.0	22.20	860
8		2.4	3.0	27.41	870
8		2.6	10.5	30.02	880
8		3.0	22.5	35.24	890
8		3.2	36.0	37.85	900
8		3.6	60.0	43.06	910
8		4.0	90.0	48.28	920

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

8                      4.6        135.0      56.11                        930
8                      5.4        180.0      66.55                        940
8                      6.0        181.0      74.38                        950
8                      7.0        315.0      87.42                        960
8                      8.0        375.0      100.47                       970
8                      8.1        700.0      100.50                       980
9 ENDTBL                                                                  990
6 RUNOFF 1    10     6 0.84       51.        7.50       1                1000
6 RESVOR 2    10 6   7 7.0                              1                1010
6 REACH  3 010   7   5 1750.      1.2        1.10       1                1020
6 RUNOFF 1 010       6 0.20       42.        0.19       1                1030
6 ADDHYD 4 010   5 6 7                                  1 1              1040
6 SAVMOV 5 010   7   6                                                   1050
6 RESVOR 2    20 6   7 4.5                              1                1060
6 REACH  3 020   7   5 2900.      0.28       1.94       1                1070
6 RUNOFF 1 020       6 0.28       53.        1.02       1                1080
6 ADDHYD 4 020   5 6 7                                  1 1              1090
6 SAVMOV 5 020   7   1                                                   1100
6 RUNOFF 1    30     6 0.37       49.        3.90       1                1110
6 RESVOR 2    30 6   7 21.0                             1                1120
6 REACH  3 040   7   5 1300.      0.88       1.10       1                1130
6 RUNOFF 1 040       6 0.06       40.        1.00       1                1140
6 ADDHYD 4 040   5 6 7                                  1                1150
6 SAVMOV 5 040   7   6                                                   1160
6 RESVOR 2    40 6   7 9.0                              1                1170
6 REACH  3 050   7   5 1700.      1.6        1.45       1                1180
6 RUNOFF 1 049       6 0.11       40.        1.67       1                1190
6 ADDHYD 4 050   5 6 7                                  1                1200
6 SAVMOV 5 050   7   5                                                   1210
6 RUNOFF 1 050       6 0.36       85.        0.42       1                1220
6 ADDHYD 4 050   5 6 7                                  1                1230
6 REACH  3 060   7   5 1400.      0.44       1.94       1                1240
6 RUNOFF 1 060       6 0.05       45.        0.90       1                1250
6 ADDHYD 4 060   5 6 7                                  1 1              1260
6 SAVMOV 5 070   7   5                                                   1270
6 SAVMOV 5 070   1   6                                                   1280
6 ADDHYD 4 070   5 6 7                                  1 1              1290
6 REACH  3 080   7   5 700.       0.30       1.94       1                1300
6 RUNOFF 1 080       6 0.02       64.        0.12       1                1310
6 ADDHYD 4 080   5 6 7                                  1                1320
6 SAVMOV 5 100   7   5                                                   1330
6 RUNOFF 1 090       6 0.24       73.        0.62       1                1340
6 ADDHYD 4 100   5 6 7                                  1                1350
6 REACH  3 110   7   5 500.       0.30       1.94       1                1360
6 SAVMOV 5 120   5   7                                                   1370
6 REACH  3 120   7   5 500.       0.30       1.94       1                1380
```

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

6 RUNOFF 1 120      6 0.19        56.        0.74        1            1390
6 ADDHYD 4 120   5 6 7                                   1 1          1400
6 SAVMOV 5    50 7   6                                                1410
6 RESVOR 2    50 6   7 2.4                               1 1 1        1420
6 REACH  3 130   7   5 1000.      0.30       1.94        1            1430
6 RUNOFF 1 130      6 0.05        74.        0.19        1            1440
6 ADDHYD 4 130   5 6 7                                   1            1450
6 SAVMOV 5 130   7   6                                                1460
6 RESVOR 2    60 6   7 2.0                               1 1 1        1470
6 REACH  3 140   7   5 2500.      0.21       1.48        1            1480
6 RUNOFF 1 140      6 0.20        66.        1.15        1            1490
6 ADDHYD 4 140   5 6 7                                   1            1500
6 SAVMOV 5 150   7   5                                                1510
6 RUNOFF 1 149      6 0.08        50.        0.42        1            1520
6 ADDHYD 4 150   5 6 7                                                1530
6 REACH  3 150   7   5 300.       0.21       1.48        1            1540
6 RUNOFF 1 150      6 0.01        40.        0.15        1            1550
6 ADDHYD 4 150   5 6 7                                   1            1560
6 SAVMOV 5 180   7   5                                                1570
6 RUNOFF 1 180      6 0.28        50.        0.61        1            1580
6 ADDHYD 4 180   5 6 7                                   1            1590
6 REACH  3 180   7   5 1700.0     0.21       1.48        1            1600
6 RUNOFF 1 180      6 0.11        41.        0.48        1            1610
6 ADDHYD 4 180   5 6 7                                   1 1  1   1   1620
  ENDATA                                                              1630
7 ALTER  3                                                            1640
6 RUNOFF 1 010      6 0.20        43.0       0.19                     1650
6 RUNOFF 1 020      6 0.28        54.0       2.00                     1660
6 RUNOFF 1 090      6 0.24        75.0       0.62                     1665
6 RUNOFF 1 140      6 0.20        69.0       0.19                     1670
6 RUNOFF 1 149      6 0.08        65.0       0.42                     1680
6 RUNOFF 1 180      6 0.11        42.0       0.48                     1690
7 LIST                                                                1700
7 BASFLO 5            3.0                                             1710
7 INCREM 6            0.1                                             1720
7 COMPUT 7    10 180  0.0         7.0        1.0         2 2  88  01  1730
  ENDCMP 1                                                            1740
  ENDJOB 2                                                            1750
0********************************END OF 80-80 LIST********************************
```

```
0CHANGES TO STANDARD CONTROL LIST FOLLOW

 EXECUTIVE CONTROL OPERATION ALTER                                                          RECORD ID    1640

    STANDARD CONTROL OPERATION RUNOFF   CROSS SECTION  10                                   RECORD ID    1650

         OUTPUT HYDROGRAPH = 6                              DATA FIELD VALUES =      .2000     43.0000      .1900

         OUTPUT OPTIONS IN EFFECT  PEAK  VOL   SUM
    STANDARD CONTROL OPERATION RUNOFF   CROSS SECTION  20                                   RECORD ID    1660

         OUTPUT HYDROGRAPH = 6                              DATA FIELD VALUES =      .2800     54.0000     2.0000

         OUTPUT OPTIONS IN EFFECT  PEAK  VOL   SUM
    STANDARD CONTROL OPERATION RUNOFF   CROSS SECTION  90                                   RECORD ID    1665

         OUTPUT HYDROGRAPH = 6                              DATA FIELD VALUES =      .2400     75.0000      .6200

         OUTPUT OPTIONS IN EFFECT  PEAK  VOL   SUM
    STANDARD CONTROL OPERATION RUNOFF   CROSS SECTION 140                                   RECORD ID    1670

         OUTPUT HYDROGRAPH = 6                              DATA FIELD VALUES =      .2000     69.0000      .1900

         OUTPUT OPTIONS IN EFFECT  PEAK  VOL   SUM

    STANDARD CONTROL OPERATION RUNOFF   CROSS SECTION 149                                   RECORD ID    1680

         OUTPUT HYDROGRAPH = 6                              DATA FIELD VALUES =      .0800     65.0000      .4200

         OUTPUT OPTIONS IN EFFECT  PEAK  VOL   SUM

    STANDARD CONTROL OPERATION RUNOFF   CROSS SECTION 180                                   RECORD ID    1690

         OUTPUT HYDROGRAPH = 6                              DATA FIELD VALUES =      .1100     42.0000      .4800

         OUTPUT OPTIONS IN EFFECT  PEAK  VOL   SUM
```

EXECUTIVE CONTROL OPERATION LIST RECORD ID 1700

LISTING OF CURRENT DATA

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	10			
8		7.00	.00	4.33
8		7.40	2.50	5.01
8		7.60	5.00	5.36
8		7.80	10.00	5.70
8		8.20	22.00	6.38
8		8.60	52.00	7.07
8		9.00	62.00	7.75
8		9.50	96.00	8.61
8		10.00	126.00	9.47
8		11.00	198.00	11.18
8		12.00	280.00	12.89
8		13.00	360.00	14.79
8		14.00	440.00	16.68
8		15.00	500.00	18.58
8		15.10	600.00	18.60
9 ENDTBL				

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	20			
8		4.50	.00	6.80
8		4.90	1.50	7.88
8		5.10	3.70	8.42
8		5.50	11.00	9.51
8		5.70	15.00	10.13
8		6.10	25.00	11.13
8		6.50	40.00	12.21
8		7.10	60.00	13.84
8		7.90	78.00	16.01
8		8.50	79.00	17.63
8		9.50	100.00	20.34
8		10.50	126.00	23.06
8		11.50	150.00	25.76
8		11.60	300.00	26.04
9 ENDTBL				

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	30			
8		21.00	.00	.10
8		21.40	.60	.61
8		21.60	1.50	.86
8		21.80	2.50	1.12
8		22.20	5.20	1.62
8		22.60	8.20	2.13
8		23.00	11.00	2.64
8		23.50	20.00	3.27
8		24.00	27.00	3.91
8		25.00	39.00	5.18
8		26.00	49.00	6.45
8		27.00	57.00	7.72
8		27.10	200.00	7.74
9 ENDTBL				

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	40			
8		9.00	.00	.38
8		9.40	2.20	.47
8		9.60	5.00	.52
8		10.00	14.00	.62
8		10.20	21.00	.67
8		10.60	36.00	.77
8		11.00	55.00	.86
8		11.60	82.00	1.01
8		12.40	120.00	1.21
8		13.00	121.00	1.35
8		14.00	122.00	1.60
8		15.00	126.00	1.84
8		16.00	150.00	2.08
8		16.10	300.00	2.11
9 ENDTBL				

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	50			
8		2.40	.00	22.00
8		2.80	2.00	26.86
8		3.00	7.00	29.29
8		3.40	16.00	34.16
8		3.60	24.00	36.59
8		4.00	40.00	41.46
8		4.40	60.00	46.32
8		5.00	90.00	53.62

8		5.80	120.00	63.35
8		6.40	121.00	70.65
8		7.40	210.00	82.81
8		8.40	250.00	94.98
8		10.40	334.00	119.31
8		12.40	400.00	143.63
8		12.50	800.00	143.70
9 ENDTBL				

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	60			
8		2.00	.00	22.20
8		2.40	3.00	27.41
8		2.60	10.50	30.02
8		3.00	22.50	35.24
8		3.20	36.00	37.85
8		3.60	60.00	43.06
8		4.00	90.00	48.28
8		4.60	135.00	56.11
8		5.40	180.00	66.55
8		6.00	181.00	74.38
8		7.00	315.00	87.42
8		8.00	375.00	100.47
8		8.10	700.00	100.50
9 ENDTBL				

		TIME INCREMENT			
4 DIMHYD		.0200			
8	.0000	.0300	.1000	.1900	.3100
8	.4700	.6600	.8200	.9300	.9900
8	1.0000	.9900	.9300	.8600	.7800
8	.6800	.5600	.4600	.3900	.3300
8	.2800	.2410	.2070	.1740	.1470
8	.1260	.1070	.0910	.0770	.0660
8	.0550	.0470	.0400	.0340	.0290
8	.0250	.0210	.0180	.0150	.0130
8	.0110	.0090	.0080	.0070	.0060
8	.0050	.0040	.0030	.0020	.0010
8	.0000	.0000	.0000	.0000	.0000
9 ENDTBL					

COMPUTED PEAK RATE FACTOR = 484.00

TABLE NO. TIME INCREMENT
5 RAINFL 1 .5000

8	.0000	.0080	.0170	.0260	.0350
8	.0450	.0550	.0650	.0760	.0870
8	.0990	.1120	.1260	.1400	.1560
8	.1740	.1940	.2190	.2540	.3030
8	.5150	.5830	.6240	.6550	.6820
8	.7060	.7280	.7480	.7660	.7830
8	.7990	.8150	.8300	.8440	.8570
8	.8700	.8820	.8930	.9050	.9160
8	.9260	.9360	.9460	.9560	.9650
8	.9740	.9830	.9920	1.0000	1.0000

9 ENDTBL

TABLE NO. TIME INCREMENT
5 RAINFL 2 .2500

8	.0000	.0020	.0050	.0080	.0110
8	.0140	.0170	.0200	.0230	.0260
8	.0290	.0320	.0350	.0380	.0410
8	.0440	.0480	.0520	.0560	.0600
8	.0640	.0680	.0720	.0760	.0800
8	.0850	.0900	.0950	.1000	.1050
8	.1100	.1150	.1200	.1260	.1330
8	.1400	.1470	.1550	.1630	.1720
8	.1810	.1910	.2030	.2180	.2360
8	.2570	.2830	.3870	.6630	.7070
8	.7350	.7580	.7760	.7910	.8040
8	.8150	.8250	.8340	.8420	.8490
8	.8560	.8630	.8690	.8750	.8810
8	.8870	.8930	.8980	.9030	.9080
8	.9130	.9180	.9220	.9260	.9300
8	.9340	.9380	.9420	.9460	.9500
8	.9530	.9560	.9590	.9620	.9650
8	.9680	.9710	.9740	.9770	.9800
8	.9830	.9860	.9890	.9920	.9950
8	.9980	1.0000	1.0000	1.0000	1.0000

9 ENDTBL

TABLE NO. TIME INCREMENT
5 RAINFL 3 .5000

8	.0000	.0100	.0220	.0360	.0510
8	.0670	.0830	.0990	.1160	.1350

8	.1560	.1790	.2040	.2330	.2680
8	.3100	.4250	.4800	.5200	.5500
8	.5770	.6010	.6230	.6440	.6640
8	.6830	.7010	.7190	.7360	.7530
8	.7690	.7850	.8000	.8150	.8300
8	.8440	.8580	.8710	.8840	.8960
8	.9080	.9200	.9320	.9440	.9560
8	.9670	.9780	.9890	1.0000	1.0000

9 ENDTBL

TABLE NO. TIME INCREMENT
5 RAINFL 4 .5000

8	.0000	.0040	.0080	.0120	.0160
8	.0200	.0250	.0300	.0350	.0400
8	.0450	.0500	.0550	.0600	.0650
8	.0700	.0750	.0810	.0870	.0930
8	.0990	.1050	.1110	.1180	.1250
8	.1320	.1400	.1480	.1560	.1650
8	.1740	.1840	.1950	.2070	.2200
8	.2360	.2550	.2770	.3030	.4090
8	.5150	.5490	.5830	.6050	.6240
8	.6400	.6550	.6690	.6820	.6940
8	.7050	.7160	.7270	.7380	.7480
8	.7580	.7670	.7760	.7840	.7920
8	.8000	.8080	.8160	.8230	.8300
8	.8370	.8440	.8510	.8580	.8640
8	.8700	.8760	.8820	.8880	.8940
8	.9000	.9060	.9110	.9160	.9210
8	.9260	.9310	.9360	.9410	.9460
8	.9510	.9560	.9610	.9660	.9710
8	.9760	.9800	.9840	.9880	.9920
8	.9960	1.0000	1.0000	1.0000	1.0000

9 ENDTBL

TABLE NO. TIME INCREMENT
5 RAINFL 5 .5000

8	.0000	.0020	.0050	.0080	.0110
8	.0140	.0170	.0200	.0230	.0260
8	.0290	.0320	.0350	.0380	.0410
8	.0440	.0470	.0510	.0550	.0590
8	.0630	.0670	.0710	.0750	.0790
8	.0840	.0890	.0940	.0990	.1040
8	.1090	.1140	.1200	.1260	.1330
8	.1400	.1470	.1540	.1620	.1710
8	.1810	.1920	.2040	.2170	.2330

8	.2520	.2770	.3180	.6380	.6980
8	.7290	.7520	.7700	.7850	.7980
8	.8090	.8190	.8290	.8380	.8460
8	.8540	.8610	.8680	.8740	.8800
8	.8860	.8920	.8970	.9020	.9070
8	.9120	.9170	.9210	.9250	.9290
8	.9330	.9370	.9410	.9450	.9490
8	.9530	.9570	.9600	.9630	.9660
8	.9690	.9720	.9750	.9780	.9810
8	.9840	.9870	.9900	.9930	.9960
8	.9980	1.0000	1.0000	1.0000	1.0000

9 ENDTBL

TABLE NO.	TIME INCREMENT
5 RAINFL 6	.0200

8	.0000	.0080	.0162	.0246	.0333
8	.0425	.0524	.0630	.0743	.0863
8	.0990	.1124	.1265	.1420	.1595
8	.1800	.2050	.2550	.3450	.4370
8	.5300	.6030	.6330	.6600	.6840
8	.7050	.7240	.7420	.7590	.7750
8	.7900	.8043	.8180	.8312	.8439
8	.8561	.8678	.8790	.8898	.9002
8	.9103	.9201	.9297	.9391	.9483
8	.9573	.9661	.9747	.9832	.9916
8	1.0000	1.0000	1.0000	1.0000	1.0000

9 ENDTBL

0 STANDARD CONTROL INSTRUCTIONS

```
6 RUNOFF 1   10     6       .8400    51.0000     7.50001 0 0 1 0 1
6 RESVOR 2   10 6   7      7.0000                      1 0 0 1 0 1
6 REACH  3  10   7  5   1750.0000     1.2000     1.10001 0 0 1 0 1
6 RUNOFF 1  10      6       .2000    43.0000      .19001 0 0 1 0 1
6 ADDHYD 4  10    5 6 7                                1 1 0 1 0 1
6 SAVMOV 5  10   7  6
6 RESVOR 2   20 6   7      4.5000                      1 0 0 1 0 1
6 REACH  3  20   7  5   2900.0000      .2800     1.94001 0 0 1 0 1
6 RUNOFF 1  20      6       .2800    54.0000     2.00001 0 0 1 0 1
6 ADDHYD 4  20    5 6 7                                1 1 0 1 0 1
6 SAVMOV 5  20   7  1
6 RUNOFF 1   30     6       .3700    49.0000     3.90001 0 0 1 0 1
6 RESVOR 2   30 6   7     21.0000                      1 0 0 1 0 1
6 REACH  3  40   7  5   1300.0000      .8800     1.10001 0 0 1 0 1
6 RUNOFF 1  40      6       .0600    40.0000     1.00001 0 0 1 0 1
6 ADDHYD 4  40    5 6 7                                1 0 0 1 0 1
6 SAVMOV 5  40   7  6
6 RESVOR 2   40 6   7      9.0000                      1 0 0 1 0 1
6 REACH  3  50   7  5   1700.0000     1.6000     1.45001 0 0 1 0 1
6 RUNOFF 1  49      6       .1100    40.0000     1.67001 0 0 1 0 1
6 ADDHYD 4  50    5 6 7                                1 0 0 1 0 1
6 SAVMOV 5  50   7  5
6 RUNOFF 1  50      6       .3600    85.0000      .42001 0 0 1 0 1
6 ADDHYD 4  50    5 6 7                                1 0 0 1 0 1
6 REACH  3  60   7  5   1400.0000      .4400     1.94001 0 0 1 0 1
6 RUNOFF 1  60      6       .0500    45.0000      .90001 0 0 1 0 1
6 ADDHYD 4  60    5 6 7                                1 1 0 1 0 1
6 SAVMOV 5  70   7  5
6 SAVMOV 5  70   1  6
6 ADDHYD 4  70    5 6 7                                1 1 0 1 0 1
6 REACH  3  80   7  5    700.0000      .3000     1.94001 0 0 1 0 1
6 RUNOFF 1  80      6       .0200    64.0000      .12001 0 0 1 0 1
6 ADDHYD 4  80    5 6 7                                1 0 0 1 0 1
6 SAVMOV 5 100   7  5
6 RUNOFF 1  90      6       .2400    75.0000      .62001 0 0 1 0 1
6 ADDHYD 4 100    5 6 7                                1 0 0 1 0 1
6 REACH  3 110   7  5    500.0000      .3000     1.94001 0 0 1 0 1
6 SAVMOV 5 120   5  7
6 REACH  3 120   7  5    500.0000      .3000     1.94001 0 0 1 0 1
6 RUNOFF 1 120      6       .1900    56.0000      .74001 0 0 1 0 1
6 ADDHYD 4 120    5 6 7                                1 1 0 1 0 1
6 SAVMOV 5   50 7   6
6 RESVOR 2   50 6   7      2.4000                      1 1 1 1 0 1
6 REACH  3 130   7  5   1000.0000      .3000     1.94001 0 0 1 0 1
6 RUNOFF 1 130      6       .0500    74.0000      .19001 0 0 1 0 1
```

```
6 ADDHYD 4 130    5 6 7                                          1 0 0 1 0 1
6 SAVMOV 5 130    7   6
6 RESVOR 2     60 6   7       2.0000                             1 1 1 1 0 1
6 REACH  3 140    7   5    2500.0000        .2100        1.48001 0 0 1 0 1
6 RUNOFF 1 140        6        .2000      69.0000         .19001 0 0 1 0 1
6 ADDHYD 4 140    5 6 7                                          1 0 0 1 0 1
6 SAVMOV 5 150    7   5
6 RUNOFF 1 149        6        .0800      65.0000         .42001 0 0 1 0 1
6 ADDHYD 4 150    5 6 7                                          1 0 0 1 0 1
6 REACH  3 150    7   5     300.0000        .2100        1.48001 0 0 1 0 1
6 RUNOFF 1 150        6        .0100      40.0000         .15001 0 0 1 0 1
6 ADDHYD 4 150    5 6 7                                          1 0 0 1 0 1
6 SAVMOV 5 180    7   5
6 RUNOFF 1 180        6        .1100      42.0000         .48001 0 0 1 0 1
6 ADDHYD 4 180    5 6 7                                          1 0 0 1 0 1
6 REACH  3 180    7   5    1700.0000        .2100        1.48001 0 0 1 0 1
6 RUNOFF 1 180        6        .1100      41.0000         .48001 0 0 1 0 1
6 ADDHYD 4 180    5 6 7                                          1 1 0 1 0 1
  ENDATA

END OF LISTING
```

```
EXECUTIVE CONTROL OPERATION BASFLO                                                    RECORD ID     1710
+                                         NEW BASEFLOW =   3.00 CFS

EXECUTIVE CONTROL OPERATION INCREM                                                    RECORD ID     1720
+                                         MAIN TIME INCREMENT =   .10 HOURS

EXECUTIVE CONTROL OPERATION COMPUT                                                    RECORD ID     1730
+                                         FROM STRUCTURE 10
+                                                            TO XSECTION 180
        STARTING TIME =   .00    RAIN DEPTH =  7.00    RAIN DURATION=  1.00    RAIN TABLE NO.= 2    ANT. MOIST. COND= 2
        ALTERNATE NO.=88         STORM NO.= 1   MAIN TIME INCREMENT =   .10 HOURS

OPERATION RUNOFF    STRUCTURE 10
          OUTPUT HYDROGRAPH=  6
          AREA=      .84 SQ MI   INPUT RUNOFF CURVE= 51.    TIME OF CONCENTRATION=  7.50 HOURS
          INTERNAL HYDROGRAPH TIME INCREMENT=  .1000 HOURS

          PEAK TIME(HRS)            PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
             17.80                        96.56                        (RUNOFF)

  RUNOFF VOLUME ABOVE BASEFLOW =  1.67 WATERSHED INCHES,    906.24 CFS-HRS,    74.89 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION RESVOR    STRUCTURE 10
          INPUT HYDROGRAPH= 6      OUTPUT HYDROGRAPH= 7
          SURFACE ELEVATION=     7.00

          PEAK TIME(HRS)            PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
             18.14                        96.09                          9.50

  RUNOFF VOLUME ABOVE BASEFLOW =  1.63 WATERSHED INCHES,    884.09 CFS-HRS,    73.06 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION REACH     CROSS SECTION  10
          INPUT HYDROGRAPH= 7      OUTPUT HYDROGRAPH= 5
          LENGTH =   1750.00 FEET      INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA,  X=  1.20,    M= 1.10
0         MODIFIED ATT-KIN ROUTING COEFFICIENT =  .34       PEAK TRAVEL TIME =      .40 HOURS
0    *** WARNING - REACH  10 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT      18.15 CFS,  18.88 % OF PEAK.

          PEAK TIME(HRS)            PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
             18.47                        98.84                         (NULL)

  RUNOFF VOLUME ABOVE BASEFLOW =  1.62 WATERSHED INCHES,    878.37 CFS-HRS,    72.59 ACRE-FEET;   BASEFLOW =   3.00 CFS
```



```
OPERATION RUNOFF    CROSS SECTION  10
          OUTPUT HYDROGRAPH=  6
```

AREA= .20 SQ MI INPUT RUNOFF CURVE= 43. TIME OF CONCENTRATION= .19 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0253 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.07	136.13	(RUNOFF)
15.20	9.17	(RUNOFF)
16.46	8.26	(RUNOFF)
17.67	7.09	(RUNOFF)
19.66	5.91	(RUNOFF)
23.66	4.68	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 1.08 WATERSHED INCHES, 138.80 CFS-HRS, 11.47 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 10
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.07	139.13	(NULL)
18.48	104.60	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 1.04 SQ.MI.

11.00	DISCHG	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	5.07	42.12
12.00	DISCHG	119.55	135.88	74.65	52.30	39.55	33.82	31.18	28.92	28.16	25.64
13.00	DISCHG	24.32	23.27	21.88	21.56	20.60	20.25	19.78	19.11	19.30	19.34
14.00	DISCHG	20.06	21.02	22.07	23.72	25.15	26.99	28.85	31.07	34.61	38.64
15.00	DISCHG	42.77	46.81	50.71	54.35	57.09	59.37	61.51	63.49	65.38	67.22
16.00	DISCHG	69.06	71.58	74.60	77.76	80.87	83.82	86.17	88.01	90.08	92.10
17.00	DISCHG	93.97	95.69	97.25	98.68	99.98	101.15	102.19	103.09	103.75	103.67
18.00	DISCHG	103.75	104.02	104.28	104.46	104.57	104.59	104.54	104.40	104.20	103.92
19.00	DISCHG	103.58	103.16	102.66	102.09	101.45	100.73	99.93	99.06	97.99	96.22
20.00	DISCHG	94.66	93.39	92.17	90.95	89.71	88.47	87.23	86.01	84.81	83.63
21.00	DISCHG	82.47	81.34	80.23	79.14	78.07	77.02	76.00	74.99	74.01	73.04
22.00	DISCHG	72.10	71.22	70.52	69.91	69.36	68.83	68.31	67.78	67.25	66.70
23.00	DISCHG	66.13	65.56	64.97	64.37	63.76	63.14	62.52	61.89	61.15	59.57
24.00	DISCHG	58.03	55.87	53.24	51.70	50.62	49.72	48.91	48.18	47.50	46.85
25.00	DISCHG	46.24	45.66	45.10	44.55	44.02	43.50	42.98	42.48	41.98	41.49
26.00	DISCHG	41.00	40.51	40.03	39.55	39.07	38.60	38.12	37.63	37.15	36.66
27.00	DISCHG	36.16	35.66	35.15	34.64	34.13	33.61	33.09	32.57	32.04	31.51
28.00	DISCHG	30.97	30.44	29.90	29.36	28.82	28.28	27.74	27.21	26.67	26.13
29.00	DISCHG	25.68	25.30	24.94	24.59	24.24	23.89	23.52	23.14	22.75	22.35

RUNOFF VOLUME ABOVE BASEFLOW = 1.52 WATERSHED INCHES, 1017.17 CFS-HRS, 84.06 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 10
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 6

OPERATION RESVOR STRUCTURE 20
INPUT HYDROGRAPH= 6 OUTPUT HYDROGRAPH= 7
SURFACE ELEVATION= 4.50

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.78	28.06	6.18
20.09	93.50	9.19

RUNOFF VOLUME ABOVE BASEFLOW = 1.46 WATERSHED INCHES, 980.28 CFS-HRS, 81.01 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 20
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 2900.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .28, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = .72 PEAK TRAVEL TIME = .10 HOURS

*** WARNING REACH 20 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***
0 *** WARNING - REACH 20 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT 23.17 CFS, 25.60 % OF PEAK.

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.93	28.00	(NULL)
20.24	93.48	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 1.46 WATERSHED INCHES, 977.05 CFS-HRS, 80.74 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 20
OUTPUT HYDROGRAPH= 6
AREA= .28 SQ MI INPUT RUNOFF CURVE= 54. TIME OF CONCENTRATION= 2.00 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .1026 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.36	102.66	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 2.03 WATERSHED INCHES, 366.74 CFS-HRS, 30.31 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 20
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.32	129.36	(NULL)
20.12	105.96	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 1.32 SQ.MI.

11.00	DISCHG	3.00	3.00	3.00	3.01	3.02	3.06	3.18	3.47	4.17	5.78
12.00	DISCHG	9.24	16.82	28.18	41.92	55.27	68.54	81.63	93.93	104.66	113.44
13.00	DISCHG	120.26	125.10	128.07	129.31	128.89	127.14	124.34	120.63	115.93	110.44
14.00	DISCHG	104.66	99.17	94.33	90.01	86.08	82.57	79.48	76.76	74.30	72.15
15.00	DISCHG	70.61	69.69	69.26	69.22	69.52	70.10	70.86	71.66	72.43	73.25
16.00	DISCHG	74.17	75.15	76.22	77.43	78.80	80.34	81.97	83.19	84.35	85.54
17.00	DISCHG	86.78	88.06	89.37	90.69	92.04	93.38	94.71	95.52	95.60	95.50
18.00	DISCHG	95.35	95.19	95.02	94.86	94.70	95.26	96.33	97.48	98.58	99.61

19.00	DISCHG	100.56	101.42	102.21	102.93	103.56	104.13	104.63	105.06	105.42	105.70
20.00	DISCHG	105.89	105.96	105.93	105.80	105.59	105.29	104.91	104.45	103.92	103.33
21.00	DISCHG	102.70	102.02	101.30	100.56	99.79	99.00	98.20	97.39	96.57	95.75
22.00	DISCHG	94.93	94.10	93.28	92.45	91.64	90.85	90.07	89.31	88.67	88.44
23.00	DISCHG	88.31	88.22	88.14	88.06	87.99	87.91	87.83	87.74	87.66	87.57
24.00	DISCHG	87.46	87.33	86.33	84.91	83.30	81.62	79.88	78.12	76.33	74.54
25.00	DISCHG	72.75	70.98	69.24	67.55	65.90	64.17	62.27	60.42	58.68	57.04
26.00	DISCHG	55.52	54.11	52.80	51.57	50.42	49.34	48.32	47.36	46.44	45.57
27.00	DISCHG	44.73	43.93	43.17	42.42	41.71	41.01	40.31	39.59	38.88	38.18
28.00	DISCHG	37.51	36.85	36.20	35.57	34.94	34.33	33.72	33.12	32.53	31.94
29.00	DISCHG	31.36	30.79	30.23	29.69	29.17	28.67	28.18	27.71	27.25	26.79

RUNOFF VOLUME ABOVE BASEFLOW = 1.58 WATERSHED INCHES, 1343.80 CFS-HRS, 111.05 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 20
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 1

OPERATION RUNOFF STRUCTURE 30
OUTPUT HYDROGRAPH= 6
AREA= .37 SQ MI INPUT RUNOFF CURVE= 49. TIME OF CONCENTRATION= 3.90 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .1000 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
14.95	60.58	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 1.57 WATERSHED INCHES, 375.61 CFS-HRS, 31.04 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION RESVOR STRUCTURE 30
INPUT HYDROGRAPH= 6 OUTPUT HYDROGRAPH= 7
SURFACE ELEVATION= 21.00

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
16.21	48.05	25.91

RUNOFF VOLUME ABOVE BASEFLOW = 1.51 WATERSHED INCHES, 360.28 CFS-HRS, 29.77 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION REACH CROSS SECTION 40
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 1300.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .88, M= 1.10
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = .32 PEAK TRAVEL TIME = .30 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
16.55	47.70	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 1.50 WATERSHED INCHES, 358.97 CFS-HRS, 29.67 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION RUNOFF CROSS SECTION 40

```
          OUTPUT HYDROGRAPH=  6
          AREA=    .06 SQ MI   INPUT RUNOFF CURVE= 40.    TIME OF CONCENTRATION=  1.00 HOURS
          INTERNAL HYDROGRAPH TIME INCREMENT=  .0952 HOURS

          PEAK TIME(HRS)            PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
             12.72                        10.21                      (RUNOFF)
             23.76                         1.21                      (RUNOFF)

   RUNOFF VOLUME ABOVE BASEFLOW =   .84 WATERSHED INCHES,    32.57 CFS-HRS,     2.69 ACRE-FEET;   BASEFLOW =    .00 CFS

 OPERATION ADDHYD   CROSS SECTION  40
          INPUT HYDROGRAPHS= 5,6     OUTPUT HYDROGRAPH= 7

          PEAK TIME(HRS)            PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
             12.73                        10.35                      (NULL)
             16.54                        49.80                      (NULL)

   RUNOFF VOLUME ABOVE BASEFLOW = 1.41 WATERSHED INCHES,   391.54 CFS-HRS,    32.36 ACRE-FEET;   BASEFLOW =    .00 CFS

 OPERATION SAVMOV   CROSS SECTION  40
          INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 6

 OPERATION RESVOR   STRUCTURE 40
          INPUT HYDROGRAPH= 6     OUTPUT HYDROGRAPH= 7
          SURFACE ELEVATION=     9.00

          PEAK TIME(HRS)            PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
             12.90                         9.83                       9.81
             16.60                        49.78                      10.89

   RUNOFF VOLUME ABOVE BASEFLOW = 1.41 WATERSHED INCHES,   389.94 CFS-HRS,    32.22 ACRE-FEET;   BASEFLOW =    .00 CFS

 OPERATION REACH    CROSS SECTION  50
          INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 5
          LENGTH =   1700.00 FEET      INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA,  X=  1.60,    M= 1.45
0         MODIFIED ATT-KIN ROUTING COEFFICIENT =  .83     PEAK TRAVEL TIME =      .10 HOURS

    *** WARNING  REACH  50 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***

          PEAK TIME(HRS)            PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
             13.02                         9.78                      (NULL)
             16.72                        49.77                      (NULL)

   RUNOFF VOLUME ABOVE BASEFLOW = 1.40 WATERSHED INCHES,   389.36 CFS-HRS,    32.18 ACRE-FEET;   BASEFLOW =    .00 CFS

 OPERATION RUNOFF   CROSS SECTION  49
          OUTPUT HYDROGRAPH=  6
          AREA=    .11 SQ MI   INPUT RUNOFF CURVE= 40.    TIME OF CONCENTRATION=  1.67 HOURS
```

INTERNAL HYDROGRAPH TIME INCREMENT= .1012 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.33	13.76	(RUNOFF)
23.80	2.20	(RUNOFF)
	*	

* FIRST POINT OF FLAT PEAK

RUNOFF VOLUME ABOVE BASEFLOW = .84 WATERSHED INCHES, 59.78 CFS-HRS, 4.94 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 50
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.16	22.91	(NULL)
16.65	53.98	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 1.29 WATERSHED INCHES, 449.14 CFS-HRS, 37.12 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION SAVMOV CROSS SECTION 50
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5

OPERATION RUNOFF CROSS SECTION 50
OUTPUT HYDROGRAPH= 6
AREA= .36 SQ MI INPUT RUNOFF CURVE= 85. TIME OF CONCENTRATION= .42 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0560 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.13	1078.73	(RUNOFF)
19.65	24.75	(RUNOFF)
23.65	18.64	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 5.25 WATERSHED INCHES, 1220.14 CFS-HRS, 100.83 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 50
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.13	1079.95	(NULL)
16.49	90.76	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.87 WATERSHED INCHES, 1669.27 CFS-HRS, 137.95 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION REACH CROSS SECTION 60
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 1400.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .44, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 60 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.13	1079.95	(NULL)
16.49	90.76	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.87 WATERSHED INCHES, 1669.27 CFS-HRS, 137.95 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION RUNOFF CROSS SECTION 60
OUTPUT HYDROGRAPH= 6
AREA= .05 SQ MI INPUT RUNOFF CURVE= 45. TIME OF CONCENTRATION= .90 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .1000 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.56	16.56	(RUNOFF)
23.72	1.26	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 1.24 WATERSHED INCHES, 39.88 CFS-HRS, 3.30 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 60
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.14	1086.21	(NULL)
16.49	93.02	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = .95 SQ.MI.

4.00	DISCHG	.00	.00	.00	.02	.10	.26	.49	.75	1.04	1.33
5.00	DISCHG	1.62	1.91	2.20	2.49	2.77	3.04	3.32	3.58	3.84	4.10
6.00	DISCHG	4.36	4.67	5.18	5.80	6.40	6.89	7.32	7.71	8.07	8.41
7.00	DISCHG	8.75	9.07	9.38	9.69	9.99	10.29	10.58	10.86	11.14	11.41
8.00	DISCHG	11.68	12.08	12.82	13.80	14.96	16.27	17.48	18.44	19.17	19.76
9.00	DISCHG	20.27	20.91	21.91	23.16	24.29	25.16	26.02	27.23	28.66	29.92
10.00	DISCHG	30.90	31.86	33.18	34.84	37.10	40.08	43.57	47.95	52.84	58.21
11.00	DISCHG	64.10	70.07	76.45	83.02	90.75	101.27	130.10	208.30	333.15	539.50
12.00	DISCHG	836.25	1068.68	1030.91	805.58	576.69	421.03	324.82	265.51	227.09	199.69
13.00	DISCHG	178.52	161.72	147.53	136.12	127.20	119.75	113.25	107.02	101.45	96.86
14.00	DISCHG	93.29	90.54	88.31	86.99	86.63	86.30	86.13	85.74	85.37	85.47
15.00	DISCHG	86.26	87.42	88.85	90.29	90.92	90.62	90.19	90.11	90.41	90.86
16.00	DISCHG	91.35	91.83	92.25	92.60	92.86	93.02	92.76	91.64	89.95	88.43
17.00	DISCHG	87.35	86.55	85.87	85.24	84.63	84.03	83.43	82.82	82.11	80.76
18.00	DISCHG	78.62	76.40	74.60	73.30	72.20	71.21	70.27	69.38	68.51	67.67
19.00	DISCHG	66.86	66.07	65.33	64.68	63.99	63.30	62.62	61.96	61.19	59.85
20.00	DISCHG	57.76	55.58	53.88	52.62	51.60	50.72	49.94	49.23	48.56	47.93
21.00	DISCHG	47.34	46.79	46.26	45.76	45.28	44.83	44.40	43.97	43.53	43.10
22.00	DISCHG	42.70	42.29	41.89	41.51	41.15	40.80	40.46	40.14	39.84	39.55
23.00	DISCHG	39.27	39.01	38.75	38.51	38.28	38.06	37.85	37.65	37.37	36.46

24.00	DISCHG	34.72	32.26	28.67	24.55	21.18	18.97	17.56	16.54	15.77	15.13
25.00	DISCHG	14.59	14.12	13.71	13.34	13.02	12.72	12.45	12.20	11.96	11.76
26.00	DISCHG	11.57	11.41	11.25	11.11	10.97	10.84	10.71	10.57	10.42	10.28
27.00	DISCHG	10.13	9.97	9.81	9.64	9.47	9.29	9.11	8.93	8.74	8.54
28.00	DISCHG	8.34	8.13	7.93	7.72	7.51	7.29	7.08	6.87	6.67	6.46
29.00	DISCHG	6.26	6.06	5.87	5.68	5.49	5.32	5.14	4.99	4.87	4.74

RUNOFF VOLUME ABOVE BASEFLOW = 2.79 WATERSHED INCHES, 1709.15 CFS-HRS, 141.24 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION SAVMOV CROSS SECTION 70
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5

OPERATION SAVMOV CROSS SECTION 70
INPUT HYDROGRAPH= 1 OUTPUT HYDROGRAPH= 6

OPERATION ADDHYD CROSS SECTION 70
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.14	1106.90	(NULL)
17.67	178.36	(NULL)
19.31	167.60	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 2.27 SQ.MI.

4.00	DISCHG	3.00	3.00	3.00	3.02	3.10	3.26	3.49	3.75	4.04	4.33
5.00	DISCHG	4.62	4.91	5.20	5.49	5.77	6.04	6.32	6.58	6.84	7.10
6.00	DISCHG	7.36	7.67	8.18	8.80	9.40	9.89	10.32	10.71	11.07	11.41
7.00	DISCHG	11.75	12.07	12.38	12.69	12.99	13.29	13.58	13.86	14.14	14.41
8.00	DISCHG	14.68	15.08	15.82	16.80	17.96	19.27	20.48	21.44	22.17	22.76
9.00	DISCHG	23.27	23.91	24.91	26.16	27.29	28.16	29.02	30.23	31.66	32.92
10.00	DISCHG	33.90	34.86	36.18	37.84	40.10	43.08	46.57	50.95	55.84	61.21
11.00	DISCHG	67.10	73.07	79.45	86.03	93.78	104.34	133.28	211.78	337.32	545.28
12.00	DISCHG	845.49	1085.50	1059.08	847.51	631.96	489.56	406.44	359.44	331.74	313.13
13.00	DISCHG	298.78	286.82	275.60	265.43	256.10	246.89	237.59	227.64	217.38	207.30
14.00	DISCHG	197.94	189.71	182.63	177.00	172.71	168.87	165.61	162.49	159.67	157.62
15.00	DISCHG	156.87	157.10	158.11	159.51	160.44	160.71	161.04	161.78	162.83	164.10
16.00	DISCHG	165.52	166.98	168.47	170.03	171.67	173.36	174.74	174.83	174.30	173.97
17.00	DISCHG	174.13	174.61	175.24	175.94	176.67	177.41	178.14	178.33	177.71	176.26
18.00	DISCHG	173.97	171.58	169.63	168.16	166.91	166.47	166.60	166.86	167.09	167.28
19.00	DISCHG	167.42	167.49	167.54	167.60	167.56	167.43	167.25	167.02	166.61	165.55
20.00	DISCHG	163.65	161.54	159.81	158.42	157.19	156.02	154.85	153.67	152.48	151.27
21.00	DISCHG	150.04	148.80	147.56	146.32	145.07	143.83	142.60	141.35	140.11	138.86
22.00	DISCHG	137.63	136.39	135.17	133.97	132.79	131.64	130.53	129.45	128.51	127.98
23.00	DISCHG	127.59	127.23	126.90	126.58	126.27	125.97	125.68	125.40	125.03	124.02
24.00	DISCHG	122.18	119.59	115.00	109.46	104.49	100.59	97.44	94.66	92.10	89.67
25.00	DISCHG	87.34	85.10	82.95	80.89	78.92	76.89	74.72	72.62	70.64	68.80

26.00	DISCHG	67.09	65.52	64.05	62.68	61.40	60.18	59.03	57.92	56.86	55.84
27.00	DISCHG	54.86	53.90	52.97	52.07	51.18	50.30	49.42	48.52	47.61	46.72
28.00	DISCHG	45.85	44.98	44.13	43.28	42.45	41.62	40.80	40.00	39.20	38.41
29.00	DISCHG	37.62	36.85	36.10	35.37	34.66	33.98	33.33	32.70	32.11	31.53

RUNOFF VOLUME ABOVE BASEFLOW = 2.08 WATERSHED INCHES, 3052.95 CFS-HRS, 252.30 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 80
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 700.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .30, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 80 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.14	1106.90	(NULL)
17.67	178.36	(NULL)
19.31	167.60	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.08 WATERSHED INCHES, 3052.95 CFS-HRS, 252.30 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 80
OUTPUT HYDROGRAPH= 6
AREA= .02 SQ MI INPUT RUNOFF CURVE= 64. TIME OF CONCENTRATION= .12 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0160 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
11.98	54.99	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 2.98 WATERSHED INCHES, 38.49 CFS-HRS, 3.18 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 80
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.13	1128.27	(NULL)
17.67	179.69	(NULL)
19.31	168.68	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.09 WATERSHED INCHES, 3091.43 CFS-HRS, 255.48 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 100
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5

OPERATION RUNOFF CROSS SECTION 90
OUTPUT HYDROGRAPH= 6
AREA= .24 SQ MI INPUT RUNOFF CURVE= 75. TIME OF CONCENTRATION= .62 HOURS

INTERNAL HYDROGRAPH TIME INCREMENT= .0827 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.26	458.49	(RUNOFF)
19.66	15.09	(RUNOFF)
23.66	11.44	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 4.14 WATERSHED INCHES, 641.76 CFS-HRS, 53.03 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 100
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.16	1534.58	(NULL)
16.63	198.47	(NULL)
17.67	198.50	(NULL)
19.30	183.76	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.29 WATERSHED INCHES, 3733.19 CFS-HRS, 308.51 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 110
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 500.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .30, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 110 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.16	1534.58	(NULL)
16.63	198.47	(NULL)
17.67	198.50	(NULL)
19.30	183.76	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.29 WATERSHED INCHES, 3733.19 CFS-HRS, 308.51 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 120
INPUT HYDROGRAPH= 5 OUTPUT HYDROGRAPH= 7

OPERATION REACH CROSS SECTION 120
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 500.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .30, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 120 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.16	1534.58	(NULL)
16.63	198.47	(NULL)
17.67	198.50	(NULL)
19.30	183.76	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.29 WATERSHED INCHES, 3733.19 CFS-HRS, 308.51 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 120
OUTPUT HYDROGRAPH= 6
AREA= .19 SQ MI INPUT RUNOFF CURVE= 56. TIME OF CONCENTRATION= .74 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0987 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.38	159.29	(RUNOFF)
19.68	8.61	(RUNOFF)
23.67	6.65	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 2.22 WATERSHED INCHES, 271.72 CFS-HRS, 22.45 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 120
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.18	1657.29	(NULL)
15.37	202.67	(NULL)
16.62	210.86	(NULL)
17.66	209.13	(NULL)
19.30	192.36	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 2.72 SQ.MI.

4.00	DISCHG	3.00	3.00	3.00	3.02	3.10	3.26	3.49	3.75	4.04	4.33
5.00	DISCHG	4.62	4.91	5.20	5.49	5.77	6.04	6.32	6.58	6.84	7.10
6.00	DISCHG	7.36	7.67	8.18	8.80	9.40	9.89	10.32	10.71	11.07	11.42
7.00	DISCHG	11.77	12.13	12.52	12.93	13.36	13.79	14.23	14.67	15.11	15.54
8.00	DISCHG	15.98	16.55	17.48	18.71	20.15	21.78	23.35	24.68	25.76	26.68
9.00	DISCHG	27.51	28.47	29.83	31.49	33.06	34.37	35.71	37.41	39.40	41.24
10.00	DISCHG	42.78	44.33	46.25	48.59	51.71	55.68	60.49	66.40	73.12	80.64
11.00	DISCHG	88.89	97.64	107.04	117.05	128.94	144.54	188.67	293.11	469.26	778.69
12.00	DISCHG	1219.90	1582.97	1650.59	1466.92	1206.10	978.15	804.27	682.80	598.75	537.17
13.00	DISCHG	491.13	453.70	422.41	396.08	373.52	353.85	335.53	317.99	301.05	285.11
14.00	DISCHG	271.00	258.63	248.00	239.22	232.03	225.65	219.82	214.29	209.21	205.15
15.00	DISCHG	202.73	201.70	201.81	202.51	202.63	202.05	201.36	201.05	201.19	201.77
16.00	DISCHG	202.71	203.85	205.13	206.56	208.12	209.75	210.82	210.44	209.15	207.90
17.00	DISCHG	207.15	206.86	206.93	207.26	207.75	208.33	208.94	209.07	208.30	206.40
18.00	DISCHG	203.49	200.23	197.31	194.98	193.05	192.14	191.94	191.98	192.08	192.17
19.00	DISCHG	192.24	192.28	192.30	192.36	192.31	192.19	192.01	191.78	191.28	189.81

20.00	DISCHG	187.31	184.31	181.61	179.34	177.42	175.76	174.27	172.87	171.52	170.20
21.00	DISCHG	168.91	167.63	166.36	165.09	163.84	162.59	161.36	160.12	158.87	157.63
22.00	DISCHG	156.40	155.18	153.96	152.77	151.60	150.46	149.35	148.28	147.35	146.83
23.00	DISCHG	146.44	146.10	145.77	145.46	145.16	144.87	144.58	144.31	143.84	142.40
24.00	DISCHG	139.89	135.78	129.19	121.20	113.57	107.25	102.14	97.90	94.33	91.22
25.00	DISCHG	88.42	85.85	83.47	81.24	79.16	77.05	74.83	72.69	70.68	68.82
26.00	DISCHG	67.11	65.52	64.05	62.68	61.40	60.18	59.03	57.92	56.86	55.84
27.00	DISCHG	54.86	53.90	52.97	52.07	51.18	50.30	49.42	48.52	47.61	46.72
28.00	DISCHG	45.85	44.98	44.13	43.28	42.45	41.62	40.80	40.00	39.20	38.41
29.00	DISCHG	37.62	36.85	36.10	35.37	34.66	33.98	33.33	32.70	32.11	31.53

RUNOFF VOLUME ABOVE BASEFLOW = 2.28 WATERSHED INCHES, 4004.91 CFS-HRS, 330.97 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV STRUCTURE 50
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 6

OPERATION RESVOR STRUCTURE 50
INPUT HYDROGRAPH= 6 OUTPUT HYDROGRAPH= 7
SURFACE ELEVATION= 2.40

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.56	343.65	10.69

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 2.72 SQ.MI.

9.00	DISCHG	3.00	3.00	3.28	3.75	4.23	4.72	5.24	5.76	6.31	6.89
9.00	ELEV	2.84	2.84	2.85	2.87	2.89	2.91	2.93	2.95	2.97	3.00
10.00	DISCHG	7.43	7.98	8.54	9.13	9.76	10.42	11.14	11.94	12.81	13.78
10.00	ELEV	3.02	3.04	3.07	3.09	3.12	3.15	3.18	3.22	3.26	3.30
11.00	DISCHG	14.86	16.09	18.40	20.91	23.65	26.68	30.43	36.07	46.64	65.94
11.00	ELEV	3.35	3.40	3.46	3.52	3.59	3.67	3.76	3.90	4.13	4.52
12.00	DISCHG	95.35	120.37	176.14	231.60	261.77	285.13	302.18	314.59	323.77	330.64
12.00	ELEV	5.14	6.02	7.02	7.94	8.68	9.24	9.64	9.94	10.16	10.32
13.00	DISCHG	335.42	338.46	340.67	342.19	343.13	343.59	343.61	343.24	342.49	341.40
13.00	ELEV	10.44	10.54	10.60	10.65	10.68	10.69	10.69	10.68	10.66	10.62
14.00	DISCHG	339.99	338.32	336.44	334.38	331.70	328.81	325.83	322.77	319.64	316.48
14.00	ELEV	10.58	10.53	10.47	10.41	10.35	10.28	10.21	10.13	10.06	9.98
15.00	DISCHG	313.31	310.19	307.14	304.18	301.32	298.54	295.82	293.15	290.57	288.06
15.00	ELEV	9.91	9.83	9.76	9.69	9.62	9.56	9.49	9.43	9.37	9.31
16.00	DISCHG	285.64	283.33	281.11	278.99	276.98	275.06	273.24	271.48	269.74	268.02
16.00	ELEV	9.25	9.19	9.14	9.09	9.04	9.00	8.95	8.91	8.87	8.83
17.00	DISCHG	266.32	264.65	263.03	261.45	259.94	258.48	257.07	255.72	254.40	253.07
17.00	ELEV	8.79	8.75	8.71	8.67	8.64	8.60	8.57	8.54	8.50	8.47
18.00	DISCHG	251.72	250.32	248.92	247.51	246.07	244.64	243.23	241.86	240.52	239.22
18.00	ELEV	8.44	8.41	8.37	8.34	8.30	8.27	8.23	8.20	8.16	8.13
19.00	DISCHG	237.96	236.74	235.55	234.39	233.26	232.16	231.09	230.04	229.01	227.98
19.00	ELEV	8.10	8.07	8.04	8.01	7.98	7.95	7.93	7.90	7.88	7.85
20.00	DISCHG	226.92	225.82	224.67	223.49	222.28	221.05	219.82	218.58	217.34	216.09
20.00	ELEV	7.82	7.80	7.77	7.74	7.71	7.68	7.65	7.61	7.58	7.55

21.00	DISCHG	214.84	213.60	212.35	211.10	209.67	206.94	204.30	201.74	199.26	196.85
21.00	ELEV	7.52	7.49	7.46	7.43	7.40	7.37	7.34	7.31	7.28	7.25
22.00	DISCHG	194.51	192.24	190.03	187.88	185.78	183.74	181.75	179.82	177.94	176.13
22.00	ELEV	7.23	7.20	7.18	7.15	7.13	7.10	7.08	7.06	7.04	7.02
23.00	DISCHG	174.40	172.75	171.17	169.67	168.24	166.88	165.58	164.34	163.15	161.97
23.00	ELEV	7.00	6.98	6.96	6.95	6.93	6.92	6.90	6.89	6.87	6.86
24.00	DISCHG	160.75	159.40	157.82	155.91	153.65	151.11	148.38	145.54	142.64	139.71
24.00	ELEV	6.85	6.83	6.81	6.79	6.77	6.74	6.71	6.68	6.64	6.61
25.00	DISCHG	136.78	133.87	130.98	128.12	125.31	122.54	120.98	120.92	120.87	120.81
25.00	ELEV	6.58	6.54	6.51	6.48	6.45	6.42	6.39	6.35	6.32	6.29
26.00	DISCHG	120.75	120.69	120.63	120.56	120.49	120.43	120.36	120.29	120.22	120.14
26.00	ELEV	6.25	6.21	6.18	6.14	6.10	6.06	6.01	5.97	5.93	5.89
27.00	DISCHG	120.07	119.93	118.26	116.60	114.97	113.35	111.75	110.17	108.61	107.07
27.00	ELEV	5.84	5.80	5.75	5.71	5.67	5.62	5.58	5.54	5.50	5.46
28.00	DISCHG	105.54	104.02	102.53	101.05	99.58	98.14	96.70	95.29	93.89	92.50
28.00	ELEV	5.41	5.37	5.33	5.29	5.26	5.22	5.18	5.14	5.10	5.07
29.00	DISCHG	91.13	89.70	87.92	86.18	84.47	82.80	81.15	79.55	77.97	76.43
29.00	ELEV	5.03	4.99	4.96	4.92	4.89	4.86	4.82	4.79	4.76	4.73

RUNOFF VOLUME ABOVE BASEFLOW = 2.10 WATERSHED INCHES, 3683.56 CFS-HRS, 304.41 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 130
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 1000.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .30, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 130 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***
0 *** WARNING - REACH 130 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT 73.43 CFS, 21.56 % OF PEAK.

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.56	343.65	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.10 WATERSHED INCHES, 3683.56 CFS-HRS, 304.41 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 130
OUTPUT HYDROGRAPH= 6
AREA= .05 SQ MI INPUT RUNOFF CURVE= 74. TIME OF CONCENTRATION= .19 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0253 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.01	160.37	(RUNOFF)
23.65	2.37	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 4.05 WATERSHED INCHES, 130.79 CFS-HRS, 10.81 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 130
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.05	264.17	(NULL)
13.44	353.46	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.13 WATERSHED INCHES, 3814.35 CFS-HRS, 315.22 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 130
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 6

OPERATION RESVOR STRUCTURE 60
INPUT HYDROGRAPH= 6 OUTPUT HYDROGRAPH= 7
SURFACE ELEVATION= 2.00

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
16.65	276.64	6.71

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 2.77 SQ.MI.

11.00	DISCHG	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.04	5.06	8.27
11.00	ELEV	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.46	2.54
12.00	DISCHG	12.66	17.21	21.55	30.19	40.15	49.79	59.68	72.00	84.27	96.27
12.00	ELEV	2.67	2.82	2.97	3.11	3.27	3.43	3.59	3.76	3.92	4.08
13.00	DISCHG	107.92	119.16	129.95	138.99	146.49	153.74	160.72	167.42	173.86	180.00
13.00	ELEV	4.24	4.39	4.53	4.67	4.80	4.93	5.06	5.18	5.29	5.40
14.00	DISCHG	180.18	180.35	180.53	180.70	180.87	183.28	195.50	206.46	216.24	224.97
14.00	ELEV	5.51	5.61	5.72	5.82	5.92	6.02	6.11	6.19	6.26	6.33
15.00	DISCHG	232.73	239.60	245.66	250.98	255.61	259.61	263.05	265.98	268.46	270.53
15.00	ELEV	6.39	6.44	6.48	6.52	6.56	6.59	6.61	6.63	6.65	6.67
16.00	DISCHG	272.24	273.61	274.68	275.49	276.07	276.44	276.62	276.61	276.45	276.15
16.00	ELEV	6.68	6.69	6.70	6.71	6.71	6.71	6.71	6.71	6.71	6.71
17.00	DISCHG	275.73	275.21	274.59	273.90	273.14	272.32	271.45	270.53	269.59	268.59
17.00	ELEV	6.71	6.70	6.70	6.69	6.69	6.68	6.67	6.67	6.66	6.65
18.00	DISCHG	267.54	266.45	265.33	264.19	263.02	261.84	260.63	259.41	258.18	256.94
18.00	ELEV	6.65	6.64	6.63	6.62	6.61	6.60	6.59	6.59	6.58	6.57
19.00	DISCHG	255.70	254.46	253.22	251.98	250.76	249.54	248.33	247.14	245.96	244.77
19.00	ELEV	6.56	6.55	6.54	6.53	6.52	6.51	6.50	6.49	6.48	6.48
20.00	DISCHG	243.56	242.36	241.15	239.95	238.75	237.55	236.35	235.14	233.93	232.72
20.00	ELEV	6.47	6.46	6.45	6.44	6.43	6.42	6.41	6.40	6.40	6.39
21.00	DISCHG	231.51	230.29	229.07	227.85	226.61	225.31	223.90	222.39	220.80	219.14
21.00	ELEV	6.38	6.37	6.36	6.35	6.34	6.33	6.32	6.31	6.30	6.28
22.00	DISCHG	217.42	215.65	213.84	212.01	210.15	208.27	206.38	204.49	202.60	200.70
22.00	ELEV	6.27	6.26	6.25	6.23	6.22	6.20	6.19	6.18	6.16	6.15
23.00	DISCHG	198.82	196.96	195.11	193.29	191.50	189.74	188.02	186.33	184.68	183.05
23.00	ELEV	6.13	6.12	6.11	6.09	6.08	6.07	6.05	6.04	6.03	6.02
24.00	DISCHG	181.43	180.98	180.96	180.94	180.91	180.88	180.85	180.81	180.77	180.73
24.00	ELEV	6.00	5.99	5.98	5.96	5.95	5.93	5.91	5.89	5.86	5.84
25.00	DISCHG	180.68	180.64	180.59	180.53	180.48	180.42	180.35	180.29	180.23	180.17
25.00	ELEV	5.81	5.78	5.75	5.72	5.69	5.65	5.61	5.57	5.54	5.50

26.00	DISCHG	180.10	180.04	179.28	177.22	175.24	173.32	171.47	169.68	167.95	166.28
26.00	ELEV	5.46	5.42	5.39	5.35	5.32	5.28	5.25	5.22	5.19	5.16
27.00	DISCHG	164.66	163.10	161.56	160.01	158.47	156.92	155.36	153.81	152.25	150.70
27.00	ELEV	5.13	5.10	5.07	5.04	5.02	4.99	4.96	4.93	4.91	4.88
28.00	DISCHG	149.15	147.59	146.04	144.49	142.95	141.40	139.86	138.33	136.80	135.27
28.00	ELEV	4.85	4.82	4.80	4.77	4.74	4.71	4.69	4.66	4.63	4.60
29.00	DISCHG	133.34	131.35	129.38	127.42	125.46	123.52	121.59	119.68	117.78	115.90
29.00	ELEV	4.58	4.55	4.53	4.50	4.47	4.45	4.42	4.40	4.37	4.35

RUNOFF VOLUME ABOVE BASEFLOW = 1.94 WATERSHED INCHES, 3469.50 CFS-HRS, 286.72 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 140
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 2500.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .21, M= 1.48
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = .37 PEAK TRAVEL TIME = .30 HOURS
0 *** WARNING - REACH 140 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT 112.90 CFS, 41.26 % OF PEAK.

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
16.94	276.19	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 1.92 WATERSHED INCHES, 3438.16 CFS-HRS, 284.13 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 140
OUTPUT HYDROGRAPH= 6
AREA= .20 SQ MI INPUT RUNOFF CURVE= 69. TIME OF CONCENTRATION= .19 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0253 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.02	560.07	(RUNOFF)
15.16	19.75	(RUNOFF)
16.45	17.22	(RUNOFF)
17.66	14.43	(RUNOFF)
19.65	11.68	(RUNOFF)
23.65	8.90	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 3.52 WATERSHED INCHES, 454.78 CFS-HRS, 37.58 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 140
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.02	565.95	(NULL)
16.90	290.55	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.03 WATERSHED INCHES, 3892.94 CFS-HRS, 321.71 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 150
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5

OPERATION RUNOFF CROSS SECTION 149
OUTPUT HYDROGRAPH= 6
AREA= .08 SQ MI INPUT RUNOFF CURVE= 65. TIME OF CONCENTRATION= .42 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0560 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.15	142.32	(RUNOFF)
16.45	6.39	(RUNOFF)
17.67	5.39	(RUNOFF)
19.66	4.37	(RUNOFF)
23.66	3.34	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 3.10 WATERSHED INCHES, 160.17 CFS-HRS, 13.24 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 150
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.03	676.34	(NULL)
14.30	212.55	(NULL)
16.54	297.91	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.06 WATERSHED INCHES, 4053.11 CFS-HRS, 334.95 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 150
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 300.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .21, M= 1.48
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 150 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***
0 *** WARNING - REACH 150 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT 117.99 CFS, 17.92 % OF PEAK.

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.03	676.34	(NULL)
14.30	212.55	(NULL)
16.54	297.91	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.06 WATERSHED INCHES, 4053.11 CFS-HRS, 334.95 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 150
OUTPUT HYDROGRAPH= 6
AREA= .01 SQ MI INPUT RUNOFF CURVE= 40. TIME OF CONCENTRATION= .15 HOURS

INTERNAL HYDROGRAPH TIME INCREMENT= .0200 HOURS

*** WARNING-MAIN TIME INCREMENT MAY BE TOO LARGE.
COMPUTED PEAK(4.99) AT EXCEEDS MAX. ADJACENT HYDROGRAPH COORDINATE BY 8 %.
+ XSECTION 150

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.05	4.99	(RUNOFF)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = .01 SQ.MI.

11.00	DISCHG	.00	.00	.00	.00	.00	.00	.00	.00	.00	1.05
12.00	DISCHG	4.60	4.46	2.17	1.71	1.28	1.17	1.09	1.02	1.00	.87
13.00	DISCHG	.84	.78	.73	.71	.66	.64	.60	.56	.55	.52
14.00	DISCHG	.52	.50	.48	.47	.44	.43	.41	.38	.38	.38
15.00	DISCHG	.38	.39	.39	.38	.35	.34	.34	.34	.34	.34
16.00	DISCHG	.34	.34	.35	.35	.35	.35	.32	.30	.30	.30
17.00	DISCHG	.30	.30	.30	.30	.30	.30	.30	.30	.30	.26
18.00	DISCHG	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25
19.00	DISCHG	.25	.25	.25	.25	.25	.25	.25	.25	.25	.21
20.00	DISCHG	.19	.19	.19	.19	.19	.19	.19	.19	.19	.19
21.00	DISCHG	.19	.20	.20	.20	.20	.20	.20	.20	.20	.20
22.00	DISCHG	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20
23.00	DISCHG	.20	.20	.20	.20	.20	.20	.20	.20	.20	.15
24.00	DISCHG	.14	.08	.01	.00						

RUNOFF VOLUME ABOVE BASEFLOW = .84 WATERSHED INCHES, 5.41 CFS-HRS, .45 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 150
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.03	681.31	(NULL)
14.30	213.02	(NULL)
16.54	298.25	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.06 WATERSHED INCHES, 4058.52 CFS-HRS, 335.40 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 180
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5

OPERATION RUNOFF CROSS SECTION 180
OUTPUT HYDROGRAPH= 6
AREA= .11 SQ MI INPUT RUNOFF CURVE= 42. TIME OF CONCENTRATION= .48 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0640 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.27	39.64	(RUNOFF)
23.68	2.45	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = .99 WATERSHED INCHES, 70.57 CFS-HRS, 5.83 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 180
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.04	698.28	(NULL)
14.28	219.39	(NULL)
16.54	302.51	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.02 WATERSHED INCHES, 4129.10 CFS-HRS, 341.23 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 180
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 1700.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .21, M= 1.48
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = .62 PEAK TRAVEL TIME = .20 HOURS
0 *** WARNING - REACH 180 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT 117.99 CFS, 17.48 % OF PEAK.

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.18	618.41	(NULL)
14.43	218.85	(NULL)
16.69	302.05	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.01 WATERSHED INCHES, 4106.99 CFS-HRS, 339.40 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 180
OUTPUT HYDROGRAPH= 6
AREA= .11 SQ MI INPUT RUNOFF CURVE= 41. TIME OF CONCENTRATION= .48 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0640 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.28	34.74	(RUNOFF)
23.69	2.34	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = .92 WATERSHED INCHES, 65.08 CFS-HRS, 5.38 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 180
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.19	650.38	(NULL)
14.41	224.58	(NULL)
16.68	306.01	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 3.28 SQ.MI.

8.00	DISCHG	3.00	3.00	3.00	3.00	3.00	3.00	3.06	3.19	3.36	3.56
9.00	DISCHG	3.76	3.97	4.22	4.52	4.81	5.09	5.38	5.74	6.22	6.68
10.00	DISCHG	7.12	7.54	8.06	8.69	9.35	10.35	11.38	12.69	14.43	16.07
11.00	DISCHG	18.28	20.49	22.93	25.83	28.60	32.85	37.24	61.29	113.91	179.08
12.00	DISCHG	357.82	576.31	648.94	529.22	410.16	314.64	251.59	214.45	192.94	183.46
13.00	DISCHG	177.90	176.87	178.73	181.61	186.75	191.64	196.95	201.87	205.88	210.42
14.00	DISCHG	214.69	219.25	222.38	223.85	224.57	224.09	223.33	222.74	224.49	229.08
15.00	DISCHG	235.62	243.18	251.07	258.82	265.98	271.57	276.40	280.96	285.23	289.17
16.00	DISCHG	292.71	295.83	298.54	300.85	302.79	304.40	305.66	306.00	305.33	304.68
17.00	DISCHG	304.19	303.82	303.49	303.15	302.75	302.28	301.73	301.11	300.42	299.46
18.00	DISCHG	297.42	295.18	293.25	291.63	290.23	288.96	287.75	286.57	285.40	284.23
19.00	DISCHG	283.04	281.85	280.64	279.44	278.23	277.01	275.81	274.60	273.39	271.98
20.00	DISCHG	269.54	266.95	264.72	262.86	261.26	259.83	258.51	257.24	256.00	254.78
21.00	DISCHG	253.57	252.37	251.17	249.97	248.76	247.56	246.35	245.12	243.85	242.51
22.00	DISCHG	241.10	239.62	238.07	236.45	234.78	233.06	231.30	229.50	227.68	225.84
23.00	DISCHG	223.98	222.12	220.25	218.38	216.52	214.68	212.85	211.05	209.27	207.30
24.00	DISCHG	204.30	201.08	196.88	191.77	187.81	185.13	183.44	182.41	181.78	181.40
25.00	DISCHG	181.15	180.99	180.88	180.79	180.71	180.66	180.60	180.54	180.49	180.43
26.00	DISCHG	180.37	180.30	180.24	180.18	179.96	179.26	178.16	176.78	175.21	173.55
27.00	DISCHG	171.86	170.16	168.48	166.82	165.21	163.62	162.04	160.47	158.91	157.36
28.00	DISCHG	155.80	154.24	152.69	151.13	149.58	148.03	146.48	144.93	143.38	141.84
29.00	DISCHG	140.30	138.77	137.14	135.41	133.60	131.73	129.83	127.91	125.99	124.06

RUNOFF VOLUME ABOVE BASEFLOW = 1.97 WATERSHED INCHES, 4172.07 CFS-HRS, 344.78 ACRE-FEET; BASEFLOW = 3.00 CFS

EXECUTIVE CONTROL OPERATION ENDCMP RECORD ID 1740

+ COMPUTATIONS COMPLETED FOR PASS 1

EXECUTIVE CONTROL OPERATION ENDJOB RECORD ID 1750

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

SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RAIN TABLE #	ANTEC MOIST COND	MAIN TIME INCREM (HR)	PRECIPITATION BEGIN (HR)	PRECIPITATION AMOUNT (IN)	PRECIPITATION DURATION (HR)	RUNOFF AMOUNT (IN)	PEAK DISCHARGE ELEVATION (FT)	PEAK DISCHARGE TIME (HR)	PEAK DISCHARGE RATE (CFS)	PEAK DISCHARGE RATE (CSM)
ALTERNATE 88 STORM 1													
STRUCTURE 10	RUNOFF	.84	2	2	.10	.0	7.00	24.00	1.67	---	17.80	96.56	114.9
STRUCTURE 10	RESVOR	.84	2	2	.10	.0	7.00	24.00	1.63	9.50	18.14	96.09	114.4
XSECTION 10	REACH	.84	2	2	.10	.0	7.00	24.00	1.62	---	18.47	98.84	117.7
XSECTION 10	RUNOFF	.20	2	2	.10	.0	7.00	24.00	1.08	---	12.07	136.13	680.6
XSECTION 10	ADDHYD	1.04	2	2	.10	.0	7.00	24.00	1.52	---	12.07	139.13	133.8
STRUCTURE 20	RESVOR	1.04	2	2	.10	.0	7.00	24.00	1.46	9.19	20.09	93.50	89.9
XSECTION 20	REACH	1.04	2	2	.10	.0	7.00	24.00	1.46	---	20.24	93.48	89.9
XSECTION 20	RUNOFF	.28	2	2	.10	.0	7.00	24.00	2.03	---	13.36	102.66	366.6
XSECTION 20	ADDHYD	1.32	2	2	.10	.0	7.00	24.00	1.58	---	13.32	129.36	98.0
STRUCTURE 30	RUNOFF	.37	2	2	.10	.0	7.00	24.00	1.57	---	14.95	60.58	163.7
STRUCTURE 30	RESVOR	.37	2	2	.10	.0	7.00	24.00	1.51	25.91	16.21	48.05	129.9
XSECTION 40	REACH	.37	2	2	.10	.0	7.00	24.00	1.50	---	16.55	47.70	128.9
XSECTION 40	RUNOFF	.06	2	2	.10	.0	7.00	24.00	.84	---	12.72	10.21	170.2
XSECTION 40	ADDHYD	.43	2	2	.10	.0	7.00	24.00	1.41	---	16.54	49.80	115.8
STRUCTURE 40	RESVOR	.43	2	2	.10	.0	7.00	24.00	1.41	10.89	16.60	49.78	115.8
XSECTION 50	REACH	.43	2	2	.10	.0	7.00	24.00	1.40	---	16.72	49.77	115.7
XSECTION 49	RUNOFF	.11	2	2	.10	.0	7.00	24.00	.84	---	13.33	13.76	125.1
XSECTION 50	ADDHYD	.54	2	2	.10	.0	7.00	24.00	1.29	---	16.65	53.98	100.0
XSECTION 50	RUNOFF	.36	2	2	.10	.0	7.00	24.00	5.25	---	12.13	1078.73	2996.5
XSECTION 50	ADDHYD	.90	2	2	.10	.0	7.00	24.00	2.87	---	12.13	1079.95	1199.9
XSECTION 60	REACH	.90	2	2	.10	.0	7.00	24.00	2.87	---	12.13	1079.95	1199.9
XSECTION 60	RUNOFF	.05	2	2	.10	.0	7.00	24.00	1.24	---	12.56	16.56	331.2
XSECTION 60	ADDHYD	.95	2	2	.10	.0	7.00	24.00	2.79	---	12.14	1086.21	1143.4
XSECTION 70	ADDHYD	2.27	2	2	.10	.0	7.00	24.00	2.08	---	12.14	1106.90	487.6
XSECTION 80	REACH	2.27	2	2	.10	.0	7.00	24.00	2.08	---	12.14	1106.90	487.6
XSECTION 80	RUNOFF	.02	2	2	.10	.0	7.00	24.00	2.98	---	11.98	54.99	2749.6
XSECTION 80	ADDHYD	2.29	2	2	.10	.0	7.00	24.00	2.09	---	12.13	1128.27	492.7
XSECTION 90	RUNOFF	.24	2	2	.10	.0	7.00	24.00	4.14	---	12.26	458.49	1910.4
XSECTION 100	ADDHYD	2.53	2	2	.10	.0	7.00	24.00	2.29	---	12.16	1534.58	606.6
XSECTION 110	REACH	2.53	2	2	.10	.0	7.00	24.00	2.29	---	12.16	1534.58	606.6
XSECTION 120	REACH	2.53	2	2	.10	.0	7.00	24.00	2.29	---	12.16	1534.58	606.6
XSECTION 120	RUNOFF	.19	2	2	.10	.0	7.00	24.00	2.22	---	12.38	159.29	838.4

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

SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RAIN TABLE #	ANTEC MOIST COND	MAIN TIME INCREM (HR)	PRECIPITATION BEGIN (HR)	PRECIPITATION AMOUNT (IN)	PRECIPITATION DURATION (HR)	RUNOFF AMOUNT (IN)	PEAK DISCHARGE ELEVATION (FT)	PEAK DISCHARGE TIME (HR)	PEAK DISCHARGE RATE (CFS)	PEAK DISCHARGE RATE (CSM)
ALTERNATE 88 STORM 1													
XSECTION 120	ADDHYD	2.72	2	2	.10	.0	7.00	24.00	2.28	---	12.18	1657.29	609.3
STRUCTURE 50	RESVOR	2.72	2	2	.10	.0	7.00	24.00	2.10	10.69	13.56	343.65	126.3
XSECTION 130	REACH	2.72	2	2	.10	.0	7.00	24.00	2.10	---	13.56	343.65	126.3
XSECTION 130	RUNOFF	.05	2	2	.10	.0	7.00	24.00	4.05	---	12.01	160.37	3207.4
XSECTION 130	ADDHYD	2.77	2	2	.10	.0	7.00	24.00	2.13	---	13.44	353.46	127.6
STRUCTURE 60	RESVOR	2.77	2	2	.10	.0	7.00	24.00	1.94	6.71	16.65	276.64	99.9
XSECTION 140	REACH	2.77	2	2	.10	.0	7.00	24.00	1.92	---	16.94	276.19	99.7
XSECTION 140	RUNOFF	.20	2	2	.10	.0	7.00	24.00	3.52	---	12.02	560.07	2800.4
XSECTION 140	ADDHYD	2.97	2	2	.10	.0	7.00	24.00	2.03	---	12.02	565.95	190.6
XSECTION 149	RUNOFF	.08	2	2	.10	.0	7.00	24.00	3.10	---	12.15	142.32	1779.0
XSECTION 150	ADDHYD	3.05	2	2	.10	.0	7.00	24.00	2.06	---	12.03	676.34	221.8
XSECTION 150	REACH	3.05	2	2	.10	.0	7.00	24.00	2.06	---	12.03	676.34	221.8
XSECTION 150	RUNOFF	.01	2	2	.10	.0	7.00	24.00	.84	---	12.05	4.99	499.3
XSECTION 150	ADDHYD	3.06	2	2	.10	.0	7.00	24.00	2.06	---	12.03	681.31	222.6
XSECTION 180	RUNOFF	.11	2	2	.10	.0	7.00	24.00	.99	---	12.27	39.64	360.4
XSECTION 180	ADDHYD	3.17	2	2	.10	.0	7.00	24.00	2.02	---	12.04	698.28	220.3
XSECTION 180	REACH	3.17	2	2	.10	.0	7.00	24.00	2.01	---	12.18	618.41	195.1
XSECTION 180	RUNOFF	.11	2	2	.10	.0	7.00	24.00	.92	---	12.28	34.74	315.8
XSECTION 180	ADDHYD	3.28	2	2	.10	.0	7.00	24.00	1.97	---	12.19	650.38	198.3

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

		HYDROGRAPH INFORMATION							ROUTING PARAMETERS									PEAK	
						OUTFLOW+			VOLUME	MAIN	ITER-	Q AND A			PEAK	S/Q	ATT-	TRAVEL TIME	
XSEC	REACH	INFLOW		OUTFLOW		INTERV.AREA		BASE-	ABOVE	TIME	ATION	EQUATION		LENGTH	RATIO	@PEAK	KIN	STOR-	KINE-
ID	LENGTH	PEAK	TIME	PEAK	TIME	PEAK	TIME	FLOW	BASE	INCR	#	COEFF	POWER	FACTOR	O/I	(K)	COEFF	AGE	MATIC
	(FT)	(CFS)	(HR)	(CFS)	(HR)	(CFS)	(HR)	(CFS)	(IN)	(HR)		(X)	(M)	(K*)	(Q*)	(SEC)	(C)	(HR)	(HR)
ALTERNATE 88 STORM 1																			
												1.20							
+ 10	1750	99	18.1	99	18.5			3	1.63*	.10	1		1.10	.021	.997	888	.34	.40	.25
+						136	12.1												
												.280							
+ 20	2900	94	20.1	93	20.2			3	1.46*	.10	1		1.94	.000	1.000	320	.72?	.10	.09
+						129	13.3												
												.880							
+ 40	1300	48	16.2	48	16.5			0	1.51	.10	1		1.10	.027	.992	934	.32	.30	.26
+						50	16.5												
												1.60							
+ 50	1700	50	16.6	50	16.7			0	1.41	.10	1		1.45	.002	1.000	252	.83?	.10	.07
+						54	16.6												
												.440							
+ 60	1400	1064	12.1	1064	12.1			0	2.87	.10	0		1.94	.000	1.000	38	1.00?	.00	.00
+						1069	12.1												
												.300							
+ 80	700	1085	12.1	1085	12.1			3	2.08	.10	0		1.94	.000	1.000	23	1.00?	.00	.00
+						1114	12.1												
												.300							
+110	500	1518	12.2	1518	12.2			3	2.29	.10	0		1.94	.000	1.000	14	1.00?	.00	.00
+						---	---												
												.300							
+120	500	1518	12.2	1518	12.2			3	2.29	.10	0		1.94	.000	1.000	14	1.00?	.00	.00
+						1651	12.2												
												.300							

+130	1000	344	13.6	344	13.6			3	2.10*	.10	0		1.94	.000	1.000	57	1.00?	.00	.00
+						353	13.4												
												.210							
+140	2500	277	16.6	276	16.9			3	1.94*	.10	1		1.48	.004	.998	783	.37	.30	.22
+						562	12.0												
												.210							
+150	300	661	12.0	661	12.0			3	2.06*	.10	0		1.48	.000	1.000	71	1.00?	.00	.00
+						666	12.0												
												.210							
+180	1700	678	12.0	616	12.2			3	2.02*	.10	1		1.48	.005	.908	398	.62	.20	.11
+						649	12.2												

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

XSECTION/ STRUCTURE ID	DRAINAGE AREA (SQ MI)	STORM NUMBERS.......... 1
0 STRUCTURE 60	2.77	
ALTERNATE 88		276.64
0 STRUCTURE 50	2.72	
ALTERNATE 88		343.65
0 STRUCTURE 40	.43	
ALTERNATE 88		49.78
0 STRUCTURE 30	.37	
ALTERNATE 88		48.05
0 STRUCTURE 20	1.04	
ALTERNATE 88		93.50
0 STRUCTURE 10	.84	
ALTERNATE 88		96.09
0 XSECTION 10	1.04	
ALTERNATE 88		139.13
0 XSECTION 20	1.32	
ALTERNATE 88		129.36
0 XSECTION 40	.43	
ALTERNATE 88		49.80
0 XSECTION 49	.11	
ALTERNATE 88		13.76
0 XSECTION 50	.90	
ALTERNATE 88		1079.95
0 XSECTION 60	.95	
ALTERNATE 88		1086.21
0 XSECTION 70	2.27	
ALTERNATE 88		1106.90
0 XSECTION 80	2.29	
ALTERNATE 88		1128.27

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

XSECTION/ STRUCTURE ID	DRAINAGE AREA (SQ MI)	STORM NUMBERS.......... 1
0 XSECTION 90	.24	
ALTERNATE 88		458.49
0 XSECTION 100	2.53	
ALTERNATE 88		1534.58
0 XSECTION 110	2.53	
ALTERNATE 88		1534.58
0 XSECTION 120	2.72	
ALTERNATE 88		1657.29
0 XSECTION 130	2.77	
ALTERNATE 88		353.46
0 XSECTION 140	2.97	
ALTERNATE 88		565.95
0 XSECTION 149	.08	
ALTERNATE 88		142.32
0 XSECTION 150	3.06	
ALTERNATE 88		681.31
0 XSECTION 180	3.28	
ALTERNATE 88		650.38

FISCAL YEAR 89

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

JOB TR-20                      FULLPRINT PASS=001  SUMMARY                       10
TITLE 004 COGDELL'S CREEK WATERSHED STUDY NV5010 24 HR 10YR TYPE 2 STORM         20
TITLE      ALT  89                                                         30
 3 STRUCT       10                                                               40
 8                     7.00        0.00        4.33                              50
 8                     7.4         2.5         5.01                              60
 8                     7.6         5.0         5.36                              70
 8                     7.8         10.0        5.70                              80
 8                     8.2         22.0        6.38                              90
 8                     8.6         52.0        7.07                             100
 8                     9.0         62.0        7.75                             110
 8                     9.5         96.0        8.61                             120
 8                     10.0        126.0       9.47                             130
 8                     11.0        198.0       11.18                            140
 8                     12.0        280.0       12.89                            150
 8                     13.00       360.0       14.79                            160
 8                     14.00       440.0       16.68                            170
 8                     15.00       500.0       18.58                            180
 8                     15.1        600.00      18.60                            190
 9 ENDTBL                                                                       200
 3 STRUCT       20                                                              210
 8                     4.5         0.00        6.80                             220
 8                     4.9         1.5         7.88                             230
 8                     5.1         3.7         8.42                             240
 8                     5.5         11.0        9.51                             250
 8                     5.7         15.0        10.13                            260
 8                     6.1         25.0        11.13                            270
 8                     6.5         40.0        12.21                            280
 8                     7.1         60.0        13.84                            290
 8                     7.9         78.0        16.01                            300
 8                     8.5         79.0        17.63                            310
 8                     9.5         100.0       20.34                            320
 8                     10.5        126.0       23.06                            330
 8                     11.5        150.0       25.76                            340
 8                     11.6        300.0       26.04                            350
 9 ENDTBL                                                                       360
 3 STRUCT       30                                                              370
 8                     21.0        0.00        0.10                             380
 8                     21.4        0.6         0.61                             390
 8                     21.6        1.5         0.86                             400
 8                     21.8        2.5         1.12                             410
 8                     22.2        5.2         1.62                             420
 8                     22.6        8.2         2.13                             430
 8                     23.0        11.0        2.64                             440
 8                     23.5        20.0        3.27                             450
 8                     24.0        27.0        3.91                             460
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**************************80-80 LIST OF INPUT DATA (CONTINUED)**************************

8		25.0	39.0	5.18	470
8		26.0	49.0	6.45	480
8		27.0	57.0	7.72	490
8		27.1	200.00	7.74	500
9 ENDTBL					510
3 STRUCT	40				520
8		9.0	0.0	0.38	530
8		9.4	2.2	0.47	540
8		9.6	5.0	0.52	550
8		10.0	14.0	0.62	560
8		10.2	21.0	0.67	570
8		10.6	36.0	0.77	580
8		11.0	55.0	0.86	590
8		11.6	82.0	1.01	600
8		12.4	120.0	1.21	610
8		13.0	121.0	1.35	620
8		14.0	122.0	1.60	630
8		15.0	126.0	1.84	640
8		16.0	150.00	2.08	650
8		16.1	300.0	2.11	660
9 ENDTBL					670
3 STRUCT	50				680
8		2.4	0.00	22.00	690
8		2.8	2.0	26.86	700
8		3.0	7.0	29.29	710
8		3.4	16.0	34.16	720
8		3.6	24.0	36.59	730
8		4.0	40.0	41.46	740
8		4.4	60.0	46.32	750
8		5.0	90.0	53.62	760
8		5.8	120.0	63.35	770
8		6.4	121.0	70.65	780
8		7.4	210.0	82.81	790
8		8.4	250.00	94.98	800
8		10.4	334.0	119.31	810
8		12.4	400.0	143.63	820
8		12.5	800.0	143.70	830
9 ENDTBL					840
3 STRUCT	60				850
8		2.0	0.0	22.20	860
8		2.4	3.0	27.41	870
8		2.6	10.5	30.02	880
8		3.0	22.5	35.24	890
8		3.2	36.0	37.85	900
8		3.6	60.0	43.06	910
8		4.0	90.0	48.28	920

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************************80-80 LIST OF INPUT DATA (CONTINUED)**********************
 8                   4.6         135.0      56.11                        930
 8                   5.4         180.0      66.55                        940
 8                   6.0         181.0      74.38                        950
 8                   7.0         315.0      87.42                        960
 8                   8.0         375.0      100.47                       970
 8                   8.1         700.0      100.50                       980
 9 ENDTBL                                                                990
 6 RUNOFF 1   10       6 0.84    51.        7.50      1                 1000
 6 RESVOR 2    10 6    7 7.0                          1                 1010
 6 REACH  3 010    7   5 1750.   1.2        1.10      1                 1020
 6 RUNOFF 1 010        6 0.20    42.        0.19      1                 1030
 6 ADDHYD 4 010    5 6 7                              1 1               1040
 6 SAVMOV 5 010    7   6                                                1050
 6 RESVOR 2    20 6    7 4.5                          1                 1060
 6 REACH  3 020    7   5 2900.   0.28       1.94      1                 1070
 6 RUNOFF 1 020        6 0.28    53.        1.02      1                 1080
 6 ADDHYD 4 020    5 6 7                              1 1               1090
 6 SAVMOV 5 020    7   1                                                1100
 6 RUNOFF 1    30      6 0.37    49.        3.90      1                 1110
 6 RESVOR 2    30 6    7 21.0                         1                 1120
 6 REACH  3 040    7   5 1300.   0.88       1.10      1                 1130
 6 RUNOFF 1 040        6 0.06    40.        1.00      1                 1140
 6 ADDHYD 4 040    5 6 7                              1                 1150
 6 SAVMOV 5 040    7   6                                                1160
 6 RESVOR 2    40 6    7 9.0                          1                 1170
 6 REACH  3 050    7   5 1700.   1.6        1.45      1                 1180
 6 RUNOFF 1 049        6 0.11    40.        1.67      1                 1190
 6 ADDHYD 4 050    5 6 7                              1                 1200
 6 SAVMOV 5 050    7   5                                                1210
 6 RUNOFF 1 050        6 0.36    85.        0.42      1                 1220
 6 ADDHYD 4 050    5 6 7                              1                 1230
 6 REACH  3 060    7   5 1400.   0.44       1.94      1                 1240
 6 RUNOFF 1 060        6 0.05    45.        0.90      1                 1250
 6 ADDHYD 4 060    5 6 7                              1 1               1260
 6 SAVMOV 5 070    7   5                                                1270
 6 SAVMOV 5 070    1   6                                                1280
 6 ADDHYD 4 070    5 6 7                              1 1               1290
 6 REACH  3 080    7   5 700.    0.30       1.94      1                 1300
 6 RUNOFF 1 080        6 0.02    64.        0.12      1                 1310
 6 ADDHYD 4 080    5 6 7                              1                 1320
 6 SAVMOV 5 100    7   5                                                1330
 6 RUNOFF 1 090        6 0.24    73.        0.62      1                 1340
 6 ADDHYD 4 100    5 6 7                              1                 1350
 6 REACH  3 110    7   5 500.    0.30       1.94      1                 1360
 6 SAVMOV 5 120    5   7                                                1370
 6 REACH  3 120    7   5 500.    0.30       1.94      1                 1380
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**********************80-80 LIST OF INPUT DATA (CONTINUED)**********************

 6 RUNOFF 1 120        6 0.19      56.         0.74        1                  1390
 6 ADDHYD 4 120    5 6 7                                   1 1                1400
 6 SAVMOV 5    50 7    6                                                      1410
 6 RESVOR 2    50 6    7 2.4                               1 1 1              1420
 6 REACH  3 130    7   5 1000.     0.30        1.94        1                  1430
 6 RUNOFF 1 130        6 0.05      74.         0.19        1                  1440
 6 ADDHYD 4 130    5 6 7                                   1                  1450
 6 SAVMOV 5 130    7   6                                                      1460
 6 RESVOR 2    60 6    7 2.0                               1 1 1              1470
 6 REACH  3 140    7   5 2500.     0.21        1.48        1                  1480
 6 RUNOFF 1 140        6 0.20      66.         1.15        1                  1490
 6 ADDHYD 4 140    5 6 7                                   1                  1500
 6 SAVMOV 5 150    7   5                                                      1510
 6 RUNOFF 1 149        6 0.08      50.         0.42        1                  1520
 6 ADDHYD 4 150    5 6 7                                                      1530
 6 REACH  3 150    7   5 300.      0.21        1.48        1                  1540
 6 RUNOFF 1 150        6 0.01      40.         0.15        1                  1550
 6 ADDHYD 4 150    5 6 7                                   1                  1560
 6 SAVMOV 5 180    7   5                                                      1570
 6 RUNOFF 1 180        6 0.28      50.         0.61        1                  1580
 6 ADDHYD 4 180    5 6 7                                   1                  1590
 6 REACH  3 180    7   5 1700.0    0.21        1.48        1                  1600
 6 RUNOFF 1 180        6 0.11      41.         0.48        1                  1610
 6 ADDHYD 4 180    5 6 7                                   1 1   1   1        1620
   ENDATA                                                                     1630
 7 ALTER  3                                                                   1640
 6 RUNOFF 1 010        6 0.20      44.0        0.19        1                  1650
 6 RUNOFF 1 020        6 0.28      54.0        2.00        1                  1660
 6 RUNOFF 1 090        6 0.24      75.0        0.62        1                  1665
 6 RUNOFF 1 120        6 0.19      57.0        0.74        1                  1668
 6 RUNOFF 1 140        6 0.20      69.0        0.19        1                  1670
 6 RUNOFF 1 149        6 0.08      65.0        0.42        1                  1680
 6 RUNOFF 1 180        6 0.11      42.0        0.48        1                  1690
 7 LIST                                                                       1700
 7 BASFLO 5              3.0                                                  1710
 7 INCREM 6              0.1                                                  1720
 7 COMPUT 7     10 180   0.0       7.0         1.0         2 2  89  01        1730
   ENDCMP 1                                                                   1740
   ENDJOB 2                                                                   1750
0********************************END OF 80-80 LIST*********************************
```

0CHANGES TO STANDARD CONTROL LIST FOLLOW

EXECUTIVE CONTROL OPERATION ALTER RECORD ID 1640

STANDARD CONTROL OPERATION RUNOFF CROSS SECTION 10 RECORD ID 1650
OUTPUT HYDROGRAPH = 6 DATA FIELD VALUES = .2000 44.0000 .1900
OUTPUT OPTIONS IN EFFECT PEAK VOL SUM

STANDARD CONTROL OPERATION RUNOFF CROSS SECTION 20 RECORD ID 1660
OUTPUT HYDROGRAPH = 6 DATA FIELD VALUES = .2800 54.0000 2.0000
OUTPUT OPTIONS IN EFFECT PEAK VOL SUM

STANDARD CONTROL OPERATION RUNOFF CROSS SECTION 90 RECORD ID 1665
OUTPUT HYDROGRAPH = 6 DATA FIELD VALUES = .2400 75.0000 .6200
OUTPUT OPTIONS IN EFFECT PEAK VOL SUM

STANDARD CONTROL OPERATION RUNOFF CROSS SECTION 120 RECORD ID 1668
OUTPUT HYDROGRAPH = 6 DATA FIELD VALUES = .1900 57.0000 .7400
OUTPUT OPTIONS IN EFFECT PEAK VOL SUM

STANDARD CONTROL OPERATION RUNOFF CROSS SECTION 140 RECORD ID 1670
OUTPUT HYDROGRAPH = 6 DATA FIELD VALUES = .2000 69.0000 .1900
OUTPUT OPTIONS IN EFFECT PEAK VOL SUM

STANDARD CONTROL OPERATION RUNOFF CROSS SECTION 149 RECORD ID 1680
OUTPUT HYDROGRAPH = 6 DATA FIELD VALUES = .0800 65.0000 .4200
OUTPUT OPTIONS IN EFFECT PEAK VOL SUM

STANDARD CONTROL OPERATION RUNOFF CROSS SECTION 180 RECORD ID 1690
OUTPUT HYDROGRAPH = 6 DATA FIELD VALUES = .1100 42.0000 .4800
OUTPUT OPTIONS IN EFFECT PEAK VOL SUM

EXECUTIVE CONTROL OPERATION LIST RECORD ID 1700

LISTING OF CURRENT DATA

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	10			
8		7.00	.00	4.33
8		7.40	2.50	5.01
8		7.60	5.00	5.36
8		7.80	10.00	5.70
8		8.20	22.00	6.38
8		8.60	52.00	7.07
8		9.00	62.00	7.75
8		9.50	96.00	8.61
8		10.00	126.00	9.47
8		11.00	198.00	11.18
8		12.00	280.00	12.89
8		13.00	360.00	14.79
8		14.00	440.00	16.68
8		15.00	500.00	18.58
8		15.10	600.00	18.60
9 ENDTBL				

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	20			
8		4.50	.00	6.80
8		4.90	1.50	7.88
8		5.10	3.70	8.42
8		5.50	11.00	9.51
8		5.70	15.00	10.13
8		6.10	25.00	11.13
8		6.50	40.00	12.21
8		7.10	60.00	13.84
8		7.90	78.00	16.01
8		8.50	79.00	17.63
8		9.50	100.00	20.34
8		10.50	126.00	23.06
8		11.50	150.00	25.76
8		11.60	300.00	26.04
9 ENDTBL				

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	30			
8		21.00	.00	.10
8		21.40	.60	.61
8		21.60	1.50	.86
8		21.80	2.50	1.12
8		22.20	5.20	1.62
8		22.60	8.20	2.13
8		23.00	11.00	2.64
8		23.50	20.00	3.27
8		24.00	27.00	3.91
8		25.00	39.00	5.18
8		26.00	49.00	6.45
8		27.00	57.00	7.72
8		27.10	200.00	7.74
9 ENDTBL				

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	40			
8		9.00	.00	.38
8		9.40	2.20	.47
8		9.60	5.00	.52
8		10.00	14.00	.62
8		10.20	21.00	.67
8		10.60	36.00	.77
8		11.00	55.00	.86
8		11.60	82.00	1.01
8		12.40	120.00	1.21
8		13.00	121.00	1.35
8		14.00	122.00	1.60
8		15.00	126.00	1.84
8		16.00	150.00	2.08
8		16.10	300.00	2.11
9 ENDTBL				

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	50			
8		2.40	.00	22.00
8		2.80	2.00	26.86
8		3.00	7.00	29.29
8		3.40	16.00	34.16
8		3.60	24.00	36.59
8		4.00	40.00	41.46
8		4.40	60.00	46.32
8		5.00	90.00	53.62

```
8                  5.80     120.00      63.35
8                  6.40     121.00      70.65
8                  7.40     210.00      82.81
8                  8.40     250.00      94.98
8                 10.40     334.00     119.31
8                 12.40     400.00     143.63
8                 12.50     800.00     143.70
9 ENDTBL

         STRUCT NO.     ELEVATION  DISCHARGE    STORAGE
3 STRUCT     60

8                  2.00        .00      22.20
8                  2.40       3.00      27.41
8                  2.60      10.50      30.02
8                  3.00      22.50      35.24
8                  3.20      36.00      37.85
8                  3.60      60.00      43.06
8                  4.00      90.00      48.28
8                  4.60     135.00      56.11
8                  5.40     180.00      66.55
8                  6.00     181.00      74.38
8                  7.00     315.00      87.42
8                  8.00     375.00     100.47
8                  8.10     700.00     100.50
9 ENDTBL

               TIME INCREMENT
4 DIMHYD              .0200

8          .0000      .0300      .1000      .1900      .3100
8          .4700      .6600      .8200      .9300      .9900
8         1.0000      .9900      .9300      .8600      .7800
8          .6800      .5600      .4600      .3900      .3300
8          .2800      .2410      .2070      .1740      .1470
8          .1260      .1070      .0910      .0770      .0660
8          .0550      .0470      .0400      .0340      .0290
8          .0250      .0210      .0180      .0150      .0130
8          .0110      .0090      .0080      .0070      .0060
8          .0050      .0040      .0030      .0020      .0010
8          .0000      .0000      .0000      .0000      .0000
9 ENDTBL

  COMPUTED PEAK RATE FACTOR =  484.00
```

TABLE NO.	TIME INCREMENT				
5 RAINFL 1		.5000			
8	.0000	.0080	.0170	.0260	.0350
8	.0450	.0550	.0650	.0760	.0870
8	.0990	.1120	.1260	.1400	.1560
8	.1740	.1940	.2190	.2540	.3030
8	.5150	.5830	.6240	.6550	.6820
8	.7060	.7280	.7480	.7660	.7830
8	.7990	.8150	.8300	.8440	.8570
8	.8700	.8820	.8930	.9050	.9160
8	.9260	.9360	.9460	.9560	.9650
8	.9740	.9830	.9920	1.0000	1.0000
9 ENDTBL					

TABLE NO.	TIME INCREMENT				
5 RAINFL 2		.2500			
8	.0000	.0020	.0050	.0080	.0110
8	.0140	.0170	.0200	.0230	.0260
8	.0290	.0320	.0350	.0380	.0410
8	.0440	.0480	.0520	.0560	.0600
8	.0640	.0680	.0720	.0760	.0800
8	.0850	.0900	.0950	.1000	.1050
8	.1100	.1150	.1200	.1260	.1330
8	.1400	.1470	.1550	.1630	.1720
8	.1810	.1910	.2030	.2180	.2360
8	.2570	.2830	.3870	.6630	.7070
8	.7350	.7580	.7760	.7910	.8040
8	.8150	.8250	.8340	.8420	.8490
8	.8560	.8630	.8690	.8750	.8810
8	.8870	.8930	.8980	.9030	.9080
8	.9130	.9180	.9220	.9260	.9300
8	.9340	.9380	.9420	.9460	.9500
8	.9530	.9560	.9590	.9620	.9650
8	.9680	.9710	.9740	.9770	.9800
8	.9830	.9860	.9890	.9920	.9950
8	.9980	1.0000	1.0000	1.0000	1.0000
9 ENDTBL					

TABLE NO.	TIME INCREMENT				
5 RAINFL 3		.5000			
8	.0000	.0100	.0220	.0360	.0510
8	.0670	.0830	.0990	.1160	.1350

8	.1560	.1790	.2040	.2330	.2680
8	.3100	.4250	.4800	.5200	.5500
8	.5770	.6010	.6230	.6440	.6640
8	.6830	.7010	.7190	.7360	.7530
8	.7690	.7850	.8000	.8150	.8300
8	.8440	.8580	.8710	.8840	.8960
8	.9080	.9200	.9320	.9440	.9560
8	.9670	.9780	.9890	1.0000	1.0000

9 ENDTBL

TABLE NO.	TIME INCREMENT
5 RAINFL 4	.5000

8	.0000	.0040	.0080	.0120	.0160
8	.0200	.0250	.0300	.0350	.0400
8	.0450	.0500	.0550	.0600	.0650
8	.0700	.0750	.0810	.0870	.0930
8	.0990	.1050	.1110	.1180	.1250
8	.1320	.1400	.1480	.1560	.1650
8	.1740	.1840	.1950	.2070	.2200
8	.2360	.2550	.2770	.3030	.4090
8	.5150	.5490	.5830	.6050	.6240
8	.6400	.6550	.6690	.6820	.6940
8	.7050	.7160	.7270	.7380	.7480
8	.7580	.7670	.7760	.7840	.7920
8	.8000	.8080	.8160	.8230	.8300
8	.8370	.8440	.8510	.8580	.8640
8	.8700	.8760	.8820	.8880	.8940
8	.9000	.9060	.9110	.9160	.9210
8	.9260	.9310	.9360	.9410	.9460
8	.9510	.9560	.9610	.9660	.9710
8	.9760	.9800	.9840	.9880	.9920
8	.9960	1.0000	1.0000	1.0000	1.0000

9 ENDTBL

TABLE NO.	TIME INCREMENT
5 RAINFL 5	.5000

8	.0000	.0020	.0050	.0080	.0110
8	.0140	.0170	.0200	.0230	.0260
8	.0290	.0320	.0350	.0380	.0410
8	.0440	.0470	.0510	.0550	.0590
8	.0630	.0670	.0710	.0750	.0790
8	.0840	.0890	.0940	.0990	.1040
8	.1090	.1140	.1200	.1260	.1330
8	.1400	.1470	.1540	.1620	.1710
8	.1810	.1920	.2040	.2170	.2330

8	.2520	.2770	.3180	.6380	.6980
8	.7290	.7520	.7700	.7850	.7980
8	.8090	.8190	.8290	.8380	.8460
8	.8540	.8610	.8680	.8740	.8800
8	.8860	.8920	.8970	.9020	.9070
8	.9120	.9170	.9210	.9250	.9290
8	.9330	.9370	.9410	.9450	.9490
8	.9530	.9570	.9600	.9630	.9660
8	.9690	.9720	.9750	.9780	.9810
8	.9840	.9870	.9900	.9930	.9960
8	.9980	1.0000	1.0000	1.0000	1.0000

9 ENDTBL

	TABLE NO.	TIME INCREMENT
5 RAINFL 6		.0200

8	.0000	.0080	.0162	.0246	.0333
8	.0425	.0524	.0630	.0743	.0863
8	.0990	.1124	.1265	.1420	.1595
8	.1800	.2050	.2550	.3450	.4370
8	.5300	.6030	.6330	.6600	.6840
8	.7050	.7240	.7420	.7590	.7750
8	.7900	.8043	.8180	.8312	.8439
8	.8561	.8678	.8790	.8898	.9002
8	.9103	.9201	.9297	.9391	.9483
8	.9573	.9661	.9747	.9832	.9916
8	1.0000	1.0000	1.0000	1.0000	1.0000

9 ENDTBL

0 STANDARD CONTROL INSTRUCTIONS

```
 6 RUNOFF 1  10      6      .8400    51.0000     7.50001 0 0 1 0 1
 6 RESVOR 2    10 6  7     7.0000                      1 0 0 1 0 1
 6 REACH  3  10   7  5  1750.0000     1.2000     1.10001 0 0 1 0 1
 6 RUNOFF 1  10      6      .2000    44.0000      .19001 0 0 1 0 1
 6 ADDHYD 4  10   5 6 7                                1 1 0 1 0 1
 6 SAVMOV 5  10   7  6
 6 RESVOR 2    20 6  7     4.5000                      1 0 0 1 0 1
 6 REACH  3  20   7  5  2900.0000      .2800     1.94001 0 0 1 0 1
 6 RUNOFF 1  20      6      .2800    54.0000     2.00001 0 0 1 0 1
 6 ADDHYD 4  20   5 6 7                                1 1 0 1 0 1
 6 SAVMOV 5  20   7  1
 6 RUNOFF 1   30     6      .3700    49.0000     3.90001 0 0 1 0 1
 6 RESVOR 2    30 6  7    21.0000                      1 0 0 1 0 1
 6 REACH  3  40   7  5  1300.0000      .8800     1.10001 0 0 1 0 1
 6 RUNOFF 1  40      6      .0600    40.0000     1.00001 0 0 1 0 1
 6 ADDHYD 4  40   5 6 7                                1 0 0 1 0 1
 6 SAVMOV 5  40   7  6
 6 RESVOR 2    40 6  7     9.0000                      1 0 0 1 0 1
 6 REACH  3  50   7  5  1700.0000     1.6000     1.45001 0 0 1 0 1
 6 RUNOFF 1  49      6      .1100    40.0000     1.67001 0 0 1 0 1
 6 ADDHYD 4  50   5 6 7                                1 0 0 1 0 1
 6 SAVMOV 5  50   7  5
 6 RUNOFF 1  50      6      .3600    85.0000      .42001 0 0 1 0 1
 6 ADDHYD 4  50   5 6 7                                1 0 0 1 0 1
 6 REACH  3  60   7  5  1400.0000      .4400     1.94001 0 0 1 0 1
 6 RUNOFF 1  60      6      .0500    45.0000      .90001 0 0 1 0 1
 6 ADDHYD 4  60   5 6 7                                1 1 0 1 0 1
 6 SAVMOV 5  70   7  5
 6 SAVMOV 5  70   1  6
 6 ADDHYD 4  70   5 6 7                                1 1 0 1 0 1
 6 REACH  3  80   7  5   700.0000      .3000     1.94001 0 0 1 0 1
 6 RUNOFF 1  80      6      .0200    64.0000      .12001 0 0 1 0 1
 6 ADDHYD 4  80   5 6 7                                1 0 0 1 0 1
 6 SAVMOV 5 100   7  5
 6 RUNOFF 1  90      6      .2400    75.0000      .62001 0 0 1 0 1
 6 ADDHYD 4 100   5 6 7                                1 0 0 1 0 1
 6 REACH  3 110   7  5   500.0000      .3000     1.94001 0 0 1 0 1
 6 SAVMOV 5 120   5  7
 6 REACH  3 120   7  5   500.0000      .3000     1.94001 0 0 1 0 1
 6 RUNOFF 1 120      6      .1900    57.0000      .74001 0 0 1 0 1
 6 ADDHYD 4 120   5 6 7                                1 1 0 1 0 1
 6 SAVMOV 5    50 7  6
 6 RESVOR 2    50 6  7     2.4000                      1 1 1 1 0 1
 6 REACH  3 130   7  5  1000.0000      .3000     1.94001 0 0 1 0 1
 6 RUNOFF 1 130      6      .0500    74.0000      .19001 0 0 1 0 1
```

```
6 ADDHYD 4 130   5 6 7                                      1 0 0 1 0 1
6 SAVMOV 5 130   7   6
6 RESVOR 2    60 6   7         2.0000                       1 1 1 1 0 1
6 REACH  3 140   7   5      2500.0000       .2100    1.48001 0 0 1 0 1
6 RUNOFF 1 140       6          .2000     69.0000     .19001 0 0 1 0 1
6 ADDHYD 4 140   5 6 7                                      1 0 0 1 0 1
6 SAVMOV 5 150   7   5
6 RUNOFF 1 149       6          .0800     65.0000     .42001 0 0 1 0 1
6 ADDHYD 4 150   5 6 7                                      1 0 0 1 0 1
6 REACH  3 150   7   5       300.0000       .2100    1.48001 0 0 1 0 1
6 RUNOFF 1 150       6          .0100     40.0000     .15001 0 0 1 0 1
6 ADDHYD 4 150   5 6 7                                      1 0 0 1 0 1
6 SAVMOV 5 180   7   5
6 RUNOFF 1 180       6          .1100     42.0000     .48001 0 0 1 0 1
6 ADDHYD 4 180   5 6 7                                      1 0 0 1 0 1
6 REACH  3 180   7   5      1700.0000       .2100    1.48001 0 0 1 0 1
6 RUNOFF 1 180       6          .1100     41.0000     .48001 0 0 1 0 1
6 ADDHYD 4 180   5 6 7                                      1 1 0 1 0 1
  ENDATA

END OF LISTING
```

```
EXECUTIVE CONTROL OPERATION BASFLO                                                            RECORD ID    1710
+                                            NEW BASEFLOW =   3.00 CFS

EXECUTIVE CONTROL OPERATION INCREM                                                            RECORD ID    1720
+                                            MAIN TIME INCREMENT =   .10 HOURS

EXECUTIVE CONTROL OPERATION COMPUT                                                            RECORD ID    1730
+                                            FROM STRUCTURE 10
+                                                              TO XSECTION 180
       STARTING TIME =    .00    RAIN DEPTH =  7.00    RAIN DURATION=  1.00    RAIN TABLE NO.= 2    ANT. MOIST. COND= 2
       ALTERNATE NO.=89          STORM NO.= 1    MAIN TIME INCREMENT =   .10 HOURS

OPERATION RUNOFF    STRUCTURE 10
          OUTPUT HYDROGRAPH=  6
          AREA=    .84 SQ MI   INPUT RUNOFF CURVE= 51.    TIME OF CONCENTRATION=  7.50 HOURS
          INTERNAL HYDROGRAPH TIME INCREMENT=  .1000 HOURS

          PEAK TIME(HRS)            PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
             17.80                        96.56                       (RUNOFF)

  RUNOFF VOLUME ABOVE BASEFLOW =  1.67 WATERSHED INCHES,    906.24 CFS-HRS,    74.89 ACRE-FEET;    BASEFLOW =    .00 CFS

OPERATION RESVOR    STRUCTURE 10
          INPUT HYDROGRAPH= 6     OUTPUT HYDROGRAPH= 7
          SURFACE ELEVATION=    7.00

          PEAK TIME(HRS)            PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
             18.14                        96.09                        9.50

  RUNOFF VOLUME ABOVE BASEFLOW =  1.63 WATERSHED INCHES,    884.09 CFS-HRS,    73.06 ACRE-FEET;    BASEFLOW =    .00 CFS

OPERATION REACH     CROSS SECTION  10
          INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 5
          LENGTH =   1750.00 FEET      INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA,  X=  1.20,    M= 1.10
0         MODIFIED ATT-KIN ROUTING COEFFICIENT =  .34     PEAK TRAVEL TIME =     .40 HOURS
0     *** WARNING - REACH  10 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT      18.15 CFS,  18.88 % OF PEAK.

          PEAK TIME(HRS)            PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
             18.47                        98.84                        (NULL)

  RUNOFF VOLUME ABOVE BASEFLOW =  1.62 WATERSHED INCHES,    878.37 CFS-HRS,    72.59 ACRE-FEET;    BASEFLOW =   3.00 CFS

OPERATION RUNOFF    CROSS SECTION  10
          OUTPUT HYDROGRAPH=  6
```

AREA= .20 SQ MI INPUT RUNOFF CURVE= 44. TIME OF CONCENTRATION= .19 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0253 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.07	150.75	(RUNOFF)
15.19	9.64	(RUNOFF)
16.46	8.67	(RUNOFF)
17.67	7.42	(RUNOFF)
19.66	6.17	(RUNOFF)
23.65	4.88	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 1.16 WATERSHED INCHES, 149.25 CFS-HRS, 12.33 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 10
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.07	153.76	(NULL)
18.48	104.86	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 1.04 SQ.MI.

11.00	DISCHG	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	7.21	53.07
12.00	DISCHG	135.64	149.19	80.95	56.13	42.16	35.91	33.02	30.56	29.72	27.02
13.00	DISCHG	25.58	24.44	22.95	22.58	21.54	21.15	20.62	19.89	20.05	20.05
14.00	DISCHG	20.75	21.68	22.70	24.32	25.72	27.54	29.37	31.56	35.09	39.12
15.00	DISCHG	43.24	47.29	51.18	54.82	57.52	59.78	61.92	63.90	65.78	67.63
16.00	DISCHG	69.47	71.98	75.00	78.16	81.27	84.22	86.55	88.36	90.42	92.43
17.00	DISCHG	94.31	96.02	97.59	99.01	100.31	101.48	102.52	103.43	104.09	103.97
18.00	DISCHG	104.02	104.29	104.55	104.73	104.84	104.86	104.81	104.67	104.47	104.19
19.00	DISCHG	103.84	103.42	102.93	102.36	101.72	101.00	100.20	99.32	98.25	96.45
20.00	DISCHG	94.87	93.59	92.37	91.15	89.91	88.67	87.43	86.21	85.01	83.83
21.00	DISCHG	82.67	81.54	80.43	79.34	78.27	77.22	76.20	75.19	74.21	73.24
22.00	DISCHG	72.30	71.42	70.72	70.11	69.56	69.03	68.51	67.98	67.44	66.89
23.00	DISCHG	66.33	65.76	65.17	64.57	63.96	63.34	62.72	62.09	61.34	59.73
24.00	DISCHG	58.17	55.97	53.27	51.71	50.62	49.72	48.91	48.18	47.50	46.85
25.00	DISCHG	46.24	45.66	45.10	44.55	44.02	43.50	42.98	42.48	41.98	41.49
26.00	DISCHG	41.00	40.51	40.03	39.55	39.07	38.60	38.12	37.63	37.15	36.66
27.00	DISCHG	36.16	35.66	35.15	34.64	34.13	33.61	33.09	32.57	32.04	31.51
28.00	DISCHG	30.97	30.44	29.90	29.36	28.82	28.28	27.74	27.21	26.67	26.13
29.00	DISCHG	25.68	25.30	24.94	24.59	24.24	23.89	23.52	23.14	22.75	22.35

RUNOFF VOLUME ABOVE BASEFLOW = 1.53 WATERSHED INCHES, 1027.62 CFS-HRS, 84.92 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 10
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 6

OPERATION RESVOR STRUCTURE 20
INPUT HYDROGRAPH= 6 OUTPUT HYDROGRAPH= 7
SURFACE ELEVATION= 4.50

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.65	31.90	6.28
20.08	93.83	9.21

RUNOFF VOLUME ABOVE BASEFLOW = 1.48 WATERSHED INCHES, 990.65 CFS-HRS, 81.87 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 20
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 2900.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .28, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = .72 PEAK TRAVEL TIME = .10 HOURS

*** WARNING REACH 20 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***
0 *** WARNING - REACH 20 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT 23.17 CFS, 25.51 % OF PEAK.

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.82	31.79	(NULL)
20.23	93.80	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 1.47 WATERSHED INCHES, 987.44 CFS-HRS, 81.60 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 20
OUTPUT HYDROGRAPH= 6
AREA= .28 SQ MI INPUT RUNOFF CURVE= 54. TIME OF CONCENTRATION= 2.00 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .1026 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.36	102.66	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 2.03 WATERSHED INCHES, 366.74 CFS-HRS, 30.31 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 20
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.31	132.15	(NULL)
20.11	106.29	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 1.32 SQ.MI.

11.00	DISCHG	3.00	3.00	3.00	3.01	3.02	3.06	3.18	3.47	4.17	5.78
12.00	DISCHG	9.45	17.69	29.98	44.84	59.25	72.98	86.02	98.12	108.61	117.14
13.00	DISCHG	123.73	128.34	131.09	132.14	131.53	129.60	126.63	122.67	117.70	111.97
14.00	DISCHG	106.02	100.46	95.56	91.20	87.22	83.67	80.54	77.77	75.29	73.28
15.00	DISCHG	71.78	70.81	70.32	70.22	70.47	70.99	71.70	72.40	73.11	73.90
16.00	DISCHG	74.80	75.76	76.81	78.00	79.36	80.88	82.38	83.57	84.72	85.90
17.00	DISCHG	87.14	88.42	89.73	91.05	92.39	93.73	95.06	95.63	95.66	95.54
18.00	DISCHG	95.38	95.22	95.06	94.90	94.74	95.60	96.75	97.91	99.01	100.03

19.00	DISCHG	100.97	101.82	102.60	103.31	103.94	104.50	104.99	105.42	105.77	106.05
20.00	DISCHG	106.23	106.29	106.25	106.12	105.90	105.59	105.20	104.74	104.21	103.61
21.00	DISCHG	102.97	102.29	101.57	100.82	100.05	99.26	98.45	97.64	96.82	95.99
22.00	DISCHG	95.17	94.34	93.51	92.69	91.87	91.07	90.29	89.53	88.78	88.48
23.00	DISCHG	88.34	88.25	88.16	88.09	88.01	87.93	87.85	87.77	87.68	87.59
24.00	DISCHG	87.49	87.36	86.62	85.25	83.64	81.94	80.19	78.40	76.60	74.78
25.00	DISCHG	72.98	71.20	69.44	67.74	66.08	64.38	62.48	60.62	58.85	57.20
26.00	DISCHG	55.67	54.24	52.92	51.68	50.52	49.43	48.40	47.43	46.50	45.62
27.00	DISCHG	44.78	43.98	43.21	42.46	41.74	41.04	40.34	39.62	38.90	38.21
28.00	DISCHG	37.53	36.87	36.22	35.58	34.96	34.34	33.73	33.13	32.54	31.95
29.00	DISCHG	31.37	30.80	30.24	29.70	29.17	28.67	28.18	27.71	27.25	26.80

RUNOFF VOLUME ABOVE BASEFLOW = 1.59 WATERSHED INCHES, 1354.18 CFS-HRS, 111.91 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 20
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 1

OPERATION RUNOFF STRUCTURE 30
OUTPUT HYDROGRAPH= 6
AREA= .37 SQ MI INPUT RUNOFF CURVE= 49. TIME OF CONCENTRATION= 3.90 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .1000 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
14.95	60.58	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 1.57 WATERSHED INCHES, 375.61 CFS-HRS, 31.04 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION RESVOR STRUCTURE 30
INPUT HYDROGRAPH= 6 OUTPUT HYDROGRAPH= 7
SURFACE ELEVATION= 21.00

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
16.21	48.05	25.91

RUNOFF VOLUME ABOVE BASEFLOW = 1.51 WATERSHED INCHES, 360.28 CFS-HRS, 29.77 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION REACH CROSS SECTION 40
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 1300.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .88, M= 1.10
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = .32 PEAK TRAVEL TIME = .30 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
16.55	47.70	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 1.50 WATERSHED INCHES, 358.97 CFS-HRS, 29.67 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION RUNOFF CROSS SECTION 40

```
        OUTPUT HYDROGRAPH=  6
        AREA=    .06 SQ MI   INPUT RUNOFF CURVE= 40.    TIME OF CONCENTRATION=  1.00 HOURS
        INTERNAL HYDROGRAPH TIME INCREMENT=  .0952 HOURS

        PEAK TIME(HRS)             PEAK DISCHARGE(CFS)             PEAK ELEVATION(FEET)
          12.72                         10.21                          (RUNOFF)
          23.76                          1.21                          (RUNOFF)

  RUNOFF VOLUME ABOVE BASEFLOW =  .84 WATERSHED INCHES,     32.57 CFS-HRS,     2.69 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION ADDHYD   CROSS SECTION  40
        INPUT HYDROGRAPHS= 5,6     OUTPUT HYDROGRAPH= 7

        PEAK TIME(HRS)             PEAK DISCHARGE(CFS)             PEAK ELEVATION(FEET)
          12.73                         10.35                          (NULL)
          16.54                         49.80                          (NULL)

  RUNOFF VOLUME ABOVE BASEFLOW = 1.41 WATERSHED INCHES,    391.54 CFS-HRS,    32.36 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION SAVMOV   CROSS SECTION  40
        INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 6

OPERATION RESVOR   STRUCTURE 40
        INPUT HYDROGRAPH= 6     OUTPUT HYDROGRAPH= 7
        SURFACE ELEVATION=    9.00

        PEAK TIME(HRS)             PEAK DISCHARGE(CFS)             PEAK ELEVATION(FEET)
          12.90                          9.83                           9.81
          16.60                         49.78                          10.89

  RUNOFF VOLUME ABOVE BASEFLOW = 1.41 WATERSHED INCHES,    389.94 CFS-HRS,    32.22 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION REACH    CROSS SECTION  50
        INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 5
        LENGTH =   1700.00 FEET       INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA,  X=  1.60,    M= 1.45
0       MODIFIED ATT-KIN ROUTING COEFFICIENT =  .83      PEAK TRAVEL TIME =     .10 HOURS

     ***  WARNING  REACH  50 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***

        PEAK TIME(HRS)             PEAK DISCHARGE(CFS)             PEAK ELEVATION(FEET)
          13.02                          9.78                          (NULL)
          16.72                         49.77                          (NULL)

  RUNOFF VOLUME ABOVE BASEFLOW = 1.40 WATERSHED INCHES,    389.36 CFS-HRS,    32.18 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION RUNOFF   CROSS SECTION  49
        OUTPUT HYDROGRAPH=  6
        AREA=    .11 SQ MI   INPUT RUNOFF CURVE= 40.    TIME OF CONCENTRATION=  1.67 HOURS
```

```
          INTERNAL HYDROGRAPH TIME INCREMENT=  .1012 HOURS

          PEAK TIME(HRS)            PEAK DISCHARGE(CFS)        PEAK ELEVATION(FEET)
             13.33                        13.76                     (RUNOFF)
             23.80                         2.20                     (RUNOFF)
+                                            *                    * FIRST POINT OF FLAT PEAK

  RUNOFF VOLUME ABOVE BASEFLOW =   .84 WATERSHED INCHES,    59.78 CFS-HRS,     4.94 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION ADDHYD   CROSS SECTION  50
          INPUT HYDROGRAPHS= 5,6     OUTPUT HYDROGRAPH= 7

          PEAK TIME(HRS)            PEAK DISCHARGE(CFS)        PEAK ELEVATION(FEET)
             13.16                        22.91                     (NULL)
             16.65                        53.98                     (NULL)

  RUNOFF VOLUME ABOVE BASEFLOW =  1.29 WATERSHED INCHES,   449.14 CFS-HRS,    37.12 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION SAVMOV   CROSS SECTION  50
          INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 5

OPERATION RUNOFF   CROSS SECTION  50
          OUTPUT HYDROGRAPH=  6
          AREA=    .36 SQ MI   INPUT RUNOFF CURVE= 85.    TIME OF CONCENTRATION=   .42 HOURS
          INTERNAL HYDROGRAPH TIME INCREMENT=  .0560 HOURS

          PEAK TIME(HRS)            PEAK DISCHARGE(CFS)        PEAK ELEVATION(FEET)
             12.13                      1078.73                     (RUNOFF)
             19.65                        24.75                     (RUNOFF)
             23.65                        18.64                     (RUNOFF)

  RUNOFF VOLUME ABOVE BASEFLOW =  5.25 WATERSHED INCHES,  1220.14 CFS-HRS,   100.83 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION ADDHYD   CROSS SECTION  50
          INPUT HYDROGRAPHS= 5,6     OUTPUT HYDROGRAPH= 7

          PEAK TIME(HRS)            PEAK DISCHARGE(CFS)        PEAK ELEVATION(FEET)
             12.13                      1079.95                     (NULL)
             16.49                        90.76                     (NULL)

  RUNOFF VOLUME ABOVE BASEFLOW =  2.87 WATERSHED INCHES,  1669.27 CFS-HRS,   137.95 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION REACH    CROSS SECTION  60
          INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 5
          LENGTH =   1400.00 FEET      INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA,  X=   .44,   M= 1.94
0         MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00      PEAK TRAVEL TIME =    .00 HOURS
```

*** WARNING REACH 60 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.13	1079.95	(NULL)
16.49	90.76	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.87 WATERSHED INCHES, 1669.27 CFS-HRS, 137.95 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION RUNOFF CROSS SECTION 60
OUTPUT HYDROGRAPH= 6
AREA= .05 SQ MI INPUT RUNOFF CURVE= 45. TIME OF CONCENTRATION= .90 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .1000 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.56	16.56	(RUNOFF)
23.72	1.26	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 1.24 WATERSHED INCHES, 39.88 CFS-HRS, 3.30 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 60
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.14	1086.21	(NULL)
16.49	93.02	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = .95 SQ.MI.

4.00	DISCHG	.00	.00	.00	.02	.10	.26	.49	.75	1.04	1.33
5.00	DISCHG	1.62	1.91	2.20	2.49	2.77	3.04	3.32	3.58	3.84	4.10
6.00	DISCHG	4.36	4.67	5.18	5.80	6.40	6.89	7.32	7.71	8.07	8.41
7.00	DISCHG	8.75	9.07	9.38	9.69	9.99	10.29	10.58	10.86	11.14	11.41
8.00	DISCHG	11.68	12.08	12.82	13.80	14.96	16.27	17.48	18.44	19.17	19.76
9.00	DISCHG	20.27	20.91	21.91	23.16	24.29	25.16	26.02	27.23	28.66	29.92
10.00	DISCHG	30.90	31.86	33.18	34.84	37.10	40.08	43.57	47.95	52.84	58.21
11.00	DISCHG	64.10	70.07	76.45	83.02	90.75	101.27	130.10	208.30	333.15	539.50
12.00	DISCHG	836.25	1068.68	1030.91	805.58	576.69	421.03	324.82	265.51	227.09	199.69
13.00	DISCHG	178.52	161.72	147.53	136.12	127.20	119.75	113.25	107.02	101.45	96.86
14.00	DISCHG	93.29	90.54	88.31	86.99	86.63	86.30	86.13	85.74	85.37	85.47
15.00	DISCHG	86.26	87.42	88.85	90.29	90.92	90.62	90.19	90.11	90.41	90.86
16.00	DISCHG	91.35	91.83	92.25	92.60	92.86	93.02	92.76	91.64	89.95	88.43
17.00	DISCHG	87.35	86.55	85.87	85.24	84.63	84.03	83.43	82.82	82.11	80.76
18.00	DISCHG	78.62	76.40	74.60	73.30	72.20	71.21	70.27	69.38	68.51	67.67
19.00	DISCHG	66.86	66.07	65.33	64.68	63.99	63.30	62.62	61.96	61.19	59.85
20.00	DISCHG	57.76	55.58	53.88	52.62	51.60	50.72	49.94	49.23	48.56	47.93
21.00	DISCHG	47.34	46.79	46.26	45.76	45.28	44.83	44.40	43.97	43.53	43.10
22.00	DISCHG	42.70	42.29	41.89	41.51	41.15	40.80	40.46	40.14	39.84	39.55
23.00	DISCHG	39.27	39.01	38.75	38.51	38.28	38.06	37.85	37.65	37.37	36.46

24.00	DISCHG	34.72	32.26	28.67	24.55	21.18	18.97	17.56	16.54	15.77	15.13
25.00	DISCHG	14.59	14.12	13.71	13.34	13.02	12.72	12.45	12.20	11.96	11.76
26.00	DISCHG	11.57	11.41	11.25	11.11	10.97	10.84	10.71	10.57	10.42	10.28
27.00	DISCHG	10.13	9.97	9.81	9.64	9.47	9.29	9.11	8.93	8.74	8.54
28.00	DISCHG	8.34	8.13	7.93	7.72	7.51	7.29	7.08	6.87	6.67	6.46
29.00	DISCHG	6.26	6.06	5.87	5.68	5.49	5.32	5.14	4.99	4.87	4.74

RUNOFF VOLUME ABOVE BASEFLOW = 2.79 WATERSHED INCHES, 1709.15 CFS-HRS, 141.24 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION SAVMOV CROSS SECTION 70
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5

OPERATION SAVMOV CROSS SECTION 70
INPUT HYDROGRAPH= 1 OUTPUT HYDROGRAPH= 6

OPERATION ADDHYD CROSS SECTION 70
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.14	1108.12	(NULL)
17.64	178.57	(NULL)
19.30	167.99	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 2.27 SQ.MI.

4.00	DISCHG	3.00	3.00	3.00	3.02	3.10	3.26	3.49	3.75	4.04	4.33
5.00	DISCHG	4.62	4.91	5.20	5.49	5.77	6.04	6.32	6.58	6.84	7.10
6.00	DISCHG	7.36	7.67	8.18	8.80	9.40	9.89	10.32	10.71	11.07	11.41
7.00	DISCHG	11.75	12.07	12.38	12.69	12.99	13.29	13.58	13.86	14.14	14.41
8.00	DISCHG	14.68	15.08	15.82	16.80	17.96	19.27	20.48	21.44	22.17	22.76
9.00	DISCHG	23.27	23.91	24.91	26.16	27.29	28.16	29.02	30.23	31.66	32.92
10.00	DISCHG	33.90	34.86	36.18	37.84	40.10	43.08	46.57	50.95	55.84	61.21
11.00	DISCHG	67.10	73.07	79.45	86.03	93.78	104.34	133.28	211.78	337.32	545.28
12.00	DISCHG	845.70	1086.37	1060.89	850.42	635.93	494.01	410.84	363.63	335.70	316.84
13.00	DISCHG	302.25	290.06	278.62	268.25	258.73	249.35	239.88	229.68	219.15	208.83
14.00	DISCHG	199.31	191.00	183.87	178.18	173.85	169.97	166.66	163.51	160.66	158.75
15.00	DISCHG	158.04	158.23	159.17	160.51	161.38	161.60	161.89	162.51	163.52	164.76
16.00	DISCHG	166.15	167.59	169.06	170.60	172.22	173.90	175.15	175.21	174.67	174.33
17.00	DISCHG	174.49	174.97	175.59	176.29	177.03	177.77	178.49	178.45	177.77	176.30
18.00	DISCHG	174.00	171.61	169.66	168.20	166.94	166.81	167.02	167.29	167.52	167.70
19.00	DISCHG	167.83	167.90	167.93	167.99	167.93	167.80	167.61	167.37	166.96	165.90
20.00	DISCHG	163.99	161.88	160.13	158.74	157.50	156.32	155.15	153.96	152.76	151.55
21.00	DISCHG	150.31	149.07	147.83	146.58	145.33	144.09	142.85	141.60	140.35	139.10
22.00	DISCHG	137.86	136.63	135.40	134.20	133.02	131.87	130.75	129.67	128.62	128.03
23.00	DISCHG	127.61	127.25	126.92	126.60	126.29	125.99	125.70	125.42	125.06	124.05
24.00	DISCHG	122.21	119.62	115.28	109.80	104.83	100.91	97.75	94.95	92.36	89.91
25.00	DISCHG	87.57	85.32	83.15	81.08	79.10	77.11	74.93	72.81	70.82	68.96

26.00	DISCHG	67.24	65.65	64.17	62.79	61.49	60.27	59.11	57.99	56.93	55.90
27.00	DISCHG	54.91	53.95	53.02	52.10	51.21	50.33	49.45	48.54	47.64	46.75
28.00	DISCHG	45.87	45.00	44.14	43.30	42.46	41.63	40.81	40.00	39.20	38.41
29.00	DISCHG	37.63	36.86	36.10	35.37	34.67	33.99	33.33	32.70	32.12	31.53

RUNOFF VOLUME ABOVE BASEFLOW = 2.09 WATERSHED INCHES, 3063.33 CFS-HRS, 253.15 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 80
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 700.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .30, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 80 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.14	1108.12	(NULL)
17.64	178.57	(NULL)
19.30	167.99	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.09 WATERSHED INCHES, 3063.33 CFS-HRS, 253.15 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 80
OUTPUT HYDROGRAPH= 6
AREA= .02 SQ MI INPUT RUNOFF CURVE= 64. TIME OF CONCENTRATION= .12 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0160 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
11.98	54.99	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 2.98 WATERSHED INCHES, 38.49 CFS-HRS, 3.18 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 80
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.13	1129.43	(NULL)
17.64	179.89	(NULL)
19.30	169.06	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.10 WATERSHED INCHES, 3101.82 CFS-HRS, 256.33 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 100
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5

OPERATION RUNOFF CROSS SECTION 90
OUTPUT HYDROGRAPH= 6
AREA= .24 SQ MI INPUT RUNOFF CURVE= 75. TIME OF CONCENTRATION= .62 HOURS

INTERNAL HYDROGRAPH TIME INCREMENT= .0827 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.26	458.49	(RUNOFF)
19.66	15.09	(RUNOFF)
23.66	11.44	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 4.14 WATERSHED INCHES, 641.76 CFS-HRS, 53.03 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 100
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.16	1536.02	(NULL)
16.63	198.86	(NULL)
17.64	198.71	(NULL)
19.30	184.14	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.29 WATERSHED INCHES, 3743.57 CFS-HRS, 309.37 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 110
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 500.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .30, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 110 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.16	1536.02	(NULL)
16.63	198.86	(NULL)
17.64	198.71	(NULL)
19.30	184.14	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.29 WATERSHED INCHES, 3743.57 CFS-HRS, 309.37 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 120
INPUT HYDROGRAPH= 5 OUTPUT HYDROGRAPH= 7

OPERATION REACH CROSS SECTION 120
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 500.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .30, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 120 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.16	1536.02	(NULL)
16.63	198.86	(NULL)
17.64	198.71	(NULL)
19.30	184.14	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.29 WATERSHED INCHES, 3743.57 CFS-HRS, 309.37 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 120
OUTPUT HYDROGRAPH= 6
AREA= .19 SQ MI INPUT RUNOFF CURVE= 57. TIME OF CONCENTRATION= .74 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0987 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.38	167.75	(RUNOFF)
19.68	8.82	(RUNOFF)
23.66	6.81	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 2.31 WATERSHED INCHES, 283.37 CFS-HRS, 23.42 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 120
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.18	1666.75	(NULL)
15.36	204.04	(NULL)
16.62	211.58	(NULL)
17.63	209.61	(NULL)
19.29	192.96	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 2.72 SQ.MI.

4.00	DISCHG	3.00	3.00	3.00	3.02	3.10	3.26	3.49	3.75	4.04	4.33
5.00	DISCHG	4.62	4.91	5.20	5.49	5.77	6.04	6.32	6.58	6.84	7.10
6.00	DISCHG	7.36	7.67	8.18	8.80	9.40	9.89	10.32	10.71	11.07	11.42
7.00	DISCHG	11.77	12.13	12.52	12.93	13.36	13.79	14.23	14.67	15.11	15.54
8.00	DISCHG	15.98	16.55	17.48	18.71	20.15	21.78	23.35	24.68	25.76	26.68
9.00	DISCHG	27.51	28.47	29.83	31.49	33.06	34.37	35.71	37.41	39.40	41.24
10.00	DISCHG	42.78	44.33	46.25	48.59	51.71	55.68	60.49	66.40	73.12	80.68
11.00	DISCHG	88.99	97.85	107.40	117.59	129.65	145.43	189.80	294.64	471.47	782.03
12.00	DISCHG	1225.03	1590.55	1660.52	1478.51	1218.41	989.95	814.78	691.91	606.66	544.13
13.00	DISCHG	497.31	459.22	427.38	400.58	377.62	357.60	338.98	321.07	303.76	287.50
14.00	DISCHG	273.16	260.66	249.91	241.04	233.77	227.32	221.41	215.82	210.69	206.74
15.00	DISCHG	204.35	203.26	203.29	203.92	203.97	203.33	202.59	202.16	202.24	202.78
16.00	DISCHG	203.68	204.79	206.06	207.46	209.00	210.62	211.56	211.14	209.83	208.57
17.00	DISCHG	207.81	207.51	207.57	207.90	208.38	208.96	209.57	209.46	208.62	206.70
18.00	DISCHG	203.79	200.52	197.60	195.26	193.31	192.70	192.58	192.63	192.72	192.81
19.00	DISCHG	192.87	192.90	192.91	192.96	192.90	192.77	192.58	192.35	191.85	190.37

20.00	DISCHG	187.85	184.84	182.12	179.84	177.90	176.23	174.73	173.32	171.97	170.64
21.00	DISCHG	169.34	168.05	166.78	165.51	164.25	163.00	161.76	160.52	159.27	158.03
22.00	DISCHG	156.80	155.57	154.35	153.15	151.98	150.84	149.73	148.66	147.62	147.03
23.00	DISCHG	146.62	146.27	145.95	145.63	145.33	145.04	144.76	144.49	144.02	142.58
24.00	DISCHG	140.06	135.95	129.60	121.65	114.00	107.64	102.49	98.22	94.62	91.49
25.00	DISCHG	88.66	86.07	83.67	81.44	79.34	77.27	75.04	72.88	70.86	68.98
26.00	DISCHG	67.25	65.66	64.17	62.79	61.49	60.27	59.11	57.99	56.93	55.90
27.00	DISCHG	54.91	53.95	53.02	52.10	51.21	50.33	49.45	48.54	47.64	46.75
28.00	DISCHG	45.87	45.00	44.14	43.30	42.46	41.63	40.81	40.00	39.20	38.41
29.00	DISCHG	37.63	36.86	36.10	35.37	34.67	33.99	33.33	32.70	32.12	31.53

RUNOFF VOLUME ABOVE BASEFLOW = 2.29 WATERSHED INCHES, 4026.95 CFS-HRS, 332.79 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV STRUCTURE 50
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 6

OPERATION RESVOR STRUCTURE 50
INPUT HYDROGRAPH= 6 OUTPUT HYDROGRAPH= 7
SURFACE ELEVATION= 2.40

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.56	345.99	10.76

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 2.72 SQ.MI.

9.00	DISCHG	3.00	3.00	3.28	3.75	4.23	4.72	5.24	5.76	6.31	6.89
9.00	ELEV	2.84	2.84	2.85	2.87	2.89	2.91	2.93	2.95	2.97	3.00
10.00	DISCHG	7.43	7.98	8.54	9.13	9.76	10.42	11.14	11.94	12.81	13.78
10.00	ELEV	3.02	3.04	3.07	3.09	3.12	3.15	3.18	3.22	3.26	3.30
11.00	DISCHG	14.86	16.09	18.42	20.94	23.70	26.75	30.52	36.19	46.85	66.23
11.00	ELEV	3.35	3.40	3.46	3.52	3.59	3.67	3.76	3.90	4.14	4.52
12.00	DISCHG	95.67	120.39	177.76	232.58	263.11	286.77	304.08	316.72	326.08	333.09
12.00	ELEV	5.15	6.03	7.04	7.96	8.71	9.28	9.69	9.99	10.21	10.38
13.00	DISCHG	337.45	340.57	342.85	344.43	345.42	345.91	345.96	345.61	344.87	343.78
13.00	ELEV	10.50	10.60	10.67	10.72	10.75	10.76	10.76	10.75	10.73	10.70
14.00	DISCHG	342.37	340.70	338.80	336.73	334.53	331.75	328.73	325.63	322.47	319.27
14.00	ELEV	10.65	10.60	10.55	10.48	10.42	10.35	10.27	10.20	10.13	10.05
15.00	DISCHG	316.07	312.91	309.83	306.84	303.94	301.12	298.36	295.66	293.03	290.48
15.00	ELEV	9.97	9.90	9.82	9.75	9.68	9.62	9.55	9.49	9.42	9.36
16.00	DISCHG	288.03	285.67	283.42	281.26	279.20	277.25	275.39	273.59	271.81	270.05
16.00	ELEV	9.31	9.25	9.20	9.14	9.10	9.05	9.00	8.96	8.92	8.88
17.00	DISCHG	268.31	266.61	264.94	263.34	261.78	260.29	258.85	257.46	256.10	254.74
17.00	ELEV	8.84	8.80	8.76	8.72	8.68	8.64	8.61	8.58	8.55	8.51
18.00	DISCHG	253.35	251.91	250.42	248.95	247.49	246.03	244.60	243.20	241.85	240.53
18.00	ELEV	8.48	8.45	8.41	8.37	8.34	8.30	8.26	8.23	8.20	8.16
19.00	DISCHG	239.26	238.01	236.80	235.63	234.48	233.37	232.28	231.21	230.16	229.12
19.00	ELEV	8.13	8.10	8.07	8.04	8.01	7.98	7.96	7.93	7.90	7.88
20.00	DISCHG	228.04	226.93	225.76	224.56	223.34	222.10	220.85	219.59	218.34	217.08
20.00	ELEV	7.85	7.82	7.79	7.76	7.73	7.70	7.67	7.64	7.61	7.58

21.00	DISCHG	215.81	214.55	213.29	212.02	210.76	208.90	206.17	203.52	200.96	198.48
21.00	ELEV	7.55	7.51	7.48	7.45	7.42	7.39	7.36	7.33	7.30	7.27
22.00	DISCHG	196.07	193.73	191.45	189.24	187.08	184.99	182.95	180.97	179.04	177.18
22.00	ELEV	7.24	7.22	7.19	7.17	7.14	7.12	7.10	7.07	7.05	7.03
23.00	DISCHG	175.40	173.70	172.08	170.54	169.06	167.66	166.33	165.05	163.83	162.63
23.00	ELEV	7.01	6.99	6.97	6.96	6.94	6.92	6.91	6.89	6.88	6.87
24.00	DISCHG	161.37	160.00	158.40	156.48	154.21	151.66	148.93	146.08	143.16	140.22
24.00	ELEV	6.85	6.84	6.82	6.80	6.77	6.74	6.71	6.68	6.65	6.62
25.00	DISCHG	137.27	134.34	131.44	128.57	125.74	122.96	120.98	120.93	120.88	120.82
25.00	ELEV	6.58	6.55	6.52	6.49	6.45	6.42	6.39	6.36	6.33	6.29
26.00	DISCHG	120.76	120.70	120.63	120.57	120.50	120.44	120.37	120.30	120.23	120.15
26.00	ELEV	6.26	6.22	6.18	6.14	6.10	6.06	6.02	5.98	5.94	5.89
27.00	DISCHG	120.08	120.01	118.47	116.81	115.17	113.55	111.95	110.37	108.80	107.25
27.00	ELEV	5.85	5.80	5.76	5.71	5.67	5.63	5.59	5.54	5.50	5.46
28.00	DISCHG	105.71	104.20	102.70	101.21	99.75	98.29	96.86	95.44	94.03	92.64
28.00	ELEV	5.42	5.38	5.34	5.30	5.26	5.22	5.18	5.15	5.11	5.07
29.00	DISCHG	91.27	89.88	88.10	86.35	84.63	82.95	81.31	79.70	78.12	76.57
29.00	ELEV	5.03	5.00	4.96	4.93	4.89	4.86	4.83	4.79	4.76	4.73

RUNOFF VOLUME ABOVE BASEFLOW = 2.11 WATERSHED INCHES, 3705.16 CFS-HRS, 306.19 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 130
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 1000.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .30, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 130 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***
0 *** WARNING - REACH 130 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT 73.57 CFS, 21.45 % OF PEAK.

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.56	345.99	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.11 WATERSHED INCHES, 3705.16 CFS-HRS, 306.19 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 130
OUTPUT HYDROGRAPH= 6
AREA= .05 SQ MI INPUT RUNOFF CURVE= 74. TIME OF CONCENTRATION= .19 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0253 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.01	160.37	(RUNOFF)
23.65	2.37	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 4.05 WATERSHED INCHES, 130.79 CFS-HRS, 10.81 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 130
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.05	264.38	(NULL)
13.46	355.81	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.15 WATERSHED INCHES, 3835.95 CFS-HRS, 317.00 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 130
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 6

OPERATION RESVOR STRUCTURE 60
INPUT HYDROGRAPH= 6 OUTPUT HYDROGRAPH= 7
SURFACE ELEVATION= 2.00

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
16.63	279.24	6.73

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 2.77 SQ.MI.

11.00	DISCHG	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.05	5.07	8.29
11.00	ELEV	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.46	2.54
12.00	DISCHG	12.67	17.23	21.58	30.32	40.31	50.00	59.95	72.42	84.77	96.86
12.00	ELEV	2.67	2.82	2.97	3.12	3.27	3.43	3.60	3.77	3.93	4.09
13.00	DISCHG	108.58	119.88	130.74	139.64	147.20	154.50	161.53	168.29	174.78	180.03
13.00	ELEV	4.25	4.40	4.54	4.68	4.82	4.95	5.07	5.19	5.31	5.42
14.00	DISCHG	180.21	180.39	180.56	180.74	180.91	186.75	198.92	209.83	219.58	228.26
14.00	ELEV	5.53	5.63	5.74	5.84	5.94	6.04	6.13	6.22	6.29	6.35
15.00	DISCHG	235.98	242.81	248.83	254.11	258.70	262.66	266.05	268.95	271.39	273.42
15.00	ELEV	6.41	6.46	6.51	6.55	6.58	6.61	6.63	6.66	6.67	6.69
16.00	DISCHG	275.09	276.42	277.45	278.23	278.76	279.09	279.23	279.19	278.98	278.64
16.00	ELEV	6.70	6.71	6.72	6.73	6.73	6.73	6.73	6.73	6.73	6.73
17.00	DISCHG	278.18	277.62	276.97	276.24	275.44	274.58	273.67	272.72	271.73	270.70
17.00	ELEV	6.73	6.72	6.72	6.71	6.70	6.70	6.69	6.68	6.68	6.67
18.00	DISCHG	269.61	268.48	267.33	266.14	264.93	263.71	262.46	261.20	259.93	258.66
18.00	ELEV	6.66	6.65	6.64	6.64	6.63	6.62	6.61	6.60	6.59	6.58
19.00	DISCHG	257.38	256.11	254.84	253.57	252.32	251.07	249.84	248.62	247.41	246.19
19.00	ELEV	6.57	6.56	6.55	6.54	6.53	6.52	6.51	6.50	6.50	6.49
20.00	DISCHG	244.97	243.74	242.51	241.29	240.07	238.84	237.62	236.39	235.16	233.93
20.00	ELEV	6.48	6.47	6.46	6.45	6.44	6.43	6.42	6.41	6.40	6.40
21.00	DISCHG	232.70	231.46	230.22	228.98	227.74	226.47	225.12	223.66	222.11	220.47
21.00	ELEV	6.39	6.38	6.37	6.36	6.35	6.34	6.33	6.32	6.31	6.29
22.00	DISCHG	218.78	217.02	215.22	213.39	211.52	209.64	207.74	205.83	203.92	202.01
22.00	ELEV	6.28	6.27	6.26	6.24	6.23	6.21	6.20	6.19	6.17	6.16
23.00	DISCHG	200.10	198.21	196.34	194.50	192.68	190.89	189.13	187.41	185.73	184.07
23.00	ELEV	6.14	6.13	6.11	6.10	6.09	6.07	6.06	6.05	6.04	6.02
24.00	DISCHG	182.42	181.00	180.97	180.95	180.92	180.89	180.86	180.83	180.79	180.75
24.00	ELEV	6.01	6.00	5.98	5.97	5.95	5.94	5.92	5.90	5.87	5.85
25.00	DISCHG	180.70	180.66	180.60	180.55	180.49	180.44	180.37	180.31	180.25	180.19
25.00	ELEV	5.82	5.79	5.76	5.73	5.70	5.66	5.62	5.59	5.55	5.51

26.00	DISCHG	180.12	180.06	179.94	177.86	175.85	173.92	172.04	170.23	168.48	166.79
26.00	ELEV	5.47	5.44	5.40	5.36	5.33	5.29	5.26	5.23	5.20	5.17
27.00	DISCHG	165.16	163.58	162.03	160.48	158.92	157.36	155.80	154.24	152.67	151.11
27.00	ELEV	5.14	5.11	5.08	5.05	5.03	5.00	4.97	4.94	4.91	4.89
28.00	DISCHG	149.55	147.99	146.43	144.87	143.32	141.77	140.22	138.68	137.14	135.61
28.00	ELEV	4.86	4.83	4.80	4.78	4.75	4.72	4.69	4.67	4.64	4.61
29.00	DISCHG	133.78	131.78	129.79	127.82	125.85	123.90	121.96	120.04	118.13	116.24
29.00	ELEV	4.58	4.56	4.53	4.50	4.48	4.45	4.43	4.40	4.38	4.35

RUNOFF VOLUME ABOVE BASEFLOW = 1.95 WATERSHED INCHES, 3490.43 CFS-HRS, 288.45 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 140
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 2500.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .21, M= 1.48
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = .37 PEAK TRAVEL TIME = .30 HOURS
0 *** WARNING - REACH 140 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT 113.24 CFS, 40.99 % OF PEAK.

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
16.92	278.79	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 1.93 WATERSHED INCHES, 3459.06 CFS-HRS, 285.86 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 140
OUTPUT HYDROGRAPH= 6
AREA= .20 SQ MI INPUT RUNOFF CURVE= 69. TIME OF CONCENTRATION= .19 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0253 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.02	560.07	(RUNOFF)
15.16	19.75	(RUNOFF)
16.45	17.22	(RUNOFF)
17.66	14.43	(RUNOFF)
19.65	11.68	(RUNOFF)
23.65	8.90	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 3.52 WATERSHED INCHES, 454.78 CFS-HRS, 37.58 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 140
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.02	565.97	(NULL)
16.54	294.29	(NULL)
16.85	293.16	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.04 WATERSHED INCHES, 3913.84 CFS-HRS, 323.44 ACRE-FEET; BASEFLOW = 3.00 CFS

```
OPERATION SAVMOV   CROSS SECTION 150
        INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 5

OPERATION RUNOFF   CROSS SECTION 149
        OUTPUT HYDROGRAPH=  6
        AREA=    .08 SQ MI   INPUT RUNOFF CURVE= 65.    TIME OF CONCENTRATION=    .42 HOURS
        INTERNAL HYDROGRAPH TIME INCREMENT=  .0560 HOURS

        PEAK TIME(HRS)             PEAK DISCHARGE(CFS)            PEAK ELEVATION(FEET)
          12.15                          142.32                          (RUNOFF)
          16.45                            6.39                          (RUNOFF)
          17.67                            5.39                          (RUNOFF)
          19.66                            4.37                          (RUNOFF)
          23.66                            3.34                          (RUNOFF)

  RUNOFF VOLUME ABOVE BASEFLOW =  3.10 WATERSHED INCHES,    160.17 CFS-HRS,    13.24 ACRE-FEET;   BASEFLOW =     .00 CFS

OPERATION ADDHYD   CROSS SECTION 150
        INPUT HYDROGRAPHS= 5,6     OUTPUT HYDROGRAPH= 7

        PEAK TIME(HRS)             PEAK DISCHARGE(CFS)            PEAK ELEVATION(FEET)
          12.03                          676.36                          (NULL)
          14.30                          212.74                          (NULL)
          16.54                          300.66                          (NULL)

  RUNOFF VOLUME ABOVE BASEFLOW =  2.07 WATERSHED INCHES,   4074.00 CFS-HRS,   336.68 ACRE-FEET;   BASEFLOW =    3.00 CFS

OPERATION REACH    CROSS SECTION 150
        INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 5
        LENGTH =     300.00 FEET      INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA,  X=    .21,    M= 1.48
0       MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00      PEAK TRAVEL TIME =     .00 HOURS

    *** WARNING  REACH 150 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***
0   *** WARNING - REACH 150 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT      118.34 CFS,  17.97 % OF PEAK.

        PEAK TIME(HRS)             PEAK DISCHARGE(CFS)            PEAK ELEVATION(FEET)
          12.03                          676.36                          (NULL)
          14.30                          212.74                          (NULL)
          16.54                          300.66                          (NULL)

  RUNOFF VOLUME ABOVE BASEFLOW =  2.07 WATERSHED INCHES,   4074.00 CFS-HRS,   336.68 ACRE-FEET;   BASEFLOW =    3.00 CFS

OPERATION RUNOFF   CROSS SECTION 150
        OUTPUT HYDROGRAPH=  6
        AREA=    .01 SQ MI   INPUT RUNOFF CURVE= 40.    TIME OF CONCENTRATION=    .15 HOURS
```

INTERNAL HYDROGRAPH TIME INCREMENT= .0200 HOURS

*** WARNING-MAIN TIME INCREMENT MAY BE TOO LARGE.
COMPUTED PEAK(4.99) AT EXCEEDS MAX. ADJACENT HYDROGRAPH COORDINATE BY 8 %.
+ XSECTION 150

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.05	4.99	(RUNOFF)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = .01 SQ.MI.

11.00	DISCHG	.00	.00	.00	.00	.00	.00	.00	.00	.00	1.05
12.00	DISCHG	4.60	4.46	2.17	1.71	1.28	1.17	1.09	1.02	1.00	.87
13.00	DISCHG	.84	.78	.73	.71	.66	.64	.60	.56	.55	.52
14.00	DISCHG	.52	.50	.48	.47	.44	.43	.41	.38	.38	.38
15.00	DISCHG	.38	.39	.39	.38	.35	.34	.34	.34	.34	.34
16.00	DISCHG	.34	.34	.35	.35	.35	.35	.32	.30	.30	.30
17.00	DISCHG	.30	.30	.30	.30	.30	.30	.30	.30	.30	.26
18.00	DISCHG	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25
19.00	DISCHG	.25	.25	.25	.25	.25	.25	.25	.25	.25	.21
20.00	DISCHG	.19	.19	.19	.19	.19	.19	.19	.19	.19	.19
21.00	DISCHG	.19	.20	.20	.20	.20	.20	.20	.20	.20	.20
22.00	DISCHG	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20
23.00	DISCHG	.20	.20	.20	.20	.20	.20	.20	.20	.20	.15
24.00	DISCHG	.14	.08	.01	.00						

RUNOFF VOLUME ABOVE BASEFLOW = .84 WATERSHED INCHES, 5.41 CFS-HRS, .45 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 150
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.03	681.33	(NULL)
14.29	213.21	(NULL)
16.54	301.00	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.07 WATERSHED INCHES, 4079.42 CFS-HRS, 337.12 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 180
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5

OPERATION RUNOFF CROSS SECTION 180
OUTPUT HYDROGRAPH= 6
AREA= .11 SQ MI INPUT RUNOFF CURVE= 42. TIME OF CONCENTRATION= .48 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0640 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.27	39.64	(RUNOFF)
23.68	2.45	(RUNOFF)

```
 RUNOFF VOLUME ABOVE BASEFLOW =   .99 WATERSHED INCHES,     70.57 CFS-HRS,     5.83 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION ADDHYD   CROSS SECTION 180
        INPUT HYDROGRAPHS= 5,6     OUTPUT HYDROGRAPH= 7

        PEAK TIME(HRS)            PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
          12.04                        698.30                      (NULL)
          14.28                        219.59                      (NULL)
          16.54                        305.26                      (NULL)

 RUNOFF VOLUME ABOVE BASEFLOW =  2.03 WATERSHED INCHES,   4149.99 CFS-HRS,   342.96 ACRE-FEET;   BASEFLOW =   3.00 CFS

OPERATION REACH    CROSS SECTION 180
        INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 5
        LENGTH =   1700.00 FEET      INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA,  X=   .21,   M= 1.48
0       MODIFIED ATT-KIN ROUTING COEFFICIENT =  .62      PEAK TRAVEL TIME =    .20 HOURS
0     *** WARNING - REACH 180 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT     118.34 CFS,  17.53 % OF PEAK.

        PEAK TIME(HRS)            PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
          12.18                        618.43                      (NULL)
          16.69                        304.81                      (NULL)

 RUNOFF VOLUME ABOVE BASEFLOW =  2.02 WATERSHED INCHES,   4127.82 CFS-HRS,   341.12 ACRE-FEET;   BASEFLOW =   3.00 CFS

OPERATION RUNOFF   CROSS SECTION 180
        OUTPUT HYDROGRAPH=  6
        AREA=    .11 SQ MI    INPUT RUNOFF CURVE= 41.    TIME OF CONCENTRATION=    .48 HOURS
        INTERNAL HYDROGRAPH TIME INCREMENT=  .0640 HOURS

        PEAK TIME(HRS)            PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
          12.28                         34.74                      (RUNOFF)
          23.69                          2.34                      (RUNOFF)

 RUNOFF VOLUME ABOVE BASEFLOW =   .92 WATERSHED INCHES,     65.08 CFS-HRS,     5.38 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION ADDHYD   CROSS SECTION 180
        INPUT HYDROGRAPHS= 5,6     OUTPUT HYDROGRAPH= 7

        PEAK TIME(HRS)            PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
          12.19                        650.40                      (NULL)
          14.40                        224.82                      (NULL)
          16.68                        308.77                      (NULL)

TIME(HRS)       FIRST HYDROGRAPH POINT =   .00 HOURS     TIME INCREMENT =  .10 HOURS      DRAINAGE AREA =   3.28 SQ.MI.
   8.00   DISCHG       3.00       3.00       3.00       3.00       3.00       3.00       3.06       3.19       3.36       3.56
```

9.00	DISCHG	3.76	3.97	4.22	4.52	4.81	5.09	5.38	5.74	6.22	6.68
10.00	DISCHG	7.12	7.54	8.06	8.69	9.35	10.35	11.38	12.69	14.43	16.07
11.00	DISCHG	18.28	20.49	22.93	25.83	28.60	32.85	37.24	61.29	113.91	179.08
12.00	DISCHG	357.82	576.33	648.96	529.24	410.20	314.71	251.70	214.60	193.14	183.74
13.00	DISCHG	178.26	177.33	179.27	182.23	187.45	192.36	197.69	202.63	206.67	211.24
14.00	DISCHG	215.56	219.94	222.89	224.20	224.82	224.27	223.46	223.64	226.17	231.35
15.00	DISCHG	238.29	246.10	254.14	261.97	269.16	274.75	279.58	284.11	288.35	292.25
16.00	DISCHG	295.75	298.83	301.50	303.77	305.67	307.24	308.46	308.75	308.04	307.35
17.00	DISCHG	306.82	306.41	306.04	305.66	305.22	304.70	304.12	303.46	302.72	301.73
18.00	DISCHG	299.65	297.37	295.41	293.74	292.31	291.00	289.75	288.53	287.32	286.10
19.00	DISCHG	284.87	283.64	282.40	281.16	279.92	278.67	277.43	276.19	274.95	273.51
20.00	DISCHG	271.05	268.43	266.18	264.29	262.66	261.21	259.86	258.57	257.31	256.07
21.00	DISCHG	254.85	253.62	252.40	251.18	249.95	248.73	247.50	246.27	245.01	243.70
22.00	DISCHG	242.32	240.87	239.35	237.76	236.11	234.40	232.65	230.86	229.03	227.18
23.00	DISCHG	225.32	223.44	221.55	219.67	217.79	215.92	214.07	212.24	210.43	208.43
24.00	DISCHG	205.40	202.16	197.93	192.57	188.37	185.50	183.68	182.57	181.89	181.47
25.00	DISCHG	181.20	181.03	180.91	180.81	180.74	180.68	180.62	180.56	180.50	180.45
26.00	DISCHG	180.38	180.32	180.26	180.20	180.12	179.58	178.58	177.25	175.72	174.08
27.00	DISCHG	172.39	170.68	168.99	167.33	165.70	164.09	162.51	160.93	159.36	157.79
28.00	DISCHG	156.23	154.66	153.10	151.54	149.98	148.41	146.86	145.30	143.75	142.20
29.00	DISCHG	140.65	139.11	137.50	135.78	133.98	132.12	130.21	128.29	126.36	124.43

RUNOFF VOLUME ABOVE BASEFLOW = 1.98 WATERSHED INCHES, 4192.91 CFS-HRS, 346.50 ACRE-FEET; BASEFLOW = 3.00 CFS

EXECUTIVE CONTROL OPERATION ENDCMP RECORD ID 1740

+ COMPUTATIONS COMPLETED FOR PASS 1

EXECUTIVE CONTROL OPERATION ENDJOB RECORD ID 1750

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

ALTERNATE 89 STORM 1

SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RAIN TABLE #	ANTEC MOIST COND	MAIN TIME INCREM (HR)	PRECIPITATION BEGIN (HR)	PRECIPITATION AMOUNT (IN)	PRECIPITATION DURATION (HR)	RUNOFF AMOUNT (IN)	PEAK DISCHARGE ELEVATION (FT)	PEAK DISCHARGE TIME (HR)	PEAK DISCHARGE RATE (CFS)	PEAK DISCHARGE RATE (CSM)
STRUCTURE 10	RUNOFF	.84	2	2	.10	.0	7.00	24.00	1.67	---	17.80	96.56	114.9
STRUCTURE 10	RESVOR	.84	2	2	.10	.0	7.00	24.00	1.63	9.50	18.14	96.09	114.4
XSECTION 10	REACH	.84	2	2	.10	.0	7.00	24.00	1.62	---	18.47	98.84	117.7
XSECTION 10	RUNOFF	.20	2	2	.10	.0	7.00	24.00	1.16	---	12.07	150.75	753.8
XSECTION 10	ADDHYD	1.04	2	2	.10	.0	7.00	24.00	1.53	---	12.07	153.76	147.8
STRUCTURE 20	RESVOR	1.04	2	2	.10	.0	7.00	24.00	1.48	9.21	20.08	93.83	90.2
XSECTION 20	REACH	1.04	2	2	.10	.0	7.00	24.00	1.47	---	20.23	93.80	90.2
XSECTION 20	RUNOFF	.28	2	2	.10	.0	7.00	24.00	2.03	---	13.36	102.66	366.6
XSECTION 20	ADDHYD	1.32	2	2	.10	.0	7.00	24.00	1.59	---	13.31	132.15	100.1
STRUCTURE 30	RUNOFF	.37	2	2	.10	.0	7.00	24.00	1.57	---	14.95	60.58	163.7
STRUCTURE 30	RESVOR	.37	2	2	.10	.0	7.00	24.00	1.51	25.91	16.21	48.05	129.9
XSECTION 40	REACH	.37	2	2	.10	.0	7.00	24.00	1.50	---	16.55	47.70	128.9
XSECTION 40	RUNOFF	.06	2	2	.10	.0	7.00	24.00	.84	---	12.72	10.21	170.2
XSECTION 40	ADDHYD	.43	2	2	.10	.0	7.00	24.00	1.41	---	16.54	49.80	115.8
STRUCTURE 40	RESVOR	.43	2	2	.10	.0	7.00	24.00	1.41	10.89	16.60	49.78	115.8
XSECTION 50	REACH	.43	2	2	.10	.0	7.00	24.00	1.40	---	16.72	49.77	115.7
XSECTION 49	RUNOFF	.11	2	2	.10	.0	7.00	24.00	.84	---	13.33	13.76	125.1
XSECTION 50	ADDHYD	.54	2	2	.10	.0	7.00	24.00	1.29	---	16.65	53.98	100.0
XSECTION 50	RUNOFF	.36	2	2	.10	.0	7.00	24.00	5.25	---	12.13	1078.73	2996.5
XSECTION 50	ADDHYD	.90	2	2	.10	.0	7.00	24.00	2.87	---	12.13	1079.95	1199.9
XSECTION 60	REACH	.90	2	2	.10	.0	7.00	24.00	2.87	---	12.13	1079.95	1199.9
XSECTION 60	RUNOFF	.05	2	2	.10	.0	7.00	24.00	1.24	---	12.56	16.56	331.2
XSECTION 60	ADDHYD	.95	2	2	.10	.0	7.00	24.00	2.79	---	12.14	1086.21	1143.4
XSECTION 70	ADDHYD	2.27	2	2	.10	.0	7.00	24.00	2.09	---	12.14	1108.12	488.2
XSECTION 80	REACH	2.27	2	2	.10	.0	7.00	24.00	2.09	---	12.14	1108.12	488.2
XSECTION 80	RUNOFF	.02	2	2	.10	.0	7.00	24.00	2.98	---	11.98	54.99	2749.6
XSECTION 80	ADDHYD	2.29	2	2	.10	.0	7.00	24.00	2.10	---	12.13	1129.43	493.2
XSECTION 90	RUNOFF	.24	2	2	.10	.0	7.00	24.00	4.14	---	12.26	458.49	1910.4
XSECTION 100	ADDHYD	2.53	2	2	.10	.0	7.00	24.00	2.29	---	12.16	1536.02	607.1
XSECTION 110	REACH	2.53	2	2	.10	.0	7.00	24.00	2.29	---	12.16	1536.02	607.1
XSECTION 120	REACH	2.53	2	2	.10	.0	7.00	24.00	2.29	---	12.16	1536.02	607.1
XSECTION 120	RUNOFF	.19	2	2	.10	.0	7.00	24.00	2.31	---	12.38	167.75	882.9

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

SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RAIN TABLE #	ANTEC MOIST COND	MAIN TIME INCREM (HR)	PRECIPITATION BEGIN (HR)	AMOUNT (IN)	DURATION (HR)	RUNOFF AMOUNT (IN)	PEAK DISCHARGE ELEVATION (FT)	TIME (HR)	RATE (CFS)	RATE (CSM)
ALTERNATE 89 STORM 1													
XSECTION 120	ADDHYD	2.72	2	2	.10	.0	7.00	24.00	2.29	---	12.18	1666.75	612.8
STRUCTURE 50	RESVOR	2.72	2	2	.10	.0	7.00	24.00	2.11	10.76	13.56	345.99	127.2
XSECTION 130	REACH	2.72	2	2	.10	.0	7.00	24.00	2.11	---	13.56	345.99	127.2
XSECTION 130	RUNOFF	.05	2	2	.10	.0	7.00	24.00	4.05	---	12.01	160.37	3207.4
XSECTION 130	ADDHYD	2.77	2	2	.10	.0	7.00	24.00	2.15	---	13.46	355.81	128.5
STRUCTURE 60	RESVOR	2.77	2	2	.10	.0	7.00	24.00	1.95	6.73	16.63	279.24	100.8
XSECTION 140	REACH	2.77	2	2	.10	.0	7.00	24.00	1.93	---	16.92	278.79	100.6
XSECTION 140	RUNOFF	.20	2	2	.10	.0	7.00	24.00	3.52	---	12.02	560.07	2800.4
XSECTION 140	ADDHYD	2.97	2	2	.10	.0	7.00	24.00	2.04	---	12.02	565.97	190.6
XSECTION 149	RUNOFF	.08	2	2	.10	.0	7.00	24.00	3.10	---	12.15	142.32	1779.0
XSECTION 150	ADDHYD	3.05	2	2	.10	.0	7.00	24.00	2.07	---	12.03	676.36	221.8
XSECTION 150	REACH	3.05	2	2	.10	.0	7.00	24.00	2.07	---	12.03	676.36	221.8
XSECTION 150	RUNOFF	.01	2	2	.10	.0	7.00	24.00	.84	---	12.05	4.99	499.3
XSECTION 150	ADDHYD	3.06	2	2	.10	.0	7.00	24.00	2.07	---	12.03	681.33	222.7
XSECTION 180	RUNOFF	.11	2	2	.10	.0	7.00	24.00	.99	---	12.27	39.64	360.4
XSECTION 180	ADDHYD	3.17	2	2	.10	.0	7.00	24.00	2.03	---	12.04	698.30	220.3
XSECTION 180	REACH	3.17	2	2	.10	.0	7.00	24.00	2.02	---	12.18	618.43	195.1
XSECTION 180	RUNOFF	.11	2	2	.10	.0	7.00	24.00	.92	---	12.28	34.74	315.8
XSECTION 180	ADDHYD	3.28	2	2	.10	.0	7.00	24.00	1.98	---	12.19	650.40	198.3

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

XSEC ID	REACH LENGTH (FT)	INFLOW PEAK (CFS)	INFLOW TIME (HR)	OUTFLOW PEAK (CFS)	OUTFLOW TIME (HR)	INTERV.AREA OUTFLOW+ PEAK (CFS)	INTERV.AREA OUTFLOW+ TIME (HR)	BASE-FLOW (CFS)	VOLUME ABOVE BASE (IN)	MAIN TIME INCR (HR)	ITER-ATION #	Q AND A EQUATION COEFF (X)	Q AND A EQUATION POWER (M)	LENGTH FACTOR (K*)	PEAK RATIO O/I (Q*)	S/Q @PEAK (K) (SEC)	ATT-KIN COEFF (C)	PEAK TRAVEL TIME STOR-AGE (HR)	PEAK TRAVEL TIME KINE-MATIC (HR)
ALTERNATE 89 STORM 1																			
+												1.20							
+ 10	1750	99	18.1	99	18.5			3	1.63*	.10	1		1.10	.021	.997	888	.34	.40	.25
+						149	12.1					.280							
+ 20	2900	94	20.1	94	20.2			3	1.48*	.10	1		1.94	.000	1.000	319	.72?	.10	.09
+						132	13.3					.880							
+ 40	1300	48	16.2	48	16.5			0	1.51	.10	1		1.10	.027	.992	934	.32	.30	.26
+						50	16.5					1.60							
+ 50	1700	50	16.6	50	16.7			0	1.41	.10	1		1.45	.002	1.000	252	.83?	.10	.07
+						54	16.6					.440							
+ 60	1400	1064	12.1	1064	12.1			0	2.87	.10	0		1.94	.000	1.000	38	1.00?	.00	.00
+						1069	12.1					.300							
+ 80	700	1086	12.1	1086	12.1			3	2.09	.10	0		1.94	.000	1.000	23	1.00?	.00	.00
+						1115	12.1					.300							
+110	500	1520	12.2	1520	12.2			3	2.29	.10	0		1.94	.000	1.000	14	1.00?	.00	.00
+						---	---					.300							
+120	500	1520	12.2	1520	12.2			3	2.29	.10	0		1.94	.000	1.000	14	1.00?	.00	.00
+						1661	12.2					.300							

+130	1000	346	13.6	346	13.6			3	2.11*	.10	0		1.94	.000	1.000	56	1.00?	.00	.00
+						356	13.5												
												.210							
+140	2500	279	16.6	279	16.9			3	1.95*	.10	1		1.48	.004	.998	780	.37	.30	.22
+						562	12.0												
												.210							
+150	300	661	12.0	661	12.0			3	2.07*	.10	0		1.48	.000	1.000	71	1.00?	.00	.00
+						666	12.0												
												.210							
+180	1700	678	12.0	616	12.2			3	2.03*	.10	1		1.48	.005	.908	398	.62	.20	.11
+						649	12.2												

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

XSECTION/ STRUCTURE ID	DRAINAGE AREA (SQ MI)	STORM NUMBERS.......... 1
0 STRUCTURE 60	2.77	
ALTERNATE 89		279.24
0 STRUCTURE 50	2.72	
ALTERNATE 89		345.99
0 STRUCTURE 40	.43	
ALTERNATE 89		49.78
0 STRUCTURE 30	.37	
ALTERNATE 89		48.05
0 STRUCTURE 20	1.04	
ALTERNATE 89		93.83
0 STRUCTURE 10	.84	
ALTERNATE 89		96.09
0 XSECTION 10	1.04	
ALTERNATE 89		153.76
0 XSECTION 20	1.32	
ALTERNATE 89		132.15
0 XSECTION 40	.43	
ALTERNATE 89		49.80
0 XSECTION 49	.11	
ALTERNATE 89		13.76
0 XSECTION 50	.90	
ALTERNATE 89		1079.95
0 XSECTION 60	.95	
ALTERNATE 89		1086.21
0 XSECTION 70	2.27	
ALTERNATE 89		1108.12
0 XSECTION 80	2.29	
ALTERNATE 89		1129.43

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

XSECTION/ STRUCTURE ID	DRAINAGE AREA (SQ MI)	STORM NUMBERS.......... 1
0 XSECTION 90	.24	
ALTERNATE 89		458.49
0 XSECTION 100	2.53	
ALTERNATE 89		1536.02
0 XSECTION 110	2.53	
ALTERNATE 89		1536.02
0 XSECTION 120	2.72	
ALTERNATE 89		1666.75
0 XSECTION 130	2.77	
ALTERNATE 89		355.81
0 XSECTION 140	2.97	
ALTERNATE 89		565.97
0 XSECTION 149	.08	
ALTERNATE 89		142.32
0 XSECTION 150	3.06	
ALTERNATE 89		681.33
0 XSECTION 180	3.28	
ALTERNATE 89		650.40

FISCAL YEAR 90

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

JOB TR-20                     FULLPRINT PASS=001  SUMMARY                     10
TITLE 005 COGDELL'S CREEK WATERSHED STUDY NV5010 24 HR 10YR TYPE 2 STORM      20
TITLE     ALT  90                                                      30
 3 STRUCT      10                                                             40
 8                   7.00       0.00       4.33                               50
 8                   7.4        2.5        5.01                               60
 8                   7.6        5.0        5.36                               70
 8                   7.8        10.0       5.70                               80
 8                   8.2        22.0       6.38                               90
 8                   8.6        52.0       7.07                               100
 8                   9.0        62.0       7.75                               110
 8                   9.5        96.0       8.61                               120
 8                   10.0       126.0      9.47                               130
 8                   11.0       198.0      11.18                              140
 8                   12.0       280.0      12.89                              150
 8                   13.00      360.0      14.79                              160
 8                   14.00      440.0      16.68                              170
 8                   15.00      500.0      18.58                              180
 8                   15.1       600.00     18.60                              190
 9 ENDTBL                                                                     200
 3 STRUCT       20                                                            210
 8                   4.5        0.00       6.80                               220
 8                   4.9        1.5        7.88                               230
 8                   5.1        3.7        8.42                               240
 8                   5.5        11.0       9.51                               250
 8                   5.7        15.0       10.13                              260
 8                   6.1        25.0       11.13                              270
 8                   6.5        40.0       12.21                              280
 8                   7.1        60.0       13.84                              290
 8                   7.9        78.0       16.01                              300
 8                   8.5        79.0       17.63                              310
 8                   9.5        100.0      20.34                              320
 8                   10.5       126.0      23.06                              330
 8                   11.5       150.0      25.76                              340
 8                   11.6       300.0      26.04                              350
 9 ENDTBL                                                                     360
 3 STRUCT       30                                                            370
 8                   21.0       0.00       0.10                               380
 8                   21.4       0.6        0.61                               390
 8                   21.6       1.5        0.86                               400
 8                   21.8       2.5        1.12                               410
 8                   22.2       5.2        1.62                               420
 8                   22.6       8.2        2.13                               430
 8                   23.0       11.0       2.64                               440
 8                   23.5       20.0       3.27                               450
 8                   24.0       27.0       3.91                               460
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**********************80-80 LIST OF INPUT DATA (CONTINUED)**********************

8		25.0	39.0	5.18	470
8		26.0	49.0	6.45	480
8		27.0	57.0	7.72	490
8		27.1	200.00	7.74	500
9 ENDTBL					510
3 STRUCT	40				520
8		9.0	0.0	0.38	530
8		9.4	2.2	0.47	540
8		9.6	5.0	0.52	550
8		10.0	14.0	0.62	560
8		10.2	21.0	0.67	570
8		10.6	36.0	0.77	580
8		11.0	55.0	0.86	590
8		11.6	82.0	1.01	600
8		12.4	120.0	1.21	610
8		13.0	121.0	1.35	620
8		14.0	122.0	1.60	630
8		15.0	126.0	1.84	640
8		16.0	150.00	2.08	650
8		16.1	300.0	2.11	660
9 ENDTBL					670
3 STRUCT	50				680
8		2.4	0.00	22.00	690
8		2.8	2.0	26.86	700
8		3.0	7.0	29.29	710
8		3.4	16.0	34.16	720
8		3.6	24.0	36.59	730
8		4.0	40.0	41.46	740
8		4.4	60.0	46.32	750
8		5.0	90.0	53.62	760
8		5.8	120.0	63.35	770
8		6.4	121.0	70.65	780
8		7.4	210.0	82.81	790
8		8.4	250.00	94.98	800
8		10.4	334.0	119.31	810
8		12.4	400.0	143.63	820
8		12.5	800.0	143.70	830
9 ENDTBL					840
3 STRUCT	60				850
8		2.0	0.0	22.20	860
8		2.4	3.0	27.41	870
8		2.6	10.5	30.02	880
8		3.0	22.5	35.24	890
8		3.2	36.0	37.85	900
8		3.6	60.0	43.06	910
8		4.0	90.0	48.28	920

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

```
8                       4.6          135.0         56.11                         930
8                       5.4          180.0         66.55                         940
8                       6.0          181.0         74.38                         950
8                       7.0          315.0         87.42                         960
8                       8.0          375.0         100.47                        970
8                       8.1          700.0         100.50                        980
9 ENDTBL                                                                         990
6 RUNOFF 1    10      6 0.84         51.           7.50          1              1000
6 RESVOR 2    10 6    7 7.0                                      1              1010
6 REACH  3 010    7   5 1750.        1.2           1.10          1              1020
6 RUNOFF 1 010        6 0.20         42.           0.19          1              1030
6 ADDHYD 4 010    5 6 7                                          1 1            1040
6 SAVMOV 5 010    7   6                                                         1050
6 RESVOR 2    20 6    7 4.5                                      1              1060
6 REACH  3 020    7   5 2900.        0.28          1.94          1              1070
6 RUNOFF 1 020        6 0.28         53.           1.02          1              1080
6 ADDHYD 4 020    5 6 7                                          1 1            1090
6 SAVMOV 5 020    7   1                                                         1100
6 RUNOFF 1    30      6 0.37         49.           3.90          1              1110
6 RESVOR 2    30 6    7 21.0                                     1              1120
6 REACH  3 040    7   5 1300.        0.88          1.10          1              1130
6 RUNOFF 1 040        6 0.06         40.           1.00          1              1140
6 ADDHYD 4 040    5 6 7                                          1              1150
6 SAVMOV 5 040    7   6                                                         1160
6 RESVOR 2    40 6    7 9.0                                      1              1170
6 REACH  3 050    7   5 1700.        1.6           1.45          1              1180
6 RUNOFF 1 049        6 0.11         40.           1.67          1              1190
6 ADDHYD 4 050    5 6 7                                          1              1200
6 SAVMOV 5 050    7   5                                                         1210
6 RUNOFF 1 050        6 0.36         85.           0.42          1              1220
6 ADDHYD 4 050    5 6 7                                          1              1230
6 REACH  3 060    7   5 1400.        0.44          1.94          1              1240
6 RUNOFF 1 060        6 0.05         45.           0.90          1              1250
6 ADDHYD 4 060    5 6 7                                          1 1            1260
6 SAVMOV 5 070    7   5                                                         1270
6 SAVMOV 5 070    1   6                                                         1280
6 ADDHYD 4 070    5 6 7                                          1 1            1290
6 REACH  3 080    7   5 700.         0.30          1.94          1              1300
6 RUNOFF 1 080        6 0.02         64.           0.12          1              1310
6 ADDHYD 4 080    5 6 7                                          1              1320
6 SAVMOV 5 100    7   5                                                         1330
6 RUNOFF 1 090        6 0.24         73.           0.62          1              1340
6 ADDHYD 4 100    5 6 7                                          1              1350
6 REACH  3 110    7   5 500.         0.30          1.94          1              1360
6 SAVMOV 5 120    5   7                                                         1370
6 REACH  3 120    7   5 500.         0.30          1.94          1              1380
```

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

 6 RUNOFF 1 120      6 0.19       56.        0.74       1                1390
 6 ADDHYD 4 120   5 6 7                                 1 1              1400
 6 SAVMOV 5    50 7  6                                                   1410
 6 RESVOR 2    50 6  7 2.4                              1 1 1            1420
 6 REACH  3 130   7  5 1000.      0.30       1.94       1                1430
 6 RUNOFF 1 130      6 0.05       74.        0.19       1                1440
 6 ADDHYD 4 130   5 6 7                                 1                1450
 6 SAVMOV 5 130   7  6                                                   1460
 6 RESVOR 2    60 6  7 2.0                              1 1 1            1470
 6 REACH  3 140   7  5 2500.      0.21       1.48       1                1480
 6 RUNOFF 1 140      6 0.20       66.        1.15       1                1490
 6 ADDHYD 4 140   5 6 7                                 1                1500
 6 SAVMOV 5 150   7  5                                                   1510
 6 RUNOFF 1 149      6 0.08       50.        0.42       1                1520
 6 ADDHYD 4 150   5 6 7                                                  1530
 6 REACH  3 150   7  5 300.       0.21       1.48       1                1540
 6 RUNOFF 1 150      6 0.01       40.        0.15       1                1550
 6 ADDHYD 4 150   5 6 7                                 1                1560
 6 SAVMOV 5 180   7  5                                                   1570
 6 RUNOFF 1 180      6 0.28       50.        0.61       1                1580
 6 ADDHYD 4 180   5 6 7                                 1                1590
 6 REACH  3 180   7  5 1700.0     0.21       1.48       1                1600
 6 RUNOFF 1 180      6 0.11       41.        0.48       1                1610
 6 ADDHYD 4 180   5 6 7                                 1 1   1   1      1620
   ENDATA                                                                1630
 7 ALTER  3                                                              1640
 6 RUNOFF 1 010      6 0.20       44.0       0.19       1                1650
 6 RUNOFF 1 020      6 0.28       54.0       2.00       1                1660
 6 RUNOFF 1 090      6 0.24       75.0       0.62       1                1665
 6 RUNOFF 1 120      6 0.19       58.0       0.74       1                1668
 6 RUNOFF 1 140      6 0.20       70.0       0.19       1                1670
 6 RUNOFF 1 149      6 0.08       65.0       0.42       1                1680
 6 RUNOFF 1 180      6 0.11       42.0       0.48       1                1690
 7 LIST                                                                  1700
 7 BASFLO 5            3.0                                               1710
 7 INCREM 6            0.1                                               1720
 7 COMPUT 7    10 180  0.0        7.0        1.0        2 2  90  01      1730
   ENDCMP 1                                                              1740
   ENDJOB 2                                                              1750
0*********************************END OF 80-80 LIST*********************************
```

```
0CHANGES TO STANDARD CONTROL LIST FOLLOW

 EXECUTIVE CONTROL OPERATION ALTER                                                          RECORD ID     1640

    STANDARD CONTROL OPERATION RUNOFF   CROSS SECTION  10                                   RECORD ID     1650

           OUTPUT HYDROGRAPH = 6                          DATA FIELD VALUES =      .2000    44.0000      .1900

           OUTPUT OPTIONS IN EFFECT  PEAK  VOL   SUM

    STANDARD CONTROL OPERATION RUNOFF   CROSS SECTION  20                                   RECORD ID     1660

           OUTPUT HYDROGRAPH = 6                          DATA FIELD VALUES =      .2800    54.0000     2.0000

           OUTPUT OPTIONS IN EFFECT  PEAK  VOL   SUM

    STANDARD CONTROL OPERATION RUNOFF   CROSS SECTION  90                                   RECORD ID     1665

           OUTPUT HYDROGRAPH = 6                          DATA FIELD VALUES =      .2400    75.0000      .6200

           OUTPUT OPTIONS IN EFFECT  PEAK  VOL   SUM

    STANDARD CONTROL OPERATION RUNOFF   CROSS SECTION 120                                   RECORD ID     1668

           OUTPUT HYDROGRAPH = 6                          DATA FIELD VALUES =      .1900    58.0000      .7400

           OUTPUT OPTIONS IN EFFECT  PEAK  VOL   SUM

    STANDARD CONTROL OPERATION RUNOFF   CROSS SECTION 140                                   RECORD ID     1670

           OUTPUT HYDROGRAPH = 6                          DATA FIELD VALUES =      .2000    70.0000      .1900

           OUTPUT OPTIONS IN EFFECT  PEAK  VOL   SUM

    STANDARD CONTROL OPERATION RUNOFF   CROSS SECTION 149                                   RECORD ID     1680

           OUTPUT HYDROGRAPH = 6                          DATA FIELD VALUES =      .0800    65.0000      .4200

           OUTPUT OPTIONS IN EFFECT  PEAK  VOL   SUM

    STANDARD CONTROL OPERATION RUNOFF   CROSS SECTION 180                                   RECORD ID     1690

           OUTPUT HYDROGRAPH = 6                          DATA FIELD VALUES =      .1100    42.0000      .4800

           OUTPUT OPTIONS IN EFFECT  PEAK  VOL   SUM
```

EXECUTIVE CONTROL OPERATION LIST RECORD ID 1700

LISTING OF CURRENT DATA

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	10			
8		7.00	.00	4.33
8		7.40	2.50	5.01
8		7.60	5.00	5.36
8		7.80	10.00	5.70
8		8.20	22.00	6.38
8		8.60	52.00	7.07
8		9.00	62.00	7.75
8		9.50	96.00	8.61
8		10.00	126.00	9.47
8		11.00	198.00	11.18
8		12.00	280.00	12.89
8		13.00	360.00	14.79
8		14.00	440.00	16.68
8		15.00	500.00	18.58
8		15.10	600.00	18.60
9 ENDTBL				

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	20			
8		4.50	.00	6.80
8		4.90	1.50	7.88
8		5.10	3.70	8.42
8		5.50	11.00	9.51
8		5.70	15.00	10.13
8		6.10	25.00	11.13
8		6.50	40.00	12.21
8		7.10	60.00	13.84
8		7.90	78.00	16.01
8		8.50	79.00	17.63
8		9.50	100.00	20.34
8		10.50	126.00	23.06
8		11.50	150.00	25.76
8		11.60	300.00	26.04
9 ENDTBL				

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	30			
8		21.00	.00	.10
8		21.40	.60	.61
8		21.60	1.50	.86
8		21.80	2.50	1.12
8		22.20	5.20	1.62
8		22.60	8.20	2.13
8		23.00	11.00	2.64
8		23.50	20.00	3.27
8		24.00	27.00	3.91
8		25.00	39.00	5.18
8		26.00	49.00	6.45
8		27.00	57.00	7.72
8		27.10	200.00	7.74
9 ENDTBL				

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	40			
8		9.00	.00	.38
8		9.40	2.20	.47
8		9.60	5.00	.52
8		10.00	14.00	.62
8		10.20	21.00	.67
8		10.60	36.00	.77
8		11.00	55.00	.86
8		11.60	82.00	1.01
8		12.40	120.00	1.21
8		13.00	121.00	1.35
8		14.00	122.00	1.60
8		15.00	126.00	1.84
8		16.00	150.00	2.08
8		16.10	300.00	2.11
9 ENDTBL				

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	50			
8		2.40	.00	22.00
8		2.80	2.00	26.86
8		3.00	7.00	29.29
8		3.40	16.00	34.16
8		3.60	24.00	36.59
8		4.00	40.00	41.46
8		4.40	60.00	46.32
8		5.00	90.00	53.62

8	5.80	120.00	63.35
8	6.40	121.00	70.65
8	7.40	210.00	82.81
8	8.40	250.00	94.98
8	10.40	334.00	119.31
8	12.40	400.00	143.63
8	12.50	800.00	143.70

9 ENDTBL

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	60			
8		2.00	.00	22.20
8		2.40	3.00	27.41
8		2.60	10.50	30.02
8		3.00	22.50	35.24
8		3.20	36.00	37.85
8		3.60	60.00	43.06
8		4.00	90.00	48.28
8		4.60	135.00	56.11
8		5.40	180.00	66.55
8		6.00	181.00	74.38
8		7.00	315.00	87.42
8		8.00	375.00	100.47
8		8.10	700.00	100.50

9 ENDTBL

		TIME INCREMENT			
4 DIMHYD		.0200			
8	.0000	.0300	.1000	.1900	.3100
8	.4700	.6600	.8200	.9300	.9900
8	1.0000	.9900	.9300	.8600	.7800
8	.6800	.5600	.4600	.3900	.3300
8	.2800	.2410	.2070	.1740	.1470
8	.1260	.1070	.0910	.0770	.0660
8	.0550	.0470	.0400	.0340	.0290
8	.0250	.0210	.0180	.0150	.0130
8	.0110	.0090	.0080	.0070	.0060
8	.0050	.0040	.0030	.0020	.0010
8	.0000	.0000	.0000	.0000	.0000

9 ENDTBL

COMPUTED PEAK RATE FACTOR = 484.00

TABLE NO. TIME INCREMENT
5 RAINFL 1 .5000

8	.0000	.0080	.0170	.0260	.0350
8	.0450	.0550	.0650	.0760	.0870
8	.0990	.1120	.1260	.1400	.1560
8	.1740	.1940	.2190	.2540	.3030
8	.5150	.5830	.6240	.6550	.6820
8	.7060	.7280	.7480	.7660	.7830
8	.7990	.8150	.8300	.8440	.8570
8	.8700	.8820	.8930	.9050	.9160
8	.9260	.9360	.9460	.9560	.9650
8	.9740	.9830	.9920	1.0000	1.0000

9 ENDTBL

TABLE NO. TIME INCREMENT
5 RAINFL 2 .2500

8	.0000	.0020	.0050	.0080	.0110
8	.0140	.0170	.0200	.0230	.0260
8	.0290	.0320	.0350	.0380	.0410
8	.0440	.0480	.0520	.0560	.0600
8	.0640	.0680	.0720	.0760	.0800
8	.0850	.0900	.0950	.1000	.1050
8	.1100	.1150	.1200	.1260	.1330
8	.1400	.1470	.1550	.1630	.1720
8	.1810	.1910	.2030	.2180	.2360
8	.2570	.2830	.3870	.6630	.7070
8	.7350	.7580	.7760	.7910	.8040
8	.8150	.8250	.8340	.8420	.8490
8	.8560	.8630	.8690	.8750	.8810
8	.8870	.8930	.8980	.9030	.9080
8	.9130	.9180	.9220	.9260	.9300
8	.9340	.9380	.9420	.9460	.9500
8	.9530	.9560	.9590	.9620	.9650
8	.9680	.9710	.9740	.9770	.9800
8	.9830	.9860	.9890	.9920	.9950
8	.9980	1.0000	1.0000	1.0000	1.0000

9 ENDTBL

TABLE NO. TIME INCREMENT
5 RAINFL 3 .5000

8	.0000	.0100	.0220	.0360	.0510
8	.0670	.0830	.0990	.1160	.1350

```
8          .1560      .1790      .2040      .2330      .2680
8          .3100      .4250      .4800      .5200      .5500
8          .5770      .6010      .6230      .6440      .6640
8          .6830      .7010      .7190      .7360      .7530
8          .7690      .7850      .8000      .8150      .8300
8          .8440      .8580      .8710      .8840      .8960
8          .9080      .9200      .9320      .9440      .9560
8          .9670      .9780      .9890     1.0000     1.0000
9 ENDTBL

   TABLE NO.     TIME INCREMENT
5 RAINFL 4                .5000

8          .0000      .0040      .0080      .0120      .0160
8          .0200      .0250      .0300      .0350      .0400
8          .0450      .0500      .0550      .0600      .0650
8          .0700      .0750      .0810      .0870      .0930
8          .0990      .1050      .1110      .1180      .1250
8          .1320      .1400      .1480      .1560      .1650
8          .1740      .1840      .1950      .2070      .2200
8          .2360      .2550      .2770      .3030      .4090
8          .5150      .5490      .5830      .6050      .6240
8          .6400      .6550      .6690      .6820      .6940
8          .7050      .7160      .7270      .7380      .7480
8          .7580      .7670      .7760      .7840      .7920
8          .8000      .8080      .8160      .8230      .8300
8          .8370      .8440      .8510      .8580      .8640
8          .8700      .8760      .8820      .8880      .8940
8          .9000      .9060      .9110      .9160      .9210
8          .9260      .9310      .9360      .9410      .9460
8          .9510      .9560      .9610      .9660      .9710
8          .9760      .9800      .9840      .9880      .9920
8          .9960     1.0000     1.0000     1.0000     1.0000
9 ENDTBL

   TABLE NO.     TIME INCREMENT
5 RAINFL 5                .5000

8          .0000      .0020      .0050      .0080      .0110
8          .0140      .0170      .0200      .0230      .0260
8          .0290      .0320      .0350      .0380      .0410
8          .0440      .0470      .0510      .0550      .0590
8          .0630      .0670      .0710      .0750      .0790
8          .0840      .0890      .0940      .0990      .1040
8          .1090      .1140      .1200      .1260      .1330
8          .1400      .1470      .1540      .1620      .1710
8          .1810      .1920      .2040      .2170      .2330
```

8	.2520	.2770	.3180	.6380	.6980
8	.7290	.7520	.7700	.7850	.7980
8	.8090	.8190	.8290	.8380	.8460
8	.8540	.8610	.8680	.8740	.8800
8	.8860	.8920	.8970	.9020	.9070
8	.9120	.9170	.9210	.9250	.9290
8	.9330	.9370	.9410	.9450	.9490
8	.9530	.9570	.9600	.9630	.9660
8	.9690	.9720	.9750	.9780	.9810
8	.9840	.9870	.9900	.9930	.9960
8	.9980	1.0000	1.0000	1.0000	1.0000

9 ENDTBL

TABLE NO.	TIME INCREMENT
5 RAINFL 6	.0200

8	.0000	.0080	.0162	.0246	.0333
8	.0425	.0524	.0630	.0743	.0863
8	.0990	.1124	.1265	.1420	.1595
8	.1800	.2050	.2550	.3450	.4370
8	.5300	.6030	.6330	.6600	.6840
8	.7050	.7240	.7420	.7590	.7750
8	.7900	.8043	.8180	.8312	.8439
8	.8561	.8678	.8790	.8898	.9002
8	.9103	.9201	.9297	.9391	.9483
8	.9573	.9661	.9747	.9832	.9916
8	1.0000	1.0000	1.0000	1.0000	1.0000

9 ENDTBL

0 STANDARD CONTROL INSTRUCTIONS

```
6 RUNOFF 1   10       6      .8400    51.0000    7.50001 0 0 1 0 1
6 RESVOR 2   10 6     7     7.0000                     1 0 0 1 0 1
6 REACH  3   10    7  5  1750.0000     1.2000    1.10001 0 0 1 0 1
6 RUNOFF 1   10       6      .2000    44.0000     .19001 0 0 1 0 1
6 ADDHYD 4   10    5 6 7                               1 1 0 1 0 1
6 SAVMOV 5   10    7  6
6 RESVOR 2   20 6     7     4.5000                     1 0 0 1 0 1
6 REACH  3   20    7  5  2900.0000      .2800    1.94001 0 0 1 0 1
6 RUNOFF 1   20       6      .2800    54.0000    2.00001 0 0 1 0 1
6 ADDHYD 4   20    5 6 7                               1 1 0 1 0 1
6 SAVMOV 5   20    7  1
6 RUNOFF 1   30       6      .3700    49.0000    3.90001 0 0 1 0 1
6 RESVOR 2   30 6     7    21.0000                     1 0 0 1 0 1
6 REACH  3   40    7  5  1300.0000      .8800    1.10001 0 0 1 0 1
6 RUNOFF 1   40       6      .0600    40.0000    1.00001 0 0 1 0 1
6 ADDHYD 4   40    5 6 7                               1 0 0 1 0 1
6 SAVMOV 5   40    7  6
6 RESVOR 2   40 6     7     9.0000                     1 0 0 1 0 1
6 REACH  3   50    7  5  1700.0000     1.6000    1.45001 0 0 1 0 1
6 RUNOFF 1   49       6      .1100    40.0000    1.67001 0 0 1 0 1
6 ADDHYD 4   50    5 6 7                               1 0 0 1 0 1
6 SAVMOV 5   50    7  5
6 RUNOFF 1   50       6      .3600    85.0000     .42001 0 0 1 0 1
6 ADDHYD 4   50    5 6 7                               1 0 0 1 0 1
6 REACH  3   60    7  5  1400.0000      .4400    1.94001 0 0 1 0 1
6 RUNOFF 1   60       6      .0500    45.0000     .90001 0 0 1 0 1
6 ADDHYD 4   60    5 6 7                               1 1 0 1 0 1
6 SAVMOV 5   70    7  5
6 SAVMOV 5   70    1  6
6 ADDHYD 4   70    5 6 7                               1 1 0 1 0 1
6 REACH  3   80    7  5   700.0000      .3000    1.94001 0 0 1 0 1
6 RUNOFF 1   80       6      .0200    64.0000     .12001 0 0 1 0 1
6 ADDHYD 4   80    5 6 7                               1 0 0 1 0 1
6 SAVMOV 5  100    7  5
6 RUNOFF 1   90       6      .2400    75.0000     .62001 0 0 1 0 1
6 ADDHYD 4  100    5 6 7                               1 0 0 1 0 1
6 REACH  3  110    7  5   500.0000      .3000    1.94001 0 0 1 0 1
6 SAVMOV 5  120    5  7
6 REACH  3  120    7  5   500.0000      .3000    1.94001 0 0 1 0 1
6 RUNOFF 1  120       6      .1900    58.0000     .74001 0 0 1 0 1
6 ADDHYD 4  120    5 6 7                               1 1 0 1 0 1
6 SAVMOV 5   50 7     6
6 RESVOR 2   50 6     7     2.4000                     1 1 1 1 0 1
6 REACH  3  130    7  5  1000.0000      .3000    1.94001 0 0 1 0 1
6 RUNOFF 1  130       6      .0500    74.0000     .19001 0 0 1 0 1
```

```
6 ADDHYD 4 130    5 6 7                                          1 0 0 1 0 1
6 SAVMOV 5 130      7   6
6 RESVOR 2      60 6   7       2.0000                            1 1 1 1 0 1
6 REACH  3 140    7   5    2500.0000        .2100      1.48001 0 0 1 0 1
6 RUNOFF 1 140        6        .2000      70.0000       .19001 0 0 1 0 1
6 ADDHYD 4 140    5 6 7                                          1 0 0 1 0 1
6 SAVMOV 5 150    7   5
6 RUNOFF 1 149        6        .0800      65.0000       .42001 0 0 1 0 1
6 ADDHYD 4 150    5 6 7                                          1 0 0 1 0 1
6 REACH  3 150    7   5     300.0000        .2100      1.48001 0 0 1 0 1
6 RUNOFF 1 150        6        .0100      40.0000       .15001 0 0 1 0 1
6 ADDHYD 4 150    5 6 7                                          1 0 0 1 0 1
6 SAVMOV 5 180    7   5
6 RUNOFF 1 180        6        .1100      42.0000       .48001 0 0 1 0 1
6 ADDHYD 4 180    5 6 7                                          1 0 0 1 0 1
6 REACH  3 180    7   5    1700.0000        .2100      1.48001 0 0 1 0 1
6 RUNOFF 1 180        6        .1100      41.0000       .48001 0 0 1 0 1
6 ADDHYD 4 180    5 6 7                                          1 1 0 1 0 1
  ENDATA

END OF LISTING
```

```
EXECUTIVE CONTROL OPERATION BASFLO                                                                RECORD ID    1710
+                                         NEW BASEFLOW =   3.00 CFS

EXECUTIVE CONTROL OPERATION INCREM                                                                RECORD ID    1720
+                                         MAIN TIME INCREMENT =   .10 HOURS

EXECUTIVE CONTROL OPERATION COMPUT                                                                RECORD ID    1730
+                                         FROM STRUCTURE 10
+                                                          TO XSECTION 180
      STARTING TIME =   .00   RAIN DEPTH =  7.00   RAIN DURATION=  1.00   RAIN TABLE NO.= 2   ANT. MOIST. COND= 2
      ALTERNATE NO.=90        STORM NO.= 1    MAIN TIME INCREMENT =   .10 HOURS

OPERATION RUNOFF    STRUCTURE 10
         OUTPUT HYDROGRAPH=  6
         AREA=    .84 SQ MI   INPUT RUNOFF CURVE= 51.    TIME OF CONCENTRATION=  7.50 HOURS
         INTERNAL HYDROGRAPH TIME INCREMENT=  .1000 HOURS

         PEAK TIME(HRS)             PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
           17.80                           96.56                       (RUNOFF)

  RUNOFF VOLUME ABOVE BASEFLOW =  1.67 WATERSHED INCHES,     906.24 CFS-HRS,     74.89 ACRE-FEET;   BASEFLOW =     .00 CFS

OPERATION RESVOR    STRUCTURE 10
         INPUT HYDROGRAPH= 6     OUTPUT HYDROGRAPH= 7
         SURFACE ELEVATION=     7.00

         PEAK TIME(HRS)             PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
           18.14                           96.09                         9.50

  RUNOFF VOLUME ABOVE BASEFLOW =  1.63 WATERSHED INCHES,     884.09 CFS-HRS,     73.06 ACRE-FEET;   BASEFLOW =     .00 CFS

OPERATION REACH     CROSS SECTION  10
         INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 5
         LENGTH =    1750.00 FEET       INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA,  X=  1.20,    M= 1.10
0        MODIFIED ATT-KIN ROUTING COEFFICIENT =  .34       PEAK TRAVEL TIME =     .40 HOURS
0     *** WARNING - REACH  10 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT      18.15 CFS,  18.88 % OF PEAK.

         PEAK TIME(HRS)             PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
           18.47                           98.84                        (NULL)

  RUNOFF VOLUME ABOVE BASEFLOW =  1.62 WATERSHED INCHES,     878.37 CFS-HRS,     72.59 ACRE-FEET;   BASEFLOW =    3.00 CFS

OPERATION RUNOFF    CROSS SECTION  10
         OUTPUT HYDROGRAPH=  6
```

AREA=   .20 SQ MI   INPUT RUNOFF CURVE= 44.   TIME OF CONCENTRATION=   .19 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0253 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.07	150.75	(RUNOFF)
15.19	9.64	(RUNOFF)
16.46	8.67	(RUNOFF)
17.67	7.42	(RUNOFF)
19.66	6.17	(RUNOFF)
23.65	4.88	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 1.16 WATERSHED INCHES, 149.25 CFS-HRS, 12.33 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 10
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.07	153.76	(NULL)
18.48	104.86	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 1.04 SQ.MI.

11.00	DISCHG	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	7.21	53.07
12.00	DISCHG	135.64	149.19	80.95	56.13	42.16	35.91	33.02	30.56	29.72	27.02
13.00	DISCHG	25.58	24.44	22.95	22.58	21.54	21.15	20.62	19.89	20.05	20.05
14.00	DISCHG	20.75	21.68	22.70	24.32	25.72	27.54	29.37	31.56	35.09	39.12
15.00	DISCHG	43.24	47.29	51.18	54.82	57.52	59.78	61.92	63.90	65.78	67.63
16.00	DISCHG	69.47	71.98	75.00	78.16	81.27	84.22	86.55	88.36	90.42	92.43
17.00	DISCHG	94.31	96.02	97.59	99.01	100.31	101.48	102.52	103.43	104.09	103.97
18.00	DISCHG	104.02	104.29	104.55	104.73	104.84	104.86	104.81	104.67	104.47	104.19
19.00	DISCHG	103.84	103.42	102.93	102.36	101.72	101.00	100.20	99.32	98.25	96.45
20.00	DISCHG	94.87	93.59	92.37	91.15	89.91	88.67	87.43	86.21	85.01	83.83
21.00	DISCHG	82.67	81.54	80.43	79.34	78.27	77.22	76.20	75.19	74.21	73.24
22.00	DISCHG	72.30	71.42	70.72	70.11	69.56	69.03	68.51	67.98	67.44	66.89
23.00	DISCHG	66.33	65.76	65.17	64.57	63.96	63.34	62.72	62.09	61.34	59.73
24.00	DISCHG	58.17	55.97	53.27	51.71	50.62	49.72	48.91	48.18	47.50	46.85
25.00	DISCHG	46.24	45.66	45.10	44.55	44.02	43.50	42.98	42.48	41.98	41.49
26.00	DISCHG	41.00	40.51	40.03	39.55	39.07	38.60	38.12	37.63	37.15	36.66
27.00	DISCHG	36.16	35.66	35.15	34.64	34.13	33.61	33.09	32.57	32.04	31.51
28.00	DISCHG	30.97	30.44	29.90	29.36	28.82	28.28	27.74	27.21	26.67	26.13
29.00	DISCHG	25.68	25.30	24.94	24.59	24.24	23.89	23.52	23.14	22.75	22.35

RUNOFF VOLUME ABOVE BASEFLOW = 1.53 WATERSHED INCHES, 1027.62 CFS-HRS, 84.92 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 10
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 6

OPERATION RESVOR STRUCTURE 20
INPUT HYDROGRAPH= 6 OUTPUT HYDROGRAPH= 7
SURFACE ELEVATION= 4.50

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.65	31.90	6.28
20.08	93.83	9.21

RUNOFF VOLUME ABOVE BASEFLOW = 1.48 WATERSHED INCHES, 990.65 CFS-HRS, 81.87 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 20
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 2900.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .28, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = .72 PEAK TRAVEL TIME = .10 HOURS

*** WARNING REACH 20 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***
0 *** WARNING - REACH 20 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT 23.17 CFS, 25.51 % OF PEAK.

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.82	31.79	(NULL)
20.23	93.80	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 1.47 WATERSHED INCHES, 987.44 CFS-HRS, 81.60 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 20
OUTPUT HYDROGRAPH= 6
AREA= .28 SQ MI INPUT RUNOFF CURVE= 54. TIME OF CONCENTRATION= 2.00 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .1026 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.36	102.66	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 2.03 WATERSHED INCHES, 366.74 CFS-HRS, 30.31 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 20
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.31	132.15	(NULL)
20.11	106.29	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 1.32 SQ.MI.

11.00	DISCHG	3.00	3.00	3.00	3.01	3.02	3.06	3.18	3.47	4.17	5.78
12.00	DISCHG	9.45	17.69	29.98	44.84	59.25	72.98	86.02	98.12	108.61	117.14
13.00	DISCHG	123.73	128.34	131.09	132.14	131.53	129.60	126.63	122.67	117.70	111.97
14.00	DISCHG	106.02	100.46	95.56	91.20	87.22	83.67	80.54	77.77	75.29	73.28
15.00	DISCHG	71.78	70.81	70.32	70.22	70.47	70.99	71.70	72.40	73.11	73.90
16.00	DISCHG	74.80	75.76	76.81	78.00	79.36	80.88	82.38	83.57	84.72	85.90
17.00	DISCHG	87.14	88.42	89.73	91.05	92.39	93.73	95.06	95.63	95.66	95.54
18.00	DISCHG	95.38	95.22	95.06	94.90	94.74	95.60	96.75	97.91	99.01	100.03

19.00	DISCHG	100.97	101.82	102.60	103.31	103.94	104.50	104.99	105.42	105.77	106.05
20.00	DISCHG	106.23	106.29	106.25	106.12	105.90	105.59	105.20	104.74	104.21	103.61
21.00	DISCHG	102.97	102.29	101.57	100.82	100.05	99.26	98.45	97.64	96.82	95.99
22.00	DISCHG	95.17	94.34	93.51	92.69	91.87	91.07	90.29	89.53	88.78	88.48
23.00	DISCHG	88.34	88.25	88.16	88.09	88.01	87.93	87.85	87.77	87.68	87.59
24.00	DISCHG	87.49	87.36	86.62	85.25	83.64	81.94	80.19	78.40	76.60	74.78
25.00	DISCHG	72.98	71.20	69.44	67.74	66.08	64.38	62.48	60.62	58.85	57.20
26.00	DISCHG	55.67	54.24	52.92	51.68	50.52	49.43	48.40	47.43	46.50	45.62
27.00	DISCHG	44.78	43.98	43.21	42.46	41.74	41.04	40.34	39.62	38.90	38.21
28.00	DISCHG	37.53	36.87	36.22	35.58	34.96	34.34	33.73	33.13	32.54	31.95
29.00	DISCHG	31.37	30.80	30.24	29.70	29.17	28.67	28.18	27.71	27.25	26.80

RUNOFF VOLUME ABOVE BASEFLOW = 1.59 WATERSHED INCHES, 1354.18 CFS-HRS, 111.91 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 20
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 1

OPERATION RUNOFF STRUCTURE 30
OUTPUT HYDROGRAPH= 6
AREA= .37 SQ MI INPUT RUNOFF CURVE= 49. TIME OF CONCENTRATION= 3.90 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .1000 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
14.95	60.58	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 1.57 WATERSHED INCHES, 375.61 CFS-HRS, 31.04 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION RESVOR STRUCTURE 30
INPUT HYDROGRAPH= 6 OUTPUT HYDROGRAPH= 7
SURFACE ELEVATION= 21.00

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
16.21	48.05	25.91

RUNOFF VOLUME ABOVE BASEFLOW = 1.51 WATERSHED INCHES, 360.28 CFS-HRS, 29.77 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION REACH CROSS SECTION 40
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 1300.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .88, M= 1.10
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = .32 PEAK TRAVEL TIME = .30 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
16.55	47.70	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 1.50 WATERSHED INCHES, 358.97 CFS-HRS, 29.67 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION RUNOFF CROSS SECTION 40

```
          OUTPUT HYDROGRAPH=  6
          AREA=    .06 SQ MI   INPUT RUNOFF CURVE= 40.    TIME OF CONCENTRATION=  1.00 HOURS
          INTERNAL HYDROGRAPH TIME INCREMENT=  .0952 HOURS

          PEAK TIME(HRS)              PEAK DISCHARGE(CFS)            PEAK ELEVATION(FEET)
             12.72                          10.21                         (RUNOFF)
             23.76                           1.21                         (RUNOFF)

  RUNOFF VOLUME ABOVE BASEFLOW =   .84 WATERSHED INCHES,     32.57 CFS-HRS,     2.69 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION ADDHYD   CROSS SECTION  40
          INPUT HYDROGRAPHS= 5,6     OUTPUT HYDROGRAPH= 7

          PEAK TIME(HRS)              PEAK DISCHARGE(CFS)            PEAK ELEVATION(FEET)
             12.73                          10.35                         (NULL)
             16.54                          49.80                         (NULL)

  RUNOFF VOLUME ABOVE BASEFLOW = 1.41 WATERSHED INCHES,    391.54 CFS-HRS,    32.36 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION SAVMOV   CROSS SECTION  40
          INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 6

OPERATION RESVOR   STRUCTURE 40
          INPUT HYDROGRAPH= 6     OUTPUT HYDROGRAPH= 7
          SURFACE ELEVATION=     9.00

          PEAK TIME(HRS)              PEAK DISCHARGE(CFS)            PEAK ELEVATION(FEET)
             12.90                           9.83                          9.81
             16.60                          49.78                         10.89

  RUNOFF VOLUME ABOVE BASEFLOW = 1.41 WATERSHED INCHES,    389.94 CFS-HRS,    32.22 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION REACH    CROSS SECTION  50
          INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 5
          LENGTH =   1700.00 FEET      INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA,  X=  1.60,   M= 1.45
0         MODIFIED ATT-KIN ROUTING COEFFICIENT =  .83      PEAK TRAVEL TIME =     .10 HOURS

     ***  WARNING  REACH  50 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***

          PEAK TIME(HRS)              PEAK DISCHARGE(CFS)            PEAK ELEVATION(FEET)
             13.02                           9.78                         (NULL)
             16.72                          49.77                         (NULL)

  RUNOFF VOLUME ABOVE BASEFLOW = 1.40 WATERSHED INCHES,    389.36 CFS-HRS,    32.18 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION RUNOFF   CROSS SECTION  49
          OUTPUT HYDROGRAPH=  6
          AREA=    11.80 MI   INPUT RUNOFF CURVE= 40.    TIME OF CONCENTRATION=  1.67 HOURS
```

```
        INTERNAL HYDROGRAPH TIME INCREMENT=  .1012 HOURS

        PEAK TIME(HRS)          PEAK DISCHARGE(CFS)        PEAK ELEVATION(FEET)
           13.33                    13.76                      (RUNOFF)
           23.80                     2.20                      (RUNOFF)
+                                     *                        * FIRST POINT OF FLAT PEAK

  RUNOFF VOLUME ABOVE BASEFLOW =   .84 WATERSHED INCHES,    59.78 CFS-HRS,    4.94 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION ADDHYD   CROSS SECTION  50
        INPUT HYDROGRAPHS= 5,6     OUTPUT HYDROGRAPH= 7

        PEAK TIME(HRS)          PEAK DISCHARGE(CFS)        PEAK ELEVATION(FEET)
           13.16                    22.91                      (NULL)
           16.65                    53.98                      (NULL)

  RUNOFF VOLUME ABOVE BASEFLOW =  1.29 WATERSHED INCHES,   449.14 CFS-HRS,   37.12 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION SAVMOV   CROSS SECTION  50
        INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 5

OPERATION RUNOFF   CROSS SECTION  50
        OUTPUT HYDROGRAPH=  6
        AREA=    .36 SQ MI   INPUT RUNOFF CURVE= 85.   TIME OF CONCENTRATION=   .42 HOURS
        INTERNAL HYDROGRAPH TIME INCREMENT=  .0560 HOURS

        PEAK TIME(HRS)          PEAK DISCHARGE(CFS)        PEAK ELEVATION(FEET)
           12.13                  1078.73                      (RUNOFF)
           19.65                    24.75                      (RUNOFF)
           23.65                    18.64                      (RUNOFF)

  RUNOFF VOLUME ABOVE BASEFLOW =  5.25 WATERSHED INCHES,  1220.14 CFS-HRS,  100.83 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION ADDHYD   CROSS SECTION  50
        INPUT HYDROGRAPHS= 5,6     OUTPUT HYDROGRAPH= 7

        PEAK TIME(HRS)          PEAK DISCHARGE(CFS)        PEAK ELEVATION(FEET)
           12.13                  1079.95                      (NULL)
           16.49                    90.76                      (NULL)

  RUNOFF VOLUME ABOVE BASEFLOW =  2.87 WATERSHED INCHES,  1669.27 CFS-HRS,  137.95 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION REACH    CROSS SECTION  60
        INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 5
        LENGTH =   1400.00 FEET      INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA,  X=   .44,   M= 1.94
0       MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00      PEAK TRAVEL TIME =    .00 HOURS
```

*** WARNING REACH 60 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.13	1079.95	(NULL)
16.49	90.76	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.87 WATERSHED INCHES, 1669.27 CFS-HRS, 137.95 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION RUNOFF CROSS SECTION 60
OUTPUT HYDROGRAPH= 6
AREA= .05 SQ MI INPUT RUNOFF CURVE= 45. TIME OF CONCENTRATION= .90 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .1000 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.56	16.56	(RUNOFF)
23.72	1.26	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 1.24 WATERSHED INCHES, 39.88 CFS-HRS, 3.30 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 60
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.14	1086.21	(NULL)
16.49	93.02	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = .95 SQ.MI.

4.00	DISCHG	.00	.00	.00	.02	.10	.26	.49	.75	1.04	1.33
5.00	DISCHG	1.62	1.91	2.20	2.49	2.77	3.04	3.32	3.58	3.84	4.10
6.00	DISCHG	4.36	4.67	5.18	5.80	6.40	6.89	7.32	7.71	8.07	8.41
7.00	DISCHG	8.75	9.07	9.38	9.69	9.99	10.29	10.58	10.86	11.14	11.41
8.00	DISCHG	11.68	12.08	12.82	13.80	14.96	16.27	17.48	18.44	19.17	19.76
9.00	DISCHG	20.27	20.91	21.91	23.16	24.29	25.16	26.02	27.23	28.66	29.92
10.00	DISCHG	30.90	31.86	33.18	34.84	37.10	40.08	43.57	47.95	52.84	58.21
11.00	DISCHG	64.10	70.07	76.45	83.02	90.75	101.27	130.10	208.30	333.15	539.50
12.00	DISCHG	836.25	1068.68	1030.91	805.58	576.69	421.03	324.82	265.51	227.09	199.69
13.00	DISCHG	178.52	161.72	147.53	136.12	127.20	119.75	113.25	107.02	101.45	96.86
14.00	DISCHG	93.29	90.54	88.31	86.99	86.63	86.30	86.13	85.74	85.37	85.47
15.00	DISCHG	86.26	87.42	88.85	90.29	90.92	90.62	90.19	90.11	90.41	90.86
16.00	DISCHG	91.35	91.83	92.25	92.60	92.86	93.02	92.76	91.64	89.95	88.43
17.00	DISCHG	87.35	86.55	85.87	85.24	84.63	84.03	83.43	82.82	82.11	80.76
18.00	DISCHG	78.62	76.40	74.60	73.30	72.20	71.21	70.27	69.38	68.51	67.67
19.00	DISCHG	66.86	66.07	65.33	64.68	63.99	63.30	62.62	61.96	61.19	59.85
20.00	DISCHG	57.76	55.58	53.88	52.62	51.60	50.72	49.94	49.23	48.56	47.93
21.00	DISCHG	47.34	46.79	46.26	45.76	45.28	44.83	44.40	43.97	43.53	43.10
22.00	DISCHG	42.70	42.29	41.89	41.51	41.15	40.80	40.46	40.14	39.84	39.55
23.00	DISCHG	39.27	39.01	38.75	38.51	38.28	38.06	37.85	37.65	37.37	36.46

24.00	DISCHG	34.72	32.26	28.67	24.55	21.18	18.97	17.56	16.54	15.77	15.13
25.00	DISCHG	14.59	14.12	13.71	13.34	13.02	12.72	12.45	12.20	11.96	11.76
26.00	DISCHG	11.57	11.41	11.25	11.11	10.97	10.84	10.71	10.57	10.42	10.28
27.00	DISCHG	10.13	9.97	9.81	9.64	9.47	9.29	9.11	8.93	8.74	8.54
28.00	DISCHG	8.34	8.13	7.93	7.72	7.51	7.29	7.08	6.87	6.67	6.46
29.00	DISCHG	6.26	6.06	5.87	5.68	5.49	5.32	5.14	4.99	4.87	4.74

RUNOFF VOLUME ABOVE BASEFLOW = 2.79 WATERSHED INCHES, 1709.15 CFS-HRS, 141.24 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION SAVMOV CROSS SECTION 70
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5

OPERATION SAVMOV CROSS SECTION 70
INPUT HYDROGRAPH= 1 OUTPUT HYDROGRAPH= 6

OPERATION ADDHYD CROSS SECTION 70
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.14	1108.12	(NULL)
17.64	178.57	(NULL)
19.30	167.99	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 2.27 SQ.MI.

4.00	DISCHG	3.00	3.00	3.00	3.02	3.10	3.26	3.49	3.75	4.04	4.33
5.00	DISCHG	4.62	4.91	5.20	5.49	5.77	6.04	6.32	6.58	6.84	7.10
6.00	DISCHG	7.36	7.67	8.18	8.80	9.40	9.89	10.32	10.71	11.07	11.41
7.00	DISCHG	11.75	12.07	12.38	12.69	12.99	13.29	13.58	13.86	14.14	14.41
8.00	DISCHG	14.68	15.08	15.82	16.80	17.96	19.27	20.48	21.44	22.17	22.76
9.00	DISCHG	23.27	23.91	24.91	26.16	27.29	28.16	29.02	30.23	31.66	32.92
10.00	DISCHG	33.90	34.86	36.18	37.84	40.10	43.08	46.57	50.95	55.84	61.21
11.00	DISCHG	67.10	73.07	79.45	86.03	93.78	104.34	133.28	211.78	337.32	545.28
12.00	DISCHG	845.70	1086.37	1060.89	850.42	635.93	494.01	410.84	363.63	335.70	316.84
13.00	DISCHG	302.25	290.06	278.62	268.25	258.73	249.35	239.88	229.68	219.15	208.83
14.00	DISCHG	199.31	191.00	183.87	178.18	173.85	169.97	166.66	163.51	160.66	158.75
15.00	DISCHG	158.04	158.23	159.17	160.51	161.38	161.60	161.89	162.51	163.52	164.76
16.00	DISCHG	166.15	167.59	169.06	170.60	172.22	173.90	175.15	175.21	174.67	174.33
17.00	DISCHG	174.49	174.97	175.59	176.29	177.03	177.77	178.49	178.45	177.77	176.30
18.00	DISCHG	174.00	171.61	169.66	168.20	166.94	166.81	167.02	167.29	167.52	167.70
19.00	DISCHG	167.83	167.90	167.93	167.99	167.93	167.80	167.61	167.37	166.96	165.90
20.00	DISCHG	163.99	161.88	160.13	158.74	157.50	156.32	155.15	153.96	152.76	151.55
21.00	DISCHG	150.31	149.07	147.83	146.58	145.33	144.09	142.85	141.60	140.35	139.10
22.00	DISCHG	137.86	136.63	135.40	134.20	133.02	131.87	130.75	129.67	128.62	128.03
23.00	DISCHG	127.61	127.25	126.92	126.60	126.29	125.99	125.70	125.42	125.06	124.05
24.00	DISCHG	122.21	119.62	115.28	109.80	104.83	100.91	97.75	94.95	92.36	89.91
25.00	DISCHG	87.57	85.32	83.15	81.08	79.10	77.11	74.93	72.81	70.82	68.96

26.00	DISCHG	67.24	65.65	64.17	62.79	61.49	60.27	59.11	57.99	56.93	55.90
27.00	DISCHG	54.91	53.95	53.02	52.10	51.21	50.33	49.45	48.54	47.64	46.75
28.00	DISCHG	45.87	45.00	44.14	43.30	42.46	41.63	40.81	40.00	39.20	38.41
29.00	DISCHG	37.63	36.86	36.10	35.37	34.67	33.99	33.33	32.70	32.12	31.53

RUNOFF VOLUME ABOVE BASEFLOW = 2.09 WATERSHED INCHES, 3063.33 CFS-HRS, 253.15 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 80
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 700.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .30, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 80 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.14	1108.12	(NULL)
17.64	178.57	(NULL)
19.30	167.99	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.09 WATERSHED INCHES, 3063.33 CFS-HRS, 253.15 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 80
OUTPUT HYDROGRAPH= 6
AREA= .02 SQ MI INPUT RUNOFF CURVE= 64. TIME OF CONCENTRATION= .12 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0160 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
11.98	54.99	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 2.98 WATERSHED INCHES, 38.49 CFS-HRS, 3.18 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 80
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.13	1129.43	(NULL)
17.64	179.89	(NULL)
19.30	169.06	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.10 WATERSHED INCHES, 3101.82 CFS-HRS, 256.33 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 100
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5

OPERATION RUNOFF CROSS SECTION 90
OUTPUT HYDROGRAPH= 6
AREA= .24 SQ MI INPUT RUNOFF CURVE= 75. TIME OF CONCENTRATION= .62 HOURS

INTERNAL HYDROGRAPH TIME INCREMENT= .0827 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.26	458.49	(RUNOFF)
19.66	15.09	(RUNOFF)
23.66	11.44	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 4.14 WATERSHED INCHES, 641.76 CFS-HRS, 53.03 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 100
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.16	1536.02	(NULL)
16.63	198.86	(NULL)
17.64	198.71	(NULL)
19.30	184.14	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.29 WATERSHED INCHES, 3743.57 CFS-HRS, 309.37 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 110
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 500.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .30, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 110 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.16	1536.02	(NULL)
16.63	198.86	(NULL)
17.64	198.71	(NULL)
19.30	184.14	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.29 WATERSHED INCHES, 3743.57 CFS-HRS, 309.37 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 120
INPUT HYDROGRAPH= 5 OUTPUT HYDROGRAPH= 7

OPERATION REACH CROSS SECTION 120
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 500.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .30, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 120 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.16	1536.02	(NULL)
16.63	198.86	(NULL)
17.64	198.71	(NULL)
19.30	184.14	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.29 WATERSHED INCHES, 3743.57 CFS-HRS, 309.37 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 120
OUTPUT HYDROGRAPH= 6
AREA= .19 SQ MI INPUT RUNOFF CURVE= 58. TIME OF CONCENTRATION= .74 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0987 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.37	176.25	(RUNOFF)
19.67	9.03	(RUNOFF)
23.66	6.96	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 2.41 WATERSHED INCHES, 295.13 CFS-HRS, 24.39 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 120
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.18	1674.69	(NULL)
15.36	204.43	(NULL)
16.62	211.90	(NULL)
17.63	209.88	(NULL)
19.29	193.16	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 2.72 SQ.MI.

TIME(HRS)											
4.00	DISCHG	3.00	3.00	3.00	3.02	3.10	3.26	3.49	3.75	4.04	4.33
5.00	DISCHG	4.62	4.91	5.20	5.49	5.77	6.04	6.32	6.58	6.84	7.10
6.00	DISCHG	7.36	7.67	8.18	8.80	9.40	9.89	10.32	10.71	11.07	11.42
7.00	DISCHG	11.77	12.13	12.52	12.93	13.36	13.79	14.23	14.67	15.11	15.54
8.00	DISCHG	15.98	16.55	17.48	18.71	20.15	21.78	23.35	24.68	25.76	26.68
9.00	DISCHG	27.51	28.47	29.83	31.49	33.06	34.37	35.71	37.41	39.40	41.24
10.00	DISCHG	42.78	44.33	46.25	48.59	51.71	55.68	60.49	66.42	73.17	80.80
11.00	DISCHG	89.23	98.24	107.95	118.29	130.50	146.43	191.02	296.23	473.75	785.42
12.00	DISCHG	1230.01	1597.32	1668.70	1487.21	1226.75	997.31	820.89	696.82	610.62	547.37
13.00	DISCHG	500.00	461.48	429.30	402.24	379.07	358.88	340.12	322.10	304.70	288.35
14.00	DISCHG	273.94	261.38	250.58	241.67	234.36	227.88	221.95	216.33	211.17	207.20
15.00	DISCHG	204.79	203.68	203.70	204.33	204.37	203.72	202.96	202.52	202.59	203.12
16.00	DISCHG	204.02	205.13	206.39	207.79	209.33	210.94	211.88	211.45	210.15	208.87
17.00	DISCHG	208.11	207.80	207.86	208.18	208.66	209.23	209.84	209.73	208.89	206.96
18.00	DISCHG	204.05	200.77	197.84	195.49	193.54	192.93	192.80	192.85	192.94	193.02
19.00	DISCHG	193.08	193.11	193.12	193.16	193.10	192.98	192.79	192.56	192.05	190.57

20.00	DISCHG	188.05	185.04	182.31	180.02	178.07	176.40	174.90	173.48	172.13	170.80
21.00	DISCHG	169.50	168.21	166.93	165.66	164.40	163.16	161.91	160.67	159.42	158.18
22.00	DISCHG	156.95	155.72	154.50	153.31	152.13	150.99	149.89	148.81	147.77	147.18
23.00	DISCHG	146.77	146.42	146.10	145.78	145.48	145.19	144.91	144.64	144.17	142.73
24.00	DISCHG	140.21	136.09	129.73	121.75	114.09	107.71	102.54	98.26	94.65	91.50
25.00	DISCHG	88.67	86.08	83.68	81.44	79.34	77.27	75.04	72.89	70.86	68.98
26.00	DISCHG	67.25	65.66	64.17	62.79	61.49	60.27	59.11	57.99	56.93	55.90
27.00	DISCHG	54.91	53.95	53.02	52.10	51.21	50.33	49.45	48.54	47.64	46.75
28.00	DISCHG	45.87	45.00	44.14	43.30	42.46	41.63	40.81	40.00	39.20	38.41
29.00	DISCHG	37.63	36.86	36.10	35.37	34.67	33.99	33.33	32.70	32.12	31.53

RUNOFF VOLUME ABOVE BASEFLOW = 2.30 WATERSHED INCHES, 4038.70 CFS-HRS, 333.76 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV STRUCTURE 50
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 6

OPERATION RESVOR STRUCTURE 50
INPUT HYDROGRAPH= 6 OUTPUT HYDROGRAPH= 7
SURFACE ELEVATION= 2.40

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.56	347.44	10.81

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 2.72 SQ.MI.

9.00	DISCHG	3.00	3.00	3.28	3.75	4.23	4.72	5.24	5.76	6.31	6.89
9.00	ELEV	2.84	2.84	2.85	2.87	2.89	2.91	2.93	2.95	2.97	3.00
10.00	DISCHG	7.43	7.98	8.54	9.13	9.76	10.42	11.14	11.94	12.81	13.79
10.00	ELEV	3.02	3.04	3.07	3.09	3.12	3.15	3.18	3.22	3.26	3.30
11.00	DISCHG	14.87	16.11	18.44	20.99	23.76	26.83	30.64	36.34	47.09	66.56
11.00	ELEV	3.35	3.40	3.46	3.52	3.59	3.67	3.77	3.91	4.14	4.53
12.00	DISCHG	96.02	120.41	179.33	233.48	264.27	288.12	305.59	318.34	327.77	334.66
12.00	ELEV	5.16	6.05	7.06	7.99	8.74	9.31	9.72	10.03	10.25	10.42
13.00	DISCHG	338.85	342.00	344.30	345.88	346.87	347.36	347.41	347.05	346.30	345.20
13.00	ELEV	10.55	10.64	10.71	10.76	10.79	10.80	10.81	10.80	10.77	10.74
14.00	DISCHG	343.78	342.09	340.18	338.09	335.87	333.43	330.38	327.25	324.06	320.82
14.00	ELEV	10.70	10.65	10.59	10.52	10.46	10.39	10.31	10.24	10.16	10.09
15.00	DISCHG	317.59	314.40	311.29	308.27	305.35	302.50	299.71	296.98	294.32	291.75
15.00	ELEV	10.01	9.93	9.86	9.79	9.72	9.65	9.58	9.52	9.46	9.39
16.00	DISCHG	289.27	286.89	284.61	282.43	280.35	278.37	276.49	274.66	272.87	271.09
16.00	ELEV	9.34	9.28	9.22	9.17	9.12	9.08	9.03	8.99	8.94	8.90
17.00	DISCHG	269.33	267.60	265.92	264.29	262.72	261.20	259.75	258.34	256.96	255.59
17.00	ELEV	8.86	8.82	8.78	8.74	8.70	8.67	8.63	8.60	8.57	8.53
18.00	DISCHG	254.18	252.72	251.22	249.70	248.22	246.75	245.30	243.90	242.53	241.20
18.00	ELEV	8.50	8.46	8.43	8.39	8.36	8.32	8.28	8.25	8.21	8.18
19.00	DISCHG	239.91	238.66	237.43	236.25	235.09	233.97	232.86	231.79	230.73	229.67
19.00	ELEV	8.15	8.12	8.09	8.06	8.03	8.00	7.97	7.94	7.92	7.89
20.00	DISCHG	228.59	227.46	226.29	225.08	223.85	222.60	221.34	220.08	218.81	217.54
20.00	ELEV	7.86	7.84	7.81	7.78	7.75	7.71	7.68	7.65	7.62	7.59

21.00	DISCHG	216.27	215.00	213.73	212.46	211.19	209.82	207.04	204.36	201.75	199.23
21.00	ELEV	7.56	7.53	7.49	7.46	7.43	7.40	7.37	7.34	7.31	7.28
22.00	DISCHG	196.79	194.41	192.10	189.86	187.68	185.56	183.50	181.49	179.54	177.66
22.00	ELEV	7.25	7.22	7.20	7.17	7.15	7.13	7.10	7.08	7.06	7.04
23.00	DISCHG	175.86	174.14	172.50	170.95	169.46	168.04	166.69	165.41	164.17	162.96
23.00	ELEV	7.02	7.00	6.98	6.96	6.94	6.93	6.91	6.90	6.89	6.87
24.00	DISCHG	161.69	160.31	158.70	156.77	154.49	151.93	149.18	146.32	143.39	140.43
24.00	ELEV	6.86	6.84	6.82	6.80	6.78	6.75	6.72	6.68	6.65	6.62
25.00	DISCHG	137.48	134.54	131.62	128.74	125.90	123.11	120.99	120.93	120.88	120.82
25.00	ELEV	6.59	6.55	6.52	6.49	6.46	6.42	6.39	6.36	6.33	6.29
26.00	DISCHG	120.76	120.70	120.64	120.57	120.51	120.44	120.37	120.30	120.23	120.16
26.00	ELEV	6.26	6.22	6.18	6.14	6.10	6.06	6.02	5.98	5.94	5.89
27.00	DISCHG	120.08	120.01	118.53	116.87	115.23	113.61	112.00	110.42	108.85	107.30
27.00	ELEV	5.85	5.81	5.76	5.72	5.67	5.63	5.59	5.54	5.50	5.46
28.00	DISCHG	105.76	104.25	102.74	101.26	99.79	98.34	96.90	95.48	94.07	92.68
28.00	ELEV	5.42	5.38	5.34	5.30	5.26	5.22	5.18	5.15	5.11	5.07
29.00	DISCHG	91.31	89.93	88.15	86.40	84.68	83.00	81.35	79.74	78.16	76.61
29.00	ELEV	5.03	5.00	4.96	4.93	4.89	4.86	4.83	4.79	4.76	4.73

RUNOFF VOLUME ABOVE BASEFLOW = 2.12 WATERSHED INCHES, 3716.78 CFS-HRS, 307.15 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 130
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 1000.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .30, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 130 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***
0 *** WARNING - REACH 130 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT 73.61 CFS, 21.37 % OF PEAK.

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.56	347.44	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.12 WATERSHED INCHES, 3716.78 CFS-HRS, 307.15 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 130
OUTPUT HYDROGRAPH= 6
AREA= .05 SQ MI INPUT RUNOFF CURVE= 74. TIME OF CONCENTRATION= .19 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0253 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.01	160.37	(RUNOFF)
23.65	2.37	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 4.05 WATERSHED INCHES, 130.79 CFS-HRS, 10.81 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 130
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.05	264.61	(NULL)
13.45	357.27	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.15 WATERSHED INCHES, 3847.57 CFS-HRS, 317.96 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 130
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 6

OPERATION RESVOR STRUCTURE 60
INPUT HYDROGRAPH= 6 OUTPUT HYDROGRAPH= 7
SURFACE ELEVATION= 2.00

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
16.61	280.68	6.74

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 2.77 SQ.MI.

11.00	DISCHG	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.06	5.09	8.31
11.00	ELEV	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.46	2.54
12.00	DISCHG	12.70	17.26	21.62	30.46	40.47	50.20	60.24	72.78	85.19	97.34
12.00	ELEV	2.67	2.83	2.97	3.12	3.27	3.44	3.60	3.77	3.94	4.10
13.00	DISCHG	109.11	120.45	131.35	140.12	147.72	155.05	162.12	168.91	175.42	180.05
13.00	ELEV	4.25	4.41	4.55	4.69	4.83	4.96	5.08	5.20	5.32	5.43
14.00	DISCHG	180.23	180.41	180.59	180.76	180.93	188.98	201.12	211.98	221.68	230.32
14.00	ELEV	5.54	5.65	5.75	5.86	5.96	6.06	6.15	6.23	6.30	6.37
15.00	DISCHG	238.00	244.78	250.76	256.00	260.55	264.48	267.84	270.70	273.10	275.10
15.00	ELEV	6.43	6.48	6.52	6.56	6.59	6.62	6.65	6.67	6.69	6.70
16.00	DISCHG	276.73	278.03	279.03	279.77	280.27	280.57	280.68	280.61	280.37	280.00
16.00	ELEV	6.71	6.72	6.73	6.74	6.74	6.74	6.74	6.74	6.74	6.74
17.00	DISCHG	279.52	278.93	278.25	277.50	276.67	275.78	274.85	273.88	272.87	271.81
17.00	ELEV	6.74	6.73	6.73	6.72	6.71	6.71	6.70	6.69	6.69	6.68
18.00	DISCHG	270.70	269.55	268.37	267.16	265.93	264.68	263.41	262.13	260.85	259.55
18.00	ELEV	6.67	6.66	6.65	6.64	6.63	6.62	6.62	6.61	6.60	6.59
19.00	DISCHG	258.26	256.96	255.68	254.39	253.12	251.86	250.61	249.37	248.15	246.92
19.00	ELEV	6.58	6.57	6.56	6.55	6.54	6.53	6.52	6.51	6.50	6.49
20.00	DISCHG	245.68	244.44	243.20	241.96	240.73	239.49	238.25	237.02	235.77	234.53
20.00	ELEV	6.48	6.47	6.46	6.45	6.45	6.44	6.43	6.42	6.41	6.40
21.00	DISCHG	233.29	232.04	230.79	229.54	228.29	227.03	225.71	224.27	222.73	221.11
21.00	ELEV	6.39	6.38	6.37	6.36	6.35	6.34	6.33	6.32	6.31	6.30
22.00	DISCHG	219.42	217.67	215.87	214.04	212.17	210.28	208.37	206.46	204.53	202.61
22.00	ELEV	6.29	6.27	6.26	6.25	6.23	6.22	6.20	6.19	6.18	6.16
23.00	DISCHG	200.70	198.80	196.91	195.05	193.22	191.42	189.65	187.92	186.23	184.55
23.00	ELEV	6.15	6.13	6.12	6.10	6.09	6.08	6.06	6.05	6.04	6.03
24.00	DISCHG	182.89	181.22	180.98	180.96	180.93	180.90	180.87	180.83	180.80	180.75
24.00	ELEV	6.01	6.00	5.99	5.97	5.96	5.94	5.92	5.90	5.88	5.85
25.00	DISCHG	180.71	180.66	180.61	180.56	180.50	180.44	180.38	180.32	180.26	180.20
25.00	ELEV	5.83	5.80	5.77	5.74	5.70	5.67	5.63	5.59	5.55	5.52

26.00	DISCHG	180.13	180.07	180.01	178.16	176.14	174.19	172.31	170.49	168.73	167.03
26.00	ELEV	5.48	5.44	5.40	5.37	5.33	5.30	5.26	5.23	5.20	5.17
27.00	DISCHG	165.39	163.80	162.25	160.69	159.12	157.56	155.99	154.43	152.86	151.29
27.00	ELEV	5.14	5.11	5.08	5.06	5.03	5.00	4.97	4.95	4.92	4.89
28.00	DISCHG	149.72	148.16	146.60	145.03	143.48	141.92	140.37	138.83	137.28	135.75
28.00	ELEV	4.86	4.83	4.81	4.78	4.75	4.72	4.70	4.67	4.64	4.61
29.00	DISCHG	133.96	131.95	129.96	127.98	126.01	124.05	122.11	120.18	118.27	116.37
29.00	ELEV	4.59	4.56	4.53	4.51	4.48	4.45	4.43	4.40	4.38	4.35

RUNOFF VOLUME ABOVE BASEFLOW = 1.96 WATERSHED INCHES, 3501.82 CFS-HRS, 289.39 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 140
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 2500.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .21, M= 1.48
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = .38 PEAK TRAVEL TIME = .30 HOURS
0 *** WARNING - REACH 140 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT 113.37 CFS, 40.83 % OF PEAK.

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
16.90	280.23	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 1.94 WATERSHED INCHES, 3470.43 CFS-HRS, 286.80 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 140
OUTPUT HYDROGRAPH= 6
AREA= .20 SQ MI INPUT RUNOFF CURVE= 70. TIME OF CONCENTRATION= .19 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0253 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.02	576.56	(RUNOFF)
15.16	20.07	(RUNOFF)
16.45	17.49	(RUNOFF)
17.65	14.64	(RUNOFF)
19.65	11.84	(RUNOFF)
23.65	9.02	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 3.63 WATERSHED INCHES, 468.30 CFS-HRS, 38.70 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 140
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.02	582.45	(NULL)
16.54	296.10	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.05 WATERSHED INCHES, 3938.73 CFS-HRS, 325.50 ACRE-FEET; BASEFLOW = 3.00 CFS

```
OPERATION SAVMOV   CROSS SECTION 150
         INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 5


OPERATION RUNOFF   CROSS SECTION 149
         OUTPUT HYDROGRAPH=  6
         AREA=    .08 SQ MI   INPUT RUNOFF CURVE= 65.    TIME OF CONCENTRATION=   .42 HOURS
         INTERNAL HYDROGRAPH TIME INCREMENT=  .0560 HOURS

         PEAK TIME(HRS)           PEAK DISCHARGE(CFS)         PEAK ELEVATION(FEET)
            12.15                       142.32                     (RUNOFF)
            16.45                         6.39                     (RUNOFF)
            17.67                         5.39                     (RUNOFF)
            19.66                         4.37                     (RUNOFF)
            23.66                         3.34                     (RUNOFF)

  RUNOFF VOLUME ABOVE BASEFLOW = 3.10 WATERSHED INCHES,    160.17 CFS-HRS,    13.24 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION ADDHYD   CROSS SECTION 150
         INPUT HYDROGRAPHS= 5,6     OUTPUT HYDROGRAPH= 7

         PEAK TIME(HRS)           PEAK DISCHARGE(CFS)         PEAK ELEVATION(FEET)
            12.03                       692.42                     (NULL)
            14.29                       213.29                     (NULL)
            16.54                       302.47                     (NULL)

  RUNOFF VOLUME ABOVE BASEFLOW =  2.08 WATERSHED INCHES,   4098.89 CFS-HRS,   338.73 ACRE-FEET;   BASEFLOW =   3.00 CFS

OPERATION REACH    CROSS SECTION 150
         INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 5
         LENGTH =     300.00 FEET       INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA,   X=   .21,    M= 1.48
0        MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00      PEAK TRAVEL TIME =     .00 HOURS

     *** WARNING  REACH 150 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***
0    *** WARNING - REACH 150 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT     118.47 CFS,  17.55 % OF PEAK.

         PEAK TIME(HRS)           PEAK DISCHARGE(CFS)         PEAK ELEVATION(FEET)
            12.03                       692.42                     (NULL)
            14.29                       213.29                     (NULL)
            16.54                       302.47                     (NULL)

  RUNOFF VOLUME ABOVE BASEFLOW =  2.08 WATERSHED INCHES,   4098.89 CFS-HRS,   338.73 ACRE-FEET;   BASEFLOW =   3.00 CFS

OPERATION RUNOFF   CROSS SECTION 150
         OUTPUT HYDROGRAPH=  6
         AREA=    .01 SQ MI   INPUT RUNOFF CURVE= 40.    TIME OF CONCENTRATION=   .15 HOURS
```

INTERNAL HYDROGRAPH TIME INCREMENT= .0200 HOURS

*** WARNING-MAIN TIME INCREMENT MAY BE TOO LARGE.
COMPUTED PEAK(4.99) AT EXCEEDS MAX. ADJACENT HYDROGRAPH COORDINATE BY 8 %.
+ XSECTION 150

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.05	4.99	(RUNOFF)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = .01 SQ.MI.

TIME(HRS)											
11.00	DISCHG	.00	.00	.00	.00	.00	.00	.00	.00	.00	1.05
12.00	DISCHG	4.60	4.46	2.17	1.71	1.28	1.17	1.09	1.02	1.00	.87
13.00	DISCHG	.84	.78	.73	.71	.66	.64	.60	.56	.55	.52
14.00	DISCHG	.52	.50	.48	.47	.44	.43	.41	.38	.38	.38
15.00	DISCHG	.38	.39	.39	.38	.35	.34	.34	.34	.34	.34
16.00	DISCHG	.34	.34	.35	.35	.35	.35	.32	.30	.30	.30
17.00	DISCHG	.30	.30	.30	.30	.30	.30	.30	.30	.30	.26
18.00	DISCHG	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25
19.00	DISCHG	.25	.25	.25	.25	.25	.25	.25	.25	.25	.21
20.00	DISCHG	.19	.19	.19	.19	.19	.19	.19	.19	.19	.19
21.00	DISCHG	.19	.20	.20	.20	.20	.20	.20	.20	.20	.20
22.00	DISCHG	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20
23.00	DISCHG	.20	.20	.20	.20	.20	.20	.20	.20	.20	.15
24.00	DISCHG	.14	.08	.01	.00						

RUNOFF VOLUME ABOVE BASEFLOW = .84 WATERSHED INCHES, 5.41 CFS-HRS, .45 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 150
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.03	697.38	(NULL)
14.29	213.76	(NULL)
16.53	302.82	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.08 WATERSHED INCHES, 4104.31 CFS-HRS, 339.18 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 180
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5

OPERATION RUNOFF CROSS SECTION 180
OUTPUT HYDROGRAPH= 6
AREA= .11 SQ MI INPUT RUNOFF CURVE= 42. TIME OF CONCENTRATION= .48 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0640 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.27	39.64	(RUNOFF)
23.68	2.45	(RUNOFF)

```
  RUNOFF VOLUME ABOVE BASEFLOW =   .99 WATERSHED INCHES,     70.57 CFS-HRS,     5.83 ACRE-FEET;   BASEFLOW =    .00 CFS

 OPERATION ADDHYD   CROSS SECTION 180
         INPUT HYDROGRAPHS= 5,6     OUTPUT HYDROGRAPH= 7

         PEAK TIME(HRS)            PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
            12.04                       714.15                        (NULL)
            14.27                       220.16                        (NULL)
            16.53                       307.08                        (NULL)

  RUNOFF VOLUME ABOVE BASEFLOW =  2.04 WATERSHED INCHES,   4174.88 CFS-HRS,   345.01 ACRE-FEET;   BASEFLOW =   3.00 CFS

 OPERATION REACH    CROSS SECTION 180
         INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 5
         LENGTH =    1700.00 FEET       INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA,  X=    .21,    M= 1.48
0        MODIFIED ATT-KIN ROUTING COEFFICIENT =  .63      PEAK TRAVEL TIME =      .20 HOURS
0    *** WARNING - REACH 180 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT      118.47 CFS,  17.13 % OF PEAK.

         PEAK TIME(HRS)            PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
            12.18                       633.33                        (NULL)
            14.41                       219.68                        (NULL)
            16.68                       306.64                        (NULL)

  RUNOFF VOLUME ABOVE BASEFLOW =  2.03 WATERSHED INCHES,   4152.71 CFS-HRS,   343.18 ACRE-FEET;   BASEFLOW =   3.00 CFS

 OPERATION RUNOFF   CROSS SECTION 180
         OUTPUT HYDROGRAPH=  6
         AREA=    .11 SQ MI   INPUT RUNOFF CURVE= 41.    TIME OF CONCENTRATION=    .48 HOURS
         INTERNAL HYDROGRAPH TIME INCREMENT=  .0640 HOURS

         PEAK TIME(HRS)            PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
            12.28                        34.74                        (RUNOFF)
            23.69                         2.34                        (RUNOFF)

  RUNOFF VOLUME ABOVE BASEFLOW =   .92 WATERSHED INCHES,     65.08 CFS-HRS,     5.38 ACRE-FEET;   BASEFLOW =    .00 CFS

 OPERATION ADDHYD   CROSS SECTION 180
         INPUT HYDROGRAPHS= 5,6     OUTPUT HYDROGRAPH= 7

         PEAK TIME(HRS)            PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
            12.19                       665.17                        (NULL)
            14.40                       225.43                        (NULL)
            16.67                       310.60                        (NULL)

 TIME(HRS)       FIRST HYDROGRAPH POINT =    .00 HOURS     TIME INCREMENT =  .10 HOURS      DRAINAGE AREA =    3.28 SQ.MI.
```

8.00	DISCHG	3.00	3.00	3.00	3.01	3.07	3.21	3.40	3.61	3.83	4.04
9.00	DISCHG	4.26	4.47	4.73	5.07	5.38	5.67	5.96	6.35	6.86	7.34
10.00	DISCHG	7.79	8.22	8.76	9.43	10.11	11.17	12.27	13.65	15.49	17.21
11.00	DISCHG	19.54	21.84	24.37	27.39	30.24	34.66	39.19	64.54	119.62	186.81
12.00	DISCHG	370.65	592.75	663.22	537.42	414.66	317.25	253.43	216.05	194.50	185.13
13.00	DISCHG	179.62	178.68	180.63	183.57	188.81	193.68	198.96	203.87	207.87	212.43
14.00	DISCHG	216.74	220.96	223.75	224.92	225.43	224.80	223.94	224.60	227.62	233.18
15.00	DISCHG	240.37	248.34	256.46	264.32	271.52	277.08	281.85	286.34	290.54	294.40
16.00	DISCHG	297.86	300.90	303.52	305.76	307.62	309.14	310.32	310.57	309.81	309.07
17.00	DISCHG	308.50	308.06	307.66	307.24	306.77	306.23	305.62	304.93	304.17	303.14
18.00	DISCHG	301.02	298.70	296.71	295.02	293.56	292.22	290.96	289.71	288.48	287.24
19.00	DISCHG	285.99	284.74	283.48	282.21	280.95	279.69	278.43	277.17	275.91	274.46
20.00	DISCHG	271.95	269.30	267.03	265.12	263.49	262.02	260.66	259.36	258.09	256.83
21.00	DISCHG	255.59	254.35	253.12	251.89	250.65	249.42	248.18	246.94	245.68	244.38
22.00	DISCHG	243.02	241.58	240.07	238.49	236.85	235.14	233.39	231.60	229.77	227.92
23.00	DISCHG	226.05	224.16	222.27	220.37	218.48	216.61	214.74	212.90	211.08	209.06
24.00	DISCHG	206.00	202.73	198.46	192.99	188.66	185.69	183.80	182.64	181.94	181.50
25.00	DISCHG	181.23	181.05	180.92	180.82	180.75	180.69	180.63	180.57	180.51	180.45
26.00	DISCHG	180.39	180.33	180.27	180.21	180.15	179.66	178.72	177.44	175.93	174.30
27.00	DISCHG	172.61	170.90	169.21	167.54	165.91	164.30	162.71	161.12	159.55	157.98
28.00	DISCHG	156.41	154.84	153.27	151.70	150.13	148.57	147.01	145.45	143.89	142.34
29.00	DISCHG	140.79	139.24	137.64	135.93	134.12	132.26	130.35	128.43	126.49	124.56

RUNOFF VOLUME ABOVE BASEFLOW = 1.99 WATERSHED INCHES, 4217.80 CFS-HRS, 348.56 ACRE-FEET; BASEFLOW = 3.00 CFS

EXECUTIVE CONTROL OPERATION ENDCMP RECORD ID 1740

\+ COMPUTATIONS COMPLETED FOR PASS 1

EXECUTIVE CONTROL OPERATION ENDJOB RECORD ID 1750

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

SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RAIN TABLE #	ANTEC MOIST COND	MAIN TIME INCREM (HR)	PRECIPITATION BEGIN (HR)	AMOUNT (IN)	DURATION (HR)	RUNOFF AMOUNT (IN)	PEAK DISCHARGE ELEVATION (FT)	TIME (HR)	RATE (CFS)	RATE (CSM)
ALTERNATE 90 STORM 1													
STRUCTURE 10	RUNOFF	.84	2	2	.10	.0	7.00	24.00	1.67	---	17.80	96.56	114.9
STRUCTURE 10	RESVOR	.84	2	2	.10	.0	7.00	24.00	1.63	9.50	18.14	96.09	114.4
XSECTION 10	REACH	.84	2	2	.10	.0	7.00	24.00	1.62	---	18.47	98.84	117.7
XSECTION 10	RUNOFF	.20	2	2	.10	.0	7.00	24.00	1.16	---	12.07	150.75	753.8
XSECTION 10	ADDHYD	1.04	2	2	.10	.0	7.00	24.00	1.53	---	12.07	153.76	147.8
STRUCTURE 20	RESVOR	1.04	2	2	.10	.0	7.00	24.00	1.48	9.21	20.08	93.83	90.2
XSECTION 20	REACH	1.04	2	2	.10	.0	7.00	24.00	1.47	---	20.23	93.80	90.2
XSECTION 20	RUNOFF	.28	2	2	.10	.0	7.00	24.00	2.03	---	13.36	102.66	366.6
XSECTION 20	ADDHYD	1.32	2	2	.10	.0	7.00	24.00	1.59	---	13.31	132.15	100.1
STRUCTURE 30	RUNOFF	.37	2	2	.10	.0	7.00	24.00	1.57	---	14.95	60.58	163.7
STRUCTURE 30	RESVOR	.37	2	2	.10	.0	7.00	24.00	1.51	25.91	16.21	48.05	129.9
XSECTION 40	REACH	.37	2	2	.10	.0	7.00	24.00	1.50	---	16.55	47.70	128.9
XSECTION 40	RUNOFF	.06	2	2	.10	.0	7.00	24.00	.84	---	12.72	10.21	170.2
XSECTION 40	ADDHYD	.43	2	2	.10	.0	7.00	24.00	1.41	---	16.54	49.80	115.8
STRUCTURE 40	RESVOR	.43	2	2	.10	.0	7.00	24.00	1.41	10.89	16.60	49.78	115.8
XSECTION 50	REACH	.43	2	2	.10	.0	7.00	24.00	1.40	---	16.72	49.77	115.7
XSECTION 49	RUNOFF	.11	2	2	.10	.0	7.00	24.00	.84	---	13.33	13.76	125.1
XSECTION 50	ADDHYD	.54	2	2	.10	.0	7.00	24.00	1.29	---	16.65	53.98	100.0
XSECTION 50	RUNOFF	.36	2	2	.10	.0	7.00	24.00	5.25	---	12.13	1078.73	2996.5
XSECTION 50	ADDHYD	.90	2	2	.10	.0	7.00	24.00	2.87	---	12.13	1079.95	1199.9
XSECTION 60	REACH	.90	2	2	.10	.0	7.00	24.00	2.87	---	12.13	1079.95	1199.9
XSECTION 60	RUNOFF	.05	2	2	.10	.0	7.00	24.00	1.24	---	12.56	16.56	331.2
XSECTION 60	ADDHYD	.95	2	2	.10	.0	7.00	24.00	2.79	---	12.14	1086.21	1143.4
XSECTION 70	ADDHYD	2.27	2	2	.10	.0	7.00	24.00	2.09	---	12.14	1108.12	488.2
XSECTION 80	REACH	2.27	2	2	.10	.0	7.00	24.00	2.09	---	12.14	1108.12	488.2
XSECTION 80	RUNOFF	.02	2	2	.10	.0	7.00	24.00	2.98	---	11.98	54.99	2749.6
XSECTION 80	ADDHYD	2.29	2	2	.10	.0	7.00	24.00	2.10	---	12.13	1129.43	493.2
XSECTION 90	RUNOFF	.24	2	2	.10	.0	7.00	24.00	4.14	---	12.26	458.49	1910.4
XSECTION 100	ADDHYD	2.53	2	2	.10	.0	7.00	24.00	2.29	---	12.16	1536.02	607.1
XSECTION 110	REACH	2.53	2	2	.10	.0	7.00	24.00	2.29	---	12.16	1536.02	607.1
XSECTION 120	REACH	2.53	2	2	.10	.0	7.00	24.00	2.29	---	12.16	1536.02	607.1
XSECTION 120	RUNOFF	.19	2	2	.10	.0	7.00	24.00	2.41	---	12.37	176.25	927.6

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

SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RAIN TABLE #	ANTEC MOIST COND	MAIN TIME INCREM (HR)	PRECIPITATION BEGIN (HR)	AMOUNT (IN)	DURATION (HR)	RUNOFF AMOUNT (IN)	PEAK DISCHARGE ELEVATION (FT)	TIME (HR)	RATE (CFS)	RATE (CSM)
ALTERNATE 90 STORM 1													
XSECTION 120	ADDHYD	2.72	2	2	.10	.0	7.00	24.00	2.30	---	12.18	1674.69	615.7
STRUCTURE 50	RESVOR	2.72	2	2	.10	.0	7.00	24.00	2.12	10.81	13.56	347.44	127.7
XSECTION 130	REACH	2.72	2	2	.10	.0	7.00	24.00	2.12	---	13.56	347.44	127.7
XSECTION 130	RUNOFF	.05	2	2	.10	.0	7.00	24.00	4.05	---	12.01	160.37	3207.4
XSECTION 130	ADDHYD	2.77	2	2	.10	.0	7.00	24.00	2.15	---	13.45	357.27	129.0
STRUCTURE 60	RESVOR	2.77	2	2	.10	.0	7.00	24.00	1.96	6.74	16.61	280.68	101.3
XSECTION 140	REACH	2.77	2	2	.10	.0	7.00	24.00	1.94	---	16.90	280.23	101.2
XSECTION 140	RUNOFF	.20	2	2	.10	.0	7.00	24.00	3.63	---	12.02	576.56	2882.8
XSECTION 140	ADDHYD	2.97	2	2	.10	.0	7.00	24.00	2.05	---	12.02	582.45	196.1
XSECTION 149	RUNOFF	.08	2	2	.10	.0	7.00	24.00	3.10	---	12.15	142.32	1779.0
XSECTION 150	ADDHYD	3.05	2	2	.10	.0	7.00	24.00	2.08	---	12.03	692.42	227.0
XSECTION 150	REACH	3.05	2	2	.10	.0	7.00	24.00	2.08	---	12.03	692.42	227.0
XSECTION 150	RUNOFF	.01	2	2	.10	.0	7.00	24.00	.84	---	12.05	4.99	499.3
XSECTION 150	ADDHYD	3.06	2	2	.10	.0	7.00	24.00	2.08	---	12.03	697.38	227.9
XSECTION 180	RUNOFF	.11	2	2	.10	.0	7.00	24.00	.99	---	12.27	39.64	360.4
XSECTION 180	ADDHYD	3.17	2	2	.10	.0	7.00	24.00	2.04	---	12.04	714.15	225.3
XSECTION 180	REACH	3.17	2	2	.10	.0	7.00	24.00	2.03	---	12.18	633.33	199.8
XSECTION 180	RUNOFF	.11	2	2	.10	.0	7.00	24.00	.92	---	12.28	34.74	315.8
XSECTION 180	ADDHYD	3.28	2	2	.10	.0	7.00	24.00	1.99	---	12.19	665.17	202.8

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

	HYDROGRAPH INFORMATION									ROUTING PARAMETERS									PEAK	
+						OUTFLOW+			VOLUME	MAIN	ITER-	Q AND A			PEAK	S/Q	ATT-	TRAVEL TIME	
XSEC	REACH	INFLOW		OUTFLOW		INTERV.AREA		BASE-	ABOVE	TIME	ATION	EQUATION		LENGTH	RATIO	@PEAK	KIN	STOR-	KINE-
ID	LENGTH	PEAK	TIME	PEAK	TIME	PEAK	TIME	FLOW	BASE	INCR	#	COEFF	POWER	FACTOR	D/I	(K)	COEFF	AGE	MATIC
	(FT)	(CFS)	(HR)	(CFS)	(HR)	(CFS)	(HR)	(CFS)	(IN)	(HR)		(X)	(M)	(K*)	(Q*)	(SEC)	(C)	(HR)	(HR)
ALTERNATE	90	STORM	1																
												1.20							
+ 10	1750	99	18.1	99	18.5			3	1.63*	.10	1		1.10	.021	.997	888	.34	.40	.25
+						149	12.1												
												.280							
+ 20	2900	94	20.1	94	20.2			3	1.48*	.10	1		1.94	.000	1.000	319	.72?	.10	.09
+						132	13.3												
												.880							
+ 40	1300	48	16.2	48	16.5			0	1.51	.10	1		1.10	.027	.992	934	.32	.30	.26
+						50	16.5												
												1.60							
+ 50	1700	50	16.6	50	16.7			0	1.41	.10	1		1.45	.002	1.000	252	.83?	.10	.07
+						54	16.6												
												.440							
+ 60	1400	1064	12.1	1064	12.1			0	2.87	.10	0		1.94	.000	1.000	38	1.00?	.00	.00
+						1069	12.1												
												.300							
+ 80	700	1086	12.1	1086	12.1			3	2.09	.10	0		1.94	.000	1.000	23	1.00?	.00	.00
+						1115	12.1												
												.300							
+110	500	1520	12.2	1520	12.2			3	2.29	.10	0		1.94	.000	1.000	14	1.00?	.00	.00
+						---	---												
												.300							
+120	500	1520	12.2	1520	12.2			3	2.29	.10	0		1.94	.000	1.000	14	1.00?	.00	.00
+						1669	12.2												
												.300							

+130	1000	347	13.6	347	13.6			3	2.12‡	.10	0		1.94	.000	1.000	56	1.00?	.00	.00
+						357	13.5												
												.210							
+140	2500	281	16.6	280	16.9			3	1.96‡	.10	1		1.48	.004	.998	779	.38	.30	.22
+						578	12.0												
												.210							
+150	300	678	12.0	678	12.0			3	2.08‡	.10	0		1.48	.000	1.000	70	1.00?	.00	.00
+						683	12.0												
												.210							
+180	1700	695	12.0	630	12.2			3	2.04‡	.10	1		1.48	.005	.907	395	.63	.20	.11
+						663	12.2												

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

XSECTION/ STRUCTURE ID	DRAINAGE AREA (SQ MI)	STORM NUMBERS.......... 1
0 STRUCTURE 60	2.77	
ALTERNATE 90		280.68
0 STRUCTURE 50	2.72	
ALTERNATE 90		347.44
0 STRUCTURE 40	.43	
ALTERNATE 90		49.78
0 STRUCTURE 30	.37	
ALTERNATE 90		48.05
0 STRUCTURE 20	1.04	
ALTERNATE 90		93.83
0 STRUCTURE 10	.84	
ALTERNATE 90		96.09
0 XSECTION 10	1.04	
ALTERNATE 90		153.76
0 XSECTION 20	1.32	
ALTERNATE 90		132.15
0 XSECTION 40	.43	
ALTERNATE 90		49.80
0 XSECTION 49	.11	
ALTERNATE 90		13.76
0 XSECTION 50	.90	
ALTERNATE 90		1079.95
0 XSECTION 60	.95	
ALTERNATE 90		1086.21
0 XSECTION 70	2.27	
ALTERNATE 90		1108.12
0 XSECTION 80	2.29	
ALTERNATE 90		1129.43

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

XSECTION/ STRUCTURE ID	DRAINAGE AREA (SQ MI)	STORM NUMBERS.......... 1
0 XSECTION 90	.24	
ALTERNATE 90		458.49
0 XSECTION 100	2.53	
ALTERNATE 90		1536.02
0 XSECTION 110	2.53	
ALTERNATE 90		1536.02
0 XSECTION 120	2.72	
ALTERNATE 90		1674.69
0 XSECTION 130	2.77	
ALTERNATE 90		357.27
0 XSECTION 140	2.97	
ALTERNATE 90		582.45
0 XSECTION 149	.08	
ALTERNATE 90		142.32
0 XSECTION 150	3.06	
ALTERNATE 90		697.38
0 XSECTION 180	3.28	
ALTERNATE 90		665.17

FISCAL YEAR 91

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###################80-80 LIST OF INPUT DATA FOR TR-20 HYDROLOGY##################

JOB TR-20                      FULLPRINT PASS=001  SUMMARY                      10
TITLE 006 COGDELL'S CREEK WATERSHED STUDY NV5010 24 HR 10YR TYPE 2 STORM        20
TITLE     ALT  91                                                      30
 3 STRUCT     10                                                                40
 8                    7.00        0.00        4.33                              50
 8                    7.4         2.5         5.01                              60
 8                    7.6         5.0         5.36                              70
 8                    7.8         10.0        5.70                              80
 8                    8.2         22.0        6.38                              90
 8                    8.6         52.0        7.07                             100
 8                    9.0         62.0        7.75                             110
 8                    9.5         96.0        8.61                             120
 8                    10.0        126.0       9.47                             130
 8                    11.0        198.0       11.18                            140
 8                    12.0        280.0       12.89                            150
 8                    13.00       360.0       14.79                            160
 8                    14.00       440.0       16.68                            170
 8                    15.00       500.0       18.58                            180
 8                    15.1        600.00      18.60                            190
 9 ENDTBL                                                                      200
 3 STRUCT      20                                                              210
 8                    4.5         0.00        6.80                             220
 8                    4.9         1.5         7.88                             230
 8                    5.1         3.7         8.42                             240
 8                    5.5         11.0        9.51                             250
 8                    5.7         15.0        10.13                            260
 8                    6.1         25.0        11.13                            270
 8                    6.5         40.0        12.21                            280
 8                    7.1         60.0        13.84                            290
 8                    7.9         78.0        16.01                            300
 8                    8.5         79.0        17.63                            310
 8                    9.5         100.0       20.34                            320
 8                    10.5        126.0       23.06                            330
 8                    11.5        150.0       25.76                            340
 8                    11.6        300.0       26.04                            350
 9 ENDTBL                                                                      360
 3 STRUCT      30                                                              370
 8                    21.0        0.00        0.10                             380
 8                    21.4        0.6         0.61                             390
 8                    21.6        1.5         0.86                             400
 8                    21.8        2.5         1.12                             410
 8                    22.2        5.2         1.62                             420
 8                    22.6        8.2         2.13                             430
 8                    23.0        11.0        2.64                             440
 8                    23.5        20.0        3.27                             450
 8                    24.0        27.0        3.91                             460
```

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

8			25.0	39.0	5.18	470
8			26.0	49.0	6.45	480
8			27.0	57.0	7.72	490
8			27.1	200.00	7.74	500
9	ENDTBL					510
3	STRUCT	40				520
8			9.0	0.0	0.38	530
8			9.4	2.2	0.47	540
8			9.6	5.0	0.52	550
8			10.0	14.0	0.62	560
8			10.2	21.0	0.67	570
8			10.6	36.0	0.77	580
8			11.0	55.0	0.86	590
8			11.6	82.0	1.01	600
8			12.4	120.0	1.21	610
8			13.0	121.0	1.35	620
8			14.0	122.0	1.60	630
8			15.0	126.0	1.84	640
8			16.0	150.00	2.08	650
8			16.1	300.0	2.11	660
9	ENDTBL					670
3	STRUCT	50				680
8			2.4	0.00	22.00	690
8			2.8	2.0	26.86	700
8			3.0	7.0	29.29	710
8			3.4	16.0	34.16	720
8			3.6	24.0	36.59	730
8			4.0	40.0	41.46	740
8			4.4	60.0	46.32	750
8			5.0	90.0	53.62	760
8			5.8	120.0	63.35	770
8			6.4	121.0	70.65	780
8			7.4	210.0	82.81	790
8			8.4	250.00	94.98	800
8			10.4	334.0	119.31	810
8			12.4	400.0	143.63	820
8			12.5	800.0	143.70	830
9	ENDTBL					840
3	STRUCT	60				850
8			2.0	0.0	22.20	860
8			2.4	3.0	27.41	870
8			2.6	10.5	30.02	880
8			3.0	22.5	35.24	890
8			3.2	36.0	37.85	900
8			3.6	60.0	43.06	910
8			4.0	90.0	48.28	920

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

8                  4.6        135.0        56.11                        930
8                  5.4        180.0        66.55                        940
8                  6.0        181.0        74.38                        950
8                  7.0        315.0        87.42                        960
8                  8.0        375.0        100.47                       970
8                  8.1        700.0        100.50                       980
9 ENDTBL                                                                990
6 RUNOFF 1    10     6 0.84   51.          7.50         1               1000
6 RESVOR 2    10 6   7 7.0                              1               1010
6 REACH  3 010   7   5 1750.  1.2          1.10         1               1020
6 RUNOFF 1 010       6 0.20   42.          0.19         1               1030
6 ADDHYD 4 010   5 6 7                                  1 1             1040
6 SAVMOV 5 010   7   6                                                  1050
6 RESVOR 2    20 6   7 4.5                              1               1060
6 REACH  3 020   7   5 2900.  0.28         1.94         1               1070
6 RUNOFF 1 020       6 0.28   53.          1.02         1               1080
6 ADDHYD 4 020   5 6 7                                  1 1             1090
6 SAVMOV 5 020   7   1                                                  1100
6 RUNOFF 1    30     6 0.37   49.          3.90         1               1110
6 RESVOR 2    30 6   7 21.0                             1               1120
6 REACH  3 040   7   5 1300.  0.88         1.10         1               1130
6 RUNOFF 1 040       6 0.06   40.          1.00         1               1140
6 ADDHYD 4 040   5 6 7                                  1               1150
6 SAVMOV 5 040   7   6                                                  1160
6 RESVOR 2    40 6   7 9.0                              1               1170
6 REACH  3 050   7   5 1700.  1.6          1.45         1               1180
6 RUNOFF 1 049       6 0.11   40.          1.67         1               1190
6 ADDHYD 4 050   5 6 7                                  1               1200
6 SAVMOV 5 050   7   5                                                  1210
6 RUNOFF 1 050       6 0.36   85.          0.42         1               1220
6 ADDHYD 4 050   5 6 7                                  1               1230
6 REACH  3 060   7   5 1400.  0.44         1.94         1               1240
6 RUNOFF 1 060       6 0.05   45.          0.90         1               1250
6 ADDHYD 4 060   5 6 7                                  1 1             1260
6 SAVMOV 5 070   7   5                                                  1270
6 SAVMOV 5 070   1   6                                                  1280
6 ADDHYD 4 070   5 6 7                                  1 1             1290
6 REACH  3 080   7   5 700.   0.30         1.94         1               1300
6 RUNOFF 1 080       6 0.02   64.          0.12         1               1310
6 ADDHYD 4 080   5 6 7                                  1               1320
6 SAVMOV 5 100   7   5                                                  1330
6 RUNOFF 1 090       6 0.24   73.          0.62         1               1340
6 ADDHYD 4 100   5 6 7                                  1               1350
6 REACH  3 110   7   5 500.   0.30         1.94         1               1360
6 SAVMOV 5 120   5   7                                                  1370
6 REACH  3 120   7   5 500.   0.30         1.94         1               1380
```

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

 6 RUNOFF 1 120        6 0.19        56.          0.74          1              1390
 6 ADDHYD 4 120    5 6 7                                        1 1            1400
 6 SAVMOV 5    50 7    6                                                       1410
 6 RESVOR 2    50 6    7 2.4                                    1 1 1          1420
 6 REACH  3 130    7   5 1000.       0.30         1.94          1              1430
 6 RUNOFF 1 130        6 0.05        74.          0.19          1              1440
 6 ADDHYD 4 130    5 6 7                                        1              1450
 6 SAVMOV 5 130    7   6                                                       1460
 6 RESVOR 2    60 6    7 2.0                                    1 1 1          1470
 6 REACH  3 140    7   5 2500.       0.21         1.48          1              1480
 6 RUNOFF 1 140        6 0.20        66.          1.15          1              1490
 6 ADDHYD 4 140    5 6 7                                        1              1500
 6 SAVMOV 5 150    7   5                                                       1510
 6 RUNOFF 1 149        6 0.08        50.          0.42          1              1520
 6 ADDHYD 4 150    5 6 7                                                       1530
 6 REACH  3 150    7   5 300.        0.21         1.48          1              1540
 6 RUNOFF 1 150        6 0.01        40.          0.15          1              1550
 6 ADDHYD 4 150    5 6 7                                        1              1560
 6 SAVMOV 5 180    7   5                                                       1570
 6 RUNOFF 1 180        6 0.28        50.          0.61          1              1580
 6 ADDHYD 4 180    5 6 7                                        1              1590
 6 REACH  3 180    7   5 1700.0      0.21         1.48          1              1600
 6 RUNOFF 1 180        6 0.11        41.          0.48          1              1610
 6 ADDHYD 4 180    5 6 7                                        1 1   1   1    1620
   ENDATA                                                                      1630
 7 ALTER  3                                                                    1640
 6 RUNOFF 1 010        6 0.20        44.0         0.19          1              1650
 6 RUNOFF 1 020        6 0.28        54.0         2.00          1              1660
 6 RUNOFF 1 090        6 0.24        75.0         0.62          1              1665
 6 RUNOFF 1 120        6 0.19        62.0         0.74          1              1668
 6 RUNOFF 1 140        6 0.20        70.0         0.19          1              1670
 6 RUNOFF 1 149        6 0.08        65.0         0.42          1              1680
 6 RUNOFF 1 180        6 0.11        42.0         0.48          1              1690
 7 LIST                                                                        1700
 7 BASFLO 5              3.0                                                   1710
 7 INCREM 6              0.1                                                   1720
 7 COMPUT 7     10 180   0.0         7.0          1.0           2 2  91  01    1730
   ENDCMP 1                                                                    1740
   ENDJOB 2                                                                    1750
0*********************************END OF 80-80 LIST*********************************
```

0CHANGES TO STANDARD CONTROL LIST FOLLOW

```
EXECUTIVE CONTROL OPERATION ALTER                                                       RECORD ID    1640

   STANDARD CONTROL OPERATION RUNOFF   CROSS SECTION  10                                RECORD ID    1650
         OUTPUT HYDROGRAPH = 6                         DATA FIELD VALUES =      .2000    44.0000      .1900
         OUTPUT OPTIONS IN EFFECT  PEAK  VOL   SUM
   STANDARD CONTROL OPERATION RUNOFF   CROSS SECTION  20                                RECORD ID    1660
         OUTPUT HYDROGRAPH = 6                         DATA FIELD VALUES =      .2800    54.0000     2.0000
         OUTPUT OPTIONS IN EFFECT  PEAK  VOL   SUM
   STANDARD CONTROL OPERATION RUNOFF   CROSS SECTION  90                                RECORD ID    1665
         OUTPUT HYDROGRAPH = 6                         DATA FIELD VALUES =      .2400    75.0000      .6200
         OUTPUT OPTIONS IN EFFECT  PEAK  VOL   SUM
   STANDARD CONTROL OPERATION RUNOFF   CROSS SECTION 120                                RECORD ID    1668
         OUTPUT HYDROGRAPH = 6                         DATA FIELD VALUES =      .1900    62.0000      .7400
         OUTPUT OPTIONS IN EFFECT  PEAK  VOL   SUM
   STANDARD CONTROL OPERATION RUNOFF   CROSS SECTION 140                                RECORD ID    1670
         OUTPUT HYDROGRAPH = 6                         DATA FIELD VALUES =      .2000    70.0000      .1900
         OUTPUT OPTIONS IN EFFECT  PEAK  VOL   SUM
   STANDARD CONTROL OPERATION RUNOFF   CROSS SECTION 149                                RECORD ID    1680
         OUTPUT HYDROGRAPH = 6                         DATA FIELD VALUES =      .0800    65.0000      .4200
         OUTPUT OPTIONS IN EFFECT  PEAK  VOL   SUM
   STANDARD CONTROL OPERATION RUNOFF   CROSS SECTION 180                                RECORD ID    1690
         OUTPUT HYDROGRAPH = 6                         DATA FIELD VALUES =      .1100    42.0000      .4800
         OUTPUT OPTIONS IN EFFECT  PEAK  VOL   SUM
```

EXECUTIVE CONTROL OPERATION LIST RECORD ID 1700

LISTING OF CURRENT DATA

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	10			
8		7.00	.00	4.33
8		7.40	2.50	5.01
8		7.60	5.00	5.36
8		7.80	10.00	5.70
8		8.20	22.00	6.38
8		8.60	52.00	7.07
8		9.00	62.00	7.75
8		9.50	96.00	8.61
8		10.00	126.00	9.47
8		11.00	198.00	11.18
8		12.00	280.00	12.89
8		13.00	360.00	14.79
8		14.00	440.00	16.68
8		15.00	500.00	18.58
8		15.10	600.00	18.60
9 ENDTBL				

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	20			
8		4.50	.00	6.80
8		4.90	1.50	7.88
8		5.10	3.70	8.42
8		5.50	11.00	9.51
8		5.70	15.00	10.13
8		6.10	25.00	11.13
8		6.50	40.00	12.21
8		7.10	60.00	13.84
8		7.90	78.00	16.01
8		8.50	79.00	17.63
8		9.50	100.00	20.34
8		10.50	126.00	23.06
8		11.50	150.00	25.76
8		11.60	300.00	26.04
9 ENDTBL				

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	30			
8		21.00	.00	.10
8		21.40	.60	.61
8		21.60	1.50	.86
8		21.80	2.50	1.12
8		22.20	5.20	1.62
8		22.60	8.20	2.13
8		23.00	11.00	2.64
8		23.50	20.00	3.27
8		24.00	27.00	3.91
8		25.00	39.00	5.18
8		26.00	49.00	6.45
8		27.00	57.00	7.72
8		27.10	200.00	7.74
9 ENDTBL				

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	40			
8		9.00	.00	.38
8		9.40	2.20	.47
8		9.60	5.00	.52
8		10.00	14.00	.62
8		10.20	21.00	.67
8		10.60	36.00	.77
8		11.00	55.00	.86
8		11.60	82.00	1.01
8		12.40	120.00	1.21
8		13.00	121.00	1.35
8		14.00	122.00	1.60
8		15.00	126.00	1.84
8		16.00	150.00	2.08
8		16.10	300.00	2.11
9 ENDTBL				

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	50			
8		2.40	.00	22.00
8		2.80	2.00	26.86
8		3.00	7.00	29.29
8		3.40	16.00	34.16
8		3.60	24.00	36.59
8		4.00	40.00	41.46
8		4.40	60.00	46.32
8		5.00	90.00	53.62

8	5.80	120.00	63.35
8	6.40	121.00	70.65
8	7.40	210.00	82.81
8	8.40	250.00	94.98
8	10.40	334.00	119.31
8	12.40	400.00	143.63
8	12.50	800.00	143.70

9 ENDTBL

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	60			
8		2.00	.00	22.20
8		2.40	3.00	27.41
8		2.60	10.50	30.02
8		3.00	22.50	35.24
8		3.20	36.00	37.85
8		3.60	60.00	43.06
8		4.00	90.00	48.28
8		4.60	135.00	56.11
8		5.40	180.00	66.55
8		6.00	181.00	74.38
8		7.00	315.00	87.42
8		8.00	375.00	100.47
8		8.10	700.00	100.50

9 ENDTBL

TIME INCREMENT

4 DIMHYD .0200

8	.0000	.0300	.1000	.1900	.3100
8	.4700	.6600	.8200	.9300	.9900
8	1.0000	.9900	.9300	.8600	.7800
8	.6800	.5600	.4600	.3900	.3300
8	.2800	.2410	.2070	.1740	.1470
8	.1260	.1070	.0910	.0770	.0660
8	.0550	.0470	.0400	.0340	.0290
8	.0250	.0210	.0180	.0150	.0130
8	.0110	.0090	.0080	.0070	.0060
8	.0050	.0040	.0030	.0020	.0010
8	.0000	.0000	.0000	.0000	.0000

9 ENDTBL

COMPUTED PEAK RATE FACTOR = 484.00

TABLE NO.		TIME INCREMENT			
5 RAINFL 1		.5000			
8	.0000	.0080	.0170	.0260	.0350
8	.0450	.0550	.0650	.0760	.0870
8	.0990	.1120	.1260	.1400	.1560
8	.1740	.1940	.2190	.2540	.3030
8	.5150	.5830	.6240	.6550	.6820
8	.7060	.7280	.7480	.7660	.7830
8	.7990	.8150	.8300	.8440	.8570
8	.8700	.8820	.8930	.9050	.9160
8	.9260	.9360	.9460	.9560	.9650
8	.9740	.9830	.9920	1.0000	1.0000
9 ENDTBL					

TABLE NO.		TIME INCREMENT			
5 RAINFL 2		.2500			
8	.0000	.0020	.0050	.0080	.0110
8	.0140	.0170	.0200	.0230	.0260
8	.0290	.0320	.0350	.0380	.0410
8	.0440	.0480	.0520	.0560	.0600
8	.0640	.0680	.0720	.0760	.0800
8	.0850	.0900	.0950	.1000	.1050
8	.1100	.1150	.1200	.1260	.1330
8	.1400	.1470	.1550	.1630	.1720
8	.1810	.1910	.2030	.2180	.2360
8	.2570	.2830	.3870	.6630	.7070
8	.7350	.7580	.7760	.7910	.8040
8	.8150	.8250	.8340	.8420	.8490
8	.8560	.8630	.8690	.8750	.8810
8	.8870	.8930	.8980	.9030	.9080
8	.9130	.9180	.9220	.9260	.9300
8	.9340	.9380	.9420	.9460	.9500
8	.9530	.9560	.9590	.9620	.9650
8	.9680	.9710	.9740	.9770	.9800
8	.9830	.9860	.9890	.9920	.9950
8	.9980	1.0000	1.0000	1.0000	1.0000
9 ENDTBL					

TABLE NO.		TIME INCREMENT			
5 RAINFL 3		.5000			
8	.0000	.0100	.0220	.0360	.0510
8	.0670	.0830	.0990	.1160	.1350

8	.1560	.1790	.2040	.2330	.2680
8	.3100	.4250	.4800	.5200	.5500
8	.5770	.6010	.6230	.6440	.6640
8	.6830	.7010	.7190	.7360	.7530
8	.7690	.7850	.8000	.8150	.8300
8	.8440	.8580	.8710	.8840	.8960
8	.9080	.9200	.9320	.9440	.9560
8	.9670	.9780	.9890	1.0000	1.0000

9 ENDTBL

TABLE NO. TIME INCREMENT
5 RAINFL 4 .5000

8	.0000	.0040	.0080	.0120	.0160
8	.0200	.0250	.0300	.0350	.0400
8	.0450	.0500	.0550	.0600	.0650
8	.0700	.0750	.0810	.0870	.0930
8	.0990	.1050	.1110	.1180	.1250
8	.1320	.1400	.1480	.1560	.1650
8	.1740	.1840	.1950	.2070	.2200
8	.2360	.2550	.2770	.3030	.4090
8	.5150	.5490	.5830	.6050	.6240
8	.6400	.6550	.6690	.6820	.6940
8	.7050	.7160	.7270	.7380	.7480
8	.7580	.7670	.7760	.7840	.7920
8	.8000	.8080	.8160	.8230	.8300
8	.8370	.8440	.8510	.8580	.8640
8	.8700	.8760	.8820	.8880	.8940
8	.9000	.9060	.9110	.9160	.9210
8	.9260	.9310	.9360	.9410	.9460
8	.9510	.9560	.9610	.9660	.9710
8	.9760	.9800	.9840	.9880	.9920
8	.9960	1.0000	1.0000	1.0000	1.0000

9 ENDTBL

TABLE NO. TIME INCREMENT
5 RAINFL 5 .5000

8	.0000	.0020	.0050	.0080	.0110
8	.0140	.0170	.0200	.0230	.0260
8	.0290	.0320	.0350	.0380	.0410
8	.0440	.0470	.0510	.0550	.0590
8	.0630	.0670	.0710	.0750	.0790
8	.0840	.0890	.0940	.0990	.1040
8	.1090	.1140	.1200	.1260	.1330
8	.1400	.1470	.1540	.1620	.1710
8	.1810	.1920	.2040	.2170	.2330

8	.2520	.2770	.3180	.6380	.6980
8	.7290	.7520	.7700	.7850	.7980
8	.8090	.8190	.8290	.8380	.8460
8	.8540	.8610	.8680	.8740	.8800
8	.8860	.8920	.8970	.9020	.9070
8	.9120	.9170	.9210	.9250	.9290
8	.9330	.9370	.9410	.9450	.9490
8	.9530	.9570	.9600	.9630	.9660
8	.9690	.9720	.9750	.9780	.9810
8	.9840	.9870	.9900	.9930	.9960
8	.9980	1.0000	1.0000	1.0000	1.0000

9 ENDTBL

TABLE NO. TIME INCREMENT
5 RAINFL 6 .0200

8	.0000	.0080	.0162	.0246	.0333
8	.0425	.0524	.0630	.0743	.0863
8	.0990	.1124	.1265	.1420	.1595
8	.1800	.2050	.2550	.3450	.4370
8	.5300	.6030	.6330	.6600	.6840
8	.7050	.7240	.7420	.7590	.7750
8	.7900	.8043	.8180	.8312	.8439
8	.8561	.8678	.8790	.8898	.9002
8	.9103	.9201	.9297	.9391	.9483
8	.9573	.9661	.9747	.9832	.9916
8	1.0000	1.0000	1.0000	1.0000	1.0000

9 ENDTBL

0 STANDARD CONTROL INSTRUCTIONS

```
6 RUNOFF 1   10    6       .8400    51.0000     7.50001 0 0 1 0 1
6 RESVOR 2   10 6  7      7.0000                      1 0 0 1 0 1
6 REACH  3  10  7  5  1750.0000     1.2000     1.10001 0 0 1 0 1
6 RUNOFF 1  10     6       .2000    44.0000      .19001 0 0 1 0 1
6 ADDHYD 4  10   5 6 7                                1 1 0 1 0 1
6 SAVMOV 5  10   7  6
6 RESVOR 2   20 6  7      4.5000                      1 0 0 1 0 1
6 REACH  3  20  7  5  2900.0000      .2800     1.94001 0 0 1 0 1
6 RUNOFF 1  20     6       .2800    54.0000     2.00001 0 0 1 0 1
6 ADDHYD 4  20   5 6 7                                1 1 0 1 0 1
6 SAVMOV 5  20   7  1
6 RUNOFF 1   30    6       .3700    49.0000     3.90001 0 0 1 0 1
6 RESVOR 2   30 6  7     21.0000                      1 0 0 1 0 1
6 REACH  3  40  7  5  1300.0000      .8800     1.10001 0 0 1 0 1
6 RUNOFF 1  40     6       .0600    40.0000     1.00001 0 0 1 0 1
6 ADDHYD 4  40   5 6 7                                1 0 0 1 0 1
6 SAVMOV 5  40   7  6
6 RESVOR 2   40 6  7      9.0000                      1 0 0 1 0 1
6 REACH  3  50  7  5  1700.0000     1.6000     1.45001 0 0 1 0 1
6 RUNOFF 1  49     6       .1100    40.0000     1.67001 0 0 1 0 1
6 ADDHYD 4  50   5 6 7                                1 0 0 1 0 1
6 SAVMOV 5  50   7  5
6 RUNOFF 1  50     6       .3600    85.0000      .42001 0 0 1 0 1
6 ADDHYD 4  50   5 6 7                                1 0 0 1 0 1
6 REACH  3  60  7  5  1400.0000      .4400     1.94001 0 0 1 0 1
6 RUNOFF 1  60     6       .0500    45.0000      .90001 0 0 1 0 1
6 ADDHYD 4  60   5 6 7                                1 1 0 1 0 1
6 SAVMOV 5  70   7  5
6 SAVMOV 5  70   1  6
6 ADDHYD 4  70   5 6 7                                1 1 0 1 0 1
6 REACH  3  80  7  5   700.0000      .3000     1.94001 0 0 1 0 1
6 RUNOFF 1  80     6       .0200    64.0000      .12001 0 0 1 0 1
6 ADDHYD 4  80   5 6 7                                1 0 0 1 0 1
6 SAVMOV 5 100   7  5
6 RUNOFF 1  90     6       .2400    75.0000      .62001 0 0 1 0 1
6 ADDHYD 4 100   5 6 7                                1 0 0 1 0 1
6 REACH  3 110  7  5   500.0000      .3000     1.94001 0 0 1 0 1
6 SAVMOV 5 120   5  7
6 REACH  3 120  7  5   500.0000      .3000     1.94001 0 0 1 0 1
6 RUNOFF 1 120     6       .1900    62.0000      .74001 0 0 1 0 1
6 ADDHYD 4 120   5 6 7                                1 1 0 1 0 1
6 SAVMOV 5    50 7  6
6 RESVOR 2    50 6  7     2.4000                      1 1 1 1 0 1
6 REACH  3 130  7  5  1000.0000      .3000     1.94001 0 0 1 0 1
6 RUNOFF 1 130     6       .0500    74.0000      .19001 0 0 1 0 1
```

```
6 ADDHYD 4 130    5 6 7                                     1 0 0 1 0 1
6 SAVMOV 5 130      7   6
6 RESVOR 2     60 6   7       2.0000                        1 1 1 1 0 1
6 REACH  3 140      7   5  2500.0000        .2100    1.48001 0 0 1 0 1
6 RUNOFF 1 140          6      .2000      70.0000     .19001 0 0 1 0 1
6 ADDHYD 4 140    5 6 7                                     1 0 0 1 0 1
6 SAVMOV 5 150      7   5
6 RUNOFF 1 149          6      .0800      65.0000     .42001 0 0 1 0 1
6 ADDHYD 4 150    5 6 7                                     1 0 0 1 0 1
6 REACH  3 150      7   5   300.0000        .2100    1.48001 0 0 1 0 1
6 RUNOFF 1 150          6      .0100      40.0000     .15001 0 0 1 0 1
6 ADDHYD 4 150    5 6 7                                     1 0 0 1 0 1
6 SAVMOV 5 180      7   5
6 RUNOFF 1 180          6      .1100      42.0000     .48001 0 0 1 0 1
6 ADDHYD 4 180    5 6 7                                     1 0 0 1 0 1
6 REACH  3 180      7   5  1700.0000        .2100    1.48001 0 0 1 0 1
6 RUNOFF 1 180          6      .1100      41.0000     .48001 0 0 1 0 1
6 ADDHYD 4 180    5 6 7                                     1 1 0 1 0 1
  ENDATA

END OF LISTING
```

```
EXECUTIVE CONTROL OPERATION BASFLO                                                      RECORD ID    1710

+                                 NEW BASEFLOW =   3.00 CFS


EXECUTIVE CONTROL OPERATION INCREM                                                      RECORD ID    1720

+                                 MAIN TIME INCREMENT =   .10 HOURS


EXECUTIVE CONTROL OPERATION COMPUT                                                      RECORD ID    1730

+                                 FROM STRUCTURE 10
+                                              TO XSECTION 180
     STARTING TIME =   .00   RAIN DEPTH =  7.00   RAIN DURATION=  1.00   RAIN TABLE NO.= 2   ANT. MOIST. COND= 2
     ALTERNATE NO.=91          STORM NO.= 1   MAIN TIME INCREMENT =   .10 HOURS


OPERATION RUNOFF   STRUCTURE 10
       OUTPUT HYDROGRAPH=  6
       AREA=     .84 SQ MI   INPUT RUNOFF CURVE= 51.    TIME OF CONCENTRATION=  7.50 HOURS
       INTERNAL HYDROGRAPH TIME INCREMENT=  .1000 HOURS

       PEAK TIME(HRS)              PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
          17.80                         96.56                        (RUNOFF)

  RUNOFF VOLUME ABOVE BASEFLOW =  1.67 WATERSHED INCHES,    906.24 CFS-HRS,    74.89 ACRE-FEET;   BASEFLOW =     .00 CFS


OPERATION RESVOR   STRUCTURE 10
       INPUT HYDROGRAPH= 6    OUTPUT HYDROGRAPH= 7
       SURFACE ELEVATION=     7.00

       PEAK TIME(HRS)              PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
          18.14                         96.09                          9.50

  RUNOFF VOLUME ABOVE BASEFLOW =  1.63 WATERSHED INCHES,    884.09 CFS-HRS,    73.06 ACRE-FEET;   BASEFLOW =     .00 CFS


OPERATION REACH    CROSS SECTION  10
       INPUT HYDROGRAPH= 7    OUTPUT HYDROGRAPH= 5
       LENGTH =   1750.00 FEET      INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA,  X=  1.20,    M= 1.10
0      MODIFIED ATT-KIN ROUTING COEFFICIENT =  .34       PEAK TRAVEL TIME =      .40 HOURS
0   *** WARNING - REACH  10 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT      18.15 CFS,  18.88 % OF PEAK.

       PEAK TIME(HRS)              PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
          18.47                         98.84                         (NULL)

  RUNOFF VOLUME ABOVE BASEFLOW =  1.62 WATERSHED INCHES,    878.37 CFS-HRS,    72.59 ACRE-FEET;   BASEFLOW =    3.00 CFS
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OPERATION RUNOFF   CROSS SECTION  10
       OUTPUT HYDROGRAPH=  6
```

AREA= .20 SQ MI INPUT RUNOFF CURVE= 44. TIME OF CONCENTRATION= .19 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0253 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.07	150.75	(RUNOFF)
15.19	9.64	(RUNOFF)
16.46	8.67	(RUNOFF)
17.67	7.42	(RUNOFF)
19.66	6.17	(RUNOFF)
23.65	4.88	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 1.16 WATERSHED INCHES, 149.25 CFS-HRS, 12.33 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 10
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.07	153.76	(NULL)
18.48	104.86	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 1.04 SQ.MI.

11.00	DISCHG	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	7.21	53.07
12.00	DISCHG	135.64	149.19	80.95	56.13	42.16	35.91	33.02	30.56	29.72	27.02
13.00	DISCHG	25.58	24.44	22.95	22.58	21.54	21.15	20.62	19.89	20.05	20.05
14.00	DISCHG	20.75	21.68	22.70	24.32	25.72	27.54	29.37	31.56	35.09	39.12
15.00	DISCHG	43.24	47.29	51.18	54.82	57.52	59.78	61.92	63.90	65.78	67.63
16.00	DISCHG	69.47	71.98	75.00	78.16	81.27	84.22	86.55	88.36	90.42	92.43
17.00	DISCHG	94.31	96.02	97.59	99.01	100.31	101.48	102.52	103.43	104.09	103.97
18.00	DISCHG	104.02	104.29	104.55	104.73	104.84	104.86	104.81	104.67	104.47	104.19
19.00	DISCHG	103.84	103.42	102.93	102.36	101.72	101.00	100.20	99.32	98.25	96.45
20.00	DISCHG	94.87	93.59	92.37	91.15	89.91	88.67	87.43	86.21	85.01	83.83
21.00	DISCHG	82.67	81.54	80.43	79.34	78.27	77.22	76.20	75.19	74.21	73.24
22.00	DISCHG	72.30	71.42	70.72	70.11	69.56	69.03	68.51	67.98	67.44	66.89
23.00	DISCHG	66.33	65.76	65.17	64.57	63.96	63.34	62.72	62.09	61.34	59.73
24.00	DISCHG	58.17	55.97	53.27	51.71	50.62	49.72	48.91	48.18	47.50	46.85
25.00	DISCHG	46.24	45.66	45.10	44.55	44.02	43.50	42.98	42.48	41.98	41.49
26.00	DISCHG	41.00	40.51	40.03	39.55	39.07	38.60	38.12	37.63	37.15	36.66
27.00	DISCHG	36.16	35.66	35.15	34.64	34.13	33.61	33.09	32.57	32.04	31.51
28.00	DISCHG	30.97	30.44	29.90	29.36	28.82	28.28	27.74	27.21	26.67	26.13
29.00	DISCHG	25.68	25.30	24.94	24.59	24.24	23.89	23.52	23.14	22.75	22.35

RUNOFF VOLUME ABOVE BASEFLOW = 1.53 WATERSHED INCHES, 1027.62 CFS-HRS, 84.92 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 10
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 6

OPERATION RESVOR STRUCTURE 20
INPUT HYDROGRAPH= 6 OUTPUT HYDROGRAPH= 7
SURFACE ELEVATION= 4.50

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.65	31.90	6.28
20.08	93.83	9.21

RUNOFF VOLUME ABOVE BASEFLOW = 1.48 WATERSHED INCHES, 990.65 CFS-HRS, 81.87 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 20
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 2900.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .28, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = .72 PEAK TRAVEL TIME = .10 HOURS

*** WARNING REACH 20 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***
0 *** WARNING - REACH 20 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT 23.17 CFS, 25.51 % OF PEAK.

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.82	31.79	(NULL)
20.23	93.80	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 1.47 WATERSHED INCHES, 987.44 CFS-HRS, 81.60 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 20
OUTPUT HYDROGRAPH= 6
AREA= .28 SQ MI INPUT RUNOFF CURVE= 54. TIME OF CONCENTRATION= 2.00 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .1026 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.36	102.66	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 2.03 WATERSHED INCHES, 366.74 CFS-HRS, 30.31 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 20
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.31	132.15	(NULL)
20.11	106.29	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 1.32 SQ.MI.

11.00	DISCHG	3.00	3.00	3.00	3.01	3.02	3.06	3.18	3.47	4.17	5.78
12.00	DISCHG	9.45	17.69	29.98	44.84	59.25	72.98	86.02	98.12	108.61	117.14
13.00	DISCHG	123.73	128.34	131.09	132.14	131.53	129.60	126.63	122.67	117.70	111.97
14.00	DISCHG	106.02	100.46	95.56	91.20	87.22	83.67	80.54	77.77	75.29	73.28
15.00	DISCHG	71.78	70.81	70.32	70.22	70.47	70.99	71.70	72.40	73.11	73.90
16.00	DISCHG	74.80	75.76	76.81	78.00	79.36	80.88	82.38	83.57	84.72	85.90
17.00	DISCHG	87.14	88.42	89.73	91.05	92.39	93.73	95.06	95.63	95.66	95.54
18.00	DISCHG	95.38	95.22	95.06	94.90	94.74	95.60	96.75	97.91	99.01	100.03

19.00	DISCHG	100.97	101.82	102.60	103.31	103.94	104.50	104.99	105.42	105.77	106.05
20.00	DISCHG	106.23	106.29	106.25	106.12	105.90	105.59	105.20	104.74	104.21	103.61
21.00	DISCHG	102.97	102.29	101.57	100.82	100.05	99.26	98.45	97.64	96.82	95.99
22.00	DISCHG	95.17	94.34	93.51	92.69	91.87	91.07	90.29	89.53	88.78	88.48
23.00	DISCHG	88.34	88.25	88.16	88.09	88.01	87.93	87.85	87.77	87.68	87.59
24.00	DISCHG	87.49	87.36	86.62	85.25	83.64	81.94	80.19	78.40	76.60	74.78
25.00	DISCHG	72.98	71.20	69.44	67.74	66.08	64.38	62.48	60.62	58.85	57.20
26.00	DISCHG	55.67	54.24	52.92	51.68	50.52	49.43	48.40	47.43	46.50	45.62
27.00	DISCHG	44.78	43.98	43.21	42.46	41.74	41.04	40.34	39.62	38.90	38.21
28.00	DISCHG	37.53	36.87	36.22	35.58	34.96	34.34	33.73	33.13	32.54	31.95
29.00	DISCHG	31.37	30.80	30.24	29.70	29.17	28.67	28.18	27.71	27.25	26.80

RUNOFF VOLUME ABOVE BASEFLOW = 1.59 WATERSHED INCHES, 1354.18 CFS-HRS, 111.91 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 20
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 1

OPERATION RUNOFF STRUCTURE 30
OUTPUT HYDROGRAPH= 6
AREA= .37 SQ MI INPUT RUNOFF CURVE= 49. TIME OF CONCENTRATION= 3.90 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .1000 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
14.95	60.58	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 1.57 WATERSHED INCHES, 375.61 CFS-HRS, 31.04 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION RESVOR STRUCTURE 30
INPUT HYDROGRAPH= 6 OUTPUT HYDROGRAPH= 7
SURFACE ELEVATION= 21.00

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
16.21	48.05	25.91

RUNOFF VOLUME ABOVE BASEFLOW = 1.51 WATERSHED INCHES, 360.28 CFS-HRS, 29.77 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION REACH CROSS SECTION 40
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 1300.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .88, M= 1.10
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = .32 PEAK TRAVEL TIME = .30 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
16.55	47.70	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 1.50 WATERSHED INCHES, 358.97 CFS-HRS, 29.67 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION RUNOFF CROSS SECTION 40

```
        OUTPUT HYDROGRAPH=  6
        AREA=    .06 SQ MI   INPUT RUNOFF CURVE= 40.    TIME OF CONCENTRATION=  1.00 HOURS
        INTERNAL HYDROGRAPH TIME INCREMENT=  .0952 HOURS

        PEAK TIME(HRS)              PEAK DISCHARGE(CFS)             PEAK ELEVATION(FEET)
           12.72                           10.21                        (RUNOFF)
           23.76                            1.21                        (RUNOFF)

   RUNOFF VOLUME ABOVE BASEFLOW =   .84 WATERSHED INCHES,     32.57 CFS-HRS,     2.69 ACRE-FEET;  BASEFLOW =    .00 CFS

OPERATION ADDHYD   CROSS SECTION  40
        INPUT HYDROGRAPHS= 5,6     OUTPUT HYDROGRAPH= 7

        PEAK TIME(HRS)              PEAK DISCHARGE(CFS)             PEAK ELEVATION(FEET)
           12.73                           10.35                        (NULL)
           16.54                           49.80                        (NULL)

   RUNOFF VOLUME ABOVE BASEFLOW = 1.41 WATERSHED INCHES,    391.54 CFS-HRS,    32.36 ACRE-FEET;  BASEFLOW =    .00 CFS

OPERATION SAVMOV   CROSS SECTION  40
        INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 6

OPERATION RESVOR   STRUCTURE 40
        INPUT HYDROGRAPH= 6     OUTPUT HYDROGRAPH= 7
        SURFACE ELEVATION=     9.00

        PEAK TIME(HRS)              PEAK DISCHARGE(CFS)             PEAK ELEVATION(FEET)
           12.90                            9.83                         9.81
           16.60                           49.78                        10.89

   RUNOFF VOLUME ABOVE BASEFLOW = 1.41 WATERSHED INCHES,    389.94 CFS-HRS,    32.22 ACRE-FEET;  BASEFLOW =    .00 CFS

OPERATION REACH    CROSS SECTION  50
        INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 5
        LENGTH =   1700.00 FEET      INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA,  X=  1.60,   M= 1.45
0       MODIFIED ATT-KIN ROUTING COEFFICIENT =  .83       PEAK TRAVEL TIME =    .10 HOURS

    *** WARNING  REACH  50 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***

        PEAK TIME(HRS)              PEAK DISCHARGE(CFS)             PEAK ELEVATION(FEET)
           13.02                            9.78                        (NULL)
           16.72                           49.77                        (NULL)

   RUNOFF VOLUME ABOVE BASEFLOW = 1.40 WATERSHED INCHES,    389.36 CFS-HRS,    32.18 ACRE-FEET;  BASEFLOW =    .00 CFS

OPERATION RUNOFF   CROSS SECTION  49
        OUTPUT HYDROGRAPH=  6
        AREA=    .11 SQ MI   INPUT RUNOFF CURVE= 40.    TIME OF CONCENTRATION=  1.67 HOURS
```

INTERNAL HYDROGRAPH TIME INCREMENT= .1012 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.33	13.76	(RUNOFF)
23.80	2.20	(RUNOFF)
+	*	* FIRST POINT OF FLAT PEAK

RUNOFF VOLUME ABOVE BASEFLOW = .84 WATERSHED INCHES, 59.78 CFS-HRS, 4.94 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 50
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.16	22.91	(NULL)
16.65	53.98	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 1.29 WATERSHED INCHES, 449.14 CFS-HRS, 37.12 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION SAVMOV CROSS SECTION 50
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5

OPERATION RUNOFF CROSS SECTION 50
OUTPUT HYDROGRAPH= 6
AREA= .36 SQ MI INPUT RUNOFF CURVE= 85. TIME OF CONCENTRATION= .42 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0560 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.13	1078.73	(RUNOFF)
19.65	24.75	(RUNOFF)
23.65	18.64	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 5.25 WATERSHED INCHES, 1220.14 CFS-HRS, 100.83 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 50
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.13	1079.95	(NULL)
16.49	90.76	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.87 WATERSHED INCHES, 1669.27 CFS-HRS, 137.95 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION REACH CROSS SECTION 60
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 1400.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .44, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 60 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.13	1079.95	(NULL)
16.49	90.76	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.87 WATERSHED INCHES, 1669.27 CFS-HRS, 137.95 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION RUNOFF CROSS SECTION 60
OUTPUT HYDROGRAPH= 6
AREA= .05 SQ MI INPUT RUNOFF CURVE= 45. TIME OF CONCENTRATION= .90 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .1000 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.56	16.56	(RUNOFF)
23.72	1.26	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 1.24 WATERSHED INCHES, 39.88 CFS-HRS, 3.30 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 60
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.14	1086.21	(NULL)
16.49	93.02	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = .95 SQ.MI.

4.00	DISCHG	.00	.00	.00	.02	.10	.26	.49	.75	1.04	1.33
5.00	DISCHG	1.62	1.91	2.20	2.49	2.77	3.04	3.32	3.58	3.84	4.10
6.00	DISCHG	4.36	4.67	5.18	5.80	6.40	6.89	7.32	7.71	8.07	8.41
7.00	DISCHG	8.75	9.07	9.38	9.69	9.99	10.29	10.58	10.86	11.14	11.41
8.00	DISCHG	11.68	12.08	12.82	13.80	14.96	16.27	17.48	18.44	19.17	19.76
9.00	DISCHG	20.27	20.91	21.91	23.16	24.29	25.16	26.02	27.23	28.66	29.92
10.00	DISCHG	30.90	31.86	33.18	34.84	37.10	40.08	43.57	47.95	52.84	58.21
11.00	DISCHG	64.10	70.07	76.45	83.02	90.75	101.27	130.10	208.30	333.15	539.50
12.00	DISCHG	836.25	1068.68	1030.91	805.58	576.69	421.03	324.82	265.51	227.09	199.69
13.00	DISCHG	178.52	161.72	147.53	136.12	127.20	119.75	113.25	107.02	101.45	96.86
14.00	DISCHG	93.29	90.54	88.31	86.99	86.63	86.30	86.13	85.74	85.37	85.47
15.00	DISCHG	86.26	87.42	88.85	90.29	90.92	90.62	90.19	90.11	90.41	90.86
16.00	DISCHG	91.35	91.83	92.25	92.60	92.86	93.02	92.76	91.64	89.95	88.43
17.00	DISCHG	87.35	86.55	85.87	85.24	84.63	84.03	83.43	82.82	82.11	80.76
18.00	DISCHG	78.62	76.40	74.60	73.30	72.20	71.21	70.27	69.38	68.51	67.67
19.00	DISCHG	66.86	66.07	65.33	64.68	63.99	63.30	62.62	61.96	61.19	59.85
20.00	DISCHG	57.76	55.58	53.88	52.62	51.60	50.72	49.94	49.23	48.56	47.93
21.00	DISCHG	47.34	46.79	46.26	45.76	45.28	44.83	44.40	43.97	43.53	43.10
22.00	DISCHG	42.70	42.29	41.89	41.51	41.15	40.80	40.46	40.14	39.84	39.55
23.00	DISCHG	39.27	39.01	38.75	38.51	38.28	38.06	37.85	37.65	37.37	36.46

24.00	DISCHG	34.72	32.26	28.67	24.55	21.18	18.97	17.56	16.54	15.77	15.13
25.00	DISCHG	14.59	14.12	13.71	13.34	13.02	12.72	12.45	12.20	11.96	11.76
26.00	DISCHG	11.57	11.41	11.25	11.11	10.97	10.84	10.71	10.57	10.42	10.28
27.00	DISCHG	10.13	9.97	9.81	9.64	9.47	9.29	9.11	8.93	8.74	8.54
28.00	DISCHG	8.34	8.13	7.93	7.72	7.51	7.29	7.08	6.87	6.67	6.46
29.00	DISCHG	6.26	6.06	5.87	5.68	5.49	5.32	5.14	4.99	4.87	4.74

RUNOFF VOLUME ABOVE BASEFLOW = 2.79 WATERSHED INCHES, 1709.15 CFS-HRS, 141.24 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION SAVMOV CROSS SECTION 70
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5

OPERATION SAVMOV CROSS SECTION 70
INPUT HYDROGRAPH= 1 OUTPUT HYDROGRAPH= 6

OPERATION ADDHYD CROSS SECTION 70
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.14	1108.12	(NULL)
17.64	178.57	(NULL)
19.30	167.99	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 2.27 SQ.MI.

4.00	DISCHG	3.00	3.00	3.00	3.02	3.10	3.26	3.49	3.75	4.04	4.33
5.00	DISCHG	4.62	4.91	5.20	5.49	5.77	6.04	6.32	6.58	6.84	7.10
6.00	DISCHG	7.36	7.67	8.18	8.80	9.40	9.89	10.32	10.71	11.07	11.41
7.00	DISCHG	11.75	12.07	12.38	12.69	12.99	13.29	13.58	13.86	14.14	14.41
8.00	DISCHG	14.68	15.08	15.82	16.80	17.96	19.27	20.48	21.44	22.17	22.76
9.00	DISCHG	23.27	23.91	24.91	26.16	27.29	28.16	29.02	30.23	31.66	32.92
10.00	DISCHG	33.90	34.86	36.18	37.84	40.10	43.08	46.57	50.95	55.84	61.21
11.00	DISCHG	67.10	73.07	79.45	86.03	93.78	104.34	133.28	211.78	337.32	545.28
12.00	DISCHG	845.70	1086.37	1060.89	850.42	635.93	494.01	410.84	363.63	335.70	316.84
13.00	DISCHG	302.25	290.06	278.62	268.25	258.73	249.35	239.88	229.68	219.15	208.83
14.00	DISCHG	199.31	191.00	183.87	178.18	173.85	169.97	166.66	163.51	160.66	158.75
15.00	DISCHG	158.04	158.23	159.17	160.51	161.38	161.60	161.89	162.51	163.52	164.76
16.00	DISCHG	166.15	167.59	169.06	170.60	172.22	173.90	175.15	175.21	174.67	174.33
17.00	DISCHG	174.49	174.97	175.59	176.29	177.03	177.77	178.49	178.45	177.77	176.30
18.00	DISCHG	174.00	171.61	169.66	168.20	166.94	166.81	167.02	167.29	167.52	167.70
19.00	DISCHG	167.83	167.90	167.93	167.99	167.93	167.80	167.61	167.37	166.96	165.90
20.00	DISCHG	163.99	161.88	160.13	158.74	157.50	156.32	155.15	153.96	152.76	151.55
21.00	DISCHG	150.31	149.07	147.83	146.58	145.33	144.09	142.85	141.60	140.35	139.10
22.00	DISCHG	137.86	136.63	135.40	134.20	133.02	131.87	130.75	129.67	128.62	128.03
23.00	DISCHG	127.61	127.25	126.92	126.60	126.29	125.99	125.70	125.42	125.06	124.05
24.00	DISCHG	122.21	119.62	115.28	109.80	104.83	100.91	97.75	94.95	92.36	89.91
25.00	DISCHG	87.57	85.32	83.15	81.08	79.10	77.11	74.93	72.81	70.82	68.96

26.00	DISCHG	67.24	65.65	64.17	62.79	61.49	60.27	59.11	57.99	56.93	55.90
27.00	DISCHG	54.91	53.95	53.02	52.10	51.21	50.33	49.45	48.54	47.64	46.75
28.00	DISCHG	45.87	45.00	44.14	43.30	42.46	41.63	40.81	40.00	39.20	38.41
29.00	DISCHG	37.63	36.86	36.10	35.37	34.67	33.99	33.33	32.70	32.12	31.53

RUNOFF VOLUME ABOVE BASEFLOW = 2.09 WATERSHED INCHES, 3063.33 CFS-HRS, 253.15 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 80
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 700.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .30, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 80 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.14	1108.12	(NULL)
17.64	178.57	(NULL)
19.30	167.99	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.09 WATERSHED INCHES, 3063.33 CFS-HRS, 253.15 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 80
OUTPUT HYDROGRAPH= 6
AREA= .02 SQ MI INPUT RUNOFF CURVE= 64. TIME OF CONCENTRATION= .12 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0160 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
11.98	54.99	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 2.98 WATERSHED INCHES, 38.49 CFS-HRS, 3.18 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 80
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.13	1129.43	(NULL)
17.64	179.89	(NULL)
19.30	169.06	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.10 WATERSHED INCHES, 3101.82 CFS-HRS, 256.33 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 100
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5

OPERATION RUNOFF CROSS SECTION 90
OUTPUT HYDROGRAPH= 6
AREA= .24 SQ MI INPUT RUNOFF CURVE= 75. TIME OF CONCENTRATION= .62 HOURS

INTERNAL HYDROGRAPH TIME INCREMENT= .0827 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.26	458.49	(RUNOFF)
19.66	15.09	(RUNOFF)
23.66	11.44	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 4.14 WATERSHED INCHES, 641.76 CFS-HRS, 53.03 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 100
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.16	1536.02	(NULL)
16.63	198.86	(NULL)
17.64	198.71	(NULL)
19.30	184.14	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.29 WATERSHED INCHES, 3743.57 CFS-HRS, 309.37 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 110
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 500.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .30, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 110 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.16	1536.02	(NULL)
16.63	198.86	(NULL)
17.64	198.71	(NULL)
19.30	184.14	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.29 WATERSHED INCHES, 3743.57 CFS-HRS, 309.37 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 120
INPUT HYDROGRAPH= 5 OUTPUT HYDROGRAPH= 7

OPERATION REACH CROSS SECTION 120
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 500.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .30, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 120 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.16	1536.02	(NULL)
16.63	198.86	(NULL)
17.64	198.71	(NULL)
19.30	184.14	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.29 WATERSHED INCHES, 3743.57 CFS-HRS, 309.37 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 120
OUTPUT HYDROGRAPH= 6
AREA= .19 SQ MI INPUT RUNOFF CURVE= 62. TIME OF CONCENTRATION= .74 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0987 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.36	210.53	(RUNOFF)
19.67	9.82	(RUNOFF)
23.66	7.53	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 2.80 WATERSHED INCHES, 343.12 CFS-HRS, 28.36 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 120
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.18	1706.92	(NULL)
15.35	205.97	(NULL)
16.62	213.14	(NULL)
17.63	210.91	(NULL)
19.29	193.96	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 2.72 SQ.MI.

4.00	DISCHG	3.00	3.00	3.00	3.02	3.10	3.26	3.49	3.75	4.04	4.33
5.00	DISCHG	4.62	4.91	5.20	5.49	5.77	6.04	6.32	6.58	6.84	7.10
6.00	DISCHG	7.36	7.67	8.18	8.80	9.40	9.89	10.32	10.71	11.07	11.42
7.00	DISCHG	11.77	12.13	12.52	12.93	13.36	13.79	14.23	14.67	15.11	15.54
8.00	DISCHG	15.98	16.55	17.48	18.71	20.15	21.78	23.35	24.68	25.76	26.68
9.00	DISCHG	27.51	28.47	29.83	31.49	33.06	34.37	35.71	37.41	39.40	41.24
10.00	DISCHG	42.79	44.36	46.33	48.77	52.04	56.22	61.31	67.58	74.73	82.80
11.00	DISCHG	91.67	101.12	111.25	121.99	134.59	151.00	196.40	303.10	483.36	799.54
12.00	DISCHG	1250.49	1624.90	1701.78	1522.28	1260.25	1026.78	845.25	716.35	626.33	560.22
13.00	DISCHG	510.65	470.41	436.88	408.75	384.73	363.87	344.56	326.09	308.32	291.66
14.00	DISCHG	276.98	264.18	253.18	244.10	236.65	230.05	224.01	218.29	213.04	208.98
15.00	DISCHG	206.49	205.32	205.29	205.88	205.89	205.20	204.41	203.92	203.96	204.45
16.00	DISCHG	205.33	206.42	207.66	209.05	210.59	212.19	213.12	212.68	211.35	210.04
17.00	DISCHG	209.25	208.91	208.94	209.24	209.70	210.26	210.87	210.75	209.91	207.97
18.00	DISCHG	205.04	201.73	198.77	196.39	194.42	193.78	193.64	193.68	193.75	193.83
19.00	DISCHG	193.88	193.91	193.92	193.96	193.90	193.77	193.58	193.35	192.84	191.35

20.00	DISCHG	188.82	185.78	183.02	180.70	178.73	177.03	175.52	174.10	172.73	171.40
21.00	DISCHG	170.09	168.80	167.52	166.25	164.99	163.74	162.50	161.26	160.01	158.76
22.00	DISCHG	157.53	156.30	155.08	153.89	152.71	151.57	150.46	149.39	148.35	147.76
23.00	DISCHG	147.35	147.00	146.67	146.36	146.06	145.77	145.48	145.21	144.74	143.29
24.00	DISCHG	140.75	136.60	130.20	122.16	114.41	107.96	102.73	98.39	94.74	91.57
25.00	DISCHG	88.72	86.12	83.70	81.46	79.35	77.28	75.05	72.89	70.86	68.98
26.00	DISCHG	67.25	65.66	64.17	62.79	61.49	60.27	59.11	57.99	56.93	55.90
27.00	DISCHG	54.91	53.95	53.02	52.10	51.21	50.33	49.45	48.54	47.64	46.75
28.00	DISCHG	45.87	45.00	44.14	43.30	42.46	41.63	40.81	40.00	39.20	38.41
29.00	DISCHG	37.63	36.86	36.10	35.37	34.67	33.99	33.33	32.70	32.12	31.53

RUNOFF VOLUME ABOVE BASEFLOW = 2.33 WATERSHED INCHES, 4086.70 CFS-HRS, 337.72 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV STRUCTURE 50
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 6

OPERATION RESVOR STRUCTURE 50
INPUT HYDROGRAPH= 6 OUTPUT HYDROGRAPH= 7
SURFACE ELEVATION= 2.40

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.55	353.43	10.99

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 2.72 SQ.MI.

9.00	DISCHG	3.00	3.00	3.28	3.75	4.23	4.72	5.24	5.76	6.31	6.89
9.00	ELEV	2.84	2.84	2.85	2.87	2.89	2.91	2.93	2.95	2.97	3.00
10.00	DISCHG	7.43	7.98	8.55	9.14	9.76	10.44	11.17	11.98	12.87	13.87
10.00	ELEV	3.02	3.04	3.07	3.09	3.12	3.15	3.19	3.22	3.26	3.31
11.00	DISCHG	14.98	16.38	18.79	21.42	24.29	27.46	31.38	37.23	48.45	68.27
11.00	ELEV	3.35	3.41	3.47	3.54	3.61	3.69	3.78	3.93	4.17	4.57
12.00	DISCHG	97.70	120.51	186.33	237.40	269.24	293.83	311.90	325.09	334.65	340.39
12.00	ELEV	5.21	6.11	7.13	8.09	8.86	9.44	9.87	10.19	10.42	10.59
13.00	DISCHG	344.72	347.95	350.30	351.90	352.90	353.37	353.39	352.99	352.20	351.04
13.00	ELEV	10.72	10.82	10.89	10.94	10.97	10.99	10.99	10.98	10.95	10.92
14.00	DISCHG	349.56	347.81	345.83	343.68	341.38	338.99	336.50	333.93	330.60	327.24
14.00	ELEV	10.87	10.82	10.76	10.69	10.62	10.55	10.48	10.40	10.32	10.24
15.00	DISCHG	323.88	320.56	317.32	314.17	311.13	308.16	305.25	302.41	299.64	296.95
15.00	ELEV	10.16	10.08	10.00	9.93	9.86	9.78	9.72	9.65	9.58	9.52
16.00	DISCHG	294.36	291.87	289.49	287.20	285.03	282.95	280.98	279.06	277.18	275.31
16.00	ELEV	9.46	9.40	9.34	9.29	9.23	9.18	9.14	9.09	9.05	9.00
17.00	DISCHG	273.46	271.65	269.89	268.17	266.52	264.93	263.40	261.92	260.47	259.02
17.00	ELEV	8.96	8.92	8.87	8.83	8.79	8.76	8.72	8.68	8.65	8.61
18.00	DISCHG	257.54	256.02	254.45	252.85	251.23	249.64	248.15	246.69	245.27	243.89
18.00	ELEV	8.58	8.54	8.51	8.47	8.43	8.39	8.35	8.32	8.28	8.25
19.00	DISCHG	242.55	241.24	239.97	238.74	237.54	236.37	235.22	234.10	233.01	231.91
19.00	ELEV	8.21	8.18	8.15	8.12	8.09	8.06	8.03	8.00	7.98	7.95
20.00	DISCHG	230.79	229.62	228.41	227.16	225.89	224.61	223.31	222.01	220.71	219.40
20.00	ELEV	7.92	7.89	7.86	7.83	7.80	7.77	7.73	7.70	7.67	7.64

21.00	DISCHG	218.10	216.80	215.49	214.19	212.89	211.59	210.29	207.79	205.02	202.34
21.00	ELEV	7.60	7.57	7.54	7.50	7.47	7.44	7.41	7.38	7.34	7.31
22.00	DISCHG	199.75	197.23	194.79	192.43	190.13	187.90	185.73	183.63	181.59	179.62
22.00	ELEV	7.28	7.26	7.23	7.20	7.18	7.15	7.13	7.10	7.08	7.06
23.00	DISCHG	177.74	175.95	174.24	172.61	171.06	169.58	168.18	166.84	165.55	164.29
23.00	ELEV	7.04	7.02	7.00	6.98	6.96	6.95	6.93	6.92	6.90	6.89
24.00	DISCHG	162.98	161.55	159.90	157.92	155.59	152.99	150.19	147.28	144.30	141.30
24.00	ELEV	6.87	6.86	6.84	6.81	6.79	6.76	6.73	6.70	6.66	6.63
25.00	DISCHG	138.29	135.31	132.35	129.43	126.55	123.72	121.00	120.95	120.89	120.83
25.00	ELEV	6.59	6.56	6.53	6.49	6.46	6.43	6.40	6.37	6.33	6.30
26.00	DISCHG	120.77	120.71	120.65	120.58	120.52	120.45	120.38	120.31	120.24	120.17
26.00	ELEV	6.26	6.23	6.19	6.15	6.11	6.07	6.03	5.99	5.94	5.90
27.00	DISCHG	120.09	120.02	118.77	117.10	115.46	113.83	112.22	110.63	109.06	107.50
27.00	ELEV	5.86	5.81	5.77	5.72	5.68	5.64	5.59	5.55	5.51	5.47
28.00	DISCHG	105.96	104.44	102.93	101.44	99.97	98.51	97.07	95.64	94.23	92.84
28.00	ELEV	5.43	5.39	5.34	5.31	5.27	5.23	5.19	5.15	5.11	5.08
29.00	DISCHG	91.46	90.10	88.34	86.58	84.86	83.17	81.52	79.90	78.31	76.76
29.00	ELEV	5.04	5.00	4.97	4.93	4.90	4.86	4.83	4.80	4.77	4.74

RUNOFF VOLUME ABOVE BASEFLOW = 2.14 WATERSHED INCHES, 3764.10 CFS-HRS, 311.06 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 130
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 1000.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .30, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 130 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***
0 *** WARNING - REACH 130 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT 73.76 CFS, 21.05 % OF PEAK.

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.55	353.43	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.14 WATERSHED INCHES, 3764.10 CFS-HRS, 311.06 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 130
OUTPUT HYDROGRAPH= 6
AREA= .05 SQ MI INPUT RUNOFF CURVE= 74. TIME OF CONCENTRATION= .19 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0253 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.01	160.37	(RUNOFF)
23.65	2.37	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 4.05 WATERSHED INCHES, 130.79 CFS-HRS, 10.81 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 130
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.05	265.73	(NULL)
13.45	363.29	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.18 WATERSHED INCHES, 3894.89 CFS-HRS, 321.87 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 130
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 6

OPERATION RESVOR STRUCTURE 60
INPUT HYDROGRAPH= 6 OUTPUT HYDROGRAPH= 7
SURFACE ELEVATION= 2.00

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
16.54	286.61	6.79

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 2.77 SQ.MI.

11.00	DISCHG	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.14	5.20	8.45
11.00	ELEV	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.46	2.55
12.00	DISCHG	12.84	17.42	21.85	31.18	41.25	51.15	61.65	74.43	87.08	99.43
12.00	ELEV	2.68	2.83	2.98	3.13	3.29	3.45	3.62	3.79	3.96	4.13
13.00	DISCHG	111.37	122.89	133.95	142.20	149.94	157.40	164.60	171.51	178.14	180.14
13.00	ELEV	4.28	4.44	4.59	4.73	4.87	5.00	5.13	5.25	5.37	5.48
14.00	DISCHG	180.32	180.51	180.69	180.87	184.81	197.97	209.85	220.52	230.07	238.55
14.00	ELEV	5.59	5.71	5.81	5.92	6.03	6.13	6.22	6.29	6.37	6.43
15.00	DISCHG	246.08	252.71	258.54	263.63	268.04	271.82	275.03	277.75	280.02	281.88
15.00	ELEV	6.49	6.54	6.58	6.62	6.65	6.68	6.70	6.72	6.74	6.75
16.00	DISCHG	283.38	284.55	285.42	286.03	286.41	286.59	286.58	286.38	286.03	285.55
16.00	ELEV	6.76	6.77	6.78	6.78	6.79	6.79	6.79	6.79	6.78	6.78
17.00	DISCHG	284.95	284.26	283.47	282.61	281.68	280.69	279.66	278.59	277.48	276.33
17.00	ELEV	6.78	6.77	6.76	6.76	6.75	6.74	6.74	6.73	6.72	6.71
18.00	DISCHG	275.13	273.89	272.63	271.33	270.01	268.67	267.31	265.94	264.57	263.19
18.00	ELEV	6.70	6.69	6.68	6.67	6.66	6.65	6.64	6.63	6.62	6.61
19.00	DISCHG	261.82	260.45	259.08	257.73	256.39	255.06	253.74	252.44	251.15	249.86
19.00	ELEV	6.60	6.59	6.58	6.57	6.56	6.55	6.54	6.53	6.52	6.51
20.00	DISCHG	248.56	247.26	245.97	244.68	243.39	242.10	240.81	239.53	238.24	236.95
20.00	ELEV	6.50	6.49	6.48	6.48	6.47	6.46	6.45	6.44	6.43	6.42
21.00	DISCHG	235.65	234.36	233.07	231.77	230.48	229.19	227.89	226.55	225.10	223.54
21.00	ELEV	6.41	6.40	6.39	6.38	6.37	6.36	6.35	6.34	6.33	6.32
22.00	DISCHG	221.90	220.19	218.41	216.58	214.71	212.81	210.88	208.94	206.99	205.03
22.00	ELEV	6.31	6.29	6.28	6.27	6.25	6.24	6.22	6.21	6.19	6.18
23.00	DISCHG	203.07	201.13	199.20	197.29	195.41	193.56	191.74	189.96	188.21	186.49
23.00	ELEV	6.16	6.15	6.14	6.12	6.11	6.09	6.08	6.07	6.05	6.04
24.00	DISCHG	184.77	183.05	181.29	180.98	180.95	180.93	180.90	180.86	180.82	180.78
24.00	ELEV	6.03	6.02	6.00	5.99	5.97	5.96	5.94	5.92	5.89	5.87
25.00	DISCHG	180.74	180.70	180.65	180.59	180.54	180.48	180.42	180.36	180.29	180.23
25.00	ELEV	5.84	5.82	5.79	5.76	5.72	5.69	5.65	5.61	5.58	5.54

26.00	DISCHG	180.17	180.10	180.04	179.31	177.25	175.26	173.34	171.49	169.70	167.97
26.00	ELEV	5.50	5.46	5.43	5.39	5.35	5.32	5.28	5.25	5.22	5.19
27.00	DISCHG	166.29	164.67	163.09	161.51	159.92	158.34	156.75	155.17	153.58	152.00
27.00	ELEV	5.16	5.13	5.10	5.07	5.04	5.01	4.99	4.96	4.93	4.90
28.00	DISCHG	150.41	148.83	147.25	145.67	144.10	142.53	140.96	139.40	137.85	136.29
28.00	ELEV	4.87	4.85	4.82	4.79	4.76	4.73	4.71	4.68	4.65	4.62
29.00	DISCHG	134.67	132.63	130.62	128.61	126.62	124.65	122.69	120.74	118.81	116.89
29.00	ELEV	4.60	4.57	4.54	4.51	4.49	4.46	4.44	4.41	4.38	4.36

RUNOFF VOLUME ABOVE BASEFLOW = 1.98 WATERSHED INCHES, 3548.28 CFS-HRS, 293.23 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 140
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 2500.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .21, M= 1.48
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = .38 PEAK TRAVEL TIME = .30 HOURS
0 *** WARNING - REACH 140 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT 113.89 CFS, 40.16 % OF PEAK.

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
16.83	286.13	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 1.97 WATERSHED INCHES, 3516.90 CFS-HRS, 290.64 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 140
OUTPUT HYDROGRAPH= 6
AREA= .20 SQ MI INPUT RUNOFF CURVE= 70. TIME OF CONCENTRATION= .19 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0253 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.02	576.56	(RUNOFF)
15.16	20.07	(RUNOFF)
16.45	17.49	(RUNOFF)
17.65	14.64	(RUNOFF)
19.65	11.84	(RUNOFF)
23.65	9.02	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 3.63 WATERSHED INCHES, 468.30 CFS-HRS, 38.70 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 140
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.02	582.56	(NULL)
16.53	302.43	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.08 WATERSHED INCHES, 3985.21 CFS-HRS, 329.34 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 150
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5

OPERATION RUNOFF CROSS SECTION 149
OUTPUT HYDROGRAPH= 6
AREA= .08 SQ MI INPUT RUNOFF CURVE= 65. TIME OF CONCENTRATION= .42 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0560 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.15	142.32	(RUNOFF)
16.45	6.39	(RUNOFF)
17.67	5.39	(RUNOFF)
19.66	4.37	(RUNOFF)
23.66	3.34	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 3.10 WATERSHED INCHES, 160.17 CFS-HRS, 13.24 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 150
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.03	692.53	(NULL)
16.53	308.81	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.11 WATERSHED INCHES, 4145.37 CFS-HRS, 342.57 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 150
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 300.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .21, M= 1.48
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 150 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***
0 *** WARNING - REACH 150 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT 119.01 CFS, 17.63 % OF PEAK.

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.03	692.53	(NULL)
16.53	308.81	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.11 WATERSHED INCHES, 4145.37 CFS-HRS, 342.57 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 150
OUTPUT HYDROGRAPH= 6
AREA= .01 SQ MI INPUT RUNOFF CURVE= 40. TIME OF CONCENTRATION= .15 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0200 HOURS

*** WARNING-MAIN TIME INCREMENT MAY BE TOO LARGE.
COMPUTED PEAK(4.99) AT EXCEEDS MAX. ADJACENT HYDROGRAPH COORDINATE BY 8 %.
+ XSECTION 150

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.05	4.99	(RUNOFF)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = .01 SQ.MI.

11.00	DISCHG	.00	.00	.00	.00	.00	.00	.00	.00	.00	1.05
12.00	DISCHG	4.60	4.46	2.17	1.71	1.28	1.17	1.09	1.02	1.00	.87
13.00	DISCHG	.84	.78	.73	.71	.66	.64	.60	.56	.55	.52
14.00	DISCHG	.52	.50	.48	.47	.44	.43	.41	.38	.38	.38
15.00	DISCHG	.38	.39	.39	.38	.35	.34	.34	.34	.34	.34
16.00	DISCHG	.34	.34	.35	.35	.35	.35	.32	.30	.30	.30
17.00	DISCHG	.30	.30	.30	.30	.30	.30	.30	.30	.30	.26
18.00	DISCHG	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25
19.00	DISCHG	.25	.25	.25	.25	.25	.25	.25	.25	.25	.21
20.00	DISCHG	.19	.19	.19	.19	.19	.19	.19	.19	.19	.19
21.00	DISCHG	.19	.20	.20	.20	.20	.20	.20	.20	.20	.20
22.00	DISCHG	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20
23.00	DISCHG	.20	.20	.20	.20	.20	.20	.20	.20	.20	.15
24.00	DISCHG	.14	.08	.01	.00						

RUNOFF VOLUME ABOVE BASEFLOW = .84 WATERSHED INCHES, 5.41 CFS-HRS, .45 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 150
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.03	697.49	(NULL)
14.28	214.31	(NULL)
16.52	309.15	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.10 WATERSHED INCHES, 4150.79 CFS-HRS, 343.02 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 180
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5

OPERATION RUNOFF CROSS SECTION 180
OUTPUT HYDROGRAPH= 6
AREA= .11 SQ MI INPUT RUNOFF CURVE= 42. TIME OF CONCENTRATION= .48 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0640 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.27	39.64	(RUNOFF)
23.68	2.45	(RUNOFF)

```
 RUNOFF VOLUME ABOVE BASEFLOW =  .99 WATERSHED INCHES,    70.57 CFS-HRS,     5.83 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION ADDHYD   CROSS SECTION 180
         INPUT HYDROGRAPHS= 5,6    OUTPUT HYDROGRAPH= 7

         PEAK TIME(HRS)           PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
            12.04                      714.27                       (NULL)
            14.26                      220.74                       (NULL)
            16.52                      313.42                       (NULL)

 RUNOFF VOLUME ABOVE BASEFLOW = 2.06 WATERSHED INCHES,  4221.36 CFS-HRS,   348.85 ACRE-FEET;   BASEFLOW =   3.00 CFS

OPERATION REACH    CROSS SECTION 180
         INPUT HYDROGRAPH= 7    OUTPUT HYDROGRAPH= 5
         LENGTH =   1700.00 FEET      INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA,  X=   .21,   M= 1.48
0        MODIFIED ATT-KIN ROUTING COEFFICIENT =  .63      PEAK TRAVEL TIME =    .20 HOURS
0     *** WARNING - REACH 180 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT    119.01 CFS,  17.20 % OF PEAK.

         PEAK TIME(HRS)           PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
            12.18                      633.45                       (NULL)
            16.67                      312.99                       (NULL)

 RUNOFF VOLUME ABOVE BASEFLOW = 2.05 WATERSHED INCHES,  4199.10 CFS-HRS,   347.01 ACRE-FEET;   BASEFLOW =   3.00 CFS

OPERATION RUNOFF   CROSS SECTION 180
         OUTPUT HYDROGRAPH=  6
         AREA=    .11 SQ MI   INPUT RUNOFF CURVE= 41.    TIME OF CONCENTRATION=    .48 HOURS
         INTERNAL HYDROGRAPH TIME INCREMENT=  .0640 HOURS

         PEAK TIME(HRS)           PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
            12.28                       34.74                       (RUNOFF)
            23.69                        2.34                       (RUNOFF)

 RUNOFF VOLUME ABOVE BASEFLOW =  .92 WATERSHED INCHES,    65.08 CFS-HRS,     5.38 ACRE-FEET;   BASEFLOW =    .00 CFS

OPERATION ADDHYD   CROSS SECTION 180
         INPUT HYDROGRAPHS= 5,6    OUTPUT HYDROGRAPH= 7

         PEAK TIME(HRS)           PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
            12.19                      665.28                       (NULL)
            16.66                      316.97                       (NULL)

TIME(HRS)        FIRST HYDROGRAPH POINT =    .00 HOURS     TIME INCREMENT = .10 HOURS      DRAINAGE AREA =    3.28 SQ.MI.
   8.00   DISCHG        3.00      3.00      3.00      3.01      3.07      3.21      3.40      3.61      3.83      4.04
   9.00   DISCHG        4.26      4.47      4.73      5.07      5.38      5.67      5.96      6.35      6.86      7.34
```

10.00	DISCHG	7.79	8.22	8.76	9.43	10.11	11.17	12.27	13.65	15.49	17.21
11.00	DISCHG	19.54	21.84	24.37	27.39	30.24	34.66	39.19	64.54	119.62	186.83
12.00	DISCHG	370.70	592.84	663.34	537.56	414.83	317.59	253.93	216.72	195.42	186.31
13.00	DISCHG	181.07	180.39	182.56	185.72	191.15	196.04	201.32	206.26	210.31	214.95
14.00	DISCHG	219.35	223.02	225.22	225.94	226.14	225.30	225.18	227.86	232.67	239.50
15.00	DISCHG	247.51	255.96	264.33	272.29	279.49	284.99	289.67	294.04	298.11	301.83
16.00	DISCHG	305.15	308.04	310.53	312.62	314.34	315.73	316.78	316.89	316.00	315.13
17.00	DISCHG	314.44	313.87	313.36	312.82	312.24	311.59	310.86	310.07	309.20	308.07
18.00	DISCHG	305.85	303.43	301.34	299.55	298.00	296.58	295.22	293.89	292.56	291.23
19.00	DISCHG	289.89	288.55	287.21	285.86	284.52	283.18	281.84	280.51	279.18	277.66
20.00	DISCHG	275.09	272.37	270.04	268.07	266.37	264.85	263.43	262.07	260.75	259.44
21.00	DISCHG	258.15	256.86	255.58	254.30	253.02	251.74	250.46	249.17	247.89	246.60
22.00	DISCHG	245.26	243.87	242.42	240.88	239.28	237.60	235.87	234.09	232.26	230.40
23.00	DISCHG	228.51	226.60	224.68	222.76	220.83	218.91	217.00	215.12	213.24	211.18
24.00	DISCHG	208.07	204.75	200.43	194.91	190.18	186.76	184.52	183.12	182.25	181.71
25.00	DISCHG	181.37	181.14	180.99	180.88	180.80	180.73	180.67	180.61	180.55	180.49
26.00	DISCHG	180.43	180.37	180.30	180.24	180.18	179.96	179.27	178.16	176.76	175.19
27.00	DISCHG	173.53	171.82	170.12	168.44	166.78	165.15	163.53	161.93	160.33	158.74
28.00	DISCHG	157.15	155.56	153.97	152.39	150.80	149.22	147.64	146.07	144.49	142.92
29.00	DISCHG	141.36	139.79	138.22	136.53	134.74	132.88	130.96	129.02	127.07	125.12

RUNOFF VOLUME ABOVE BASEFLOW = 2.01 WATERSHED INCHES, 4264.19 CFS-HRS, 352.39 ACRE-FEET; BASEFLOW = 3.00 CFS

EXECUTIVE CONTROL OPERATION ENDCMP RECORD ID 1740

+ COMPUTATIONS COMPLETED FOR PASS 1

EXECUTIVE CONTROL OPERATION ENDJOB RECORD ID 1750

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

SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RAIN TABLE #	ANTEC MOIST COND	MAIN TIME INCREM (HR)	PRECIPITATION BEGIN (HR)	PRECIPITATION AMOUNT (IN)	PRECIPITATION DURATION (HR)	RUNOFF AMOUNT (IN)	PEAK DISCHARGE ELEVATION (FT)	PEAK DISCHARGE TIME (HR)	PEAK DISCHARGE RATE (CFS)	PEAK DISCHARGE RATE (CSM)
ALTERNATE 91 STORM 1													
STRUCTURE 10	RUNOFF	.84	2	2	.10	.0	7.00	24.00	1.67	---	17.80	96.56	114.9
STRUCTURE 10	RESVOR	.84	2	2	.10	.0	7.00	24.00	1.63	9.50	18.14	96.09	114.4
XSECTION 10	REACH	.84	2	2	.10	.0	7.00	24.00	1.62	---	18.47	98.84	117.7
XSECTION 10	RUNOFF	.20	2	2	.10	.0	7.00	24.00	1.16	---	12.07	150.75	753.8
XSECTION 10	ADDHYD	1.04	2	2	.10	.0	7.00	24.00	1.53	---	12.07	153.76	147.8
STRUCTURE 20	RESVOR	1.04	2	2	.10	.0	7.00	24.00	1.48	9.21	20.08	93.83	90.2
XSECTION 20	REACH	1.04	2	2	.10	.0	7.00	24.00	1.47	---	20.23	93.80	90.2
XSECTION 20	RUNOFF	.28	2	2	.10	.0	7.00	24.00	2.03	---	13.36	102.66	366.6
XSECTION 20	ADDHYD	1.32	2	2	.10	.0	7.00	24.00	1.59	---	13.31	132.15	100.1
STRUCTURE 30	RUNOFF	.37	2	2	.10	.0	7.00	24.00	1.57	---	14.95	60.58	163.7
STRUCTURE 30	RESVOR	.37	2	2	.10	.0	7.00	24.00	1.51	25.91	16.21	48.05	129.9
XSECTION 40	REACH	.37	2	2	.10	.0	7.00	24.00	1.50	---	16.55	47.70	128.9
XSECTION 40	RUNOFF	.06	2	2	.10	.0	7.00	24.00	.84	---	12.72	10.21	170.2
XSECTION 40	ADDHYD	.43	2	2	.10	.0	7.00	24.00	1.41	---	16.54	49.80	115.8
STRUCTURE 40	RESVOR	.43	2	2	.10	.0	7.00	24.00	1.41	10.89	16.60	49.78	115.8
XSECTION 50	REACH	.43	2	2	.10	.0	7.00	24.00	1.40	---	16.72	49.77	115.7
XSECTION 49	RUNOFF	.11	2	2	.10	.0	7.00	24.00	.84	---	13.33	13.76	125.1
XSECTION 50	ADDHYD	.54	2	2	.10	.0	7.00	24.00	1.29	---	16.65	53.98	100.0
XSECTION 50	RUNOFF	.36	2	2	.10	.0	7.00	24.00	5.25	---	12.13	1078.73	2996.5
XSECTION 50	ADDHYD	.90	2	2	.10	.0	7.00	24.00	2.87	---	12.13	1079.95	1199.9
XSECTION 60	REACH	.90	2	2	.10	.0	7.00	24.00	2.87	---	12.13	1079.95	1199.9
XSECTION 60	RUNOFF	.05	2	2	.10	.0	7.00	24.00	1.24	---	12.56	16.56	331.2
XSECTION 60	ADDHYD	.95	2	2	.10	.0	7.00	24.00	2.79	---	12.14	1086.21	1143.4
XSECTION 70	ADDHYD	2.27	2	2	.10	.0	7.00	24.00	2.09	---	12.14	1108.12	488.2
XSECTION 80	REACH	2.27	2	2	.10	.0	7.00	24.00	2.09	---	12.14	1108.12	488.2
XSECTION 80	RUNOFF	.02	2	2	.10	.0	7.00	24.00	2.98	---	11.98	54.99	2749.6
XSECTION 80	ADDHYD	2.29	2	2	.10	.0	7.00	24.00	2.10	---	12.13	1129.43	493.2
XSECTION 90	RUNOFF	.24	2	2	.10	.0	7.00	24.00	4.14	---	12.26	458.49	1910.4
XSECTION 100	ADDHYD	2.53	2	2	.10	.0	7.00	24.00	2.29	---	12.16	1536.02	607.1
XSECTION 110	REACH	2.53	2	2	.10	.0	7.00	24.00	2.29	---	12.16	1536.02	607.1
XSECTION 120	REACH	2.53	2	2	.10	.0	7.00	24.00	2.29	---	12.16	1536.02	607.1
XSECTION 120	RUNOFF	.19	2	2	.10	.0	7.00	24.00	2.80	---	12.36	210.53	1108.1

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

SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RAIN TABLE #	ANTEC MOIST COND	MAIN TIME INCREM (HR)	PRECIPITATION BEGIN (HR)	AMOUNT (IN)	DURATION (HR)	RUNOFF AMOUNT (IN)	PEAK DISCHARGE ELEVATION (FT)	TIME (HR)	RATE (CFS)	RATE (CSM)
ALTERNATE 91 STORM 1													
XSECTION 120	ADDHYD	2.72	2	2	.10	.0	7.00	24.00	2.33	---	12.18	1706.92	627.5
STRUCTURE 50	RESVOR	2.72	2	2	.10	.0	7.00	24.00	2.14	10.99	13.55	353.43	129.9
XSECTION 130	REACH	2.72	2	2	.10	.0	7.00	24.00	2.14	---	13.55	353.43	129.9
XSECTION 130	RUNOFF	.05	2	2	.10	.0	7.00	24.00	4.05	---	12.01	160.37	3207.4
XSECTION 130	ADDHYD	2.77	2	2	.10	.0	7.00	24.00	2.18	---	13.45	363.29	131.2
STRUCTURE 60	RESVOR	2.77	2	2	.10	.0	7.00	24.00	1.98	6.79	16.54	286.61	103.5
XSECTION 140	REACH	2.77	2	2	.10	.0	7.00	24.00	1.97	---	16.83	286.13	103.3
XSECTION 140	RUNOFF	.20	2	2	.10	.0	7.00	24.00	3.63	---	12.02	576.56	2882.8
XSECTION 140	ADDHYD	2.97	2	2	.10	.0	7.00	24.00	2.08	---	12.02	582.56	196.1
XSECTION 149	RUNOFF	.08	2	2	.10	.0	7.00	24.00	3.10	---	12.15	142.32	1779.0
XSECTION 150	ADDHYD	3.05	2	2	.10	.0	7.00	24.00	2.11	---	12.03	692.53	227.1
XSECTION 150	REACH	3.05	2	2	.10	.0	7.00	24.00	2.11	---	12.03	692.53	227.1
XSECTION 150	RUNOFF	.01	2	2	.10	.0	7.00	24.00	.84	---	12.05	4.99	499.3
XSECTION 150	ADDHYD	3.06	2	2	.10	.0	7.00	24.00	2.10	---	12.03	697.49	227.9
XSECTION 180	RUNOFF	.11	2	2	.10	.0	7.00	24.00	.99	---	12.27	39.64	360.4
XSECTION 180	ADDHYD	3.17	2	2	.10	.0	7.00	24.00	2.06	---	12.04	714.27	225.3
XSECTION 180	REACH	3.17	2	2	.10	.0	7.00	24.00	2.05	---	12.18	633.45	199.8
XSECTION 180	RUNOFF	.11	2	2	.10	.0	7.00	24.00	.92	---	12.28	34.74	315.8
XSECTION 180	ADDHYD	3.28	2	2	.10	.0	7.00	24.00	2.01	---	12.19	665.28	202.8

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

HYDROGRAPH INFORMATION									ROUTING PARAMETERS									PEAK	
						OUTFLOW+			VOLUME	MAIN	ITER-	Q AND A			PEAK	S/Q	ATT-	TRAVEL TIME	
XSEC	REACH	INFLOW		OUTFLOW		INTERV.AREA		BASE-	ABOVE	TIME	ATION	EQUATION		LENGTH	RATIO	@PEAK	KIN	STOR-	KINE-
ID	LENGTH	PEAK	TIME	PEAK	TIME	PEAK	TIME	FLOW	BASE	INCR	#	COEFF	POWER	FACTOR	O/I	(K)	COEFF	AGE	MATIC
	(FT)	(CFS)	(HR)	(CFS)	(HR)	(CFS)	(HR)	(CFS)	(IN)	(HR)		(X)	(M)	(K*)	(Q*)	(SEC)	(C)	(HR)	(HR)
ALTERNATE 91 STORM 1																			
+ 10	1750	99	18.1	99	18.5	149	12.1	3	1.63*	.10	1	1.20	1.10	.021	.997	888	.34	.40	.25
+ 20	2900	94	20.1	94	20.2	132	13.3	3	1.48*	.10	1	.280	1.94	.000	1.000	319	.72?	.10	.09
+ 40	1300	48	16.2	48	16.5	50	16.5	0	1.51	.10	1	.880	1.10	.027	.992	934	.32	.30	.26
+ 50	1700	50	16.6	50	16.7	54	16.6	0	1.41	.10	1	1.60	1.45	.002	1.000	252	.83?	.10	.07
+ 60	1400	1064	12.1	1064	12.1	1069	12.1	0	2.87	.10	0	.440	1.94	.000	1.000	38	1.00?	.00	.00
+ 80	700	1086	12.1	1086	12.1	1115	12.1	3	2.09	.10	0	.300	1.94	.000	1.000	23	1.00?	.00	.00
+110	500	1520	12.2	1520	12.2	---	---	3	2.29	.10	0	.300	1.94	.000	1.000	14	1.00?	.00	.00
+120	500	1520	12.2	1520	12.2	1702	12.2	3	2.29	.10	0	.300	1.94	.000	1.000	14	1.00?	.00	.00
												.300							

+130	1000	353	13.6	353	13.6			3	2.14*	.10	0		1.94	.000	1.000	56	1.00?	.00	.00
+						363	13.5												
												.210							
+140	2500	287	16.5	286	16.8			3	1.98*	.10	1		1.48	.004	.998	774	.38	.30	.22
+						578	12.0												
												.210							
+150	300	678	12.0	678	12.0			3	2.11*	.10	0		1.48	.000	1.000	70	1.00?	.00	.00
+						683	12.0												
												.210							
+180	1700	695	12.0	630	12.2			3	2.06*	.10	1		1.48	.005	.907	395	.63	.20	.11
+						663	12.2												

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

XSECTION/ STRUCTURE ID	DRAINAGE AREA (SQ MI)	STORM NUMBERS.......... 1
0 STRUCTURE 60	2.77	
ALTERNATE 91		286.61
0 STRUCTURE 50	2.72	
ALTERNATE 91		353.43
0 STRUCTURE 40	.43	
ALTERNATE 91		49.78
0 STRUCTURE 30	.37	
ALTERNATE 91		48.05
0 STRUCTURE 20	1.04	
ALTERNATE 91		93.83
0 STRUCTURE 10	.84	
ALTERNATE 91		96.09
0 XSECTION 10	1.04	
ALTERNATE 91		153.76
0 XSECTION 20	1.32	
ALTERNATE 91		132.15
0 XSECTION 40	.43	
ALTERNATE 91		49.80
0 XSECTION 49	.11	
ALTERNATE 91		13.76
0 XSECTION 50	.90	
ALTERNATE 91		1079.95
0 XSECTION 60	.95	
ALTERNATE 91		1086.21
0 XSECTION 70	2.27	
ALTERNATE 91		1108.12
0 XSECTION 80	2.29	
ALTERNATE 91		1129.43

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

XSECTION/ STRUCTURE ID	DRAINAGE AREA (SQ MI)	STORM NUMBERS.......... 1
0 XSECTION 90	.24	
ALTERNATE 91		458.49
0 XSECTION 100	2.53	
ALTERNATE 91		1536.02
0 XSECTION 110	2.53	
ALTERNATE 91		1536.02
0 XSECTION 120	2.72	
ALTERNATE 91		1706.92
0 XSECTION 130	2.77	
ALTERNATE 91		363.29
0 XSECTION 140	2.97	
ALTERNATE 91		582.56
0 XSECTION 149	.08	
ALTERNATE 91		142.32
0 XSECTION 150	3.06	
ALTERNATE 91		697.49
0 XSECTION 180	3.28	
ALTERNATE 91		665.28

FISCAL YEAR 92

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###################80-80 LIST OF INPUT DATA FOR TR-20 HYDROLOGY##################

JOB TR-20                       FULLPRINT PASS=001  SUMMARY
TITLE 007 COGDELL'S CREEK WATERSHED STUDY NV5010 24 HR 10YR TYPE 2 STORM
TITLE     ALT  92
 3 STRUCT      10
 8                     7.00        0.00        4.33
 8                     7.4         2.5         5.01
 8                     7.6         5.0         5.36
 8                     7.8         10.0        5.70
 8                     8.2         22.0        6.38
 8                     8.6         52.0        7.07
 8                     9.0         62.0        7.75
 8                     9.5         96.0        8.61
 8                     10.0        126.0       9.47
 8                     11.0        198.0       11.18
 8                     12.0        280.0       12.89
 8                     13.00       360.0       14.79
 8                     14.00       440.0       16.68
 8                     15.00       500.0       18.58
 8                     15.1        600.00      18.60
 9 ENDTBL
 3 STRUCT      20
 8                     4.5         0.00        6.80
 8                     4.9         1.5         7.88
 8                     5.1         3.7         8.42
 8                     5.5         11.0        9.51
 8                     5.7         15.0        10.13
 8                     6.1         25.0        11.13
 8                     6.5         40.0        12.21
 8                     7.1         60.0        13.84
 8                     7.9         78.0        16.01
 8                     8.5         79.0        17.63
 8                     9.5         100.0       20.34
 8                     10.5        126.0       23.06
 8                     11.5        150.0       25.76
 8                     11.6        300.0       26.04
 9 ENDTBL
 3 STRUCT      30
 8                     21.0        0.00        0.10
 8                     21.4        0.6         0.61
 8                     21.6        1.5         0.86
 8                     21.8        2.5         1.12
 8                     22.2        5.2         1.62
 8                     22.6        8.2         2.13
 8                     23.0        11.0        2.64
 8                     23.5        20.0        3.27
 8                     24.0        27.0        3.91
```

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

8			25.0	39.0	5.18	470
8			26.0	49.0	6.45	480
8			27.0	57.0	7.72	490
8			27.1	200.00	7.74	500
9	ENDTBL					510
3	STRUCT	40				520
8			9.0	0.0	0.38	530
8			9.4	2.2	0.47	540
8			9.6	5.0	0.52	550
8			10.0	14.0	0.62	560
8			10.2	21.0	0.67	570
8			10.6	36.0	0.77	580
8			11.0	55.0	0.86	590
8			11.6	82.0	1.01	600
8			12.4	120.0	1.21	610
8			13.0	121.0	1.35	620
8			14.0	122.0	1.60	630
8			15.0	126.0	1.84	640
8			16.0	150.00	2.08	650
8			16.1	300.0	2.11	660
9	ENDTBL					670
3	STRUCT	50				680
8			2.4	0.00	22.00	690
8			2.8	2.0	26.86	700
8			3.0	7.0	29.29	710
8			3.4	16.0	34.16	720
8			3.6	24.0	36.59	730
8			4.0	40.0	41.46	740
8			4.4	60.0	46.32	750
8			5.0	90.0	53.62	760
8			5.8	120.0	63.35	770
8			6.4	121.0	70.65	780
8			7.4	210.0	82.81	790
8			8.4	250.00	94.98	800
8			10.4	334.0	119.31	810
8			12.4	400.0	143.63	820
8			12.5	800.0	143.70	830
9	ENDTBL					840
3	STRUCT	60				850
8			2.0	0.0	22.20	860
8			2.4	3.0	27.41	870
8			2.6	10.5	30.02	880
8			3.0	22.5	35.24	890
8			3.2	36.0	37.85	900
8			3.6	60.0	43.06	910
8			4.0	90.0	48.28	920

```
************************80-80 LIST OF INPUT DATA (CONTINUED)**********************
8                     4.6        135.0      56.11                    930
8                     5.4        180.0      66.55                    940
8                     6.0        181.0      74.38                    950
8                     7.0        315.0      87.42                    960
8                     8.0        375.0      100.47                   970
8                     8.1        700.0      100.50                   980
9 ENDTBL                                                             990
6 RUNOFF 1    10    6 0.84       51.        7.50       1            1000
6 RESVOR 2    10 6  7 7.0                              1            1010
6 REACH  3 010   7  5 1750.      1.2        1.10       1            1020
6 RUNOFF 1 010      6 0.20       42.        0.19       1            1030
6 ADDHYD 4 010   5 6 7                                 1 1          1040
6 SAVMOV 5 010   7  6                                               1050
6 RESVOR 2    20 6  7 4.5                              1            1060
6 REACH  3 020   7  5 2900.      0.28       1.94       1            1070
6 RUNOFF 1 020      6 0.28       53.        1.02       1            1080
6 ADDHYD 4 020   5 6 7                                 1 1          1090
6 SAVMOV 5 020   7  1                                               1100
6 RUNOFF 1    30    6 0.37       49.        3.90       1            1110
6 RESVOR 2    30 6  7 21.0                             1            1120
6 REACH  3 040   7  5 1300.      0.88       1.10       1            1130
6 RUNOFF 1 040      6 0.06       40.        1.00       1            1140
6 ADDHYD 4 040   5 6 7                                 1            1150
6 SAVMOV 5 040   7  6                                               1160
6 RESVOR 2    40 6  7 9.0                              1            1170
6 REACH  3 050   7  5 1700.      1.6        1.45       1            1180
6 RUNOFF 1 049      6 0.11       40.        1.67       1            1190
6 ADDHYD 4 050   5 6 7                                 1            1200
6 SAVMOV 5 050   7  5                                               1210
6 RUNOFF 1 050      6 0.36       85.        0.42       1            1220
6 ADDHYD 4 050   5 6 7                                 1            1230
6 REACH  3 060   7  5 1400.      0.44       1.94       1            1240
6 RUNOFF 1 060      6 0.05       45.        0.90       1            1250
6 ADDHYD 4 060   5 6 7                                 1 1          1260
6 SAVMOV 5 070   7  5                                               1270
6 SAVMOV 5 070   1  6                                               1280
6 ADDHYD 4 070   5 6 7                                 1 1          1290
6 REACH  3 080   7  5 700.       0.30       1.94       1            1300
6 RUNOFF 1 080      6 0.02       64.        0.12       1            1310
6 ADDHYD 4 080   5 6 7                                 1            1320
6 SAVMOV 5 100   7  5                                               1330
6 RUNOFF 1 090      6 0.24       73.        0.62       1            1340
6 ADDHYD 4 100   5 6 7                                 1            1350
6 REACH  3 110   7  5 500.       0.30       1.94       1            1360
6 SAVMOV 5 120   5  7                                               1370
6 REACH  3 120   7  5 500.       0.30       1.94       1            1380
```

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

 6 RUNOFF 1 120        6 0.19        56.          0.74          1                1390
 6 ADDHYD 4 120    5 6 7                                        1 1              1400
 6 SAVMOV 5    50 7    6                                                         1410
 6 RESVOR 2    50 6    7 2.4                                    1 1 1            1420
 6 REACH  3 130    7   5 1000.       0.30         1.94          1                1430
 6 RUNOFF 1 130        6 0.05        74.          0.19          1                1440
 6 ADDHYD 4 130    5 6 7                                        1                1450
 6 SAVMOV 5 130    7   6                                                         1460
 6 RESVOR 2    60 6    7 2.0                                    1 1 1            1470
 6 REACH  3 140    7   5 2500.       0.21         1.48          1                1480
 6 RUNOFF 1 140        6 0.20        66.          1.15          1                1490
 6 ADDHYD 4 140    5 6 7                                        1                1500
 6 SAVMOV 5 150    7   5                                                         1510
 6 RUNOFF 1 149        6 0.08        50.          0.42          1                1520
 6 ADDHYD 4 150    5 6 7                                                         1530
 6 REACH  3 150    7   5 300.        0.21         1.48          1                1540
 6 RUNOFF 1 150        6 0.01        40.          0.15          1                1550
 6 ADDHYD 4 150    5 6 7                                        1                1560
 6 SAVMOV 5 180    7   5                                                         1570
 6 RUNOFF 1 180        6 0.28        50.          0.61          1                1580
 6 ADDHYD 4 180    5 6 7                                        1                1590
 6 REACH  3 180    7   5 1700.0      0.21         1.48          1                1600
 6 RUNOFF 1 180        6 0.11        41.          0.48          1                1610
 6 ADDHYD 4 180    5 6 7                                        1 1   1   1      1620
   ENDATA                                                                        1630
 7 ALTER  3                                                                      1640
 6 RUNOFF 1 010        6 0.20        48.0         0.19          1                1650
 6 RUNOFF 1 020        6 0.28        55.0         2.00          1                1660
 6 RUNOFF 1 090        6 0.24        75.0         0.62          1                1665
 6.RUNOFF 1 120        6 0.19        66.0         0.74          1                1668
 6 RUNOFF 1 140        6 0.20        71.0         0.19          1                1670
 6 RUNOFF 1 149        6 0.08        65.0         0.42          1                1680
 6 RUNOFF 1 180        6 0.11        42.0         0.48          1                1690
 7 LIST                                                                          1700
 7 BASFLO 5              3.0                                                     1710
 7 INCREM 6              0.1                                                     1720
 7 COMPUT 7     10 180   0.0         7.0          1.0           2 2  92  01      1730
   ENDCMP 1                                                                      1740
   ENDJOB 2                                                                      1750
0*********************************END OF 80-80 LIST*********************************
```

```
0CHANGES TO STANDARD CONTROL LIST FOLLOW

 EXECUTIVE CONTROL OPERATION ALTER                                                    RECORD ID    1640

   STANDARD CONTROL OPERATION RUNOFF   CROSS SECTION  10                              RECORD ID    1650

        OUTPUT HYDROGRAPH = 6                        DATA FIELD VALUES =     .2000   48.0000     .1900

        OUTPUT OPTIONS IN EFFECT  PEAK  VOL   SUM
   STANDARD CONTROL OPERATION RUNOFF   CROSS SECTION  20                              RECORD ID    1660

        OUTPUT HYDROGRAPH = 6                        DATA FIELD VALUES =     .2800   55.0000    2.0000

        OUTPUT OPTIONS IN EFFECT  PEAK  VOL   SUM
   STANDARD CONTROL OPERATION RUNOFF   CROSS SECTION  90                              RECORD ID    1665

        OUTPUT HYDROGRAPH = 6                        DATA FIELD VALUES =     .2400   75.0000     .6200

        OUTPUT OPTIONS IN EFFECT  PEAK  VOL   SUM
   STANDARD CONTROL OPERATION RUNOFF   CROSS SECTION 120                              RECORD ID    1668

        OUTPUT HYDROGRAPH = 6                        DATA FIELD VALUES =     .1900   66.0000     .7400

        OUTPUT OPTIONS IN EFFECT  PEAK  VOL   SUM

   STANDARD CONTROL OPERATION RUNOFF   CROSS SECTION 140                              RECORD ID    1670

        OUTPUT HYDROGRAPH = 6                        DATA FIELD VALUES =     .2000   71.0000     .1900

        OUTPUT OPTIONS IN EFFECT  PEAK  VOL   SUM
   STANDARD CONTROL OPERATION RUNOFF   CROSS SECTION 149                              RECORD ID    1680

        OUTPUT HYDROGRAPH = 6                        DATA FIELD VALUES =     .0800   65.0000     .4200

        OUTPUT OPTIONS IN EFFECT  PEAK  VOL   SUM
   STANDARD CONTROL OPERATION RUNOFF   CROSS SECTION 180                              RECORD ID    1690

        OUTPUT HYDROGRAPH = 6                        DATA FIELD VALUES =     .1100   42.0000     .4800

        OUTPUT OPTIONS IN EFFECT  PEAK  VOL   SUM
```

EXECUTIVE CONTROL OPERATION LIST RECORD ID 1700

LISTING OF CURRENT DATA

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	10			
8		7.00	.00	4.33
8		7.40	2.50	5.01
8		7.60	5.00	5.36
8		7.80	10.00	5.70
8		8.20	22.00	6.38
8		8.60	52.00	7.07
8		9.00	62.00	7.75
8		9.50	96.00	8.61
8		10.00	126.00	9.47
8		11.00	198.00	11.18
8		12.00	280.00	12.89
8		13.00	360.00	14.79
8		14.00	440.00	16.68
8		15.00	500.00	18.58
8		15.10	600.00	18.60
9 ENDTBL				

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	20			
8		4.50	.00	6.80
8		4.90	1.50	7.88
8		5.10	3.70	8.42
8		5.50	11.00	9.51
8		5.70	15.00	10.13
8		6.10	25.00	11.13
8		6.50	40.00	12.21
8		7.10	60.00	13.84
8		7.90	78.00	16.01
8		8.50	79.00	17.63
8		9.50	100.00	20.34
8		10.50	126.00	23.06
8		11.50	150.00	25.76
8		11.60	300.00	26.04
9 ENDTBL				

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	30			
8		21.00	.00	.10
8		21.40	.60	.61
8		21.60	1.50	.86
8		21.80	2.50	1.12
8		22.20	5.20	1.62
8		22.60	8.20	2.13
8		23.00	11.00	2.64
8		23.50	20.00	3.27
8		24.00	27.00	3.91
8		25.00	39.00	5.18
8		26.00	49.00	6.45
8		27.00	57.00	7.72
8		27.10	200.00	7.74
9 ENDTBL				

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	40			
8		9.00	.00	.38
8		9.40	2.20	.47
8		9.60	5.00	.52
8		10.00	14.00	.62
8		10.20	21.00	.67
8		10.60	36.00	.77
8		11.00	55.00	.86
8		11.60	82.00	1.01
8		12.40	120.00	1.21
8		13.00	121.00	1.35
8		14.00	122.00	1.60
8		15.00	126.00	1.84
8		16.00	150.00	2.08
8		16.10	300.00	2.11
9 ENDTBL				

	STRUCT NO.	ELEVATION	DISCHARGE	STORAGE
3 STRUCT	50			
8		2.40	.00	22.00
8		2.80	2.00	26.86
8		3.00	7.00	29.29
8		3.40	16.00	34.16
8		3.60	24.00	36.59
8		4.00	40.00	41.46
8		4.40	60.00	46.32
8		5.00	90.00	53.62

```
8                   5.80     120.00     63.35
8                   6.40     121.00     70.65
8                   7.40     210.00     82.81
8                   8.40     250.00     94.98
8                  10.40     334.00    119.31
8                  12.40     400.00    143.63
8                  12.50     800.00    143.70
9 ENDTBL

      STRUCT NO.   ELEVATION  DISCHARGE   STORAGE
3 STRUCT   60

8                   2.00        .00     22.20
8                   2.40       3.00     27.41
8                   2.60      10.50     30.02
8                   3.00      22.50     35.24
8                   3.20      36.00     37.85
8                   3.60      60.00     43.06
8                   4.00      90.00     48.28
8                   4.60     135.00     56.11
8                   5.40     180.00     66.55
8                   6.00     181.00     74.38
8                   7.00     315.00     87.42
8                   8.00     375.00    100.47
8                   8.10     700.00    100.50
9 ENDTBL

               TIME INCREMENT
4 DIMHYD            .0200

8         .0000     .0300     .1000     .1900     .3100
8         .4700     .6600     .8200     .9300     .9900
8        1.0000     .9900     .9300     .8600     .7800
8         .6800     .5600     .4600     .3900     .3300
8         .2800     .2410     .2070     .1740     .1470
8         .1260     .1070     .0910     .0770     .0660
8         .0550     .0470     .0400     .0340     .0290
8         .0250     .0210     .0180     .0150     .0130
8         .0110     .0090     .0080     .0070     .0060
8         .0050     .0040     .0030     .0020     .0010
8         .0000     .0000     .0000     .0000     .0000
9 ENDTBL

 COMPUTED PEAK RATE FACTOR =  484.00
```

TABLE NO. TIME INCREMENT
5 RAINFL 1 .5000

8	.0000	.0080	.0170	.0260	.0350
8	.0450	.0550	.0650	.0760	.0870
8	.0990	.1120	.1260	.1400	.1560
8	.1740	.1940	.2190	.2540	.3030
8	.5150	.5830	.6240	.6550	.6820
8	.7060	.7280	.7480	.7660	.7830
8	.7990	.8150	.8300	.8440	.8570
8	.8700	.8820	.8930	.9050	.9160
8	.9260	.9360	.9460	.9560	.9650
8	.9740	.9830	.9920	1.0000	1.0000

9 ENDTBL

TABLE NO. TIME INCREMENT
5 RAINFL 2 .2500

8	.0000	.0020	.0050	.0080	.0110
8	.0140	.0170	.0200	.0230	.0260
8	.0290	.0320	.0350	.0380	.0410
8	.0440	.0480	.0520	.0560	.0600
8	.0640	.0680	.0720	.0760	.0800
8	.0850	.0900	.0950	.1000	.1050
8	.1100	.1150	.1200	.1260	.1330
8	.1400	.1470	.1550	.1630	.1720
8	.1810	.1910	.2030	.2180	.2360
8	.2570	.2830	.3870	.6630	.7070
8	.7350	.7580	.7760	.7910	.8040
8	.8150	.8250	.8340	.8420	.8490
8	.8560	.8630	.8690	.8750	.8810
8	.8870	.8930	.8980	.9030	.9080
8	.9130	.9180	.9220	.9260	.9300
8	.9340	.9380	.9420	.9460	.9500
8	.9530	.9560	.9590	.9620	.9650
8	.9680	.9710	.9740	.9770	.9800
8	.9830	.9860	.9890	.9920	.9950
8	.9980	1.0000	1.0000	1.0000	1.0000

9 ENDTBL

TABLE NO. TIME INCREMENT
5 RAINFL 3 .5000

8	.0000	.0100	.0220	.0360	.0510
8	.0670	.0830	.0990	.1160	.1350

8	.1560	.1790	.2040	.2330	.2680
8	.3100	.4250	.4800	.5200	.5500
8	.5770	.6010	.6230	.6440	.6640
8	.6830	.7010	.7190	.7360	.7530
8	.7690	.7850	.8000	.8150	.8300
8	.8440	.8580	.8710	.8840	.8960
8	.9080	.9200	.9320	.9440	.9560
8	.9670	.9780	.9890	1.0000	1.0000

9 ENDTBL

TABLE NO.	TIME INCREMENT
5 RAINFL 4	.5000

8	.0000	.0040	.0080	.0120	.0160
8	.0200	.0250	.0300	.0350	.0400
8	.0450	.0500	.0550	.0600	.0650
8	.0700	.0750	.0810	.0870	.0930
8	.0990	.1050	.1110	.1180	.1250
8	.1320	.1400	.1480	.1560	.1650
8	.1740	.1840	.1950	.2070	.2200
8	.2360	.2550	.2770	.3030	.4090
8	.5150	.5490	.5830	.6050	.6240
8	.6400	.6550	.6690	.6820	.6940
8	.7050	.7160	.7270	.7380	.7480
8	.7580	.7670	.7760	.7840	.7920
8	.8000	.8080	.8160	.8230	.8300
8	.8370	.8440	.8510	.8580	.8640
8	.8700	.8760	.8820	.8880	.8940
8	.9000	.9060	.9110	.9160	.9210
8	.9260	.9310	.9360	.9410	.9460
8	.9510	.9560	.9610	.9660	.9710
8	.9760	.9800	.9840	.9880	.9920
8	.9960	1.0000	1.0000	1.0000	1.0000

9 ENDTBL

TABLE NO.	TIME INCREMENT
5 RAINFL 5	.5000

8	.0000	.0020	.0050	.0080	.0110
8	.0140	.0170	.0200	.0230	.0260
8	.0290	.0320	.0350	.0380	.0410
8	.0440	.0470	.0510	.0550	.0590
8	.0630	.0670	.0710	.0750	.0790
8	.0840	.0890	.0940	.0990	.1040
8	.1090	.1140	.1200	.1260	.1330
8	.1400	.1470	.1540	.1620	.1710
8	.1810	.1920	.2040	.2170	.2330

8	.2520	.2770	.3180	.6380	.6980
8	.7290	.7520	.7700	.7850	.7980
8	.8090	.8190	.8290	.8380	.8460
8	.8540	.8610	.8680	.8740	.8800
8	.8860	.8920	.8970	.9020	.9070
8	.9120	.9170	.9210	.9250	.9290
8	.9330	.9370	.9410	.9450	.9490
8	.9530	.9570	.9600	.9630	.9660
8	.9690	.9720	.9750	.9780	.9810
8	.9840	.9870	.9900	.9930	.9960
8	.9980	1.0000	1.0000	1.0000	1.0000

9 ENDTBL

TABLE NO.	TIME INCREMENT
5 RAINFL 6	.0200

8	.0000	.0080	.0162	.0246	.0333
8	.0425	.0524	.0630	.0743	.0863
8	.0990	.1124	.1265	.1420	.1595
8	.1800	.2050	.2550	.3450	.4370
8	.5300	.6030	.6330	.6600	.6840
8	.7050	.7240	.7420	.7590	.7750
8	.7900	.8043	.8180	.8312	.8439
8	.8561	.8678	.8790	.8898	.9002
8	.9103	.9201	.9297	.9391	.9483
8	.9573	.9661	.9747	.9832	.9916
8	1.0000	1.0000	1.0000	1.0000	1.0000

9 ENDTBL

0 STANDARD CONTROL INSTRUCTIONS

```
6 RUNOFF 1   10     6        .8400     51.0000       7.50001 0 0 1 0 1
6 RESVOR 2   10 6   7       7.0000                         1 0 0 1 0 1
6 REACH  3  10   7  5   1750.0000      1.2000       1.10001 0 0 1 0 1
6 RUNOFF 1  10      6        .2000     48.0000        .19001 0 0 1 0 1
6 ADDHYD 4  10   5 6 7                                     1 1 0 1 0 1
6 SAVMOV 5  10   7  6
6 RESVOR 2   20 6   7       4.5000                         1 0 0 1 0 1
6 REACH  3  20   7  5   2900.0000       .2800       1.94001 0 0 1 0 1
6 RUNOFF 1  20      6        .2800     55.0000       2.00001 0 0 1 0 1
6 ADDHYD 4  20   5 6 7                                     1 1 0 1 0 1
6 SAVMOV 5  20   7  1
6 RUNOFF 1   30     6        .3700     49.0000       3.90001 0 0 1 0 1
6 RESVOR 2   30 6   7      21.0000                         1 0 0 1 0 1
6 REACH  3  40   7  5   1300.0000       .8800       1.10001 0 0 1 0 1
6 RUNOFF 1  40      6        .0600     40.0000       1.00001 0 0 1 0 1
6 ADDHYD 4  40   5 6 7                                     1 0 0 1 0 1
6 SAVMOV 5  40   7  6
6 RESVOR 2   40 6   7       9.0000                         1 0 0 1 0 1
6 REACH  3  50   7  5   1700.0000      1.6000       1.45001 0 0 1 0 1
6 RUNOFF 1  49      6        .1100     40.0000       1.67001 0 0 1 0 1
6 ADDHYD 4  50   5 6 7                                     1 0 0 1 0 1
6 SAVMOV 5  50   7  5
6 RUNOFF 1  50      6        .3600     85.0000        .42001 0 0 1 0 1
6 ADDHYD 4  50   5 6 7                                     1 0 0 1 0 1
6 REACH  3  60   7  5   1400.0000       .4400       1.94001 0 0 1 0 1
6 RUNOFF 1  60      6        .0500     45.0000        .90001 0 0 1 0 1
6 ADDHYD 4  60   5 6 7                                     1 1 0 1 0 1
6 SAVMOV 5  70   7  5
6 SAVMOV 5  70   1  6
6 ADDHYD 4  70   5 6 7                                     1 1 0 1 0 1
6 REACH  3  80   7  5    700.0000       .3000       1.94001 0 0 1 0 1
6 RUNOFF 1  80      6        .0200     64.0000        .12001 0 0 1 0 1
6 ADDHYD 4  80   5 6 7                                     1 0 0 1 0 1
6 SAVMOV 5 100   7  5
6 RUNOFF 1  90      6        .2400     75.0000        .62001 0 0 1 0 1
6 ADDHYD 4 100   5 6 7                                     1 0 0 1 0 1
6 REACH  3 110   7  5    500.0000       .3000       1.94001 0 0 1 0 1
6 SAVMOV 5 120   5  7
6 REACH  3 120   7  5    500.0000       .3000       1.94001 0 0 1 0 1
6 RUNOFF 1 120      6        .1900     66.0000        .74001 0 0 1 0 1
6 ADDHYD 4 120   5 6 7                                     1 1 0 1 0 1
6 SAVMOV 5    50 7  6
6 RESVOR 2    50 6  7       2.4000                         1 1 1 1 0 1
6 REACH  3 130   7  5   1000.0000       .3000       1.94001 0 0 1 0 1
6 RUNOFF 1 130      6        .0500     74.0000        .19001 0 0 1 0 1
```

```
6 ADDHYD 4 130    5 6 7                                         1 0 0 1 0 1
6 SAVMOV 5 130    7   6
6 RESVOR 2    60 6   7        2.0000                            1 1 1 1 0 1
6 REACH  3 140    7   5    2500.0000       .2100        1.48001 0 0 1 0 1
6 RUNOFF 1 140        6        .2000     71.0000         .19001 0 0 1 0 1
6 ADDHYD 4 140    5 6 7                                         1 0 0 1 0 1
6 SAVMOV 5 150    7   5
6 RUNOFF 1 149        6        .0800     65.0000         .42001 0 0 1 0 1
6 ADDHYD 4 150    5 6 7                                         1 0 0 1 0 1
6 REACH  3 150    7   5     300.0000       .2100        1.48001 0 0 1 0 1
6 RUNOFF 1 150        6        .0100     40.0000         .15001 0 0 1 0 1
6 ADDHYD 4 150    5 6 7                                         1 0 0 1 0 1
6 SAVMOV 5 180    7   5
6 RUNOFF 1 180        6        .1100     42.0000         .48001 0 0 1 0 1
6 ADDHYD 4 180    5 6 7                                         1 0 0 1 0 1
6 REACH  3 180    7   5    1700.0000       .2100        1.48001 0 0 1 0 1
6 RUNOFF 1 180        6        .1100     41.0000         .48001 0 0 1 0 1
6 ADDHYD 4 180    5 6 7                                         1 1 0 1 0 1
  ENDATA

END OF LISTING
```

```
EXECUTIVE CONTROL OPERATION BASFLO                                                     RECORD ID     1710
 +                               NEW BASEFLOW =   3.00 CFS

EXECUTIVE CONTROL OPERATION INCREM                                                     RECORD ID     1720
 +                               MAIN TIME INCREMENT =   .10 HOURS

EXECUTIVE CONTROL OPERATION COMPUT                                                     RECORD ID     1730
 +                               FROM STRUCTURE 10
 +                                            TO XSECTION 180
      STARTING TIME =   .00    RAIN DEPTH =  7.00    RAIN DURATION=  1.00    RAIN TABLE NO.= 2    ANT. MOIST. COND= 2
      ALTERNATE NO.=92         STORM NO.= 1    MAIN TIME INCREMENT =   .10 HOURS

OPERATION RUNOFF   STRUCTURE 10
        OUTPUT HYDROGRAPH=  6
        AREA=    .84 SQ MI   INPUT RUNOFF CURVE= 51.    TIME OF CONCENTRATION=  7.50 HOURS
        INTERNAL HYDROGRAPH TIME INCREMENT=  .1000 HOURS

        PEAK TIME(HRS)             PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
          17.80                          96.56                       (RUNOFF)

  RUNOFF VOLUME ABOVE BASEFLOW =  1.67 WATERSHED INCHES,    906.24 CFS-HRS,    74.89 ACRE-FEET;   BASEFLOW =     .00 CFS

OPERATION RESVOR   STRUCTURE 10
        INPUT HYDROGRAPH= 6     OUTPUT HYDROGRAPH= 7
        SURFACE ELEVATION=    7.00

        PEAK TIME(HRS)             PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
          18.14                          96.09                         9.50

  RUNOFF VOLUME ABOVE BASEFLOW =  1.63 WATERSHED INCHES,    884.09 CFS-HRS,    73.06 ACRE-FEET;   BASEFLOW =     .00 CFS

OPERATION REACH    CROSS SECTION  10
        INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 5
        LENGTH =    1750.00 FEET      INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA,  X=  1.20,    M= 1.10
 0      MODIFIED ATT-KIN ROUTING COEFFICIENT =  .34      PEAK TRAVEL TIME =     .40 HOURS
 0    *** WARNINGS - REACH  10 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT      18.15 CFS,  18.88 % OF PEAK.

        PEAK TIME(HRS)             PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
          18.47                          98.84                        (NULL)

  RUNOFF VOLUME ABOVE BASEFLOW =  1.62 WATERSHED INCHES,    878.37 CFS-HRS,    72.59 ACRE-FEET;   BASEFLOW =    3.00 CFS

OPERATION RUNOFF   CROSS SECTION  10
        OUTPUT HYDROGRAPH=  6
```

AREA= .20 SQ MI INPUT RUNOFF CURVE= 48. TIME OF CONCENTRATION= .19 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0253 HOURS

*** WARNING-MAIN TIME INCREMENT MAY BE TOO LARGE.
COMPUTED PEAK(211.47) AT EXCEEDS MAX. ADJACENT HYDROGRAPH COORDINATE BY 5 %.
\+ XSECTION 10

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.05	211.47	(RUNOFF)
15.19	11.49	(RUNOFF)
16.45	10.25	(RUNOFF)
17.66	8.73	(RUNOFF)
19.66	7.21	(RUNOFF)
23.65	5.65	(RUNOFF)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = .20 SQ.MI.

11.00	DISCHG	.00	.00	.00	.00	.00	.00	.10	4.73	23.48	98.78
12.00	DISCHG	198.70	199.79	103.14	68.30	49.45	41.05	37.14	33.86	32.58	29.03
13.00	DISCHG	27.04	25.39	23.29	22.55	20.96	20.13	19.10	17.65	17.13	16.30
14.00	DISCHG	15.86	15.33	14.60	14.29	13.47	13.01	12.44	11.67	11.44	11.40
15.00	DISCHG	11.42	11.45	11.49	11.43	10.60	10.13	10.01	10.00	10.02	10.04
16.00	DISCHG	10.07	10.10	10.12	10.15	10.17	10.20	9.72	8.92	8.66	8.60
17.00	DISCHG	8.60	8.61	8.63	8.65	8.67	8.68	8.70	8.72	8.61	7.75
18.00	DISCHG	7.22	7.08	7.05	7.05	7.06	7.07	7.08	7.09	7.10	7.11
19.00	DISCHG	7.12	7.13	7.14	7.15	7.16	7.18	7.19	7.20	7.08	6.18
20.00	DISCHG	5.63	5.48	5.45	5.44	5.44	5.45	5.46	5.46	5.47	5.47
21.00	DISCHG	5.48	5.48	5.49	5.50	5.50	5.51	5.51	5.52	5.52	5.53
22.00	DISCHG	5.54	5.54	5.55	5.55	5.56	5.56	5.57	5.58	5.58	5.59
23.00	DISCHG	5.59	5.60	5.60	5.61	5.62	5.62	5.63	5.63	5.50	4.56
24.00	DISCHG	3.97	2.71	.85	.23	.06	.01	.00			

RUNOFF VOLUME ABOVE BASEFLOW = 1.49 WATERSHED INCHES, 192.76 CFS-HRS, 15.93 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 10
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

*** WARNING-MAIN TIME INCREMENT MAY BE TOO LARGE.
COMPUTED PEAK(214.47) AT EXCEEDS MAX. ADJACENT HYDROGRAPH COORDINATE BY 5 %.
\+ XSECTION 10

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.05	214.47	(NULL)
18.48	105.90	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 1.04 SQ.MI.

11.00	DISCHG	3.00	3.00	3.00	3.00	3.00	3.00	3.10	7.73	26.48	101.78
12.00	DISCHG	201.70	202.80	106.16	71.34	52.51	44.15	40.29	37.07	35.88	32.43
13.00	DISCHG	30.56	29.06	27.14	26.60	25.25	24.68	23.94	22.93	22.99	22.83
14.00	DISCHG	23.44	24.26	25.15	26.71	27.96	29.68	31.42	33.47	36.95	40.97
15.00	DISCHG	45.09	49.13	53.02	56.65	59.21	61.39	63.50	65.48	67.36	69.20
16.00	DISCHG	71.04	73.56	76.58	79.74	82.85	85.80	88.04	89.73	91.74	93.74
17.00	DISCHG	95.62	97.33	98.89	100.32	101.62	102.79	103.83	104.73	105.37	105.12

18.00	DISCHG	105.09	105.34	105.59	105.77	105.88	105.90	105.84	105.71	105.50	105.23
19.00	DISCHG	104.88	104.46	103.97	103.40	102.75	102.03	101.23	100.36	99.27	97.33
20.00	DISCHG	95.67	94.37	93.15	91.92	90.69	89.45	88.21	86.98	85.78	84.60
21.00	DISCHG	83.44	82.31	81.20	80.11	79.04	77.99	76.97	75.96	74.98	74.01
22.00	DISCHG	73.07	72.19	71.48	70.88	70.33	69.80	69.28	68.75	68.21	67.66
23.00	DISCHG	67.10	66.52	65.93	65.33	64.72	64.11	63.48	62.86	62.09	60.35
24.00	DISCHG	58.71	56.33	53.38	51.74	50.63	49.72	48.91	48.18	47.50	46.85
25.00	DISCHG	46.24	45.66	45.10	44.55	44.02	43.50	42.98	42.48	41.98	41.49
26.00	DISCHG	41.00	40.51	40.03	39.55	39.07	38.60	38.12	37.63	37.15	36.66
27.00	DISCHG	36.16	35.66	35.15	34.64	34.13	33.61	33.09	32.57	32.04	31.51
28.00	DISCHG	30.97	30.44	29.90	29.36	28.82	28.28	27.74	27.21	26.67	26.13
29.00	DISCHG	25.68	25.30	24.94	24.59	24.24	23.89	23.52	23.14	22.75	22.35

RUNOFF VOLUME ABOVE BASEFLOW = 1.60 WATERSHED INCHES, 1071.12 CFS-HRS, 88.52 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 10
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 6

OPERATION RESVOR STRUCTURE 20
INPUT HYDROGRAPH= 6 OUTPUT HYDROGRAPH= 7
SURFACE ELEVATION= 4.50

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.45	48.97	6.77
20.05	95.07	9.27

RUNOFF VOLUME ABOVE BASEFLOW = 1.54 WATERSHED INCHES, 1034.01 CFS-HRS, 85.45 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 20
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 2900.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .28, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = .72 PEAK TRAVEL TIME = .20 HOURS

*** WARNING REACH 20 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***
0 *** WARNING - REACH 20 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT 23.18 CFS, 25.18 % OF PEAK.

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.63	48.51	(NULL)
20.19	95.04	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 1.54 WATERSHED INCHES, 1030.71 CFS-HRS, 85.18 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 20
OUTPUT HYDROGRAPH= 6
AREA= .28 SQ MI INPUT RUNOFF CURVE= 55. TIME OF CONCENTRATION= 2.00 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .1026 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.35	108.69	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 2.12 WATERSHED INCHES, 383.61 CFS-HRS, 31.70 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 20
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.27	150.11	(NULL)
20.08	107.90	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 1.32 SQ.MI.

11.00	DISCHG	3.00	3.00	3.01	3.03	3.06	3.13	3.29	3.67	4.50	6.54
12.00	DISCHG	12.21	23.37	42.89	64.00	80.57	94.77	107.72	119.54	129.62	137.67
13.00	DISCHG	143.70	147.67	149.73	150.02	148.57	145.69	141.74	136.80	130.86	124.17
14.00	DISCHG	117.26	110.78	105.06	99.98	95.40	91.32	87.76	84.64	81.86	79.46
15.00	DISCHG	77.58	76.27	75.46	75.08	75.06	75.35	75.65	76.07	76.61	77.25
16.00	DISCHG	78.02	78.87	79.82	80.91	82.19	83.58	84.62	85.67	86.77	87.93
17.00	DISCHG	89.14	90.40	91.68	92.99	94.31	95.64	96.41	96.47	96.34	96.18
18.00	DISCHG	96.00	95.83	95.66	95.50	96.44	97.62	98.82	99.96	101.02	102.00
19.00	DISCHG	102.90	103.72	104.46	105.13	105.73	106.27	106.73	107.12	107.45	107.71
20.00	DISCHG	107.86	107.90	107.83	107.66	107.41	107.07	106.66	106.16	105.60	104.99
21.00	DISCHG	104.32	103.61	102.87	102.10	101.31	100.50	99.68	98.85	98.01	97.18
22.00	DISCHG	96.34	95.50	94.66	93.82	93.00	92.19	91.41	90.64	89.88	89.15
23.00	DISCHG	88.75	88.59	88.49	88.41	88.33	88.26	88.18	88.10	88.02	87.93
24.00	DISCHG	87.83	87.70	87.53	86.67	85.14	83.39	81.56	79.69	77.81	75.92
25.00	DISCHG	74.04	72.18	70.36	68.59	66.87	65.21	63.37	61.46	59.62	57.90
26.00	DISCHG	56.29	54.81	53.42	52.14	50.93	49.80	48.74	47.73	46.78	45.87
27.00	DISCHG	45.01	44.18	43.39	42.62	41.89	41.17	40.47	39.73	39.01	38.30
28.00	DISCHG	37.61	36.94	36.28	35.64	35.01	34.38	33.77	33.17	32.57	31.98
29.00	DISCHG	31.39	30.82	30.25	29.71	29.19	28.68	28.19	27.72	27.26	26.80

RUNOFF VOLUME ABOVE BASEFLOW = 1.66 WATERSHED INCHES, 1414.31 CFS-HRS, 116.88 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 20
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 1

OPERATION RUNOFF STRUCTURE 30
OUTPUT HYDROGRAPH= 6
AREA= .37 SQ MI INPUT RUNOFF CURVE= 49. TIME OF CONCENTRATION= 3.90 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .1000 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
14.95	60.58	(RUNOFF)

```
 RUNOFF VOLUME ABOVE BASEFLOW = 1.57 WATERSHED INCHES,   375.61 CFS-HRS,   31.04 ACRE-FEET;   BASEFLOW =   .00 CFS

OPERATION RESVOR   STRUCTURE 30
          INPUT HYDROGRAPH= 6    OUTPUT HYDROGRAPH= 7
          SURFACE ELEVATION=   21.00

          PEAK TIME(HRS)            PEAK DISCHARGE(CFS)        PEAK ELEVATION(FEET)
             16.21                        48.05                       25.91

 RUNOFF VOLUME ABOVE BASEFLOW = 1.51 WATERSHED INCHES,   360.28 CFS-HRS,   29.77 ACRE-FEET;   BASEFLOW =   .00 CFS

OPERATION REACH    CROSS SECTION  40
          INPUT HYDROGRAPH= 7    OUTPUT HYDROGRAPH= 5
          LENGTH =   1300.00 FEET      INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA,  X=   .88,   M= 1.10
0         MODIFIED ATT-KIN ROUTING COEFFICIENT =  .32     PEAK TRAVEL TIME =    .30 HOURS

          PEAK TIME(HRS)            PEAK DISCHARGE(CFS)        PEAK ELEVATION(FEET)
             16.55                        47.70                      (NULL)

 RUNOFF VOLUME ABOVE BASEFLOW = 1.50 WATERSHED INCHES,   358.97 CFS-HRS,   29.67 ACRE-FEET;   BASEFLOW =   .00 CFS

OPERATION RUNOFF   CROSS SECTION  40
          OUTPUT HYDROGRAPH=  6
          AREA=    .06 SQ MI   INPUT RUNOFF CURVE= 40.   TIME OF CONCENTRATION=  1.00 HOURS
          INTERNAL HYDROGRAPH TIME INCREMENT=  .0952 HOURS

          PEAK TIME(HRS)            PEAK DISCHARGE(CFS)        PEAK ELEVATION(FEET)
             12.72                        10.21                     (RUNOFF)
             23.76                         1.21                     (RUNOFF)

 RUNOFF VOLUME ABOVE BASEFLOW =   .84 WATERSHED INCHES,    32.57 CFS-HRS,    2.69 ACRE-FEET;   BASEFLOW =   .00 CFS

OPERATION ADDHYD   CROSS SECTION  40
          INPUT HYDROGRAPHS= 5,6     OUTPUT HYDROGRAPH= 7

          PEAK TIME(HRS)            PEAK DISCHARGE(CFS)        PEAK ELEVATION(FEET)
             12.73                        10.35                      (NULL)
             16.54                        49.80                      (NULL)

 RUNOFF VOLUME ABOVE BASEFLOW = 1.41 WATERSHED INCHES,   391.54 CFS-HRS,   32.36 ACRE-FEET;   BASEFLOW =   .00 CFS

OPERATION SAVMOV   CROSS SECTION  40
          INPUT HYDROGRAPH= 7    OUTPUT HYDROGRAPH= 6

OPERATION RESVOR   STRUCTURE 40
```

```
        INPUT HYDROGRAPH= 6     OUTPUT HYDROGRAPH= 7
        SURFACE ELEVATION=    9.00

        PEAK TIME(HRS)            PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
          12.90                        9.83                          9.81
          16.60                       49.78                         10.89

   RUNOFF VOLUME ABOVE BASEFLOW =  1.41 WATERSHED INCHES,    389.94 CFS-HRS,    32.22 ACRE-FEET;   BASEFLOW =    .00 CFS


 OPERATION REACH    CROSS SECTION  50
        INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 5
        LENGTH =   1700.00 FEET      INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA,  X= 1.60,   M= 1.45
0       MODIFIED ATT-KIN ROUTING COEFFICIENT =  .83     PEAK TRAVEL TIME =    .10 HOURS

     *** WARNING  REACH  50 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT  ***

        PEAK TIME(HRS)            PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
          13.02                        9.78                         (NULL)
          16.72                       49.77                         (NULL)

   RUNOFF VOLUME ABOVE BASEFLOW =  1.40 WATERSHED INCHES,    389.36 CFS-HRS,    32.18 ACRE-FEET;   BASEFLOW =    .00 CFS


 OPERATION RUNOFF   CROSS SECTION  49
        OUTPUT HYDROGRAPH=  6
        AREA=    .11 SQ MI   INPUT RUNOFF CURVE= 40.    TIME OF CONCENTRATION=  1.67 HOURS
        INTERNAL HYDROGRAPH TIME INCREMENT=  .1012 HOURS

        PEAK TIME(HRS)            PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
          13.33                       13.76                         (RUNOFF)
          23.80                        2.20                         (RUNOFF)
+                                        *                       * FIRST POINT OF FLAT PEAK

   RUNOFF VOLUME ABOVE BASEFLOW =   .84 WATERSHED INCHES,     59.78 CFS-HRS,     4.94 ACRE-FEET;   BASEFLOW =    .00 CFS


 OPERATION ADDHYD   CROSS SECTION  50
        INPUT HYDROGRAPHS= 5,6     OUTPUT HYDROGRAPH= 7

        PEAK TIME(HRS)            PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
          13.16                       22.91                         (NULL)
          16.65                       53.98                         (NULL)

   RUNOFF VOLUME ABOVE BASEFLOW =  1.29 WATERSHED INCHES,    449.14 CFS-HRS,    37.12 ACRE-FEET;   BASEFLOW =    .00 CFS


 OPERATION SAVMOV   CROSS SECTION  50
        INPUT HYDROGRAPH= 7     OUTPUT HYDROGRAPH= 5


 OPERATION RUNOFF   CROSS SECTION  50
        OUTPUT HYDROGRAPH=  6
        AREA=    .36 SQ MI   INPUT RUNOFF CURVE= 85.    TIME OF CONCENTRATION=   .42 HOURS
```

INTERNAL HYDROGRAPH TIME INCREMENT= .0560 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.13	1078.73	(RUNOFF)
19.65	24.75	(RUNOFF)
23.65	18.64	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 5.25 WATERSHED INCHES, 1220.14 CFS-HRS, 100.83 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 50
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.13	1079.95	(NULL)
16.49	90.76	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.87 WATERSHED INCHES, 1669.27 CFS-HRS, 137.95 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION REACH CROSS SECTION 60
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 1400.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .44, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 60 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.13	1079.95	(NULL)
16.49	90.76	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.87 WATERSHED INCHES, 1669.27 CFS-HRS, 137.95 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION RUNOFF CROSS SECTION 60
OUTPUT HYDROGRAPH= 6
AREA= .05 SQ MI INPUT RUNOFF CURVE= 45. TIME OF CONCENTRATION= .90 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .1000 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.56	16.56	(RUNOFF)
23.72	1.26	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 1.24 WATERSHED INCHES, 39.88 CFS-HRS, 3.30 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 60
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.14	1086.21	(NULL)
16.49	93.02	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = .95 SQ.MI.

4.00	DISCHG	.00	.00	.00	.02	.10	.26	.49	.75	1.04	1.33
5.00	DISCHG	1.62	1.91	2.20	2.49	2.77	3.04	3.32	3.58	3.84	4.10
6.00	DISCHG	4.36	4.67	5.18	5.80	6.40	6.89	7.32	7.71	8.07	8.41
7.00	DISCHG	8.75	9.07	9.38	9.69	9.99	10.29	10.58	10.86	11.14	11.41
8.00	DISCHG	11.68	12.08	12.82	13.80	14.96	16.27	17.48	18.44	19.17	19.76
9.00	DISCHG	20.27	20.91	21.91	23.16	24.29	25.16	26.02	27.23	28.66	29.92
10.00	DISCHG	30.90	31.86	33.18	34.84	37.10	40.08	43.57	47.95	52.84	58.21
11.00	DISCHG	64.10	70.07	76.45	83.02	90.75	101.27	130.10	208.30	333.15	539.50
12.00	DISCHG	836.25	1068.68	1030.91	805.58	576.69	421.03	324.82	265.51	227.09	199.69
13.00	DISCHG	178.52	161.72	147.53	136.12	127.20	119.75	113.25	107.02	101.45	96.86
14.00	DISCHG	93.29	90.54	88.31	86.99	86.63	86.30	86.13	85.74	85.37	85.47
15.00	DISCHG	86.26	87.42	88.85	90.29	90.92	90.62	90.19	90.11	90.41	90.86
16.00	DISCHG	91.35	91.83	92.25	92.60	92.86	93.02	92.76	91.64	89.95	88.43
17.00	DISCHG	87.35	86.55	85.87	85.24	84.63	84.03	83.43	82.82	82.11	80.76
18.00	DISCHG	78.62	76.40	74.60	73.30	72.20	71.21	70.27	69.38	68.51	67.67
19.00	DISCHG	66.86	66.07	65.33	64.68	63.99	63.30	62.62	61.96	61.19	59.85
20.00	DISCHG	57.76	55.58	53.88	52.62	51.60	50.72	49.94	49.23	48.56	47.93
21.00	DISCHG	47.34	46.79	46.26	45.76	45.28	44.83	44.40	43.97	43.53	43.10
22.00	DISCHG	42.70	42.29	41.89	41.51	41.15	40.80	40.46	40.14	39.84	39.55
23.00	DISCHG	39.27	39.01	38.75	38.51	38.28	38.06	37.85	37.65	37.37	36.46
24.00	DISCHG	34.72	32.26	28.67	24.55	21.18	18.97	17.56	16.54	15.77	15.13
25.00	DISCHG	14.59	14.12	13.71	13.34	13.02	12.72	12.45	12.20	11.96	11.76
26.00	DISCHG	11.57	11.41	11.25	11.11	10.97	10.84	10.71	10.57	10.42	10.28
27.00	DISCHG	10.13	9.97	9.81	9.64	9.47	9.29	9.11	8.93	8.74	8.54
28.00	DISCHG	8.34	8.13	7.93	7.72	7.51	7.29	7.08	6.87	6.67	6.46
29.00	DISCHG	6.26	6.06	5.87	5.68	5.49	5.32	5.14	4.99	4.87	4.74

RUNOFF VOLUME ABOVE BASEFLOW = 2.79 WATERSHED INCHES, 1709.15 CFS-HRS, 141.24 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION SAVMOV CROSS SECTION 70
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5

OPERATION SAVMOV CROSS SECTION 70
INPUT HYDROGRAPH= 1 OUTPUT HYDROGRAPH= 6

OPERATION ADDHYD CROSS SECTION 70
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.14	1116.29	(NULL)
16.64	177.46	(NULL)
17.57	179.86	(NULL)
19.27	169.82	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 2.27 SQ.MI.

TIME(HRS)											
4.00	DISCHG	3.00	3.00	3.00	3.02	3.10	3.26	3.49	3.75	4.04	4.33
5.00	DISCHG	4.62	4.91	5.20	5.49	5.77	6.04	6.32	6.58	6.84	7.10
6.00	DISCHG	7.36	7.67	8.18	8.80	9.40	9.89	10.32	10.71	11.07	11.41
7.00	DISCHG	11.75	12.07	12.38	12.69	12.99	13.29	13.58	13.86	14.14	14.41
8.00	DISCHG	14.68	15.08	15.82	16.80	17.96	19.27	20.48	21.44	22.17	22.76
9.00	DISCHG	23.27	23.91	24.91	26.16	27.29	28.16	29.02	30.23	31.66	32.92
10.00	DISCHG	33.90	34.86	36.18	37.84	40.10	43.08	46.57	50.95	55.84	61.21
11.00	DISCHG	67.10	73.07	79.46	86.04	93.81	104.40	133.39	211.97	337.64	546.04
12.00	DISCHG	848.46	1092.05	1073.80	869.58	657.26	515.80	432.54	385.05	356.71	337.37
13.00	DISCHG	322.22	309.40	297.26	286.13	275.78	265.44	254.99	243.81	232.31	221.03
14.00	DISCHG	210.55	201.32	193.36	186.97	182.02	177.62	173.89	170.38	167.23	164.94
15.00	DISCHG	163.84	163.69	164.31	165.37	165.98	165.96	165.84	166.19	167.01	168.11
16.00	DISCHG	169.37	170.69	172.07	173.51	175.05	176.60	177.39	177.31	176.72	176.35
17.00	DISCHG	176.49	176.95	177.55	178.23	178.95	179.67	179.84	179.28	178.45	176.94
18.00	DISCHG	174.62	172.23	170.26	168.80	168.64	168.83	169.09	169.34	169.53	169.67
19.00	DISCHG	169.76	169.79	169.79	169.81	169.73	169.56	169.35	169.08	168.65	167.56
20.00	DISCHG	165.62	163.48	161.71	160.28	159.01	157.80	156.60	155.39	154.16	152.92
21.00	DISCHG	151.66	150.40	149.13	147.86	146.59	145.33	144.07	142.81	141.55	140.28
22.00	DISCHG	139.03	137.79	136.55	135.34	134.15	132.99	131.87	130.78	129.72	128.69
23.00	DISCHG	128.02	127.60	127.25	126.92	126.62	126.32	126.03	125.76	125.40	124.39
24.00	DISCHG	122.55	119.96	116.20	111.22	106.32	102.36	99.12	96.24	93.57	91.05
25.00	DISCHG	88.63	86.30	84.07	81.93	79.89	77.93	75.82	73.65	71.58	69.65
26.00	DISCHG	67.86	66.21	64.68	63.25	61.91	60.64	59.44	58.30	57.20	56.15
27.00	DISCHG	55.13	54.15	53.20	52.27	51.36	50.46	49.58	48.66	47.74	46.84
28.00	DISCHG	45.95	45.07	44.21	43.35	42.51	41.68	40.85	40.04	39.23	38.44
29.00	DISCHG	37.65	36.88	36.12	35.39	34.68	34.00	33.34	32.71	32.13	31.54

RUNOFF VOLUME ABOVE BASEFLOW = 2.13 WATERSHED INCHES, 3123.47 CFS-HRS, 258.12 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 80
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 700.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .30, M= 1.94
MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 80 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.14	1116.29	(NULL)
16.64	177.46	(NULL)
17.57	179.86	(NULL)
19.27	169.82	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.13 WATERSHED INCHES, 3123.47 CFS-HRS, 258.12 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 80
OUTPUT HYDROGRAPH= 6
AREA= .02 SQ MI INPUT RUNOFF CURVE= 64. TIME OF CONCENTRATION= .12 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0160 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
11.98	54.99	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 2.98 WATERSHED INCHES, 38.49 CFS-HRS, 3.18 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 80
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.14	1137.15	(NULL)
16.63	178.84	(NULL)
17.57	181.19	(NULL)
19.27	170.89	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.14 WATERSHED INCHES, 3161.95 CFS-HRS, 261.30 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 100
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5

OPERATION RUNOFF CROSS SECTION 90
OUTPUT HYDROGRAPH= 6
AREA= .24 SQ MI INPUT RUNOFF CURVE= 75. TIME OF CONCENTRATION= .62 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0827 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.26	458.49	(RUNOFF)
19.66	15.09	(RUNOFF)
23.66	11.44	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 4.14 WATERSHED INCHES, 641.76 CFS-HRS, 53.03 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 100
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.17	1546.52	(NULL)
15.36	193.69	(NULL)
16.60	201.06	(NULL)
17.57	200.03	(NULL)
19.27	185.97	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.33 WATERSHED INCHES, 3803.71 CFS-HRS, 314.34 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 110
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 500.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .30, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 110 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.17	1546.52	(NULL)
15.36	193.69	(NULL)
16.60	201.06	(NULL)
17.57	200.03	(NULL)
19.27	185.97	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.33 WATERSHED INCHES, 3803.71 CFS-HRS, 314.34 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 120
INPUT HYDROGRAPH= 5 OUTPUT HYDROGRAPH= 7

OPERATION REACH CROSS SECTION 120
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 500.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .30, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 120 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.17	1546.52	(NULL)
15.36	193.69	(NULL)
16.60	201.06	(NULL)
17.57	200.03	(NULL)
19.27	185.97	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.33 WATERSHED INCHES, 3803.71 CFS-HRS, 314.34 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 120
OUTPUT HYDROGRAPH= 6
AREA= .19 SQ MI INPUT RUNOFF CURVE= 66. TIME OF CONCENTRATION= .74 HOURS

INTERNAL HYDROGRAPH TIME INCREMENT= .0987 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.35	245.11	(RUNOFF)
19.66	10.55	(RUNOFF)
23.65	8.06	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 3.20 WATERSHED INCHES, 392.54 CFS-HRS, 32.44 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 120
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.18	1751.46	(NULL)
15.30	212.19	(NULL)
16.59	216.51	(NULL)
17.56	213.23	(NULL)
19.26	196.53	(NULL)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 2.72 SQ.MI.

4.00	DISCHG	3.00	3.00	3.00	3.02	3.10	3.26	3.49	3.75	4.04	4.33
5.00	DISCHG	4.62	4.91	5.20	5.49	5.77	6.04	6.32	6.58	6.84	7.10
6.00	DISCHG	7.36	7.67	8.18	8.80	9.40	9.89	10.32	10.71	11.07	11.42
7.00	DISCHG	11.77	12.13	12.52	12.93	13.36	13.79	14.23	14.67	15.11	15.54
8.00	DISCHG	15.98	16.55	17.48	18.71	20.15	21.78	23.35	24.68	25.76	26.68
9.00	DISCHG	27.51	28.47	29.84	31.53	33.15	34.55	36.01	37.88	40.05	42.12
10.00	DISCHG	43.90	45.70	47.90	50.55	54.01	58.39	63.67	70.15	77.54	85.86
11.00	DISCHG	95.01	104.76	115.21	126.29	139.25	156.15	202.42	310.72	493.94	815.14
12.00	DISCHG	1274.46	1658.82	1748.24	1576.73	1315.08	1077.89	891.10	757.03	662.79	593.32
13.00	DISCHG	541.00	498.41	462.85	432.90	407.21	384.73	363.91	344.02	324.91	306.99
14.00	DISCHG	291.09	277.14	265.12	255.16	246.96	239.74	233.17	227.00	221.35	216.82
15.00	DISCHG	213.89	212.31	211.92	212.19	211.90	210.94	209.71	208.91	208.73	209.04
16.00	DISCHG	209.77	210.72	211.85	213.14	214.59	216.05	216.51	215.92	214.51	213.15
17.00	DISCHG	212.30	211.91	211.90	212.16	212.59	213.13	213.17	212.53	211.54	209.54
18.00	DISCHG	206.57	203.23	200.23	197.83	196.92	196.58	196.48	196.49	196.52	196.55
19.00	DISCHG	196.56	196.54	196.52	196.52	196.43	196.26	196.05	195.79	195.25	193.74
20.00	DISCHG	191.16	188.06	185.25	182.87	180.85	179.10	177.54	176.08	174.69	173.32
21.00	DISCHG	171.99	170.67	169.37	168.07	166.79	165.52	164.26	163.00	161.74	160.48
22.00	DISCHG	159.24	158.00	156.77	155.56	154.37	153.22	152.11	151.03	149.98	148.95
23.00	DISCHG	148.29	147.87	147.53	147.21	146.91	146.62	146.34	146.07	145.60	144.14
24.00	DISCHG	141.60	137.42	131.54	123.95	116.21	109.64	104.27	99.81	96.04	92.77
25.00	DISCHG	89.83	87.13	84.65	82.33	80.16	78.12	75.94	73.73	71.63	69.68
26.00	DISCHG	67.88	66.22	64.68	63.25	61.91	60.64	59.44	58.30	57.20	56.15
27.00	DISCHG	55.13	54.15	53.20	52.27	51.36	50.46	49.58	48.66	47.74	46.84
28.00	DISCHG	45.95	45.07	44.21	43.35	42.51	41.68	40.85	40.04	39.23	38.44
29.00	DISCHG	37.65	36.88	36.12	35.39	34.68	34.00	33.34	32.71	32.13	31.54

RUNOFF VOLUME ABOVE BASEFLOW = 2.39 WATERSHED INCHES, 4196.24 CFS-HRS, 346.78 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV STRUCTURE 50
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 6

OPERATION RESVOR STRUCTURE 50
INPUT HYDROGRAPH= 6 OUTPUT HYDROGRAPH= 7
SURFACE ELEVATION= 2.40

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.60	365.02	11.34

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 2.72 SQ.MI.

9.00	DISCHG	3.00	3.00	3.28	3.75	4.23	4.73	5.24	5.78	6.34	6.92
9.00	ELEV	2.84	2.84	2.85	2.87	2.89	2.91	2.93	2.95	2.97	3.00
10.00	DISCHG	7.48	8.04	8.63	9.25	9.90	10.60	11.37	12.21	13.14	14.18
10.00	ELEV	3.02	3.05	3.07	3.10	3.13	3.16	3.19	3.23	3.27	3.32
11.00	DISCHG	15.34	17.09	19.59	22.30	25.27	28.55	32.58	38.58	50.40	70.59
11.00	ELEV	3.37	3.43	3.49	3.56	3.63	3.71	3.81	3.96	4.21	4.61
12.00	DISCHG	99.89	120.64	195.35	242.63	276.12	302.01	321.21	335.07	343.38	349.70
12.00	ELEV	5.26	6.19	7.24	8.22	9.02	9.64	10.10	10.43	10.68	10.88
13.00	DISCHG	354.52	358.18	360.90	362.83	364.10	364.80	365.02	364.77	364.10	363.03
13.00	ELEV	11.02	11.13	11.22	11.27	11.31	11.33	11.34	11.33	11.31	11.28
14.00	DISCHG	361.61	359.89	357.92	355.75	353.43	350.99	348.45	345.83	343.13	340.38
14.00	ELEV	11.24	11.18	11.12	11.06	10.99	10.91	10.84	10.76	10.68	10.59
15.00	DISCHG	337.60	334.84	331.62	328.25	324.98	321.79	318.65	315.58	312.57	309.66
15.00	ELEV	10.51	10.43	10.34	10.26	10.19	10.11	10.03	9.96	9.89	9.82
16.00	DISCHG	306.84	304.12	301.51	299.00	296.61	294.32	292.13	289.99	287.89	285.80
16.00	ELEV	9.75	9.69	9.63	9.57	9.51	9.46	9.40	9.35	9.30	9.25
17.00	DISCHG	283.75	281.73	279.77	277.86	276.02	274.24	272.52	270.85	269.19	267.54
17.00	ELEV	9.20	9.16	9.11	9.06	9.02	8.98	8.94	8.90	8.86	8.82
18.00	DISCHG	265.87	264.15	262.40	260.61	258.84	257.09	255.38	253.73	252.12	250.55
18.00	ELEV	8.78	8.74	8.70	8.65	8.61	8.57	8.53	8.49	8.45	8.41
19.00	DISCHG	249.08	247.67	246.30	244.97	243.67	242.40	241.16	239.95	238.76	237.57
19.00	ELEV	8.38	8.34	8.31	8.27	8.24	8.21	8.18	8.15	8.12	8.09
20.00	DISCHG	236.36	235.11	233.81	232.48	231.12	229.75	228.37	226.99	225.61	224.22
20.00	ELEV	8.06	8.03	8.00	7.96	7.93	7.89	7.86	7.82	7.79	7.76
21.00	DISCHG	222.84	221.46	220.08	218.71	217.33	215.96	214.59	213.23	211.86	210.50
21.00	ELEV	7.72	7.69	7.65	7.62	7.58	7.55	7.51	7.48	7.45	7.41
22.00	DISCHG	208.13	205.22	202.41	199.70	197.07	194.53	192.07	189.70	187.39	185.17
22.00	ELEV	7.38	7.35	7.31	7.28	7.25	7.23	7.20	7.17	7.15	7.12
23.00	DISCHG	183.02	180.97	179.02	177.16	175.39	173.71	172.11	170.59	169.14	167.71
23.00	ELEV	7.10	7.07	7.05	7.03	7.01	6.99	6.97	6.96	6.94	6.92
24.00	DISCHG	166.25	164.68	162.91	160.85	158.45	155.78	152.91	149.93	146.87	143.79
24.00	ELEV	6.91	6.89	6.87	6.85	6.82	6.79	6.76	6.73	6.69	6.66
25.00	DISCHG	140.71	137.64	134.61	131.60	128.65	125.74	122.88	120.98	120.93	120.87
25.00	ELEV	6.62	6.59	6.55	6.52	6.49	6.45	6.42	6.39	6.36	6.32
26.00	DISCHG	120.81	120.75	120.69	120.62	120.56	120.49	120.42	120.35	120.28	120.21
26.00	ELEV	6.29	6.25	6.21	6.17	6.13	6.09	6.05	6.01	5.97	5.93

27.00	DISCHG	120.14	120.06	119.73	118.05	116.38	114.73	113.10	111.49	109.90	108.33
27.00	ELEV	5.88	5.84	5.79	5.75	5.70	5.66	5.62	5.57	5.53	5.49
28.00	DISCHG	106.77	105.23	103.70	102.19	100.70	99.23	97.77	96.33	94.90	93.49
28.00	ELEV	5.45	5.41	5.37	5.33	5.29	5.25	5.21	5.17	5.13	5.09
29.00	DISCHG	92.10	90.72	89.14	87.36	85.61	83.90	82.22	80.58	78.97	77.39
29.00	ELEV	5.06	5.02	4.98	4.95	4.91	4.88	4.84	4.81	4.78	4.75

RUNOFF VOLUME ABOVE BASEFLOW = 2.21 WATERSHED INCHES, 3871.54 CFS-HRS, 319.94 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 130
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 1000.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .30, M= 1.94
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 130 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***
0 *** WARNING - REACH 130 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT 74.39 CFS, 20.55 % OF PEAK.

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.60	365.02	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.21 WATERSHED INCHES, 3871.54 CFS-HRS, 319.94 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 130
OUTPUT HYDROGRAPH= 6
AREA= .05 SQ MI INPUT RUNOFF CURVE= 74. TIME OF CONCENTRATION= .19 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0253 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.01	160.37	(RUNOFF)
23.65	2.37	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 4.05 WATERSHED INCHES, 130.79 CFS-HRS, 10.81 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 130
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.04	267.23	(NULL)
13.49	374.66	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.24 WATERSHED INCHES, 4002.33 CFS-HRS, 330.75 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 130
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 6

OPERATION RESVOR STRUCTURE 60
INPUT HYDROGRAPH= 6 OUTPUT HYDROGRAPH= 7
SURFACE ELEVATION= 2.00

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
16.46	299.80	6.89

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = 2.77 SQ.MI.

11.00	DISCHG	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.34	5.43	8.72
11.00	ELEV	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.41	2.46	2.55
12.00	DISCHG	13.10	17.69	22.20	32.25	42.39	52.53	63.70	76.84	89.81	102.45
12.00	ELEV	2.69	2.84	2.99	3.14	3.31	3.48	3.65	3.82	4.00	4.17
13.00	DISCHG	114.70	126.52	137.18	145.45	153.45	161.19	168.66	175.84	180.08	180.28
13.00	ELEV	4.33	4.49	4.64	4.79	4.93	5.07	5.20	5.33	5.45	5.57
14.00	DISCHG	180.48	180.68	180.88	186.48	200.71	213.56	225.14	235.54	244.86	253.18
14.00	ELEV	5.69	5.81	5.93	6.04	6.15	6.24	6.33	6.41	6.48	6.54
15.00	DISCHG	260.61	267.20	273.01	278.08	282.45	286.17	289.32	291.96	294.13	295.89
15.00	ELEV	6.59	6.64	6.69	6.72	6.76	6.78	6.81	6.83	6.84	6.86
16.00	DISCHG	297.27	298.31	299.05	299.52	299.76	299.78	299.61	299.26	298.74	298.09
16.00	ELEV	6.87	6.88	6.88	6.88	6.89	6.89	6.89	6.88	6.88	6.87
17.00	DISCHG	297.31	296.44	295.48	294.43	293.32	292.15	290.94	289.68	288.39	287.06
17.00	ELEV	6.87	6.86	6.85	6.85	6.84	6.83	6.82	6.81	6.80	6.79
18.00	DISCHG	285.67	284.24	282.78	281.30	279.80	278.27	276.73	275.17	273.61	272.05
18.00	ELEV	6.78	6.77	6.76	6.75	6.74	6.73	6.71	6.70	6.69	6.68
19.00	DISCHG	270.49	268.94	267.41	265.89	264.38	262.90	261.43	259.98	258.55	257.13
19.00	ELEV	6.67	6.66	6.64	6.63	6.62	6.61	6.60	6.59	6.58	6.57
20.00	DISCHG	255.69	254.26	252.84	251.43	250.02	248.61	247.21	245.81	244.41	243.01
20.00	ELEV	6.56	6.55	6.54	6.53	6.52	6.50	6.49	6.48	6.47	6.46
21.00	DISCHG	241.62	240.22	238.83	237.44	236.05	234.66	233.27	231.88	230.50	229.12
21.00	ELEV	6.45	6.44	6.43	6.42	6.41	6.40	6.39	6.38	6.37	6.36
22.00	DISCHG	227.69	226.17	224.54	222.82	221.02	219.16	217.24	215.29	213.30	211.29
22.00	ELEV	6.35	6.34	6.32	6.31	6.30	6.28	6.27	6.26	6.24	6.23
23.00	DISCHG	209.27	207.24	205.21	203.19	201.19	199.21	197.26	195.34	193.46	191.59
23.00	ELEV	6.21	6.20	6.18	6.17	6.15	6.14	6.12	6.11	6.09	6.08
24.00	DISCHG	189.73	187.87	185.97	184.02	182.04	180.99	180.96	180.93	180.89	180.86
24.00	ELEV	6.07	6.05	6.04	6.02	6.01	5.99	5.98	5.96	5.94	5.91
25.00	DISCHG	180.82	180.77	180.72	180.67	180.62	180.56	180.51	180.44	180.38	180.32
25.00	ELEV	5.89	5.86	5.83	5.80	5.77	5.74	5.70	5.67	5.63	5.59
26.00	DISCHG	180.26	180.19	180.13	180.07	180.00	178.05	176.04	174.09	172.21	170.39
26.00	ELEV	5.55	5.52	5.48	5.44	5.40	5.37	5.33	5.29	5.26	5.23
27.00	DISCHG	168.63	166.93	165.29	163.66	162.04	160.41	158.78	157.16	155.53	153.91
27.00	ELEV	5.20	5.17	5.14	5.11	5.08	5.05	5.02	4.99	4.96	4.94
28.00	DISCHG	152.28	150.66	149.05	147.43	145.82	144.22	142.62	141.02	139.43	137.85
28.00	ELEV	4.91	4.88	4.85	4.82	4.79	4.76	4.74	4.71	4.68	4.65
29.00	DISCHG	136.27	134.61	132.53	130.48	128.44	126.41	124.40	122.41	120.43	118.47
29.00	ELEV	4.62	4.59	4.57	4.54	4.51	4.49	4.46	4.43	4.41	4.38

RUNOFF VOLUME ABOVE BASEFLOW = 2.04 WATERSHED INCHES, 3652.58 CFS-HRS, 301.85 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 140
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 2500.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .21, M= 1.48
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = .38 PEAK TRAVEL TIME = .21 HOURS
0 *** WARNING - REACH 140 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT 115.47 CFS, 38.91 % OF PEAK.

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
16.75	299.29	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.03 WATERSHED INCHES, 3621.25 CFS-HRS, 299.26 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 140
OUTPUT HYDROGRAPH= 6
AREA= .20 SQ MI INPUT RUNOFF CURVE= 71. TIME OF CONCENTRATION= .19 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0253 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.02	592.96	(RUNOFF)
15.16	20.38	(RUNOFF)
16.45	17.75	(RUNOFF)
17.65	14.85	(RUNOFF)
19.65	12.01	(RUNOFF)
23.65	9.13	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 3.73 WATERSHED INCHES, 481.90 CFS-HRS, 39.82 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 140
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.02	599.16	(NULL)
16.51	316.26	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.14 WATERSHED INCHES, 4103.15 CFS-HRS, 339.08 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 150
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5

OPERATION RUNOFF CROSS SECTION 149
OUTPUT HYDROGRAPH= 6
AREA= .08 SQ MI INPUT RUNOFF CURVE= 65. TIME OF CONCENTRATION= .42 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0560 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.15	142.32	(RUNOFF)
16.45	6.39	(RUNOFF)
17.67	5.39	(RUNOFF)
19.66	4.37	(RUNOFF)
23.66	3.34	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 3.10 WATERSHED INCHES, 160.17 CFS-HRS, 13.24 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 150
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.03	708.73	(NULL)
16.51	322.65	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.17 WATERSHED INCHES, 4263.32 CFS-HRS, 352.32 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION REACH CROSS SECTION 150
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5
LENGTH = 300.00 FEET INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA, X= .21, M= 1.48
0 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING REACH 150 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***
0 *** WARNING - REACH 150 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT 120.64 CFS, 17.43 % OF PEAK.

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.03	708.73	(NULL)
16.51	322.65	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.17 WATERSHED INCHES, 4263.32 CFS-HRS, 352.32 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION RUNOFF CROSS SECTION 150
OUTPUT HYDROGRAPH= 6
AREA= .01 SQ MI INPUT RUNOFF CURVE= 40. TIME OF CONCENTRATION= .15 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0200 HOURS

*** WARNING-MAIN TIME INCREMENT MAY BE TOO LARGE.
COMPUTED PEAK(4.99) AT EXCEEDS MAX. ADJACENT HYDROGRAPH COORDINATE BY 8 %.
+ XSECTION 150

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.05	4.99	(RUNOFF)

TIME(HRS) FIRST HYDROGRAPH POINT = .00 HOURS TIME INCREMENT = .10 HOURS DRAINAGE AREA = .01 SQ.MI.

11.00	DISCHG	.00	.00	.00	.00	.00	.00	.00	.00	.00	1.05
12.00	DISCHG	4.60	4.46	2.17	1.71	1.28	1.17	1.09	1.02	1.00	.87

13.00	DISCHG	.84	.78	.73	.71	.66	.64	.60	.56	.55	.52
14.00	DISCHG	.52	.50	.48	.47	.44	.43	.41	.38	.38	.38
15.00	DISCHG	.38	.39	.39	.38	.35	.34	.34	.34	.34	.34
16.00	DISCHG	.34	.34	.35	.35	.35	.35	.32	.30	.30	.30
17.00	DISCHG	.30	.30	.30	.30	.30	.30	.30	.30	.30	.26
18.00	DISCHG	.25	.25	.25	.25	.25	.25	.25	.25	.25	.25
19.00	DISCHG	.25	.25	.25	.25	.25	.25	.25	.25	.25	.21
20.00	DISCHG	.19	.19	.19	.19	.19	.19	.19	.19	.19	.19
21.00	DISCHG	.19	.20	.20	.20	.20	.20	.20	.20	.20	.20
22.00	DISCHG	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20
23.00	DISCHG	.20	.20	.20	.20	.20	.20	.20	.20	.20	.15
24.00	DISCHG	.14	.08	.01	.00						

RUNOFF VOLUME ABOVE BASEFLOW = .84 WATERSHED INCHES, 5.41 CFS-HRS, .45 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 150
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.03	713.69	(NULL)
16.51	322.99	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.16 WATERSHED INCHES, 4268.73 CFS-HRS, 352.77 ACRE-FEET; BASEFLOW = 3.00 CFS

OPERATION SAVMOV CROSS SECTION 180
INPUT HYDROGRAPH= 7 OUTPUT HYDROGRAPH= 5

OPERATION RUNOFF CROSS SECTION 180
OUTPUT HYDROGRAPH= 6
AREA= .11 SQ MI INPUT RUNOFF CURVE= 42. TIME OF CONCENTRATION= .48 HOURS
INTERNAL HYDROGRAPH TIME INCREMENT= .0640 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.27	39.64	(RUNOFF)
23.68	2.45	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = .99 WATERSHED INCHES, 70.57 CFS-HRS, 5.83 ACRE-FEET; BASEFLOW = .00 CFS

OPERATION ADDHYD CROSS SECTION 180
INPUT HYDROGRAPHS= 5,6 OUTPUT HYDROGRAPH= 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.04	730.28	(NULL)
16.51	327.26	(NULL)

RUNOFF VOLUME ABOVE BASEFLOW = 2.12 WATERSHED INCHES, 4339.30 CFS-HRS, 358.60 ACRE-FEET; BASEFLOW = 3.00 CFS

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OPERATION REACH    CROSS SECTION 180
          INPUT HYDROGRAPH= 7      OUTPUT HYDROGRAPH= 5
          LENGTH =    1700.00 FEET       INPUT = COEFFICIENTS RELATED TO CROSS SECTIONAL AREA,  X=   .21,   M= 1.48
0         MODIFIED ATT-KIN ROUTING COEFFICIENT =  .63       PEAK TRAVEL TIME =     .20 HOURS
0     *** WARNING - REACH 180 INFLOW HYDROGRAPH VOLUME TRUNCATED ABOVE BASEFLOW AT      120.64 CFS,  17.02 % OF PEAK.

          PEAK TIME(HRS)              PEAK DISCHARGE(CFS)             PEAK ELEVATION(FEET)
             12.18                            648.50                          (NULL)
             16.65                            326.85                          (NULL)

  RUNOFF VOLUME ABOVE BASEFLOW =  2.11 WATERSHED INCHES,    4316.76 CFS-HRS,    356.74 ACRE-FEET;   BASEFLOW =    3.00 CFS


OPERATION RUNOFF   CROSS SECTION 180
          OUTPUT HYDROGRAPH=  6
          AREA=     .11 SQ MI   INPUT RUNOFF CURVE= 41.     TIME OF CONCENTRATION=    .48 HOURS
          INTERNAL HYDROGRAPH TIME INCREMENT=  .0640 HOURS

          PEAK TIME(HRS)              PEAK DISCHARGE(CFS)             PEAK ELEVATION(FEET)
             12.28                             34.74                          (RUNOFF)
             23.69                              2.34                          (RUNOFF)

  RUNOFF VOLUME ABOVE BASEFLOW =   .92 WATERSHED INCHES,      65.08 CFS-HRS,      5.38 ACRE-FEET;   BASEFLOW =     .00 CFS


OPERATION ADDHYD   CROSS SECTION 180
          INPUT HYDROGRAPHS= 5,6     OUTPUT HYDROGRAPH= 7

          PEAK TIME(HRS)              PEAK DISCHARGE(CFS)             PEAK ELEVATION(FEET)
             12.18                            680.21                          (NULL)
             16.65                            330.83                          (NULL)

TIME(HRS)          FIRST HYDROGRAPH POINT =    .00 HOURS      TIME INCREMENT =  .10 HOURS       DRAINAGE AREA =    3.28 SQ.MI.
   8.00   DISCHG        3.00      3.03      3.12      3.25      3.41      3.63      3.87      4.10      4.33      4.55
   9.00   DISCHG        4.77      4.99      5.27      5.63      5.97      6.27      6.57      6.98      7.52      8.03
  10.00   DISCHG        8.49      8.93      9.48     10.18     10.90     12.02     13.18     14.64     16.59     18.38
  11.00   DISCHG       20.83     23.23     25.85     28.98     31.91     36.51     41.18     67.85    125.42    194.68
  12.00   DISCHG      383.69    609.39    677.69    545.85    419.49    320.57    256.33    219.08    198.01    189.26
  13.00   DISCHG      184.32    183.94    186.41    189.83    195.38    200.28    205.62    210.64    214.82    219.63
  14.00   DISCHG      223.57    226.31    227.67    227.76    227.52    227.68    231.15    237.10    244.27    252.62
  15.00   DISCHG      261.54    270.50    279.15    287.24    294.49    299.98    304.63    308.95    312.96    316.61
  16.00   DISCHG      319.84    322.64    325.02    326.99    328.58    329.83    330.74    330.69    329.62    328.58
  17.00   DISCHG      327.72    326.98    326.30    325.59    324.83    323.99    323.09    322.11    321.06    319.74
  18.00   DISCHG      317.32    314.69    312.41    310.43    308.69    307.08    305.53    304.01    302.50    300.98
  19.00   DISCHG      299.46    297.94    296.40    294.87    293.35    291.83    290.32    288.83    287.33    285.65
  20.00   DISCHG      282.91    280.03    277.54    275.43    273.60    271.95    270.40    268.92    267.48    266.05
  21.00   DISCHG      264.64    263.24    261.85    260.46    259.08    257.69    256.31    254.93    253.55    252.17
  22.00   DISCHG      250.79    249.42    248.04    246.62    245.15    243.61    241.99    240.30    238.54    236.72
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23.00	DISCHG	234.85	232.94	230.99	229.02	227.03	225.04	223.04	221.05	219.07	216.88
24.00	DISCHG	213.63	210.15	205.68	199.98	195.09	191.18	188.02	185.57	183.89	182.78
25.00	DISCHG	182.07	181.61	181.31	181.10	180.96	180.86	180.78	180.71	180.64	180.58
26.00	DISCHG	180.52	180.45	180.39	180.33	180.26	180.20	180.14	179.62	178.64	177.32
27.00	DISCHG	175.79	174.14	172.44	170.72	169.02	167.35	165.68	164.04	162.40	160.76
28.00	DISCHG	159.13	157.50	155.87	154.25	152.62	151.00	149.39	147.77	146.16	144.56
29.00	DISCHG	142.96	141.36	139.77	138.17	136.45	134.62	132.71	130.76	128.78	126.80

RUNOFF VOLUME ABOVE BASEFLOW = 2.07 WATERSHED INCHES, 4381.85 CFS-HRS, 362.12 ACRE-FEET; BASEFLOW = 3.00 CFS

EXECUTIVE CONTROL OPERATION ENDCMP RECORD ID 1740

\+ COMPUTATIONS COMPLETED FOR PASS 1

EXECUTIVE CONTROL OPERATION ENDJOB RECORD ID 1750

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

SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RAIN TABLE #	ANTEC MOIST COND	MAIN TIME INCREM (HR)	PRECIPITATION BEGIN (HR)	PRECIPITATION AMOUNT (IN)	PRECIPITATION DURATION (HR)	RUNOFF AMOUNT (IN)	PEAK DISCHARGE ELEVATION (FT)	PEAK DISCHARGE TIME (HR)	PEAK DISCHARGE RATE (CFS)	PEAK DISCHARGE RATE (CSM)
ALTERNATE 92 STORM 1													
STRUCTURE 10	RUNOFF	.84	2	2	.10	.0	7.00	24.00	1.67	---	17.80	96.56	114.9
STRUCTURE 10	RESVOR	.84	2	2	.10	.0	7.00	24.00	1.63	9.50	18.14	96.09	114.4
XSECTION 10	REACH	.84	2	2	.10	.0	7.00	24.00	1.62	---	18.47	98.84	117.7
XSECTION 10	RUNOFF	.20	2	2	.10	.0	7.00	24.00	1.49	---	12.05	211.47	1057.4
XSECTION 10	ADDHYD	1.04	2	2	.10	.0	7.00	24.00	1.60	---	12.05	214.47	206.2
STRUCTURE 20	RESVOR	1.04	2	2	.10	.0	7.00	24.00	1.54	9.27	20.05	95.07	91.4
XSECTION 20	REACH	1.04	2	2	.10	.0	7.00	24.00	1.54	---	20.19	95.04	91.4
XSECTION 20	RUNOFF	.28	2	2	.10	.0	7.00	24.00	2.12	---	13.35	108.69	388.2
XSECTION 20	ADDHYD	1.32	2	2	.10	.0	7.00	24.00	1.66	---	13.27	150.11	113.7
STRUCTURE 30	RUNOFF	.37	2	2	.10	.0	7.00	24.00	1.57	---	14.95	60.58	163.7
STRUCTURE 30	RESVOR	.37	2	2	.10	.0	7.00	24.00	1.51	25.91	16.21	48.05	129.9
XSECTION 40	REACH	.37	2	2	.10	.0	7.00	24.00	1.50	---	16.55	47.70	128.9
XSECTION 40	RUNOFF	.06	2	2	.10	.0	7.00	24.00	.84	---	12.72	10.21	170.2
XSECTION 40	ADDHYD	.43	2	2	.10	.0	7.00	24.00	1.41	---	16.54	49.80	115.8
STRUCTURE 40	RESVOR	.43	2	2	.10	.0	7.00	24.00	1.41	10.89	16.60	49.78	115.8
XSECTION 50	REACH	.43	2	2	.10	.0	7.00	24.00	1.40	---	16.72	49.77	115.7
XSECTION 49	RUNOFF	.11	2	2	.10	.0	7.00	24.00	.84	---	13.33	13.76	125.1
XSECTION 50	ADDHYD	.54	2	2	.10	.0	7.00	24.00	1.29	---	16.65	53.98	100.0
XSECTION 50	RUNOFF	.36	2	2	.10	.0	7.00	24.00	5.25	---	12.13	1078.73	2996.5
XSECTION 50	ADDHYD	.90	2	2	.10	.0	7.00	24.00	2.87	---	12.13	1079.95	1199.9
XSECTION 60	REACH	.90	2	2	.10	.0	7.00	24.00	2.87	---	12.13	1079.95	1199.9
XSECTION 60	RUNOFF	.05	2	2	.10	.0	7.00	24.00	1.24	---	12.56	16.56	331.2
XSECTION 60	ADDHYD	.95	2	2	.10	.0	7.00	24.00	2.79	---	12.14	1086.21	1143.4
XSECTION 70	ADDHYD	2.27	2	2	.10	.0	7.00	24.00	2.13	---	12.14	1116.29	491.8
XSECTION 80	REACH	2.27	2	2	.10	.0	7.00	24.00	2.13	---	12.14	1116.29	491.8
XSECTION 80	RUNOFF	.02	2	2	.10	.0	7.00	24.00	2.98	---	11.98	54.99	2749.6
XSECTION 80	ADDHYD	2.29	2	2	.10	.0	7.00	24.00	2.14	---	12.14	1137.16	496.6
XSECTION 90	RUNOFF	.24	2	2	.10	.0	7.00	24.00	4.14	---	12.26	458.49	1910.4
XSECTION 100	ADDHYD	2.53	2	2	.10	.0	7.00	24.00	2.33	---	12.17	1546.52	611.3
XSECTION 110	REACH	2.53	2	2	.10	.0	7.00	24.00	2.33	---	12.17	1546.52	611.3
XSECTION 120	REACH	2.53	2	2	.10	.0	7.00	24.00	2.33	---	12.17	1546.52	611.3
XSECTION 120	RUNOFF	.19	2	2	.10	.0	7.00	24.00	3.20	---	12.35	245.11	1290.1

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

SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RAIN TABLE #	ANTEC MOIST COND	MAIN TIME INCREM (HR)	PRECIPITATION BEGIN (HR)	AMOUNT (IN)	DURATION (HR)	RUNOFF AMOUNT (IN)	PEAK DISCHARGE ELEVATION (FT)	TIME (HR)	RATE (CFS)	RATE (CSM)
ALTERNATE 92 STORM 1													
XSECTION 120	ADDHYD	2.72	2	2	.10	.0	7.00	24.00	2.39	---	12.18	1751.46	643.9
STRUCTURE 50	RESVOR	2.72	2	2	.10	.0	7.00	24.00	2.21	11.34	13.60	365.02	134.2
XSECTION 130	REACH	2.72	2	2	.10	.0	7.00	24.00	2.21	---	13.60	365.02	134.2
XSECTION 130	RUNOFF	.05	2	2	.10	.0	7.00	24.00	4.05	---	12.01	160.37	3207.4
XSECTION 130	ADDHYD	2.77	2	2	.10	.0	7.00	24.00	2.24	---	13.49	374.66	135.3
STRUCTURE 60	RESVOR	2.77	2	2	.10	.0	7.00	24.00	2.04	6.89	16.46	299.80	108.2
XSECTION 140	REACH	2.77	2	2	.10	.0	7.00	24.00	2.03	---	16.75	299.29	108.0
XSECTION 140	RUNOFF	.20	2	2	.10	.0	7.00	24.00	3.73	---	12.02	592.96	2964.8
XSECTION 140	ADDHYD	2.97	2	2	.10	.0	7.00	24.00	2.14	---	12.02	599.16	201.7
XSECTION 149	RUNOFF	.08	2	2	.10	.0	7.00	24.00	3.10	---	12.15	142.32	1779.0
XSECTION 150	ADDHYD	3.05	2	2	.10	.0	7.00	24.00	2.17	---	12.03	708.73	232.4
XSECTION 150	REACH	3.05	2	2	.10	.0	7.00	24.00	2.17	---	12.03	708.73	232.4
XSECTION 150	RUNOFF	.01	2	2	.10	.0	7.00	24.00	.84	---	12.05	4.99	499.3
XSECTION 150	ADDHYD	3.06	2	2	.10	.0	7.00	24.00	2.16	---	12.03	713.69	233.2
XSECTION 180	RUNOFF	.11	2	2	.10	.0	7.00	24.00	.99	---	12.27	39.64	360.4
XSECTION 180	ADDHYD	3.17	2	2	.10	.0	7.00	24.00	2.12	---	12.04	730.28	230.4
XSECTION 180	REACH	3.17	2	2	.10	.0	7.00	24.00	2.11	---	12.18	648.50	204.6
XSECTION 180	RUNOFF	.11	2	2	.10	.0	7.00	24.00	.92	---	12.28	34.74	315.8
XSECTION 180	ADDHYD	3.28	2	2	.10	.0	7.00	24.00	2.07	---	12.18	680.21	207.4

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

```
                    HYDROGRAPH INFORMATION                                ROUTING PARAMETERS                            PEAK
+          -----------------------------------------------  -----------------------------------------------------------
                                       OUTFLOW+             VOLUME  MAIN  ITER- Q AND A          PEAK   S/Q   ATT- TRAVEL TIME
+                                                                                                                  -----------
XSEC REACH    INFLOW       OUTFLOW    INTERV.AREA  BASE-    ABOVE   TIME  ATION EQUATION   LENGTH RATIO @PEAK  KIN  STOR- KINE-
+           -----------  -----------  -----------                              -----------
 ID  LENGTH PEAK   TIME  PEAK   TIME  PEAK   TIME  FLOW     BASE    INCR    #   COEFF POWER FACTOR Q/I   (K)  COEFF  AGE  MATIC
      (FT)  (CFS)  (HR)  (CFS)  (HR)  (CFS)  (HR)  (CFS)    (IN)    (HR)         (X)   (M)   (K*)  (Q*)  (SEC)  (C)   (HR)  (HR)

   ALTERNATE   92   STORM    1
+  ---------------------------
                                                                                1.20
+ 10  1750     99  18.1    99  18.5                3      1.63*   .10    1          1.10  .021   .997   888  .34    .40   .25
+                                      203  12.1
                                                                                .280
+ 20  2900     95  20.0    95  20.2                3      1.54*   .10    1          1.94  .000  1.000   317  .72?   .20   .09
+                                      150  13.3
                                                                                .880
+ 40  1300     48  16.2    48  16.5                0      1.51    .10    1          1.10  .027   .992   934  .32    .30   .26
+                                       50  16.5
                                                                                1.60
+ 50  1700     50  16.6    50  16.7                0      1.41    .10    1          1.45  .002  1.000   252  .83?   .10   .07
+                                       54  16.6
                                                                                .440
+ 60  1400   1064  12.1  1064  12.1                0      2.87    .10    0          1.94  .000  1.000    38 1.00?   .00   .00
+                                     1069  12.1
                                                                                .300
+ 80   700   1092  12.1  1092  12.1                3      2.13    .10    0          1.94  .000  1.000    23 1.00?   .00   .00
+                                     1120  12.1
                                                                                .300
+110   500   1533  12.2  1533  12.2                3      2.33    .10    0          1.94  .000  1.000    14 1.00?   .00   .00
+                                      ---   ---
                                                                                .300
+120   500   1533  12.2  1533  12.2                3      2.33    .10    0          1.94  .000  1.000    14 1.00?   .00   .00
+                                     1748  12.2
                                                                                .300
```

+130	1000	365	13.6	365	13.6			3	2.21*	.10	0		1.94	.000	1.000	55	1.00?	.00	.00
+						375	13.5												
												.210							
+140	2500	300	16.5	299	16.7			3	2.04*	.10	1		1.48	.004	.998	763	.38	.20	.21
+						595	12.0												
												.210							
+150	300	695	12.0	695	12.0			3	2.17*	.10	0		1.48	.000	1.000	70	1.00?	.00	.00
+						700	12.0												
												.210							
+180	1700	712	12.0	645	12.2			3	2.12*	.10	1		1.48	.005	.906	392	.63	.20	.11
+						678	12.2												

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

XSECTION/ STRUCTURE ID	DRAINAGE AREA (SQ MI)	STORM NUMBERS.......... 1
0 STRUCTURE 60	2.77	
ALTERNATE 92		299.80
0 STRUCTURE 50	2.72	
ALTERNATE 92		365.02
0 STRUCTURE 40	.43	
ALTERNATE 92		49.78
0 STRUCTURE 30	.37	
ALTERNATE 92		48.05
0 STRUCTURE 20	1.04	
ALTERNATE 92		95.07
0 STRUCTURE 10	.84	
ALTERNATE 92		96.09
0 XSECTION 10	1.04	
ALTERNATE 92		214.47
0 XSECTION 20	1.32	
ALTERNATE 92		150.11
0 XSECTION 40	.43	
ALTERNATE 92		49.80
0 XSECTION 49	.11	
ALTERNATE 92		13.76
0 XSECTION 50	.90	
ALTERNATE 92		1079.95
0 XSECTION 60	.95	
ALTERNATE 92		1086.21
0 XSECTION 70	2.27	
ALTERNATE 92		1116.29
0 XSECTION 80	2.29	
ALTERNATE 92		1137.16

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

XSECTION/ STRUCTURE ID	DRAINAGE AREA (SQ MI)	STORM NUMBERS.......... 1
0 XSECTION 90	.24	
ALTERNATE 92		458.49
0 XSECTION 100	2.53	
ALTERNATE 92		1546.52
0 XSECTION 110	2.53	
ALTERNATE 92		1546.52
0 XSECTION 120	2.72	
ALTERNATE 92		1751.46
0 XSECTION 130	2.77	
ALTERNATE 92		374.66
0 XSECTION 140	2.97	
ALTERNATE 92		599.16
0 XSECTION 149	.08	
ALTERNATE 92		142.32
0 XSECTION 150	3.06	
ALTERNATE 92		713.69
0 XSECTION 180	3.28	
ALTERNATE 92		680.21

Appendix C

COSTING BACKUP AND STANDARDS AND SPECIFICATIONS FOR RECOMMENDATIONS

6/30/86

Camp Lejeune

COST ESTIMATE

1. STILLING BASIN REF HDC 722-2 (attached)

ASSUME 18" CONCRETE

(A) BOT $(L+3) \times W \times 1.5 = \underline{(4/3 W+3) \times W \times 1.5}$

(B) SIDES $(H+3)(L+3) \times 1.5 \times 2 = \underline{(3/4 W+3)(4/3 W+3) \times 1.5 \times 2}$

(C) SILL $d \times W \times 1.5 = W^2/4$

(d) BAFFLE $(b+t) \times W \times 1.5 + d \times W \times 1.5 = \underline{11/16 W^2 + W^2/4}$

(e) BACK WALL $W \times H \times 1.5 = 4.5/4 \times W^2$

(F) TOP $[(a+3) \times 2 + W \times 3] \times 1.5 \quad [(W+6)+3W] \times 1.5$

$= (4W+6) \times 1.5 = \underline{6W+9}$

per design CHART, USING AN AVERAGE VALUE OF $W = 3D_0$

(A) $(4D_0+3)(4.5D_0) = 18D_0^2 + 13.5D$

(B) $(9/4 D_0+3)(4D_0+3) \times 3 = 27D_0^2 + 56.25D_0 +$

(C) $(3D_0)^2/4 = 2.25D_0^2$

(d) $11/16 (3D_0)^2 + 3^2 D_0^2/4 = 8.44D_0^2$

(e) $1.125 \times 9D_0^2 = 10.13D_0^2$

(f) $6(3D_0)+9 \quad +18D_0+$

$65.82D_0^2 + 87.75D_0 + 36$

$\div 27 \quad 2.43D_0^2 + 3.25D_0 + 1.3$ CY

UNIT COST

MEANS SITE WORK 1986

ASSUME 140#/CY REBAR

REBAR: MEANS 3.2-040-0700 $\frac{1 \times 140 \times 915}{2000} =$ \$64.05/cy

CONCRETE: MEANS 3.3-140-4350 255 cy 255/cy

Camp Lejeune

6/30/86

EXCAVATION ROUGHLY:

$$\text{VOLUME} = H \times W \times L$$
$$= \tfrac{3}{4}W \times W \times \tfrac{4}{3}W = W^3$$

$W = 3D_0$ VOLUME $\frac{3^3 D_0^3}{27} = D_0^3$ CY

(BACKFILL is MINOR & NEGLIGIBLE)

RATIO OF CONCRETE TO EXCAVATION

$$\text{RATIO} = \frac{2.43 D_0^2 + 3.25 D_0}{D_0^3} = \frac{2.4}{D_0} + \frac{3.2}{D_0^2} = 1.15$$

EXCAVATION should be ABOUT \$3.00/cy (MEANS 2.3-160)

USE AVERAGE $D_0 = 3'$

RATIO = 1.15 \$3.00/1.15 = \$2.61/cy

TOTAL UNIT PRICE \$321.66/cy

USE \$350.00/cy

$$\text{COST} = 850.5 D_0^2 + 1137.5 D_0 + 455$$

TABLE OF COSTS

Pipe DiA (FT)	BASIN COST	Rounded up
1.5	4075	\$4,100
2.0	6132	6,200
2.5	8614	8,700
3.0	11,522	11,600
3.5	14,855	14,900
4.0	18,613	18,700
4.5	22,796	22,800
5.0	27,405	27,500

HYDRAULIC DESIGN CRITERIA

SHEETS 722-1 TO 722-3

STORM DRAIN OUTLETS

FIXED ENERGY DISSIPATORS

1. Purpose. Storm drains frequently terminate in unstable channels and gullies. Under these conditions dissipation of the energy of the outflow is required to prevent serious erosion and potential undermining and subsequent failure of the storm drains. Adequate energy dissipation can be accomplished by extensive riprap protection[1,2] or by construction of specially designed fixed energy dissipators.[3,4,5,6]

2. Hydraulic Design Charts (HDC's) 722-1 to -3 present design criteria for three types of laboratory tested energy dissipators.[3] Each type has its advantages and limitations. Selection of the optimum type and size is dependent upon local tailwater conditions, maximum expected discharge, and economic considerations.

3. Stilling Wells. The stilling well energy dissipator shown in HDC 722-1 was developed at the U. S. Army Engineer Waterways Experiment Station (WES).[3] Energy dissipation in this stilling well is relatively independent of tailwater and is accomplished by flow expansion in the well, by impact of the fluid on the base and wall of the well, and by the change in momentum resulting from redirection of the flow to vertically upward. WES laboratory tests[3] indicated that the structure performs satisfactorily for flow-pipe diameter ratios ($Q/D_o^{2.5}$) up to 10 with a well-pipe diameter ratio of 5.

4. HDC 722-1 shows the relation between storm drain diameter, well diameter, and discharge. Designing for operation beyond the limits shown in HDC 722-1 is not recommended. Intermediate ratios of stilling well-drain pipe diameters within the limits shown in HDC 722-1 can be computed using the equation given in this chart.

5. Impact Energy Dissipators. The U. S. Bureau of Reclamation (USBR)[5] has developed an impact energy dissipator which is an effective stilling device even with deficient tailwater. The dimensions of this energy dissipator in terms of its width are shown in HDC 722-2. Energy dissipation in the basin is accomplished by the impact of the entering jet on the vertically hanging baffle and by the eddies that are formed following impact on the baffle.

6. HDC 722-2 shows the relation between storm drain diameters, basin width, and discharge. WES laboratory tests[3] showed that this structure properly designed performs satisfactorily for $Q/D_o^{2.5}$ ratios up to 21. Intermediate ratios of basin widths within the limits shown in HDC 722-2 can be computed using the equation given in this chart. Design for operation beyond these limits is not recommended. The WES

tests also showed that optimum energy dissipation for the design flow occurs with the tailwater midway up the hanging baffle. Excessive tailwater should be avoided as this causes flow over the top of the baffle.

7. Hydraulic Jump Energy Dissipators. The St. Anthony Falls Hydraulic Laboratory (SAFHL)[6] has developed the hydraulic jump energy dissipator shown in HDC 722-3. Design equations for dimensionalizing the structure in terms of the square of the Froude number of the flow entering the dissipator are also given in the chart. WES laboratory tests[3] showed that this type of stilling basin performs satisfactorily for ratios of $Q/D_o^{2.5}$ up to 9.5 with a basin width three times the storm drain diameter. WES tests were limited to basin widths of 1, 2, and 3 times the drain diameter with drops (drain invert to stilling basin) of 0.5 and 2 times the drain diameter. Parallel stilling basin walls were used for basin width-drain diameter ratios of 1 and 2. The transition wall flare was continued through the basin for $W = 3D_o$. Parallel basin sidewalls are generally recommended for best performance. Transition sidewall flare (1:D') during the WES tests was fixed at 1 on 8. The invert transition to the stilling basin should conform to the geometry of the trajectory of a flow not less than 1.25 times the drain outlet portal design velocity.

8. HDC 722-3 shows the relation between storm drain diameter and discharge for stilling basin widths up to 3 times the drain diameter which results in satisfactory performance. WES tests have been restricted to the limits shown in HDC 722-3, and the equation given in the chart can be used to compute intermediate basin width-drain diameter ratios within those limits. General WES model tests of outlet works indicate that this equation also applies to ratios greater than the maximum shown in the chart. However, outlet portal velocities exceeding 60 fps are not recommended for designs containing chute blocks. This chart does not reflect the outlet invert transition effects on basin performance. The design of the basin itself (HDC 722-3) is dependent upon the depth and velocity of the flow as it enters the basin. The values should be computed taking into account the drain outlet transition geometry.

9. Riprap Protection. Riprap protection in the immediate vicinity of the energy dissipator is recommended. Preliminary, unpublished WES test results[3] on riprap protection below energy dissipators indicates the following average diameter (D_{50}) stone size should result in adequate erosion protection.

$$D_{50} = D\left(\frac{V}{\sqrt{gD}}\right)^3$$

where

D_{50} = the minimum average size of stone, ft, whereby 50 percent by weight of the graded mixture is larger than D_{50} size

D = depth of flow in outlet channel, ft
V = average velocity in outlet channel, ft
g = gravitational acceleration, ft/sec^2

10. References.

(1) U. S. Army Engineer Waterways Experiment Station, CE, Erosion and Riprap Requirements at Culvert and Storm-Drain Outlets; Hydraulic Laboratory Model Investigation, by J. P. Bohan. Research Report H-70-2, Vicksburg, Miss., January 1970.

(2) ________, Practical Guidance for Estimating and Controlling Erosion at Culvert Outlets, by B. P. Fletcher and J. L. Grace, Jr. Miscellaneous Paper H-72-5, Vicksburg, Miss., May 1972.

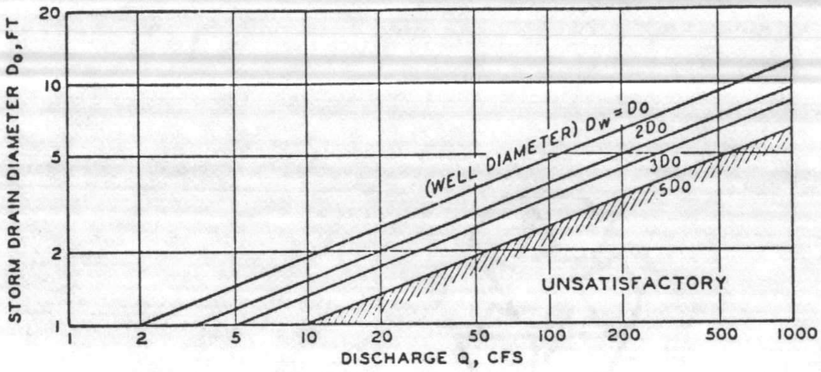
(3) ________, Evaluation of Three Energy Dissipators for Storm-Drain Outlets; Hydraulic Laboratory Investigation, by J. L. Grace, Jr., and G. A. Pickering. Research Report H-71-1, Vicksburg, Miss., April 1971.

(4) ________, Impact-Type Energy Dissipator for Storm-Drainage Outfalls Stilling Well Design; Hydraulic Model Investigation, by J. L. Grace, Jr. Technical Report No. 2-620, Vicksburg, Miss., March 1963.

(5) Beichley, G. L., Progress Report No. XIII - Research Study on Stilling Basins, Energy Dissipators and Associated Appurtenances - Section 14, Modification of Section 6 (Stilling Basin for Pipe or Open Channel Outlets - Basin VI. Report No HYD-572, Hydraulics Branch, Division of Research, U. S. Bureau of Reclamation, Denver, Colo., June 1969.

(6) Blaisdell, F. W., The SAF Stilling Basin. Agricultural Handbook No. 156, Agricultural Research Service and St. Anthony Falls Laboratory, University of Minnesota, Minneapolis, Minn., April 1959.

722-1 to 722-3



BASIC EQUATION

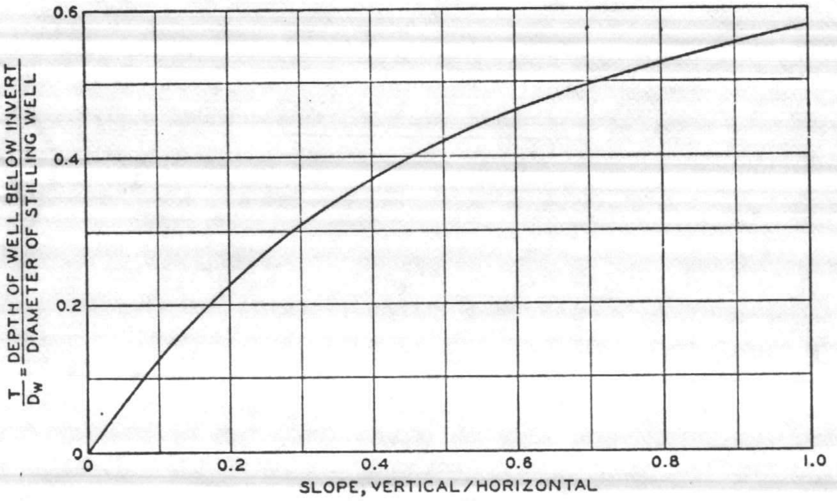
$$\frac{D_W}{D_O} = 0.53\left(\frac{Q}{D_O^{2.5}}\right) \text{ FOR } \frac{Q}{D_O^{2.5}} \leq 10$$

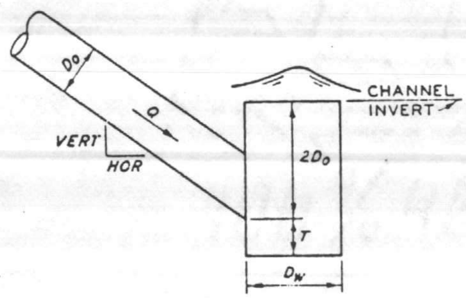
WHERE:

D_W = STILLING WELL DIAMETER, FT

D_O = DRAIN DIAMETER, FT

Q = DESIGN DISCHARGE, CFS





ELEVATION

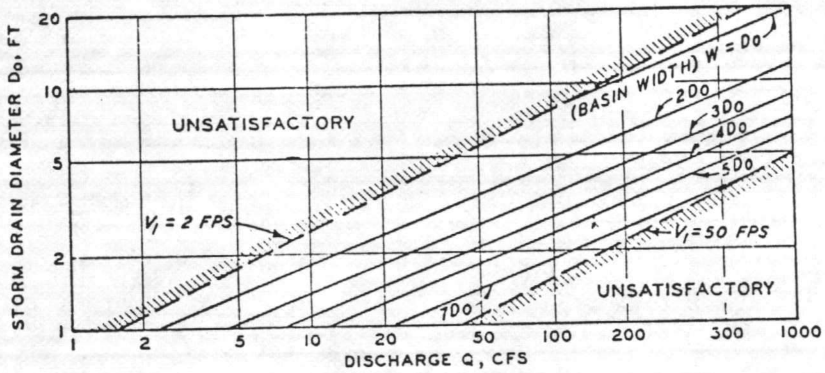
STORM DRAIN OUTLETS

ENERGY DISSAPATORS

STILLING WELL

HYDRAULIC DESIGN CHART 722-1

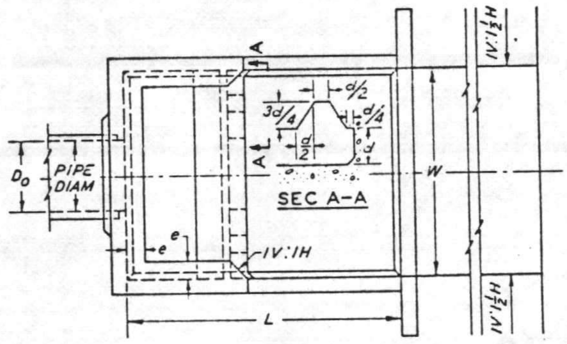
WES 7-73



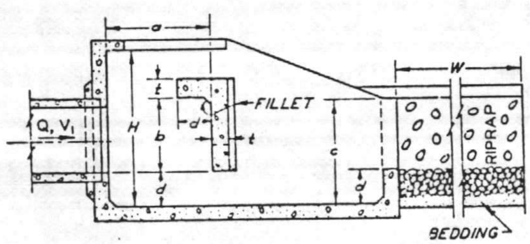
BASIC EQUATION

$$\frac{W}{D_o} = 1.3\left(\frac{Q}{D_o^{2.5}}\right) \quad \text{FOR} \quad \frac{Q}{D_o^{2.5}} \leq 21$$

WHERE:
- W = BASIN WIDTH, FT
- D_o = DRAIN DIAMETER, FT
- Q = DESIGN DISCHARGE, CFS
- V_1 = PIPE VELOCITY, FPS



PLAN



SECTION

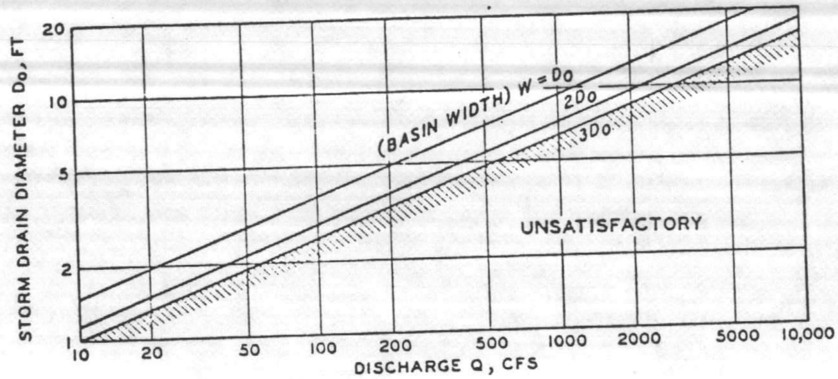
STILLING BASIN DESIGN

$H = \frac{3}{4}(W)$	$c = \frac{1}{2}(W)$
$L = \frac{4}{3}(W)$	$d = \frac{1}{6}(W)$
$a = \frac{1}{2}(W)$	$e = \frac{1}{12}(W)$
$b = \frac{3}{8}(W)$	$t = \frac{1}{12}(W)$, SUGGESTED MINIMUM

STORM DRAIN OUTLETS
ENERGY DISSAPATORS
IMPACT BASIN

HYDRAULIC DESIGN CHART 722-2

WES 7-73

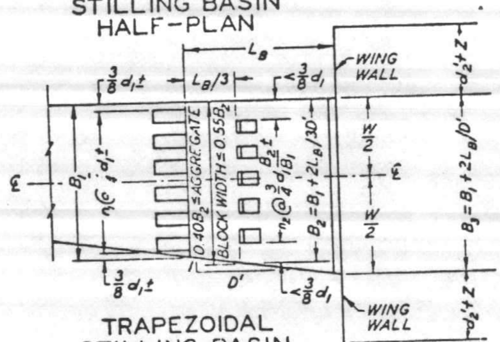


BASIC EQUATION

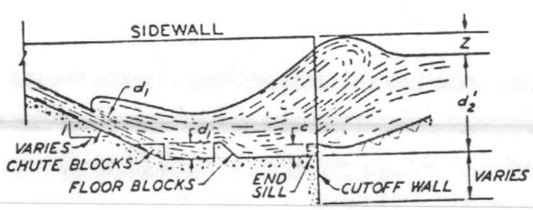
$$\frac{W}{D_o} = 0.3\left(\frac{Q}{D_o^{2.5}}\right) \text{ FOR } \frac{Q}{D_o^{2.5}} \leq 9.5$$

WHERE:
W = END SILL LENGTH, FT
D_o = DRAIN DIAMETER, FT
Q = DESIGN DISCHARGE, CFS

RECTANGULAR STILLING BASIN HALF-PLAN



TRAPEZOIDAL STILLING BASIN HALF-PLAN



CENTER-LINE SECTION

DESIGN EQUATIONS

$F = \frac{V_1^2}{g d_1}$ (1)

$d_2 = \frac{d_1}{2}(-1 + \sqrt{8F+1})$ (2)

$F = 3$ TO 30 $\quad d_2' = (1.10 - F/120)\, d_2$ (3a)

$F = 30$ TO 120 $\quad d_2' = 0.85 d_2$ (3b)

$F = 120$ TO 300 $\quad d_2' = (1.00 - F/800)\, d_2$ (3c)

$L_B = \frac{4.5 d_2}{F^{0.38}}$ (4)

$Z = \frac{d_2}{3}$ (5)

$c = 0.07 d_2$ (6)

STORM DRAIN OUTLETS
ENERGY DISSAPATORS
STILLING BASIN

HYDRAULIC DESIGN CHART 722-3

WES 7-73

Camp Lejeune

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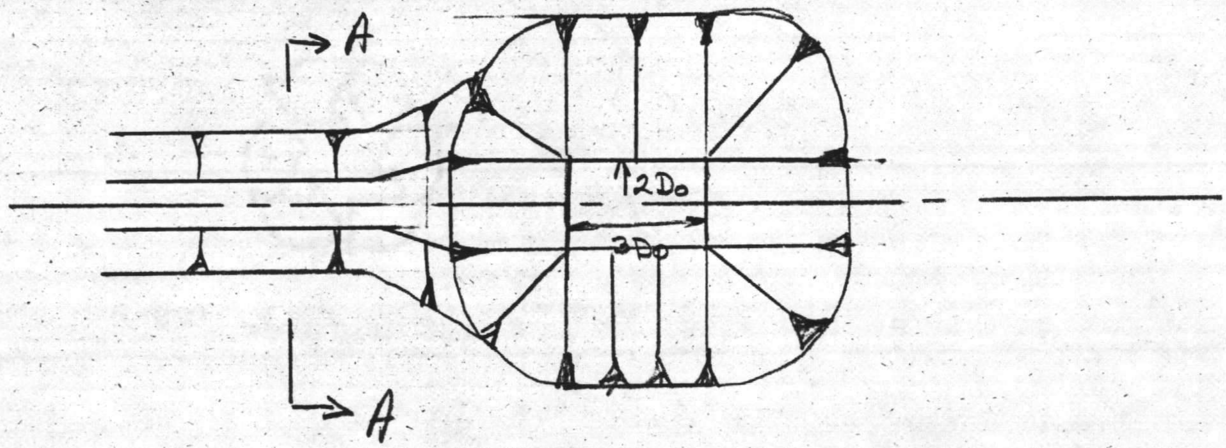
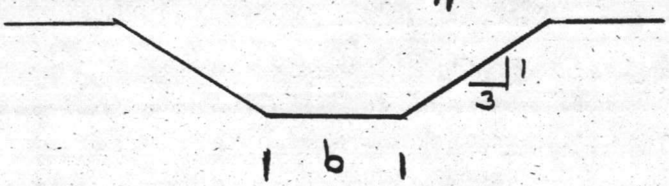
2. STONE REINFORCED DISCHARGE AREA

REFERENCE HDC 722-4 TO 722-7 (ATTACHED)



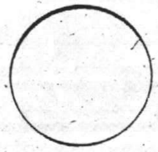


$P = 6.32d + b$

$A = d\,(b + 3d)$ $R = A/P$

$n = .025$

A-A CONVEYANCE $\frac{1.486}{n} A R^{2/3}$



$A = \frac{\pi D_o^2}{4}$ $P = \pi D_o$

$R = A/P = D_o/4$ $n = .024$ CORRUGATED $\approx .025$

$$\frac{1.486}{\cancel{n}} A R^{2/3} = \frac{1.486}{\cancel{n}} \frac{\pi D_o^2}{4} \cdot \left(\frac{D_o}{4}\right)^{2/3}$$

$$\frac{d^{5/3}(b+3d)^{5/3}}{(6.32d+b)^{2/3}} = \frac{\pi}{4 \cdot 4^{2/3}} D_o^{8/3}$$

$$\frac{d^5 (b+3d)^5}{(6.32d+b)^2} = \frac{\pi^3}{1024} D_o^8$$

$$D_o^8 = \frac{1024}{\pi^3} \frac{d^5 (b+3d)^5}{(6.32d+b)^2}$$

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$$Q = \frac{1.486}{n} \frac{\pi D_o^2}{4} \left(\frac{D_o}{4}\right)^{2/3} S^{1/2} = \frac{1.486}{.024} \frac{\pi}{4} \frac{1}{4^{2/3}} D_o^{8/3} S^{1/2}$$

$$Q = 19.31 D_o^{8/3} S^{1/2}$$

ASSUME $S = .005$ $Q = 1.37 D_o^{8/3}$

$$\frac{Q}{D_o^{5/2}} = 1.37 \frac{D_o^{16/6}}{D_o^{15/6}} = 1.37 D_o^{1/6}$$

$\therefore$ FOR $1 < D_o < 3$ $\frac{Q}{D_o^{5/2}}$ $1.37 < \frac{Q}{D_o^{5/2}} < 1.6$

REF HDC 722-7

$$D_{50} = C \frac{D_o^2}{TW} \left(\frac{Q}{D_o^{5/2}}\right)^{4/3} = .0082 \frac{D_o^2}{TW} \left(1.37 D_o^{1/6}\right)^{4/}$$

$$TW = 1.5 \left(\left(\frac{Q}{D_o}\right)^2\right)^{1/3} = 1.5 \left(\frac{Q^{2/3}}{D_o^{2/3}}\right)$$

$$D_{50} = .0082 \frac{D_o^2 \cdot D_o^{2/3}}{\cancel{Q^{2/3}}} \cdot \frac{Q^{\cancel{4/3}\,2/3}}{D_o^{20/6}}$$

$$D_{50} = .0082 \frac{D_o^{16/6}}{D_o^{20/6}} Q^{2/3} = .0082 \frac{Q^{2/3}}{D_o^{2/3}}$$

$$= .0082 \left(\frac{Q}{D_o}\right)^{2/3} \quad Q = 19.31 D_o^{8/3} S^{1/2}$$

$$D_{50} = .0082 \left(\frac{19.31 D_o^{8/3} S^{1/2}}{D_o}\right)^{2/3}$$

$$= .06 \; D_o^{5/3 \cdot 2/3} S^{1/3} = .06 D_o^{10/9} S^{1/3}$$

$$\approx .06 \; D_o \; (.005)^{1/3} = .01 \; D_o$$

FOR $D_o \leq 6'$, $D_{50} \leq .06'$

MIN $D_{50} = 0.5'$

$\therefore$ 12" RIPRAP OK

Camp Lejeune

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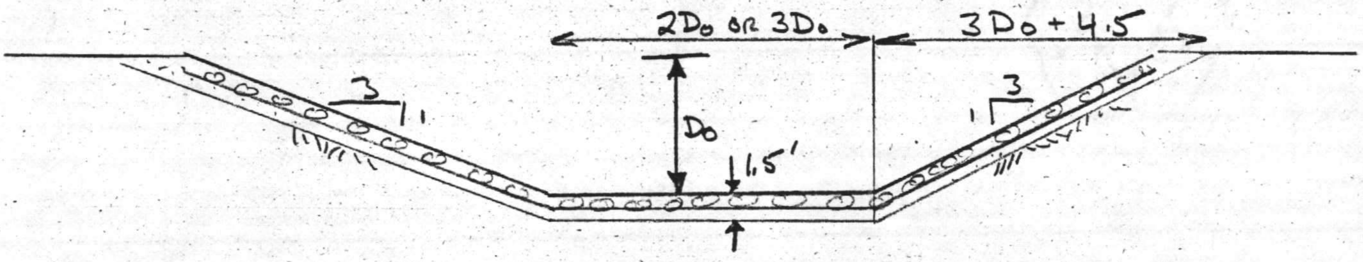
Depth of Scour Hole = $D_o + 1.5'$



Area Bottom = $2D_o \times 3D_o = 6D_o^2$

Area Top = $(6D_o + 9 + 2D_o) \times (6D_o + 9 + 3D_o)$

$= (8D_o + 9)(9D_o + 9)$

$= 72D_o^2 + 72D_o + 81D_o + 81$

$= 72D_o^2 + 153D_o + 81$

Avg Area $= \frac{78D_o^2}{2} + \frac{153}{2}D_o + 81/2$

$= 39D_o^2 + 76.5D_o + 40.5$

depth $D_o + 1.5$

volume $= 39D_o^3 + 76.5D_o^2 + 40.5D_o$

$58.5D_o^2 + 114.75D_o + 60.7$

$39D_o^3 + 135D_o^2 + 155.25D_o + 60.7$

Volume $\div 27$ $1.44D_o^3 + 5D_o^2 + 5.75D_o + 2.25$

Top perimeter $(3D_o + 4.5) \times 2 \times 4 + 2D_o \times 2 + 3D_o \times 2$

$24D_o + 36 + 4D_o + 6D_o$

$34D_o + 36$

bottom perimeter $2D_o \times 2 + 3D_o \times 2 = 10D_o$

Avg perimeter $22D_o + 18$

Slope Distance $= \frac{3D_o}{3} \times \sqrt{10} = 3.16D_o$

Slope Area $= 70D_o^2 + 57D_o$

BOTTOM AREA = $3D_o \times 2D_o = 6D_o^2$

TOTAL AREA = $76D_o + 57$ FT^2

VOLUME RIPRAP = $(76D_o^2 + 57D_o) \times 1/27 = 2.81D_o^2 + 2.1$ CY

VOLUME bedding = $1.41D_o^2 + 1.05D_o$ CY

EXCAVATION MEANS 2.3-160-1800
\$3.88/CY USE \$4.00/CY

RIPRAP

MEANS 2.3-360-0100
\$21/CY

FROM PERSONAL EXPERIENCE THIS IS LOW. IN AREAS WHERE ROCK IS READILY AVAILABLE PRICE IS \$30 - \$40/CY. LONG HAUL REQUIRED FROM QUARRY TO COASTAL PLAIN. USE \$45/CY

Bedding

MEANS 2.3-190-1000 \$24/CY

HYDRAULIC DESIGN CRITERIA

SHEET 722-4 TO 722-7

STORM DRAIN OUTLETS

RIPRAP ENERGY DISSIPATORS

1. Purpose. Criteria for the hydraulic design of fixed energy dissipating structures for storm drain outlets are presented in Hydraulic Design Charts (HDC's) 722-1 to 722-3. Under some conditions adequate energy dissipation can be accomplished more economically using riprap as an alternate to fixed structures. HDC's 722-4 to 722-5 present three basic riprap energy dissipator designs developed at WES.[1,2]

2. Scour Holes. Scour holes at storm drain exit portals effectively dissipate flow energy and reduce downstream erosion. However, uncontrolled scour holes can undermine the storm drain with subsequent structural failure. Basic laboratory tests were conducted at WES[1] during the period 1963-1969 to investigate scour hole development and erosion protection in cohesionless material downstream from storm drain exit portals. These tests showed that the length, width, depth, and volume of the scour hole could be related in terms of the storm drain diameter D_o in feet, the discharge Q in cfs, and the flow duration t in minutes. The tailwater depth TW in feet over the storm drain invert was also found to be important. The following set of design equations[2] describes the basic scour hole dimensions for two controlling tailwater conditions.

$$\frac{L_{sm}}{D_o} = C\left[\left(\frac{Q}{D_o^{2.5}}\right)^{0.71}\left(t^{0.125}\right)\right] \qquad (1)$$

$$\frac{D_{sm}}{D_o} = C\left[\left(\frac{Q}{D_o^{2.5}}\right)^{0.375}\left(t^{0.10}\right)\right] \qquad (2)$$

$$\frac{W_{sm}}{D_o} = C\left[\left(\frac{Q}{D_o^{2.5}}\right)^{0.915}\left(t^{0.15}\right)\right] \qquad (3)$$

$$\frac{V_s}{D_o^3} = C\left[\left(\frac{Q}{D_o^{2.5}}\right)^{2}\left(t^{0.375}\right)\right] \qquad (4)$$

where

L_{sm} = scour hole length, ft
D_{sm} = depth of maximum scour, ft
W_{sm} = half the width of the hole at the location of maximum scour, ft
V_s = volume of material removed from scour hole, ft^3

Empirically determined values of C in the equations above for the two controlling tailwater conditions are:

$\frac{TW}{D_o}$	Equation No. 1	2	3	4
>0.5	4.10	0.74	0.72	0.62
≤0.5	2.40	0.80	1.00	0.73

3. HDC 722-4 shows dimensionless scour hole profiles and cross sections for the two limiting tailwater conditions.

4. Horizontal Riprap Blanket. HDC 722-5 shows the recommended length L_{sp} and geometry of the horizontal riprap blanket protection required for satisfactory dissipation of the energy of the design outflow from a storm drain. (The required D_{50} riprap size can be estimated using HDC 722-7.)

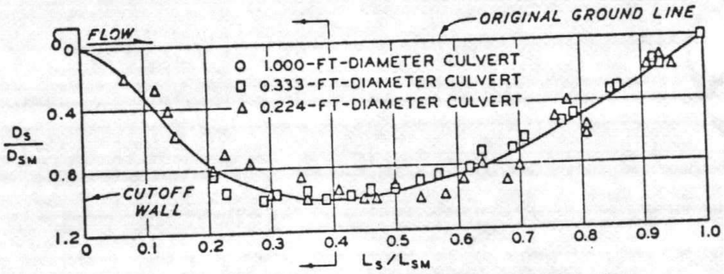
5. Preformed Scour Holes. Laboratory studies have shown that satisfactory energy dissipation of storm drain outflow occurs in riprap-lined, preformed scour holes of nominal size. HDC 722-6 shows the recommended design for preformed scour holes 0.5 and $1.0D_o$ deep. The D_{50} minimum stone size required for each scour hole depth can be estimated using HDC 722-7.

5. Application. Study of the basic test data indicates that the resulting design criteria are generally applicable to both circular and rectangular conduits flowing full or partly full. For rectangular conduits the conduit width is used in place of the diameter D_o of the circular conduits.

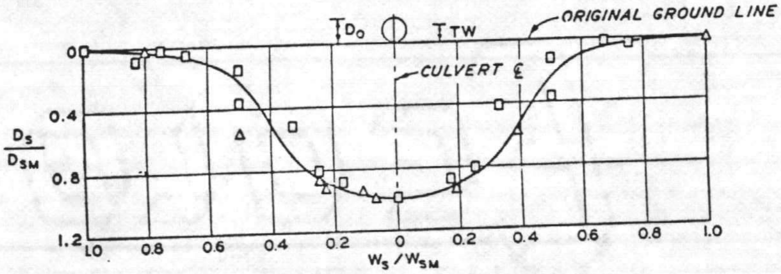
6. References.

(1) U. S. Army Engineer Waterways Experiment Station, CE, Erosion and Riprap Requirements at Culvert and Storm-Drain Outlets; Hydraulic Model Investigation, by J. P. Bohan. Research Report H-70-2, Vicksburg, Miss., January 1970.

(2) ________, Practical Guidance for Estimating and Controlling Erosion at Culvert Outlets, by B. P. Fletcher and J. L. Grace, Jr., Miscellaneous Paper H-72-5, Vicksburg, Miss., May 1972.

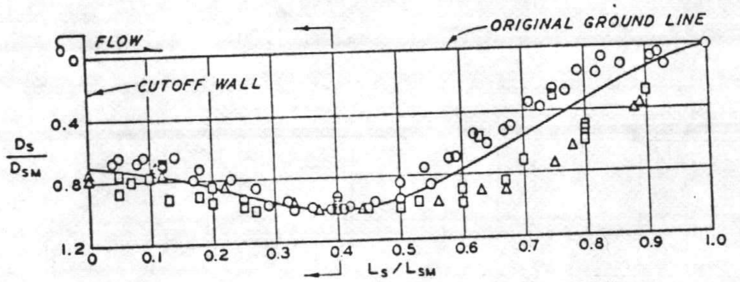


DIMENSIONLESS CENTER-LINE PROFILE

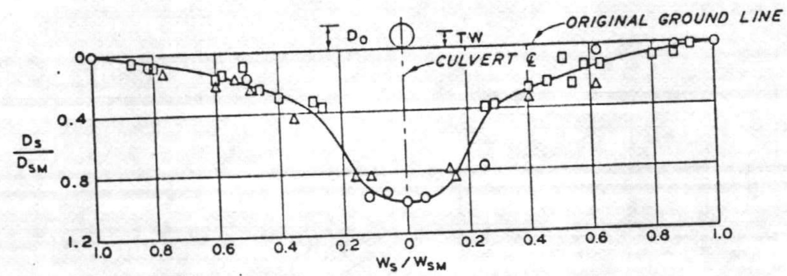


DIMENSIONLESS CROSS SECTION AT $0.4L_{SM}$

$TW > 0.5D_0$



DIMENSIONLESS CENTER-LINE PROFILE



DIMENSIONLESS CROSS SECTION AT $0.4L_{SM}$

$TW \leq 0.5D_0$

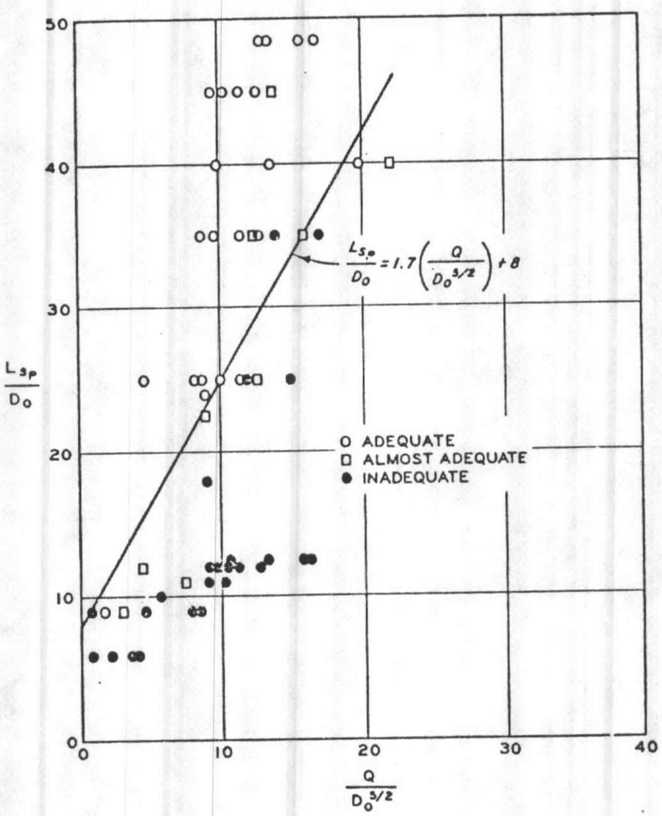
NOTE: L_s = DISTANCE FROM OUTLET TO D_s, FT
L_{SM} = DISTANCE FROM OUTLET TO END OF SCOUR, FT
W_s = DISTANCE (R & L) FROM ℄ TO D_s AT $0.4L_{SM}$, FT
W_{SM} = DISTANCE (R & L) FROM ℄ TO $0.0D_s$ AT $0.4L_{SM}$, FT
D_0 = DIAMETER OR WIDTH OF STORM DRAIN, FT
TW = TAILWATER DEPTH ABOVE DRAIN INVERT, FT
D_s = DEPTH OF SCOUR, FT
D_{SM} = MAXIMUM SCOUR DEPTH, FT

STORM DRAIN OUTLETS

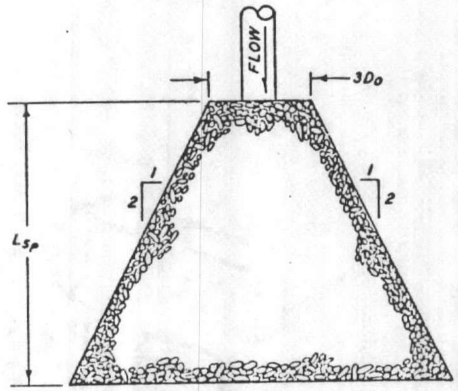
SCOUR HOLE GEOMETRY
$TW > 0.5D_0$ AND $\leq 0.5D_0$

HYDRAULIC DESIGN CHART 722-4

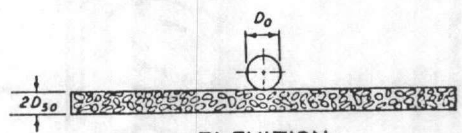
WES 7-73



NOTE: D_o – DIAMETER OR WIDTH OF STORM DRAIN, FT
Q – STORM DRAIN DISCHARGE, CFS
L_{sp} – HORIZONTAL LENGTH OF BLANKET, FT



PLAN



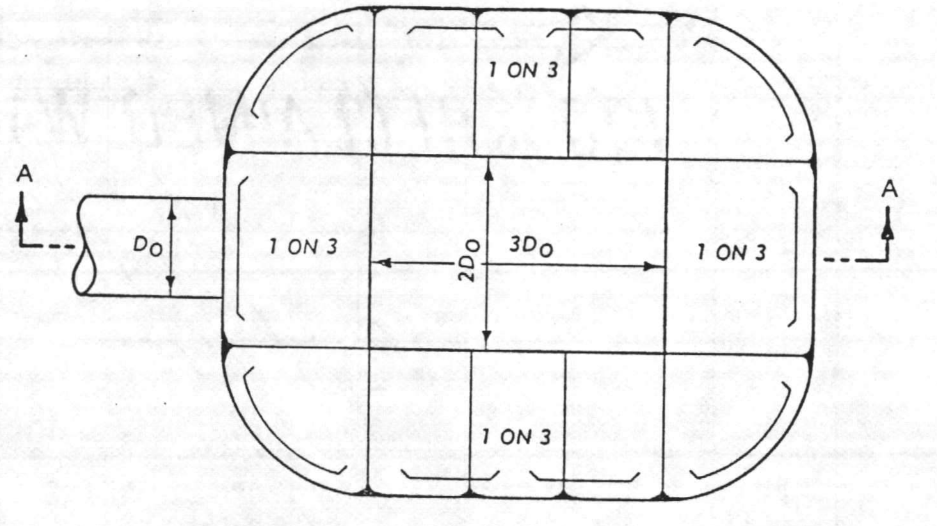
ELEVATION

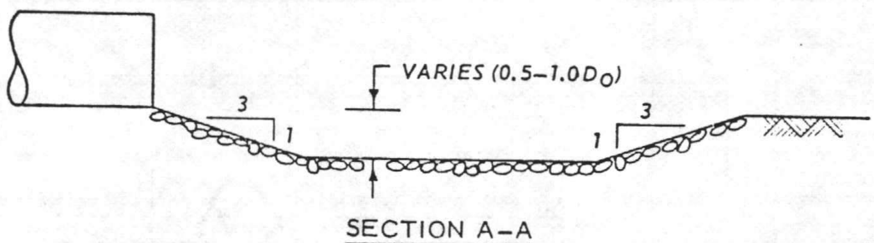
NOTE: D_{50} – MINIMUM AVERAGE SIZE OF STONE, FT

STORM DRAIN OUTLETS
RIPRAP ENERGY DISSAPATORS
HORIZONTAL BLANKET
LENGTH OF STONE PROTECTION

HYDRAULIC DESIGN CHART 722-5

WES 7-73



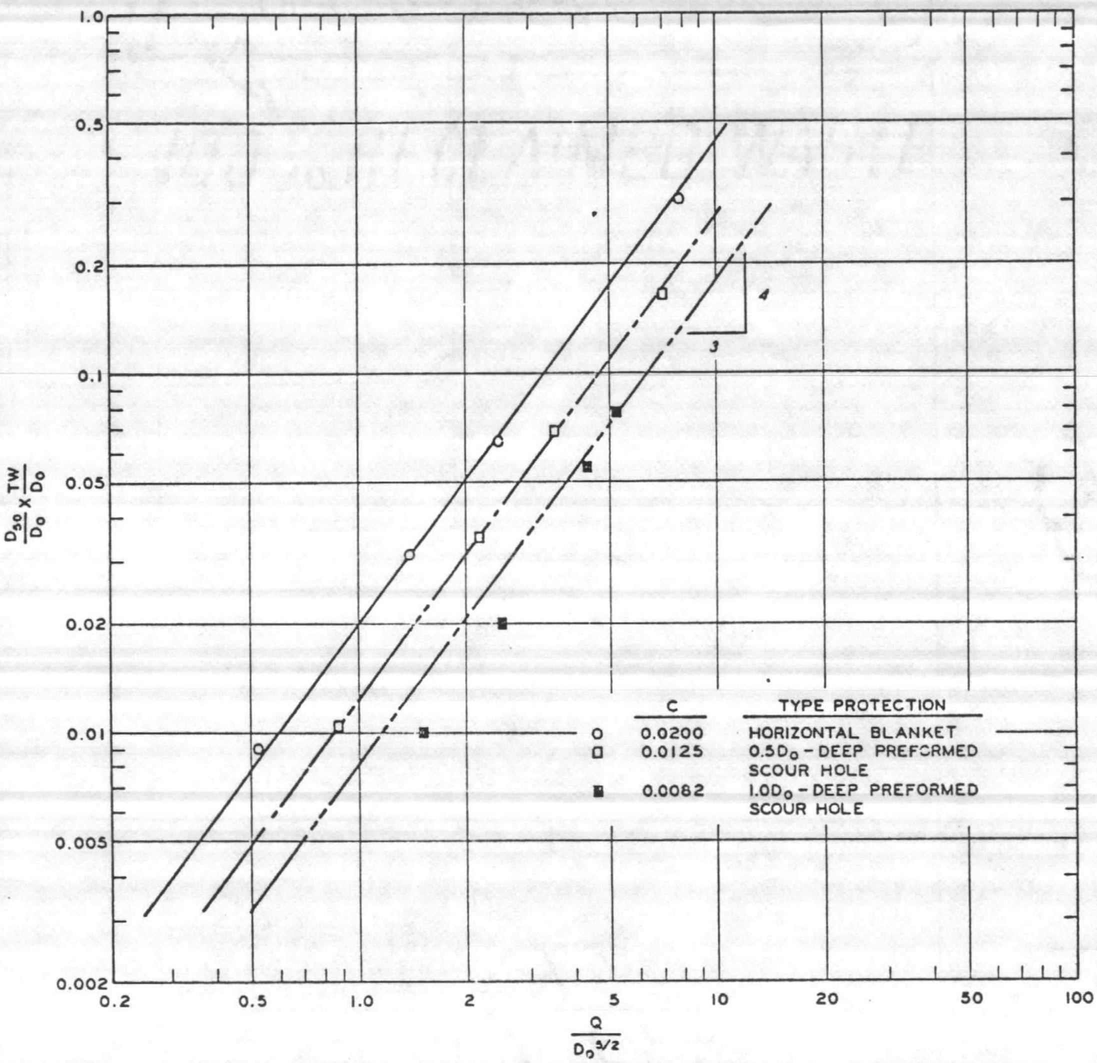


NOTE: D_O = DIAMETER OR WIDTH OF STORM DRAIN, FT

STORM DRAIN OUTLETS
RIPRAP ENERGY DISSAPATORS
PREFORMED SCOUR HOLE GEOMETRY

HYDRAULIC DESIGN CHART 722-6

WES 7-73



BASIC EQUATION

$$\frac{D_{50}}{D_o} = C \frac{D_o}{TW} \left(\frac{Q}{D_o^{5/2}} \right)^{4/3}$$

WHERE:

D_{50} = MINIMUM AVERAGE SIZE OF STONE, FT
D_o = DIAMETER OR WIDTH OF STORM DRAIN, FT
Q = STORM DRAIN DISCHARGE, CFS
TW = TAILWATER DEPTH ABOVE DRAIN INVERT, FT

STORM DRAIN OUTLETS
RIPRAP ENERGY DISSAPATORS
D_{50} STONE SIZE

HYDRAULIC DESIGN CHART 722-7

WES 7-73

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Do	Volumes (cy) Excav.	Riprap	Bedding	Costs $ (Rounded) Excav	Riprap	Bedding	Total
1	14.4	4.9	2.5	58	221	60	$339
1.5	27.0	9.5	4.7	108	428	113	649
2.0	45.3	15.5	7.7	181	698	185	1064
2.5	70.4	22.8	11.4	282	1026	274	158[illegible]
3.0	103.4	31.6	15.8	414	1422	379	2215
3.5	145.3	41.8	20.9	581	1881	502	2964
4.0	197.4	53.4	26.7	790	2403	641	383[illegible]
4.5	260.6	66.4	33.2	1042	2988	797	482[illegible]
5.0	336.0	80.8	40.4	1344	3636	970	595[illegible]

3. HEADWALL / ENDWALL

Ref Attached
Means 3.3-140-6300

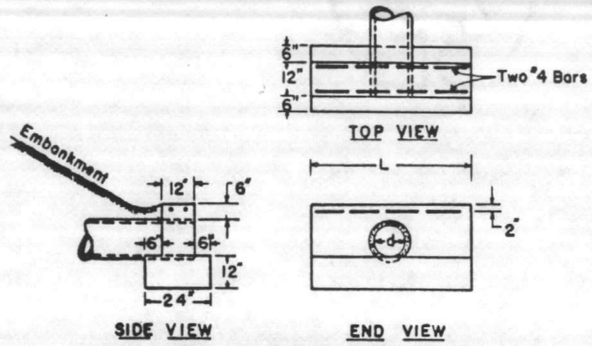
$260/cy concrete
64/cy Rebar per page 1

$324/cy

For incidental items
Excavation & Fill etc
Use $350.00/cy

Do	Volume (cy)	$
1	.7	$245
1.5	.8	280
2	1.2	410
2.5	1.7	595
3	2.8	988
3.5	3.6	1260
4	4.3	1520
4.5	5.2	1820
5.0	6.7	2345

Pipe d	L
18" & 21"	5'
24" & 27"	7'
30" & 33"	9'



TYPE D ENDWALL

$V = L \times (d + 0.5)$
$+ L \times 1 \times 2$
$= Ld + 2.5L$
(CF)

2:1 EMBANKMENT S							
PIPE ϕ	Skew ∢ = 90° to 60° θ = 30°			Skew ∢ = 55° θ = 35°			
d	L	ℓ	W_1	L	ℓ	W_1	L
in.	ft.	ft.	ft.	ft.	ft.	ft.	ft.
36	5.8	0	4.6	6.0	.33	4.9	6.2
42	6.3	0	5.8	6.6	.33	6.1	6.9
48	6.9	0	6.9	7.2	.33	7.3	7.5
54	7.5	0	8.0	7.8	.33	8.5	8.2
60	8.1	0	9.2	8.4	.33	9.8	8.8
72	9.2	0	11.5	9.6	.33	12.2	10.1

2:1 EMBANKMENT SL							
PIPE ϕ	Skew ∢ = 40° θ = 50°			Skew ∢ = 30° θ = 60°			Skew θ =
d	L	ℓ	W_1	L	ℓ	W_1	L
in.	ft.	ft.	ft.	ft.	ft.	ft.	ft.
36	7.0	.75	6.2	8.3	1.33	8.0	11.1
42	7.8	.75	7.8	9.3	1.33	10.0	12.5
48	8.5	.75	9.4	10.3	1.33	12.0	14.0
54	9.3	.75	10.9	11.3	1.33	14.0	15.5
60	10.1	.75	12.5	12.3	1.33	16.0	16.9
72	11.7	.75	15.6	14.3	1.33	20.0	19.8

$SD = \frac{d}{\text{Cos. } \theta} = \frac{d}{\text{Sin Skew } \measuredangle}$

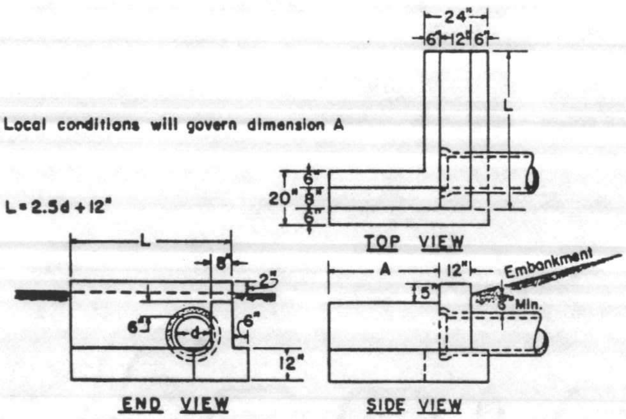
$L = SD + 2.3'$

W_1 for 2:1 Slope $= \frac{2d - 2'}{\text{Cos. } \theta}$

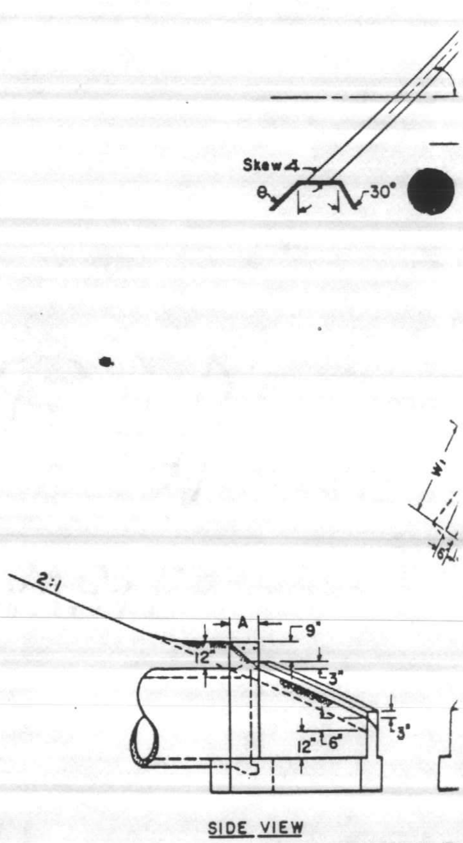
W for
dimens
W = Cc

Local conditions will govern dimension A

L = 2.5d + 12"



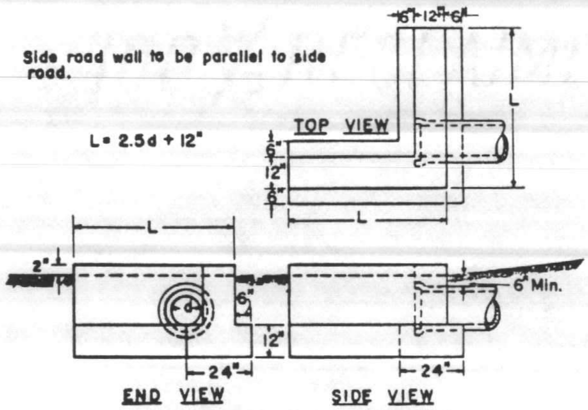
TYPE D-E ENDWALL



TYPE D-W E

Side road wall to be parallel to side road.

L = 2.5d + 12"



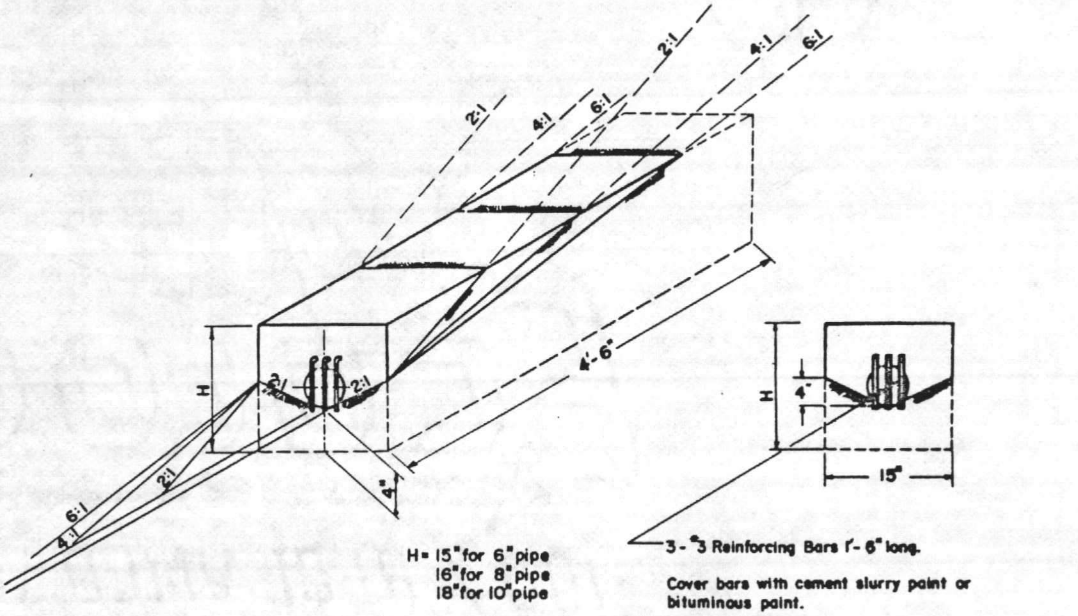
TYPE E-S ENDWALL

EMBANKMENT SLOPES										
kew ∢ = 55° θ = 35°			Skew ∢ = 50° θ = 40°			Skew ∢ = 45° θ = 45°				
	ℓ	W_1	L	ℓ	W_1	L	ℓ	W_1	W_2	A
	ft.	ft.	ft.	ft.	ft.	ft.	ft.	ft.	ft.	in.
.0	.33	4.9	6.2	.5	5.2	6.5	.67	5.7	4.6	12
.6	.33	6.1	6.9	.5	6.5	7.3	.67	7.1	5.8	12
.2	.33	7.3	7.5	.5	7.8	8.0	.67	8.5	6.9	12
.8	.33	8.5	8.2	.5	9.1	8.7	.67	9.9	8.0	12
.4	.33	9.8	8.8	.5	10.4	9.4	.67	11.3	9.2	15
.6	.33	12.2	10.1	.5	13.0	10.8	.67	14.1	11.5	15

EMBANKMENT SLOPES										
kew ∢ = 30° θ = 60°			Skew ∢ = 20° θ = 70°			Skew ∢ = 10° θ = 80°				
	ℓ	W_1	L	ℓ	W_1	L	ℓ	W_1	W_2	A
.	ft.	ft.	ft.	ft.	ft.	ft.	ft.	ft.	ft.	in.
.3	1.33	8.0	11.1	1.75	11.7	19.6	5.0	23.0	4.6	12
.3	1.33	10.0	12.5	1.75	14.6	22.5	5.0	28.8	5.8	12
.3	1.33	12.0	14.0	1.75	17.5	25.3	5.0	34.6	6.9	12
.3	1.33	14.0	15.5	1.75	20.5	28.2	5.0	40.3	8.0	12
.3	1.33	16.0	16.9	1.75	23.4	31.1	5.0	46.0	9.2	15
.3	1.33	20.0	19.8	1.75	29.2	36.9	5.0	57.6	11.5	15

W for variable slope when X = horizontal dimension of the slope designation.

$$W = \frac{X}{\cos\theta}\left(d - 0.5 - \frac{1.0}{X}\right)$$

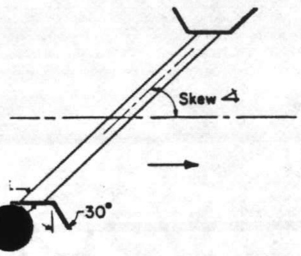


H = 15" for 6" pipe
16" for 8" pipe
18" for 10" pipe

3 - #3 Reinforcing Bars 1'- 6" long.

Cover bars with cement slurry paint or bituminous paint.

PIPE UNDERDRAIN OUTLET ENDWALL



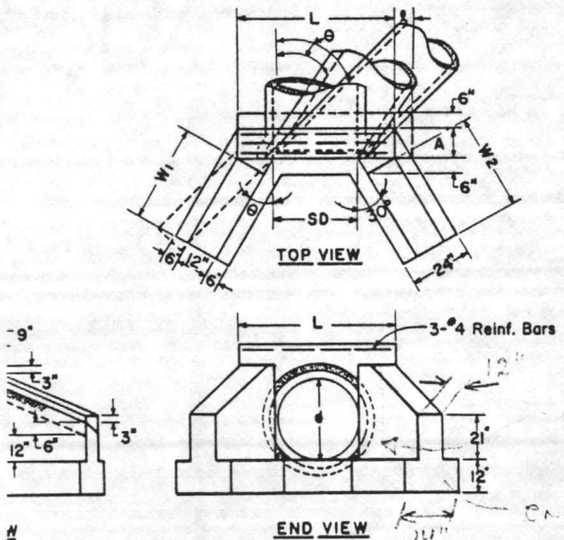
d	L	l	W_2	A
3.0	5.8	↑	4.6	1
3.5	6.3		5.8	1
4.0	6.9	0	6.9	1
4.5	7.5		8.0	1
5.0	8.1	↓	9.2	1.25

$V = L(d+1)\times A + (A+1)\times L\times 1 + 2\times W_2\times(2+d/2) = LdA + LA + A + L + W_2(6+d) = LdA + 2LA + L + W_2 d + 6W_2$ (CF)

end Area $2 + (d+0.25)\times 1 = 2.25 + d$

end Area = 3.75 □'

A.G. ... $3 + d/2$



TYPE D-W ENDWALL

NOTE:
All exposed edges shall be chamfered (1) one inch.

Commonwealth of Pennsylvania
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

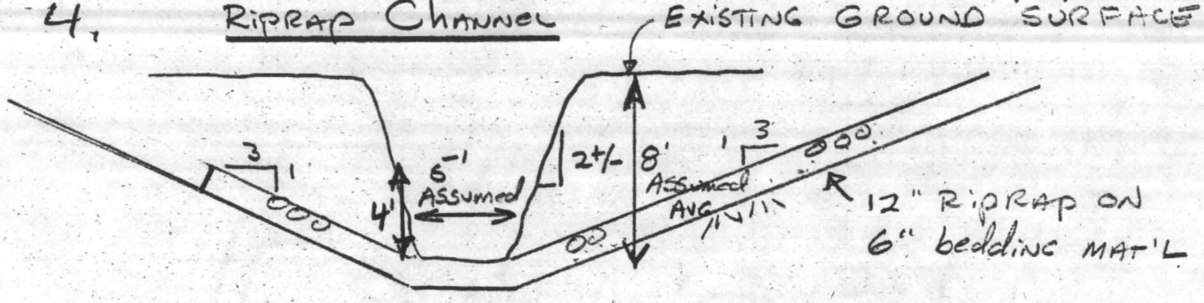
ENDWALLS

Recommended Dec. 1, 1971	Approved Dec. 1, 1971
R.R. Muller	W.J. Rovia
Location & Design Engineer	Deputy Chief Hwy. Engr.

Camp Lejeune

7/1/86

4. Riprap Channel



AREA EXCAVATED

$= 9.5(5 + 3 \times 9.5) - 8(5 + 0.5 \times 8)$

246.5 SF

$= 9.12$ CY/LF

Riprap $5 + 4' \times 3 \times 2 \times \frac{\sqrt{10}}{3} \times 1' = 30.3$ SF

$= 1.12$ CY/LF

Bedding = 1/2 Riprap = 0.56 CY/LF

Reference page 6 for costs

$9.12 \times \$4 + 1.12 \times \$45 + 0.56 \times 24$

$= \$100.32$

$\approx \$100$/LF

---

5. FOR AREA STABILIZATION (REF ATTACHED)
ADD 50' STRIP EACH SIDE
TO BE GRADED AND SEEDED

Means 2.3-220-2100 $0.55/SY GRADING
2.8-460-3000 $46/MSF

(50' STRIP + 12' SLOPE) × 2 = 124' = 124 SF/LF

COST INCREASE by $\frac{124}{9} \times 0.55 + \frac{124}{1000} \times 46$

$= \$7.57 + 5.70$

INCREASE $= \$13.27$/LF $\approx \$15$/LF

I. CRITICAL AREA PLANTING

(Permanent Seedings on Graded Development Areas, Etc.)

Where Applicable. Cleared and/or graded areas undergoing development and subject to erosion where grasses and/or legumes are needed to stabilize the soil.

Specifications Guide

The task of considering alternatives, specifying treatment and successfully establishing plant cover on critical areas is a challenging one. For example, planting earlier or later than the optimum date for the species increases the risk of failure and makes the need for mulching or irrigation more acute.

Vegetation cannot be expected to provide erosion control cover and prevent soil slippage on soils that are unstable because of structure, water movement or excessive steepness of slope.

Excessive water run-off must be controlled by establishment of needed water control measures such as desilting basins, diversions, berms, furrows, channel liners, waterways or drainage systems.

A. Table of Plants and Mixtures of Plants for Critical Areas. (See table 13)

B. Site Preparation

1. Grading or clearing of the areas should be done in such a way as to leave the soil in the best possible condition for seeding. This includes leaving as much topsoil as possible or replacing where needed to modify the condition.

2. Grade as needed and feasible to permit the use of conventional equipment for seedbed preparation, seeding, mulch application and anchoring and maintenance operations.

3. Where adverse soil conditions require modification, apply at least 3-4 inches of topsoil or similar soil material. The use of topsoil should be considered where the soil texture at the site is sandy clay, silty clay or clay. Ripping prior to the addition of new material is usually needed.

C. Lime and Fertilizer. Where soils are reasonably uniform, lime and fertilize according to soil test. In the absence of a soil test, apply 2 tons finely ground dolomitic limestone per acre (92 pounds per 1,000 square feet) and 500 to 800 pounds of 20% superphosphate or equivalent per acre (12 to 18 pounds per 1,000 square feet). Additional amounts and analysis of fertilizers to use at seeding are:

1. Grasses alone - 800 to 1,000 pounds per acre of 10-10-10, or equivalent (18-23 pounds per 1,000 square feet).

2. Grasses and legumes or legumes alone - 800 to 1,000 pounds per acre of 5-10-10 or equivalent (18-23 pounds per 1,000 square feet).

3. Normally an additional application of 30-50 pounds of nitrogen per acre is needed within three (3) to twelve (12) months to establish grass plantings. Application should be timed to growing cycle of the species being established.

D. Seedbed Preparation

1. Work lime and fertilizer into the soil where conventional equipment can be used. Use disk or similar equipment to prepare to depth of 3-4 inches.

2. Lime and fertilizer may be applied with seed mixture when a hydro-seeder is used and where mulch will be applied. As an alternative, the hydro-seeder may be used to apply lime alone or with a nitrogen topdressing after plants have made 2-3 inches of growth.

3. Slopes that are too steep for conventional equipment (2:1 or steeper) should not be disturbed if they are relatively smooth and uniform. These slopes are best seeded with hydroseeding equipment.

4. Where hydro-seeding equipment is not available for use on steep slopes (2:1 or steeper), scarify the soil surface with a chain harrow, pick chain, grader blades with chisels, hand tools or other equipment that will pit the soil or make trenches approximately 1-2 inches deep, 6-12 inches apart across the slope in which the seed can lodge and germinate.

E. Establishment with Seeds

1. Select a plant or mixture from the attached table 13. In making selections, keep in mind the intended land use, site conditions, and maintenance requirements of the plant or plants.

2. Seed specifications or contracts:

a. Specifications shall state the minimum seed purity percentage and minimum germination percentage that is acceptable for the species being used.

b. Seed containing prohibited or restricted noxious weeds may not be accepted.

c. All seed shall be labeled to show that it meets the requirements of North Carolina seed law.

d. All seed used shall have been tested within the six (6) months immediately preceding the date of seeding.

e. The inoculant for treating legume seed shall be prepared specifically for the species. Inoculants shall not be used later than the date indicated on the container. Twice the supplier's recommended rate of inoculant will be used on dry seedings; four times the recommended rate, if hydro-seeded.

3. Seed should be applied uniformly with cultipacker seeder where possible. Any equipment that will apply seed uniformly is acceptable. Cover seed from ½ inch to 1 inch deep depending on the size of the seed and firm the soil except where a hydro-seeder is used.

F. Establishment with Vegetative Material

Areas that will be subject to traffic and routine mowing in residential, commercial or industrial developments may be established by using grass stolons (sprigs or runners). Precaution should be used to make certain only fresh, moist planting material is used.

Planting Methods for Grass Stolens:

1. Prepare a smooth seedbed, shred stolons, broadcast and press or disk into the top 1-2 inches of soil and firm the soil. Plantings may be made with a transplanter or hand planting tools.

2. Open shallow furrow 24-30 inches apart, drop clumps of stolons in furrow and cover 1-2 inches deep and smooth and firm the soil.

3. Fill burlap bags with grass roots and soil. Place bags 10-15 feet apart in small gullies or scouring ditches.

4. Spread 3-4 inches of soil filled with grass roots and firm the soil.

G. Mulching. Mulch is essential on most critical areas. On moderately fertile to fertile sites planted at optimum time for the species, mulch may be omitted.

1. Mulching Materials

a. Dry, unchopped, unweathered small grain straw or hay free of seeds of competing plants - Spread at the rate of 1-2 tons per acre depending upon the site and season. Evenly spread mulch over the area by hand or blower-type spreading equipment. Apply mulch uniformly so that about 25% of the ground surface is visible.

b. Sericea Lespedeza seed bearing stems at a rate of three tons per acre - This mulch may be applied green or dry but must contain mature seed. Liming, fertilizing and land preparation should precede application of the Sericea mulch.

c. Broomsedge hay mulch - Spread where it is desirable to establish this native plant.

d. Wood chips, bark, peanut hulls, and similar plant residues - Spread so as not to present emergence of seedlings on areas that are not subject to concentrations of water. These materials are better suited for mulching woody plantings than broadcast seedings. Depths of more than 1 inch will affect seedling emergence.

e. Local materials such as burlap, tobacco plant bed metting, and pine boughs - Cover entire area; secure in place if flowing water is involved. Do not use green pine branches where pine trees are to be planted because of possible insect or disease injury to plantings.

f. Barnyard manure and bedding - Apply uniformly so that about 25% of the ground surface is visible.

g. Jute matting is a coarse, open-mesh material woven of heavy jute twine. It may be used in place of mulch or sod and has the strength to withstand waterflow. It is an accepted practice to sow half the seed before placing the matting. Sow the remaining half after the matting is laid. See the manufacturer's specifications for installing.

h. Wood fiber (excelsior) is available as mulch material to be blown on after seeding or as a matting to be stapled on steep slopes, waterways, etc. See the manufacturer's specifications for installing.

i. Wood cellulose fiber mulch is mixed with seed, fertilizer and water. The resulting slurry is sprayed on with hydraulic seeding equipment. Use at the rate of 500 pounds per acre where straw or hay is to be applied. Use at the rate of 1,000 to 1,500 pounds per acre without other mulching materials. Applied in a slurry, wood cellulose fiber mulch is self-anchoring.

j. Other commercial products, as fiberglass and various kinds of nettings, are available. Manufacturer's directions should be followed for applying and securing in place.

2. Mulch Anchoring Methods. Anchor mulch immediately after placement to minimize loss by wind and water. Consider size of area, type of site, and cost and select one of the following:

a. Mulch anchoring tool with a series of flat notched disks that punch and anchor mulch material into the soil. A regular farm disk weighted and set nearly straight may substitute but will not be sharp enough to cut up the mulch. The soil should be moist, free of stones or roots and loose enough to permit penetration to a depth of 3 inches. Operate as near as practical to the contour.

b. Mulch netting - Staple light weight paper, jute, cotton, plastic or wire nettings to the soil surface according to manufacturer's specifications. These nettings are usually in rolls 3 to 4 feet wide and up to 300 feet long.

c. Peg and twine - Drive 8 to 10 inch wooden pegs to within 2 to 3 inches of the soil surface every 4 feet in all directions. Stakes may be driven before or after applying mulch. Secure mulch to soil surface by stretching twine between pegs in a criss-cross within a square pattern. Secure twine around each peg with two or more round turns. Poles and stakes may be used to secure brush in place.

d. Pick chain - This rolling spiked-chain implement can be operated on slopes of 3:1 gradient or steeper. It is attached to a tractor or truck which operates along the top of the slope. The pick chain can also be used for seedbed preparation and mixing lime and fertilizer with the soil.

e. Slit - With a square pointed spade, cut mulch into the surface soil in contour rows 18 inches apart.

f. Asphalt mulch tie-down - Asphalt sprayed uniformly on the mulch as it is ejected from the blower is more effective than applied as a separate operation. Rates of application will vary with conditions. Apply so area has uniform appearance.

(1) Emulsified asphalt - Apply uniformly 0.04 gallons per square yard or 200 gallons per acre of emulsified asphalt. Emulsified asphalt should not be used in freezing weather since it contains approximately 50% water.

(2) Liquid asphalt - May be applied at any time of the year since it is thinned with a kerosene-like product. Uniformly apply 0.10 gallons per square yard or 500 gallons per acre. See the manufacturer's specifications.

NOTE: In areas of playing children or pedestrian traffic, asphalt methods could cause problems of "tracking in" on rugs, damaging shoes, clothing, etc.

g. Mulch can be anchored with rye for fall plantings or millet for summer plantings. Use $\frac{1}{4}$ to $\frac{1}{2}$ bushel of rye or 15 pounds of millet per acre broadcast ahead of mulch application.

H. Maintenance. Maintenance is the most important controllable factor in retaining an effective vegetative cover.

1. Control of Competition. Competitive weed growth during the period of establishment should be controlled by mowing and/or with herbicides. When chemicals are used, follow current North Carolina Agricultural Experiment Station's chemical weed control recommendations and adhere strictly to instructions on label.

2. Irrigation. If soil moisture is deficient, supply new plantings with adequate water (3"-4" penetration) for plant growth at 10-day intervals, if needed, until they are established. This is most important on late season plantings, in abnormally dry or hot seasons.

3. Repairs. Inspect all areas for planting failures and make necessary repairs, replacements and reseeding within the planting season if possible.

4. Lime and Fertilizer. Lime and fertilizer should be applied under a regular program based on soil fertility tests and on the use and general appearance of the vegetative cover. In the absence of a soil test, lime and fertilize as shown below:

a. Apply 1 to 2 tons ground dolomitic limestone per acre, or 43-92 pounds per 1,000 square feet during late fall or winter every 3-4 years and fertilize annually or as needed to maintain healthy vigorous growing plants.

b. Pure stands of Tall Fescue and similar cool season plants. Apply 400-500 pounds per acre or 9-12 pounds per 1,000 square feet of 10-10-10, or its equivalent in early fall. Additional fertilization with nitrogen or a complete fertilizer is usually needed in early spring.

c. Pure stands of Bermuda, Bahia, Lovegrass and similar warm season grasses. Apply 400-500 pounds per acre of 9-12 pounds per 1,000 square feet of 10-10-10 fertilizer or equivalent when the plants start to green up in the spring. Topdress with 60-90 pounds of nitrogen per acre or 1-2 pounds per 1,000 square feet, during the growing season. When the higher rate is used, apply in split applications.

d. Pure stands of Sericea Lespedeza and similar legumes. Fertilize in early spring with 400-500 pounds of 0-10-20 (9-12 pounds per 1,000 square feet) or equivalent per acre.

e. Mixtures of Sericea Lespedeza, Fescue, Lovegrass or Bermudagrass. Fertilize in late winter or early spring with 400-500 pounds per acre (9-12 pounds for 1,000 square feet) or

5-10-10 or equivalent. In Fescue-Sericea Lespedeza mixture, apply in the fall if the Sericea Lespedeza is developing better than the Fescue.

f. Fescue-White Clover and similar mixtures. Apply 400-500 pounds per acre (9-12 pounds per 1,000 square feet) of 0-20-20 or equivalent in early fall. An additional application of nitrogen or complete fertilizer may be needed in the spring to keep plants lush and in balance. Where grass is crowding out the clover, reduce or eliminate spring application of nitrogen.

5. Mowing

a. Mow Sericea Lespedeza or Sericea Lespedeza and grass mixtures only after a killing frost. Fall Fescue should not be mowed closer than 3-4 inches.

b. Care should be taken not to damage the vegetation mechanically through use of improper mowing equipment or be attempting to mow with heavy equipment on steep slopes when the vegetation is lush and slippery or when the ground is soft enough to be rutted by mower or tractor wheels.

c. Where mowing fails to control weeds satisfactorily, apply chemicals in accordance with current North Carolina Agricultural Experiment Station's weed control recommendations and adhere strictly to instructions on label.

Caution: Pesticides are dangerous. Use only as directed and heed all precautions on the contained label. Check the registration number and be sure that the directions for use include the target pests. Drift from aerial spraying can contaminate nearby crops and forage, lakes and reservoirs. Improper use and careless disposal of unused portions can lead to poisoning of humans, domestic animals, desirable plants, pollinating insects, fish and wildlife and can contaminate water supplies.

Table 13. Plants and Mixtures of Plants for Critical Areas

PLANTS AND MIXTURES	PLANTING RATES/ACRE	PLANTING DATES	NOTES
1. Pensacola Bahiagrass	30-40 lbs	Mar 15-Jun 15	
2. Wilmington Bahiagrass	30-40 lbs	Mar 15-Jun 15	
3. Common Bermudagrass (hulled)	8-12 lbs	April-July	
4. Common Bermudagrass (unhulled)	15-20 lbs	Jan-March	
5. Common or Tufcote Bermudagrass sprigs	Sprigs 2'x2' 30 cu ft or Broadcast 50-80 cu ft	Mar-Apr 15	Tiflawn lower-growing & finer turf than common. Requires sunny sites.
6. Tiflawn Bermudagrass sprigs	Sprigs 2'x2' 30 cu ft or Broadcast 40-60 cu ft	Mar-Apr 15	
7. Coastal Bermudagrass sprigs	Sprigs 2'x2' 30 cu ft or Broadcast 50-80 cu ft	Mar-Apr 15	Suited to well-drained sites, requires high level of management.
8. Kudzu (plants)	Space 4'x5' 2,200 plants	Late winter/ early spring	Well adapted to large & very steep cuts & high fills—not suited to soils with poor internal drainage. Excellent for gullies.
9. Weeping Lovegrass	4-5 lbs	Mar 15-June	Gives quick summer cover—well adapted to droughty sites. Best in mixture with Sericea Lespedeza—tends to become clumpy with age.
10. Maiden cane (plants)	Space 2'x2' 11,000 plants dig native plants	Late winter/ spring	Good on stream & canal banks, not for small laterals & small stream channels with low velocity.
11. Sericea Lespedeza (scarified)	40-50 lbs	March-May	Avoid wet sites—will persist & furnish cover on eroded droughty sites & subsoil material.
12. Sericea Lespedeza (unscarified)	50-60 lbs	Oct-Feb	Tolerates low level of management. May be seeded alone or overseeded on Fescue, Lovegrass, small-grain & other compatible plants during fall & winter months
13. Sericea Lespedeza (scarified) and Pensacola Bahiagrass	25-35 lbs 20-30 lbs	March-May	Tolerates low level of management.

	PLANTS AND MIXTURES	PLANTING RATES/ACRE	PLANTING DATES	NOTES
14.	Sericea Lespedeza (scarified) and Wilmington Bahiagrass	25-35 lbs 20-30 lbs	March-May	Tolerates low level of management.
15.	Sericea Lespedeza (scarified) and Weeping Lovegrass	40-50 lbs 4-5 lbs	March-May	Lovegrass provides quick protective cover
16.	Sericea Lespedeza (scarified) and Common Bermudagrass (hulled)	40-50 lbs 6-8 lbs	March-May	Bermuda provides quick land cover, spreads & heals in open areas. Bermudagrass usually disappears where Sericea establishes a canopy.
17.	Sericea Lespedeza (scarified) and Tall Fescue	40-50 lbs 25-30 lbs	March-April	Scarified Sericea may be spring seeded on Fescue seeded the previous fall
18.	Sericea Lespedeza (unscarified) and Tall Fescue	50-60 lbs 25-30 lbs	Sep-Nov	If Sericea seed is unavailable at planting time, it may be overseeded on Fescue later in the winter.
19.	Tall Fescue	40-60 lbs	Sep-Nov	Not well suited to infertile, droughty, sandy soils. Requires good maintenance.
20.	Tall Fescue and White Clover	30-50 lbs 3-4 lbs	Sep-Nov	Can be used where mowing is desired & high level of maintenance will be provided
21.	Tall Fescue and Browntop Millet or Sorghum-Sudan Hybrids	40-60 lbs 25-35 lbs 25-30 lbs	Aug-Sep	Keep annuals cut back to 10-12 inches. Mulching is desirable.
22.	Tall Fescue and Rye	40-60 lbs 25-30 lbs	Dec-Jan	Use only when necessary to complete a job. Mulching will be necessary to provide erosion control. Keep annuals cut back to 10-12 inches.

There will be conditions and interest that will warrant the use of other plants or mixtures not listed in the above table. Their use should be evaluated for each site.

Some rules of thumb for conversions:

Lbs/Ac x .367	= Oz/1,000 sq ft
Lbs/Ac x .0023	= Lbs/100 sq ft
Lbs/Ac x .023	= Lbs/1,000 sq ft
Lbs/Ac x .000207	= Lbs/100 sq ft
Lbs/Ac x .207	= Lbs/1,000 sq yds
Sq ft of area x .000023	= Acres (valid up to 10 acres)
Lbs/Ac x .0207	= Lbs/100 sq yds

Onslow Soil Conservation District
Technical Standard

June 1974

J. CRITICAL AREA PLANTING

(Permanent Seeding on Dams, Mine Spoils, Denuded or Gullied Areas, Etc.)

Where Applicable. On sediment producing, highly erodible or severely eroded areas, such as gullies, dams, spillways, borrow areas, mine spoils, road cuts, fills, shoulders and other areas where vegetation is difficult to establish with normal seeding or planting methods.

Specifications Guide

A. Table of Plants and Mixtures of Plants for Critical Areas (See attached table 14)

B. Gradingor Shaping

1. Divert concentrations of surface water where safe outlets can be provided.

2. Locate roads on the countour and provide adequate road ditch capacity for safe disposal of run-off where practical.

3. Slope the areas to be seeded to a 3:1 ratio slope or flatter if conventional equipment (as farm-type tractors, harrows, mowing machine) is to be used in seeding or maintenance.

4. Grading and shaping is desirable but not ncecesary when seeding is done by other than conventional means, such as with hydro-seeding equipment or hand methods.

5. Remove all loose rock, woody material and other obstructions from the surface that will interfere with the establishment and maintenance of vegetation.

C. Lime and Fertilizer for Establishment. Where soils are reasonably uniform, lime and fertilize according to soil test. In the absence of a soil test, apply 2 tons of finely ground dolomitic limestone and 500 to 800 pounds of 20% superphosphate or equivalent per acre. Additional amounts and analysis of fertilizers to use at seeding are:

1. Grasses alone - 800-1,000 pounds of 10-10-10 or equivalent per acre.

2. Grasses and Legumes or Legumes alone - 800-1,000 pounds of 5-10-10 or equivalent per acre.

Apply lime and fertilizer uniformly prior to seedbed preparation and mix with the soil when site is prepared with conventional equipment. Mix lime and fertilizer with the soil used to fill excavated "pot" holes. It should be evenly distributed when applied in furrows. On slopes steeper than 2:1, apply lime and fertilizer after soil scarification is done.

3. Normally an additional application of 30-50 pounds of nitrogen per acre is needed within three (3) to twelve (12) months to establish grass plantings. Application should be timed to growing cycle of the species being established.

D. Seedbed or Site Preparation

1. On slopes too steep for conventional equipment, scarify surface with a chain harrow, grader blades, chisels, hand tools or other equipment that will pit the soil or make small trenches approximately 1 to 2 inches apart across the slope in which seed can lodge and germinate.

2. On all sites where conventional equipment is used, prepare seedbeds to a depth of 3-4 inches.

3. Pre-treatment of gullies, abandoned mines or similar site conditions:

a. Where practical and feasible - slope banks and construct diversions to facilitate establishment of vegetation. Provide temporary cover with annual plants or mulch area if permanent planting is to be delayed.

b. Where impractical to slope banks - divert concentration of surface water into safe outlets, preserve existing native vegetation, construct brush, rock or similar dams on the floor of the gully, plant a 20-foot wide strip of vegetation, such as Kudzu, Sericea Lespedeza, Weeping Lovegrass, or other adapted perennial around the outside rim of the gully or abandoned mine; or plant the entire area to adapt trees and grasses and/or legumes.

c. Also see Critical Area Planting - With Shrubs, Vines, Trees and other Plants and With Short Term Seeding.

4. Site preparation is not necessary where hydro-seeding equipment is used.

E. Establishment With Seeds

1. From the attached table, select the best suited plant or mixture that is hardy and capable of withstanding abuse and will prevent erosion under adverse conditions for a long time.

2. Seed specifications on contracts:

a. Specifications shall state the minimum seed purity percentage and minimum germination percentage that is acceptable for the species being used.

b. Seed containing prohibited or restricted noxious weeds may not be accepted.

c. All seed shall be labeled to show that it meets the requirements of North Carolina Seed Law.

d. All seed used shall have been tested within the six (6) months immediately preceding the date of seeding.

e. The inoculant for treating legume seed shall be prepared specifically for the species. Inoculants shall not be used later than the date indicated on the container. Twice the supplier's recommended rate of inoculant will be used on dry seedings; four times the recommended rate if hydro-seeded.

3. Where hydraulic seeding equipment is used, seed, fertilizer, and wood-fiber mulch materials are mixed into a slurry with water. Care should be used to spread the mixture evenly and soon after the mixture is made. Keep the mixture well agitated when seeding.

4. Where conventional equipment is used, seed shall be applied uniformly with cultipacker-seeders, drills, rotary seeders or other mechanical seeders. Any equipment that will apply seed uniformly is acceptable. Seedings may be done by hand on areas where it is not practical and feasible to use equipment. When seeding by hand, sow one-half in one direction and the other half at right angles to the first. Cover seed to a depth of approximately $\frac{1}{2}$ to 1 inch, depending on the size of the seed. When cultipacker-seeder is not used, firm seedbed and cover with cultipacker or similar equipment before or after mulching, depending upon type mulch used and method of anchoring mulch that is used.

F. Establishment with Vegetative Material

1. Select a suitable plant from the attached table.

2. Apply lime and fertilizer and prepare land as for permanent seedings.

3. Bermudagrass planting methods:

a. Broadcast and press or disk sprigs into the top 1-2 inches of soil or plant sprigs in shallow furrows and cover about 1 to 2 inches deep; or use transplanter or plant sprigs by hand with spade, dibble or similar hand tools. Firm the soil around the sprigs with culti-packer, roller, or some other means.

b. Fill burlap bags with Bermudagrass roots and soil. Place bags 10-15 feet apart in gullies or ditches.

c. Spread 3 to 4 inches of soil filled with Bermudagrass roots and firm the soil.

4. Kudzu, Maiden Cane and similar plants may be planted in furrows, excavated holes or with spade, dibble or similar hand tools. When planting in excavated holes, dig holes large enough to allow roots to spread out to full length. When planting in "pot" holes or furrows, place about a level tablespoon of fertilizer per plant in the bottom of the hole or furrow and cover with fresh soil before planting. Set plants slightly deeper than they grew in the nursery and firm the soil. If vegetative materials are not dormant, water during planting operations.

G. Mulching. Mulch is essential on steep erosive sites where plant establishment may be expected to be difficult.

1. Mulching Materials

Dry, unchopped, unweathered small grain straw, pine straw, or hay free of seeds of competing plants - Spread at the rate of 1 to 2 tons per acre, depending upon the site and season. Evenly spread mulch over the area by hand or blower-type spreading equipment. Apply mulch uniformly so that about 25% of the ground surface is visible.

b. Sericea Lespedeza seed bearing stems at a rate of three tons per acre - This mulch may be applied green or dry but must contain mature seed. Liming, fertilizing and land preparation should precede application of the Sericea mulch.

c. Broomsedge hay mulch - Spread where it is desirable to establish this native plant.

d. Wood chips, bark, peanut hulls and similar plant residues - Spread so as not to prevent emergence of seedlings on areas that are not subject to concentrations of water. These materials are better suited for mulching woody plantings than broadcast seedings. Depths of more than 1 inch will affect seedling emergence.

e. Local materials such as burlap, tobacco plant bed netting and pine boughs - Cover entire area; secure in place if flowing water is involved. Do not use green pine branches where pine trees are to be planted because of possible insect or disease injury to plants.

f. Jute matting is a coarse, open mesh material woven of heavy jute twine. It may be used in the place of mulch or sod and has the strength to withstand water flow. It is an accepted practice to sow half the seed before placing the matting. Sow the remaining half after the matting is laid. See the manufacturer's specifications for installing.

g. Wood fiber (excelsior) is available as mulch material to be blown on after seeding or as a matting to be stapled on steep slopes, waterways, etc. See the manufacturer's specifications for installing.

h. Wood cellulose fiber mulch is mixed with seed, fertilizer and water. The resulting slurry is sprayed on with hydraulic seeding equipment. Use at the rate of 500 pounds per acre where straw or hay is to be applied. Use at the rate of 1,000 to 1,500 pounds per acre without other mulching materials. Applied in a slurry, wood cellulose fiber mulch is self-anchoring.

2. Mulch Anchoring Methods. Anchor mulch immediately after placement to minimize loss by wind and water. Consider size of area, type of site, and cost and select from the following methods of anchoring:

a. Mulch anchoring tool with a series of flat notched disks that punch and anchor mulch material into the soil. A regular farm disk weighted and set nearly straight may substitute but will not do a job comparable to the mulch anchoring tool. The disk should not be sharp enough to cut up the mulch. The soil should be moist, free of roots and loose enough to permit penetration to a depth of 3 inches. Operate as near as practical to the contour.

b. Mulch nettings - Staple light weight paper, jute, cotton, plastic or wire nettings to the soil surface according to manufacturer's specifications. These nettings are usually in rolls 3 to 4 feet wide and up to 300 feet long.

c. Peg and twine - Drive 8 to 10 inch wooden pegs to within 2 to 3 inches of the soil surface every 4 feet in all directions. Stakes may be driven before or after applying mulch. Secure mulch to soil surface by stretching twine between pegs in a criss-cross within a square pattern. Secure twine around each peg with two or more round turns. Poles and stakes may also be used to secure brush in place.

d. Pick chain - This rolling spiked-chain implement can be operated on slopes of 3:1 gradient or steeper. It is attached to a tractor or truck which operates along the top of the slope. The pick chain can also be used for seedbed preparation and mixing lime and fertilizer with the soil.

e. Slit - With a square pointed spade, cut mulch into the surface soil in contour rows 18 inches apart.

f. Asphalt mulch tie-down - Asphalt sprayed uniformly on the mulch as it is ejected from the blower is more effective than applied as a separate operation. Rates of application will vary with conditions. Apply so area has uniform appearance.

(1) Emulsified asphalt - Apply uniformly 0.04 gallons per square yard or 200 gallons per acre. See the manufacturer's specifications. Emulsified asphalt should not be used in freezing weather since it contains approximately 50% water.

(2) Liquid asphalt - May be applied at any time of the year since it is thinned with a kerosene-like product. Uniformly apply 0.10 gallons per square yard or 500 gallons per acre. See the manufacturer's specification.

NOTE: In areas of playing children or pedestrian traffic, asphalt methods could cause problems of "tracking in" on rugs, damaging shoes, clothing, etc.

g. Mulch can be anchored with rye for fall plantings or millet for summer plantings. Use ½ bushel of rye or 15 pounds of millet per acre broadcast ahead of mulch application.

H. Maintenance. Maintenance is the most important controllable factor in retaining an effective vegetative cover.

1. Control of Competition. Competitive weed growth during the period of establishment should be controlled by mowing and/or with herbicides. When chemicals are used, follow N. C. Agricultural Experiment Station's chemical weed control recommendations and adhere strictly to instructions on the label.

2. Irrigation. If soil moisture is deficient, supply new plantings with adequate water (3"-4" penetration) for plant growth at 10-day intervals, if needed, until they are established. This is most important on late season plantings and in abnormally dry or hot seasons.

3. Repairs. Inspect all areas for planting failures and make necessary repairs, replacements and reseeding within the planting season if possible.

4. Maintenance Fertilization. Lime and fertilizer should be applied under a regular program based on soil fertility tests and on the general appearance of the vegetative cover. In the absence of a soil test, apply 1-2 tons of finely ground dolomitic limestone per acre every 4 or 5 years. Fertilize as needed to maintain healthy, vigorous growing plants with the following fertilizer materials:

Species	N	PO 25	KO 2
Grasses and Legumes	60	60	60
	80	40	40
	0	60	60

5. Mowing. Mow Sericea or Sericea-grass mixtures only after a killing frost. Tall Fescue should be mowed not closer than 3-4 inches. Bahia and low-growing Bermudagrass may be mowed about 2 inches high. Care should be taken not to damage vegetation mechanically through use of improper mowing equipment or by attempting to mow with heavy equipment on steep slopes when the vegetation is lush and slippery or when the ground is soft enough to be rutted by mower or tractor wheels. Where mowing fails to control weeds satisfactorily, apply chemicals in accordance with current N. C. Agricultural Experiment Station Weed Control recommendations and adhere strictly to instructions on label.

Caution: Pesticides are dangerous. Use only as directed and heed all precautions on the container label. Check the registration number and be sure that the directions for use include the target pests. Drift from aerial spraying can contaminate nearby crops and forage, lakes, and reservoirs. Improper use and careless disposal of unused portions or containers can lead to poisoning of humans, domestic animals, desirable plants, pollinating insects, fish and wildlife and can contaminate water supplies.

Table 14. Plants and Mixtures of Plants for Critical Areas

PLANTS AND MIXTURES	PLANTING RATES/ACRE	PLANTING DATES	NOTES
1. Pensacola Bahiagrass	30-40 lbs	Mar 15-Jun 15	
2. Wilmington Bahiagrass	30-40 lbs	Mar 15-Jun 15	
3. Common Bermudagrass (hulled)	8-12 lbs	April-Jul	
4. Common Bermudagrass (unhulled)	15-20 lbs	Jan-March	
5. Common or Tufcote Bermudagrass sprigs	Sprigs 2'x2' 30 cu ft or Broadcast 50-80 cu ft	Mar-Apr 15	Tiflawn lower-growing and finer turf than common. Requires sunny sites.
6. Tiflawn Bermudagrass sprigs	Sprigs 2'x2' 30 cu ft or Broadcast 40-60 cu ft	Mar-Apr 15	
7. Coastal Bermudagrass sprigs	Sprigs 2'x2' 30 cu ft or Broadcast 50-80 cu ft	Mar-Apr 15	Suited to well-drained sites. Requires high level of management.
8. Kudzu (plants)	Space 4'x5' 2,200 plants	1. Late winter/ early spring	Well adapted to large & very steep cuts & high fills—not suited to soils with poor internal drainage—excellent for gullies
9. Weeping Lovegrass	4-5 lbs	Mar 15-June	Gives quick summer cover—well adapted to droughty sites—Best in mixtures with Sericea Lespedeza—tends to become clumpy with age.
10. Maiden cane (plants)	Space 2'x2' 11,000 plants dig native plants	Late winter/ spring	Adapted to all of the Coastal Plain & southeastern half of Piedmont. Good on stream & canal banks, not for small laterals & small channels with low velocity.
11. Sericea Lespedeza (scarified)	40-50 lbs	March-May	Avoid wet sites—will persist & furnish cover on eroded droughty sites & subsoil material.
12. Sericea Lespedeza (unscarified)	50-60 lbs	Oct-Feb	Tolerates low level of management. May be seeded alone or overseeded on Fescue, Lovegrass, smallgrain & other compatible plants during the fall & winter months
13. Sericea Lespedeza (scarified) and Pensacola Bahiagrass	25-35 lbs 20-30 lbs	March-May	Tolerates low level of management.

PLANTS AND MIXTURES	PLANTING RATES/ACRE	PLANTING DATES	NOTES
14. Sericea Lespedeza (scarified) and Wilmington Bahiagrass	25-35 lbs 20-30 lbs	March-May	
15. Sericea Lespedeza (scarified) and Weeping Lovegrass	40-50 lbs 4-5 lbs	March-May	Lovegrass provides quick protective cover
16. Sericea Lespedeza (scarified) and Common Bermudagrass (hulled)	40-50 lbs 6-8 lbs	March-May	Bermuda provides quick land cover, spreads & heals in open areas. Bermudagrass usually disappears where Sericea establishes a canopy.
17. Sericea Lespedeza (scarified) and Tall fescue	40-50 lbs 25-30 lbs	March-April	Scarified Sericea may be spring seeded on Fescue seeded the previous fall
18. Sericea Lespedeza (unscarified) and Tall Fescue	5—60 lbs 25-30 lbs	Sep-Nov	If Sericea seed unavailable at planting time, it may be over-seeded on Fescue later in the winter.
19. Tall Fescue	40-60 lbs	Sep-Nov	Not well suited to infertile, droughty, sandy soils. Requires good maintenance.
20. Tall Fescue and White Clover	30-50 lbs 3-4 lbs	Sep-Nov	Can be used where regular mowing is desired & high level of maintenance will be provided.
21. Tall Fescue and Browntop Millet or Sorghum-Sudan Hybrids	40-60 lbs 25-35 lbs 25-30 lbs	Aug-Sep	Keep annuals cut back to 10-12 inches. Mulching is desirable.
22. Tall Fescue and Rye	40-60 lbs 25-30 lbs	Dec-Jan	Use only when necessary to complete a job. Mulching will be necessary to provide erosion control. Keep annuals cut back to 10-12 inches.

There will be conditions and interest that will warrant the use of other plants or mixtures not listed in the above table. Their use should be evaluated for each site.

Some rules of thumb for conversions:

Lbs/Ac x .367 = Oz/1,000 sq ft
Lbs/Ac x .0023 = Lbs/100 sq ft
Lbs/Ac x .023 = Lbs/1,000 sq ft
Lbs/Ac x .000207 = Lbs/sq yd
Lbs/Ac x .0207 = Lbs/100 sq yds
Lbs/Ac x .207 = Lbs/1,000 sq yds
Sq ft of area x .000023 = Acres (valid up to 10 acres)

Onslow Soil Conservation District
North Carolina
Technical Standard

K. CRITICAL AREA PLANTING

(Permanent Seeding on Dikes, Ditch Banks, Etc.)

Where Applicable. On dikes, berms or along ditches that are newly constructed or being improved by shaping the old banks.

Specifications Guide

A. Table of Plants and Mixtures of Plants for Critical Areas. (See attached table 14.)

B. Site Preparation

1. Where practical and feasible, shape all areas to be seeded to permit the use of conventional equipment in the establishment and maintenance of vegetation.

2. Where ditch side slopes are to be seeded and maintained with conventional equipment, slope the banks to a 3:1 ratio or flatter.

3. Smoothing the soil is desirable, but not necessary when seeding with hydraulic equipment or by hand.

4. No seedbed preparation is necessary on most soil and site conditions where seeding is done immediately after excavation or soil spreading is completed. Where this type of seeding is done, the excavation work should be completed during the optimum seeding date for the desired plant or mixture of plants.

5. Remove all woody material, loose rock and other obstructions that may interfere with planned seeding and maintenance operations.

C. Lime and Fertilizer

1. Where soils are seasonably uniform, lime and fertilize according to soil test recommendations. In the absence of a soil test, apply 2 tons lime per acre and fertilize with the amounts and analysis shown below. Lime and fertilizer shall be spread uniformly over the area to be planted.

a. Grasses alone: 800 to 1,000 pounds of 10-10-10 or equivalent per acre.

b. Mixtures of grasses and legumes or legumes alone: 800 to 1,000 pounds of 5-10-10 or equivalent per acre.

c. Normally an additional application of nitrogen or complete fertilizer is needed within three (3) to twelve (12) months to establish critical area plantings. Application should be timed to growing cycle of the species being established.

2. Where possible, mix lime and fertilizer into the soil by disking or harrowing to a depth of approximately 3 inches. Otherwise, broadcast on soil surface or apply with hydraulic seeding equipment.

D. Selecting Plants

1. Tress and shrubs are not covered in these specifications. They may be used where they are compatible with the engineering design.

2. Guide to selecting plants from Table 14.

a. Consider site conditions, time of planting and maintenance requirements.

b. Plants for droughty sites - Bahiagrass, Sericea Lespedeza and Weeping Lovegrass.

c. Plants for wet sites - Tall Fescue and Maiden Cane.

d. Plants for variable or mixed soil conditions - One of the plants named above or Kudzu or Bermudagrass may be adapted. A mixture of plants will usually be more practical than a single plant to provide cover on these sites.

e. Seeding of annuals or a mixture of annuals and perennials may be justified for sediment reduction when bare soil is exposed during the off season for seeding the desired perennial alone.

f. Maintenance - Kudzu and Sericea Lespedeza maintain land cover with a lower level of maintenance than the grasses.

E. Seeding

1. Seed with a grain drill or cultipacker-type seeder when possible or broadcast seed with a cyclone or similar type seeder. Cover seed with a cultipacker or other suitable device on all areas where equipment can be used.

2. Furrowing or pitting the side slopes will help hold fertilizer and seed in place on areas where equipment cannot be used.

3. Seeding may be made by broadcasting the seed on soil areas and side slopes immediately following excavation or soil spreading.

4. Seed specifications on contracts

a. Specifications shall state the minimum seed purity percent and minimum germination percent that is acceptable for the species being used.

b. Seed containing prohibited or restricted noxious weeds should not be accepted.

c. All seed shall be labeled to show that it meets the requirements of the North Carolina Seed Law.

d. All seed used shall have been tested within the six (6) months immediately preceding the date of seeding.

e. The inoculant for treating legume seed shall be prepared specifically for the species. Inoculants shall not be used later than the date indicated on the container. Twice the supplier's recommended rate if hydro-seeded.

F. Establishment with Vegetative Material

1. Table 14 shows the kind of plants, planting material and spacing to be used.

2. Bermudagrass stolons may be: broadcast and pressed or disked into the top 1-2 inches of soil and firmed; dropped in shallow furrows, covered about 1-2 inches deep and firmed; planted with a transplanter; or by opening holes with hand planting tools.

3. Kudzu, Maiden Cane and similar plants are planted in furrows, excavated holes or by opening holes with planting irons. Plants should be set slightly deeper than they grew in the nursery.

G. Mulching. Mulch is essential on steep erosive sites where plant establishment may be expected to be difficult.

1. Mulching Materials

a. Dry, unchopped, unweathered small grain straw or hay free of seeds of competing plants - Spread at the rate of 1-2 tons per acre depending upon the site and season. Evenly spread mulch over the area by hand or blower-type spreading equipment. Apply mulch uniformly so that about 25% of the ground surface is visible.

b. Sericea Lespedeza seed bearing stems at a rate of three tons per acre - This mulch may be applied green or dry but must contain mature seed. Liming, fertilizing and land preparation should precede application of the Sericea mulch.

c. Broomsedge hay mulch - Spread where it is desirable to establish this native plant.

d. Wood chips, bark, peanut hulls and similar plant residues - Spread so as not to prevent emergence of seedlings on areas that are not subject to concentrations of water. These materials are better suited for mulching woody plantings than broadcast seedings. Depth of more than 1 inch will affect seedling emergence.

e. Local materials such as burlap, tobacco plant bed netting and pine boughs - Cover entire area; secure in place if flowing water is involved. Do not use green pine branches where pine trees are to be planted because of possible insect or disease injury to plantings.

f. Barnyard manure and bedding - Apply uniformly so that about 25% of the ground surface is visible.

g. Jute matting is a coarse, open-mesh material woven of heavy jute twine. It may be used in place of mulch or sod and has the strength to withstand waterflow. It is an accepted practice to sow half the seed before placing the matting. Sow the remaining half after the matting is laid. See the manufacturer's specifications for installing.

h. Wood fiber (excelsior) is available as mulch material to be blown on after seeding or as a matting to be stapled on steep slopes, waterways, etc. See the manufacturer's specifications for installing.

i. Wood cellulose fiber mulch is mixed with seed, fertilizer and water. The resulting slurry is sprayed on with hydraulic seeding equipment. Use at the rate of 500 pounds per acre where straw or hay is to be applied. Use at the rate of 1,000 to 1,500 pounds per acre without other mulching materials. Applied in a slurry, wood cellulose fiber mulch is self-anchoring.

j. Other commercial products, as fiberglass and various kinds of nettings, are available. Manufacturer's directions should be followed for applying and securing in place.

2. Mulch Anchoring Methods. Anchor mulch immediately after placement to minimize loss by wind and water. Consider size of area, type to site and cost, and select one of the following:

a. Mulch anchoring tool with a series of flat notched disks that punch and anchor mulch material into the soil. A regular farm disk weighted and set nearly straight may substitute but will not do a job comparable to the mulch anchoring tool. The disk should not be sharp enough to cut up the mulch. The soil should be moist, free of roots and loose enough to permit penetration to a depth of 3 inches. Operate as near as practical to the contour.

b. Mulch nettings - Staple light weight paper, jute, cotton, plastic or wire nettings to the soil surface according to manufacturer's specifications. These nettings are usually in rolls 3 to 4 feet wide and up to 300 feet long.

c. Peg and twine - Drive 8 to 10 inch wooden pegs to within 2 to 3 inches of the soil surface every 4 feet in all directions. Stakes may be driven before or after applying mulch. Secure mulch to soil surface by stretching twine between pegs in a criss-cross within a square pattern. Secure twine around each peg with two or more round turns. Poles and stakes may also be used to secure brush in place.

d. Pick chain - This rolling spiked-chain implement can be operated on slopes of 3:1 gradient or steeper. It is attached to a tractor or truck which operates along the top of the slope. The pick chain can also be used for seedbed preparation and mixing lime and fertilizer with the soil.

e. Slit - With a square pointed spade, cut mulch into the surface soil in contour rows 18 inches apart.

f. Asphalt mulch tie-down - Asphalt sprayed uniformly on the mulch as it is ejected from the blower is more effective than applied as a separate operation. Rates of application will vary with conditions. Apply so area has uniform appearance.

(1) Emulsified asphalt - Apply uniformly 0.04 gallons per square yard or 200 gallons per acre. See the manufacturer's specifications. Emulsified asphalt should not be used in freezing weather since it contains approximately 50% water.

(2) Liquid asphalt - May be applied at any time of the year since it is thinned with a kerosene-like product. Uniformly apply 0.10 gallons per square yard or 500 gallons per acre. See the manufacturer's specifications.

NOTE: In areas of playing children or pedestrian traffic, asphalt methods could cause problems of "tracking in" on rugs, damaging shoes, clothing, etc.

g. Mulch can be anchored with rye for fall plantings or millet for summer plantings. Use $\frac{1}{4}$ to $\frac{1}{2}$ bushel of rye or 15 pounds of millet per acre broadcast ahead of mulch applications.

H. Maintenance. Maintenance is the most important controllable factor in retaining an effective vegetative cover.

1. Control of Competition. Competitive weed growth during the period of establishment should be controlled by mowing and/or with herbicides. When chemicals are used, follow current N. C. Agricultural Experiment Station's chemical weed control recommendations and adhere strictly to instructions on the label.

2. Irrigation. If the soil moisture is deficient, supply new plantings with adequate water (3"-4" penetration) for plant growth at 10-day intervals, if needed, until they are established. This is most important on late season plantings and in abnormally dry or hot seasons.

3. Repairs. Inspect all areas for planting failures and make necessary repairs, replacements and reseeding within the planting season, if possible.

4. Fertilization. Lime and fertilizer to maintain effective land cover should be applied under a regular program based on soil tests and the use and general appearance of the vegetative cover. In the absence of a soil test, lime and fertilize as follows:

a. Lime. Apply 1 to 2 tons of ground dolomitic limestone per acre during late fall or winter every 4 to 5 years.

b. Fertilizer

(1) Cool season grasses - Every 2 years apply 400-500 pounds of 10-10-10 fertilizer per acre in the fall and 30-50 pounds of nitrogen annually, if needed, in the early spring.

(2) Warm season grasses - Every 2 years apply 400-500 pounds of 10-10-10 fertilizer per acre in February or March. Follow with 30-50 pounds of nitrogen annually, if needed, per acre in June or July.

(3) Sericea Lespedeza and similar legumes - Every 3-4 years apply 400-500 pounds of 0-10-20 fertilizer per acre in February or March.

(4) Mixtures of grasses and legumes should be fertilized to favor the desired plants of the mixture.

5. Weed and Brush Control. Mow grasses at least annually to control weeds and undesirable woody vegetation. Kudzu and Sericea Lespedeza may be mowed annually but only after a killing frost. Care should be taken not to damage the vegetation mechanically through use of improper mowing equipment or by attempting to mow with heavy equipment on steep slopes when vegetation is lush and slippery or when the ground is soft enough to be rutted by mower or tractor wheels.

Caution: Pesticides are dangerous. Use only as directed and heed all precautions on the container label. Check the registration number and be sure that the directions for use include the target pests. Drift from aerial spraying can contaminate nearby crops and forage, lakes and reservoirs. Improper use and careless disposal of unused portions can lead to poisoning of humans, domestic animals, desirable plants, pollinating insects, fish and wildlife and can contaminate water supplies.

FOR GRASS CHANNEL

DELETE RIPRAP & BEDDING $- \$63.84/LF$

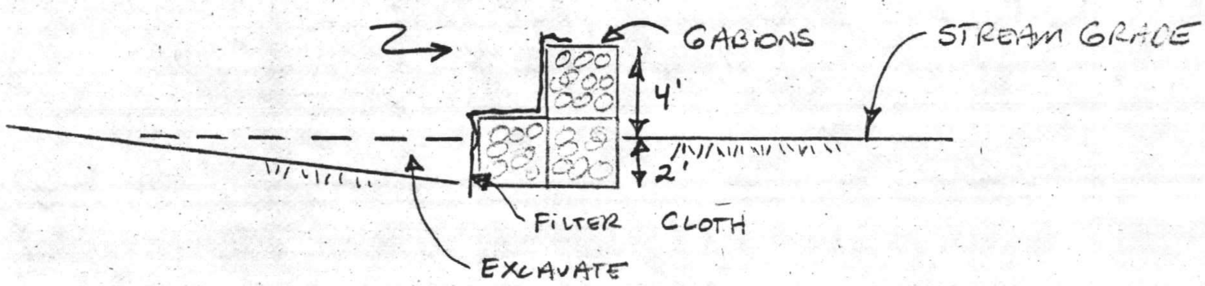
ADD SEEDING

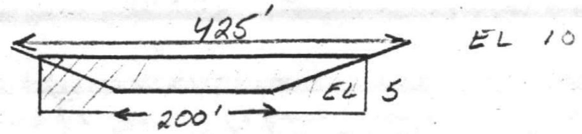
$$\frac{4 \times \sqrt{10} \times 2 + 5}{1000} \times \$46 = +1.39/LF$$

NET $-\$62.45 \approx \$60$

Item	Cost \$/LF
RIPRAP CHANNEL	\$100/LF
RIPRAP CHANNEL + AREA STABILIZE	\$115/LF
GRASS CHANNEL	\$40/LF
GRASS CHANNEL + AREA STABILIZE	\$55/LF

6. GABION CHECK DAM / SEDIMENT DAM





TYPICAL SECTION

Camp Lejeune

LENGTH OF GABIONS 380'
9 SF/LF ⇒ 3420 CF
= 127 CY

FILTER FABRIC
10 FT/LF ⇒ 3800 SF
423 SY

EXCAVATION FOR GABIONS
$2(6+2) \times 380/27 = 225$ CY

EXCAVATION FOR BASIN
LENGTH
$\frac{2(200+5\times2)}{2} \times 500/27 \approx 3900$ CY

COSTS

GABIONS

Means 2.3-360-0800 \$77/CY (1 SY = 1 CY)

\$77 × 127 ... \$9779

FILTER FABRIC (other bids)

\$3.00/SY

3 × 423 ... 1269

EXCAVATION (225 + 3900 CY) = 4125 CY

Means 2.3-163-2000 \$1.21

1.21 × 4125 ... 4991

\$16,039.25

SAY \$16,100 each

Camp Lejeune

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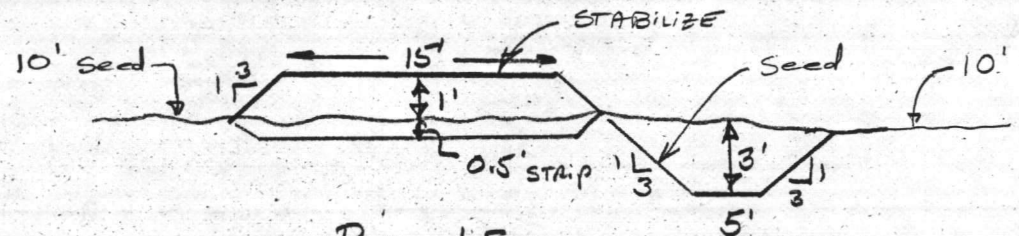
7. TANK TRAIL

Seeded perimeter = 61'



PER LF

FILL = $[1 \times (15+3) + 21 \times 0.5]/27 = 1.05$ CY/LF

STRIP $21 \times 0.5/27 = 0.39$ CY/LF

EXCAVATE $3(5+3\times3)/27 = 1.56$ CY/LF

CHECK DAMS & CULVERTS CONSIDERED NEGLIGIBLE

Seed per page 8 \$.046/SF

STRIP

Means 2.3-163-2000 \$1.21

EXCAVATE

Means 2.3-160-0260 \$2.21

FILL & Compact & Add Stabilizer

Fill Means	2.3-033-2000	0.51
Compact Means	2.3-081-5000	1.28
		1.79

Soil Stabilization - Soil Cement

4% mix - 6" 5.25/SY Means 2.3-485-1020

15'x1' = 1.67 SY

$1.67 \times 5.25 = 8.75$ /LF

$8.75/1.05 = 8.33$ /CY

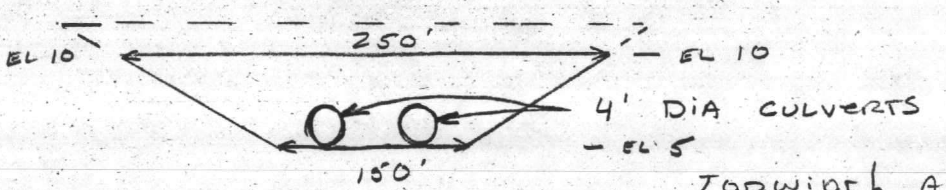
$8.33 + 1.79 = 10.12$ /CY SAY \$10.00

FILL	1.05×10.00 =	10.50
STRIP	$.39 \times 1.21$ =	0.47
EXCAVATE	1.56×2.21 =	3.45
Seed	$61 \times .046$ =	2.81
		17.23/LF

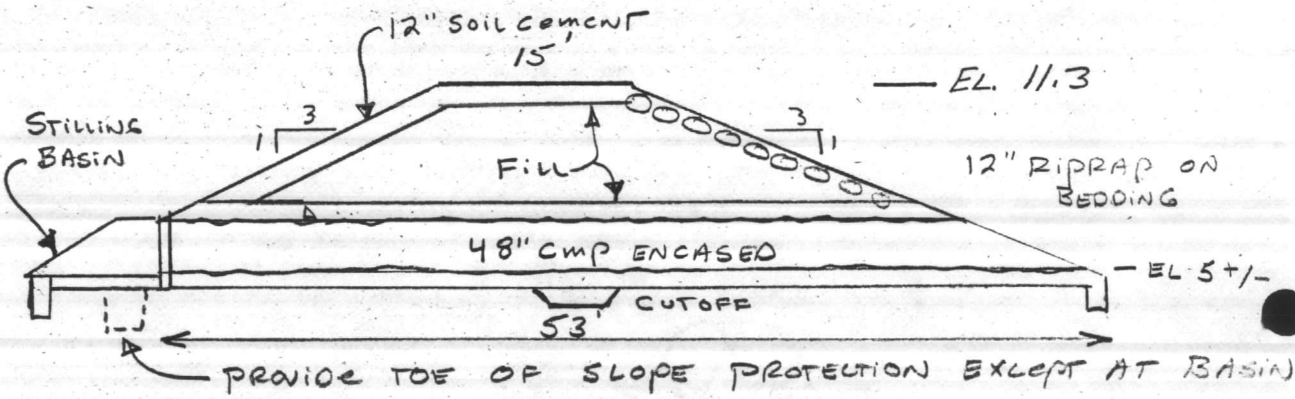
SAY \$17.00/LF

8, Main Tank Crossing at Cogdell's Creek

Stream Section



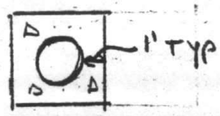
Topwidth at EL. 11.3 ≈ 276'



Quantities

Pipe $53' \times 2 - 48"$ CPM $= 106$ LF

Encasement

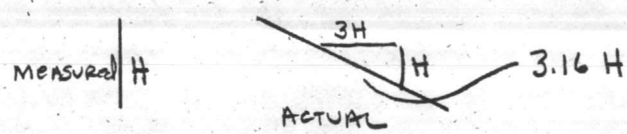


$$A = 6 \times 6 - \frac{\pi 4^2}{4} = 23.4 \text{ SF}$$

$$V = 23.4 \times 2 \times 53/27 = 92 \text{ CY}$$

Concrete

Shell



$$\text{Vert Area} = \frac{150 + 276}{2} \times 6.3/9 = 149.1 \text{ SY}$$

Actual Area = 471 SY

Area Riprap = 471 SY
Volume Riprap = 471 SY × 1/3 SY = 157 CY
Volume Bedding = 157/2 = 79 CY

Camp Lejeune

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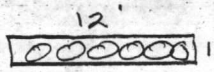
Soil Cement

Top Area = $15 \times 276/9 = 460$ sy
Side $\underline{471}$
931 sy
(310 cy)

Toe of Slope



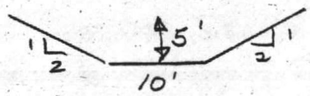
Gabions

Volume = $276 \times 12 \times 1/27 = 123$ cy

Stilling Basins 2 for 4' dia culvert

Cutoff

Excavate



Volume = $5(10+5\times2) \times 276/27 = 1023$ cy

Fill - cutoff 1023 cy

Strip 1'

STA	Area	Avg	Length	Vol
0+00	15			
		34	63	2142
0+63	53			
		53	150	7950
2+13	53			
		34	63	2142
2+76	15			
				12,234 CF
			÷ 27	453 cy

Same quantity of fill 453cy

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FILL

STA	AREA	AVG	LENGTH	VOL
0+00	0			
		106.8	63	6728.4
0+63	213.6			
		213.6	150	32040
2+13	213.6			
		106.8	63	6728.4
2+76	0			
				45,496.8 CF
			÷27	1685 cy
		Less Soil Cement		−310 cy
		Less Riprap		−157 cy
		Less Bedding		−79 cy
				1139 cy

Remove existing fill (Excavation)
Estimate 1000 cy

SUMMARY

Item	Quantity	Unit	Means Ref	Unit Price	Total Amount (Rounded)
48" CMP	106	LF	2.5-274-2200	59.00	6,254
Encasement	92	CY	3.3-120-0500	195.00	17,940
Riprap-12"	157	CY	Page 8	45.00	7,065
Bedding	79	CY	Page 8	24.00	1,896
Soil Cement	931	SY	2.3-480-1060	6.60	6,145
Gabions	123	CY	Page 10	$77.00	9,471
Stilling Basins	2	EA	Page 2	$18,700.00	37,400
Excavate & Strip	2476	CY	2.3-163-2200	2.42	5,992
Fill	2615	CY	*	6.00	15,690
					$107,853
					Say $108,000

* based on bid experience with dams assuming suitable borrow nearby

9. Footpaths
6' wide => 0.67 SY/LF
Ref Means 2.6-400-0000 $5.35/SY
$3.58/LF
SAY $3.60/LF

SUMMARY BY AREA

AREA (A)

150 LF GRADE & REVEGETATE @ $55 — $8,250
FOOTPATH 150 LF @ $3.60 — 540
8,790
AREA (A) SAY $8,800

AREA (B)
DETENTION BASIN
SHOULD be provided during
CONSTRUCTION OF P-631
COST TO be included
in P-631 COST
AREA (B) —

AREA (C)
400 LF FOOTPATH @ $3.60 — $1,440
AREA (C) SAY $1,500

AREA (D)
Riprap Channel
& Stabilization
150 LF @ $115 — $17,250
AREA (D) SAY $17,300

AREA (E)
SEDIMENT DAM
AREA (E) $16,100

AREA (F)
Riprap Energy Dissipator
Assume D_o = 3'
AREA (F) $2200

45,900

AREA G
750 LF GRASS DRAINAGE CHANNEL
750 x $40 AREA G $30,000

AREA H
500 LF RIPRAP CHANNEL @ $100 50,000
4' Do STONE DISSIPATOR @ $3834 = 3834
53,834
SAY AREA H $53,800

AREA I
MAIN CROSSING AREA I $108,000

AREA J
30" STILLING BASIN AREA J $8,700

AREA K
36" STILLING BASIN AREA K $11,600

AREA L
36" STILLING BASIN AREA L $11,600

AREA M
36" STILLING BASIN AREA M $11,600

AREA N
48" STILLING BASIN AREA N $18,700

AREA O
30" STILLING BASIN AREA O $8,700

AREA P
450 LF RIPRAP CHANNEL & STABILIZE @ $115 51750
4.5' d_o STONE ENERGY DISSIPATOR $4827 4827
56,577
AREA P SAY $56,600

319,300

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AREA Q
SEDIMENT DAM — AREA Q $16,100

AREA R
300' RIPRAP CHANNEL & STABILIZE @ $115 — AREA R $34,500

AREA S
770' RIPRAP CHANNEL & STABILIZE @ $115 88350
d_0 = 4' STONE STILLING BASIN 3834
92,384
AREA S $92,400

AREA T
54" STILLING BASIN — AREA T $22,800

AREA U
18" STILLING BASIN — AREA U $4,100

AREA V
18" STILLING BASIN — AREA V $4,100

AREA W
3600' TANK ROAD @ $17 — AREA W $61,200

AREA X
60" STILLING BASIN — AREA X $27,500

AREA Y
500 LF RIPRAP CHANNEL @ $100 50,000
4' DO STONE DISSIPATOR @ $3834 = 3834
53,834
SAY AREA Y $53,800

SUBTOTAL	681,700
+/- 25% CONTINGENCY	170,425
TOTAL	852,125