

Red Rock Canyon Drainage Basin Design Plan

April 1993

Prepared For:

**City of Rapid City
Engineering Division**



FERBER ENGINEERING COMPANY

TABLE OF CONTENTS

	<u>PAGE</u>
<u>INTRODUCTION</u>	1
Background	1
Objective	1
Design Plan Limitations	2
<u>BASIN DESCRIPTION</u>	3
General	3
Sub-Basin Information	3
Land Use and Zoning	3
Topography	8
Street Classification	8
Soil Classification	8
Special Features and Problem Areas	11
Rapid City Flood Plain	13
<u>DESIGN PLAN</u>	15
General	15
Conveyance Elements	16
Detention Cells	30
Chapel Valley Drainage	34
General	34
Conveyance Elements	35
Whispering Pines Drainage	39
Design Recommendations and Implementation	40
Multiple Use Opportunities	43
<u>COST ANALYSIS</u>	44
Cost Estimate	44

<u>HYDROLOGY</u>	46
Methodology	46
Modeling Parameters	47
<u>HYDRAULICS</u>	48
Methodology	48
Modeling Parameters	48
<u>APPENDIX A</u>	
Sub-Basin Runoff Hydrographs	
Conveyance Element Runoff Hydrographs	
<u>APPENDIX B</u>	
10 Year Existing CUHP Analysis	
100 Year Existing CUHP Analysis	
10 Year Developed CUHP Analysis	
100 Year Developed CUHP Analysis	
10 Year Developed SWMM Analysis	
100 Year Developed SWMM Analysis	

LIST OF FIGURES

	<u>PAGE</u>	
Figure 1	Basin Boundary Map	4
Figure 2	Sub-Basin Boundary Map	5
Figure 3	Land Use Map	7
Figure 4	Street Plan	9
Figure 5	Hydrologic Soil Classification Map	10
Figure 6	Rapid City Flood Plain	14
Figure 7	Hydrologic Schematic	17
Figure 8	Detailed Cost Summary	45
Figure 9	Sub-Basin Runoff Totals	46
Figure 10	Developed Sub-Basin Input Parameters	47

Introduction

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INTRODUCTION

BACKGROUND

This Drainage Basin Design Plan has been prepared for the City of Rapid City by Ferber Engineering Company. The purpose of this Basin Design Plan is to quantify the amount of runoff which would occur during a 10 year initial and 100 year major storm event, and identify the major drainage facilities required to convey the runoff from the most remote reaches of the basin to the outlet with Rapid Creek.

The City of Rapid City has recognized the need to provide long range plans for the major drainage improvements in these basins. This basin design plan will identify the major routes to be protected and the conveyance facilities necessary. This design plan is one of a series being developed under the direction of the City Engineering Department. These design plans will be implemented to promote orderly growth and to protect vital drainage routes.

The Red Rock Canyon Basin is somewhat unique in Rapid City in that the basin remains largely undeveloped. This lack of development affords the City an opportunity to identify the major drainage facilities and provide for their construction ahead of or concurrent with future development.

OBJECTIVE

The objective of this Basin Design Plan is to identify the problem locations and to prepare conceptual designs for the storm drainage improvements which will safely, economically, and aesthetically convey the runoff from the one hundred year storm. This Design Plan encompasses the area from the upper reaches of the basin to the Rapid Creek outlet.

In the lower reaches of this basin where development has already occurred, an additional objective is the preliminary design of an outlet channel which protects the property values and aesthetics of the area while safely routing the storm flows.

This Design Plan is intended to be a guide for the City of Rapid City and Pennington County to use in designing and constructing the major drainage facilities in the basin. The Design

Plan also identifies corridors which will need to be protected from further development activity.

DESIGN PLAN LIMITATIONS

This Design Plan provides a conceptual outline of the major improvements which are required. Within this outline is contained all of the necessary data to begin final design of specific plan improvements. The improvements, when completed will form an efficient, planned stormwater management system.

It is unlikely that all improvements will follow the outline of this Design Plan exactly. As modifications to the Design Plan are made, it is essential to adjust the computer models to accurately reflect changes. Users of this Design Plan are advised to contact the City Engineering Department to verify the accuracy of the design model.

This Design Plan encompasses only the major drainage improvements. In undeveloped areas, one of the Design Plan assumptions is that local drainage improvements will be constructed as part of development activity and that these local improvements will safely convey the flows to the major facilities. In developed areas, certain conveyances will be required to meet the requirements of the Rapid City Drainage Criteria Manual.

Basin Description

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BASIN DESCRIPTION

GENERAL

The Red Rock Canyon Drainage Basin is located at the southwest corner of Rapid City. The Basin includes approximately 3200 acres, portions of which are located both inside and outside of the corporate limits of Rapid City. The entire basin lies within Pennington County. The Basin discharges to Rapid Creek immediately upstream of Canyon Lake. The steep slopes and narrow canyons of the basin make extensive development in the floodplain unlikely. What development has occurred is primarily located along the ridges and in the upland meadows in the south region of the basin. Figure 1 is a portion of the USGS 7.5 minute Rapid City West Quadrangle showing the basin boundaries.

The Red Rock Canyon Drainage Basin is bounded by the Arrowhead and Wonderland Drive Basins on the east, Rapid Creek on the north, the Spring Creek Basin on the south, and an unnamed tributary to Rapid Creek on the west.

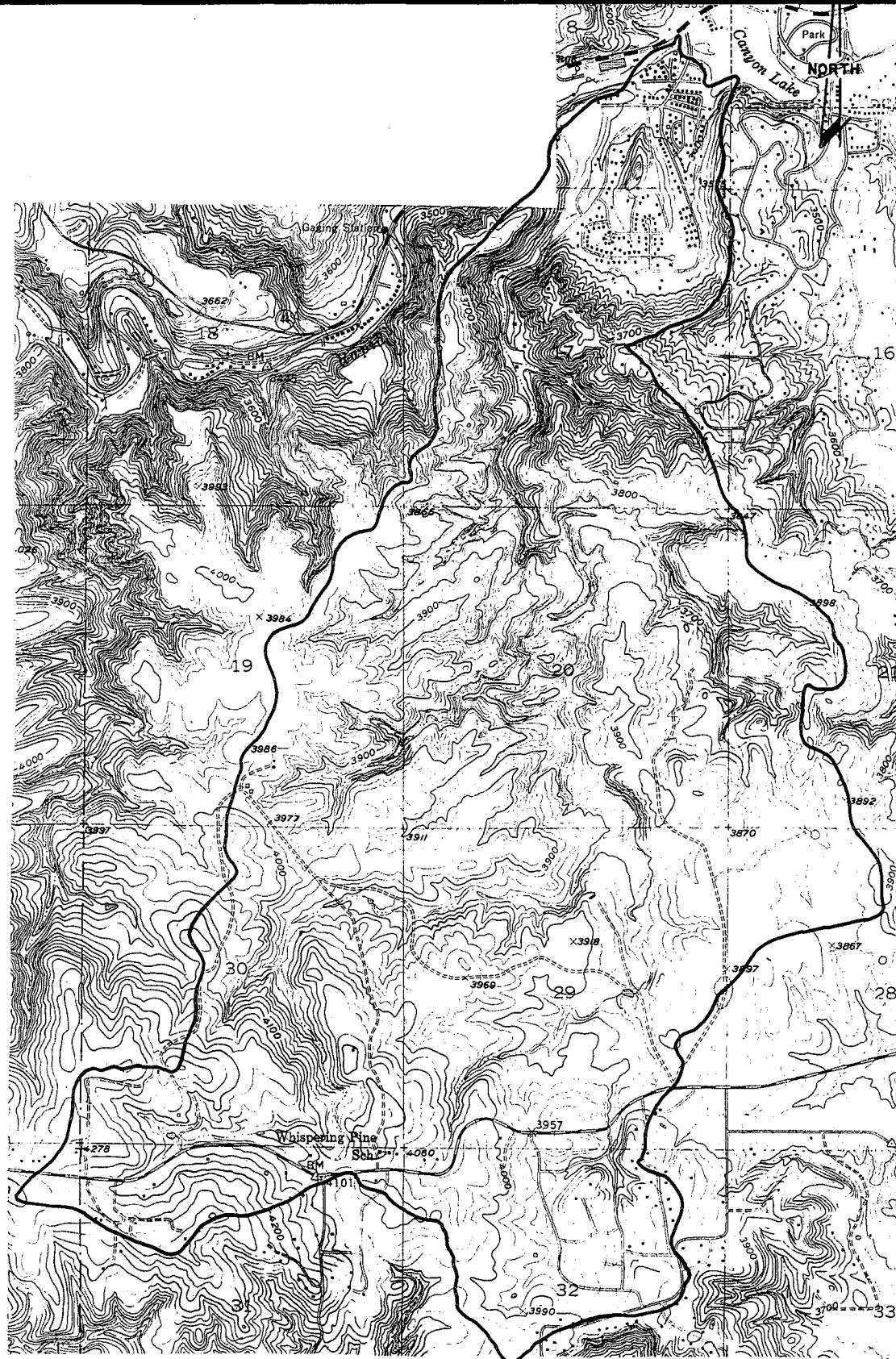
SUB-BASIN INFORMATION

The subdivision of the basin into smaller, homogeneous sub-basins enables the engineer to accurately predict runoff hydrographs. These runoff hydrographs are then routed through the drainage network to the ultimate outlet. This approach provides a more accurate prediction of runoff than calculating the entire basin as one entity.

The Red Rock Canyon Basin was subdivided into fourteen sub-basins as shown on Figure 2. The sub-basin boundaries were determined using topography, man-made barriers, and location of conveyance elements.

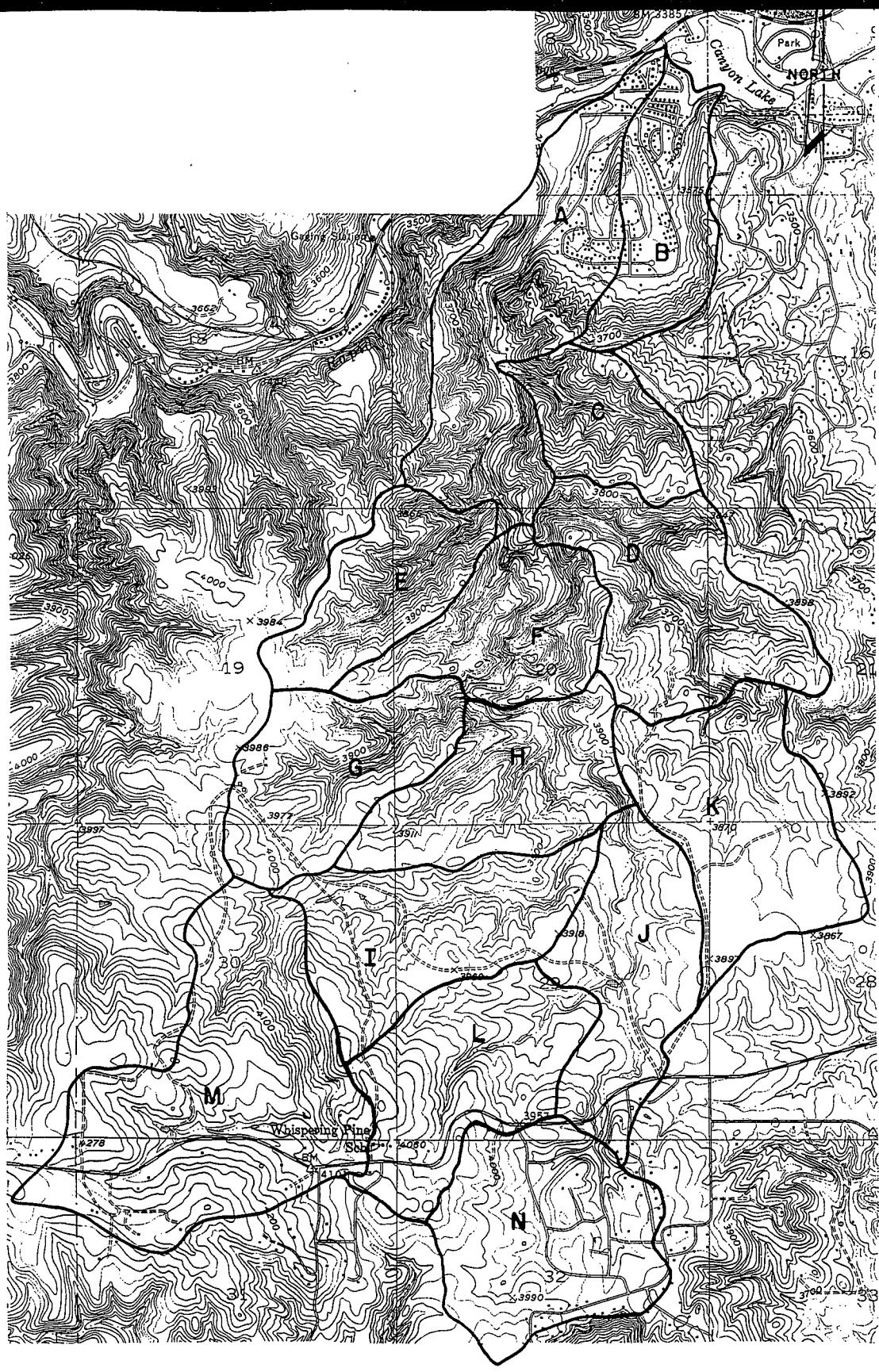
LAND USE AND ZONING

The majority of the land within the Red Rock Canyon Basin is vacant and is used for livestock grazing. The developed land within the basin is residential and agricultural. The Chapel Valley area at the extreme north end of the basin is a typical planned residential development with one-quarter acre lots, paved streets and driveways, and developed



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Figure 1 RED ROCK CANYON DRAINAGE BASIN BOUNDARY MAP



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Figure 2 RED ROCK CANYON SUB-BASIN BOUNDARY MAP

parkways which double as drainage corridors. There are several small recreational type commercial developments at this north end of the basin.

The center part of the basin is largely undeveloped. The area has some potential residential properties along the outer fringes of the basin located on large lots at the tops of the canyons.

The south portion of the basin has experienced development in two phases. The first occurred in the early to middle 1970's following the Rapid City Flood and includes the Whispering Pines Subdivision. The second phase of development began in 1980 and still continues in the Countryside area. However, the majority of the basin is still vacant land which is used for livestock grazing.

In 1990, Renner and Sperlich Engineering Company completed the "Storm Drainage Study and Design Plan for Countryside Subdivision." This plan encompassed the Whispering Pines and Countryside Subdivisions. It identified a system of detention ponds connected by a network of open channels and culverts. In the Red Rock Canyon Drainage Basin Design Plan, these detention ponds were modeled as described in the Renner and Sperlich Plan.

The Red Rock Canyon Drainage Basin lies within the planning and zoning jurisdiction of the Rapid City-Pennington County Planning Department. The majority of the area is not within the scope of any current long range plans. A land use plan for this basin was prepared for this study and reviewed by the City Planning Department. This land use plan is identified as Figure 3.

The land use plan anticipates that the area will develop as residential, with sub-basin densities ranging from two dwelling units per acre and less. This density is comparable to the density of the Countryside Development. This low density development is expected to continue due to the lack of a central wastewater collection and treatment system. In the future, if sewer service is extended to the area some increase in this density might be anticipated.

A significant percentage of this basin consists of steeply sloped canyons and hillsides. It was assumed that development will be restricted to slopes of 4:1 or flatter. All developable areas that are included in the plan are based upon this criteria.

LEGEND

- Residential - Large Lot
- Residential - MDR
- Open Reserve / Park Forest



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Figure 3 RED ROCK CANYON LAND USE MAP

TOPOGRAPHY

The topography of the Red Rock Canyon Basin ranges from the Rapid Creek floodplain on the north to the steep canyons and rolling upland hills on the south. The basin slopes from south to north, with elevations ranging from 3380 to 4300 feet above sea level. The basin drains to Rapid Creek immediately upstream of Canyon Lake Park.

The natural drainage channels in this basin vary from gentle grass lined swales in the upper reaches to steep boulder strewn canyons in the middle to lower reaches. During the construction of the Chapel Valley area channels were constructed which are inadequate to handle the developed flows from the entire basin. The developed channel ends abruptly at Guest Road, where the existing crossing is a 12 inch diameter pipe.

Ground cover in the basin ranges from nearly bare rocky canyons to grass covered hills and dense forest along the west side of the basin at the upper reaches.

STREET CLASSIFICATION

The Rapid City Drainage Criteria Manual allows different levels of inundation and different criteria for traffic access during storms for collector and arterial streets. The Rapid City Major Street Plan was reviewed to determine the applicability of these provisions. Figure 4 includes the major street plan for this area. Within the Red Rock Canyon Basin there is one arterial street, Sheridan Lake Road. There are two collector streets within the basin, Chapel Lane and the extension of Carriage Hills Drive. The only anticipated crossing of these streets by the main channel is the Sheridan Lake Road Crossing.

SOIL CLASSIFICATION

The U.S. Soil Conservation Service classifies soils into one of four hydrological groups, A-D for runoff potential. The Soil Survey of Custer and Pennington Counties was checked and all soils within the basin were classified into one of the four groups. Figure 5 shows the Hydrological Soils Groups for the basin. Group A soils have high infiltration rates and low runoff potential. Conversely, Group D soils have low infiltration rates and high runoff potential.

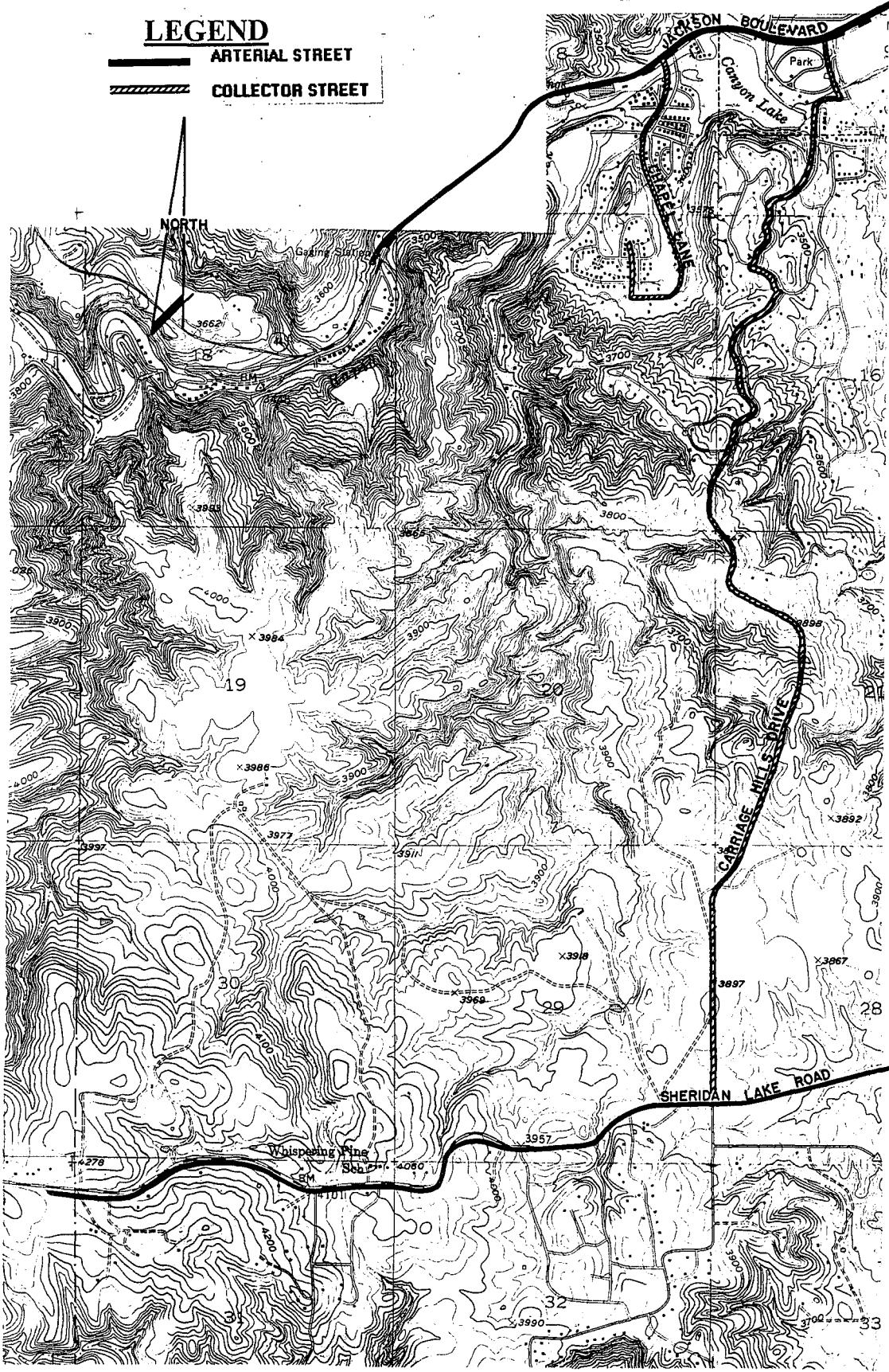


Figure 4 RED ROCK CANYON STREET PLAN

LEGEND

- A Hydrologic Soil Type A
- B Hydrologic Soil Type B
- C Hydrologic Soil Type C
- D Hydrologic Soil Type D



Figure 5 RED ROCK CANYON HYDROLOGIC SOIL CLASSIFICATION

SPECIAL FEATURES AND PROBLEM AREAS

The major drainage channel for the Red Rock Canyon Drainage Basin is a well developed natural channel beginning in the center of Sub-basin N. The channel traverses Sub-basin N to cross Sheridan Lake Road east of Okpealuk Road. The channel then skirts the developed Countryside area on the east, and meanders generally north through the rolling hills of the upper basin. The channel in the central part of the basin traverses through steep rocky canyons until it emerges in the Chapel Valley area. The natural channel transitions into a man made channel in the developed Chapel Valley area which terminates abruptly at Guest Road. Downstream of this point the outlet is blocked by several small structures.

The lack of any outlet for storm flows to reach Rapid Creek except through developed areas has the potential to destroy property and threaten lives.

The most significant problem in the Red Rock Canyon area is this lack of an outlet channel. The existing crossing of Guest Road is a 12 inch culvert. During even minor storm runoff, the flows overtop Guest Road. These flows will make their way back into the road ditch along the west side of Chapel Lane flowing around the Country Store. Above Guest Road, the channel lies along the west side of Red Rock Canyon Road. Immediately upstream of Guest Road the channel narrows to pass between a residence fronting Guest Road and Red Rock Canyon Road. The design of any channel at this location will entail special considerations or the relocation of this residence.

The outlet channel is crossed by three local streets in the Chapel Valley area, including the 12 inch crossing at Guest Road. All of these crossings are undersized. The existing crossing at Copper Hill Drive consists of a double 5' x 6' reinforced concrete box culvert. This culvert has a capacity of approximately 450 cfs without road overtopping. In order to convey the 10 year developed storm through this culvert, 3.5 feet of water would need to pass over the road.

The crossing at Idlewild Court is a 3' x 8' reinforced concrete box culvert. This culvert has a capacity of approximately 144 cfs. To pass the developed 10 year storm at this location, the road would be overtopped to a depth of approximately 3 feet. Both of these crossings will require special designs to pass the design storms in a manner compatible with the Criteria Manual.

Three hundred feet upstream from the Idlewild Court crossing there is a 60 inch CMP which has been placed in the channel and is in the process of being covered with dirt. This culvert does not appear to be anchored in any way. This type of installation of an undersized culvert will probably be washed out in a minor storm to lodge downstream and create further damage.

The County Highway Department maintained Red Rock Canyon Road crosses the channel bottom at two locations in Conveyance Element 141. These crossings consist of a 24 inch CMP with a relatively low road fill over top. These crossings will function as a low water crossing, but may also wash out in a heavy runoff. These two crossings could possibly be eliminated by moving the channel to the west side of the road in this reach. This movement would result in creating one additional driveway crossing of the channel.

In Conveyance Element 142, approximately 1600 feet above Idlewild Court a house is located less than 10 feet from the channel. This location does not allow sufficient room to construct an acceptable trapezoidal channel between the house and the canyon wall.

Upstream from this house approximately 500 feet are two driveways that cross the channel. These driveways serve several homes. The existing driveway crossings consist of 24 inch metal culverts. These culverts are inadequate to handle the 10 year developed flows of 621 cfs. The driveways are built up two to three feet above the culverts. These crossings will negatively affect the channel capacity.

The paved road ends approximately 3100 feet above Idlewild Court. At this point the road continues as a gravel driveway serving fewer than 10 homes. This gravel road meanders in and out of the channel bottom. During large runoff events this road would be inundated. Moving the road out of the channel bottom would be very expensive.

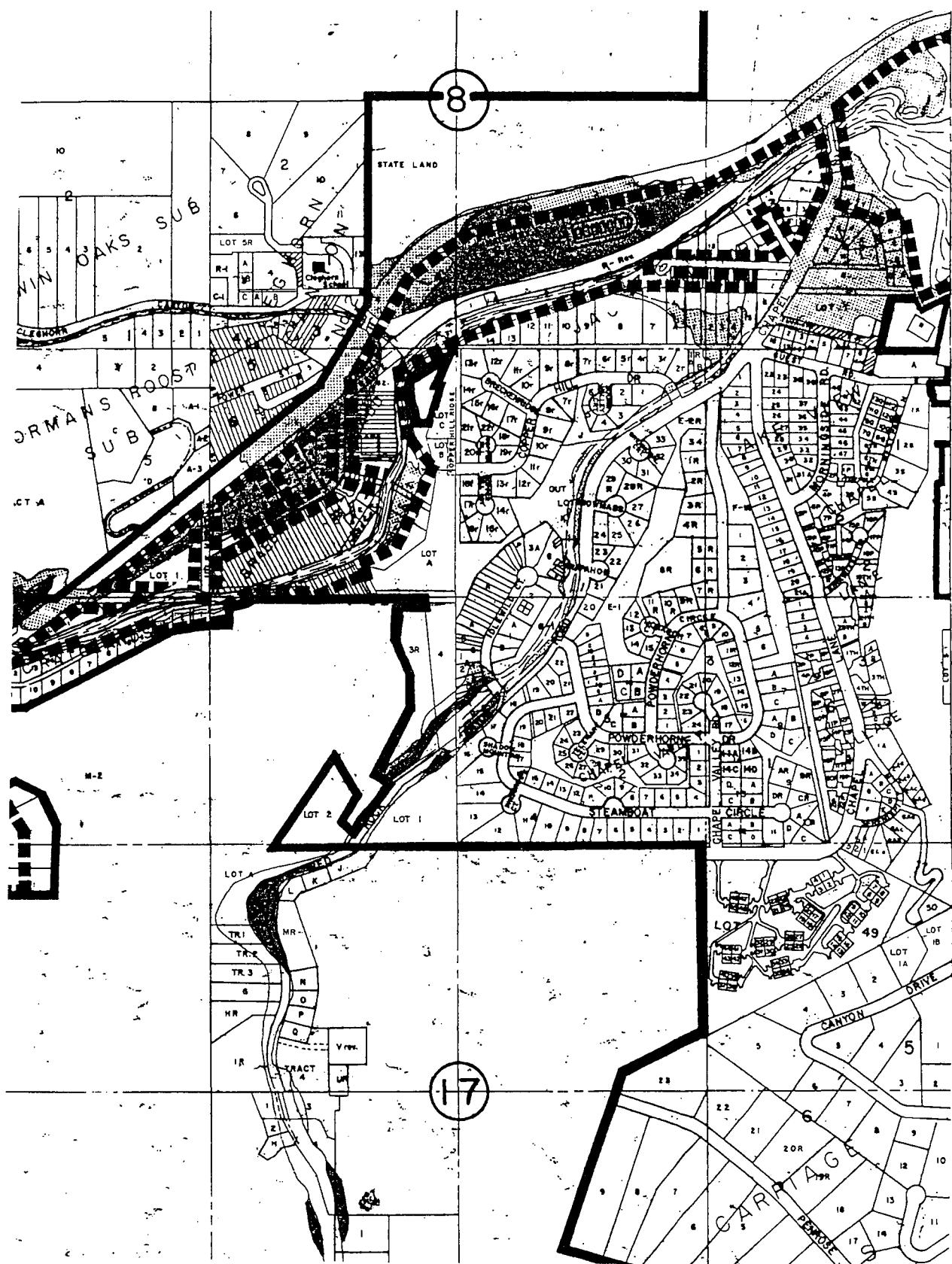
Above this point the natural channel continues to the Countryside area in the south part of the basin. The Countryside Development Drainage Report indicates that the existing stock dam at the northeast end of Sub-basin L would be improved to provide stormwater detention. The improvements to this pond to enable it to function as a detention cell have not been made. Runoff from Sub-basins L and N flows into this pond, and the lack of any outlet structure creates a potentially hazardous situation of this pond filling and overtopping the dam, causing it to breach.

There are drainage problems associated with development in the Chapel Valley area of this basin. The primary drainage from Sub-basin B, the eastern portion of the Chapel Valley area, is a combination of open channel and storm sewer. This open channel is located along the east side of Chapel Valley Road. The capacity of the channel is inadequate to handle the design storm. The numerous culverts which have been installed to provide access to the lots fronting Chapel Valley Road are undersized to handle the initial storm without overtopping the driveways and flowing into the street. Once in the street there is no way for these flows to return to the channel since the curb and gutter was installed.

RAPID CITY FLOOD PLAIN

The Red Rock Canyon Drainage Basin includes areas which have been identified as flood prone in the "Flood Insurance Study for the City of Rapid City" by the Federal Emergency Management Agency (FEMA), as revised September 28, 1990. The study shows that the lower end of the Basin lies in the Rapid Creek flood plain. The flood study also identifies as flood plain an area along the Red Rock Canyon Channel.

A copy of the Red Rock Canyon flood plain is included as Figure 6. The peak discharge from Red Rock Canyon, in the FEMA study, is 180 cfs in the 10 year storm and 1,850 cfs in the 100 year storm. This compares to a peak 100 year discharge in existing conditions as calculated in this study of 2539 cfs. This difference is probably due to different runoff parameters, and is fairly consistent with the results from other drainage basin studies. Upon construction of the facilities recommended in this report, a letter of map revision should be obtained to reflect the flood plain changes which result.



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Figure 6 RAPID CITY FLOOD PLAIN

Design Plan
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DESIGN PLAN

GENERAL

The process of developing the Design Plan includes computer simulation of runoff from each of the Sub-basins, and then routing these sub-basin hydrographs through a network of conveyance elements modeled to reflect either the natural channels, or the design channels selected by the engineer. To accomplish this task, several iterations are required to first determine the magnitude of the flows and then define the conveyance elements which will handle the flows safely, aesthetically, economically, and within the constraints of the Drainage Criteria Manual.

The final step in developing the Design Plan is the inclusion of detention cells. For the Red Rock Canyon Basin, three of the detention cells that are included were first identified in the Countryside Subdivision Drainage Report. That report included cells 102, 103, and 104. These cells were modeled exactly as they were used in the earlier report. Two of these cells could be increased in size somewhat, but investigations indicate that their net impact is limited, and the cost of construction to obtain the additional storage is not warranted.

This analysis also modeled one additional cell (Detention Cell 101) in Sub-basin I which is identified in the final report. The analysis indicated that the net impact of this cell was significant enough to warrant its inclusion.

Additional detention could be effective, but it would have to be at the lower reaches of the basin. The steep, narrow canyons typical of this part of the basin require cells that are small in size, and therefore would be very deep to obtain the necessary volume. These narrow, deep detention cells would require expensive dams to be constructed, thus, their use is not justified.

The existing natural channels that are modeled in this design plan are infinitely variable. For modeling purposes, a cross section was selected that seemed uniformly representative of the existing cross sections.

The proposed new channels do not entirely meet the criteria of the Rapid City Drainage Criteria Manual. Because of the existing slope averages over two percent, and the restricted

right-of-way, the construction costs required to flatten the slopes to less than one percent would be excessive. At one percent, the 10 year storm velocities average approximately 8.8 feet/sec. Channels lined with the native gravels should not experience significant erosion at these velocities. Some erosion may occur at greater magnitude storms. In all cases, the design element velocities are subcritical.

The numbering conventions used in this design plan include:

No.'s 1 - 4	Direct Flow Elements
No.'s 10 - 28	Conveyance Elements
No.'s 101 - 104	Detention Cells
No.'s CV1 - CV7	Chapel Valley Conveyance Elements
No.'s 141 152	Reaches of historic Conveyance 14 & 15

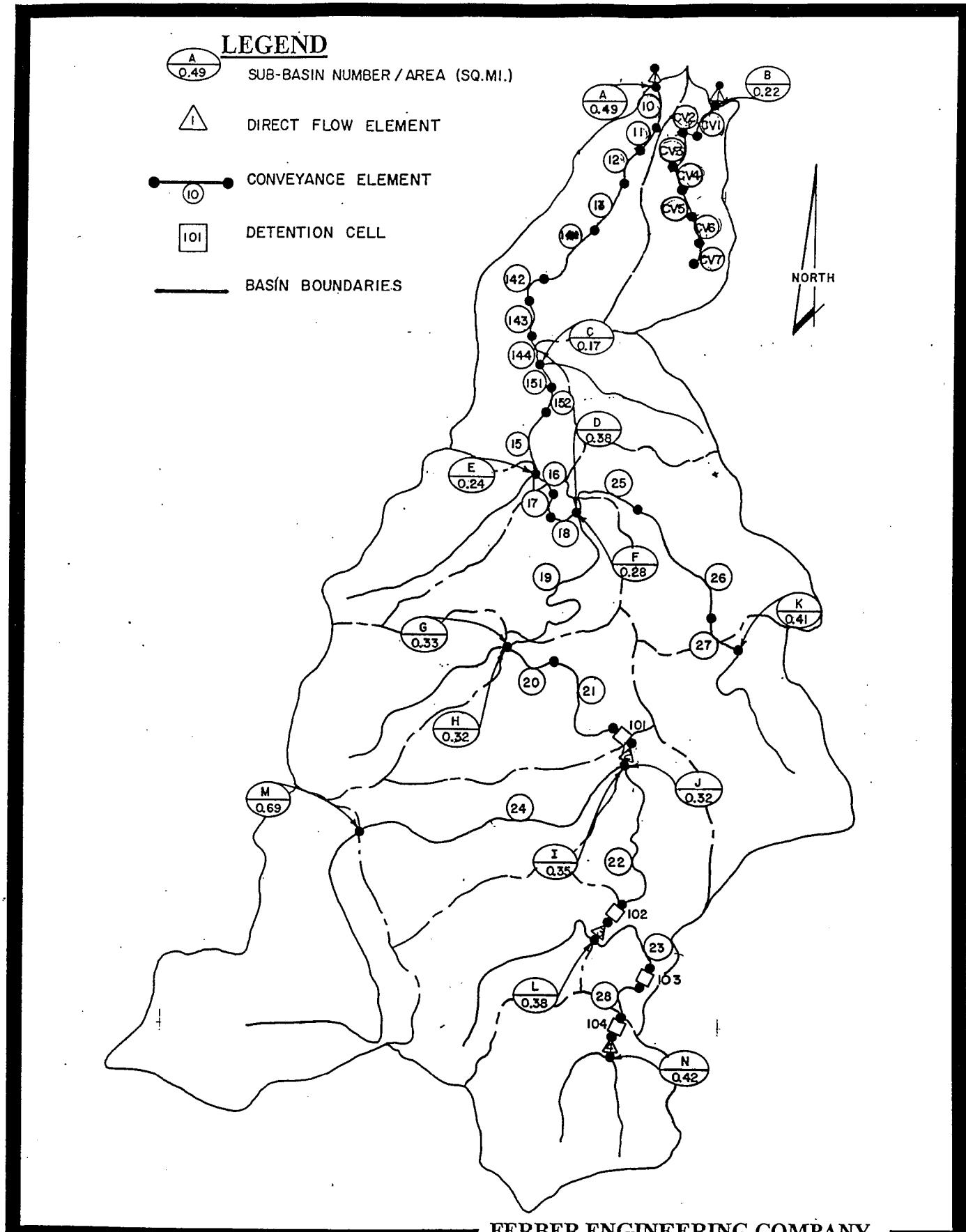
The Design Plan Hydrologic Schematic is included as Figure 7. This schematic indicates all of the Design Plan elements in a graphic manner, and details their relationship to one another. The information from this schematic is also shown on the 1" = 200' orthophotos contained in the back pockets of this document.

This Design Plan concerns itself with only those elements needed to convey the design storm runoff from the sub-basins to the outlet with Rapid Creek. Additional drainage improvements will be required to collect the runoff from individual parcels and development areas, and transport the runoff to the major drainage system.

This design plan model does not include specific crossing information for minor crossings. There is some discussion in the narrative concerning size and design considerations for these crossings.

CONVEYANCE ELEMENT 1

Conveyance Element 1 is a direct flow element which sums all flows into Rapid Creek at the outlet. For modeling purposes, it assumes that flows entering from Conveyance Element 10 merge with flows entering directly from Sub-basin B. Peak 10 year developed flow is 696 cfs and peak 100 year developed flow is 2337 cfs.



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Figure 7 RED ROCK CANYON HYDROLOGIC SCHEMATIC

CONVEYANCE ELEMENT 2

Conveyance Element 2 is a direct flow element that combines flows into Detention Cell 101. This element includes direct sub-basin flows from Sub-basins I, and J, with flows from Conveyance Elements 22 and 24. The peak 10 year developed flow is 385 cfs and the peak 100 year developed flow is 1097 cfs.

CONVEYANCE ELEMENT 3

Conveyance Element 3 is a direct flow element which sums flows entering Detention Cell 102. This element includes direct sub-basin flows from Sub-basin L, as well as flows entering from Conveyance Element 23. The peak 10 year developed flow is 262 cfs and the peak 100 year developed flow is 639 cfs.

CONVEYANCE ELEMENT 4

Conveyance Element 4 is a direct flow element summing flows entering Detention Cell 104. This includes direct sub-basin flows from Sub-basin N. The peak 10 year developed flow is 167 cfs and the peak 100 year developed flow is 427 cfs.

CONVEYANCE ELEMENT 10

Conveyance Element 10 is the primary outlet channel from the Red Rock Canyon Basin. This element begins at Rapid Creek upstream from the Chapel Valley Road bridge, and proceeds 1220 feet across the floodplain to the west side of the existing Country Store. Some structure acquisition and relocation will be required at this location. For this model it was assumed that the store and the adjacent house could be saved and that the house southwest of the store would be removed to make room for the channel. The channel would then curve to become parallel with the road on the west side. Element 10 concludes with the structure crossing of Guest Road.

The 10 year developed design flow for this element is 619 cfs at a depth of 2.1 feet. The 100 year developed design flow is 1984 cfs at a depth of 4 feet. The natural slope for this reach is approximately 2.1%. Some of this excess grade may be taken by the structure at Guest Road, but the remainder will require check structures.

The modeled channel is trapezoidal and will require some type of erosion resistant bottom. The channel was modeled with a bottom width of 40 feet, length of 1220 feet, 4 to 1 left and right sideslopes, 8 foot depth, invert slope of 1 percent and n value of 0.035. Flow depth in the 100 year storm will be 4.0 feet.

The model does not account for the roadway crossing at Guest Road. It is recommended that the 100 year flow be carried with no roadway overtopping since the turbulent flow over the top of the road will be potentially dangerous for motorists and pedestrians. Preliminary sizing of this crossing suggests a double 8' x 12' box culvert with a side tapered inlet and a 3 foot drop will pass the 100 year storm without roadway overtopping.

CONVEYANCE ELEMENT 11

Conveyance Element 11 is a proposed open channel beginning at the upstream end of the Guest Road structure and continuing upstream 520 feet to include the Copper Hill Drive crossing. This channel is located along the west side of Red Rock Canyon Road and adjacent thereto. The 10 year design flow is 619 cfs at a depth of 3.1 feet, and the 100 year design flow is 1985 cfs at a depth of 5.3 feet.

The modeled slope is one percent. The existing channel slope is approximately 2 percent, so check structures will be required to flatten the channel slope as modeled. Other recommended improvements include clearing existing brush and trees and excavating the channel to create a uniform channel section. Flow depth in the 100 year storm will be 4.0 feet.

There is one residence located upstream of the Guest Road crossing which will require extensive reconstruction or relocation. There is insufficient room between the road and the residence to construct any type of acceptable channel.

The Copper Hill Drive crossing has essentially the same requirements as Guest Road. The existing structure is a double 5'x 6' concrete box culvert. The calculated capacity of this existing structure with no road overtopping is 450 cfs, significantly less than the ten year storm. Road overtopping will be approximately 1 foot in the 10 year storm and approximately 4 feet in the 100 year storm. It is recommended that the 100 year flow be carried with no roadway overtopping since the turbulent flow over the top of the raod will be

potentially dangerous for motorists and pedestrians. Preliminary sizing of this crossing suggests a double 8' x 12' box culvert with a side tapered inlet and a 3 foot drop will pass the 100 year storm without roadway overtopping.

The modeled channel is trapezoidal with a 40 foot bottom width, 4:1 sideslopes on both sides, and a depth of 8 feet. The invert slope is one percent, and the length is 520 feet. The modeled n-factor is 0.035.

CONVEYANCE ELEMENT 12

Conveyance Element 12 is a proposed trapezoidal channel along and immediately adjacent to the west side of Red Rock Canyon Road from Copper Hill Drive to Snowmass Court, a distance of 800 feet. The 10 year design flow is 619 cfs at a depth of 4.2 feet, and the 100 year design flow is 1987 cfs at a depth of 7.1 feet.

The modeled slope is one percent. The existing channel slope is approximately 1.2 percent, so check structures will be required to flatten the channel slope as modeled. Other recommended improvements include clearing existing brush and trees and excavating the channel to create a uniform channel section. Flow depth in the 100 year storm will be 3.9 feet.

The modeled channel has an invert slope of one percent. The channel was modeled as having a 40 foot bottom width with 4:1 left and right sideslopes and a length of 800 feet. The depth is 8 feet, with an invert slope of 1 %, and an n-factor of 0.035.

CONVEYANCE ELEMENT 13

Conveyance Element 13 is a proposed trapezoidal channel along and adjacent to the west side of Red Rock Canyon Road from Snowmass Court to Idlewild Court. This element is 1580 feet long. The 10 year design flow is 619 cfs at a depth of 1.7 feet, and the 100 year design flow is 1989 cfs at a depth of 3.5 feet.

The velocity of the existing channel during the 10 year storm is approximately 7.2 ft./sec. During the 100 year storm, the velocity is 10.8 ft./sec. In order to decrease velocities and increase Froude numbers to allowable requirements, additional check structures are required

to decrease the slope from 2% to 1%. In addition to check structures, this element will require clearing of brush and trees and excavation to provide a uniform cross-section. Flow depth in the channel will be approximately 4 feet in the 100 year storm.

This element will include the structure crossing of Idlewild Court. The existing crossing is a 3' x 8' concrete box culvert. The existing roadway elevation cannot be raised because flooding of residences will occur at overflow depths of more than one foot. The calculated capacity of this culvert with no roadway overtopping is 144 cfs. Roadway overtopping depth will be 2.3 feet in the 10 year storm and 3.5 feet in the 100 year storm. To pass the 10 year storm with no overtopping, the culvert would need to be a 8' x 8' box culvert, however, in the 100 year storm, roadway overtopping depth would be approximately 3 feet. It is recommended that the 100 year flow be carried with no roadway overtopping since the turbulent flow over the top of the road will be potentially dangerous for motorists and pedestrians. Preliminary sizing of this crossing suggests a double 8' x 12' box culvert with a side tapered inlet and a 3 foot drop will pass the 100 year storm without roadway overtopping.

The modeled channel is 1580 feet of trapezoidal channel with a 40 foot bottom width, 4:1 left and right sideslopes, and a depth of 6 feet. The invert slope is one percent, and the n-factor is 0.035.

CONVEYANCE ELEMENT 141

Conveyance Element 141 is located along the natural drainage from Idlewild Court to the first residence upstream, a distance of 1510 feet. The 10 year design storm is 620 cfs at a depth of 2.5 feet, and the 100 year storm is 1989 cfs at a depth of 4.8 feet.

This channel reach has two crossings of Red Rock Canyon Road, both are in the area maintained by the Pennington County Highway Dept. These two crossings currently consist of 24 inch corrugated metal culverts in low water crossings. In order to pass the 10 year design storm, these crossings will have to be replaced with culverts capable of passing 620 cfs with no roadway overtopping. This would require an 8' x 8' concrete box culvert.

Three alternatives were evaluated for this element. The first alternative is to do nothing. This area contains no dwellings, and flooding which would occur would be more nuisance

than serious threat. The water will be confined to the natural canyon, and will naturally find the developed channel element 13.

The second alternative investigated would maintain the natural channel but raise the road for approximately 500 feet and replace the existing low water crossings with a box culvert capable of passing the 10 year storm, and passing the 100 year storm with acceptable overtopping.

Alternative number 3 would involve relocating the road and channel to keep the channel along the west side of the road for this entire reach. This alternative would require the reconstruction of the road and the channel for a distance of 400-500 feet. Moving the road would also require one additional driveway crossing the channel.

The cost is the primary reason that alternative number 1 is recommended. This alternative does not increase the risk to any residents, and will not result in any property currently developed being negatively impacted.

Alternative 2 was selected for modeling purposes. This alternative would have the most significant impact on downstream residents. The modeled channel section is 1510 feet long, with an invert slope of .015 ft./ft. The trapezoidal channel has a 32 foot bottom width, with 2:1 left and right sideslopes. The channel depth is 7.5 feet, with a modeled n-factor of 0.056.

CONVEYANCE ELEMENT 142

Conveyance Element 142 is a proposed trapezoidal channel located along the existing channel, beginning at Conveyance Element 141 and continuing upstream for a distance of 500 feet. The 10 year design flow is 621 cfs at a depth of 3.2 feet, and the 100 year design flow is 1995 cfs at a depth of 6.4 feet.

This channel needs to be modified to protect an existing home which encroaches to within 10 feet of the existing channel. The canyon wall opposite this home is nearly vertical which precludes taking additional right-of-way. The existing channel is approximately 8 feet deep at the point of tightest constriction. The intent with this modeled segment is to extend the existing channel upstream beyond the house. The left side of this channel segment would need to be protected against erosion.

The modeled channel is trapezoidal with a length of 500 feet, 20 foot bottom width, an invert slope of .018 ft./ft., and a depth of 9.5 feet. The left side slope is vertical, and the right side slope is 2:1, reflecting existing canyon conditions. The modeled n-factor is 0.056.

CONVEYANCE ELEMENT 143

Conveyance Element 143 begins at Conveyance Element 142, and continues upstream for a distance of 980 feet. The 10 year design flow is 621 cfs at a depth of 2.3 feet, and the 100 year design flow is 1996 cfs at a depth of 4.4 feet.

This channel reach has homes located on both sides of the channel. The homes located west of the channel are accessed by two driveways. The driveways have existing 24 inch corrugated metal culverts, with approximately 2 feet of fill over the top. These driveways are insufficient and the fill creates dams which would seriously impair the channel's ability to contain the runoff. In the 10 year storm, depth of overtopping on the crossing will be approximately 2 feet and in the 100 year storm, depth of overtopping on the crossing will be approximately 4 feet. The 100 year flows will not remain in the existing channel. In this model a channel was used which blends into the residential nature of this area. It is recommended that during final design, the culverts could be used but the cover needs to be lowered to less than one foot over the top, and the channel needs to be shaped to prevent storm water from leaving the channel and to provide a smooth transition over these low flow crossings. It is also recommended that the existing channel be cleared of brush and trees.

The modeled channel is trapezoidal with a 32 foot bottom width, a length of 980 feet, 3.5:1 left and right sideslopes, and a depth of 7 feet. The invert slope is .010 ft./ft., and the n-factor is 0.044.

CONVEYANCE ELEMENT 144

Conveyance Element 144 is a proposed trapezoidal channel that approximates the natural channel with only minor modifications, including clearing trees and brush to improve the water carrying capacity. This channel begins at Conveyance Element 143, and continues upstream for 670 feet. The 10 year design flow is 621 cfs at a depth of 2.8 feet, and the 100 year design flow is 1996 cfs at a depth of 5.5 feet.

At this location the existing channel is 8-10 feet lower than the road or the adjacent houses. The channel right-of-way is too narrow to widen the channel. This is the last modified channel segment before returning to the natural canyons where modifications become unnecessary and extremely expensive.

The modeled channel is trapezoidal with a 20 foot bottom width, 1:1 left and right side slopes, and a depth of 9.5 feet. The invert slope is .017 ft./ft., and the n-factor is 0.044.

CONVEYANCE ELEMENT 151

Conveyance Element 151 begins at the end of the County maintained road and continues upstream for a distance of 600 feet. The 10 year design storm is 611 cfs at a depth of 4.4 feet, and the 100 year design storm is 1925 cfs at a depth of 6.3 feet.

In this reach, the road changes to gravel with signs indicating it is a private driveway serving 6 homes. The road meanders into and out of the channel bottom. At the lower end of this reach, the road is built up along the west side of the channel approximately 3 feet. This elevated roadway causes restriction on the low flow channel elevating runoff depth, and increasing velocity. Other than possibly removing this restriction, no other improvements to this channel reach are recommended. Water depth gauges could be installed to warn motorists of runoff depth should they try to pass during storm runoff.

The modeled channel is triangular with 4:1 side slopes on both sides, and a depth of 3 feet. The invert slope is .017 ft./ft., with an n-factor of 0.056. The overflow channel is modeled as trapezoidal with a 50 foot bottom width, 4:1 side slope on the left, and 1.5:1 side slope on the right. The modeled channel depth is 10 feet, although the actual canyon is 300-400 feet deep.

CONVEYANCE ELEMENT 152

Conveyance Element 152 extends 410 feet from the upper limits of Element 151 to where the last driveway exits the channel bottom. The 10 year design flow is 611 cfs at a depth of 4 feet, and the 100 year design flow is 1924 cfs at a depth of 6.3 feet. No improvements are necessary in this reach.

The modeled channel is trapezoidal with a 5 foot bottom width, 1:1 side slope on the left, and 8:1 sideslope on the right. The channel depth is 2.5 feet, with an invert slope of .017 ft./ft., and an n-factor of 0.050. The overflow channel is modeled as a trapezoidal channel with a 34.5 foot bottom width, 1:1 left side slope, and 2.5:1 right side slope. The modeled overflow channel has a depth of 6 feet.

CONVEYANCE ELEMENT 15

Conveyance Element 15 is a natural channel which extends from Element 152 upstream for a distance of 1410 feet. The 10 year design flow is 611 cfs at a depth of 5.3 feet, and the 100 year design flow is 1922 cfs at a depth of 8.6 feet. No improvements are necessary to this natural channel.

The modeled channel is triangular with 5:1 left and right side slopes, and a depth of 1 foot. The invert slope is .017 ft./ft., and the n-factor is 0.062. The overflow channel is modeled as trapezoidal with an 11 foot bottom width, 2:1 side slope on both sides, and a depth of 12 feet.

CONVEYANCE ELEMENT 16

Conveyance Element 16 is a natural channel beginning at the end of Element 15, and extending upstream for a distance of 880 feet. The 10 year design flow is 584 cfs, and the 100 year design flow is 1797 cfs. No improvements are necessary to this natural channel.

The modeled channel is triangular with 5:1 left and right side slopes, and invert slope of .021 ft./ft., and a depth of 1 foot. The modeled n-factor is 0.062. The modeled overflow channel is trapezoidal with an eleven foot bottom width, 2:1 left and right side slopes, and a depth of 12 feet.

CONVEYANCE ELEMENT 17

Conveyance Element 17 is a natural channel beginning at Element 16, and continuing upstream for a distance of 560 feet. The 10 year design flow is 584 cfs, and the 100 year design flow is 1799 cfs. No improvements are necessary to this natural channel.

The modeled channel is triangular with 5:1 left and right side slopes, a depth of 1 foot, and an invert slope of .018 ft./ft. The modeled n-factor is 0.062. The modeled overflow channel is trapezoidal with an 11 foot bottom width, 2:1 left and right side slopes, and a depth of 12 feet.

CONVEYANCE ELEMENT 18

Conveyance Element 18 is a natural channel beginning at the upper limit of Element 17 and continuing upstream for a distance of 620 feet. The 10 year design flow is 584 cfs, and the 100 year design flow is 1798 cfs. No improvements are necessary to this natural channel.

The modeled channel is triangular with 5:1 left and right side slopes, an invert slope of .019 ft./ft. The depth is 1 foot, and the n-factor is 0.062. The overflow channel is modeled as trapezoidal with an 11 foot bottom width, 2:1 left and right side slopes, and a depth of 12 feet.

CONVEYANCE ELEMENT 19

Conveyance Element 19 is a natural channel beginning at the upper end of Element 18 and extending upstream for a distance of 5420 feet. The 10 year design flow is 422 cfs, and the 100 year design flow is 1057 cfs. No improvements are necessary to this natural channel.

The modeled channel is triangular with 5:1 side slopes, and invert slope of .024 ft./ft., a depth of 1 foot, and an n-factor of 0.062. The modeled overflow channel is trapezoidal with an 11 foot bottom width, 2:1 side slopes, and a depth of 12 feet.

CONVEYANCE ELEMENT 20

Conveyance Element 20 is a natural channel that begins at the upper limit of Element 19, and extending upstream for a distance of 970 feet. The design 10 year storm is 360 cfs, and the 100 year storm is 853 cfs. No improvements are necessary to this natural channel.

The modeled channel is triangular with 5:1 side slopes on both sides, an invert slope of .019 ft./ft., and a depth of 1.0 ft. The modeled n-factor is 0.062. The overflow channel is trapezoidal with an 11 foot bottom width, 2:1 side slopes, and a depth of 12 feet.

CONVEYANCE ELEMENT 21

Conveyance Element 21 is a natural channel that begins at the upper limit of Element 20, and continues upstream for a distance of 3890 feet to Detention Cell 101. The 10 year design flow is 360 cfs, and the 100 year design flow is 853 cfs. No improvements are necessary to this natural channel.

The modeled channel is trapezoidal with an 8 foot bottom width, 1:1 side slopes, an invert slope of .015 ft./ft., and a depth of 2.5 feet. The modeled n-factor is 0.050. The overflow channel is modeled as trapezoidal with a 25 foot bottom width, 1:1 left side slope, 2:1 right side slope, an invert slope of .015 ft./ft., and a depth of 12 feet.

CONVEYANCE ELEMENT 22

Conveyance Element 22 is a natural channel which extends southerly from Detention Cell 101 a distance of 3600 feet to Detention Cell 102. The 10 year design flow for this channel is 148 cfs, and the 100 year design flow is 406 cfs. No improvements are necessary to this natural channel.

The modeled channel is triangular with 2:1 side slope on the left, and 3:1 side slope on the right. The invert slope is .014 ft./ft., the depth is 5 feet, and the n-factor is 0.050. The modeled overflow channel is trapezoidal with a 105 foot bottom width, 1.5:1 left side slope, and 15:1 right side slope, and a depth of 10 feet.

CONVEYANCE ELEMENT 23

Conveyance Element 23 is a natural channel extending south from Detention Cell 102 along the east side of the Countryside Development to Detention Cell 103, a distance of 2080 feet. The 10 year design flow is 144 cfs, and the 100 year design flow is 354 cfs. No improvements are necessary to this natural channel.

The modeled channel is triangular with 8:1 left side slope, and 4:1 right side slope. The invert slope is .018 ft./ft., the depth is 8 feet, and the n-factor is 0.050. The modeled overflow channel is trapezoidal with a 96 foot bottom width, 15:1 left side slope, and 35:1 right side slope, and a depth of 8 feet.

CONVEYANCE ELEMENT 24

Conveyance element 24 is a natural channel which extends west from Detention Cell 101 for a distance of 6340 feet. The 10 year design flow is 110 cfs, and the 100 year design flow is 342 cfs. No improvements are necessary to this natural channel.

The modeled channel is triangular with a left side slope of 5:1, right side slope of 10:1, an invert slope of .022 ft./ft., a depth of 20 feet, and an n-factor of 0.050.

CONVEYANCE ELEMENT 25

Conveyance Element 25 is a natural channel which extends east from the upper reach of Conveyance Element 18 a distance of 3680 feet. The 10 year design flow is 140 cfs, and the 100 year design flow is 407 cfs. There is a waterfall of approximately 15 feet high, located in the middle of this element. No improvements are necessary to this natural channel.

The modeled channel is triangular with a left side slope of 2.5:1, a right side slope of 1.5:1, and an invert slope of .029 ft./ft. The modeled n-factor is 0.062, and the depth is 20 feet.

CONVEYANCE ELEMENT 26

Conveyance Element 26 is an existing natural channel extending from the upper limit of Element 25 a distance of 3680 feet. The design 10 year storm flow is 142 cfs, and the design 100 year storm flow is 410 cfs.

The modeled channel is triangular with 6:1 side slopes on both sides, an invert slope of .024 ft./ft., a depth of 2.5 feet, and an n-factor of 0.062. The modeled overflow channel is trapezoidal with a 30 foot bottom width, 2:1 left side slope, 10:1 right side slope. The modeled depth is 10 feet.

CONVEYANCE ELEMENT 27

Conveyance Element 27 is an existing natural channel extending from the upper end of Element 26 to the limit of Sub-basin K, a distance of 780 feet. The 10 year design storm is 173 cfs, and the 100 year design storm is 464 cfs.

The modeled channel is triangular with 5:1 left and right side slopes. The invert slope is .028 ft./ft., the depth is 3 feet, and the n-factor is 0.062. The overflow channel is modeled as trapezoidal with 30 foot bottom width, 2.5:1 left side slope, 1.5:1 right side slope, and a depth of 10 feet.

CONVEYANCE ELEMENT 28

Conveyance Element 28 is an existing natural channel extending from the east entrance to Countryside Subdivision, Detention Cell 103, to the crossing of Sheridan Lake Road, Detention Cell 104, a distance of 1000 feet. The 10 year design flow is 156 cfs, and the 100 year design flow is 411 cfs.

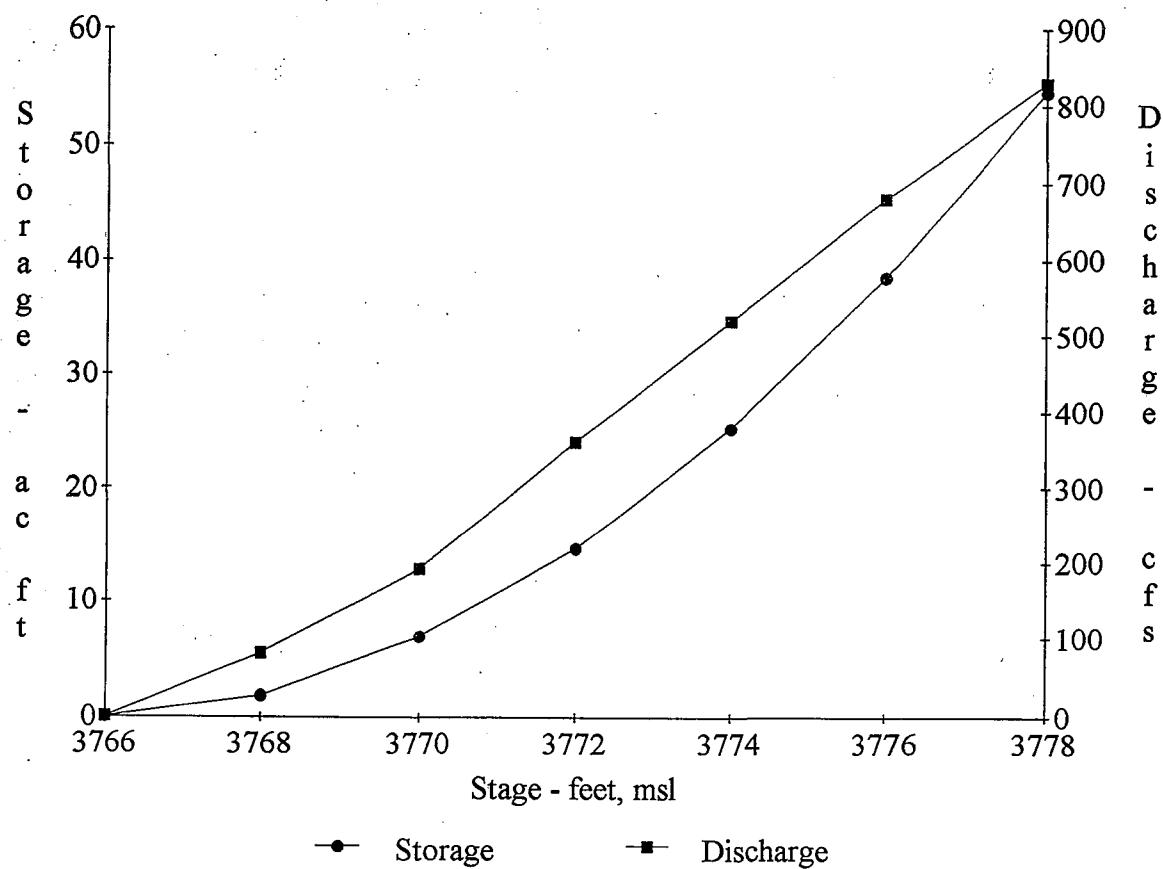
The modeled channel is triangular with 8:1 left side slope, 4:1 right side slope, an invert slope of .018 ft./ft., a depth of 8 feet, and an n-factor of 0.050. The modeled overflow channel is trapezoidal with a left side slope of 15:1, right side slope of 35:1, and a depth of 8 feet.

DETENTION CELL 101

Detention Cell 101 is a proposed 40 acre foot detention cell located at the lower end of Sub-basin J where two forks of the drainage merge. At this location, the canyon walls form a fairly effective dam and below this point storage is difficult to achieve. The invert elevation is 3768, with a top of dam height of 3780. The maximum water surface elevation is 3776. The total area inundated by this structure is approximately 6 acres. The modeling of this structure is based upon its use as a dry detention cell, which will empty itself within 24 hours following the end of the storm. Operating characteristics of the structure are based upon an 8'x 8' box outlet.

Peak 10 year inflow will be 385 cfs and discharge will be 361 cfs. The peak 100 year inflow will be 1097 cfs and discharge will be 855 cfs. This detention cell should be designed and built to include an emergency spillway capable of passing the maximum probable flood.

**DETENTION CELL 101
STAGE / STORAGE / DISCHARGE**



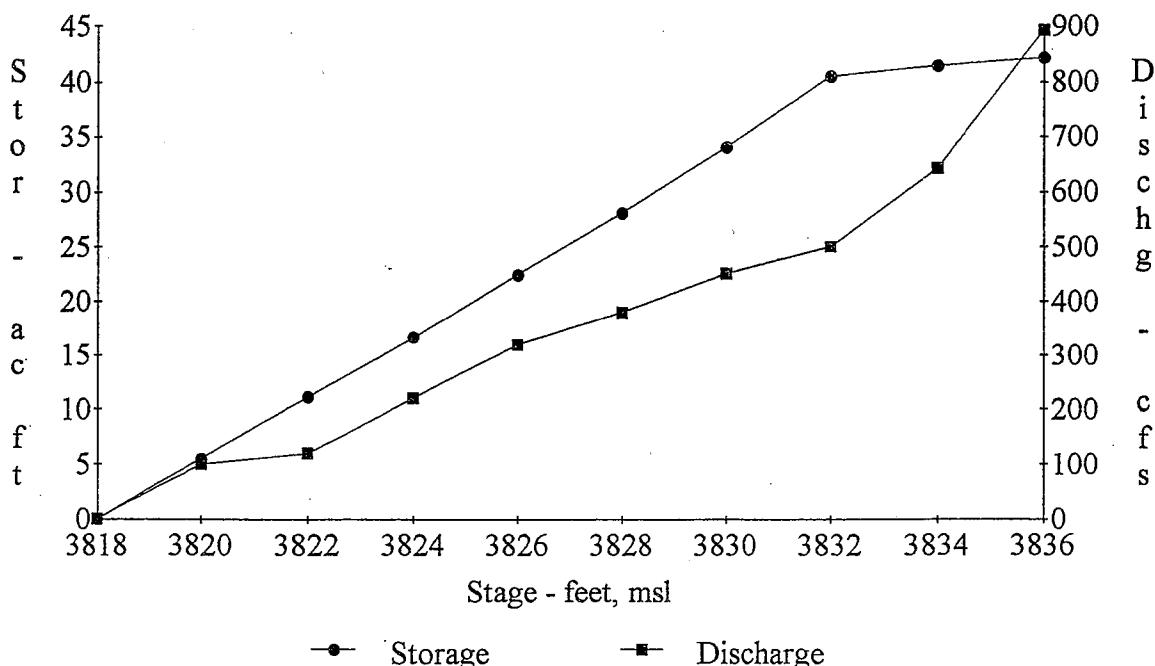
DETENTION CELL 102

Detention Cell 102 is a proposed detention cell to be constructed as part of the Countryside Development. This Detention Cell is identified as CE 28 in the Storm Drainage Study and Design Plan for Countryside Subdivision prepared by Renner & Sperlich Engineering Company, March 1990. This detention cell was also referenced in the Utility Engineering Corp. Storm Drainage System report prepared in 1980.

The area for Cell 102 is currently a stock dam with no controlled outlet. As discussed in the Renner & Sperlich study, the existing stock dam will have to be raised to an elevation of 3834 to provide freeboard, install a 72 inch RCP outlet structure, and the cell expanded to achieve capacity of 41 acre feet. This detention cell should be designed and constructed to include an emergency overflow spillway to prevent overtopping, and possible dam breach. The 1980 Utility Engineering report indicated that this detention cell would be constructed prior to 1984. To date, no improvements have been made.

The model used in this study is duplicated from the earlier Renner and Sperlich study. Peak 10 year inflow will be 262 cfs and discharge will be 150 cfs. The peak 100 year inflow will be 639 cfs and discharge will be 410 cfs.

DETENTION CELL 102 STAGE / STORAGE / DISCHARGE

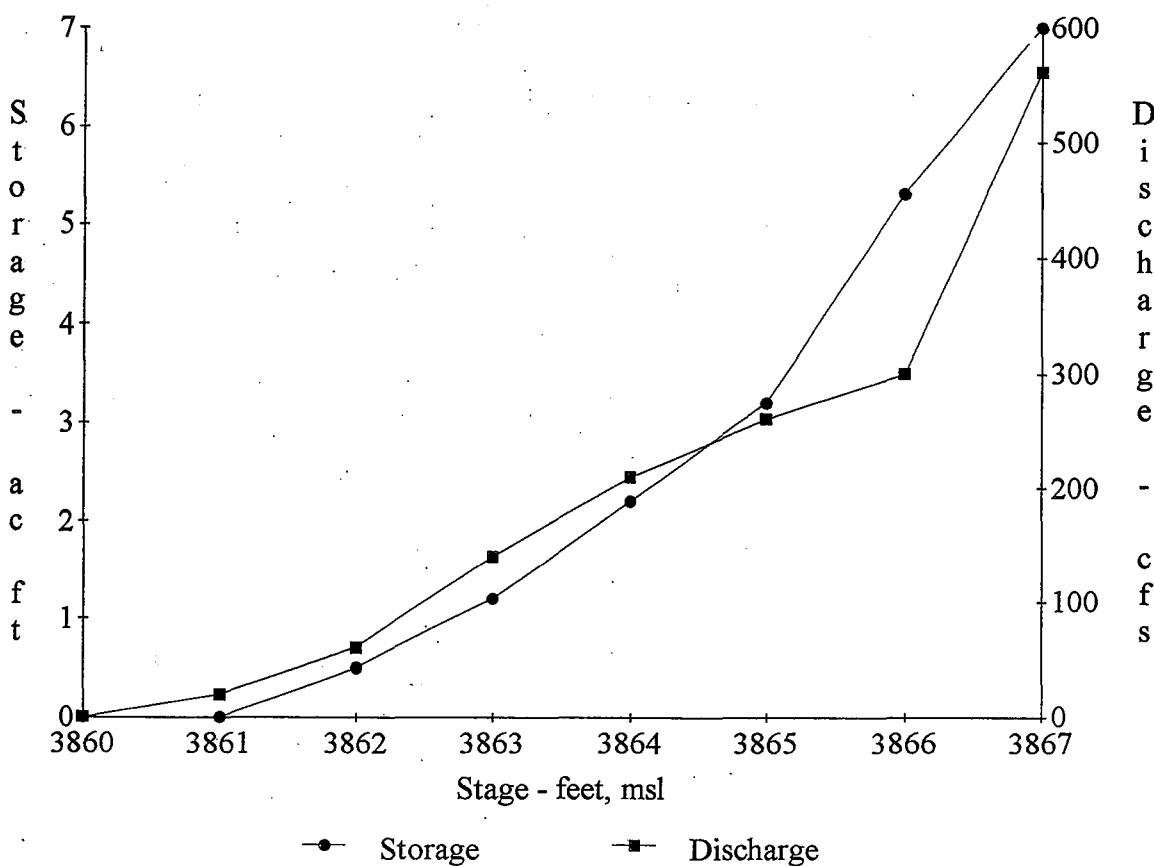


DETENTION CELL 103

Detention Cell 103 is an impoundment created by the east Countryside roadway entrance. The embankment is approximately 9 feet high with a 72 inch concrete culvert. No opening restriction is anticipated. The area in which water will back up is currently drainage channel. This detention cell is modeled directly from information provided in the Renner & Sperlich study with a storage capacity of 5.3 acre feet and peak maximum outflow of 517 cfs. This detention Cell is identified in the earlier study as CE 30.

Peak 10 year inflow will be 156 cfs and discharge will be 147 cfs. The peak 100 year inflow will be 411 cfs and discharge will be 362 cfs.

**DETENTION CELL 103
STAGE / STORAGE / DISCHARGE**

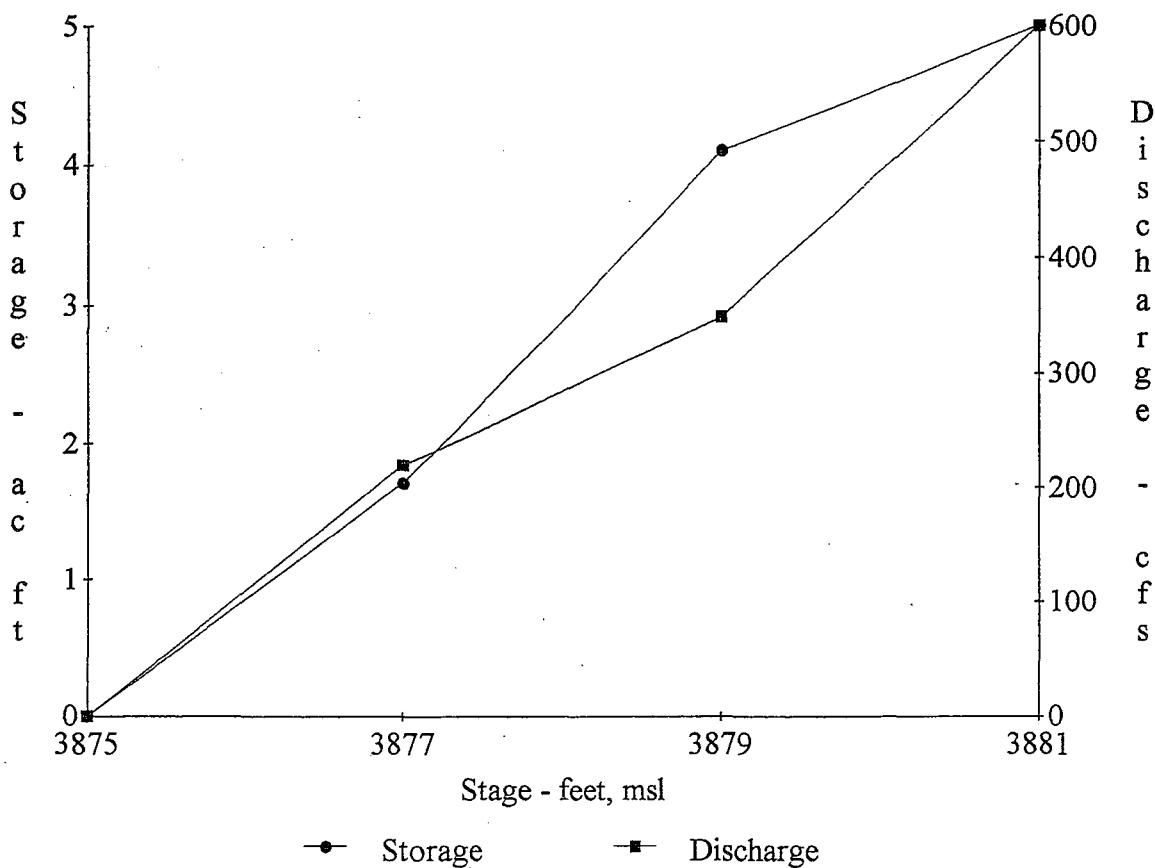


DETENTION CELL 104

Detention Cell 104 is an impoundment created by the existing road culvert at Sheridan Lake Road immediately east of Okpealuk Rd. This road embankment is 10-12 feet higher than the channel invert. The current outlet is a 66 inch concrete pipe across Sheridan Lake Road. The model for Cell 104 is duplicated from the Renner & Sperlich study, CE 31.

Peak 10 year inflow will be 167 cfs and discharge will be 157 cfs. The peak 100 year inflow will be 427 cfs and discharge will be 416 cfs.

DETENTION CELL 104
STAGE / STORAGE / DISCHARGE



CHAPEL VALLEY DRAINAGE

GENERAL

The existing drainage system in the eastern portion of Chapel Valley concentrates all of the runoff into an existing grass lined swale along the east side of Chapel Lane. This channel parallels the road to the intersection with Kirkwood. At this point the channel drains into an existing 36 inch RCP storm sewer which discharges at the southeast corner of Morningside and Chapel Lane.

The channel parallels Morningside for approximately 300 feet until it diverts to West Street. The flow is in Westpark Lane to the intersection with Guest Road, where it discharges into an open channel to Canyon Lake.

The existing drainage network is inadequate to serve the needs of the residents of this area. The outlet channel below Guest Road is 2-3 feet wide and 2-3 feet deep, choked with trees, and contains several encroachments.

The next reach consists of an inverted crown on Westpark Lane for a distance of 350-400 feet. There are a number of houses which front on this street.

From Westpark Lane the channel flows in a greenbelt between houses until it intersects Morningside 300 feet east of Chapel Lane. The calculated capacity of the channel in this reach is 70 cfs. The design flow is 211 cfs.

The capacity of the existing storm sewer along Chapel Lane from Morningside to Kirkwood is approximately 60 cfs. The calculated design flow for this reach is 186 cfs. Even adding in allowable street flows in this reach only brings the total to 150 cfs, short of the design flow of 186 cfs.

Above Kirkwood, the capacity of the existing channel varies from a 600 cfs high, to a low of 190 cfs. Velocities in these channels all exceed allowable. A major problem in this reach is the capacity of the various culverts installed at intersecting roadways and driveways. These culverts vary in size from twin 30 inch concrete pipes, to a single 18 inch corrugated metal

pipe. None of the crossings from the south intersection of Serendipity Lane to Kirkwood meets the required capacity. Flows which are diverted to the street at these crossings, cannot re-enter the channel until the flow depth exceeds the curb height. Either the channel crossings need to be constructed to adequately carry the flows with no overtopping, or the curb and gutter modified to return these flows to the channel.

Due to the problem with culverts and inefficient hydraulics of culvert openings, it is recommended that a storm sewer along the east side of Chapel Lane from Serendipity to Morningside be constructed. The storm sewer could parallel Morningside on the east from Chapel Lane to Guest Road, then parallel Guest Road on the south to Westpark Lane to daylight in an improved outlet channel to Canyon Lake. This proposed channel and storm sewer system is identified in the design plan as Conveyance Elements CV1 to CV7.

CONVEYANCE ELEMENT CV1

Conveyance Element CV1 is a proposed channel beginning at Canyon Lake and proceeding upstream along the route of the existing channel to the intersection of Guest Road and Westpark Lane. The design 10 year flow is 101 cfs at a depth of 1.5 feet, and the 100 year design flow is 258 cfs at a depth of 2.4 feet.

The proposed channel section is a trapezoidal channel with a 6 foot bottom width, 4:1 side slopes, an invert slope of .01 ft./ft., and an n-factor of .027. The depth of flow in this channel will be less than 2.5 feet, with a velocity of 7.0 fps.

CONVEYANCE ELEMENT CV2

Conveyance Element CV2 is a proposed trapezoidal channel, extending along Guest Road from the outlet at the intersection of Westpark Lane to the intersection of Morningside. This element also includes a proposed 60" RCP crossing of Guest Road at this intersection. The 10 year design flow for this element is 90 cfs, and the 100 year design flow is 230 cfs.

Two alternatives were investigated for this section. The first is an open channel along the north side of Guest Road from Westpark Lane to Morningside. The channel configuration consists of a 6 foot bottom, 3:1 left and right sideslopes, 0.01 ft/ft channel slope and 0.03 n value. In the 10 year storm, depth of flow would be 1.6 feet and in the 100 year storm, depth

of flow would be 2.5 feet. This channel would require approximately 25 feet of right-of-way. The houses in this area are set back sufficiently to allow this.

The second alternative is to extend a 60 inch storm sewer along this reach. This alternative would have less impact on adjacent landowners, but is more expensive. Alternative 1 is recommended.

The average velocity in Guest Road crossing will be 11.7 feet per second requiring some type of energy dissipation structure at the outlet.

CONVEYANCE ELEMENT CV3

Conveyance Element CV3 is a proposed trapezoidal channel extending along Morningside from the intersection with Guest Road to the intersection of Chapel Lane. The 10 year design flow for this reach is 90 cfs, and the 100 year design flow is 230 cfs.

We investigated two alternatives for this section. The first is an open channel along the east side of Morningside. The channel configuration consists of a 6 foot bottom, 3:1 left and right sideslopes, 0.01 ft/ft channel slope and 0.03 n value. In the 10 year storm, depth of flow would be 1.6 feet and in the 100 year storm, depth of flow would be 2.5 feet. This channel would require approximately 25 feet of right-of-way, but the houses in this area are set back sufficiently to allow this. Four driveway crossings would also be required.

The second alternative is to extend a 60 inch storm sewer along this entire reach. This alternative would have less impact on adjacent landowners, but is very expensive. Alternative 1 is recommended.

CONVEYANCE ELEMENT CV4

Conveyance Element 4 is a proposed storm sewer along the east side of Chapel Lane from the southeast corner of the intersection with Morningside to the southeast corner of the intersection with Kirkwood. The 10 year design flow is 82 cfs, and the 100 year design flow is 211 cfs.

The curb and gutter street has an allowable street capacity of 28 cfs in the 100 year storm, resulting in a required culvert capacity of 183 cfs. A 54 inch storm sewer should have the required capacity. If the existing 36" RCP is left in place, an additional 48" storm sewer will provide the necessary capacity. It is recommended that the existing 36" RCP be left in place and a parallel 48" RCP be installed. In this reach, a total inlet capacity of 33 cfs will be required. The existing inlets on Chapel Lane will capture a portion of this flow.

CONVEYANCE ELEMENT CV5

Conveyance Element CV5 is a proposed storm sewer along the east side of Chapel Lane from the southeast corner of the intersection with Kirkwood to the junction with the storm sewer crossing Chapel Lane at Sierra Place. The 10 year design storm flow for this element is 74 cfs, and the 100 year design flow is 191 cfs.

The curb and gutter street section has a capacity of 40 cfs resulting in a required storm sewer capacity of 151 cfs. A 48 inch storm sewer should have the required capacity. The required inlet capacity in this reach is 20 cfs. The existing inlets on Chapel Lane will capture a portion of this flow.

The upstream end of this storm sewer reach is where the existing channel crosses Chapel Lane from the west. This crossing is via two existing 30 inch corrugated metal pipes. The capacity of these existing culverts should be sufficient, depending on final design.

CONVEYANCE ELEMENT CV6

Conveyance Element CV6 is a proposed storm sewer along the east side of Chapel Lane from the junction in the center of the intersection with Sierra Place to the southeast corner of the intersection with Serendipity Lane (N). The 10 year design flow is 48 cfs, and the 100 year design flow is 122 cfs.

The existing street capacity in this reach is 31 cfs, leaving a required storm sewer capacity of 91 cfs. A 42 inch culvert should be capable of handling this flow. In this reach, required inlet capacity is 40 cfs. The existing inlets on Chapel Lane will capture a portion of this flow.

CONVEYANCE ELEMENT CV7

Conveyance Element CV7 is a proposed storm sewer along the east side of Chapel Lane from the southeast corner of the intersection with Serendipity Lane (N) to the southeast corner of the intersection with Serendipity Lane (S). The 10 year design flow for this element is 33 cfs, and the 100 year design flow is 84 cfs.

The street capacity in this reach is 52 cfs, resulting in a required storm sewer capacity of 32 cfs. A 24 inch storm sewer should be sufficient. The required inlet capacity for this reach is 0 cfs.

WHISPERING PINES DRAINAGE

Subbasin N includes the Whispering Pines Subdivision. Most of the flow from this Subbasin converges at Okpealuk Street approximately 700 feet south of Sheridan Lake Road. Approximately 125 cfs in the 10 year storm and 320 cfs in the 100 year storm will cross Okpealuk Street at this point. The existing crossing is a Double 18" CMP. One of the pipes is partially blocked. The capacity of these culverts is approximately 15 cfs, leaving overtopping flows of 110 cfs at a depth of 0.7 feet in the 10 year storm and 305 cfs at a depth of 1.4 feet in the 100 year storm. This road overtopping exceeds the allowable street flow requirements of the Rapid City Drainage Criteria Manual. The crossing should be replaced with a double 36" RCP to pass the 10 year flow. Overtopping depth in the 100 year storm will be 1.0 foot.

DESIGN RECOMMENDATIONS AND IMPLEMENTATION

The implementation of the recommendations contained in this report will be spread over a number of years as revenues become available. Some of the improvements will be constructed by developers, such as Detention Cell 102, and the channels within the Countryside Development. Some of the facilities may be constructed as part of other public works projects, including parks, roads, and bicycle trails. Other improvements may not be constructed until flood damage creates an opportunity or need to construct the facilities. With the inability to accurately predict funding sources and secondary developments, it is not possible to prepare a capital spending plan identifying which facilities will be constructed, and the timetable for construction. Instead, the critical design elements should be prioritized in the order of construction.

The first priority for the Red Rock Canyon Basin should be the construction of the outlet channel. This channel carries a potentially dangerous amount of storm water. Construction should begin at Rapid Creek with improvements to Element 10. Element 10 is the outlet channel from Guest Road to Rapid Creek. Two houses and a store are currently in danger of receiving major flood damage and possibly washing downstream and causing other flooding problems in Rapid Creek. It appears the store and the adjacent house could be saved with the construction of the design channel as shown on the orthophotos, but the house southwest of the store would need to be removed. Because of the type of channel section, and the lack of any access, the property should be considered for acquisition. This element also includes the crossing of Guest Road.

The crossing of Guest Road should be built so that roadway overtopping does not occur in the 100 year storm. It is recommended that the 100 year flow be carried with no roadway overtopping since the turbulent flow over the top of the road will be potentially dangerous for motorists and pedestrians. Preliminary sizing of this crossing suggests a double 8' x 12' box culvert with a side tapered inlet and a 3 foot drop will pass the 100 year storm without roadway overtopping. This recommendation exceeds the requirements according to the Rapid City Drainage Criteria Manual, but the potential for loss of life and/or property should be considered. If the City of Rapid City decides to allow roadway overtopping, signs should be placed at the crossing that warn pedestrians and motorists of the potential danger when overtopping occurs.

In conjunction with construction of Element 10, the channel upstream between Guest Road and Copper Hill Drive (Element 11) should also be built. One house in this reach is also in danger of receiving major flood damage. This house and out buildings also may wash downstream and cause other problems. Flow velocities in the existing channel are high enough to be considered damaging and dangerous. We recommend the Copper Hill Drive crossing be designed to carry the 100 year flow with no roadway overtopping since the turbulent flow over the top of the road will be potentially dangerous for motorists and pedestrians. Preliminary sizing of this crossing suggests a double 8' x 12' box culvert with a side tapered inlet and a 3 foot drop will pass the 100 year storm without roadway overtopping.

Elements 12, Copper Hill Drive to Snowmass Court, and 13, Snowmass Court to Idlewild Court should also be constructed. Improvements include flattening of the channel slope through the addition of check structures and clearing of the channel to provide a uniform cross section. In addition to channel improvements, there is also a crossing of Idlewild Court. This crossing cannot be raised any higher than the existing road, or inundation of residences in the area will occur. It is recommended that the 100 year flow be carried with no roadway overtopping since the turbulent flow over the top of the road will be potentially dangerous for motorists and pedestrians. Preliminary sizing of this crossing suggests a double 8' x 12' box culvert with a side tapered inlet and a 3 foot drop will pass the 100 year storm without roadway overtopping.

We recommend minor improvements to Elements 142, 143, 144 and 151. Improvements to these elements include minor regrading to provide smooth transitions over existing crossings and grading, clearing and grubbing to obtain a uniform cross section. There is also some grading required to protect residences adjacent to the channel.

Detention Cells 101 and 102 will have the positive effect of reducing the required size of down stream conveyance elements. The construction of these detention cells should be considered along with the outlet channel as primary facilities. The development of Detention Cell 101 could be undertaken as part of a major recreation facility in this location.

Detention Cell 102 is included as originally identified in the Countryside Subdivision Drainage Report, and the Utility Engineering System report prepared by Utility Engineering Corp in 1980. The earlier report indicated that this facility would be built as part of the

() development plans for Countryside Subdivision. With the amount of Countryside already developed, it may be time to require construction of the facility.

The improvements to the Chapel Lane storm sewer system should be constructed as funds become available. During the interim, minor repairs could be made to allow flows which overtop at the channel crossings to return to the channel on the downstream side of the intersections. Currently, there are several localized drainage problems in the Chapel Valley area. The Chapel Lane system will solve most, but not all problems. The system should be built as a whole because flows in down stream elements are dependant on upstream elements keeping the storm water in the system.

MULTIPLE USE OPPORTUNITIES

The rugged canyons of the area within the Red Rock Canyon Drainage Basin provide some unique recreational opportunities. A hiking / biking trail could be constructed in the canyon linking the urbanizing area of Countryside/Whispering Pines with Canyon Lake and the Rapid City urban bikeway system. Construction of this bikeway could be accomplished in the channel with only minor grading changes. This bikeway would be subject to periodic flooding, and would probably have most appeal to riders who are seeking a back country experience. The steep rocky canyon walls would make construction of a bikeway elevated above flooding levels extremely difficult, and therefore expensive.

Adequate right-of-way, and wide shoulders along Red Rock Canyon Road could be used for the bikeway in the Chapel Valley area. This bikeway would also provide a convenient location for City bikers to have access to Sheridan Lake Road and the opportunities presented there.

Detention Cell 101 would provide a convenient and attractive location for some type of developed park. The u-shape of the proposed cell could be used to wrap around the park. Motorized vehicle access for service could be easily provided from Sheridan Lake Road.

During the study and preparation of this report, we hiked the canyon from Chapel Valley to the vicinity of Detention Cell 101, and were struck by the rugged beauty of the canyon. There are several natural basins in the canyon which hold water. The area could provide an extremely attractive outdoor experience within minutes of the City. We recommend the City consider acquiring title to this canyon, and either preserve it's natural state, or develop it only slightly to improve access.

COST ANALYSIS

COST ESTIMATE

The engineers estimate of probable cost for this design plan is \$1,082,370. This estimate includes the cost of improving the channels in Conveyance Elements 10-152, Detention Cell 101, and the Chapel Valley improvements CV1-CV7. The estimate also includes 5 percent contingencies, and 25 percent engineering legal and construction administration.

The cost of improving detention Cell 102 is not included in this estimate. It is understood that this cell is to be constructed by the developers of Countryside Subdivision as part of their capital investment.

Several alternatives were evaluated for the downstream elements. These alternatives are discussed in the Design Plan, and their cost is included in Figure 8, the Detailed Cost Summary.

The costs included in the cost summary are based on the level of engineering completed for this model. Their accuracy is subject to the accuracy of the model, and the accuracy of the aerial photographs on which the plans are based.

Cost Analysis

FERBER ENGINEERING COMPANY

Figure 8
RED ROCK CANYON DRAINAGE BASIN
DETAILED COST SUMMARY

CONVEYANCE ELEMENT	DESCRIPTION	COST
<u>MAIN CHANNEL</u>		
10	Construct Outlet Channel	\$146,160 (1)
11	Modify Existing Channel	\$122,200 (1)
12	Modify Existing Channel	\$ 51,500
13	Modify Existing Channel	\$ 57,500
141	Alternative 1	No Charge *
	Alternative 2	\$ 80,300
	Alternative 3	\$135,000
142	Construct New Channel	\$ 7,650
143	Modify Existing Channel	\$ 48,000
144	Modify Existing Channel	\$ 6,750
151	Modify Existing Channel	\$ 8,450
152	Natural Channel	No Charge
15	Natural Channel	No Charge
16	Natural Channel	No Charge
17	Natural Channel	No Charge
18	Natural Channel	No Charge
19	Natural Channel	No Charge
20	Natural Channel	No Charge
21	Natural Channel	No Charge
22	Natural Channel	No Charge
23	Natural Channel	No Charge
24	Natural Channel	No Charge
25	Natural Channel	No Charge
26	Natural Channel	No Charge
27	Natural Channel	No Charge
28	Natural Channel	No Charge
101	Construct Detention Cell	\$162,500
102	Existing Detention Cell	No Charge
103	Existing Detention Cell	No Charge
104	Existing Detention Cell	<u>No Charge</u>
Main Channel		\$610,710
	5% Contingencies	\$ 30,535
Total		\$641,245

CHAPEL VALLEY DRAINAGE

CV1	Construct New Outlet Channel	\$ 5,000
CV2	Construct New Channel & Structure	\$ 13,300
CV3	Construct New Channel	\$ 27,650
CV4	Construct 48" Storm Sewer	\$ 52,500
CV5	Construct 48" Storm Sewer	\$ 57,500
CV6	Construct 42" Storm Sewer	\$ 41,500
CV7	Construct 24" Storm Sewer	<u>\$ 16,500</u>
Chapel Valley		\$213,950
	5% Contingencies	\$ 10,700
Total		\$224,650
Main Channel and Chapel Valley		\$865,895
25% Engineering, Legal and Administration		\$216,475
Total Project		\$1,082,370

(1) Includes Structure Acquisition.

Hydrology

FERBER ENGINEERING COMPANY

HYDROLOGY

METHODOLOGY

Accurately predicting runoff in any basin requires several important steps. First, the contributing area needs to be identified. To enable the engineer to complete this step, the City requires mapping the area with 1"=200' aerial orthophoto base sheets.

The engineer then uses his judgment to divide the basin into smaller, more homogeneous sub basins. Runoff parameters are then determined for these sub-basins. This information is input into the Colorado Urban Hydrograph Procedure (CUHPEPC) computer program, and the results are the Sub-basin Runoff Hydrographs contained in Appendix A. The hydrographs included in the report are only for fully developed basin conditions. Runoff hydrographs were also calculated for the existing sub-basin conditions. The CUHPEPC computer print-outs for existing and fully developed, 10 and 100 year runoff are included in Appendix B. A summary of sub-basin runoff totals for existing and developed conditions is contained in Figure 9.

Figure 9
RED ROCK CANYON DRAINAGE BASIN
SUB-BASIN RUNOFF TOTALS

SUB-BASIN	EXISTING CONDITIONS		DEVELOPED CONDITIONS	
	10 YEAR	100 YEAR	10 YEAR	100 YEAR
A	58	258	63	268
B	123	315	123	315
C	18	122	21	125
D	64	275	78	290
E	36	142	40	146
F	38	172	41	175
G	97	314	112	328
H	69	250	82	261
I	95	265	117	293
J	94	283	208	482
K	94	336	176	464
L	148	380	152	389
M	103	349	126	381
N	154	408	167	427

MODELING PARAMETERS

The hydrologic study of the Red Rock Canyon Basin included the 10 year initial storm, and the 100 year major storm. Rainfall inputs included an intensity of 1.86 inches per hour for the initial storm, and 2.95 inches per hour for the major storm. These intensities were established by the Rapid City Drainage Criteria Manual.

Runoff characteristic parameters for each of the fourteen sub-basins included area, length, distance to the area centroid, slope, basin imperviousness, soil type, and developed area. A five minute unit duration was used for all hydrologic modeling. Figure 10 is a complete listing of sub-basin input parameters for all sub-basins.

**Figure 10
RED ROCK CANYON DRAINAGE BASIN
DEVELOPED SUB-BASIN INPUT PARAMETERS**

SUB-BASIN	AREA (SQ MI)	LENGTH (MI)	L _{CA} (MI)	IMP AREA (PCT)	SLOPE (FT/FT)
A	0.49	1.61	1.15	11.4	.030
B	0.22	1.14	0.46	25.7	.040
C	0.17	0.88	0.44	6.7	.056
D	0.38	1.30	0.66	8.5	.047
E	0.24	4.52	0.89	6.0	.048
F	0.28	1.31	0.62	4.5	.032
G	0.33	1.03	0.57	9.1	.052
H	0.32	1.25	0.29	8.8	.040
I	0.35	1.34	0.79	12.9	.029
J	0.32	0.94	0.54	28.0	.023
K	0.41	1.13	0.57	19.6	.027
L	0.38	1.28	0.61	13.6	.041
M	0.69	1.95	1.35	11.1	.018
N	0.42	1.14	0.49	11.2	.026

Hydraulics
FERBER ENGINEERING COMPANY

HYDRAULICS

METHODOLOGY

The hydraulic modeling of the conveyance elements used in this report was completed using the UDSWM2-PC computer program. Following the definition of the sub-basin runoff hydrographs, these flows are routed through a series of conveyance elements to determine peak flows at any point along the drainage network. For this project, the existing channel conditions were determined from the aerial photos and field observation. SWMM runs were completed for the developed drainage with and without detention, and the optimum network was selected. This optimum network is identified as the Basin Design Plan.

This program uses some hydraulic characteristics of the individual conveyance elements to create time delayed routing of the flows through the conveyance model. Users of this report should be cautioned that while flow depths are calculated for each conveyance element, these are based upon simplified hydraulic properties and should be investigated further prior to beginning final design.

MODELING PARAMETERS

The input parameters used in this report to represent the hydraulic characteristics of the element were primarily obtained from the Rapid City Drainage Criteria Manual. In certain instances, parameters were used which more closely model the actual hydraulic characteristics of the element. These parameters were obtained from the Handbook of Hydraulics, by Brater and King.

Input parameters for the conveyance elements include size and shape of the channels, longitudinal slope, length, and roughness coefficient. Roughness coefficients were increased by 25% as per the UDSWM2-PC users manual. The majority of these input parameters define the shape of the element cross-section and the length and slope. The roughness coefficients for the proposed improved channels reflect the smooth shape and surface regularity typical of man made channels. The coefficients used are .035 indicating fairly rough gravel lining.

The roughness coefficients selected for the unimproved natural channels reflect the vegetation existing, and the irregular channel sides and bottoms. These coefficients vary from .040 reflecting irregular grass channels with some gravel and cobbles, to .055 reflecting irregular rocky bottoms strewn with cobbles and boulders.

Additional calculations were performed on the improved open channel elements to determine flow depth and velocity using Mannings equation. All improved open channel segments were selected to provide freeboard equal to 1 foot plus $V^2/2G$. In addition, all proposed open channels were designed to maintain laminar flow, and represent Froude numbers of less than .95.

Hydrographs for each of the conveyance elements modeled in this report are included in Appendix A. These hydrographs are indicative of not only the peak flows in each element, but also the length of time flows will remain.

During the modeling of this basin in the fully developed conditions several combinations of detention were evaluated. During this analysis it became apparent that additional detention upstream was counter productive. The peak flows in the developed channels (Conveyance Elements 10-144) were almost entirely caused by runoff entering the model below Conveyance Element 21. However, Detention Cell 101 did reduce the peak outflow from the upper end of the basin from 1040 cfs to 827 cfs. Additional detention above this location was only serving to extend the period of total runoff.

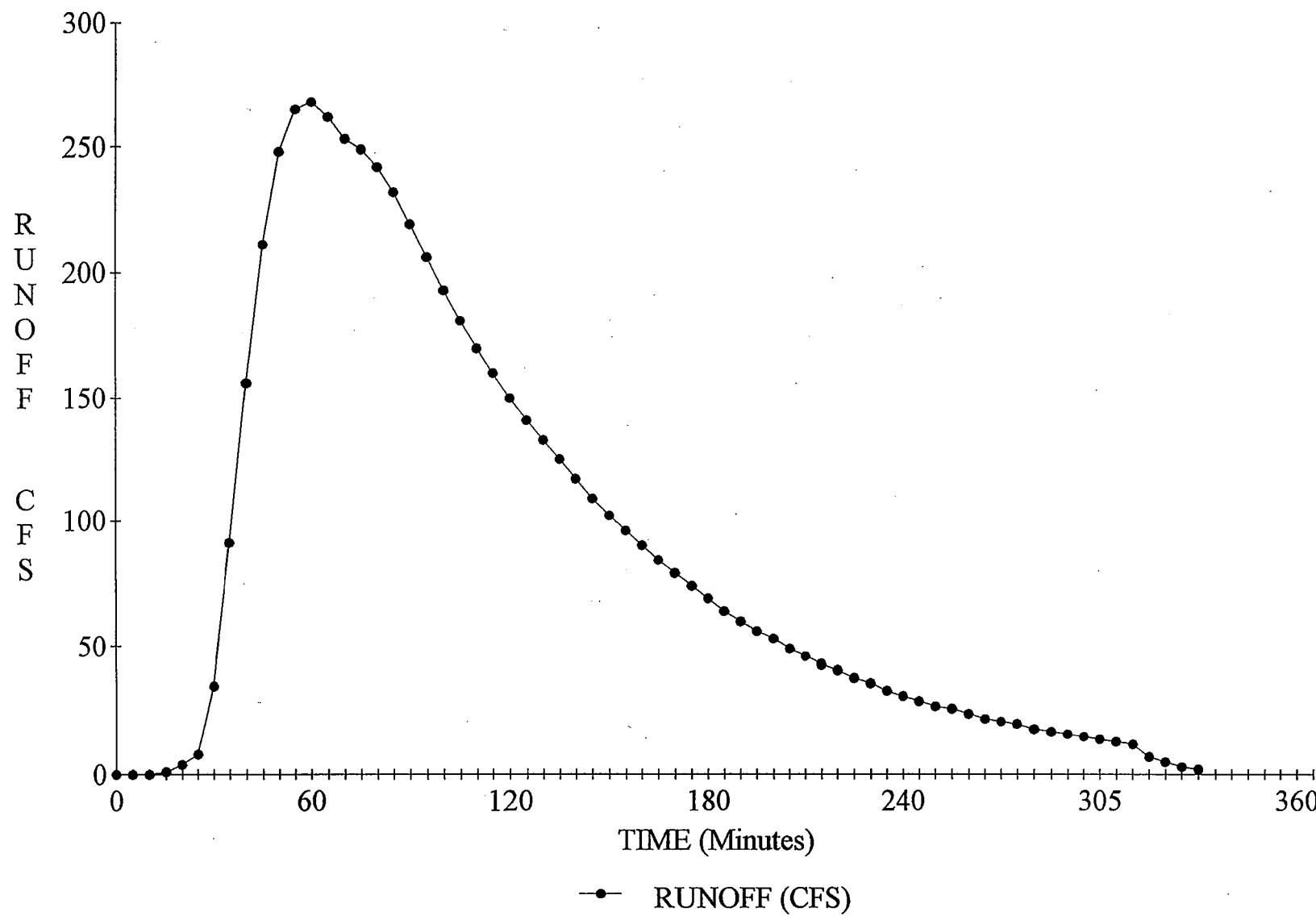
DESIGN PLAN HYDROGRAPHS

This appendix contains hydrographs for all elements used in the study. The hydrographs are in numerical order with the exception of direct flow elements. Sub-basins runoff hydrographs are included.

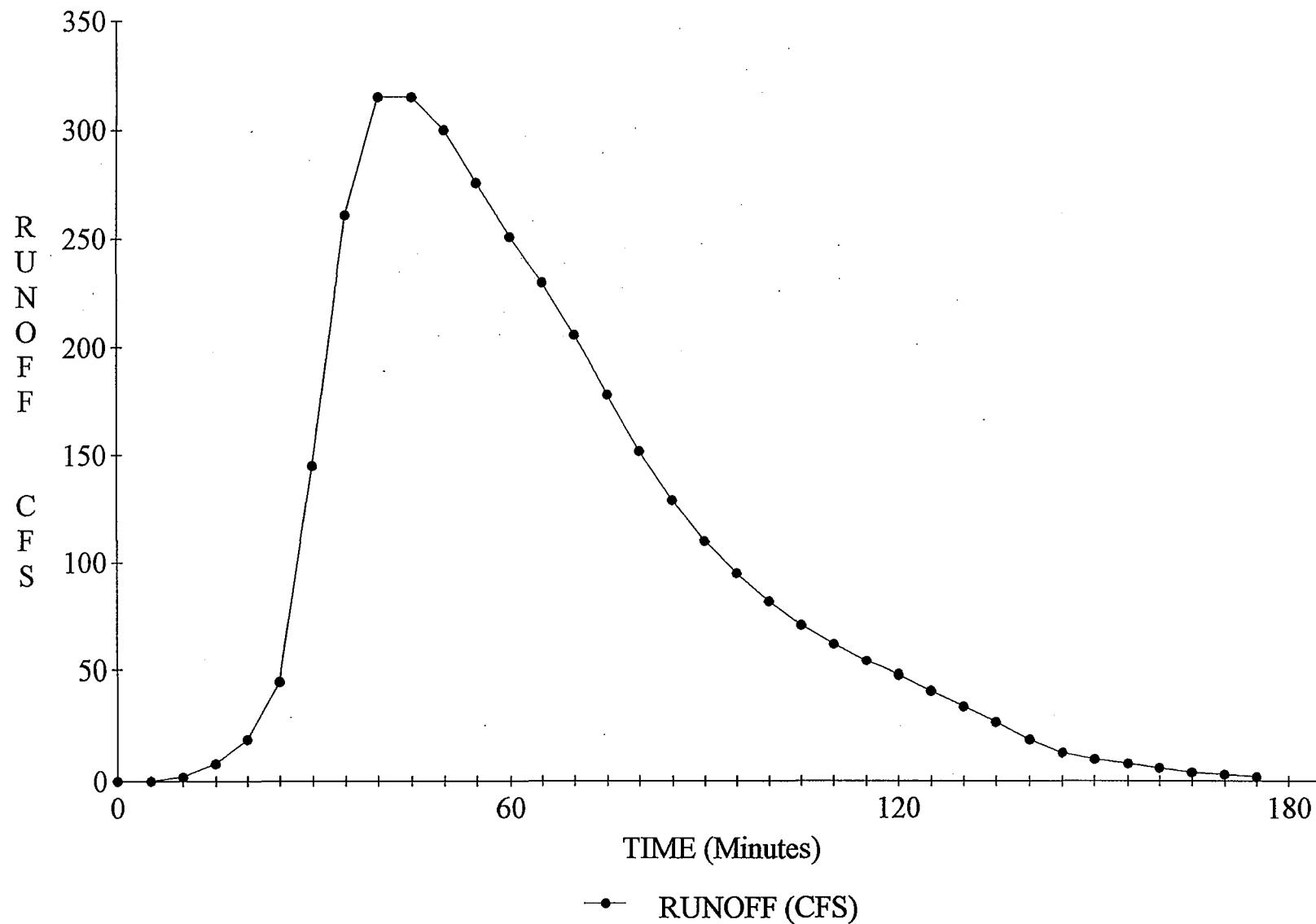
CAUTION STATEMENT

The user is advised to use caution when using open channel peak flows and hydrographs given in this report. The UDSWM2-PC model sometimes assumes that all adjacent sub-basin flow enters the open channel element at the sub-basin design point or the downstream end of the element. The open channel element is simply routing the upstream incoming flow and ignoring the possibility that additional flow may be entering from the adjacent sub-basin. Due to this model limitation, flow used for channel design may need to be increased appropriately using engineering judgement to reflect any incoming sub-basin flows.

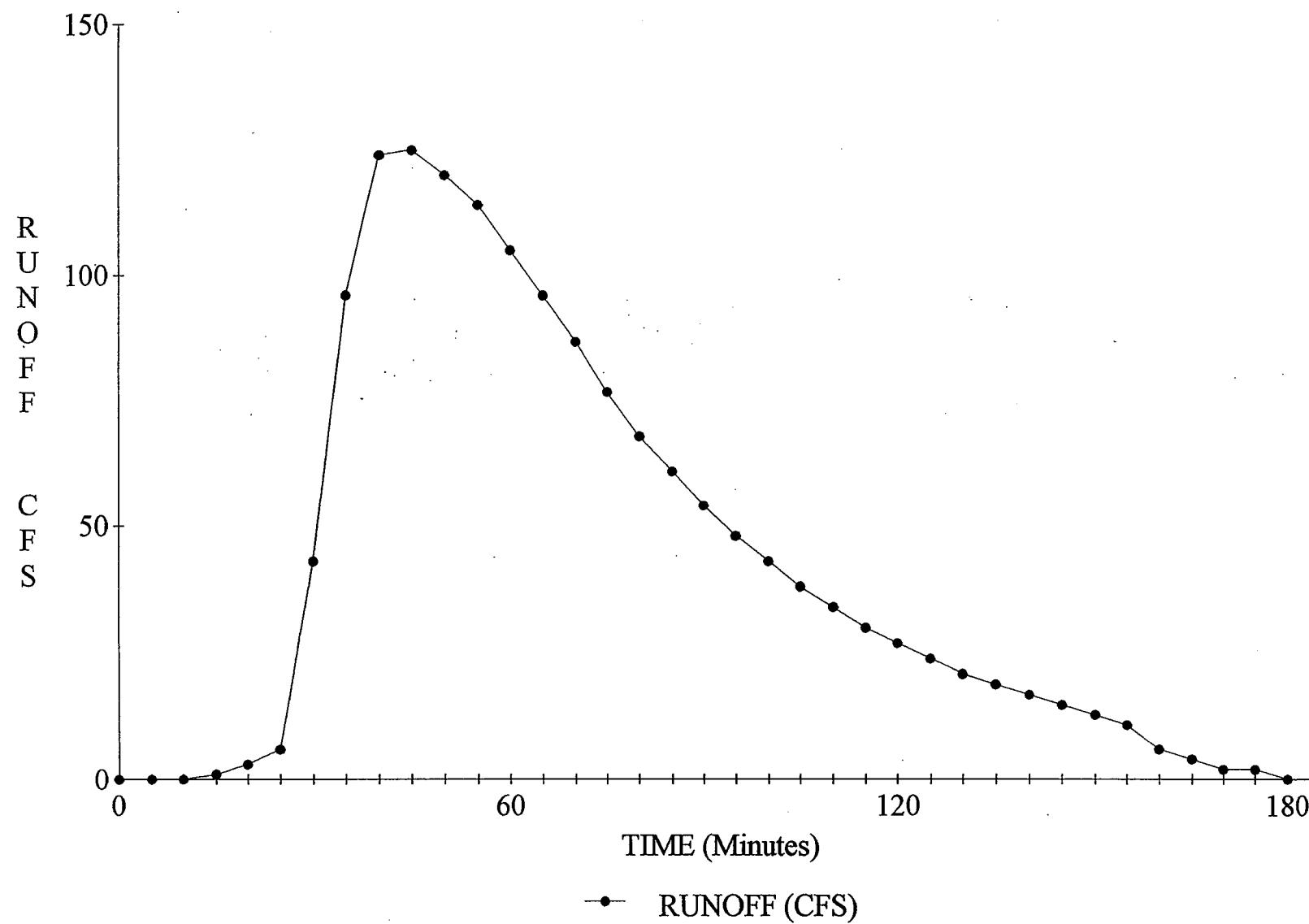
RUNOFF HYDROGRAPH - SUBBASIN A
100 YEAR DEVELOPED



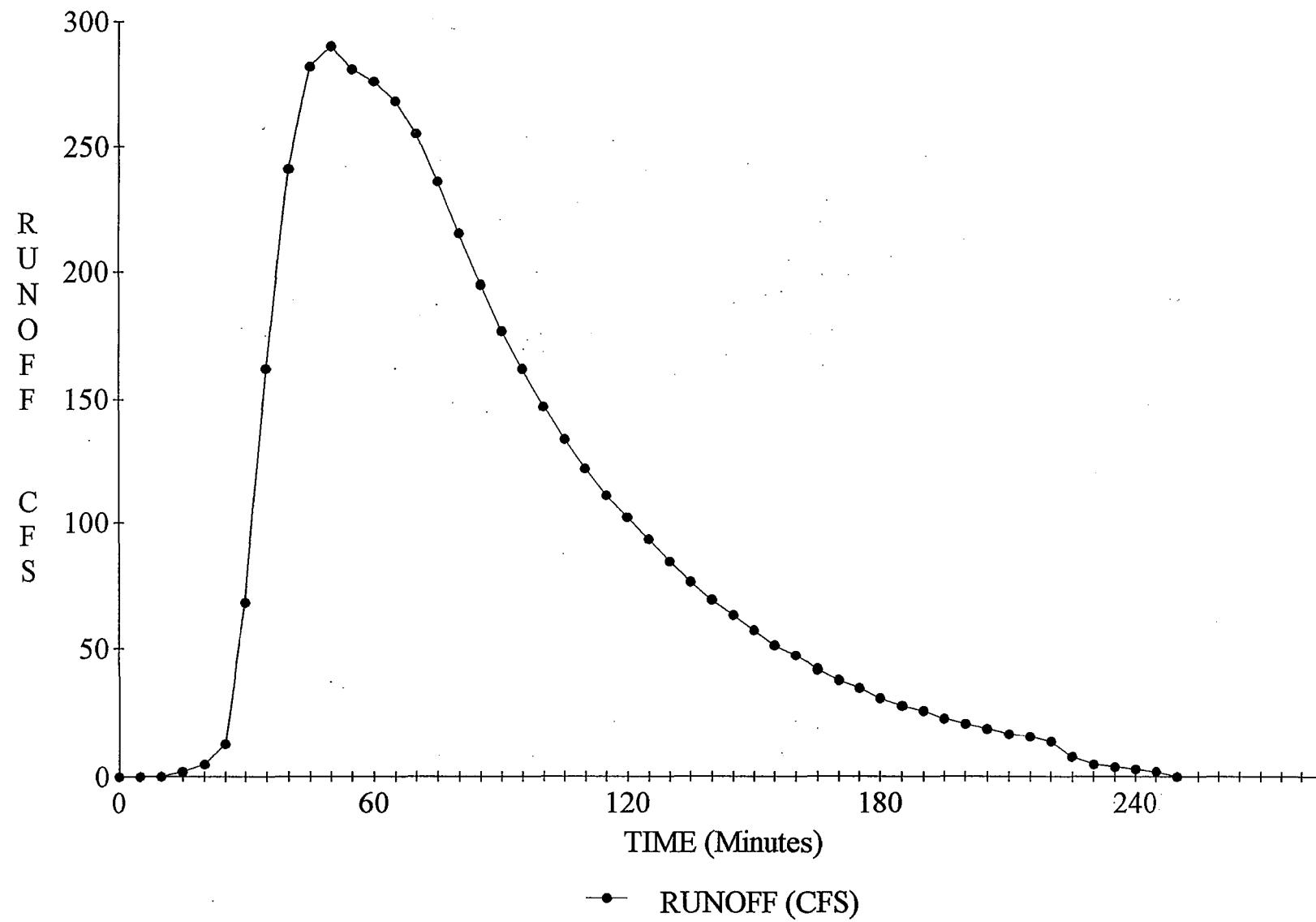
RUNOFF HYDROGRAPH - SUBBASIN B
100 YEAR DEVELOPED



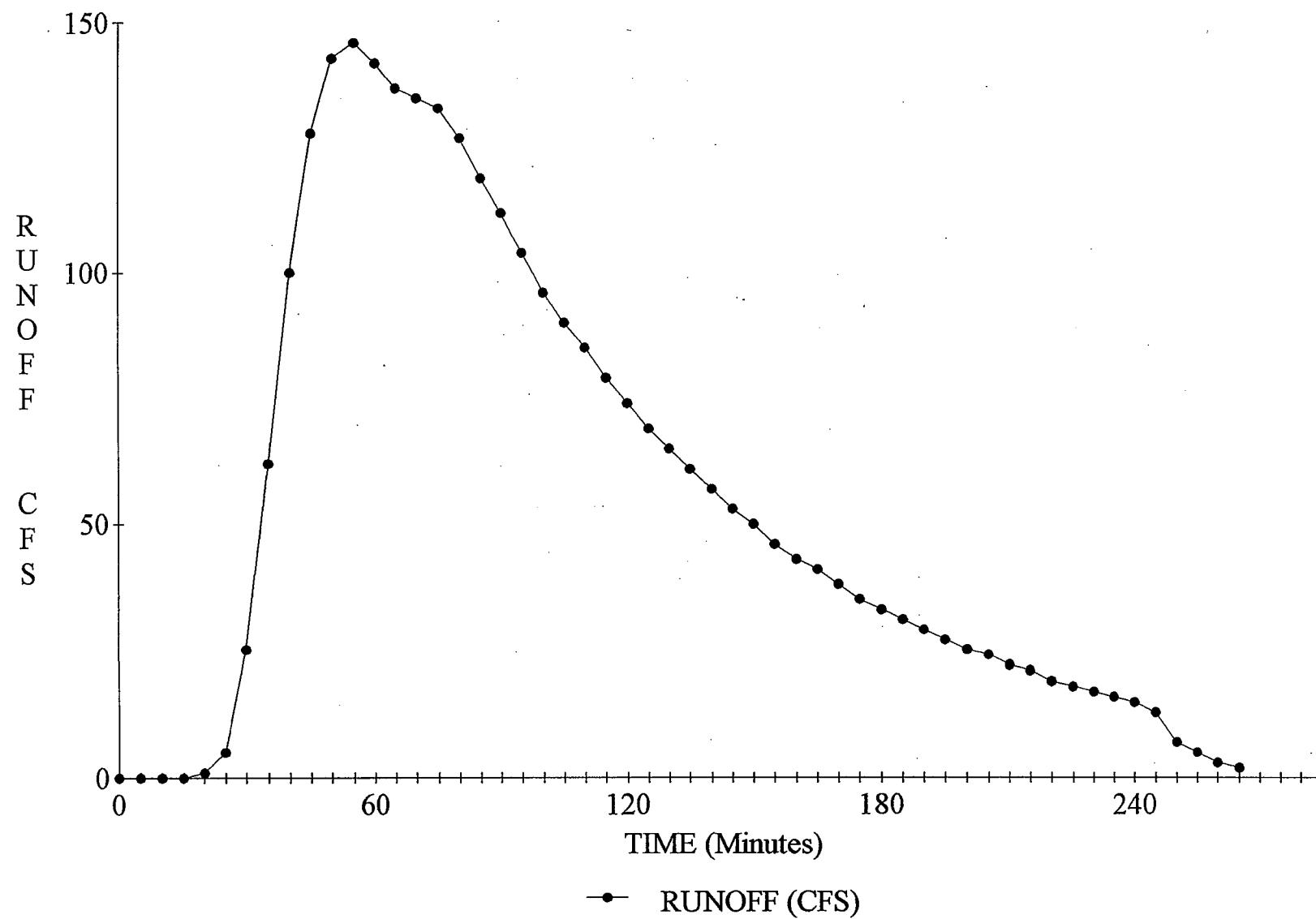
RUNOFF HYDROGRAPH - SUBBASIN C
100 YEAR DEVELOPED



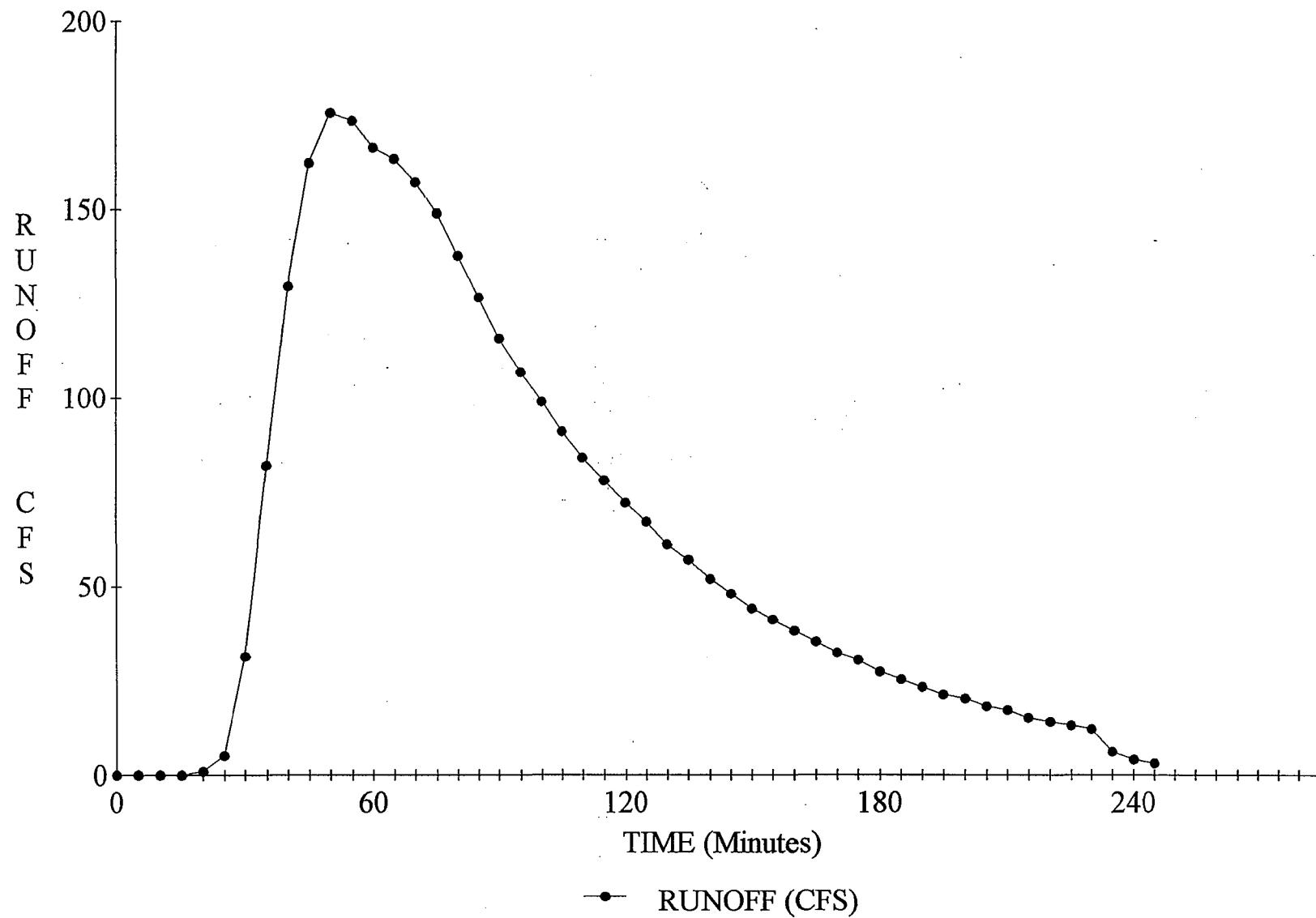
RUNOFF HYDROGRAPH - SUBBASIN D
100 YEAR DEVELOPED



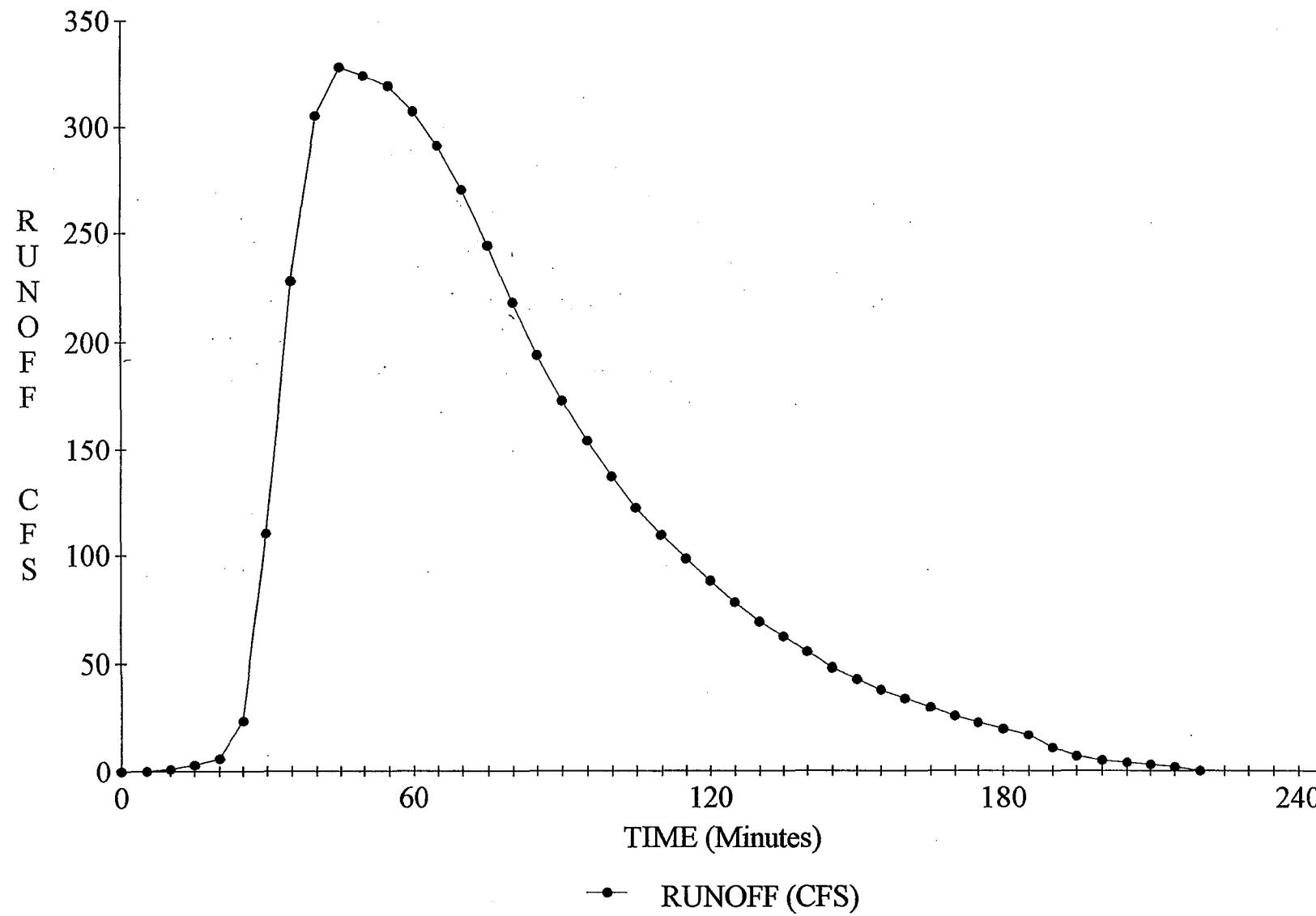
RUNOFF HYDROGRAPH - SUBBASIN E
100 YEAR DEVELOPED



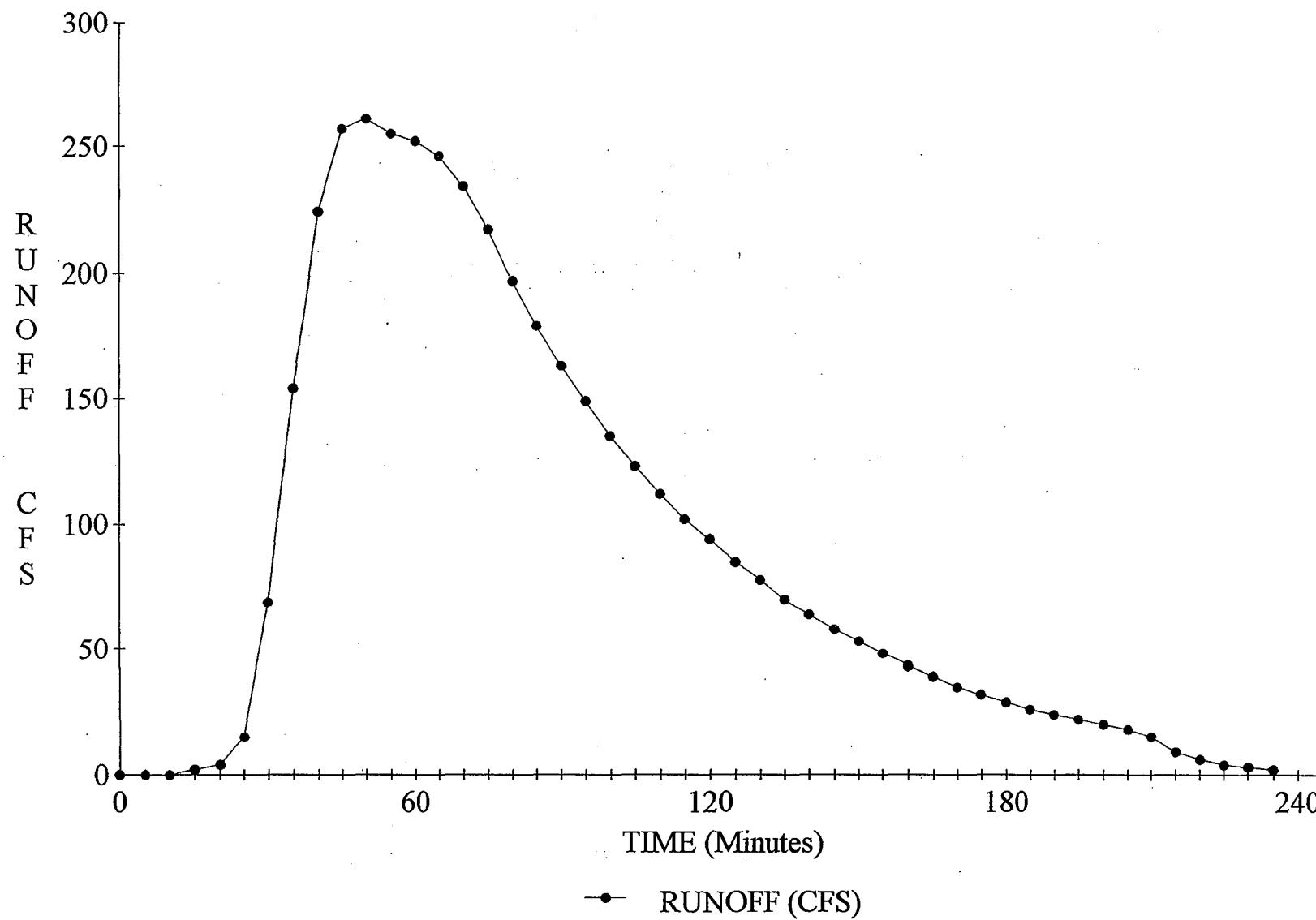
RUNOFF HYDROGRAPH - SUBBASIN F
100 YEAR DEVELOPED



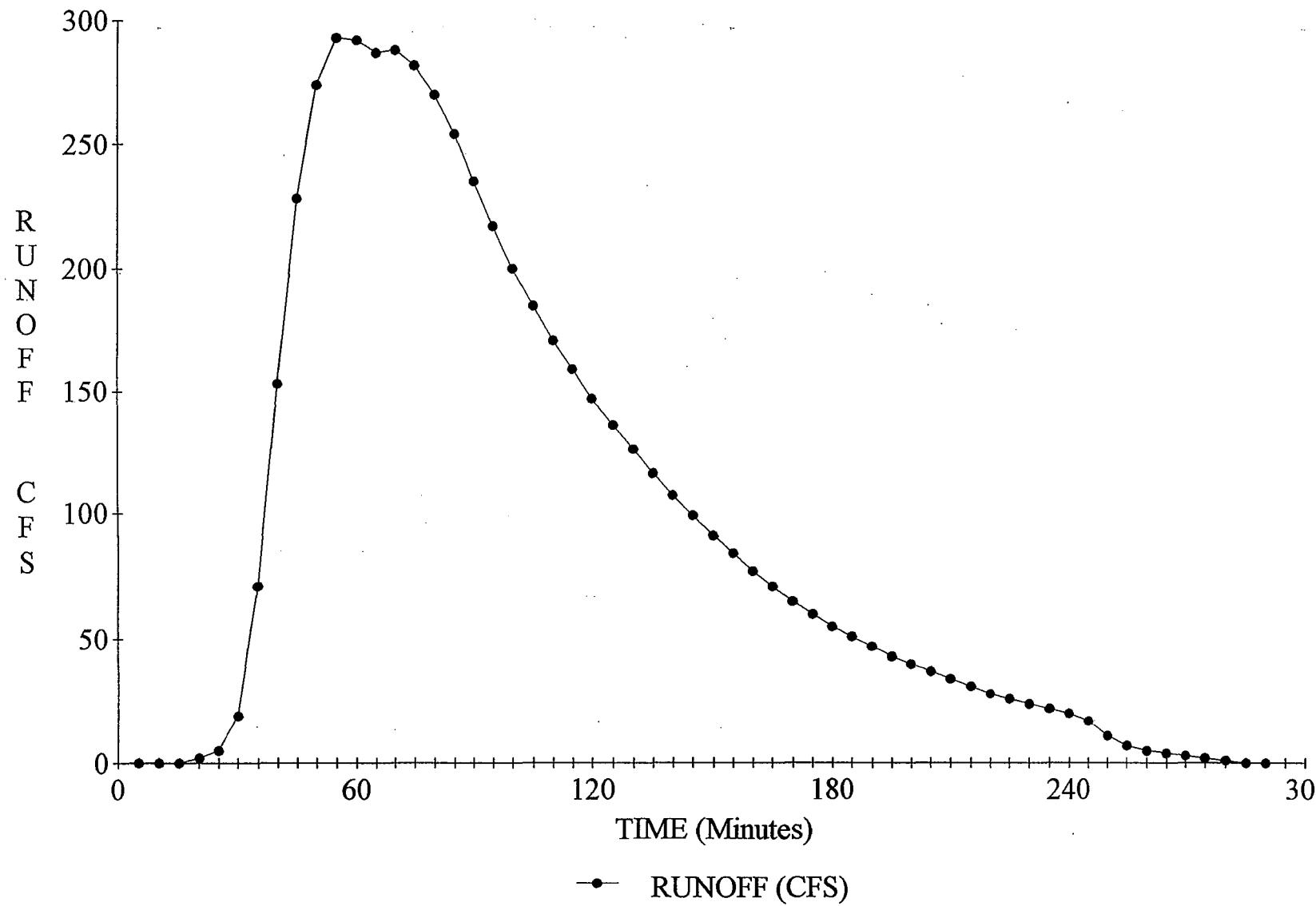
RUNOFF HYDROGRAPH - SUBBASIN G
100 YEAR DEVELOPED



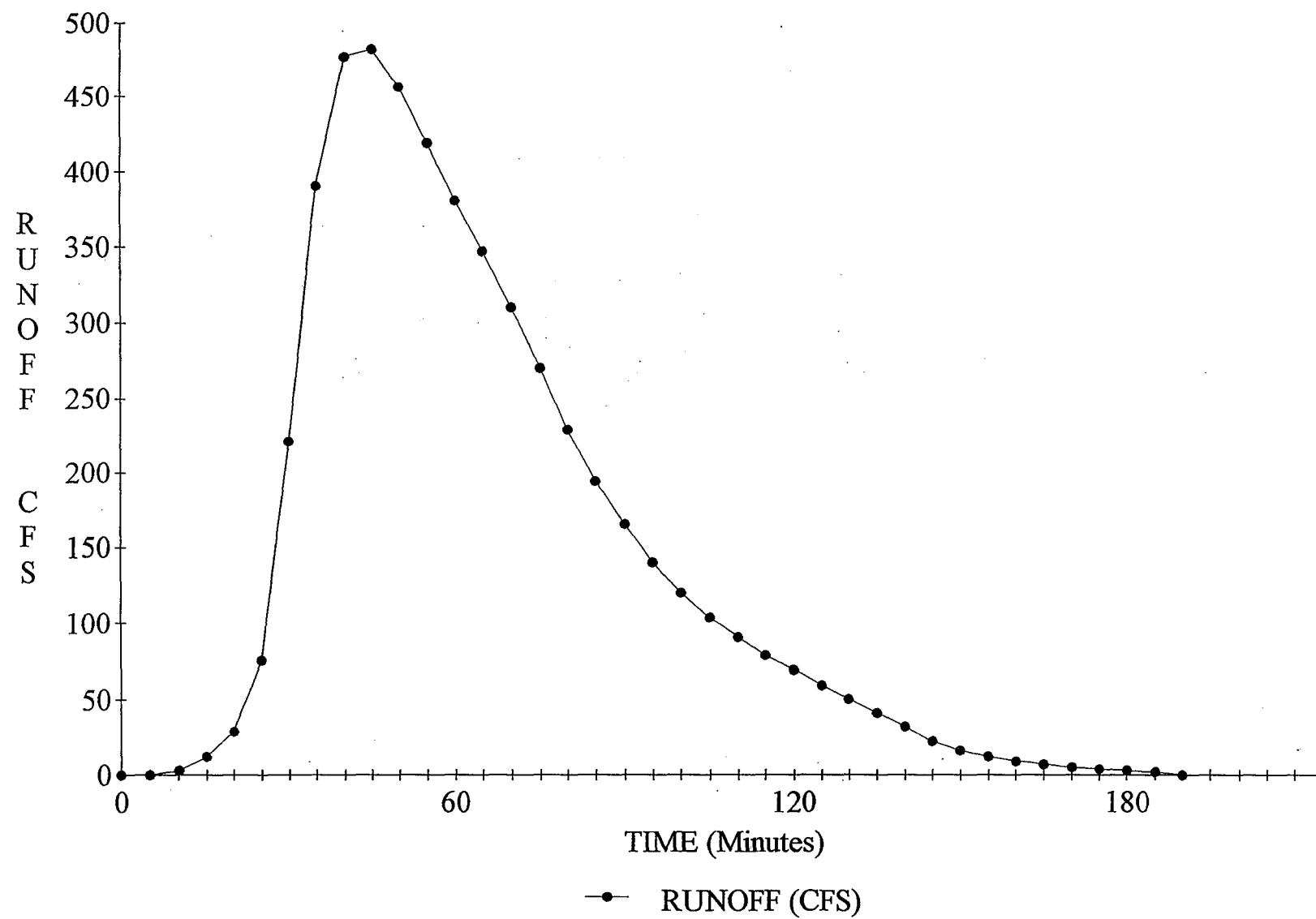
RUNOFF HYDROGRAPH - SUBBASIN H
100 YEAR DEVELOPED



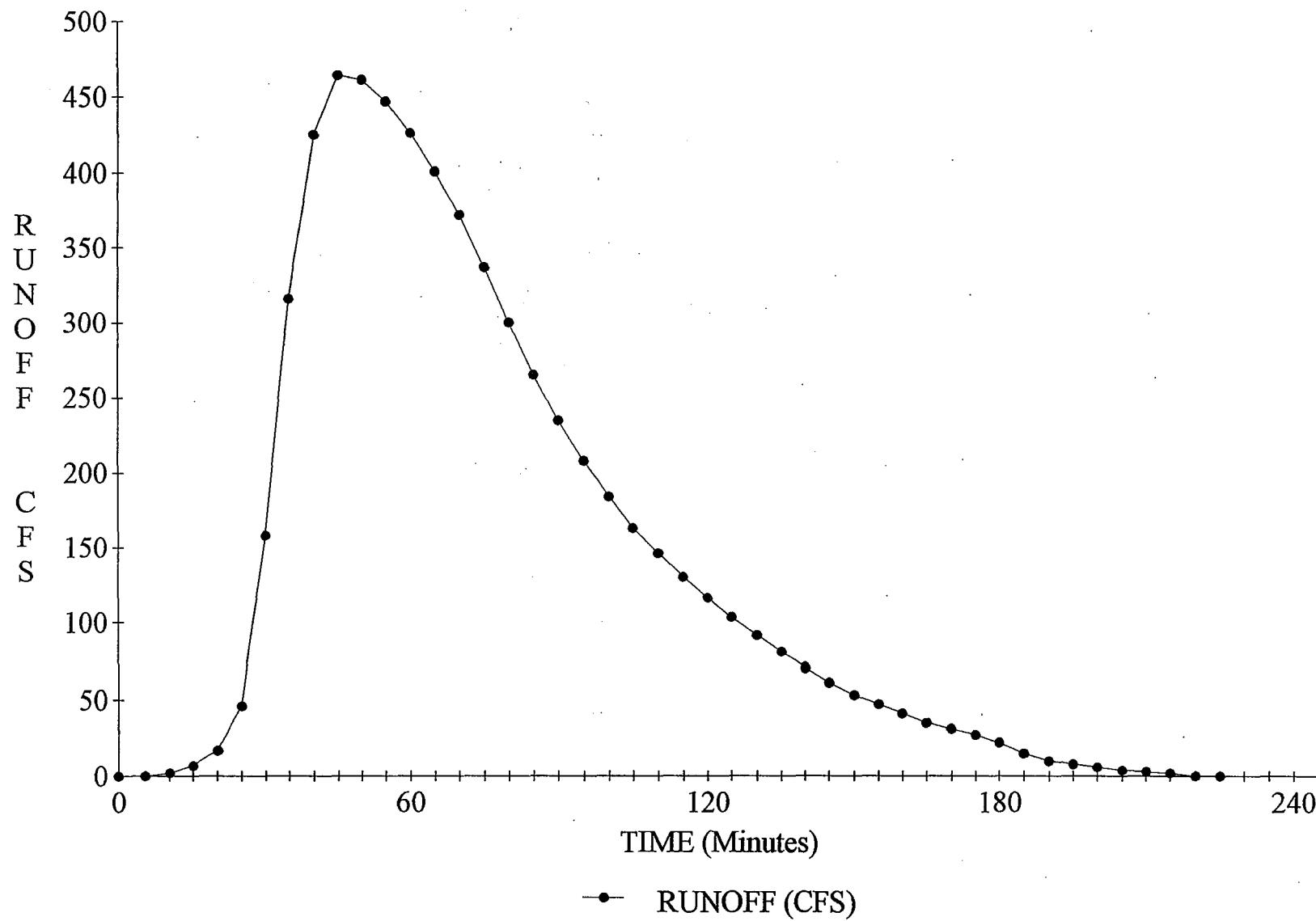
RUNOFF HYDROGRAPH - SUBBASIN I
100 YEAR DEVELOPED



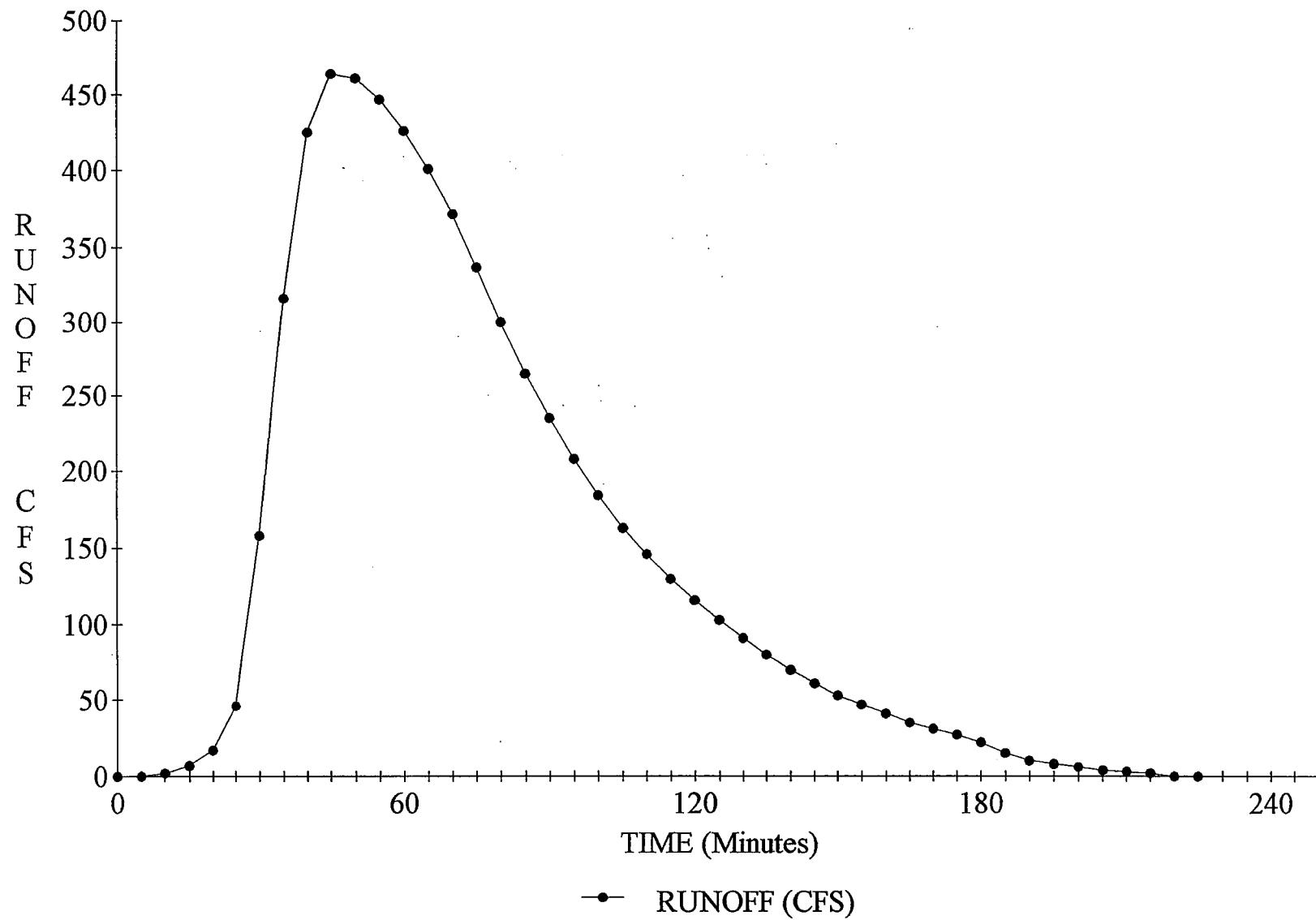
RUNOFF HYDROGRAPH - SUBBASIN J
100 YEAR DEVELOPED



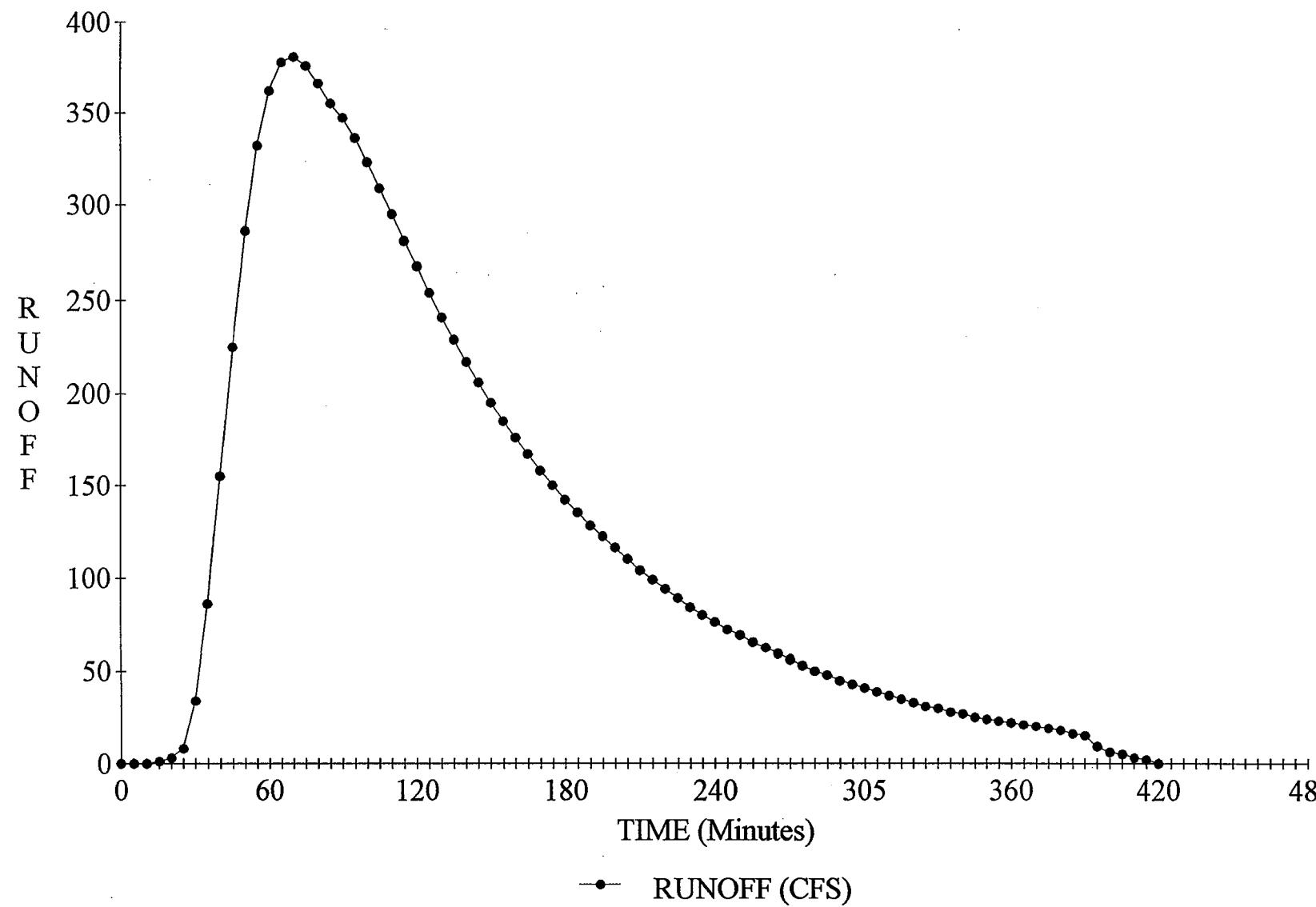
RUNOFF HYDROGRAPH - SUBBASIN K
100 YEAR DEVELOPED



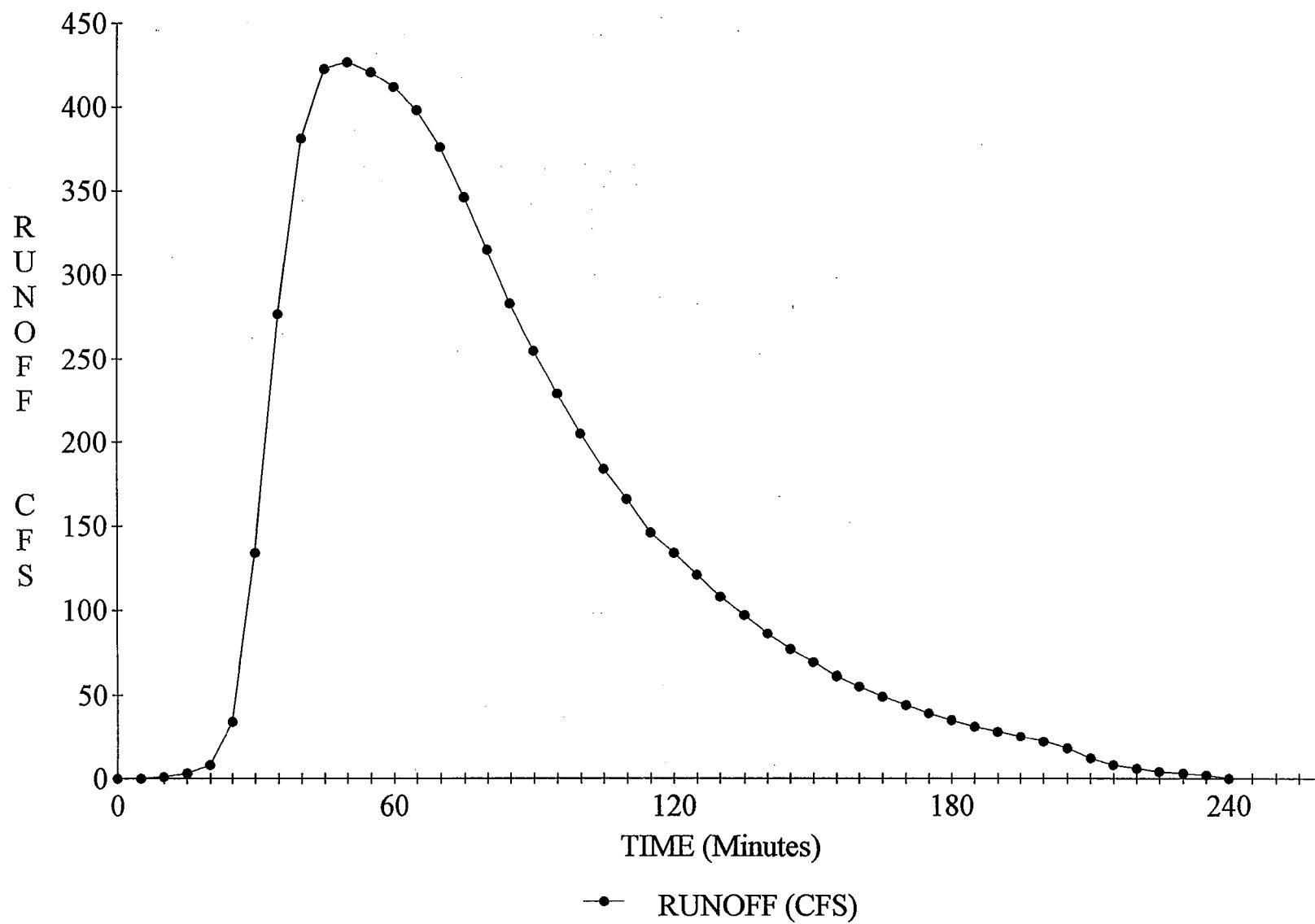
RUNOFF HYDROGRAPH - SUBBASIN L
100 YEAR DEVELOPED



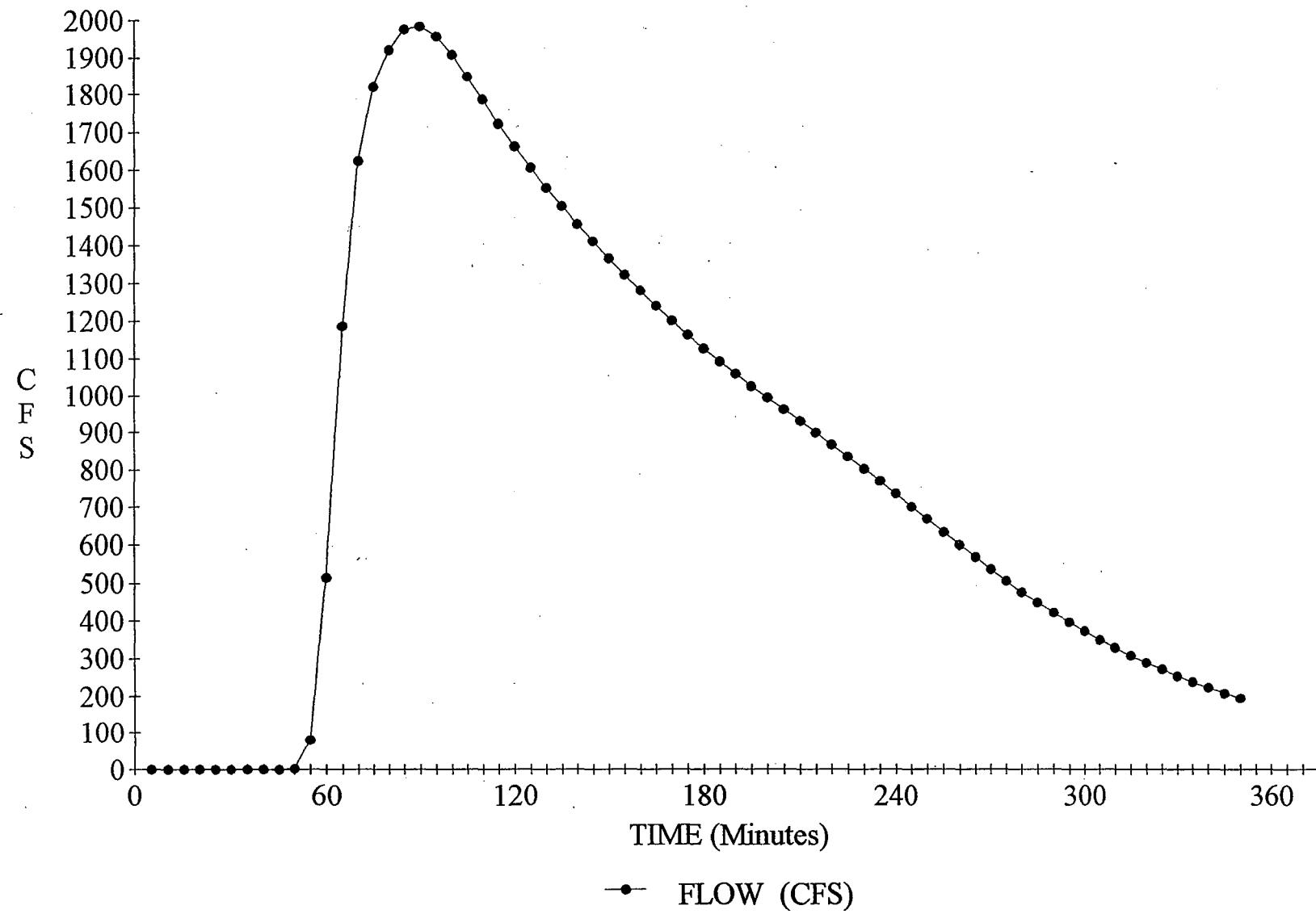
RUNOFF HYDROGRAPH - SUBBASIN M
100 YEAR DEVELOPED



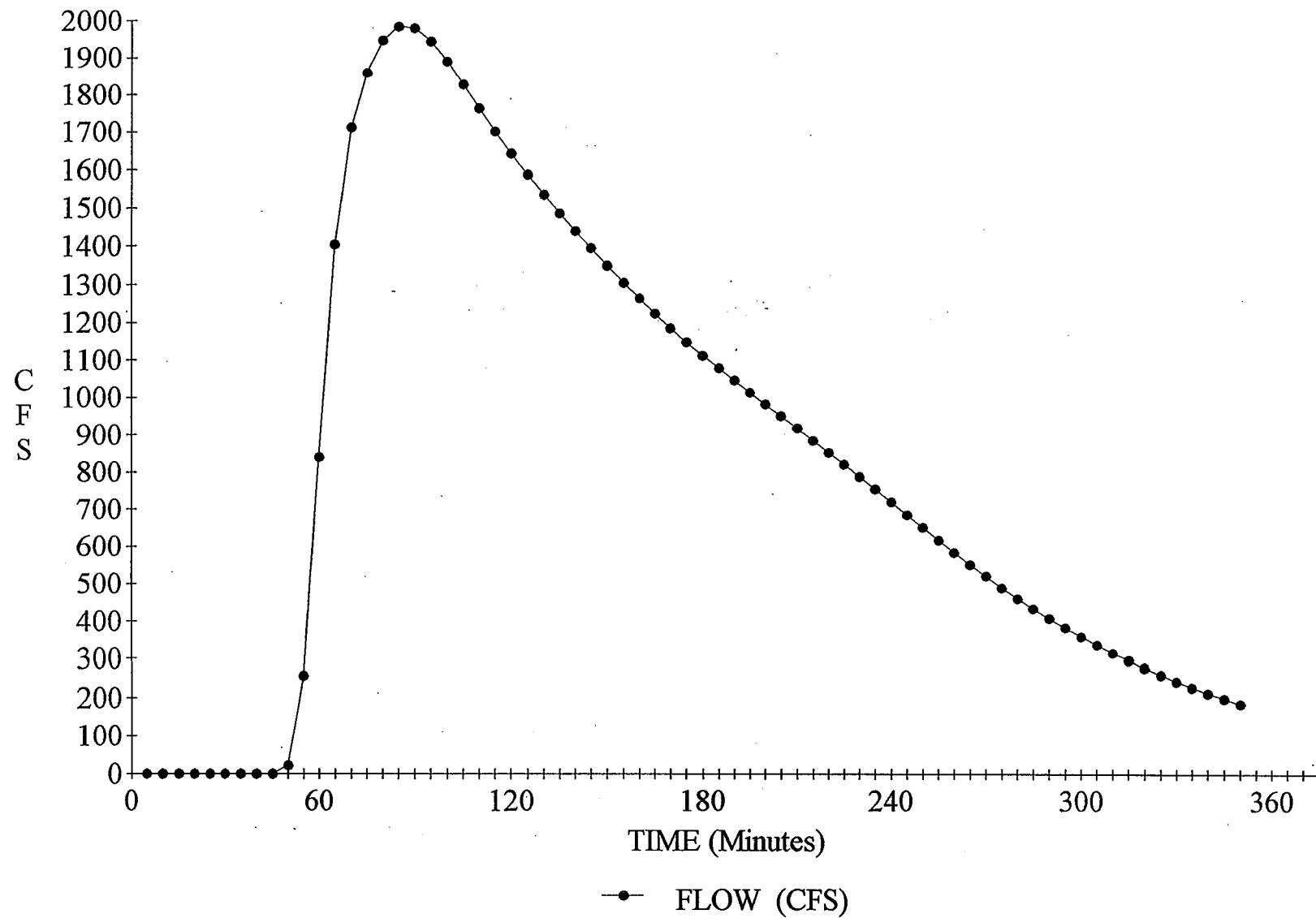
RUNOFF HYDROGRAPH - SUBBASIN N
100 YEAR DEVELOPED



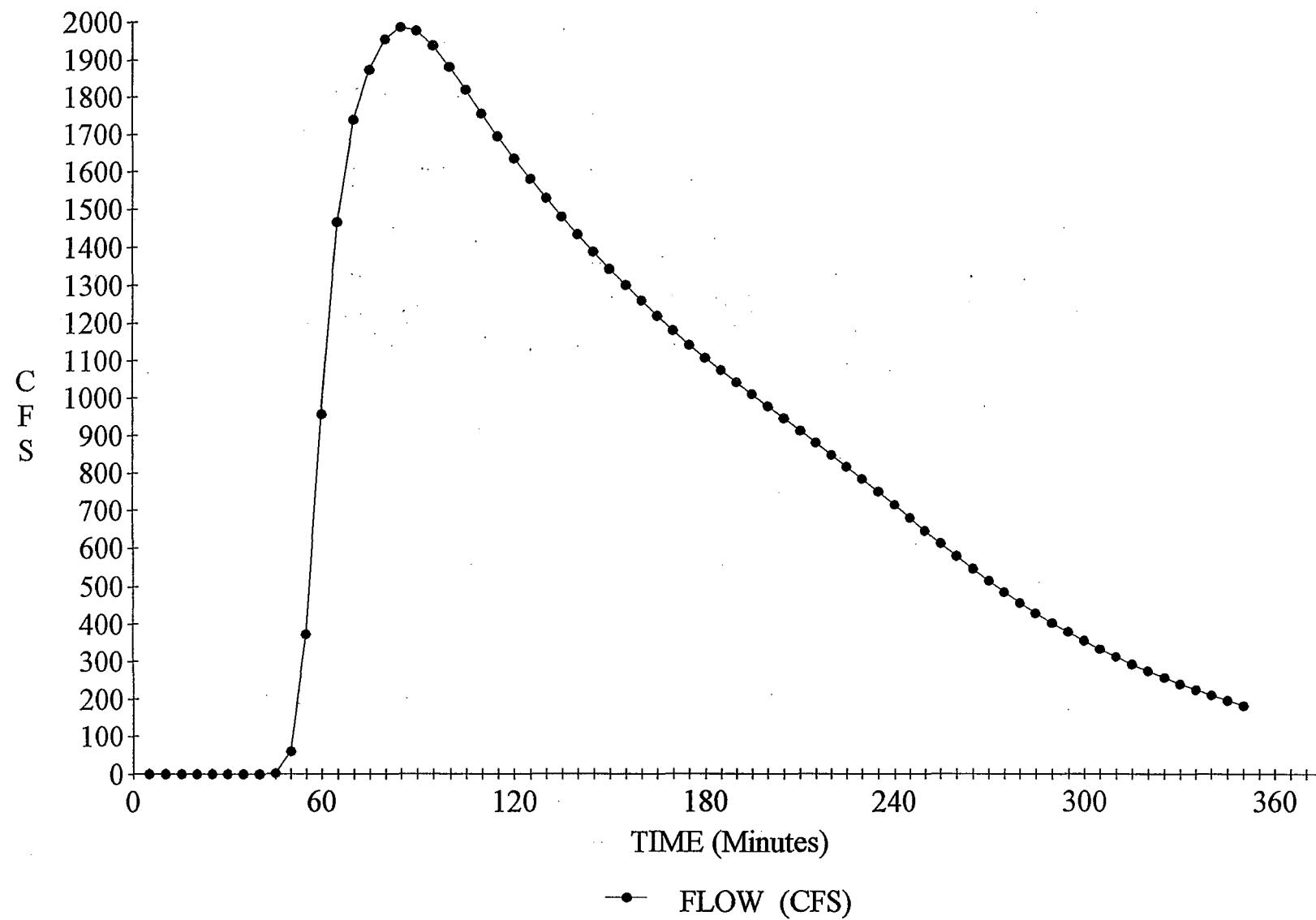
FLOW HYDROGRAPH - CONVEYANCE ELEMENT 10
100 YEAR DEVELOPED



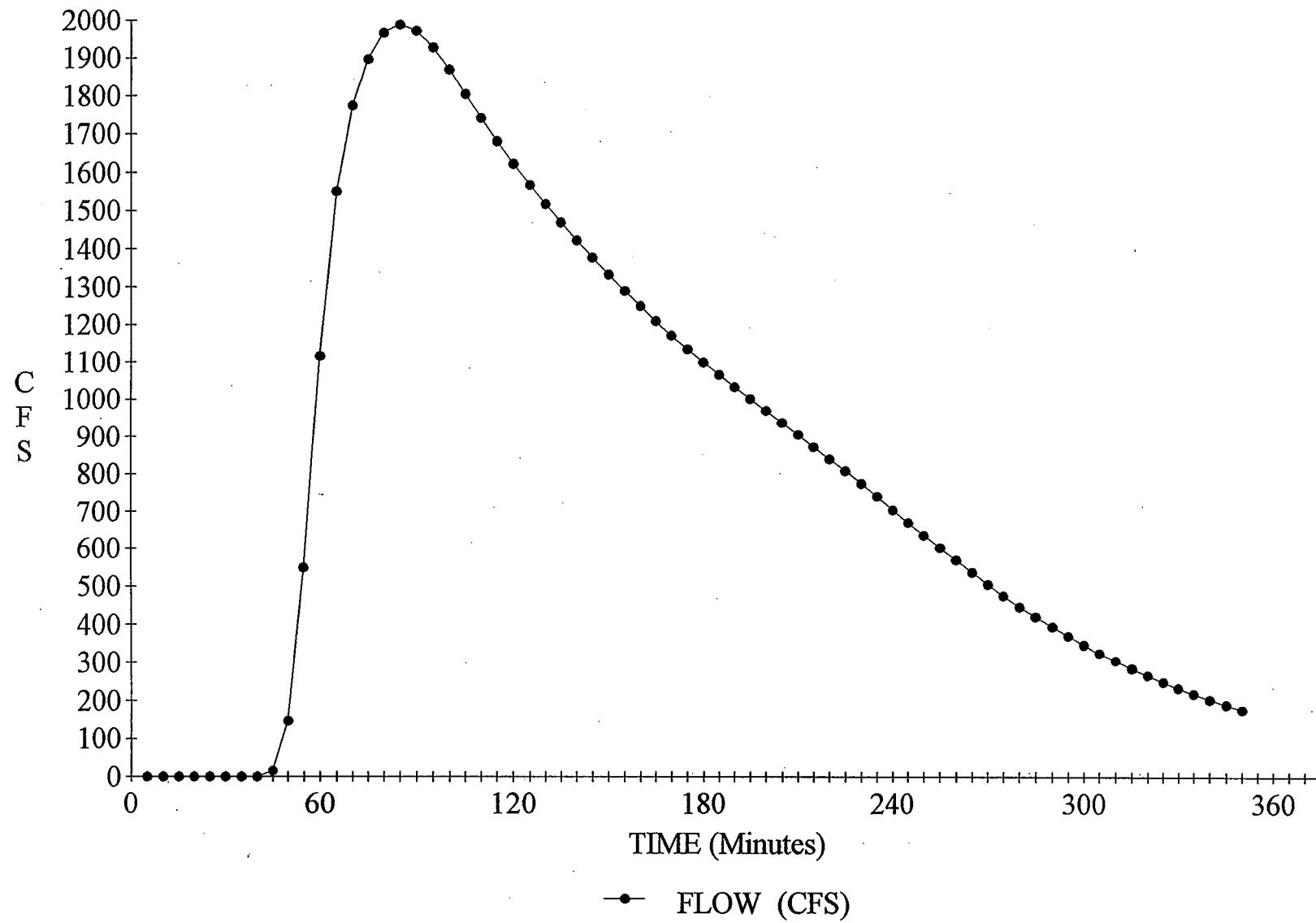
FLOW HYDROGRAPH - CONVEYANCE ELEMENT 11
100 YEAR DEVELOPED



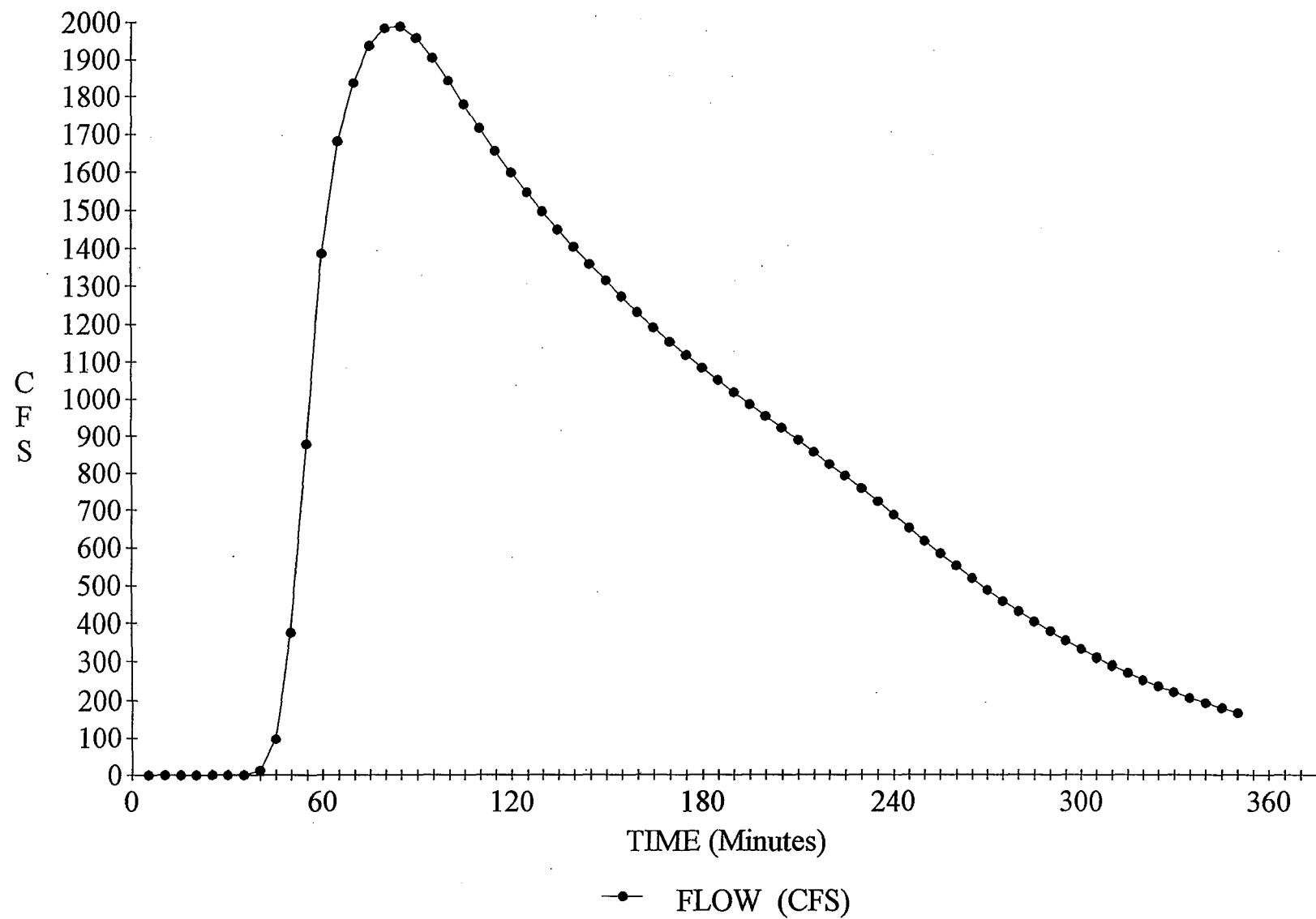
FLOW HYDROGRAPH - CONVEYANCE ELEMENT 12
100 YEAR DEVELOPED



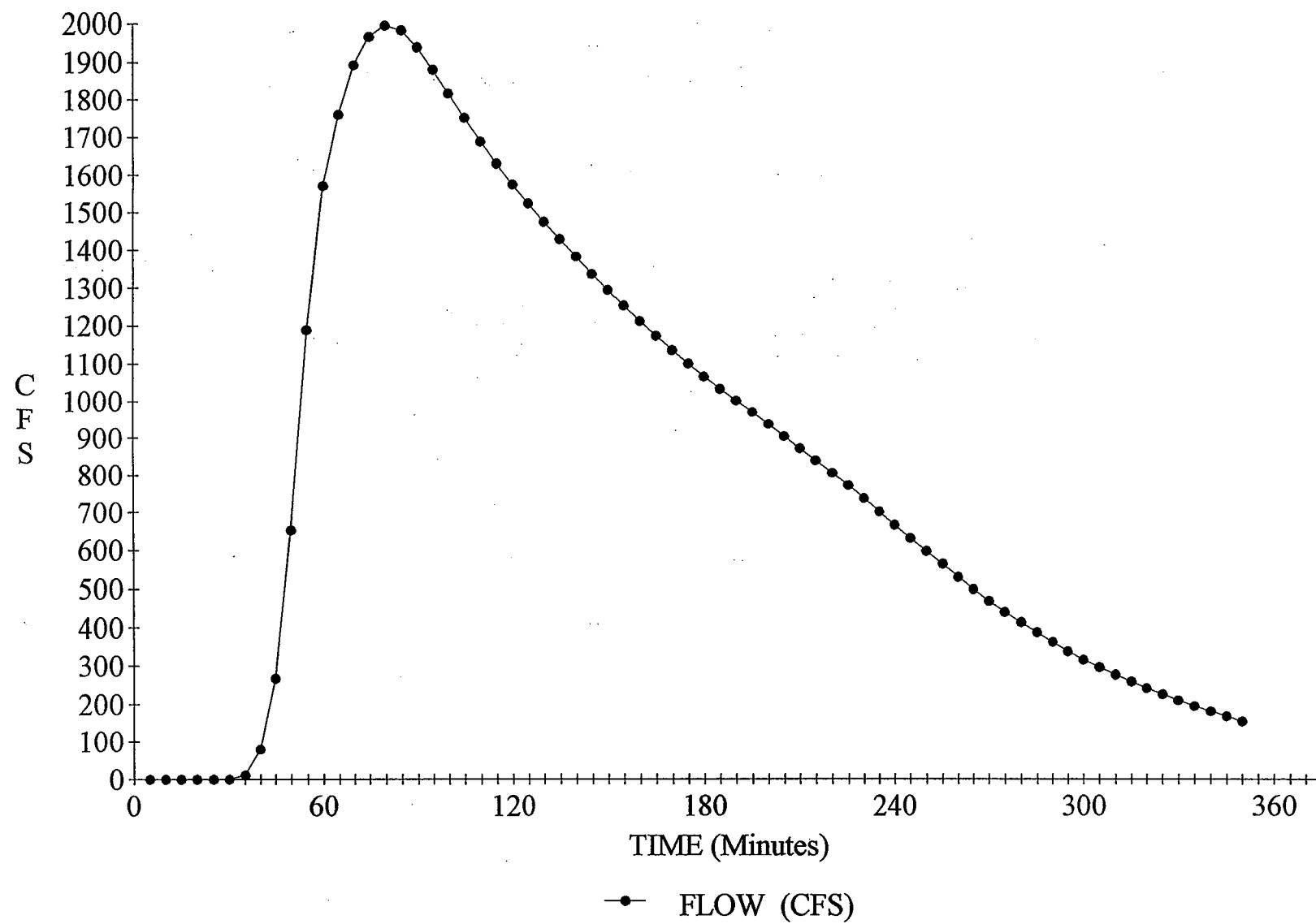
FLOW HYDROGRAPH - CONVEYANCE ELEMENT 13
100 YEAR DEVELOPED



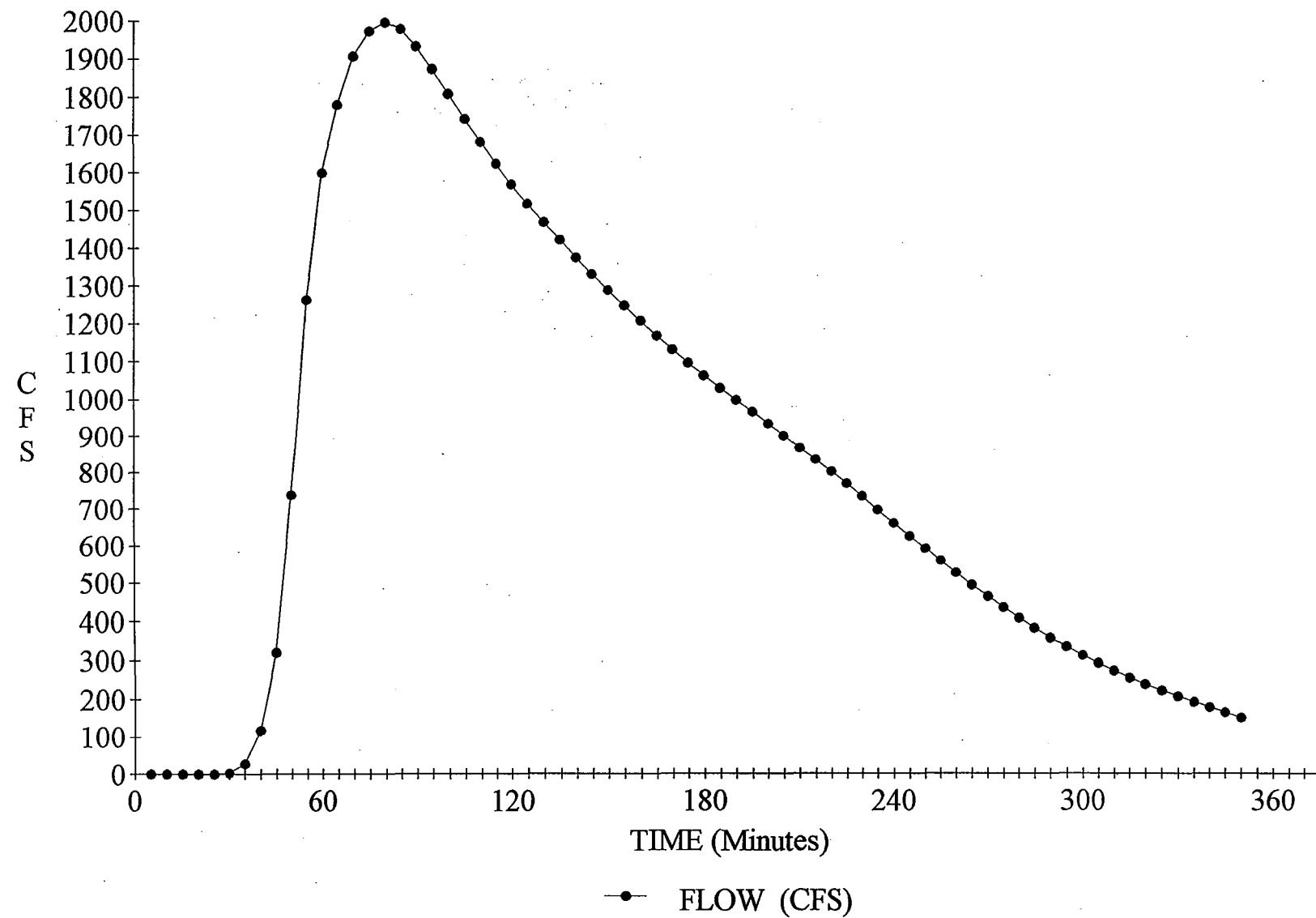
FLOW HYDROGRAPH -CONVEYANCE ELEMENT 141
100 YEAR DEVELOPED



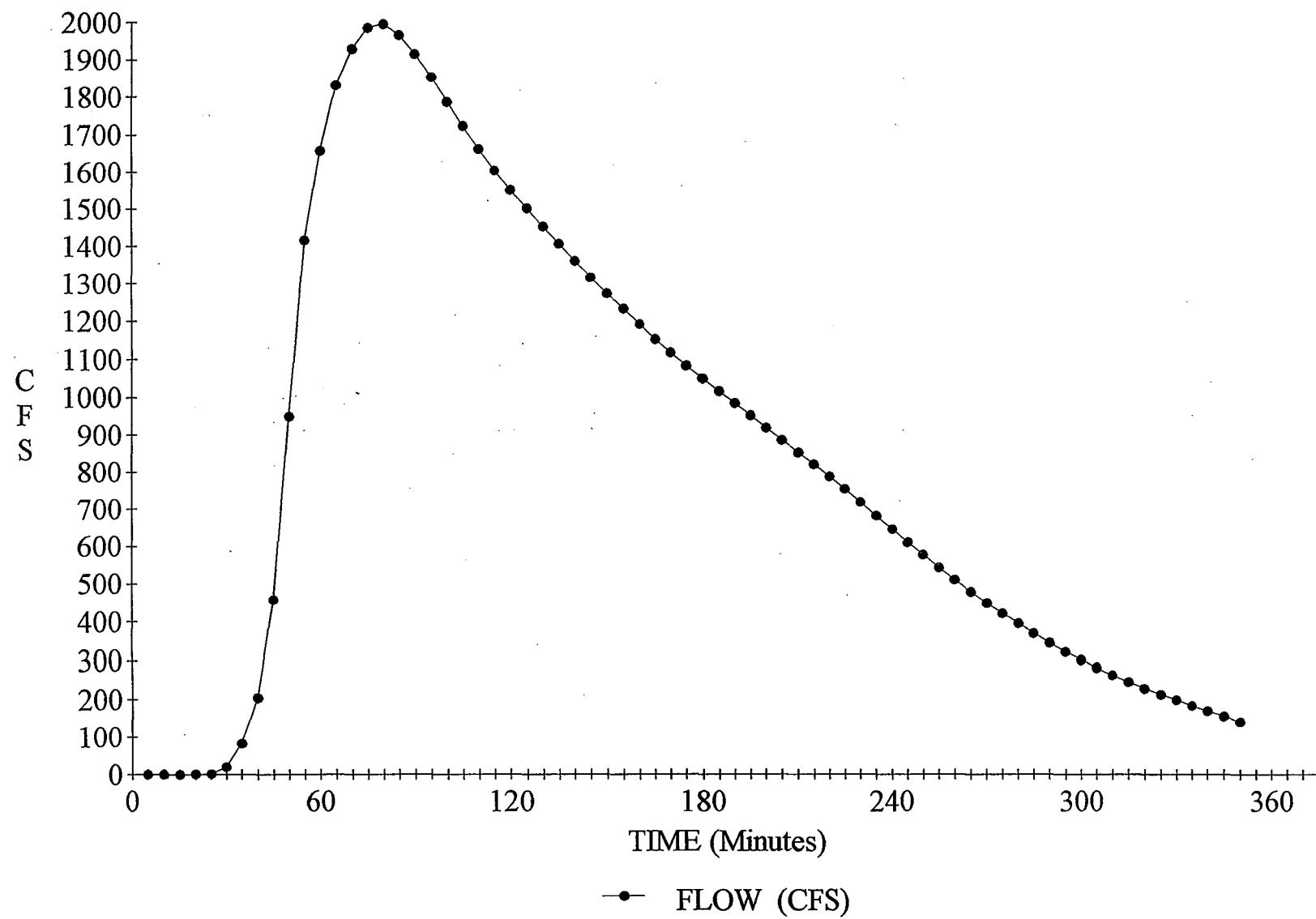
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100 YEAR DEVELOPED



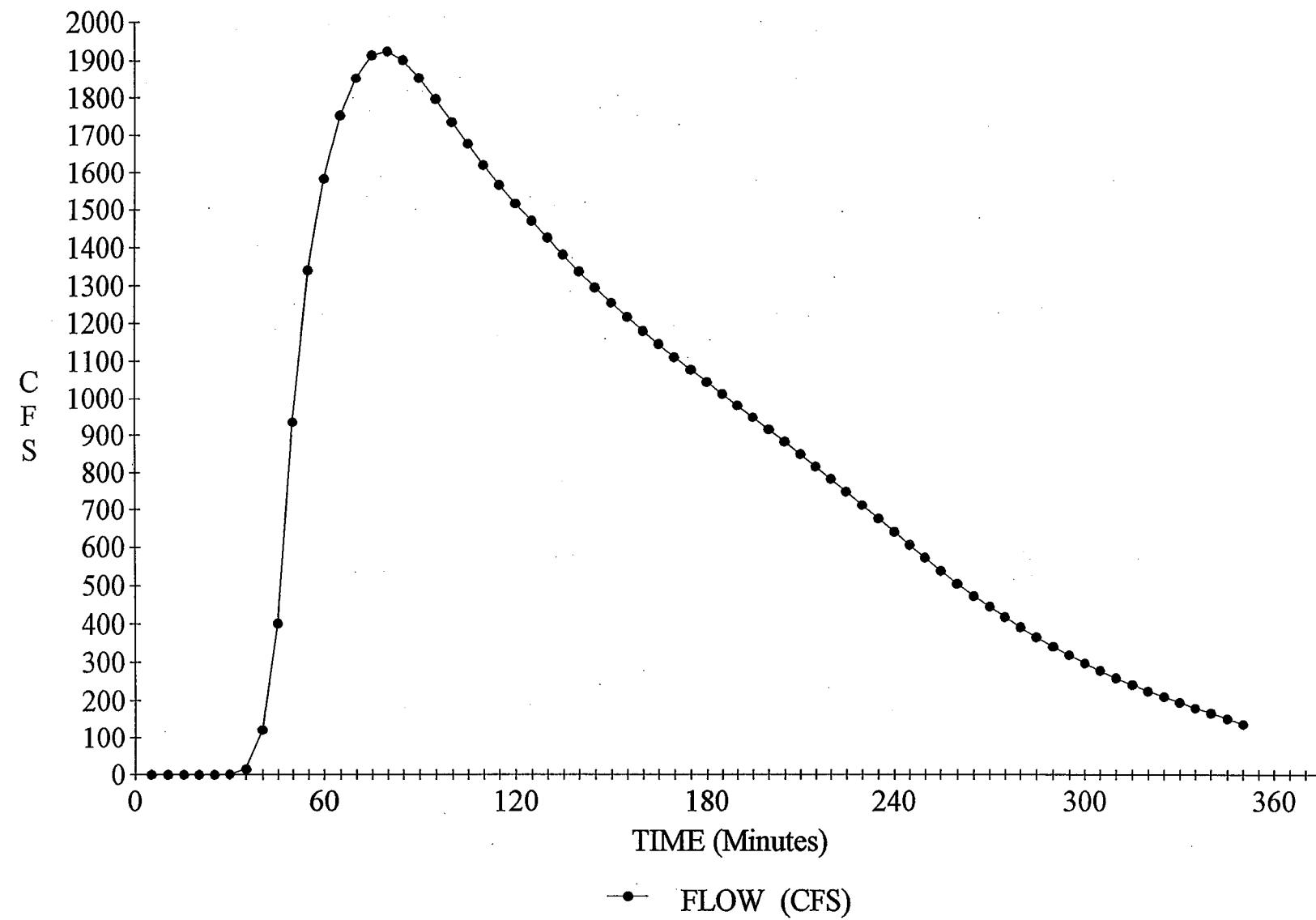
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100 YEAR DEVELOPED



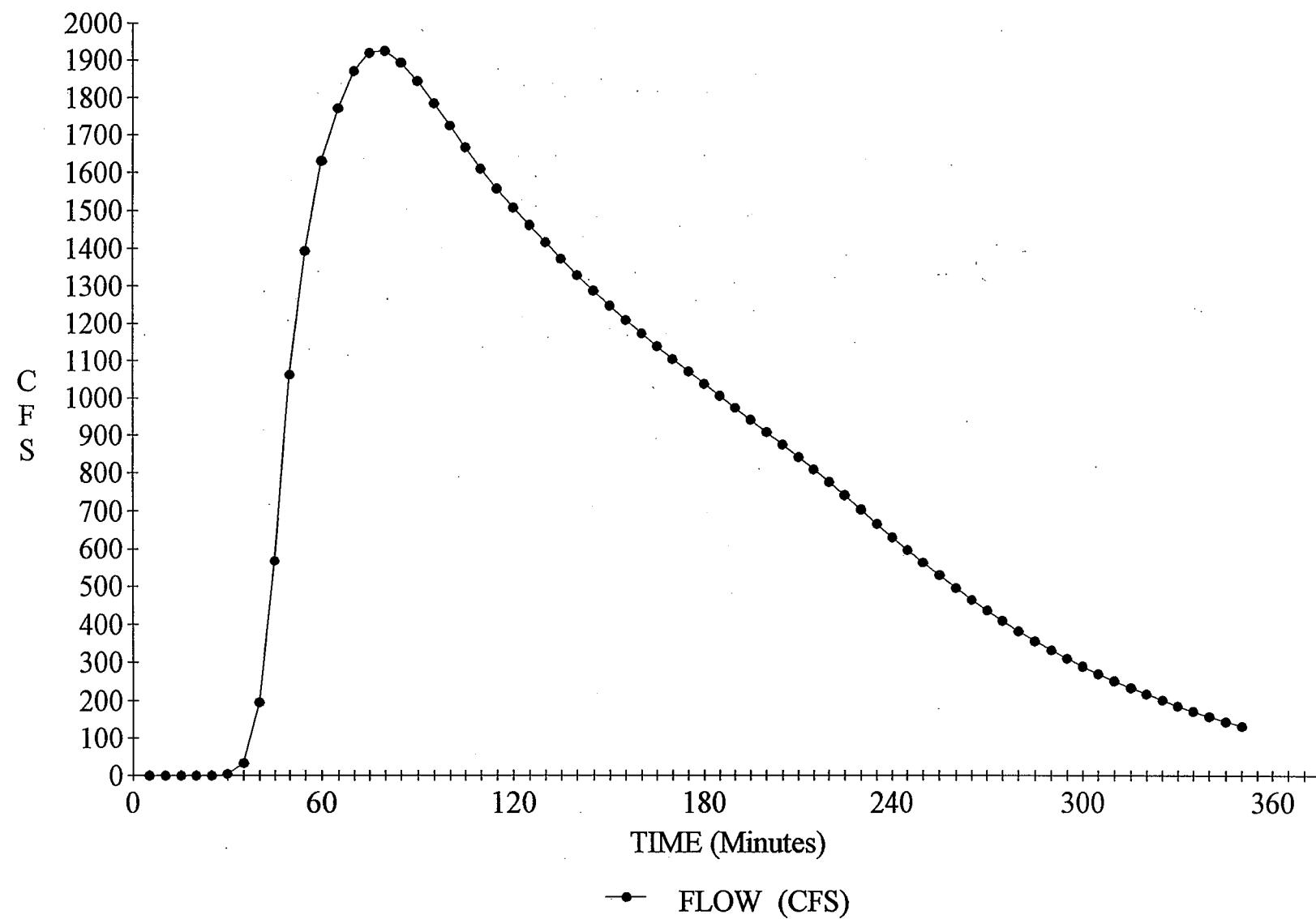
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100 YEAR DEVELOPED



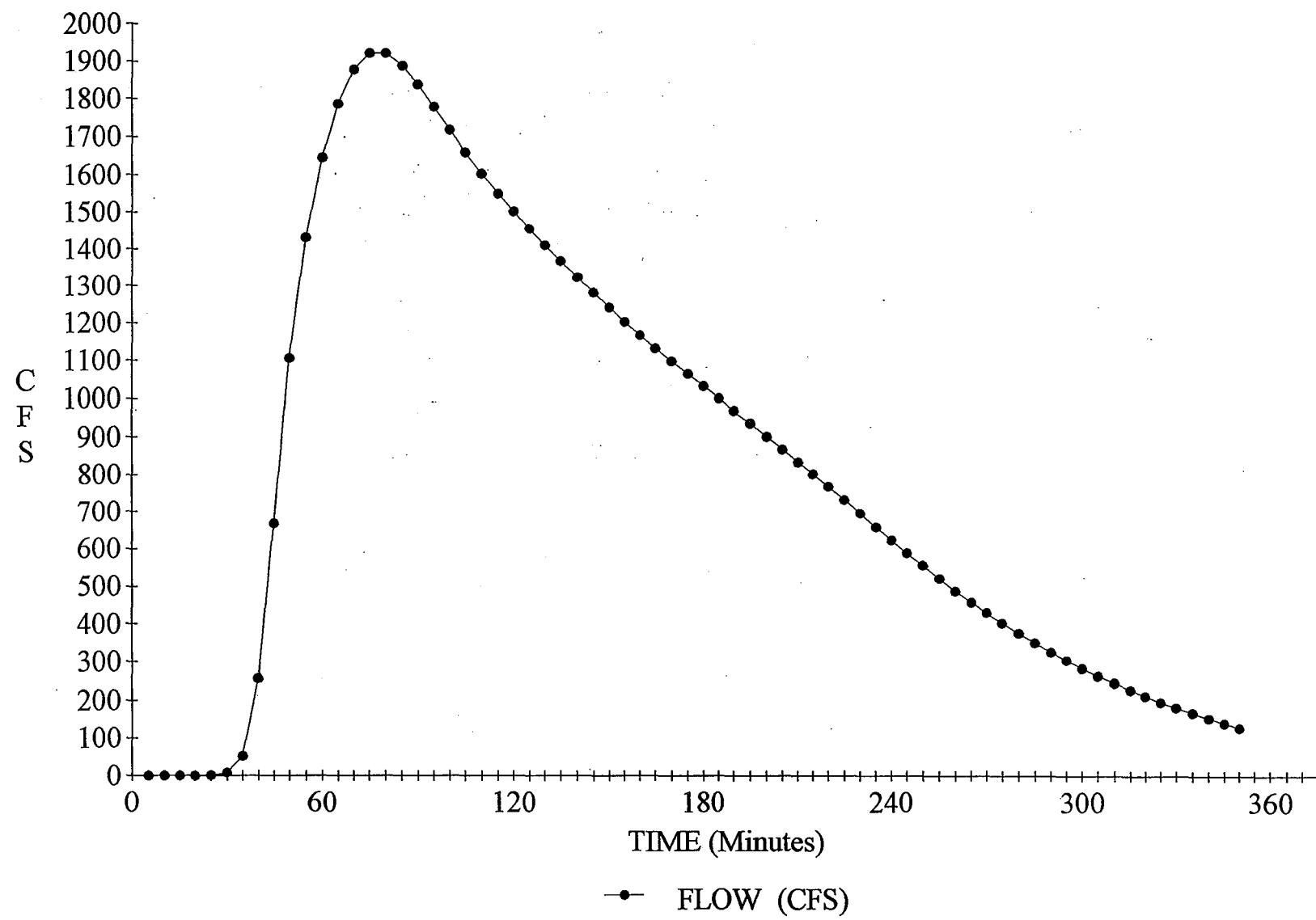
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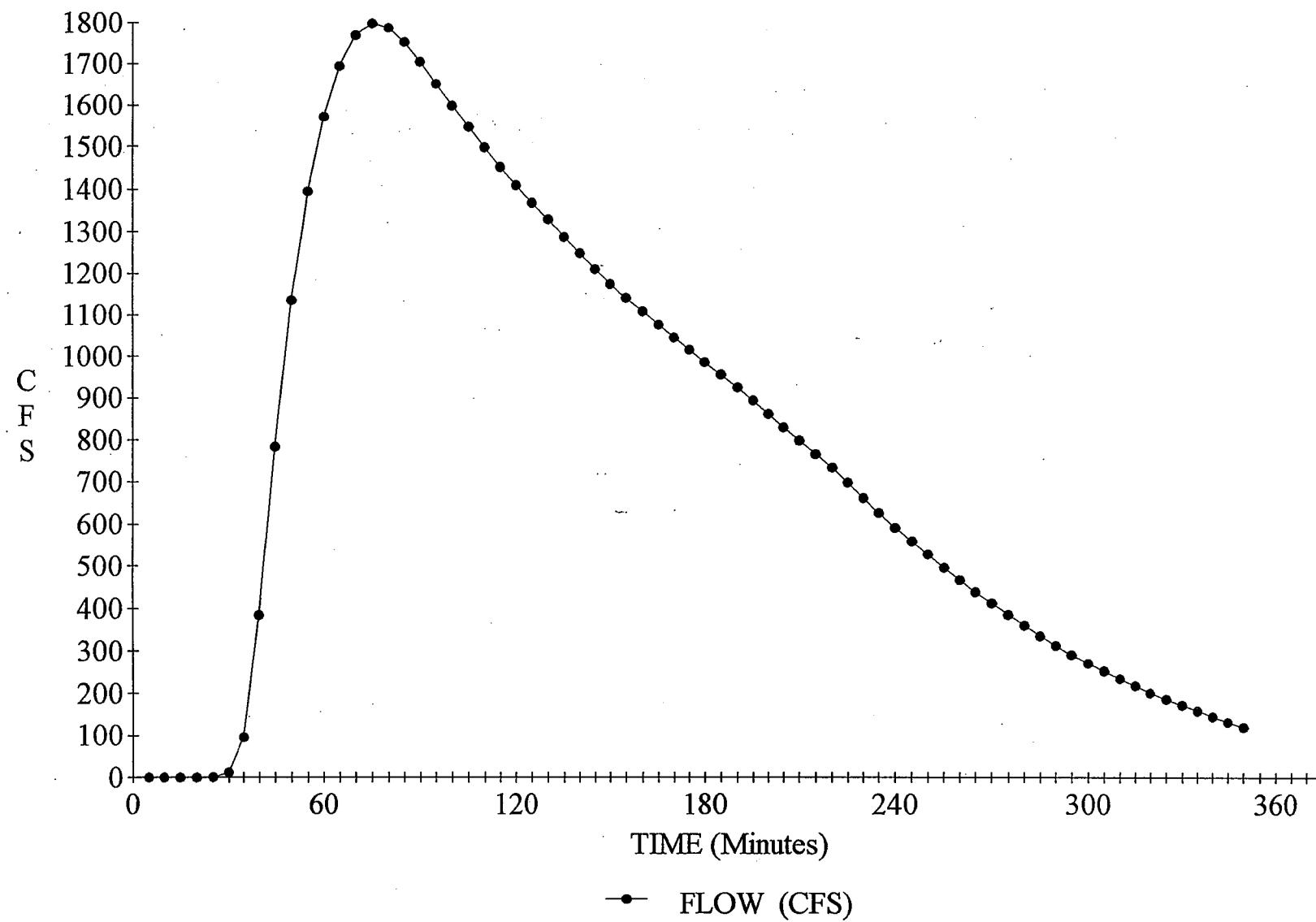
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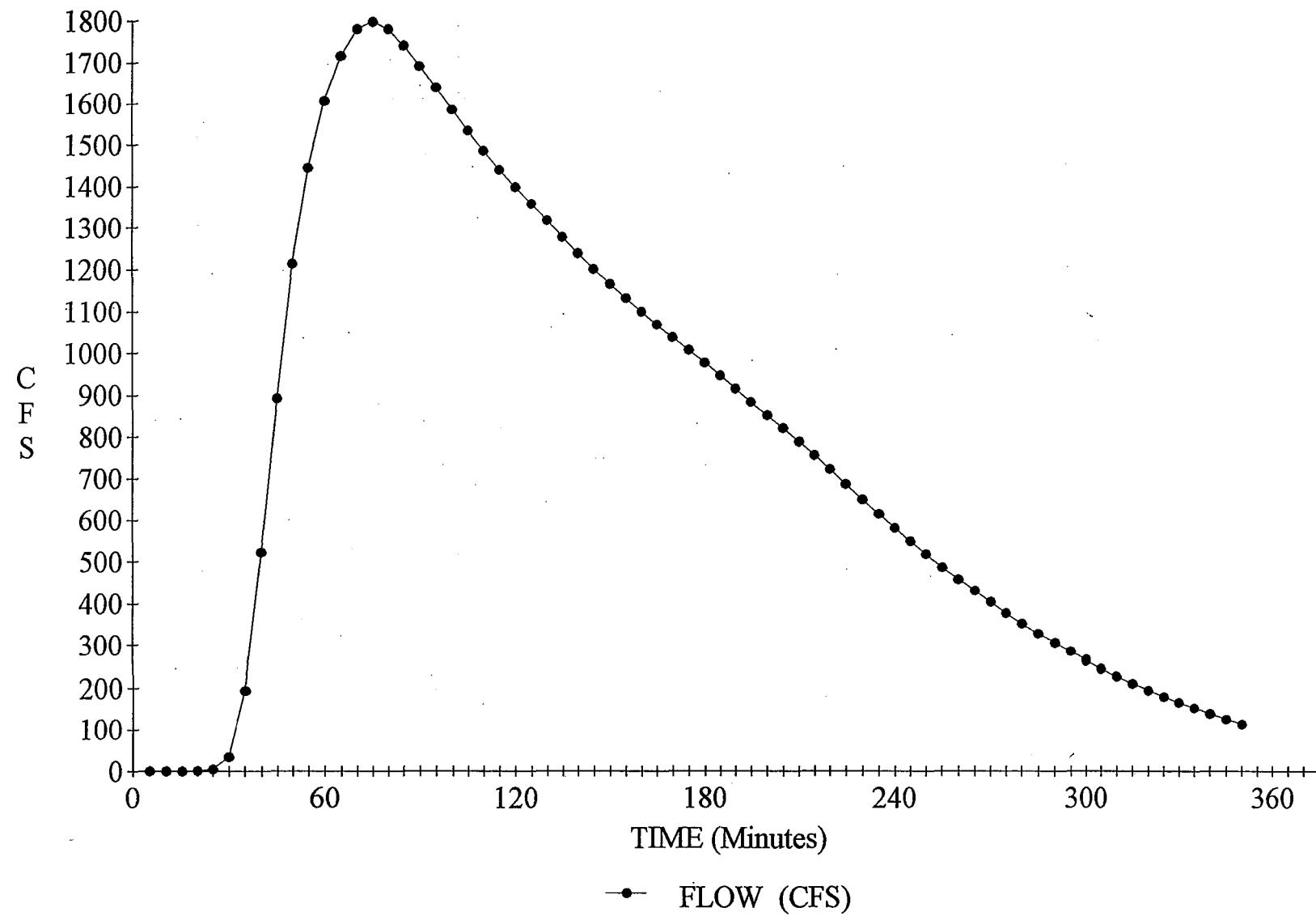
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100 YEAR DEVELOPED



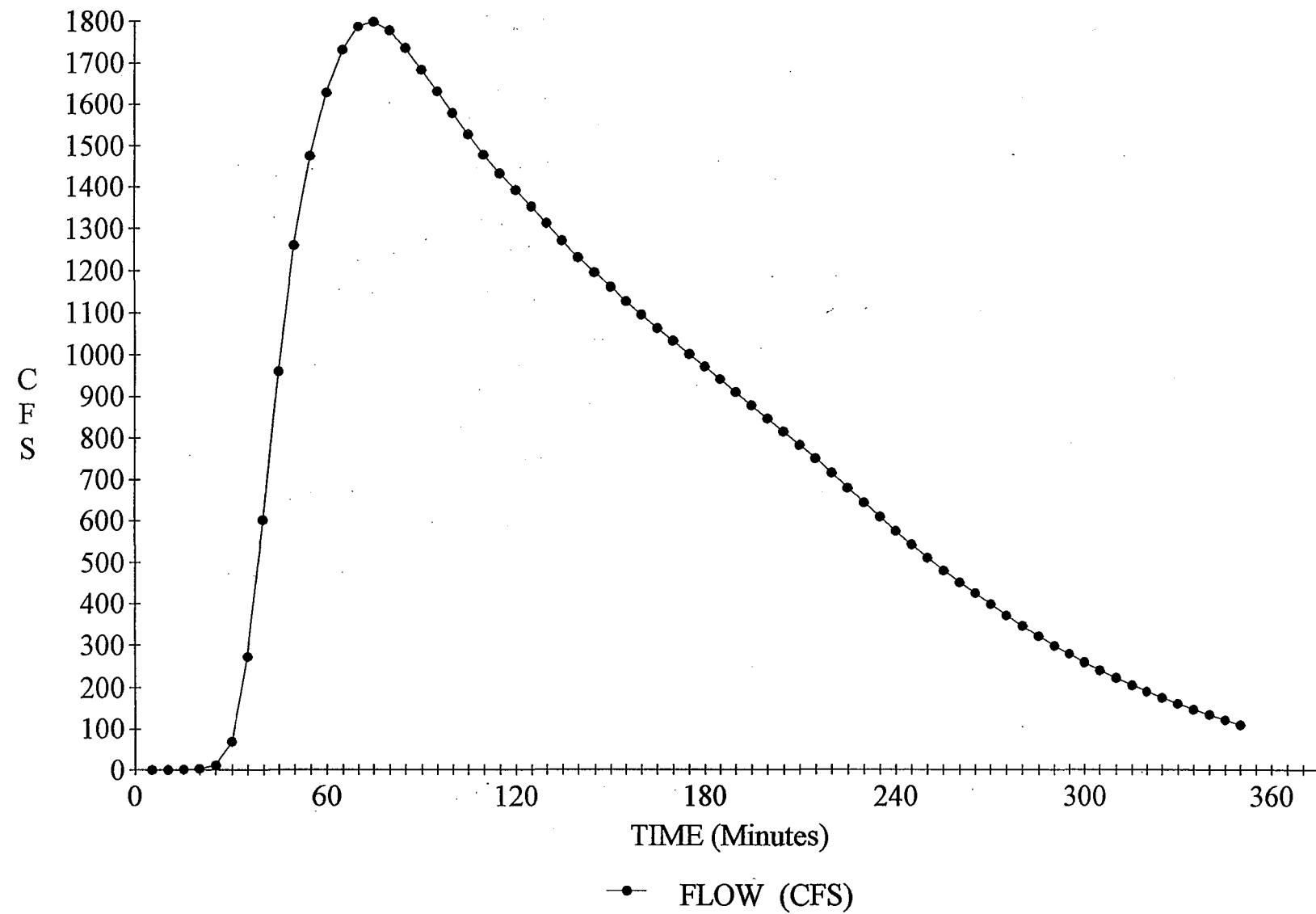
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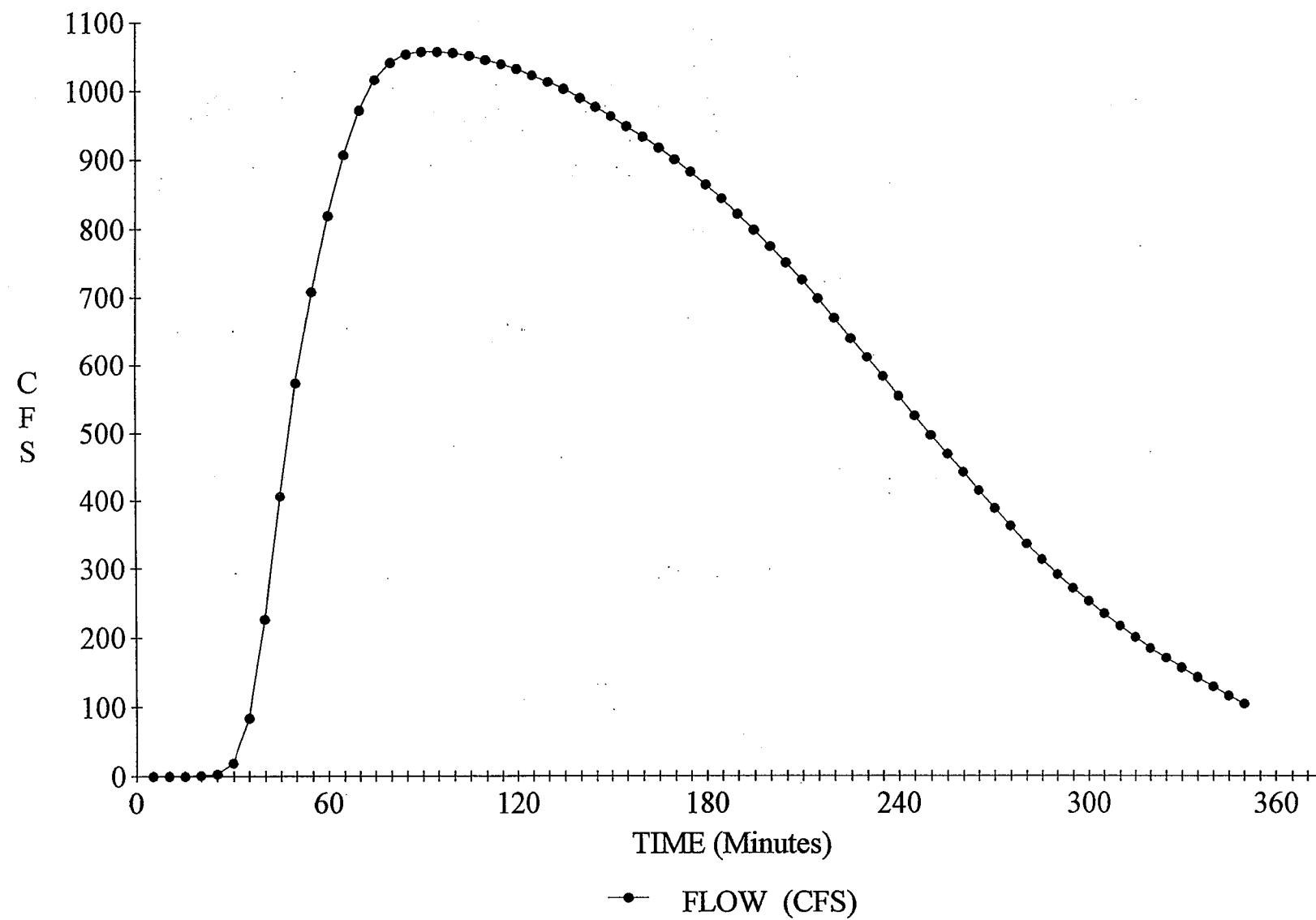
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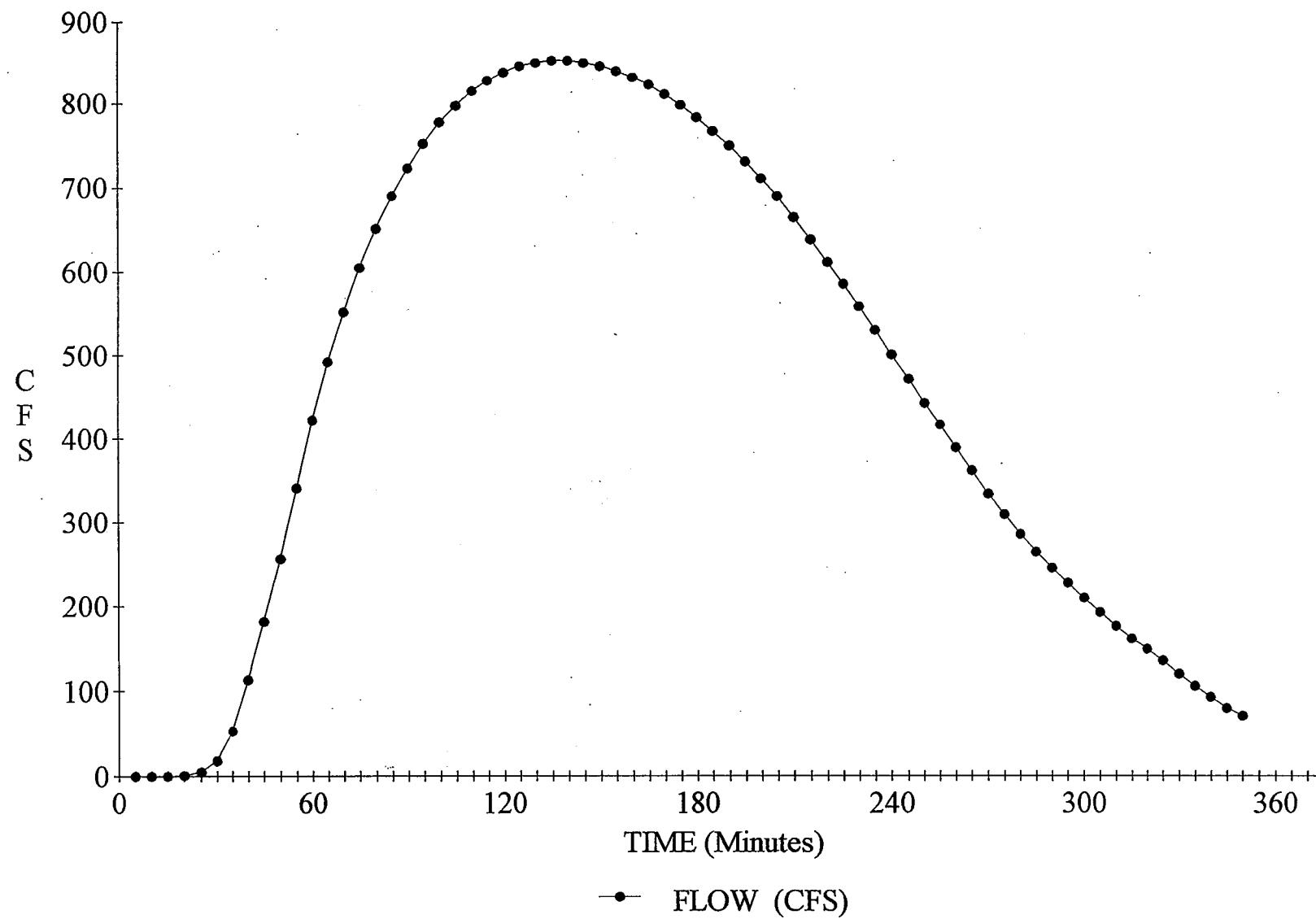
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100 YEAR DEVELOPED



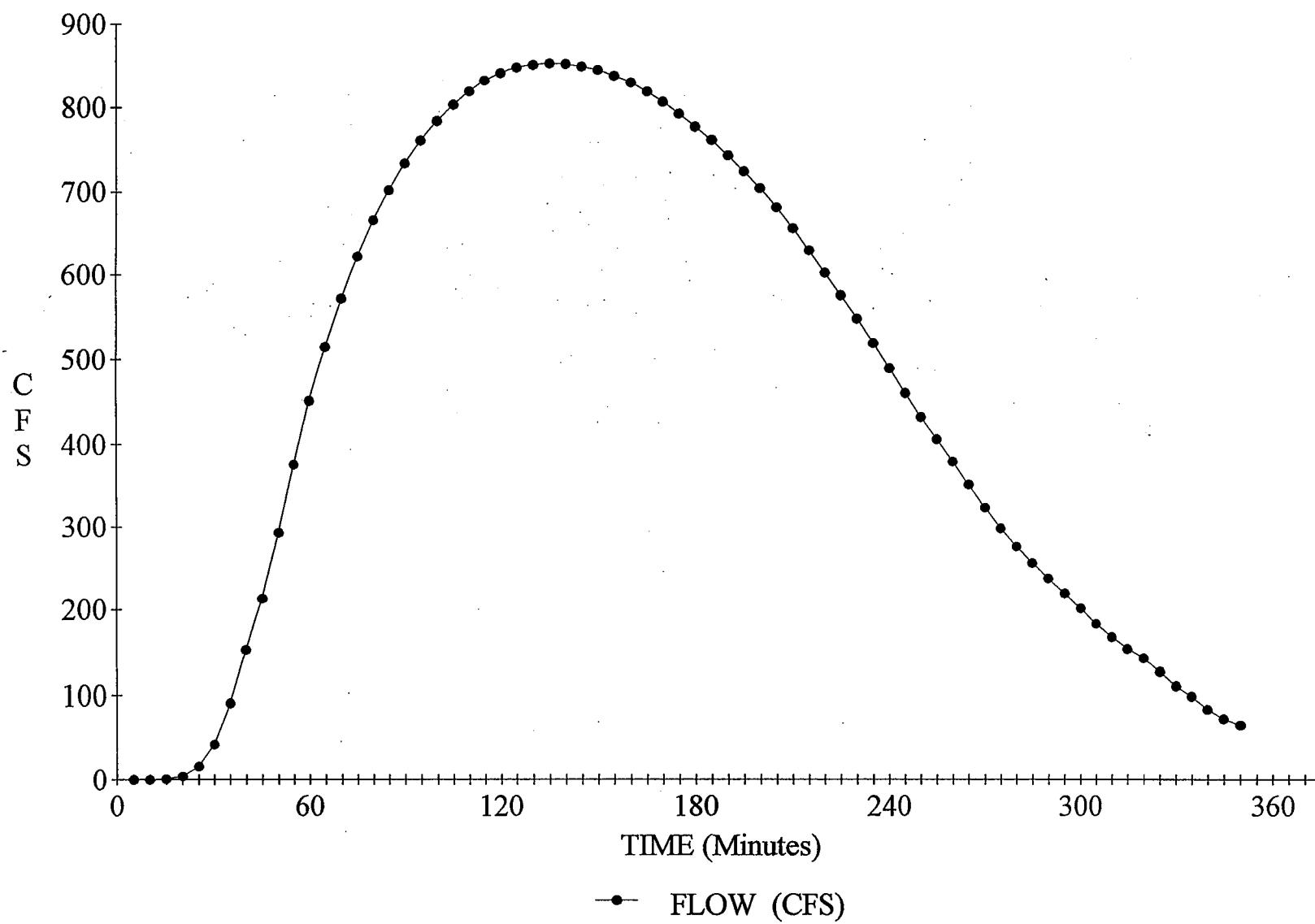
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100 YEAR DEVELOPED



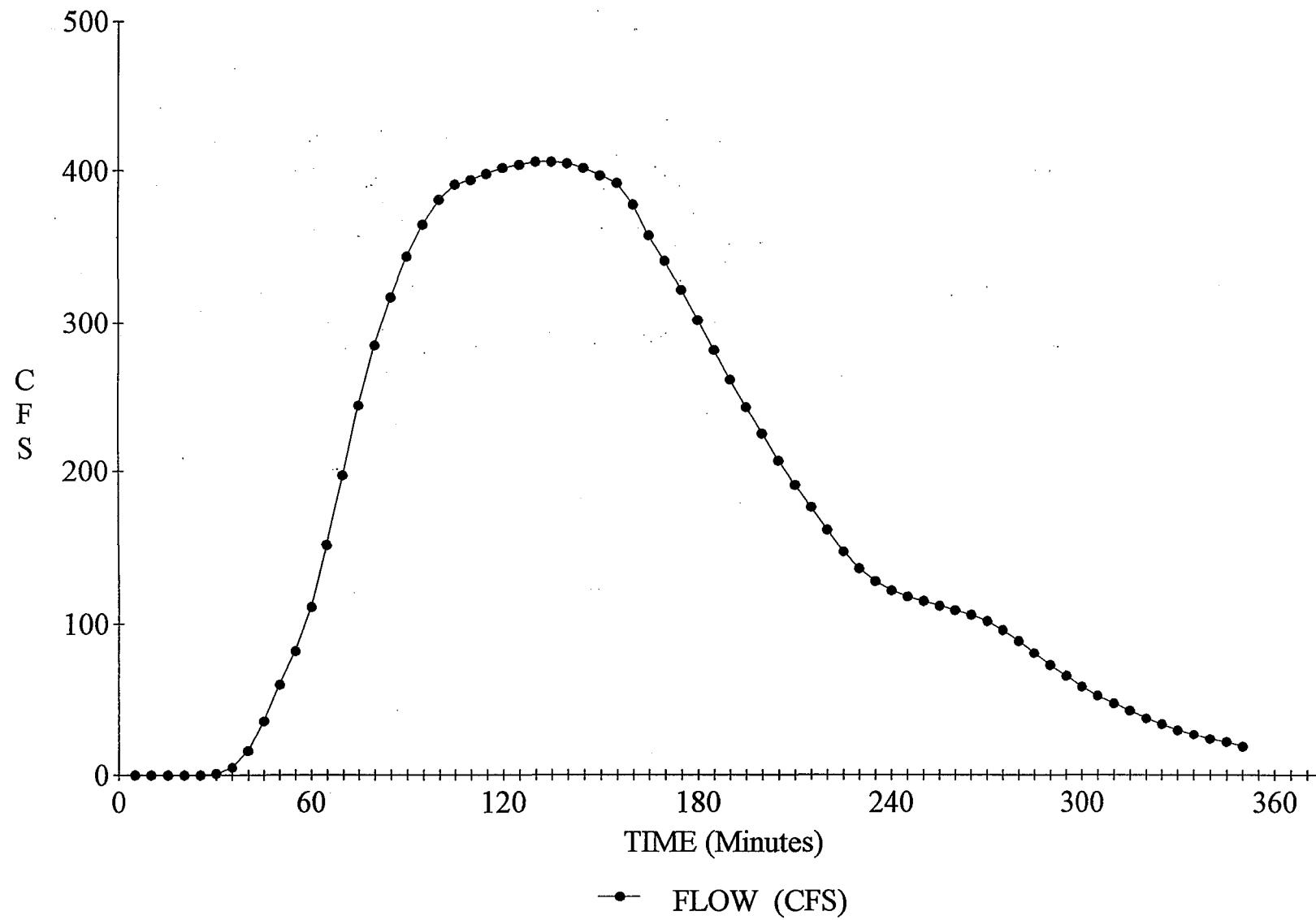
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100 YEAR DEVELOPED



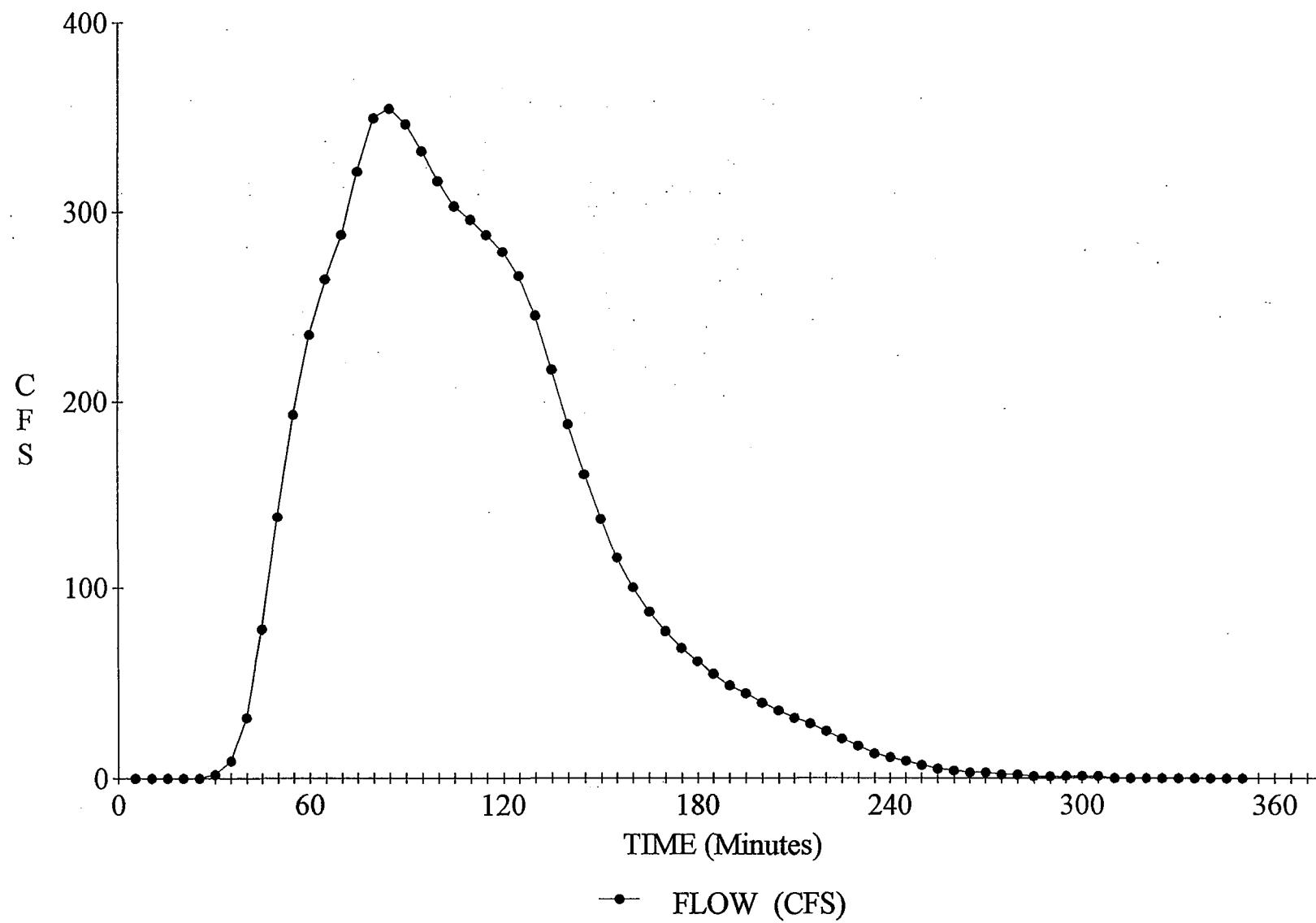
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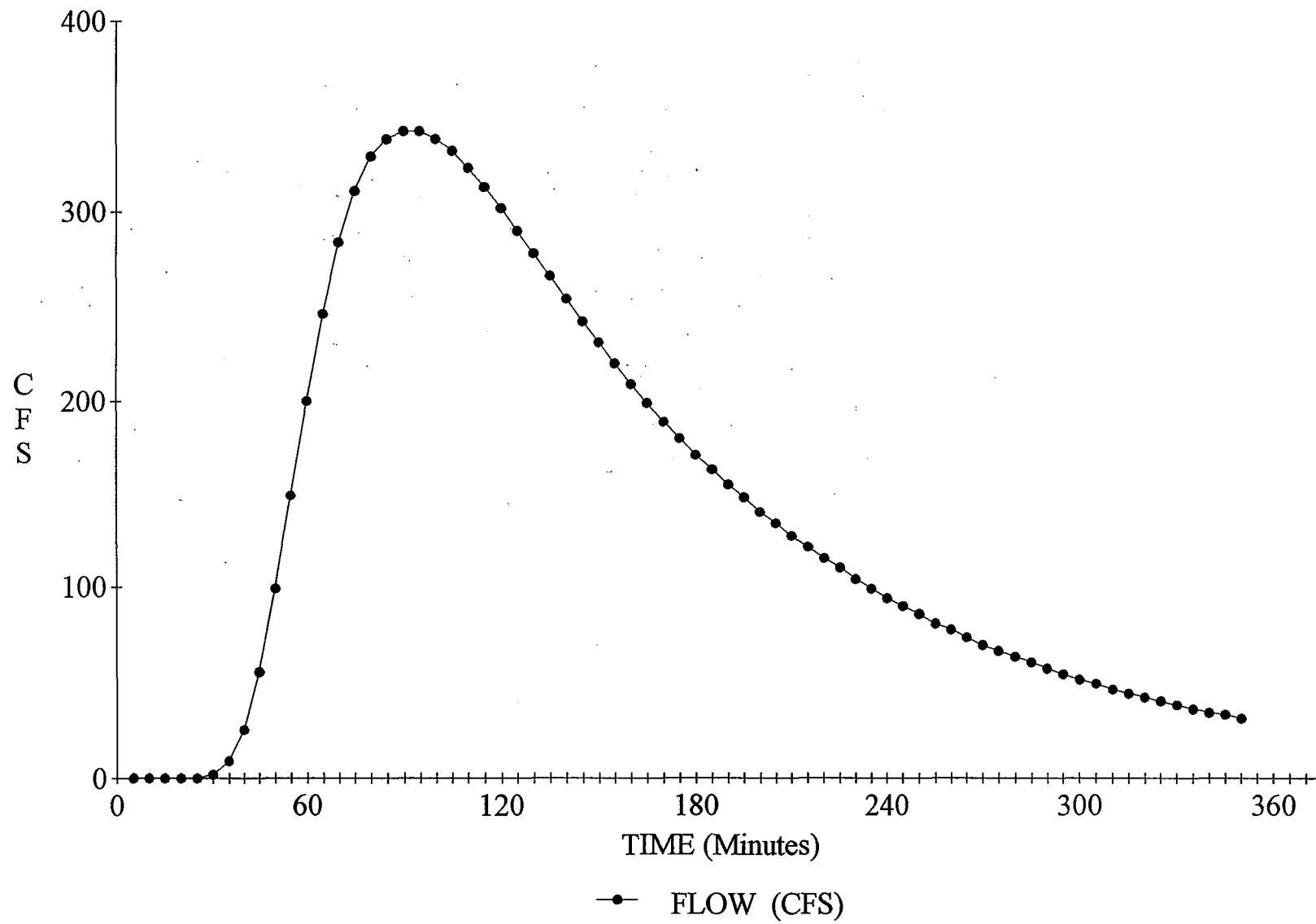
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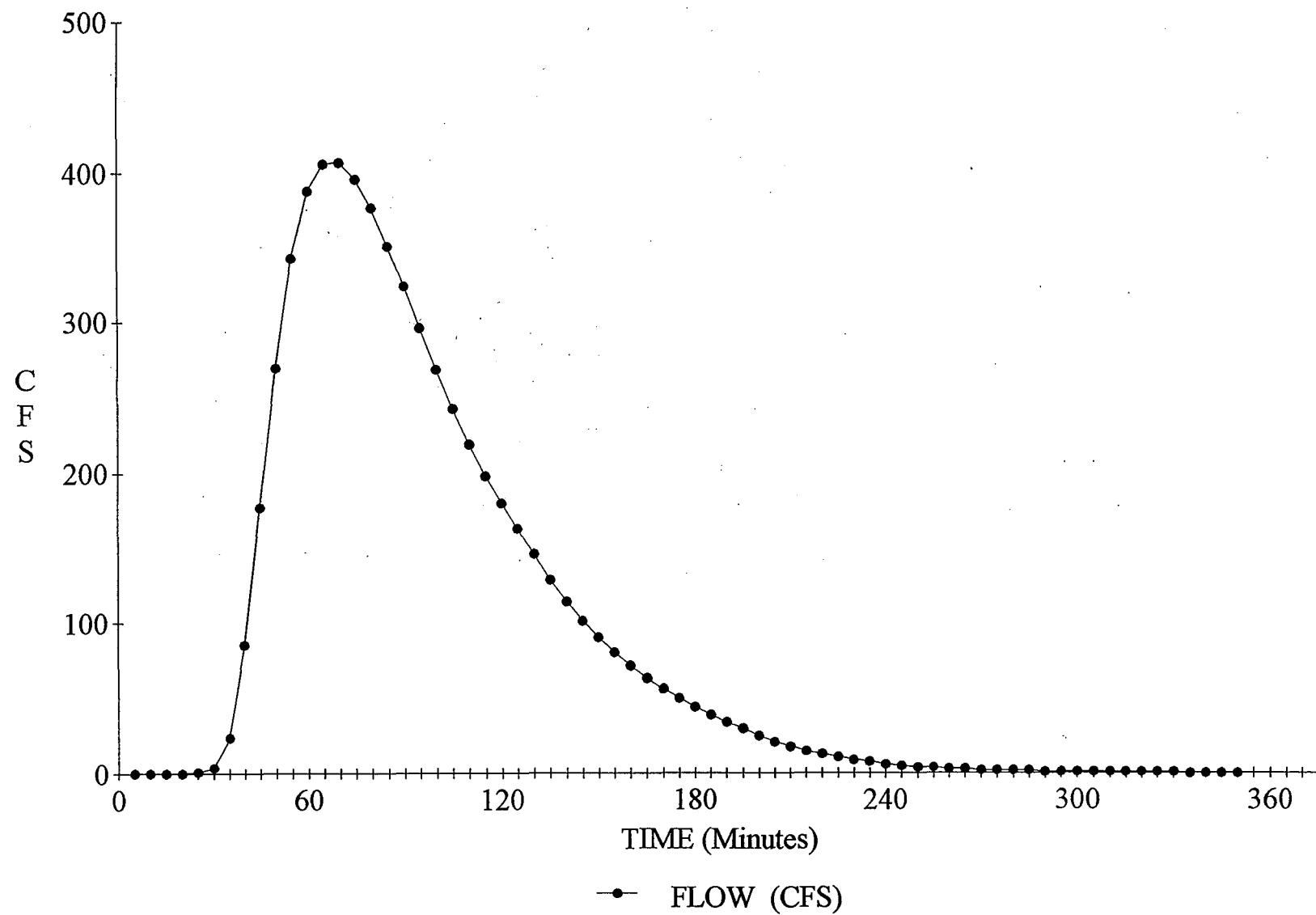
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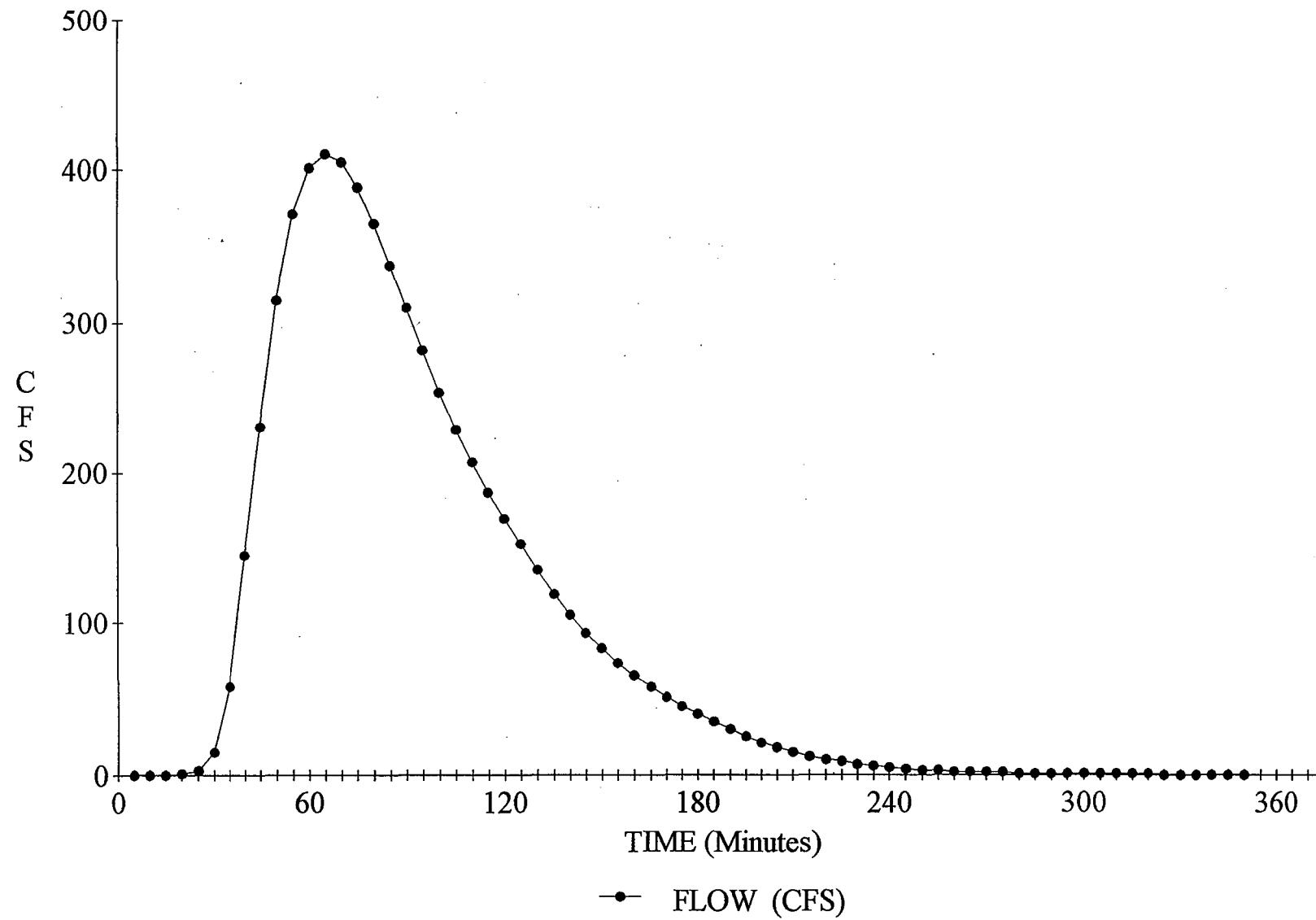
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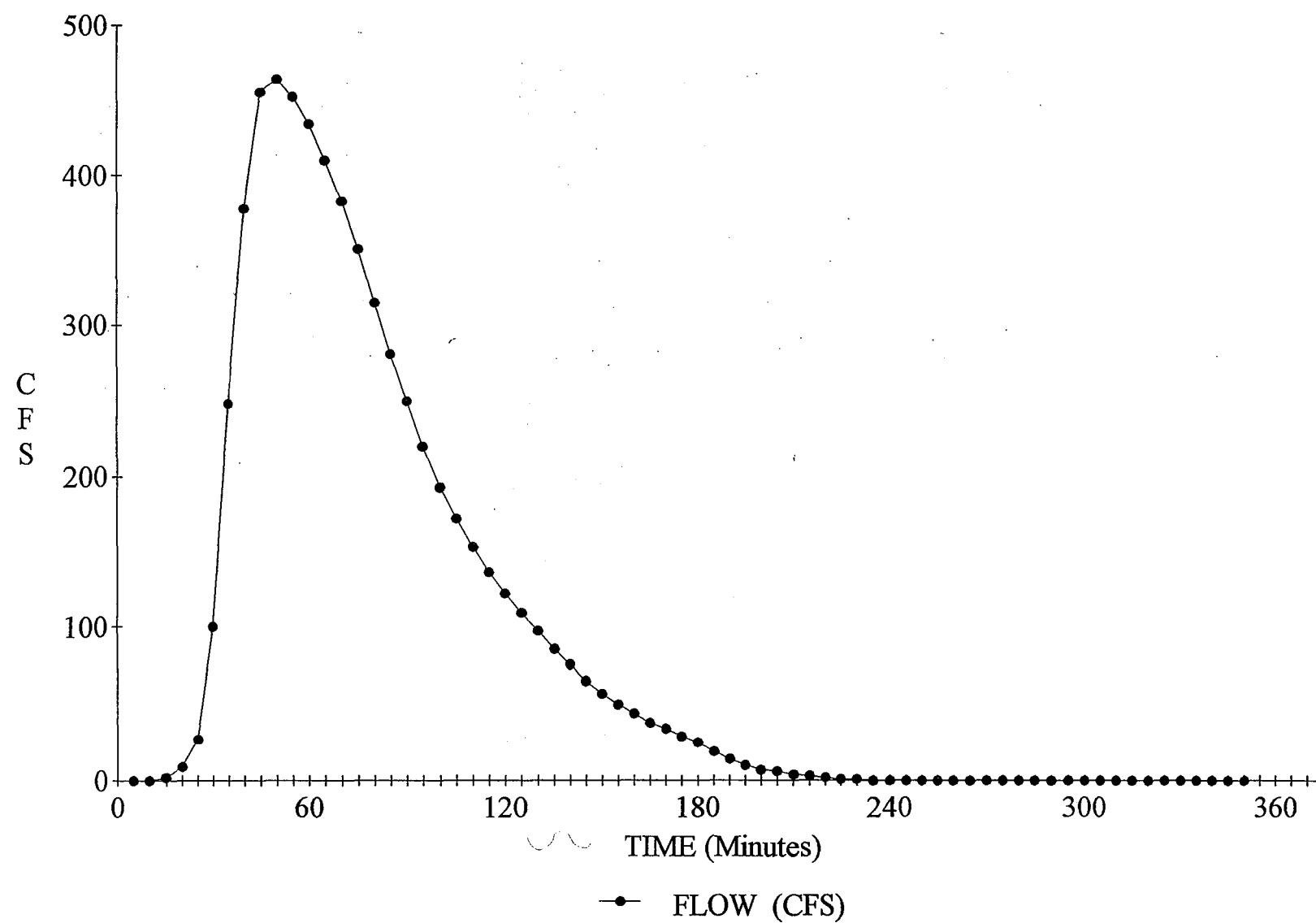
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100 YEAR DEVELOPED



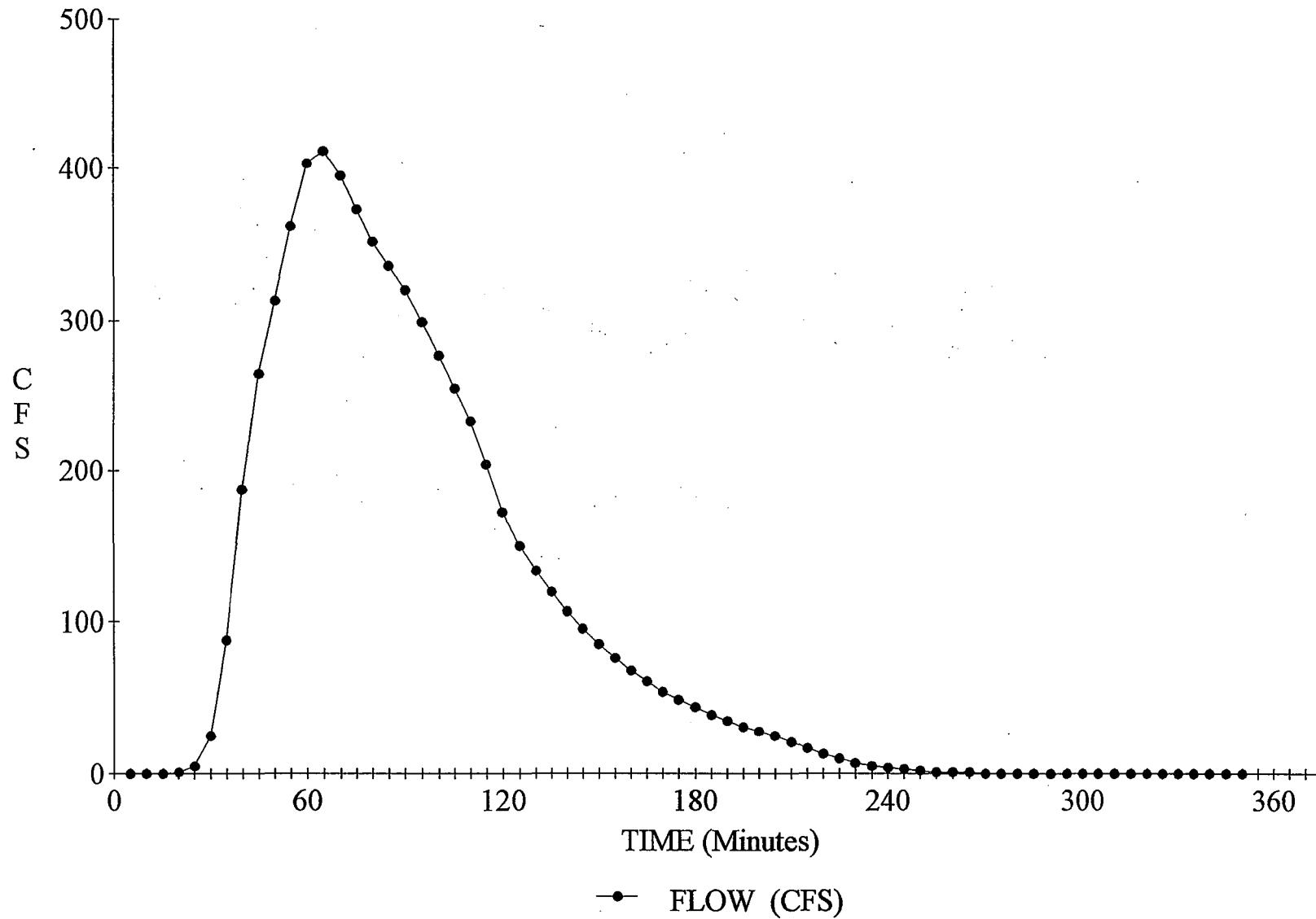
FLOW HYDROGRAPH -CONVEYANCE ELEMENT 26
100 YEAR DEVELOPED



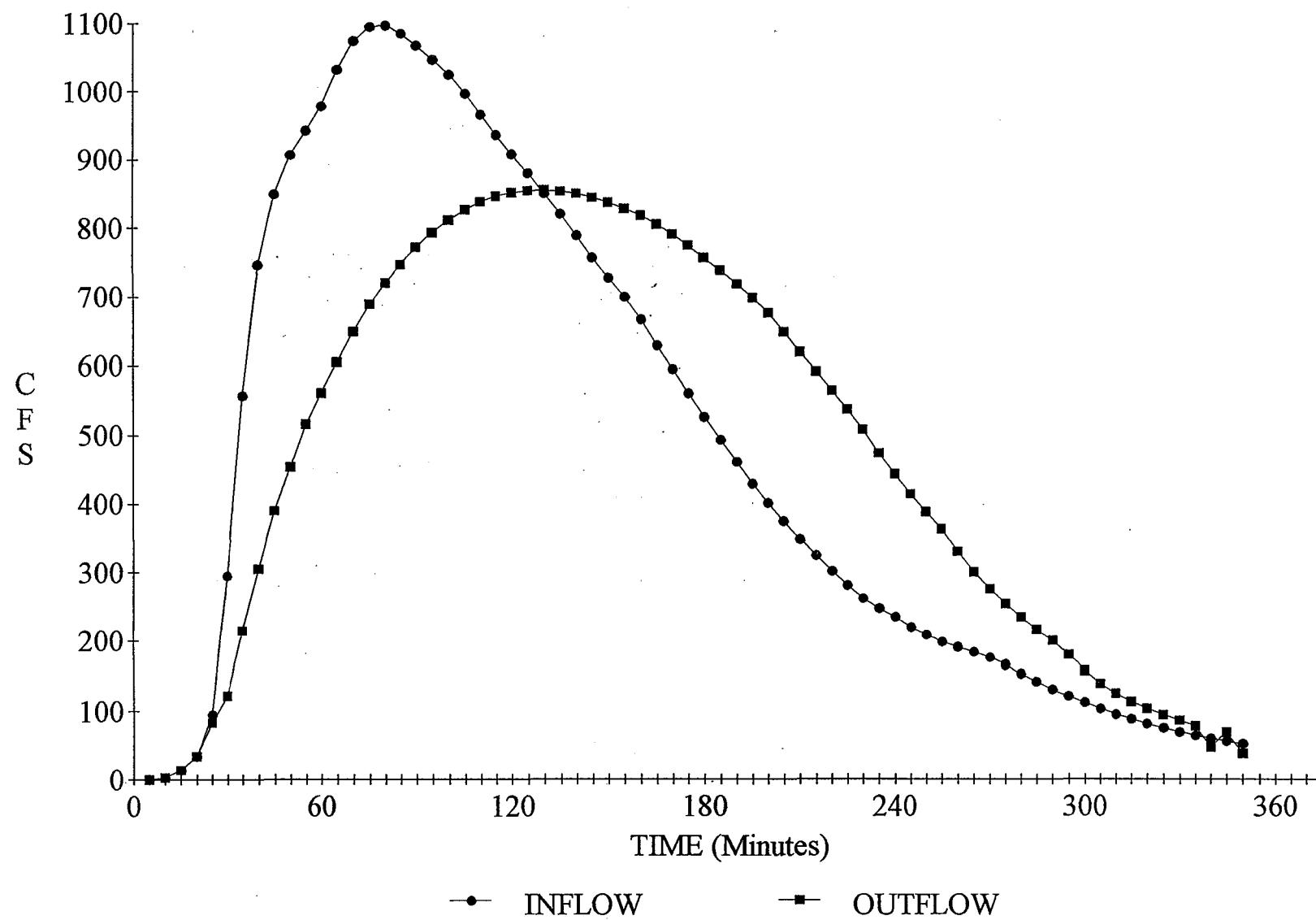
FLOW HYDROGRAPH -CONVEYANCE ELEMENT 27
100 YEAR DEVELOPED



FLOW HYDROGRAPH -CONVEYANCE ELEMENT 28
100 YEAR DEVELOPED



DETENTION CELL 101 HYDROGRAPH
100 YEAR DEVELOPED

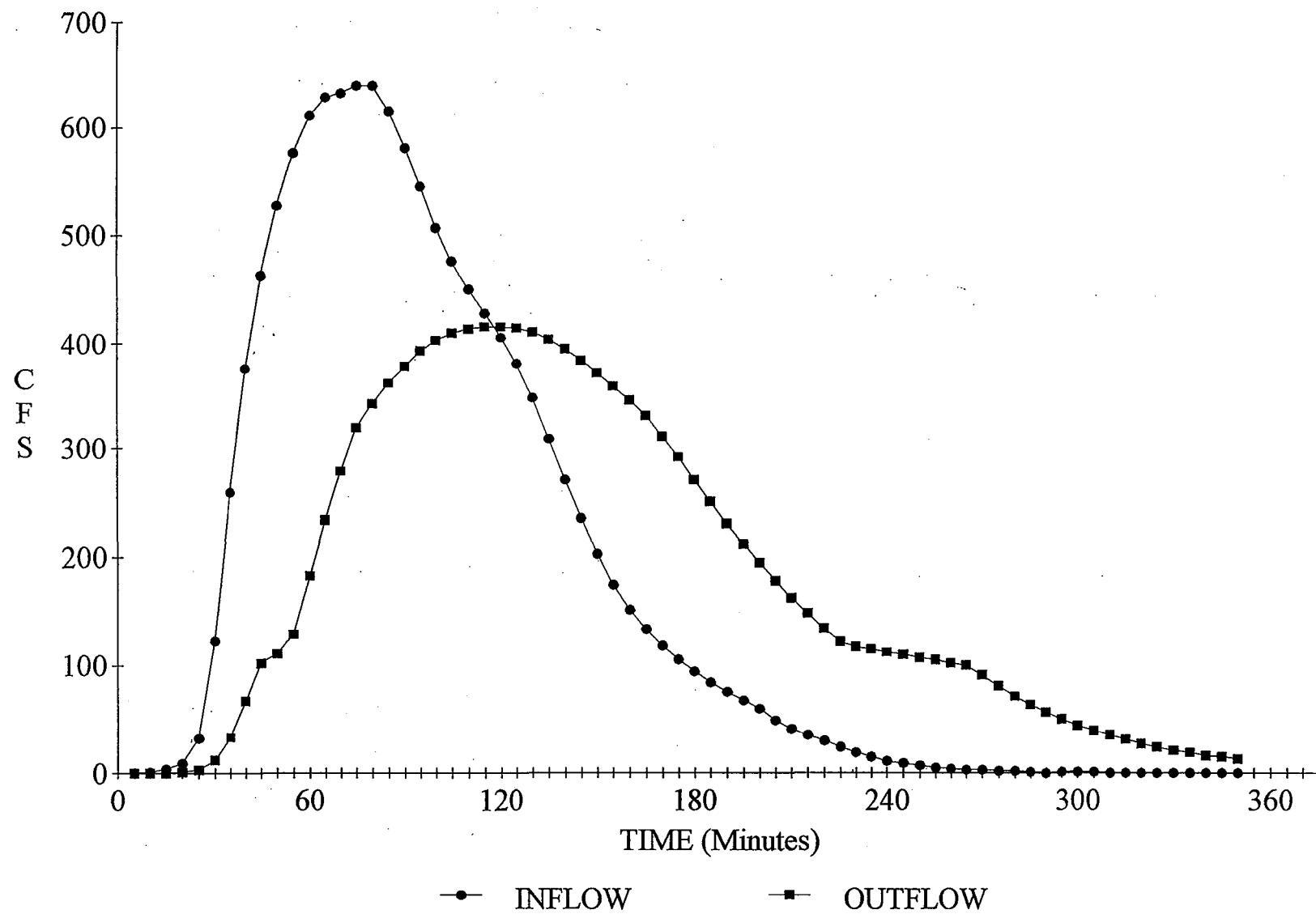


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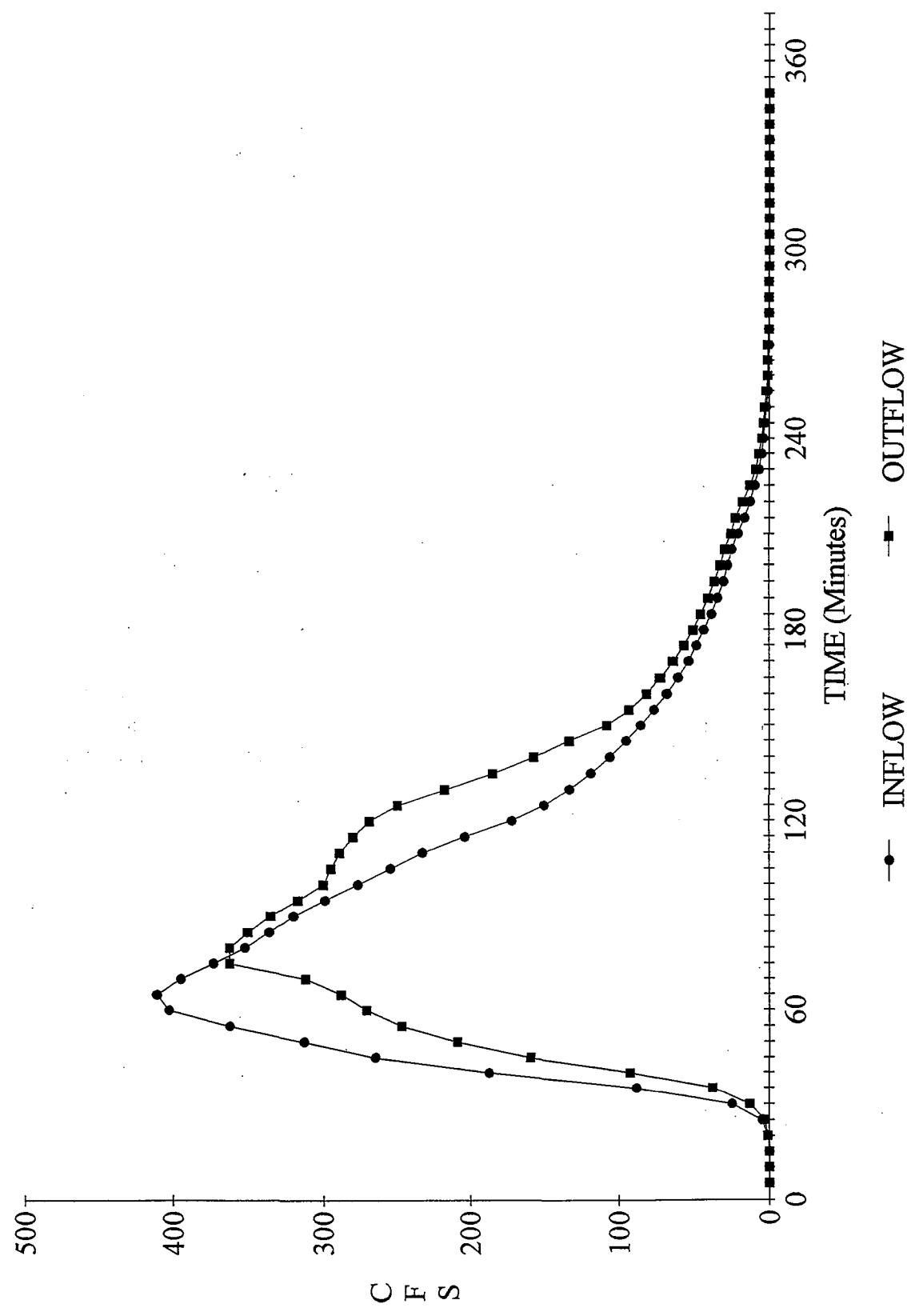
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C

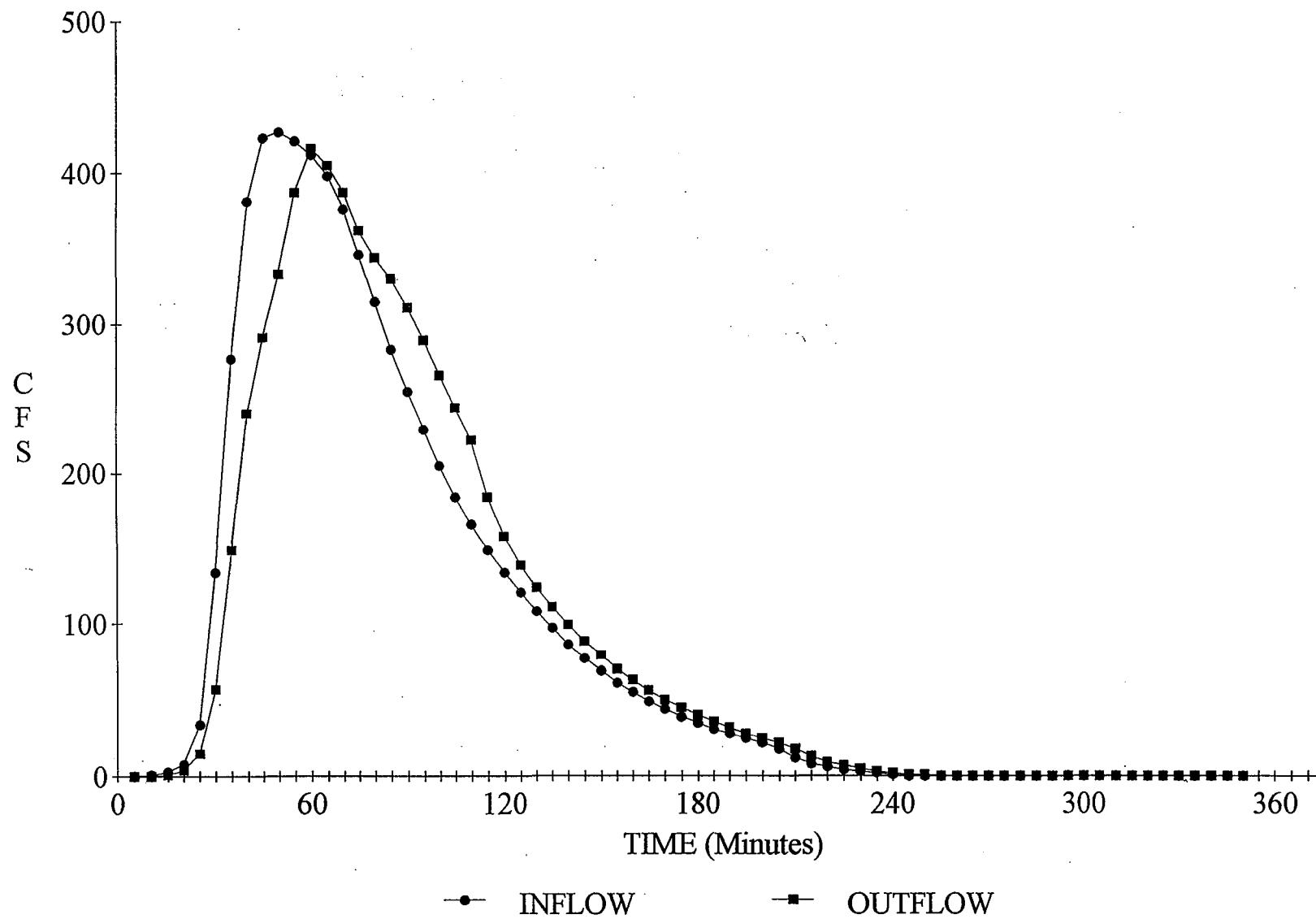
DETENTION CELL 102 HYDROGRAPH
100 YEAR DEVELOPED



DETENTION CELL 103 HYDROGRAPH
100 YEAR DEVELOPED



DETENTION CELL 104 HYDROGRAPH
100 YEAR DEVELOPED



INDEX

DESIGN PLAN CUHP HYDROGRAPH DATA

10 year storm
100 year storm

DESIGN PLAN SWMM ROUTING DATA

10 year storm
100 year storm

EXISTING CONDITION CUHP HYDROGRAPH DATA

10 year storm
100 year storm

2 RED ROCK CANYON DRAINAGE BASIN - 10 YEAR DEVELOPED DRAINAGE ANALYSIS
01010-YEAR 10 1.86

7001015.0RRCBSA001 RED ROCK CANYON SUBBASIN A
0.494 1.61 1.15 11.4 .030 0.35 0.05 4.80.0011 .837
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7001015.0RRCSSBN014 RED ROCK CANYON SUBBASIN N
0.417 1.14 0.49 11.2 .026 0.35 0.05 3.57.0018 .538
E

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN - 10 YEAR DEVELOPED DRAINAGE ANALYSIS

BASIN ID: RRCBSA -- BASIN COMMENT: RED ROCK CANYON SUBBASIN A

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
-------------------------	-------------------------	--------------------------	--------------------------	------------------	------------------------

0.49	1.61	1.15	11.40	.0300	5.00
------	------	------	-------	-------	------

COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.123	0.260
-------	-------

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH (CFS)	PEAK (CFS)	VOLUME OF RUNOFF (AF)
-----------------------	-----------------------------------	--------------------------	---------------	--------------------------

25.60	432.36	213.59	213.59	26.35
-------	--------	--------	--------	-------

WIDTH AT 50 = 69. MIN. WIDTH AT 75 = 36. MIN. K50 = 0.22 K75 = 0.30

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.35 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.80 IN./HR. DECAY = 0.00110/SECOND FNINFL = 0.84 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	100.	82.	*	200.	22.	*
5.	36.	*	105.	76.	*	205.	20.	*
10.	103.	*	110.	72.	*	210.	19.	*
15.	163.	*	115.	67.	*	215.	18.	*
20.	201.	*	120.	63.	*	220.	17.	*
25.	213.	*	125.	59.	*	225.	16.	*
30.	208.	*	130.	55.	*	230.	15.	*
35.	192.	*	135.	51.	*	235.	14.	*
40.	173.	*	140.	48.	*	240.	13.	*
45.	160.	*	145.	45.	*	245.	12.	*
50.	159.	*	150.	42.	*	250.	11.	*
55.	152.	*	155.	40.	*	255.	11.	*
60.	143.	*	160.	37.	*	260.	10.	*
65.	134.	*	165.	35.	*	265.	9.	*
70.	125.	*	170.	32.	*	270.	9.	*
75.	115.	*	175.	30.	*	275.	8.	*
80.	106.	*	180.	28.	*	280.	8.	*
85.	99.	*	185.	27.	*	285.	0.	*
90.	93.	*	190.	25.	*	0.	0.	*
95.	87.	*	195.	23.	*	0.	0.	*

BASIN ID: RRCSBA -- BASIN COMMENT: RED ROCK CANYON SUBBASIN A

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 010-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	155.	0.00	0.000	24.	*
5.	0.04	0.000	0.	*	160.	0.00	0.000	23.	*
10.	0.07	0.006	0.	*	165.	0.00	0.000	21.	*
15.	0.15	0.017	1.	*	170.	0.00	0.000	20.	*
20.	0.28	0.030	4.	*	175.	0.00	0.000	19.	*
25.	0.47	0.117	11.	*	180.	0.00	0.000	18.	*
30.	0.22	0.112	26.	*	185.	0.00	0.000	16.	*
35.	0.10	0.011	42.	*	190.	0.00	0.000	15.	*
40.	0.08	0.009	54.	*	195.	0.00	0.000	14.	*
45.	0.07	0.008	61.	*	200.	0.00	0.000	13.	*
50.	0.06	0.006	63.	*	205.	0.00	0.000	13.	*
55.	0.06	0.006	61.	*	210.	0.00	0.000	12.	*
60.	0.06	0.006	58.	*	215.	0.00	0.000	11.	*
65.	0.06	0.006	55.	*	220.	0.00	0.000	10.	*
70.	0.06	0.006	54.	*	225.	0.00	0.000	10.	*
75.	0.06	0.006	54.	*	230.	0.00	0.000	9.	*
80.	0.05	0.005	52.	*	235.	0.00	0.000	8.	*
85.	0.04	0.004	51.	*	240.	0.00	0.000	8.	*
90.	0.04	0.004	48.	*	245.	0.00	0.000	7.	*
95.	0.04	0.004	46.	*	250.	0.00	0.000	7.	*
100.	0.04	0.004	44.	*	255.	0.00	0.000	7.	*
105.	0.04	0.004	42.	*	260.	0.00	0.000	6.	*
110.	0.04	0.004	40.	*	265.	0.00	0.000	6.	*
115.	0.03	0.003	39.	*	270.	0.00	0.000	5.	*
120.	0.02	0.003	37.	*	275.	0.00	0.000	5.	*
125.	0.00	0.000	35.	*	280.	0.00	0.000	5.	*
130.	0.00	0.000	34.	*	285.	0.00	0.000	4.	*
135.	0.00	0.000	32.	*	290.	0.00	0.000	4.	*
140.	0.00	0.000	30.	*	295.	0.00	0.000	4.	*
145.	0.00	0.000	28.	*	300.	0.00	0.000	3.	*
150.	0.00	0.000	26.	*	305.	0.00	0.000	2.	*

TOTAL PRECIP. = 2.15 (1-HOUR RAIN = 1.86) EXCESS PRECIP. = 0.383 INCHES

VOLUME OF EXCESS PRECIP = 10. ACRE-FEET

PEAK Q = 63. CFS TIME OF PEAK = 50. MIN.

INFILT.= 4.80 IN/HR DECAY = 0.00110 FNINF = 0.84 IN/HR

MAX.PERV.RET.=0.35 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN - 10 YEAR DEVELOPED DRAINAGE ANALYSIS

BASIN ID: RRCSSB -- BASIN COMMENT: RED ROCK CANYON SUBBASIN B

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.22	1.14	0.46	25.70	.0400	5.00

COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.104 0.287

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH PEAK (CFS)	VOLUME OF RUNOFF (AF)
12.38	1117.81	251.51	12.00

WIDTH AT 50 = 27. MIN. WIDTH AT 75 = 14. MIN. K50 = 0.28 K75 = 0.38

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.35 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.57 IN./HR. DECAY = 0.00150/SECOND FNINFL = 0.70 IN./HR.

TIME	UNIT	TIME	UNIT	TIME	UNIT
	HYDROGRAPH	*	HYDROGRAPH	*	HYDROGRAPH
0.	0.	*	40.	94.	*
5.	127.	*	45.	78.	*
10.	240.	*	50.	65.	*
15.	241.	*	55.	55.	*
20.	197.	*	60.	46.	*
25.	166.	*	65.	38.	*
30.	136.	*	70.	32.	*
35.	112.	*	75.	27.	*

BASIN ID: RRCSBB -- BASIN COMMENT: RED ROCK CANYON SUBBASIN B

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 010-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	90.	0.04	0.009	39.	*
5.	0.04	0.000	0.	*	95.	0.04	0.009	35.	*
10.	0.07	0.014	2.	*	100.	0.04	0.009	32.	*
15.	0.15	0.037	8.	*	105.	0.04	0.009	29.	*
20.	0.28	0.068	21.	*	110.	0.04	0.009	27.	*
25.	0.47	0.239	58.	*	115.	0.03	0.008	25.	*
30.	0.22	0.157	103.	*	120.	0.02	0.006	23.	*
35.	0.10	0.047	123.	*	125.	0.00	0.000	20.	*
40.	0.08	0.028	118.	*	130.	0.00	0.000	16.	*
45.	0.07	0.021	106.	*	135.	0.00	0.000	12.	*
50.	0.06	0.015	94.	*	140.	0.00	0.000	9.	*
55.	0.06	0.015	82.	*	145.	0.00	0.000	7.	*
60.	0.06	0.015	72.	*	150.	0.00	0.000	6.	*
65.	0.06	0.015	65.	*	155.	0.00	0.000	5.	*
70.	0.06	0.015	58.	*	160.	0.00	0.000	4.	*
75.	0.06	0.015	53.	*	165.	0.00	0.000	3.	*
80.	0.05	0.011	49.	*	170.	0.00	0.000	3.	*
85.	0.04	0.009	44.	*	175.	0.00	0.000	2.	*

TOTAL PRECIP. = 2.15 (1-HOUR RAIN = 1.86) EXCESS PRECIP. = 0.776 INCHES

VOLUME OF EXCESS PRECIP = 9. ACRE-FEET

PEAK Q = 123. CFS TIME OF PEAK = 35. MIN.

INFILT.= 4.57 IN/HR DECAY = 0.00150 FNINF = 0.70 IN/HR

MAX.PERV.RET.=0.35 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN - 10 YEAR DEVELOPED DRAINAGE ANALYSIS

BASIN ID: RRCSBC -- BASIN COMMENT: RED ROCK CANYON SUBBASIN C

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
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0.17	0.88	0.44	6.70	.0560	5.00
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COEFFICIENT (REFLECTING TIME TO PEAK)	COEFFICIENT (RELATED TO PEAK RATE OF RUNOFF)
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0.138	0.232
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CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH (CFS)	PEAK (CFS)	VOLUME OF RUNOFF (AF)
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13.00	848.13	144.18	9.07	
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WIDTH AT 50 = 35. MIN. WIDTH AT 75 = 18. MIN. K50 = 0.22 K75 = 0.30

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.30 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.89 IN./HR. DECAY = 0.00080/SECOND FNINFL = 0.96 IN./HR.

TIME	UNIT	TIME	UNIT	TIME	UNIT
	HYDROGRAPH	*	HYDROGRAPH	*	HYDROGRAPH
0.	0.	*	50.	57.	*
5.	68.	*	55.	50.	*
10.	135.	*	60.	44.	*
15.	141.	*	65.	39.	*
20.	118.	*	70.	35.	*
25.	106.	*	75.	31.	*
30.	98.	*	80.	27.	*
35.	86.	*	85.	24.	*
40.	73.	*	90.	21.	*
45.	65.	*	95.	19.	*

BASIN ID: RRCSC -- BASIN COMMENT: RED ROCK CANYON SUBBASIN C

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 010-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	80.	0.05	0.003	11.	*
5.	0.04	0.000	0.	*	85.	0.04	0.002	10.	*
10.	0.07	0.004	0.	*	90.	0.04	0.002	9.	*
15.	0.15	0.010	1.	*	95.	0.04	0.002	9.	*
20.	0.28	0.018	3.	*	100.	0.04	0.002	8.	*
25.	0.47	0.059	8.	*	105.	0.04	0.002	7.	*
30.	0.22	0.066	17.	*	110.	0.04	0.002	7.	*
35.	0.10	0.007	21.	*	115.	0.03	0.002	6.	*
40.	0.08	0.005	21.	*	120.	0.02	0.002	6.	*
45.	0.07	0.004	19.	*	125.	0.00	0.000	5.	*
50.	0.06	0.004	18.	*	130.	0.00	0.000	5.	*
55.	0.06	0.004	16.	*	135.	0.00	0.000	4.	*
60.	0.06	0.004	15.	*	140.	0.00	0.000	4.	*
65.	0.06	0.004	14.	*	145.	0.00	0.000	3.	*
70.	0.06	0.004	13.	*	150.	0.00	0.000	3.	*
75.	0.06	0.004	12.	*	155.	0.00	0.000	2.	*

TOTAL PRECIP. = 2.15 (1-HOUR RAIN = 1.86) EXCESS PRECIP. = 0.216 INCHES

VOLUME OF EXCESS PRECIP = 2. ACRE-FEET

PEAK Q = 21. CFS TIME OF PEAK = 35. MIN.

INFILT.= 4.89 IN/HR DECAY = 0.00080 FNINF = 0.96 IN/HR

MAX.PERV.RET.=0.30 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN - 10 YEAR DEVELOPED DRAINAGE ANALYSIS

BASIN ID: RRCSD -- BASIN COMMENT: RED ROCK CANYON SUBBASIN D

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.38	1.30	0.66	8.50	.0470	5.00

COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.131 0.254

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH (CFS)	PEAK (CFS)	VOLUME OF RUNOFF (AF)
17.77	638.72	241.44	241.44	20.16

WIDTH AT 50 = 47. MIN. WIDTH AT 75 = 24. MIN. K50 = 0.23 K75 = 0.31

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.30 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.79 IN./HR. DECAY = 0.00120/SECOND FNINFL = 0.83 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	70.	88.	*	140.	22.	*
5.	73.	*	75.	80.	*	145.	20.	*
10.	178.	*	80.	72.	*	150.	18.	*
15.	235.	*	85.	66.	*	155.	16.	*
20.	238.	*	90.	59.	*	160.	15.	*
25.	213.	*	95.	54.	*	165.	14.	*
30.	185.	*	100.	49.	*	170.	12.	*
35.	180.	*	105.	44.	*	175.	11.	*
40.	164.	*	110.	40.	*	180.	10.	*
45.	149.	*	115.	36.	*	185.	9.	*
50.	133.	*	120.	33.	*	190.	8.	*
55.	119.	*	125.	30.	*	195.	7.	*
60.	107.	*	130.	27.	*	200.	0.	*
65.	97.	*	135.	24.	*	0.	0.	*

BASIN ID: RRCSD -- BASIN COMMENT: RED ROCK CANYON SUBBASIN D

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 010-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	110.	0.04	0.003	29.	*
5.	0.04	0.000	0.	*	115.	0.03	0.003	27.	*
10.	0.07	0.005	0.	*	120.	0.02	0.002	25.	*
15.	0.15	0.012	2.	*	125.	0.00	0.000	23.	*
20.	0.28	0.023	5.	*	130.	0.00	0.000	21.	*
25.	0.47	0.171	20.	*	135.	0.00	0.000	20.	*
30.	0.22	0.117	48.	*	140.	0.00	0.000	18.	*
35.	0.10	0.011	71.	*	145.	0.00	0.000	16.	*
40.	0.08	0.006	78.	*	150.	0.00	0.000	15.	*
45.	0.07	0.006	76.	*	155.	0.00	0.000	13.	*
50.	0.06	0.005	69.	*	160.	0.00	0.000	12.	*
55.	0.06	0.005	65.	*	165.	0.00	0.000	11.	*
60.	0.06	0.005	62.	*	170.	0.00	0.000	10.	*
65.	0.06	0.005	58.	*	175.	0.00	0.000	9.	*
70.	0.06	0.005	53.	*	180.	0.00	0.000	8.	*
75.	0.06	0.005	49.	*	185.	0.00	0.000	7.	*
80.	0.05	0.004	45.	*	190.	0.00	0.000	7.	*
85.	0.04	0.003	42.	*	195.	0.00	0.000	6.	*
90.	0.04	0.003	39.	*	200.	0.00	0.000	5.	*
95.	0.04	0.003	36.	*	205.	0.00	0.000	5.	*
100.	0.04	0.003	34.	*	210.	0.00	0.000	4.	*
105.	0.04	0.003	31.	*	215.	0.00	0.000	4.	*

TOTAL PRECIP. = 2.15 (1-HOUR RAIN = 1.86) EXCESS PRECIP. = 0.405 INCHES

VOLUME OF EXCESS PRECIP = 8. ACRE-FEET

PEAK Q = 78. CFS TIME OF PEAK = 40. MIN.

INFILT.= 4.79 IN/HR DECAY = 0.00120 FNINF = 0.83 IN/HR

MAX.PERV.RET.=0.30 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN - 10 YEAR DEVELOPED DRAINAGE ANALYSIS

BASIN ID: RRCSE -- BASIN COMMENT: RED ROCK CANYON SUBBASIN E

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.24	1.52	0.89	6.01	.0480	5.00

COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.141 0.247

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH PEAK (CFS)	VOLUME OF RUNOFF (AF)
22.73	469.59	113.17	12.85

WIDTH AT 50 = 64. MIN. WIDTH AT 75 = 33. MIN. K50 = 0.21 K75 = 0.29

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.25 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.79 IN./HR. DECAY = 0.00120/SECOND FNINFL = 0.83 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	80.	52.	*	160.	18.	*
5.	23.	*	85.	48.	*	165.	17.	*
10.	64.	*	90.	45.	*	170.	16.	*
15.	96.	*	95.	42.	*	175.	15.	*
20.	111.	*	100.	40.	*	180.	14.	*
25.	112.	*	105.	37.	*	185.	13.	*
30.	104.	*	110.	35.	*	190.	12.	*
35.	92.	*	115.	32.	*	195.	11.	*
40.	84.	*	120.	30.	*	200.	11.	*
45.	83.	*	125.	28.	*	205.	10.	*
50.	81.	*	130.	27.	*	210.	9.	*
55.	76.	*	135.	25.	*	215.	9.	*
60.	70.	*	140.	23.	*	220.	8.	*
65.	65.	*	145.	22.	*	225.	8.	*
70.	60.	*	150.	20.	*	230.	0.	*
75.	55.	*	155.	19.	*	0.	0.	*

BASIN ID: RRCSBE -- BASIN COMMENT: RED ROCK CANYON SUBBASIN E

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 010-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	125.	0.00	0.000	17.	*
5.	0.04	0.000	0.	*	130.	0.00	0.000	16.	*
10.	0.07	0.003	0.	*	135.	0.00	0.000	15.	*
15.	0.15	0.009	0.	*	140.	0.00	0.000	14.	*
20.	0.28	0.016	1.	*	145.	0.00	0.000	13.	*
25.	0.47	0.211	7.	*	150.	0.00	0.000	12.	*
30.	0.22	0.115	19.	*	155.	0.00	0.000	12.	*
35.	0.10	0.009	31.	*	160.	0.00	0.000	11.	*
40.	0.08	0.005	38.	*	165.	0.00	0.000	10.	*
45.	0.07	0.004	40.	*	170.	0.00	0.000	9.	*
50.	0.06	0.003	39.	*	175.	0.00	0.000	9.	*
55.	0.06	0.003	36.	*	180.	0.00	0.000	8.	*
60.	0.06	0.003	33.	*	185.	0.00	0.000	8.	*
65.	0.06	0.003	32.	*	190.	0.00	0.000	7.	*
70.	0.06	0.003	32.	*	195.	0.00	0.000	7.	*
75.	0.06	0.003	30.	*	200.	0.00	0.000	6.	*
80.	0.05	0.003	29.	*	205.	0.00	0.000	6.	*
85.	0.04	0.002	27.	*	210.	0.00	0.000	6.	*
90.	0.04	0.002	25.	*	215.	0.00	0.000	5.	*
95.	0.04	0.002	24.	*	220.	0.00	0.000	5.	*
100.	0.04	0.002	22.	*	225.	0.00	0.000	5.	*
105.	0.04	0.002	21.	*	230.	0.00	0.000	4.	*
110.	0.04	0.002	20.	*	235.	0.00	0.000	4.	*
115.	0.03	0.002	19.	*	240.	0.00	0.000	4.	*
120.	0.02	0.001	18.	*	245.	0.00	0.000	3.	*

TOTAL PRECIP. = 2.15 (1-HOUR RAIN = 1.86) EXCESS PRECIP. = 0.410 INCHES

VOLUME OF EXCESS PRECIP = 5. ACRE-FEET

PEAK Q = 40. CFS TIME OF PEAK = 45. MIN.

INFILT.= 4.79 IN/HR DECAY=0.00120 FNINF = 0.83 IN/HR

MAX.PERV.RET.=0.25 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN - 10 YEAR DEVELOPED DRAINAGE ANALYSIS

BASIN ID: RRCBSF -- BASIN COMMENT: RED ROCK CANYON SUBBASIN F

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
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0.28	1.31	0.62	4.50	.0320	5.00
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COEFFICIENT (REFLECTING TIME TO PEAK)	COEFFICIENT (RELATED TO PEAK RATE OF RUNOFF)
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0.146	0.260
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CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAP (CFS)	PEAK (CFS)	VOLUME OF RUNOFF (AF)
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20.65	550.75	153.11	153.11	14.83
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WIDTH AT 50 = 54. MIN. WIDTH AT 75 = 28. MIN. K50 = 0.23 K75 = 0.31

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.25 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.84 IN./HR. DECAY = 0.00100/SECOND FNINFL = 0.88 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	75.	63.	*	150.	18.	*
5.	37.	*	80.	58.	*	155.	17.	*
10.	97.	*	85.	53.	*	160.	16.	*
15.	139.	*	90.	49.	*	165.	14.	*
20.	153.	*	95.	45.	*	170.	13.	*
25.	147.	*	100.	42.	*	175.	12.	*
30.	132.	*	105.	38.	*	180.	11.	*
35.	117.	*	110.	35.	*	185.	10.	*
40.	115.	*	115.	32.	*	190.	9.	*
45.	107.	*	120.	30.	*	195.	9.	*
50.	98.	*	125.	28.	*	200.	8.	*
55.	90.	*	130.	25.	*	205.	7.	*
60.	81.	*	135.	23.	*	210.	0.	*
65.	74.	*	140.	22.	*	0.	0.	*
70.	68.	*	145.	20.	*	0.	0.	*

BASIN ID: RRCSBF -- BASIN COMMENT: RED ROCK CANYON SUBBASIN F

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 010-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	115.	0.03	0.001	16.	*
5.	0.04	0.000	0.	*	120.	0.02	0.001	15.	*
10.	0.07	0.002	0.	*	125.	0.00	0.000	14.	*
15.	0.15	0.007	0.	*	130.	0.00	0.000	13.	*
20.	0.28	0.012	1.	*	135.	0.00	0.000	12.	*
25.	0.47	0.160	8.	*	140.	0.00	0.000	11.	*
30.	0.22	0.092	22.	*	145.	0.00	0.000	10.	*
35.	0.10	0.004	34.	*	150.	0.00	0.000	9.	*
40.	0.08	0.003	41.	*	155.	0.00	0.000	9.	*
45.	0.07	0.003	41.	*	160.	0.00	0.000	8.	*
50.	0.06	0.003	39.	*	165.	0.00	0.000	7.	*
55.	0.06	0.003	35.	*	170.	0.00	0.000	7.	*
60.	0.06	0.003	34.	*	175.	0.00	0.000	6.	*
65.	0.06	0.003	32.	*	180.	0.00	0.000	6.	*
70.	0.06	0.003	30.	*	185.	0.00	0.000	5.	*
75.	0.06	0.003	28.	*	190.	0.00	0.000	5.	*
80.	0.05	0.002	26.	*	195.	0.00	0.000	4.	*
85.	0.04	0.002	24.	*	200.	0.00	0.000	4.	*
90.	0.04	0.002	22.	*	205.	0.00	0.000	4.	*
95.	0.04	0.002	21.	*	210.	0.00	0.000	3.	*
100.	0.04	0.002	19.	*	215.	0.00	0.000	3.	*
105.	0.04	0.002	18.	*	220.	0.00	0.000	3.	*
110.	0.04	0.002	17.	*	225.	0.00	0.000	3.	*

TOTAL PRECIP. = 2.15 (1-HOUR RAIN = 1.86) EXCESS PRECIP. = 0.313 INCHES

VOLUME OF EXCESS PRECIP = 5. ACRE-FEET

PEAK Q = 41. CFS TIME OF PEAK = 45. MIN.

INFILT.= 4.84 IN/HR DECAY =0.00100 FNINF = 0.88 IN/HR

MAX.PERV.RET.=0.25 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN - 10 YEAR DEVELOPED DRAINAGE ANALYSIS

BASIN ID: RRCBSG -- BASIN COMMENT: RED ROCK CANYON SUBBASIN G

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.33	1.03	0.57	9.10	.0520	5.00

COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.129 0.247

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAP (CFS)	PEAK (CFS)	VOLUME OF RUNOFF (AF)
14.71	775.73	255.99	17.60	

WIDTH AT 50 = 39. MIN. WIDTH AT .75 = 20. MIN. K50 = 0.23 K75 = 0.31

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.30 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.43 IN./HR. DECAY = 0.00150/SECOND FNINFL = 0.69 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	60.	88.	*	120.	21.	*
5.	102.	*	65.	78.	*	125.	18.	*
10.	222.	*	70.	69.	*	130.	16.	*
15.	256.	*	75.	61.	*	135.	14.	*
20.	231.	*	80.	54.	*	140.	13.	*
25.	196.	*	85.	48.	*	145.	11.	*
30.	186.	*	90.	43.	*	150.	10.	*
35.	166.	*	95.	38.	*	155.	9.	*
40.	146.	*	100.	33.	*	160.	8.	*
45.	127.	*	105.	30.	*	165.	0.	*
50.	112.	*	110.	26.	*	0.	0.	*
55.	99.	*	115.	23.	*	0.	0.	*

BASIN ID: RRCBSG -- BASIN COMMENT: RED ROCK CANYON SUBBASIN G

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 010-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	100.	0.04	0.003	37.	*
5.	0.04	0.000	0.	*	105.	0.04	0.003	34.	*
10.	0.07	0.005	0.	*	110.	0.04	0.003	31.	*
15.	0.15	0.013	2.	*	115.	0.03	0.003	28.	*
20.	0.28	0.024	7.	*	120.	0.02	0.002	26.	*
25.	0.47	0.244	35.	*	125.	0.00	0.000	23.	*
30.	0.22	0.146	79.	*	130.	0.00	0.000	21.	*
35.	0.10	0.037	108.	*	135.	0.00	0.000	19.	*
40.	0.08	0.018	112.	*	140.	0.00	0.000	16.	*
45.	0.07	0.012	104.	*	145.	0.00	0.000	15.	*
50.	0.06	0.005	97.	*	150.	0.00	0.000	13.	*
55.	0.06	0.005	90.	*	155.	0.00	0.000	11.	*
60.	0.06	0.006	81.	*	160.	0.00	0.000	10.	*
65.	0.06	0.006	73.	*	165.	0.00	0.000	9.	*
70.	0.06	0.007	66.	*	170.	0.00	0.000	8.	*
75.	0.06	0.007	60.	*	175.	0.00	0.000	7.	*
80.	0.05	0.004	55.	*	180.	0.00	0.000	6.	*
85.	0.04	0.003	50.	*	185.	0.00	0.000	4.	*
90.	0.04	0.003	45.	*	190.	0.00	0.000	2.	*
95.	0.04	0.003	41.	*	195.	0.00	0.000	2.	*

TOTAL PRECIP. = 2.15 (1-HOUR RAIN = 1.86) EXCESS PRECIP. = 0.562 INCHES

VOLUME OF EXCESS PRECIP = 10. ACRE-FEET

PEAK Q = 112. CFS TIME OF PEAK = 40. MIN.

INFILT.= 4.43 IN/HR DECAY=0.00150 FNINF = 0.69 IN/HR

MAX.PERV.RET.=0.30 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN - 10 YEAR DEVELOPED DRAINAGE ANALYSIS

BASIN ID: RRCBSH -- BASIN COMMENT: RED ROCK CANYON SUBBASIN H

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
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0.32	1.25	0.59	8.80	.0400	5.00
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COEFFICIENT (REFLECTING TIME TO PEAK)	COEFFICIENT (RELATED TO PEAK RATE OF RUNOFF)
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0.130	0.246
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CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH (CFS)	PEAK (CFS)	VOLUME OF RUNOFF (AF)
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17.13	645.88	204.10	16.85
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WIDTH AT 50 = 46. MIN. WIDTH AT 75 = 24. MIN. K50 = 0.22 K75 = 0.30

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.30 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.68 IN./HR. DECAY = 0.00140/SECOND FNINFL = 0.74 IN./HR.

TIME	UNIT	TIME	UNIT	TIME	UNIT
	HYDROGRAPH	*		HYDROGRAPH	*
0.	0.	*	65.	81.	*
5.	65.	*	70.	74.	*
10.	155.	*	75.	67.	*
15.	200.	*	80.	61.	*
20.	199.	*	85.	55.	*
25.	175.	*	90.	50.	*
30.	153.	*	95.	45.	*
35.	150.	*	100.	41.	*
40.	137.	*	105.	37.	*
45.	124.	*	110.	34.	*
50.	111.	*	115.	30.	*
55.	99.	*	120.	28.	*
60.	90.	*	125.	25.	*

BASIN ID: RRCBSH -- BASIN COMMENT: RED ROCK CANYON SUBBASIN H

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 010-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	110.	0.04	0.003	29.	*
5.	0.04	0.000	0.	*	115.	0.03	0.003	27.	*
10.	0.07	0.005	0.	*	120.	0.02	0.002	25.	*
15.	0.15	0.013	2.	*	125.	0.00	0.000	23.	*
20.	0.28	0.023	4.	*	130.	0.00	0.000	21.	*
25.	0.47	0.217	21.	*	135.	0.00	0.000	19.	*
30.	0.22	0.136	51.	*	140.	0.00	0.000	18.	*
35.	0.10	0.028	74.	*	145.	0.00	0.000	16.	*
40.	0.08	0.010	82.	*	150.	0.00	0.000	14.	*
45.	0.07	0.006	79.	*	155.	0.00	0.000	13.	*
50.	0.06	0.005	72.	*	160.	0.00	0.000	12.	*
55.	0.06	0.005	68.	*	165.	0.00	0.000	11.	*
60.	0.06	0.005	64.	*	170.	0.00	0.000	10.	*
65.	0.06	0.005	60.	*	175.	0.00	0.000	9.	*
70.	0.06	0.005	55.	*	180.	0.00	0.000	8.	*
75.	0.06	0.005	50.	*	185.	0.00	0.000	7.	*
80.	0.05	0.004	47.	*	190.	0.00	0.000	7.	*
85.	0.04	0.003	43.	*	195.	0.00	0.000	6.	*
90.	0.04	0.003	40.	*	200.	0.00	0.000	5.	*
95.	0.04	0.003	37.	*	205.	0.00	0.000	5.	*
100.	0.04	0.003	34.	*	210.	0.00	0.000	3.	*
105.	0.04	0.003	32.	*	215.	0.00	0.000	1.	*

TOTAL PRECIP. = 2.15 (1-HOUR RAIN = 1.86) EXCESS PRECIP. = 0.494 INCHES

VOLUME OF EXCESS PRECIP = 8. ACRE-FEET

PEAK Q = 82. CFS TIME OF PEAK = 40. MIN.

INFILT.= 4.68 IN/HR DECAY = 0.00140 FNINF = 0.74 IN/HR

MAX.PERV.RET.=0.30 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN - 10 YEAR DEVELOPED DRAINAGE ANALYSIS

BASIN ID: RRCBSI -- BASIN COMMENT: RED ROCK CANYON SUBBASIN I

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
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0.35	1.34	0.79	12.90	.0290	5.00
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COEFFICIENT (REFLECTING TIME TO PEAK)	COEFFICIENT (RELATED TO PEAK RATE OF RUNOFF)
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0.121	0.249
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CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH (CFS)	PEAK (CFS)	VOLUME OF RUNOFF (AF)
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19.94	548.83	192.09	192.09	18.67
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WIDTH AT 50 = 55. MIN. WIDTH AT 75 = 28. MIN. K50 = 0.22 K75 = 0.30

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.30 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 3.98 IN./HR. DECAY = 0.00180/SECOND FNINFL = 0.57 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	75.	78.	*	150.	23.	*
5.	48.	*	80.	72.	*	155.	21.	*
10.	126.	*	85.	66.	*	160.	19.	*
15.	177.	*	90.	61.	*	165.	18.	*
20.	192.	*	95.	56.	*	170.	16.	*
25.	182.	*	100.	52.	*	175.	15.	*
30.	160.	*	105.	48.	*	180.	14.	*
35.	143.	*	110.	44.	*	185.	13.	*
40.	144.	*	115.	40.	*	190.	12.	*
45.	133.	*	120.	37.	*	195.	11.	*
50.	123.	*	125.	34.	*	200.	10.	*
55.	112.	*	130.	32.	*	205.	9.	*
60.	102.	*	135.	29.	*	210.	8.	*
65.	92.	*	140.	27.	*	215.	8.	*
70.	85.	*	145.	25.	*	220.	0.	*

BASIN ID: RRCSBI -- BASIN COMMENT: RED ROCK CANYON SUBBASIN I

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 010-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	135.	0.00	0.000	42.	*
5.	0.04	0.000	0.	*	140.	0.00	0.000	39.	*
10.	0.07	0.007	0.	*	145.	0.00	0.000	36.	*
15.	0.15	0.019	2.	*	150.	0.00	0.000	33.	*
20.	0.28	0.034	5.	*	155.	0.00	0.000	30.	*
25.	0.47	0.330	25.	*	160.	0.00	0.000	28.	*
30.	0.22	0.168	61.	*	165.	0.00	0.000	26.	*
35.	0.10	0.055	93.	*	170.	0.00	0.000	24.	*
40.	0.08	0.034	112.	*	175.	0.00	0.000	22.	*
45.	0.07	0.027	117.	*	180.	0.00	0.000	20.	*
50.	0.06	0.017	113.	*	185.	0.00	0.000	18.	*
55.	0.06	0.017	107.	*	190.	0.00	0.000	17.	*
60.	0.06	0.018	105.	*	195.	0.00	0.000	16.	*
65.	0.06	0.018	103.	*	200.	0.00	0.000	14.	*
70.	0.06	0.018	99.	*	205..	0.00	0.000	13.	*
75.	0.06	0.018	95.	*	210.	0.00	0.000	12.	*
80.	0.05	0.006	90.	*	215.	0.00	0.000	11.	*
85.	0.04	0.004	85.	*	220.	0.00	0.000	10.	*
90.	0.04	0.004	79.	*	225.	0.00	0.000	9.	*
95.	0.04	0.004	74.	*	230.	0.00	0.000	9.	*
100.	0.04	0.004	69.	*	235.	0.00	0.000	8.	*
105.	0.04	0.004	64.	*	240.	0.00	0.000	5.	*
110.	0.04	0.004	60.	*	245.	0.00	0.000	3.	*
115.	0.03	0.004	57.	*	250.	0.00	0.000	2.	*
120.	0.02	0.003	53.	*	255.	0.00	0.000	2.	*
125.	0.00	0.000	49.	*	260.	0.00	0.000	2.	*
130.	0.00	0.000	46.	*	265.	0.00	0.000	1.	*

TOTAL PRECIP. = 2.15 (1-HOUR RAIN = 1.86) EXCESS PRECIP. = 0.817 INCHES

VOLUME OF EXCESS PRECIP = 15. ACRE-FEET

PEAK Q = 117. CFS TIME OF PEAK = 45. MIN.

INFILT.= 3.98 IN/HR DECAY = 0.00180 FNINF = 0.57 IN/HR

MAX.PERV.RET.=0.30 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN - 10 YEAR DEVELOPED DRAINAGE ANALYSIS

BASIN ID: RRCBJ -- BASIN COMMENT: RED ROCK CANYON SUBBASIN J

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
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0.32	0.94	0.54	28.00	.0230	5.00
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COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.101	0.319
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CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH (CFS)	PEAK (CFS)	VOLUME OF RUNOFF (AF)
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13.36	1129.62	358.09	358.09	16.91
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WIDTH AT 50 = 27. MIN. WIDTH AT 75 = 14. MIN. K50 = 0.30 K75 = 0.41

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.30 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.54 IN./HR. DECAY = 0.00170/SECOND FNINFL = 0.64 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	45.	109.	*	90.	20.	*
5.	164.	*	50.	90.	*	95.	17.	*
10.	329.	*	55.	75.	*	100.	14.	*
15.	353.	*	60.	62.	*	105.	11.	*
20.	292.	*	65.	51.	*	110.	9.	*
25.	238.	*	70.	43.	*	115.	8.	*
30.	195.	*	75.	35.	*	120.	0.	*
35.	159.	*	80.	29.	*	0.	0.	*
40.	132.	*	85.	24.	*	0.	0.	*

BASIN ID: RRCSBJ -- BASIN COMMENT: RED ROCK CANYON SUBBASIN J

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 010-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	95.	0.04	0.009	59.	*
5.	0.04	0.000	0.	*	100.	0.04	0.009	53.	*
10.	0.07	0.015	2.	*	105.	0.04	0.009	48.	*
15.	0.15	0.041	12.	*	110.	0.04	0.009	43.	*
20.	0.28	0.074	31.	*	115.	0.03	0.008	40.	*
25.	0.47	0.310	94.	*	120.	0.02	0.006	36.	*
30.	0.22	0.168	171.	*	125.	0.00	0.000	32.	*
35.	0.10	0.056	208.	*	130.	0.00	0.000	27.	*
40.	0.08	0.036	202.	*	135.	0.00	0.000	21.	*
45.	0.07	0.028	182.	*	140.	0.00	0.000	16.	*
50.	0.06	0.019	161.	*	145.	0.00	0.000	12.	*
55.	0.06	0.019	141.	*	150.	0.00	0.000	9.	*
60.	0.06	0.020	125.	*	155.	0.00	0.000	8.	*
65.	0.06	0.020	112.	*	160.	0.00	0.000	6.	*
70.	0.06	0.020	101.	*	165.	0.00	0.000	5.	*
75.	0.06	0.020	92.	*	170.	0.00	0.000	4.	*
80.	0.05	0.012	84.	*	175.	0.00	0.000	3.	*
85.	0.04	0.009	75.	*	180.	0.00	0.000	2.	*
90.	0.04	0.009	66.	*	185.	0.00	0.000	2.	*

TOTAL PRECIP. = 2.15 (1-HOUR RAIN = 1.86) EXCESS PRECIP. = 0.930 INCHES

VOLUME OF EXCESS PRECIP = 16. ACRE-FEET

PEAK Q = 208. CFS TIME OF PEAK = 35. MIN.

INFILT.= 4.54 IN/HR DECAY = 0.00170 FNINF = 0.64 IN/HR

MAX.PERV.RET.=0.30 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN - 10 YEAR DEVELOPED DRAINAGE ANALYSIS

BASIN ID: RRCBK -- BASIN COMMENT: RED ROCK CANYON SUBBASIN K

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
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0.41	1.13	0.57	19.60	.0270	5.00
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COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.111 0.278

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH (CFS)	PEAK (CFS)	VOLUME OF RUNOFF (AF)
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15.32	832.31	339.58	339.58	21.76
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WIDTH AT 50 = 36. MIN. WIDTH AT 75 = 19. MIN. K50 = 0.26 K75 = 0.35

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.35 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.55 IN./HR. DECAY = 0.00170/SECOND FNINFL = 0.64 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	55.	120.	*	110.	27.	*
5.	128.	*	60.	105.	*	115.	24.	*
10.	285.	*	65.	92.	*	120.	21.	*
15.	339.	*	70.	80.	*	125.	18.	*
20.	314.	*	75.	70.	*	130.	16.	*
25.	268.	*	80.	61.	*	135.	14.	*
30.	241.	*	85.	54.	*	140.	12.	*
35.	211.	*	90.	47.	*	145.	11.	*
40.	182.	*	95.	41.	*	150.	9.	*
45.	157.	*	100.	36.	*	155.	8.	*
50.	138.	*	105.	31.	*	160.	0.	*

BASIN ID: RRCBSK -- BASIN COMMENT: RED ROCK CANYON SUBBASIN K

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 010-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	110.	0.04	0.007	56.	*
5.	0.04	0.000	0.	*	115.	0.03	0.006	51.	*
10.	0.07	0.010	1.	*	120.	0.02	0.005	47.	*
15.	0.15	0.028	7.	*	125.	0.00	0.000	43.	*
20.	0.28	0.052	18.	*	130.	0.00	0.000	38.	*
25.	0.47	0.254	60.	*	135.	0.00	0.000	33.	*
30.	0.22	0.162	123.	*	140.	0.00	0.000	29.	*
35.	0.10	0.051	166.	*	145.	0.00	0.000	25.	*
40.	0.08	0.031	176.	*	150.	0.00	0.000	22.	*
45.	0.07	0.024	169.	*	155.	0.00	0.000	19.	*
50.	0.06	0.014	157.	*	160.	0.00	0.000	17.	*
55.	0.06	0.015	146.	*	165.	0.00	0.000	15.	*
60.	0.06	0.015	133.	*	170.	0.00	0.000	13.	*
65.	0.06	0.016	122.	*	175.	0.00	0.000	11.	*
70.	0.06	0.016	112.	*	180.	0.00	0.000	7.	*
75.	0.06	0.016	105.	*	185.	0.00	0.000	5.	*
80.	0.05	0.009	97.	*	190.	0.00	0.000	4.	*
85.	0.04	0.007	89.	*	195.	0.00	0.000	4.	*
90.	0.04	0.007	81.	*	200.	0.00	0.000	3.	*
95.	0.04	0.007	73.	*	205.	0.00	0.000	2.	*
100.	0.04	0.007	67.	*	210.	0.00	0.000	2.	*
105.	0.04	0.007	61.	*	215.	0.00	0.000	2.	*

TOTAL PRECIP. = 2.15 (1-HOUR RAIN = 1.86) EXCESS PRECIP. = 0.763 INCHES

VOLUME OF EXCESS PRECIP = 17. ACRE-FEET

PEAK Q = 176. CFS TIME OF PEAK = 40. MIN.

INFILT.= 4.55 IN/HR DECAY = 0.00170 FNINF = 0.64 IN/HR

MAX.PERV.RET.=0.35 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN - 10 YEAR DEVELOPED DRAINAGE ANALYSIS

BASIN ID: RRCBSL -- BASIN COMMENT: RED ROCK CANYON SUBBASIN L

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
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0.38	1.28	0.61	13.60	.0410	5.00
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COEFFICIENT (REFLECTING TIME TO PEAK)	COEFFICIENT (RELATED TO PEAK RATE OF RUNOFF)
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0.120	0.254
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CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH (CFS)	PEAK (CFS)	VOLUME OF RUNOFF (AF)
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16.24	710.62	272.88	272.88	20.48
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WIDTH AT 50 = 42. MIN. WIDTH AT 75 = 22. MIN. K50 = 0.23 K75 = 0.31

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.35 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 3.79 IN./HR. DECAY = 0.00180/SECOND FNINFL = 0.55 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	65.	95.	*	130.	22.	*
5.	94.	*	70.	85.	*	135.	20.	*
10.	218.	*	75.	76.	*	140.	18.	*
15.	271.	*	80.	68.	*	145.	16.	*
20.	260.	*	85.	61.	*	150.	14.	*
25.	225.	*	90.	54.	*	155.	13.	*
30.	203.	*	95.	49.	*	160.	11.	*
35.	190.	*	100.	43.	*	165.	10.	*
40.	171.	*	105.	39.	*	170.	9.	*
45.	151.	*	110.	35.	*	175.	8.	*
50.	133.	*	115.	31.	*	180.	0.	*
55.	119.	*	120.	28.	*	0.	0.	*
60.	106.	*	125.	25.	*	0.	0.	*

BASIN ID: RRCBSL -- BASIN COMMENT: RED ROCK CANYON SUBBASIN L

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 010-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	115.	0.03	0.004	55.	*
5.	0.04	0.000	0.	*	120.	0.02	0.003	50.	*
10.	0.07	0.007	1.	*	125.	0.00	0.000	46.	*
15.	0.15	0.020	3.	*	130.	0.00	0.000	41.	*
20.	0.28	0.036	10.	*	135.	0.00	0.000	37.	*
25.	0.47	0.297	43.	*	140.	0.00	0.000	33.	*
30.	0.22	0.170	97.	*	145.	0.00	0.000	30.	*
35.	0.10	0.057	138.	*	150.	0.00	0.000	26.	*
40.	0.08	0.036	152.	*	155.	0.00	0.000	24.	*
45.	0.07	0.028	149.	*	160.	0.00	0.000	21.	*
50.	0.06	0.018	142.	*	165.	0.00	0.000	19.	*
55.	0.06	0.018	136.	*	170.	0.00	0.000	17.	*
60.	0.06	0.019	129.	*	175.	0.00	0.000	15.	*
65.	0.06	0.019	122.	*	180.	0.00	0.000	14.	*
70.	0.06	0.019	114.	*	185.	0.00	0.000	12.	*
75.	0.06	0.019	108.	*	190.	0.00	0.000	11.	*
80.	0.05	0.006	101.	*	195.	0.00	0.000	9.	*
85.	0.04	0.005	94.	*	200.	0.00	0.000	6.	*
90.	0.04	0.005	85.	*	205.	0.00	0.000	4.	*
95.	0.04	0.005	78.	*	210.	0.00	0.000	3.	*
100.	0.04	0.005	71.	*	215.	0.00	0.000	3.	*
105.	0.04	0.005	65.	*	220.	0.00	0.000	2.	*
110.	0.04	0.005	60.	*	225.	0.00	0.000	2.	*

TOTAL PRECIP. = 2.15 (1-HOUR RAIN = 1.86) EXCESS PRECIP. = 0.803 INCHES

VOLUME OF EXCESS PRECIP = 16. ACRE-FEET

PEAK Q = 152. CFS TIME OF PEAK = 40. MIN.

INFILT.= 3.79 IN/HR DECAY = 0.00180 FNINF = 0.55 IN/HR

MAX.PERV.RET.=0.35 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN - 10 YEAR DEVELOPED DRAINAGE ANALYSIS

BASIN ID: RRCB -- BASIN COMMENT: RED ROCK CANYON SUBBASIN M

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
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0.69	1.95	1.35	11.10	.0180	5.00
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COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.124	0.273
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CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH (CFS)	PEAK (AF)	VOLUME OF RUNOFF (AF)
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33.54	337.61	232.27	36.69
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WIDTH AT 50 = 89. MIN. WIDTH AT 75 = 46. MIN. K50 = 0.23 K75 = 0.31

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.40 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.22 IN./HR. DECAY = 0.00180/SECOND FNINFL = 0.58 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	125.	92.	*	250.	25.	*
5.	25.	*	130.	87.	*	255.	24.	*
10.	76.	*	135.	83.	*	260.	22.	*
15.	134.	*	140.	78.	*	265.	21.	*
20.	180.	*	145.	74.	*	270.	20.	*
25.	213.	*	150.	71.	*	275.	19.	*
30.	229.	*	155.	67.	*	280.	18.	*
35.	232.	*	160.	64.	*	285.	17.	*
40.	225.	*	165.	60.	*	290.	16.	*
45.	211.	*	170.	57.	*	295.	16.	*
50.	196.	*	175.	54.	*	300.	15.	*
55.	182.	*	180.	52.	*	305.	14.	*
60.	173.	*	185.	49.	*	310.	13.	*
65.	174.	*	190.	46.	*	315.	13.	*
70.	167.	*	195.	44.	*	320.	12.	*
75.	159.	*	200.	42.	*	325.	11.	*
80.	151.	*	205.	40.	*	330.	11.	*
85.	143.	*	210.	38.	*	335.	10.	*
90.	136.	*	215.	36.	*	340.	10.	*
95.	128.	*	220.	34.	*	345.	9.	*
100.	120.	*	225.	32.	*	350.	9.	*
105.	113.	*	230.	31.	*	355.	8.	*
110.	107.	*	235.	29.	*	360.	8.	*
115.	102.	*	240.	28.	*	365.	7.	*
120.	97.	*	245.	26.	*	370.	0.	*

BASIN ID: RRCBSM -- BASIN COMMENT: RED ROCK CANYON SUBBASIN M

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 010-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	205.	0.00	0.000	38.	*
5.	0.04	0.000	0.	*	210.	0.00	0.000	36.	*
10.	0.07	0.006	0.	*	215.	0.00	0.000	35.	*
15.	0.15	0.016	1.	*	220.	0.00	0.000	33.	*
20.	0.28	0.029	3.	*	225.	0.00	0.000	31.	*
25.	0.47	0.227	11.	*	230.	0.00	0.000	30.	*
30.	0.22	0.165	30.	*	235.	0.00	0.000	28.	*
35.	0.10	0.052	54.	*	240.	0.00	0.000	27.	*
40.	0.08	0.032	79.	*	245.	0.00	0.000	25.	*
45.	0.07	0.025	100.	*	250.	0.00	0.000	24.	*
50.	0.06	0.015	115.	*	255.	0.00	0.000	23.	*
55.	0.06	0.015	123.	*	260.	0.00	0.000	22.	*
60.	0.06	0.016	126.	*	265.	0.00	0.000	21.	*
65.	0.06	0.016	126.	*	270.	0.00	0.000	19.	*
70.	0.06	0.016	123.	*	275.	0.00	0.000	19.	*
75.	0.06	0.016	120.	*	280.	0.00	0.000	18.	*
80.	0.05	0.005	117.	*	285.	0.00	0.000	17.	*
85.	0.04	0.004	117.	*	290.	0.00	0.000	16.	*
90.	0.04	0.004	115.	*	295.	0.00	0.000	15.	*
95.	0.04	0.004	112.	*	300.	0.00	0.000	14.	*
100.	0.04	0.004	109.	*	305.	0.00	0.000	14.	*
105.	0.04	0.004	105.	*	310.	0.00	0.000	13.	*
110.	0.04	0.004	100.	*	315.	0.00	0.000	12.	*
115.	0.03	0.003	96.	*	320.	0.00	0.000	12.	*
120.	0.02	0.003	92.	*	325.	0.00	0.000	11.	*
125.	0.00	0.000	87.	*	330.	0.00	0.000	10.	*
130.	0.00	0.000	83.	*	335.	0.00	0.000	10.	*
135.	0.00	0.000	80.	*	340.	0.00	0.000	9.	*
140.	0.00	0.000	76.	*	345.	0.00	0.000	9.	*
145.	0.00	0.000	72.	*	350.	0.00	0.000	8.	*
150.	0.00	0.000	68.	*	355.	0.00	0.000	8.	*
155.	0.00	0.000	65.	*	360.	0.00	0.000	8.	*
160.	0.00	0.000	62.	*	365.	0.00	0.000	7.	*
165.	0.00	0.000	58.	*	370.	0.00	0.000	7.	*
170.	0.00	0.000	55.	*	375.	0.00	0.000	6.	*
175.	0.00	0.000	53.	*	380.	0.00	0.000	6.	*
180.	0.00	0.000	50.	*	385.	0.00	0.000	6.	*
185.	0.00	0.000	47.	*	390.	0.00	0.000	4.	*
190.	0.00	0.000	45.	*	395.	0.00	0.000	2.	*
195.	0.00	0.000	43.	*	400.	0.00	0.000	2.	*
200.	0.00	0.000	41.	*	405.	0.00	0.000	1.	*

TOTAL PRECIP. = 2.15 (1-HOUR RAIN = 1.86) EXCESS PRECIP. = 0.679 INCHES

VOLUME OF EXCESS PRECIP. = 25. ACRE-FEET

PEAK Q = 126. CFS TIME OF PEAK = 60. MIN.

INFILT.= 4.22 IN/HR DECAY =0.00180 FNINF = 0.58 IN/HR

MAX.PERV.RET.=0.40 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN - 10 YEAR DEVELOPED DRAINAGE ANALYSIS

BASIN ID: RRCBSN -- BASIN COMMENT: RED ROCK CANYON SUBBASIN N

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.42	1.14	0.49	11.20	.0260	5.00

COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.124 0.253

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH (CFS)	PEAK (CFS)	VOLUME OF RUNOFF (AF)
15.99	721.25	300.76	22.24	

WIDTH AT 50 = 42. MIN. WIDTH AT 75 = 22. MIN. K50 = 0.23 K75 = 0.31

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.35 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 3.57 IN./HR. DECAY = 0.00180/SECOND FNINFL = 0.54 IN./HR.

TIME	UNIT	TIME	UNIT	TIME	UNIT
	HYDROGRAPH	*		HYDROGRAPH	*
0.	0.	*	65.	102.	*
5.	106.	*	70.	91.	*
10.	244.	*	75.	81.	*
15.	300.	*	80.	73.	*
20.	285.	*	85.	65.	*
25.	245.	*	90.	58.	*
30.	224.	*	95.	52.	*
35.	207.	*	100.	46.	*
40.	185.	*	105.	41.	*
45.	163.	*	110.	37.	*
50.	144.	*	115.	33.	*
55.	128.	*	120.	29.	*
60.	114.	*	125.	26.	*

BASIN ID: RRCBSN -- BASIN COMMENT: RED ROCK CANYON SUBBASIN N

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 010-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH *(CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH *(CFS)	*
0.	0.00	0.000	0.	*	115.	0.03	0.003	58.	*
5.	0.04	0.000	0.	*	120.	0.02	0.003	53.	*
10.	0.07	0.006	1.	*	125.	0.00	0.000	48.	*
15.	0.15	0.016	3.	*	130.	0.00	0.000	43.	*
20.	0.28	0.030	9.	*	135.	0.00	0.000	38.	*
25.	0.47	0.304	46.	*	140.	0.00	0.000	34.	*
30.	0.22	0.171	107.	*	145.	0.00	0.000	30.	*
35.	0.10	0.057	152.	*	150.	0.00	0.000	27.	*
40.	0.08	0.036	167.	*	155.	0.00	0.000	24.	*
45.	0.07	0.028	163.	*	160.	0.00	0.000	22.	*
50.	0.06	0.018	156.	*	165.	0.00	0.000	19.	*
55.	0.06	0.019	149.	*	170.	0.00	0.000	17.	*
60.	0.06	0.019	141.	*	175.	0.00	0.000	15.	*
65.	0.06	0.019	132.	*	180.	0.00	0.000	14.	*
70.	0.06	0.019	124.	*	185.	0.00	0.000	12.	*
75.	0.06	0.019	117.	*	190.	0.00	0.000	11.	*
80.	0.05	0.006	110.	*	195.	0.00	0.000	10.	*
85.	0.04	0.004	101.	*	200.	0.00	0.000	8.	*
90.	0.04	0.004	92.	*	205.	0.00	0.000	5.	*
95.	0.04	0.004	84.	*	210.	0.00	0.000	4.	*
100.	0.04	0.004	76.	*	215.	0.00	0.000	3.	*
105.	0.04	0.004	69.	*	220.	0.00	0.000	2.	*
110.	0.04	0.004	63.	*	225.	0.00	0.000	2.	*

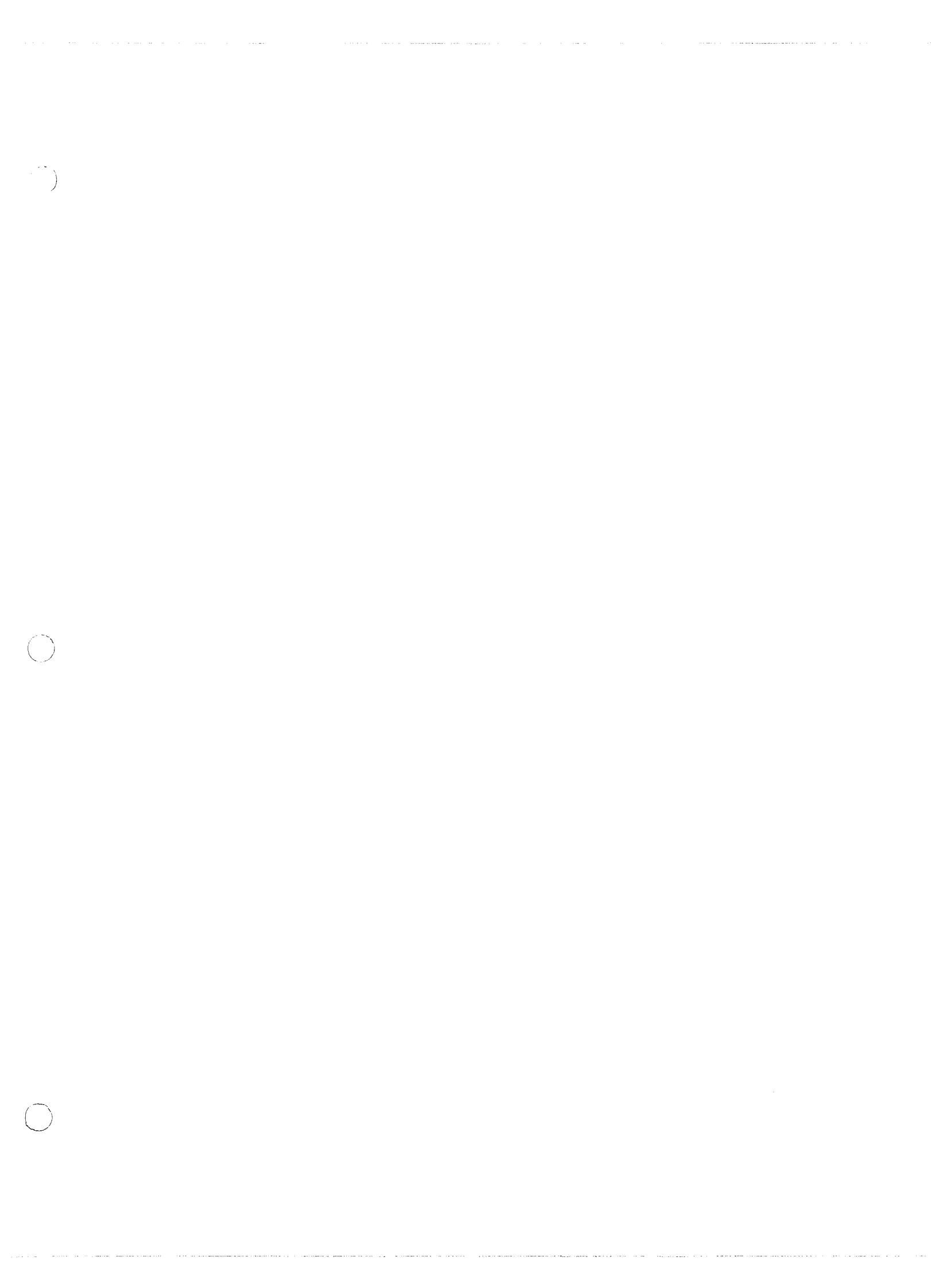
TOTAL PRECIP. = 2.15 (1-HOUR RAIN = 1.86) EXCESS PRECIP. = 0.795 INCHES

VOLUME OF EXCESS PRECIP = 18. ACRE-FEET

PEAK Q = 167. CFS TIME OF PEAK = 40. MIN.

INFILT.= 3.57 IN/HR DECAY = 0.00180 FNINF = 0.54 IN/HR

MAX.PERV.RET.=0.35 IN. MAX.IMP.RET.=0.05 IN.



2 RED ROCK CANYON DRAINAGE BASIN - 100 YEAR DEVELOPED DRAINAGE ANALYSIS
01100-YEAR 100 2.95

7001015.0RRCSBA001 RED ROCK CANYON SUBBASIN A
0.494 1.61 1.15 11.4 .030 0.35 0.05 4.80.0011 .837
7001015.0RRCSBB002 RED ROCK CANYON SUBBASIN B
0.225 1.14 0.46 25.7 .040 0.35 0.05 4.57.0015 .696
7001015.0RRCSBC003 RED ROCK CANYON SUBBASIN C
0.170 0.88 0.44 6.70 .057 0.30 0.05 4.89.0008 .956
7001015.0RRCSBD004 RED ROCK CANYON SUBBASIN D
0.378 1.30 0.66 8.50 .047 0.30 0.05 4.79.0012 .835
7001015.0RRCSBE005 RED ROCK CANYON SUBBASIN E
0.241 1.52 0.89 6.01 .048 0.25 0.05 4.79.0012 .831
7001015.0RRCSBF006 RED ROCK CANYON SUBBASIN F
0.278 1.31 0.62 4.50 .032 0.25 0.05 4.84.0010 .876
7001015.0RRCSBG007 RED ROCK CANYON SUBBASIN G
0.330 1.03 0.57 9.10 .052 0.30 0.05 4.43.0015 .686
7001015.0RRCSBH008 RED ROCK CANYON SUBBASIN H
0.316 1.25 0.59 8.80 .040 0.30 0.05 4.68.0014 .742
7001015.0RRCSBI009 RED ROCK CANYON SUBBASIN I
0.350 1.34 0.79 12.9 .029 0.30 0.05 3.98.0018 .566
7001015.0RRCSBJ010 RED ROCK CANYON SUBBASIN J
0.317 0.94 0.54 28.0 .023 0.30 0.05 4.54.0017 .636
7001015.0RRCSBK011 RED ROCK CANYON SUBBASIN K
0.408 1.13 0.57 19.6 .027 0.35 0.05 4.55.0017 .638
7001015.0RRCSBL012 RED ROCK CANYON SUBBASIN L
0.384 1.28 0.61 13.6 .041 0.35 0.05 3.79.0018 .553
7001015.0RRCSBM013 RED ROCK CANYON SUBBASIN M
0.688 1.95 1.35 11.1 .018 0.40 0.05 4.22.0018 .581
7001015.0RRCSBN014 RED ROCK CANYON SUBBASIN N
0.417 1.14 0.49 11.2 .026 0.35 0.05 3.57.0018 .538
E

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN - 100 YEAR DEVELOPED DRAINAGE ANALYSIS

BASIN ID: RRCBSA -- BASIN COMMENT: RED ROCK CANYON SUBBASIN A

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
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0.49	1.61	1.15	11.40	.0300	5.00
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COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.123	0.260
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CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAP (CFS)	PEAK (AF)	VOLUME OF RUNOFF (AF)
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25.60	432.36	213.59	26.35
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WIDTH AT 50 = 69. MIN. WIDTH AT 75 = 36. MIN. K50 = 0.22 K75 = 0.30

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.35 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.80 IN./HR. DECAY = 0.00110/SECOND FNINFL = 0.84 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	100.	82.	*	200.	22.	*
5.	36.	*	105.	76.	*	205.	20.	*
10.	103.	*	110.	72.	*	210.	19.	*
15.	163.	*	115.	67.	*	215.	18.	*
20.	201.	*	120.	63.	*	220.	17.	*
25.	213.	*	125.	59.	*	225.	16.	*
30.	208.	*	130.	55.	*	230.	15.	*
35.	192.	*	135.	51.	*	235.	14.	*
40.	173.	*	140.	48.	*	240.	13.	*
45.	160.	*	145.	45.	*	245.	12.	*
50.	159.	*	150.	42.	*	250.	11.	*
55.	152.	*	155.	40.	*	255.	11.	*
60.	143.	*	160.	37.	*	260.	10.	*
65.	134.	*	165.	35.	*	265.	9.	*
70.	125.	*	170.	32.	*	270.	9.	*
75.	115.	*	175.	30.	*	275.	8.	*
80.	106.	*	180.	28.	*	280.	8.	*
85.	99.	*	185.	27.	*	285.	0.	*
90.	93.	*	190.	25.	*	0.	0.	*
95.	87.	*	195.	23.	*	0.	0.	*

BASIN ID: RRCSBA -- BASIN COMMENT: RED ROCK CANYON SUBBASIN A

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	165.	0.00	0.000	84.	*
5.	0.03	0.000	0.	*	170.	0.00	0.000	79.	*
10.	0.09	0.007	0.	*	175.	0.00	0.000	74.	*
15.	0.14	0.015	1.	*	180.	0.00	0.000	69.	*
20.	0.24	0.026	4.	*	185.	0.00	0.000	64.	*
25.	0.41	0.045	8.	*	190.	0.00	0.000	60.	*
30.	0.74	0.607	35.	*	195.	0.00	0.000	56.	*
35.	0.41	0.315	91.	*	200.	0.00	0.000	53.	*
40.	0.24	0.148	156.	*	205.	0.00	0.000	49.	*
45.	0.18	0.102	211.	*	210.	0.00	0.000	46.	*
50.	0.15	0.072	248.	*	215.	0.00	0.000	43.	*
55.	0.12	0.046	265.	*	220.	0.00	0.000	41.	*
60.	0.12	0.049	268.	*	225.	0.00	0.000	38.	*
65.	0.12	0.051	262.	*	230.	0.00	0.000	36.	*
70.	0.06	0.006	253.	*	235.	0.00	0.000	33.	*
75.	0.06	0.006	249.	*	240.	0.00	0.000	31.	*
80.	0.04	0.004	242.	*	245.	0.00	0.000	29.	*
85.	0.04	0.004	232.	*	250.	0.00	0.000	27.	*
90.	0.04	0.004	219.	*	255.	0.00	0.000	26.	*
95.	0.04	0.004	206.	*	260.	0.00	0.000	24.	*
100.	0.04	0.004	193.	*	265.	0.00	0.000	22.	*
105.	0.04	0.004	181.	*	270.	0.00	0.000	21.	*
110.	0.04	0.004	170.	*	275.	0.00	0.000	20.	*
115.	0.04	0.004	160.	*	280.	0.00	0.000	18.	*
120.	0.04	0.004	150.	*	285.	0.00	0.000	17.	*
125.	0.00	0.000	141.	*	290.	0.00	0.000	16.	*
130.	0.00	0.000	133.	*	295.	0.00	0.000	15.	*
135.	0.00	0.000	125.	*	300.	0.00	0.000	14.	*
140.	0.00	0.000	117.	*	305.	0.00	0.000	13.	*
145.	0.00	0.000	109.	*	310.	0.00	0.000	7.	*
150.	0.00	0.000	102.	*	315.	0.00	0.000	5.	*
155.	0.00	0.000	96.	*	320.	0.00	0.000	3.	*
160.	0.00	0.000	90.	*	325.	0.00	0.000	2.	*

TOTAL PRECIP. = 3.41 (1-HOUR RAIN = 2.95) EXCESS PRECIP. = 1.530 INCHES

VOLUME OF EXCESS PRECIP = 40. ACRE-FEET

PEAK Q = 268. CFS TIME OF PEAK = 60. MIN.

INFILT.= 4.80 IN/HR DECAY = 0.00110 FNINF = 0.84 IN/HR

MAX.PERV.RET.=0.35 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN - 100 YEAR DEVELOPED DRAINAGE ANALYSIS

BASIN ID: RRCSSB -- BASIN COMMENT: RED ROCK CANYON SUBBASIN B

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
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0.22	1.14	0.46	25.70	.0400	5.00
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COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.104	0.287
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CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAP (CFS)	PEAK	VOLUME OF RUNOFF (AF)
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12.38	1117.81	251.51	12.00
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WIDTH AT 50 = 27. MIN. WIDTH AT 75 = 14. MIN. K50 = 0.28 K75 = 0.38

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.35 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.57 IN./HR. DECAY = 0.00150/SECOND FNINFL = 0.70 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	40.	94.	*	80.	22.	*
5.	127.	*	45.	78.	*	85.	19.	*
10.	240.	*	50.	65.	*	90.	15.	*
15.	241.	*	55.	55.	*	95.	13.	*
20.	197.	*	60.	46.	*	100.	11.	*
25.	166.	*	65.	38.	*	105.	9.	*
30.	136.	*	70.	32.	*	110.	8.	*
35.	112.	*	75.	27.	*	115.	0.	*

BASIN ID: RRCSSB -- BASIN COMMENT: RED ROCK CANYON SUBBASIN B

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	90.	0.04	0.009	110.	*
5.	0.03	0.000	0.	*	95.	0.04	0.009	95.	*
10.	0.09	0.017	2.	*	100.	0.04	0.009	82.	*
15.	0.14	0.033	8.	*	105.	0.04	0.009	71.	*
20.	0.24	0.058	19.	*	110.	0.04	0.009	62.	*
25.	0.41	0.155	45.	*	115.	0.04	0.009	54.	*
30.	0.74	0.665	145.	*	120.	0.04	0.009	48.	*
35.	0.41	0.352	261.	*	125.	0.00	0.000	41.	*
40.	0.24	0.182	315.	*	130.	0.00	0.000	34.	*
45.	0.18	0.132	315.	*	135.	0.00	0.000	27.	*
50.	0.15	0.099	300.	*	140.	0.00	0.000	19.	*
55.	0.12	0.071	276.	*	145.	0.00	0.000	13.	*
60.	0.12	0.072	251.	*	150.	0.00	0.000	10.	*
65.	0.12	0.073	230.	*	155.	0.00	0.000	8.	*
70.	0.06	0.015	206.	*	160.	0.00	0.000	6.	*
75.	0.06	0.015	178.	*	165.	0.00	0.000	4.	*
80.	0.04	0.009	152.	*	170.	0.00	0.000	3.	*
85.	0.04	0.009	129.	*	175.	0.00	0.000	2.	*

TOTAL PRECIP. = 3.41 (1-HOUR RAIN = 2.95) EXCESS PRECIP. = 2.015 INCHES

VOLUME OF EXCESS PRECIP = 24. ACRE-FEET

PEAK Q = 315. CFS TIME OF PEAK = 45. MIN.

INFILT.= 4.57 IN/HR DECAY = 0.00150 FNINF = 0.70 IN/HR

MAX.PERV.RET.=0.35 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN - 100 YEAR DEVELOPED DRAINAGE ANALYSIS

BASIN ID: RRCSC -- BASIN COMMENT: RED ROCK CANYON SUBBASIN C

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.17	0.88	0.44	6.70	.0570	5.00

COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.138 0.232

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAP (CFS)	PEAK (CFS)	VOLUME OF RUNOFF (AF)
12.95	851.74		144.80	9.07

WIDTH AT 50 = 35. MIN. WIDTH AT 75 = 18. MIN. K50 = 0.22 K75 = 0.30

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVERIOUS RET. = 0.30 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.89 IN./HR. DECAY = 0.00080/SECOND FNINFL = 0.96 IN./HR.

TIME	UNIT	TIME	UNIT	TIME	UNIT
	HYDROGRAPH	*	HYDROGRAPH	*	HYDROGRAPH
0.	0.	50.	57.	100.	16.
5.	69.	55.	50.	105.	14.
10.	136.	60.	44.	110.	13.
15.	141.	65.	39.	115.	11.
20.	119.	70.	35.	120.	10.
25.	107.	75.	31.	125.	9.
30.	98.	80.	27.	130.	8.
35.	86.	85.	24.	135.	0.
40.	73.	90.	21.	0.	0.
45.	65.	95.	19.	0.	0.

BASIN ID: RRCSCB -- BASIN COMMENT: RED ROCK CANYON SUBBASIN C

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	90.	0.04	0.002	54.	*
5.	0.03	0.000	0.	*	95.	0.04	0.002	48.	*
10.	0.09	0.004	0.	*	100.	0.04	0.002	43.	*
15.	0.14	0.009	1.	*	105.	0.04	0.002	38.	*
20.	0.24	0.015	3.	*	110.	0.04	0.002	34.	*
25.	0.41	0.026	6.	*	115.	0.04	0.002	30.	*
30.	0.74	0.520	43.	*	120.	0.04	0.002	27.	*
35.	0.41	0.273	96.	*	125.	0.00	0.000	24.	*
40.	0.24	0.110	124.	*	130.	0.00	0.000	21.	*
45.	0.18	0.068	125.	*	135.	0.00	0.000	19.	*
50.	0.15	0.041	120.	*	140.	0.00	0.000	17.	*
55.	0.12	0.019	114.	*	145.	0.00	0.000	15.	*
60.	0.12	0.024	105.	*	150.	0.00	0.000	13.	*
65.	0.12	0.028	96.	*	155.	0.00	0.000	11.	*
70.	0.06	0.004	87.	*	160.	0.00	0.000	6.	*
75.	0.06	0.004	77.	*	165.	0.00	0.000	4.	*
80.	0.04	0.002	68.	*	170.	0.00	0.000	2.	*
85.	0.04	0.002	61.	*	175.	0.00	0.000	2.	*

TOTAL PRECIP. = 3.41 (1-HOUR RAIN = 2.95) EXCESS PRECIP. = 1.166 INCHES

VOLUME OF EXCESS PRECIP = 11. ACRE-FEET

PEAK Q = 125. CFS TIME OF PEAK = 45. MIN.

INFILT.= 4.89 IN/HR DECAY = 0.00080 FNINF = 0.96 IN/HR

MAX.PERV.RET.=0.30 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN - 100 YEAR DEVELOPED DRAINAGE ANALYSIS

BASIN ID: RRCSD -- BASIN COMMENT: RED ROCK CANYON SUBBASIN D

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.38	1.30	0.66	8.50	.0470	5.00

COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.131 0.254

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH PEAK (CFS)	VOLUME OF RUNOFF (AF)
17.77	638.72	241.44	20.16

WIDTH AT 50 = 47. MIN. WIDTH AT 75 = 24. MIN. K50 = 0.23 K75 = 0.31

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.30 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.79 IN./HR. DECAY = 0.00120/SECOND FNINFL = 0.83 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	70.	88.	*	140.	22.	*
5.	73.	*	75.	80.	*	145.	20.	*
10.	178.	*	80.	72.	*	150.	18.	*
15.	235.	*	85.	66.	*	155.	16.	*
20.	238.	*	90.	59.	*	160.	15.	*
25.	213.	*	95.	54.	*	165.	14.	*
30.	185.	*	100.	49.	*	170.	12.	*
35.	180.	*	105.	44.	*	175.	11.	*
40.	164.	*	110.	40.	*	180.	10.	*
45.	149.	*	115.	36.	*	185.	9.	*
50.	133.	*	120.	33.	*	190.	8.	*
55.	119.	*	125.	30.	*	195.	7.	*
60.	107.	*	130.	27.	*	200.	0.	*
65.	97.	*	135.	24.	*	0.	0.	*

BASIN ID: RRCSD -- BASIN COMMENT: RED ROCK CANYON SUBBASIN D

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	125.	0.00	0.000	93.	*
5.	0.03	0.000	0.	*	130.	0.00	0.000	84.	*
10.	0.09	0.005	0.	*	135.	0.00	0.000	76.	*
15.	0.14	0.011	2.	*	140.	0.00	0.000	69.	*
20.	0.24	0.019	5.	*	145.	0.00	0.000	63.	*
25.	0.41	0.080	13.	*	150.	0.00	0.000	57.	*
30.	0.74	0.629	68.	*	155.	0.00	0.000	51.	*
35.	0.41	0.319	162.	*	160.	0.00	0.000	47.	*
40.	0.24	0.151	241.	*	165.	0.00	0.000	42.	*
45.	0.18	0.104	282.	*	170.	0.00	0.000	38.	*
50.	0.15	0.073	290.	*	175.	0.00	0.000	35.	*
55.	0.12	0.047	281.	*	180.	0.00	0.000	31.	*
60.	0.12	0.049	276.	*	185.	0.00	0.000	28.	*
65.	0.12	0.050	268.	*	190.	0.00	0.000	26.	*
70.	0.06	0.005	255.	*	195.	0.00	0.000	23.	*
75.	0.06	0.005	236.	*	200.	0.00	0.000	21.	*
80.	0.04	0.003	215.	*	205.	0.00	0.000	19.	*
85.	0.04	0.003	195.	*	210.	0.00	0.000	17.	*
90.	0.04	0.003	177.	*	215.	0.00	0.000	16.	*
95.	0.04	0.003	162.	*	220.	0.00	0.000	14.	*
100.	0.04	0.003	147.	*	225.	0.00	0.000	8.	*
105.	0.04	0.003	134.	*	230.	0.00	0.000	5.	*
110.	0.04	0.003	122.	*	235.	0.00	0.000	4.	*
115.	0.04	0.003	111.	*	240.	0.00	0.000	3.	*
120.	0.04	0.003	102.	*	245.	0.00	0.000	2.	*

TOTAL PRECIP. = 3.41 (1-HOUR RAIN = 2.95) EXCESS PRECIP. = 1.574 INCHES

VOLUME OF EXCESS PRECIP = 32. ACRE-FEET

PEAK Q = 290. CFS TIME OF PEAK = 50. MIN.

INFILT.= 4.79 IN/HR DECAY = 0.00120 FNINF = 0.83 IN/HR

MAX.PERV.RET.=0.30 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN - 100 YEAR DEVELOPED DRAINAGE ANALYSIS

BASIN ID: RRCBSE -- BASIN COMMENT: RED ROCK CANYON SUBBASIN E

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
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0.24	1.52	0.89	6.01	.0480	5.00
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COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.141 0.247

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH (CFS)	PEAK (AF)
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22.73	469.59	113.17	12.85
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WIDTH AT 50 = 64. MIN. WIDTH AT 75 = 33. MIN. K50 = 0.21 K75 = 0.29

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.25 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.79 IN./HR. DECAY = 0.00120/SECOND FNINFL = 0.83 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	80.	52.	*	160.	18.	*
5.	23.	*	85.	48.	*	165.	17.	*
10.	64.	*	90.	45.	*	170.	16.	*
15.	96.	*	95.	42.	*	175.	15.	*
20.	111.	*	100.	40.	*	180.	14.	*
25.	112.	*	105.	37.	*	185.	13.	*
30.	104.	*	110.	35.	*	190.	12.	*
35.	92.	*	115.	32.	*	195.	11.	*
40.	84.	*	120.	30.	*	200.	11.	*
45.	83.	*	125.	28.	*	205.	10.	*
50.	81.	*	130.	27.	*	210.	9.	*
55.	76.	*	135.	25.	*	215.	9.	*
60.	70.	*	140.	23.	*	220.	8.	*
65.	65.	*	145.	22.	*	225.	8.	*
70.	60.	*	150.	20.	*	230.	0.	*
75.	55.	*	155.	19.	*	0.	0.	*

BASIN ID: RRCSBE -- BASIN COMMENT: RED ROCK CANYON SUBBASIN E

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	140.	0.00	0.000	57.	*
5.	0.03	0.000	0.	*	145.	0.00	0.000	53.	*
10.	0.09	0.004	0.	*	150.	0.00	0.000	50.	*
15.	0.14	0.008	0.	*	155.	0.00	0.000	47.	*
20.	0.24	0.013	1.	*	160.	0.00	0.000	44.	*
25.	0.41	0.119	5.	*	165.	0.00	0.000	41.	*
30.	0.74	0.627	25.	*	170.	0.00	0.000	38.	*
35.	0.41	0.317	62.	*	175.	0.00	0.000	36.	*
40.	0.24	0.149	100.	*	180.	0.00	0.000	34.	*
45.	0.18	0.103	128.	*	185.	0.00	0.000	31.	*
50.	0.15	0.072	143.	*	190.	0.00	0.000	29.	*
55.	0.12	0.045	146.	*	195.	0.00	0.000	28.	*
60.	0.12	0.048	142.	*	200.	0.00	0.000	26.	*
65.	0.12	0.049	137.	*	205.	0.00	0.000	24.	*
70.	0.06	0.003	135.	*	210.	0.00	0.000	23.	*
75.	0.06	0.003	133.	*	215.	0.00	0.000	21.	*
80.	0.04	0.002	127.	*	220.	0.00	0.000	20.	*
85.	0.04	0.002	119.	*	225.	0.00	0.000	18.	*
90.	0.04	0.002	112.	*	230.	0.00	0.000	17.	*
95.	0.04	0.002	104.	*	235.	0.00	0.000	16.	*
100.	0.04	0.002	96.	*	240.	0.00	0.000	15.	*
105.	0.04	0.002	90.	*	245.	0.00	0.000	14.	*
110.	0.04	0.002	85.	*	250.	0.00	0.000	12.	*
115.	0.04	0.002	79.	*	255.	0.00	0.000	7.	*
120.	0.04	0.002	74.	*	260.	0.00	0.000	4.	*
125.	0.00	0.000	70.	*	265.	0.00	0.000	3.	*
130.	0.00	0.000	65.	*	270.	0.00	0.000	2.	*
135.	0.00	0.000	61.	*	275.	0.00	0.000	1.	*

TOTAL PRECIP. = 3.41 (1-HOUR RAIN = 2.95) EXECCESS PRECIP. = 1.579 INCHES

VOLUME OF EXCESS PRECIP = 20. ACRE-FEET

PEAK Q = 146. CFS TIME OF PEAK = 55. MIN.

INFILT.= 4.79 IN/HR DECAY =0.00120 FNINF = 0.83 IN/HR

MAX.PERV.RET.=0.25 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN - 100 YEAR DEVELOPED DRAINAGE ANALYSIS

BASIN ID: RRCSBF --- BASIN COMMENT: RED ROCK CANYON SUBBASIN F

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.28	1.31	0.62	4.50	.0320	5.00

COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.146 0.260

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH PEAK (CFS)	VOLUME OF RUNOFF (AF)
20.65	550.75	153.11	14.83

WIDTH AT 50 = 54. MIN. WIDTH AT 75 = 28. MIN. K50 = 0.23 K75 = 0.31

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.25 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.84 IN./HR. DECAY = 0.00100/SECOND FNINFL = 0.88 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	75.	63.	*	150.	18.	*
5.	37.	*	80.	58.	*	155.	17.	*
10.	97.	*	85.	53.	*	160.	16.	*
15.	139.	*	90.	49.	*	165.	14.	*
20.	153.	*	95.	45.	*	170.	13.	*
25.	147.	*	100.	42.	*	175.	12.	*
30.	132.	*	105.	38.	*	180.	11.	*
35.	117.	*	110.	35.	*	185.	10.	*
40.	115.	*	115.	32.	*	190.	9.	*
45.	107.	*	120.	30.	*	195.	9.	*
50.	98.	*	125.	28.	*	200.	8.	*
55.	90.	*	130.	25.	*	205.	7.	*
60.	81.	*	135.	23.	*	210.	0.	*
65.	74.	*	140.	22.	*	0.	0.	*
70.	68.	*	145.	20.	*	0.	0.	*

BASIN ID: RRCSBF -- BASIN COMMENT: RED ROCK CANYON SUBBASIN F

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	125.	0.00	0.000	66.	*
5.	0.03	0.000	0.	*	130.	0.00	0.000	61.	*
10.	0.09	0.003	0.	*	135.	0.00	0.000	56.	*
15.	0.14	0.006	0.	*	140.	0.00	0.000	52.	*
20.	0.24	0.010	1.	*	145.	0.00	0.000	48.	*
25.	0.41	0.067	5.	*	150.	0.00	0.000	44.	*
30.	0.74	0.606	31.	*	155.	0.00	0.000	41.	*
35.	0.41	0.297	82.	*	160.	0.00	0.000	37.	*
40.	0.24	0.133	130.	*	165.	0.00	0.000	34.	*
45.	0.18	0.088	162.	*	170.	0.00	0.000	32.	*
50.	0.15	0.059	175.	*	175.	0.00	0.000	29.	*
55.	0.12	0.035	173.	*	180.	0.00	0.000	27.	*
60.	0.12	0.038	166.	*	185.	0.00	0.000	25.	*
65.	0.12	0.041	163.	*	190.	0.00	0.000	23.	*
70.	0.06	0.003	157.	*	195.	0.00	0.000	21.	*
75.	0.06	0.003	149.	*	200.	0.00	0.000	19.	*
80.	0.04	0.002	138.	*	205.	0.00	0.000	18.	*
85.	0.04	0.002	127.	*	210.	0.00	0.000	16.	*
90.	0.04	0.002	116.	*	215.	0.00	0.000	15.	*
95.	0.04	0.002	107.	*	220.	0.00	0.000	14.	*
100.	0.04	0.002	99.	*	225.	0.00	0.000	13.	*
105.	0.04	0.002	91.	*	230.	0.00	0.000	11.	*
110.	0.04	0.002	84.	*	235.	0.00	0.000	6.	*
115.	0.04	0.002	78.	*	240.	0.00	0.000	4.	*
120.	0.04	0.002	72.	*	245.	0.00	0.000	3.	*

TOTAL PRECIP. = 3.41 (1-HOUR RAIN = 2.95) EXCESS PRECIP. = 1.401 INCHES

VOLUME OF EXCESS PRECIP = 21. ACRE-FEET

PEAK Q = 175. CFS TIME OF PEAK = 50. MIN.

INFILT.= 4.84 IN/HR DECAY = 0.00100 FNINF = 0.88 IN/HR

MAX.PERV.RET.=0.25 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN - 100 YEAR DEVELOPED DRAINAGE ANALYSIS

BASIN ID: RRCSBG -- BASIN COMMENT: RED ROCK CANYON SUBBASIN G

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.33	1.03	0.57	9.10	.0520	5.00

COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.129 0.247

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH (CFS)	PEAK (CFS)	VOLUME OF RUNOFF (AF)
14.71	775.73	255.99	255.99	17.60

WIDTH AT 50 = 39. MIN. WIDTH AT 75 = 20. MIN. K50 = 0.23 K75 = 0.31

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.30 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.43 IN./HR. DECAY = 0.00150/SECOND FNINFL = 0.69 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	60.	88.	*	120.	21.	*
5.	102.	*	65.	78.	*	125.	18.	*
10.	222.	*	70.	69.	*	130.	16.	*
15.	256.	*	75.	61.	*	135.	14.	*
20.	231.	*	80.	54.	*	140.	13.	*
25.	196.	*	85.	48.	*	145.	11.	*
30.	186.	*	90.	43.	*	150.	10.	*
35.	166.	*	95.	38.	*	155.	9.	*
40.	146.	*	100.	33.	*	160.	8.	*
45.	127.	*	105.	30.	*	165.	0.	*
50.	112.	*	110.	26.	*	0.	0.	*
55.	99.	*	115.	23.	*	0.	0.	*

BASIN ID: RRCSBG -- BASIN COMMENT: RED ROCK CANYON SUBBASIN G

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	110.	0.04	0.003	109.	*
5.	0.03	0.000	0.	*	115.	0.04	0.003	98.	*
10.	0.09	0.006	1.	*	120.	0.04	0.003	88.	*
15.	0.14	0.012	3.	*	125.	0.00	0.000	78.	*
20.	0.24	0.020	6.	*	130.	0.00	0.000	69.	*
25.	0.41	0.153	24.	*	135.	0.00	0.000	62.	*
30.	0.74	0.658	110.	*	140.	0.00	0.000	55.	*
35.	0.41	0.344	228.	*	145.	0.00	0.000	48.	*
40.	0.24	0.173	305.	*	150.	0.00	0.000	43.	*
45.	0.18	0.124	328.	*	155.	0.00	0.000	38.	*
50.	0.15	0.091	324.	*	160.	0.00	0.000	34.	*
55.	0.12	0.063	319.	*	165.	0.00	0.000	30.	*
60.	0.12	0.064	307.	*	170.	0.00	0.000	26.	*
65.	0.12	0.064	291.	*	175.	0.00	0.000	23.	*
70.	0.06	0.006	270.	*	180.	0.00	0.000	20.	*
75.	0.06	0.006	244.	*	185.	0.00	0.000	17.	*
80.	0.04	0.003	218.	*	190.	0.00	0.000	11.	*
85.	0.04	0.003	194.	*	195.	0.00	0.000	7.	*
90.	0.04	0.003	173.	*	200.	0.00	0.000	5.	*
95.	0.04	0.003	154.	*	205.	0.00	0.000	4.	*
100.	0.04	0.003	137.	*	210.	0.00	0.000	3.	*
105.	0.04	0.003	122.	*	215.	0.00	0.000	2.	*

TOTAL PRECIP. = 3.41 (1-HOUR RAIN = 2.95) EXCESS PRECIP. = 1.813 INCHES

VOLUME OF EXCESS PRECIP = 32. ACRE-FEET

PEAK Q = 328. CFS TIME OF PEAK = 45. MIN.

INFILT.= 4.43 IN/HR DECAY = 0.00150 FNINF = 0.69 IN/HR

MAX.PERV.RET.=0.30 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN - 100 YEAR DEVELOPED DRAINAGE ANALYSIS

BASIN ID: RRCSBH --- BASIN COMMENT: RED ROCK CANYON SUBBASIN H

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.32	1.25	0.59	8.80	.0400	5.00

COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.130 0.246

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH (CFS)	PEAK (CFS)	VOLUME OF RUNOFF (AF)
17.13	645.88	204.10	16.85	

WIDTH AT 50 = 46. MIN. WIDTH AT 75 = 24. MIN. K50 = 0.22 K75 = 0.30

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.30 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.68 IN./HR. DECAY = 0.00140/SECOND FNINFL = 0.74 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	65.	81.	*	130.	23.	*
5.	65.	*	70.	74.	*	135.	21.	*
10.	155.	*	75.	67.	*	140.	19.	*
15.	200.	*	80.	61.	*	145.	17.	*
20.	199.	*	85.	55.	*	150.	15.	*
25.	175.	*	90.	50.	*	155.	14.	*
30.	153.	*	95.	45.	*	160.	13.	*
35.	150.	*	100.	41.	*	165.	11.	*
40.	137.	*	105.	37.	*	170.	10.	*
45.	124.	*	110.	34.	*	175.	9.	*
50.	111.	*	115.	30.	*	180.	9.	*
55.	99.	*	120.	28.	*	185.	8.	*
60.	90.	*	125.	25.	*	190.	0.	*

BASIN ID: RRCSBH -- BASIN COMMENT: RED ROCK CANYON SUBBASIN H

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	120.	0.04	0.003	94.	*
5.	0.03	0.000	0.	*	125.	0.00	0.000	85.	*
10.	0.09	0.006	0.	*	130.	0.00	0.000	78.	*
15.	0.14	0.011	2.	*	135.	0.00	0.000	70.	*
20.	0.24	0.020	4.	*	140.	0.00	0.000	64.	*
25.	0.41	0.126	15.	*	145.	0.00	0.000	58.	*
30.	0.74	0.648	69.	*	150.	0.00	0.000	53.	*
35.	0.41	0.335	154.	*	155.	0.00	0.000	48.	*
40.	0.24	0.166	224.	*	160.	0.00	0.000	43.	*
45.	0.18	0.117	257.	*	165.	0.00	0.000	39.	*
50.	0.15	0.085	261.	*	170.	0.00	0.000	35.	*
55.	0.12	0.057	255.	*	175.	0.00	0.000	32.	*
60.	0.12	0.059	252.	*	180.	0.00	0.000	29.	*
65.	0.12	0.060	246.	*	185.	0.00	0.000	26.	*
70.	0.06	0.005	234.	*	190.	0.00	0.000	24.	*
75.	0.06	0.005	217.	*	195.	0.00	0.000	22.	*
80.	0.04	0.003	197.	*	200.	0.00	0.000	20.	*
85.	0.04	0.003	179.	*	205.	0.00	0.000	18.	*
90.	0.04	0.003	163.	*	210.	0.00	0.000	15.	*
95.	0.04	0.003	149.	*	215.	0.00	0.000	9.	*
100.	0.04	0.003	135.	*	220.	0.00	0.000	6.	*
105.	0.04	0.003	123.	*	225.	0.00	0.000	4.	*
110.	0.04	0.003	112.	*	230.	0.00	0.000	3.	*
115.	0.04	0.003	102.	*	235.	0.00	0.000	2.	*

TOTAL PRECIP. = 3.41 (1-HOUR RAIN = 2.95) EXCESS PRECIP. = 1.726 INCHES

VOLUME OF EXCESS PRECIP = 29. ACRE-FEET

PEAK Q = 261. CFS TIME OF PEAK = 50. MIN.

INFILT.= 4.68 IN/HR DECAY=0.00140 FNINF = 0.74 IN/HR

MAX.PERV.RET.=0.30 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN - 100 YEAR DEVELOPED DRAINAGE ANALYSIS

BASIN ID: RRCSBI -- BASIN COMMENT: RED ROCK CANYON SUBBASIN I

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.35	1.34	0.79	12.90	.0290	5.00

COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.121 0.249

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH PEAK (CFS)	VOLUME OF RUNOFF (AF)
19.94	548.83	192.09	18.67

WIDTH AT 50 = 55. MIN. WIDTH AT 75 = 28. MIN. K50 = 0.22 K75 = 0.30

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.30 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 3.98 IN./HR. DECAY = 0.00180/SECOND FNINFL = 0.57 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	75.	78.	*	150.	23.	*
5.	48.	*	80.	72.	*	155.	21.	*
10.	126.	*	85.	66.	*	160.	19.	*
15.	177.	*	90.	61.	*	165.	18.	*
20.	192.	*	95.	56.	*	170.	16.	*
25.	182.	*	100.	52.	*	175.	15.	*
30.	160.	*	105.	48.	*	180.	14.	*
35.	143.	*	110.	44.	*	185.	13.	*
40.	144.	*	115.	40.	*	190.	12.	*
45.	133.	*	120.	37.	*	195.	11.	*
50.	123.	*	125.	34.	*	200.	10.	*
55.	112.	*	130.	32.	*	205.	9.	*
60.	102.	*	135.	29.	*	210.	8.	*
65.	92.	*	140.	27.	*	215.	8.	*
70.	85.	*	145.	25.	*	220.	0.	*

BASIN ID: RRCBSI -- BASIN COMMENT: RED ROCK CANYON SUBBASIN I

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	140.	0.00	0.000	99.	*
5.	0.03	0.000	0.	*	145.	0.00	0.000	91.	*
10.	0.09	0.008	0.	*	150.	0.00	0.000	84.	*
15.	0.14	0.017	2.	*	155.	0.00	0.000	77.	*
20.	0.24	0.029	5.	*	160.	0.00	0.000	71.	*
25.	0.41	0.226	19.	*	165.	0.00	0.000	65.	*
30.	0.74	0.679	71.	*	170.	0.00	0.000	60.	*
35.	0.41	0.362	153.	*	175.	0.00	0.000	55.	*
40.	0.24	0.189	228.	*	180.	0.00	0.000	51.	*
45.	0.18	0.138	274.	*	185.	0.00	0.000	47.	*
50.	0.15	0.104	293.	*	190.	0.00	0.000	43.	*
55.	0.12	0.075	292.	*	195.	0.00	0.000	40.	*
60.	0.12	0.076	287.	*	200.	0.00	0.000	37.	*
65.	0.12	0.076	288.	*	205.	0.00	0.000	34.	*
70.	0.06	0.017	282.	*	210.	0.00	0.000	31.	*
75.	0.06	0.017	270.	*	215.	0.00	0.000	28.	*
80.	0.04	0.004	254.	*	220.	0.00	0.000	26.	*
85.	0.04	0.004	235.	*	225.	0.00	0.000	24.	*
90.	0.04	0.004	217.	*	230.	0.00	0.000	22.	*
95.	0.04	0.004	200.	*	235.	0.00	0.000	20.	*
100.	0.04	0.004	185.	*	240.	0.00	0.000	17.	*
105.	0.04	0.004	171.	*	245.	0.00	0.000	11.	*
110.	0.04	0.004	159.	*	250.	0.00	0.000	7.	*
115.	0.04	0.004	147.	*	255.	0.00	0.000	5.	*
120.	0.04	0.004	136.	*	260.	0.00	0.000	4.	*
125.	0.00	0.000	126.	*	265.	0.00	0.000	3.	*
130.	0.00	0.000	116.	*	270.	0.00	0.000	2.	*
135.	0.00	0.000	107.	*	275.	0.00	0.000	1.	*

TOTAL PRECIP. = 3.41 (1-HOUR RAIN = 2.95) EXECCESS PRECIP. = 2.053 INCHES

VOLUME OF EXCESS PRECIP = 38. ACRE-FEET

PEAK Q = 293. CFS TIME OF PEAK = 50. MIN.

INFILT.= 3.98 IN/HR DECAY=0.00180 FNINF = 0.57 IN/HR

MAX.PERV.RET.=0.30 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN - 100 YEAR DEVELOPED DRAINAGE ANALYSIS

BASIN ID: RRCBJ -- BASIN COMMENT: RED ROCK CANYON SUBBASIN J

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
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0.32	0.94	0.54	28.00	.0230	5.00
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COEFFICIENT (REFLECTING TIME TO PEAK)	COEFFICIENT (RELATED TO PEAK RATE OF RUNOFF)
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0.101	0.319
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CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH (CFS)	PEAK (CFS)	VOLUME OF RUNOFF (AF)
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13.36	1129.62	358.09	358.09	16.91
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WIDTH AT 50 = 27. MIN. WIDTH AT 75 = 14. MIN. K50 = 0.30 K75 = 0.41

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.30 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.54 IN./HR. DECAY = 0.00170/SECOND FNINFL = 0.64 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	45.	109.	*	90.	20.	*
5.	164.	*	50.	90.	*	95.	17.	*
10.	329.	*	55.	75.	*	100.	14.	*
15.	353.	*	60.	62.	*	105.	11.	*
20.	292.	*	65.	51.	*	110.	9.	*
25.	238.	*	70.	43.	*	115.	8.	*
30.	195.	*	75.	35.	*	120.	0.	*
35.	159.	*	80.	29.	*	0.	0.	*
40.	132.	*	85.	24.	*	0.	0.	*

BASIN ID: RRCBJ -- BASIN COMMENT: RED ROCK CANYON SUBBASIN J

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	95.	0.04	0.009	140.	*
5.	0.03	0.000	0.	*	100.	0.04	0.009	120.	*
10.	0.09	0.018	3.	*	105.	0.04	0.009	103.	*
15.	0.14	0.036	12.	*	110.	0.04	0.009	90.	*
20.	0.24	0.063	29.	*	115.	0.04	0.009	78.	*
25.	0.41	0.222	75.	*	120.	0.04	0.009	69.	*
30.	0.74	0.675	221.	*	125.	0.00	0.000	59.	*
35.	0.41	0.361	390.	*	130.	0.00	0.000	50.	*
40.	0.24	0.189	477.	*	135.	0.00	0.000	41.	*
45.	0.18	0.139	482.	*	140.	0.00	0.000	32.	*
50.	0.15	0.105	456.	*	145.	0.00	0.000	22.	*
55.	0.12	0.077	419.	*	150.	0.00	0.000	16.	*
60.	0.12	0.078	380.	*	155.	0.00	0.000	12.	*
65.	0.12	0.078	347.	*	160.	0.00	0.000	9.	*
70.	0.06	0.020	310.	*	165.	0.00	0.000	7.	*
75.	0.06	0.020	270.	*	170.	0.00	0.000	5.	*
80.	0.04	0.009	229.	*	175.	0.00	0.000	4.	*
85.	0.04	0.009	194.	*	180.	0.00	0.000	3.	*
90.	0.04	0.009	165.	*	185.	0.00	0.000	2.	*

TOTAL PRECIP. = 3.41 (1-HOUR RAIN = 2.95) EXECCESS PRECIP. = 2.165 INCHES

VOLUME OF EXCESS PRECIP = 37. ACRE-FEET

PEAK Q = 482. CFS TIME OF PEAK = 45. MIN.

INFILT.= 4.54 IN/HR DECAY=0.00170 FNINF = 0.64 IN/HR

MAX.PERV.RET.=0.30 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN - 100 YEAR DEVELOPED DRAINAGE ANALYSIS

BASIN ID: RRCBK -- BASIN COMMENT: RED ROCK CANYON SUBBASIN K

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
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0.41	1.13	0.57	19.60	.0270	5.00
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COEFFICIENT (REFLECTING TIME TO PEAK)	COEFFICIENT (RELATED TO PEAK RATE OF RUNOFF)
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0.111	0.278
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CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH (CFS)	PEAK (CFS)	VOLUME OF RUNOFF (AF)
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15.32	832.31	339.58	339.58	21.76
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WIDTH AT 50 = 36. MIN. WIDTH AT 75 = 19. MIN. K50 = 0.26 K75 = 0.35

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.35 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.55 IN./HR. DECAY = 0.00170/SECOND FNINFL = 0.64 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	55.	120.	*	110.	27.	*
5.	128.	*	60.	105.	*	115.	24.	*
10.	285.	*	65.	92.	*	120.	21.	*
15.	339.	*	70.	80.	*	125.	18.	*
20.	314.	*	75.	70.	*	130.	16.	*
25.	268.	*	80.	61.	*	135.	14.	*
30.	241.	*	85.	54.	*	140.	12.	*
35.	211.	*	90.	47.	*	145.	11.	*
40.	182.	*	95.	41.	*	150.	9.	*
45.	157.	*	100.	36.	*	155.	8.	*
50.	138.	*	105.	31.	*	160.	0.	*

BASIN ID: RRCBSK -- BASIN COMMENT: RED ROCK CANYON SUBBASIN K

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	110.	0.04	0.007	146.	*
5.	0.03	0.000	0.	*	115.	0.04	0.007	130.	*
10.	0.09	0.013	2.	*	120.	0.04	0.007	116.	*
15.	0.14	0.025	7.	*	125.	0.00	0.000	103.	*
20.	0.24	0.044	17.	*	130.	0.00	0.000	91.	*
25.	0.41	0.161	46.	*	135.	0.00	0.000	80.	*
30.	0.74	0.672	158.	*	140.	0.00	0.000	70.	*
35.	0.41	0.357	316.	*	145.	0.00	0.000	61.	*
40.	0.24	0.185	425.	*	150.	0.00	0.000	53.	*
45.	0.18	0.135	464.	*	155.	0.00	0.000	47.	*
50.	0.15	0.101	461.	*	160.	0.00	0.000	41.	*
55.	0.12	0.073	447.	*	165.	0.00	0.000	35.	*
60.	0.12	0.073	426.	*	170.	0.00	0.000	31.	*
65.	0.12	0.074	401.	*	175.	0.00	0.000	27.	*
70.	0.06	0.015	372.	*	180.	0.00	0.000	22.	*
75.	0.06	0.016	337.	*	185.	0.00	0.000	15.	*
80.	0.04	0.007	300.	*	190.	0.00	0.000	10.	*
85.	0.04	0.007	265.	*	195.	0.00	0.000	8.	*
90.	0.04	0.007	235.	*	200.	0.00	0.000	6.	*
95.	0.04	0.007	208.	*	205.	0.00	0.000	4.	*
100.	0.04	0.007	184.	*	210.	0.00	0.000	3.	*
105.	0.04	0.007	163.	*	215.	0.00	0.000	2.	*

TOTAL PRECIP. = 3.41 (1-HOUR RAIN = 2.95) EXCESS PRECIP. = 2.003 INCHES

VOLUME OF EXCESS PRECIP = 44. ACRE-FEET

PEAK Q = 464. CFS TIME OF PEAK = 45. MIN.

INFILT.= 4.55 IN/HR DECAY = 0.00170 FNINF = 0.64 IN/HR

MAX.PERV.RET.=0.35 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN - 100 YEAR DEVELOPED DRAINAGE ANALYSIS

BASIN ID: RRCBSL -- BASIN COMMENT: RED ROCK CANYON SUBBASIN L

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.38	1.28	0.61	13.60	.0410	5.00

COEFFICIENT (REFLECTING TIME TO PEAK)	COEFFICIENT (RELATED TO PEAK RATE OF RUNOFF)
0.120	0.254

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH PEAK (CFS)	VOLUME OF RUNOFF (AF)
16.24	710.62	272.88	20.48

WIDTH AT 50 = 42. MIN. WIDTH AT 75 = 22. MIN. K50 = 0.23 K75 = 0.31

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.35 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 3.79 IN./HR. DECAY = 0.00180/SECOND FNINFL = 0.55 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	65.	95.	*	130.	22.	*
5.	94.	*	70.	85.	*	135.	20.	*
10.	218.	*	75.	76.	*	140.	18.	*
15.	271.	*	80.	68.	*	145.	16.	*
20.	260.	*	85.	61.	*	150.	14.	*
25.	225.	*	90.	54.	*	155.	13.	*
30.	203.	*	95.	49.	*	160.	11.	*
35.	190.	*	100.	43.	*	165.	10.	*
40.	171.	*	105.	39.	*	170.	9.	*
45.	151.	*	110.	35.	*	175.	8.	*
50.	133.	*	115.	31.	*	180.	0.	*
55.	119.	*	120.	28.	*	0.	0.	*
60.	106.	*	125.	25.	*	0.	0.	*

BASIN ID: RRCBSL -- BASIN COMMENT: RED ROCK CANYON SUBBASIN L

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH *(CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH *(CFS)	*
0.	0.00	0.000	0.	*	120.	0.04	0.005	127.	*
5.	0.03	0.000	0.	*	125.	0.00	0.000	115.	*
10.	0.09	0.009	1.	*	130.	0.00	0.000	103.	*
15.	0.14	0.018	4.	*	135.	0.00	0.000	92.	*
20.	0.24	0.030	9.	*	140.	0.00	0.000	82.	*
25.	0.41	0.193	32.	*	145.	0.00	0.000	74.	*
30.	0.74	0.681	121.	*	150.	0.00	0.000	66.	*
35.	0.41	0.363	249.	*	155.	0.00	0.000	59.	*
40.	0.24	0.191	344.	*	160.	0.00	0.000	53.	*
45.	0.18	0.139	385.	*	165.	0.00	0.000	47.	*
50.	0.15	0.105	389.	*	170.	0.00	0.000	42.	*
55.	0.12	0.077	383.	*	175.	0.00	0.000	38.	*
60.	0.12	0.077	376.	*	180.	0.00	0.000	34.	*
65.	0.12	0.077	364.	*	185.	0.00	0.000	30.	*
70.	0.06	0.019	344.	*	190.	0.00	0.000	27.	*
75.	0.06	0.019	318.	*	195.	0.00	0.000	24.	*
80.	0.04	0.005	289.	*	200.	0.00	0.000	20.	*
85.	0.04	0.005	261.	*	205.	0.00	0.000	13.	*
90.	0.04	0.005	236.	*	210.	0.00	0.000	9.	*
95.	0.04	0.005	212.	*	215.	0.00	0.000	6.	*
100.	0.04	0.005	191.	*	220.	0.00	0.000	5.	*
105.	0.04	0.005	172.	*	225.	0.00	0.000	4.	*
110.	0.04	0.005	155.	*	230.	0.00	0.000	3.	*
115.	0.04	0.005	140.	*	235.	0.00	0.000	2.	*

TOTAL PRECIP. = 3.41 (1-HOUR RAIN = 2.95) EXCESS PRECIP. = 2.039 INCHES

VOLUME OF EXCESS PRECIP = 42. ACRE-FEET

PEAK Q = 389. CFS TIME OF PEAK = 50. MIN.

INFILT.= 3.79 IN/HR DECAY=0.00180 FNINF = 0.55 IN/HR

MAX.PERV.RET.=0.35 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN - 100 YEAR DEVELOPED DRAINAGE ANALYSIS

BASIN ID: RRCSBM -- BASIN COMMENT: RED ROCK CANYON SUBBASIN M

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.69	1.95	1.35	11.10	.0180	5.00

COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.124 0.273

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH (CFS)	PEAK (CFS)	VOLUME OF RUNOFF (AF)
33.54	337.61	232.27	337.61	36.69

WIDTH AT 50 = 89. MIN. WIDTH AT 75 = 46. MIN. K50 = 0.23 K75 = 0.31

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.40 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.22 IN./HR. DECAY = 0.00180/SECOND FNINFL = 0.58 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	125.	92.	*	250.	25.	*
5.	25.	*	130.	87.	*	255.	24.	*
10.	76.	*	135.	83.	*	260.	22.	*
15.	134.	*	140.	78.	*	265.	21.	*
20.	180.	*	145.	74.	*	270.	20.	*
25.	213.	*	150.	71.	*	275.	19.	*
30.	229.	*	155.	67.	*	280.	18.	*
35.	232.	*	160.	64.	*	285.	17.	*
40.	225.	*	165.	60.	*	290.	16.	*
45.	211.	*	170.	57.	*	295.	16.	*
50.	196.	*	175.	54.	*	300.	15.	*
55.	182.	*	180.	52.	*	305.	14.	*
60.	173.	*	185.	49.	*	310.	13.	*
65.	174.	*	190.	46.	*	315.	13.	*
70.	167.	*	195.	44.	*	320.	12.	*
75.	159.	*	200.	42.	*	325.	11.	*
80.	151.	*	205.	40.	*	330.	11.	*
85.	143.	*	210.	38.	*	335.	10.	*
90.	136.	*	215.	36.	*	340.	10.	*
95.	128.	*	220.	34.	*	345.	9.	*
100.	120.	*	225.	32.	*	350.	9.	*
105.	113.	*	230.	31.	*	355.	8.	*
110.	107.	*	235.	29.	*	360.	8.	*
115.	102.	*	240.	28.	*	365.	7.	*
120.	97.	*	245.	26.	*	370.	0.	*

BASIN ID: RRCBSM -- BASIN COMMENT: RED ROCK CANYON SUBBASIN M

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
				*					*
				*					*
0.	0.00	0.000	0.	*	210.	0.00	0.000	104.	*
5.	0.03	0.000	0.	*	215.	0.00	0.000	99.	*
10.	0.09	0.007	0.	*	220.	0.00	0.000	94.	*
15.	0.14	0.014	1.	*	225.	0.00	0.000	89.	*
20.	0.24	0.025	3.	*	230.	0.00	0.000	84.	*
25.	0.41	0.122	8.	*	235.	0.00	0.000	80.	*
30.	0.74	0.677	34.	*	240.	0.00	0.000	76.	*
35.	0.41	0.360	86.	*	245.	0.00	0.000	72.	*
40.	0.24	0.187	155.	*	250.	0.00	0.000	69.	*
45.	0.18	0.136	225.	*	255.	0.00	0.000	65.	*
50.	0.15	0.102	286.	*	260.	0.00	0.000	62.	*
55.	0.12	0.073	332.	*	265.	0.00	0.000	59.	*
60.	0.12	0.074	362.	*	270.	0.00	0.000	56.	*
65.	0.12	0.074	378.	*	275.	0.00	0.000	53.	*
70.	0.06	0.015	381.	*	280.	0.00	0.000	50.	*
75.	0.06	0.016	376.	*	285.	0.00	0.000	48.	*
80.	0.04	0.004	366.	*	290.	0.00	0.000	45.	*
85.	0.04	0.004	355.	*	295.	0.00	0.000	43.	*
90.	0.04	0.004	347.	*	300.	0.00	0.000	41.	*
95.	0.04	0.004	336.	*	305.	0.00	0.000	39.	*
100.	0.04	0.004	323.	*	310.	0.00	0.000	37.	*
105.	0.04	0.004	309.	*	315.	0.00	0.000	35.	*
110.	0.04	0.004	295.	*	320.	0.00	0.000	33.	*
115.	0.04	0.004	281.	*	325.	0.00	0.000	31.	*
120.	0.04	0.004	268.	*	330.	0.00	0.000	30.	*
125.	0.00	0.000	254.	*	335.	0.00	0.000	28.	*
130.	0.00	0.000	241.	*	340.	0.00	0.000	27.	*
135.	0.00	0.000	229.	*	345.	0.00	0.000	25.	*
140.	0.00	0.000	217.	*	350.	0.00	0.000	24.	*
145.	0.00	0.000	206.	*	355.	0.00	0.000	23.	*
150.	0.00	0.000	195.	*	360.	0.00	0.000	22.	*
155.	0.00	0.000	185.	*	365.	0.00	0.000	21.	*
160.	0.00	0.000	176.	*	370.	0.00	0.000	20.	*
165.	0.00	0.000	167.	*	375.	0.00	0.000	19.	*
170.	0.00	0.000	158.	*	380.	0.00	0.000	18.	*
175.	0.00	0.000	150.	*	385.	0.00	0.000	16.	*
180.	0.00	0.000	142.	*	390.	0.00	0.000	15.	*
185.	0.00	0.000	135.	*	395.	0.00	0.000	9.	*
190.	0.00	0.000	128.	*	400.	0.00	0.000	6.	*
195.	0.00	0.000	122.	*	405.	0.00	0.000	5.	*
200.	0.00	0.000	116.	*	410.	0.00	0.000	3.	*
205.	0.00	0.000	110.	*	415.	0.00	0.000	2.	*

TOTAL PRECIP. = 3.41 (1-HOUR RAIN = 2.95) EXCESS PRECIP. = 1.915 INCHES

VOLUME OF EXCESS PRECIP = 70. ACRE-FEET

PEAK Q = 381. CFS TIME OF PEAK = 70. MIN.

INFILT.= 4.22 IN/HR DECAY=0.00180 FNINF = 0.58 IN/HR

MAX.PERV.RET.=0.40 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN - 100 YEAR DEVELOPED DRAINAGE ANALYSIS

BASIN ID: RRCBN --- BASIN COMMENT: RED ROCK CANYON SUBBASIN N

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.42	1.14	0.49	11.20	.0260	5.00

COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.124 0.253

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH PEAK (CFS)	VOLUME OF RUNOFF (AF)
15.99	721.25	300.76	22.24

WIDTH AT 50 = 42. MIN. WIDTH AT 75 = 22. MIN. K50 = 0.23 K75 = 0.31

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.35 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 3.57 IN./HR. DECAY = 0.00180/SECOND FNINFL = 0.54 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	65.	102.	*	130.	23.	*
5.	106.	*	70.	91.	*	135.	21.	*
10.	244.	*	75.	81.	*	140.	19.	*
15.	300.	*	80.	73.	*	145.	17.	*
20.	285.	*	85.	65.	*	150.	15.	*
25.	245.	*	90.	58.	*	155.	13.	*
30.	224.	*	95.	52.	*	160.	12.	*
35.	207.	*	100.	46.	*	165.	10.	*
40.	185.	*	105.	41.	*	170.	9.	*
45.	163.	*	110.	37.	*	175.	8.	*
50.	144.	*	115.	33.	*	180.	7.	*
55.	128.	*	120.	29.	*	185.	0.	*
60.	114.	*	125.	26.	*	0.	0.	*

BASIN ID: RRCBSN -- BASIN COMMENT: RED ROCK CANYON SUBBASIN N

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH *(CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH *(CFS)	*
0.	0.00	0.000	0.	*	120.	0.04	0.004	134.	*
5.	0.03	0.000	0.	*	125.	0.00	0.000	121.	*
10.	0.09	0.007	1.	*	130.	0.00	0.000	108.	*
15.	0.14	0.014	3.	*	135.	0.00	0.000	97.	*
20.	0.24	0.025	8.	*	140.	0.00	0.000	86.	*
25.	0.41	0.199	34.	*	145.	0.00	0.000	77.	*
30.	0.74	0.682	134.	*	150.	0.00	0.000	69.	*
35.	0.41	0.364	277.	*	155.	0.00	0.000	61.	*
40.	0.24	0.191	381.	*	160.	0.00	0.000	55.	*
45.	0.18	0.140	423.	*	165.	0.00	0.000	49.	*
50.	0.15	0.106	427.	*	170.	0.00	0.000	44.	*
55.	0.12	0.077	421.	*	175.	0.00	0.000	39.	*
60.	0.12	0.077	412.	*	180.	0.00	0.000	35.	*
65.	0.12	0.077	398.	*	185.	0.00	0.000	31.	*
70.	0.06	0.019	376.	*	190.	0.00	0.000	28.	*
75.	0.06	0.019	346.	*	195.	0.00	0.000	25.	*
80.	0.04	0.004	315.	*	200.	0.00	0.000	22.	*
85.	0.04	0.004	283.	*	205.	0.00	0.000	18.	*
90.	0.04	0.004	255.	*	210.	0.00	0.000	12.	*
95.	0.04	0.004	229.	*	215.	0.00	0.000	8.	*
100.	0.04	0.004	205.	*	220.	0.00	0.000	6.	*
105.	0.04	0.004	184.	*	225.	0.00	0.000	4.	*
110.	0.04	0.004	166.	*	230.	0.00	0.000	3.	*
115.	0.04	0.004	149.	*	235.	0.00	0.000	2.	*

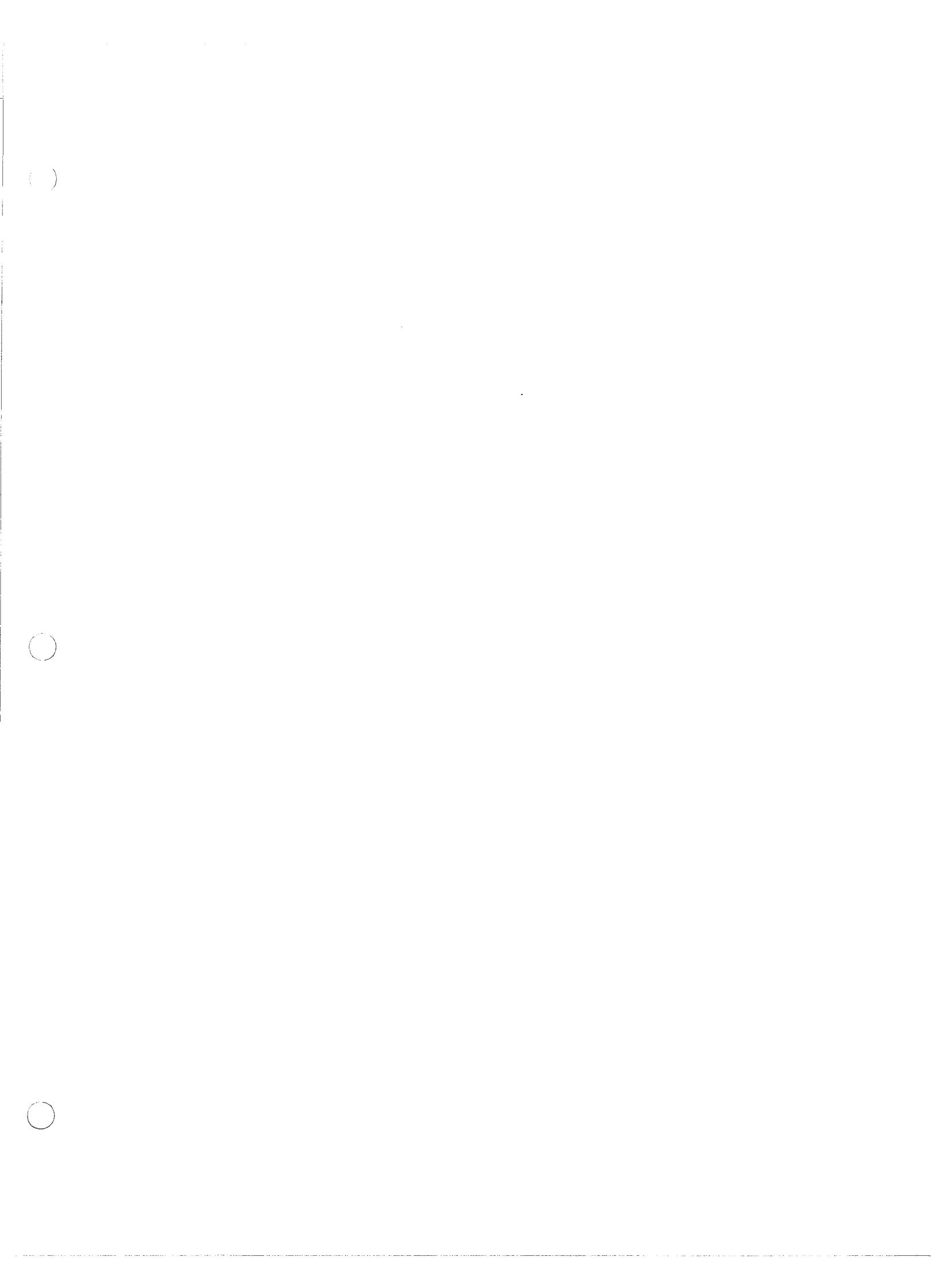
TOTAL PRECIP. = 3.41 (1-HOUR RAIN = 2.95) EXCESS PRECIP. = 2.030 INCHES

VOLUME OF EXCESS PRECIP = 45. ACRE-FEET

PEAK Q = 427. CFS TIME OF PEAK = 50. MIN.

INFILT.= 3.57 IN/HR DECAY=0.00180 FNINF = 0.54 IN/HR

MAX.PERV.RET.=0.35 IN. MAX.IMP.RET.=0.05 IN.



2 1 1 2

3 4

WATERSHED 1

RED ROCK CANYON DRAINAGE BASIN DESIGN PLAN - 10 YEAR DEVELOPED
FERBER ENGINEERING COMPANY, MARCH 15, 1993

50 0 0 5.0

1

1 1

2 1

3 144

4 18

5 15

6 18

7 19

8 19

9 2

10 2

11 27

12 3

13 24

14 4

0 1 0 0 3

0 2 101 0 3

0 3 102 0 3

0 4 104 0 3

0 10 1 0 1 40.0 1220.0 0.010 4.0 4.0 .035 8.0

0 11 10 0 1 40.0 520.0 0.010 4.0 4.0 .035 8.0

0 12 11 0 1 40.0 800.0 0.010 4.0 4.0 .035 8.0

0 13 12 0 1 40.0 1580.0 0.010 4.0 4.0 .035 6.0

0 141 13 0 1 32.0 1510.0 0.015 2.0 2.0 .056 7.5

0 142 141 0 1 20.0 500.0 0.018 2.0 0.0 .056 9.5

0 143 142 0 1 32.0 980.0 0.010 3.5 3.5 .044 7.0

0 144 143 0 1 20.0 670.0 0.017 1.0 1.0 .044 9.5

0 151 144 0 4 0.1 600.0 0.017 4.0 4.0 .056 3.0

50.0 600.0 0.017 4.0 1.5 .056 10.0

0 152 151 0 4 5.0 410.0 0.017 1.0 8.0 .050 2.5

34.5 410.0 0.017 1.0 2.5 .050 6.0

0 15 152 0 4 0.1 1410.0 0.017 5.0 5.0 .062 1.0

11.0 1410.0 0.017 2.0 2.0 .062 12.0

0 16 15 0 4 0.1 880.0 0.021 5.0 5.0 .062 1.0

11.0 880.0 0.021 2.0 2.0 .062 12.0

0 17 16 0 4 0.1 560.0 0.018 5.0 5.0 .062 1.0

11.0 560.0 0.018 2.0 2.0 .062 12.0

0 18 17 0 4 0.1 620.0 0.019 5.0 5.0 .062 1.0

11.0 620.0 0.019 2.0 2.0 .062 12.0

0 19 18 0 4 0.1 5420.0 0.024 5.0 5.0 .062 1.0

11.0 5420.0 0.024 2.0 2.0 .062 12.0

0 20 19 0 4 0.1 970.0 0.019 5.0 5.0 .062 1.0

11.0 970.0 0.019 2.0 2.0 .062 12.0

0 21 20 0 4 8.0 3890.0 0.015 1.0 1.0 .050 2.5

25.0 3890.0 0.015 1.0 2.0 .050 12.0

0 22 2 0 4 0.1 3600.0 0.014 2.0 3.0 .050 5.0

105.0 3600.0 0.014 1.5 15.0 .050 10.0

0 23 3 0 4 0.1 2080.0 0.018 8.0 4.0 .050 8.0

96.0 2080.0 0.018 15.0 35.0 .050 8.0

0 24 2 0 1 0.1 6340.0 0.022 5.0 10.0 .050 20.0

0 25 18 0 1 0.1 1340.0 0.029 2.5 1.5 .062 20.0

0 26 25 0 4 0.1 3680.0 0.024 6.0 6.0 .062 2.5

30.0 3680.0 0.024 2.0 10.0 .062 10.0

0 27 26 0 4 0.1 780.0 0.028 5.0 5.0 .062 3.0

30.0 780.0 0.028 2.5 1.5 .062 10.0

0 28 103 0 4 0.1 1000.0 0.018 8.0 4.0 .050 8.0

96.0 1000.0 0.018 15.0 35.0 .050 8.0

0 101 21 8 2 .1 1.0 0.010 .0 .0 .016 0.1

0.0 80.0 1.8 192.0 6.8 360.0 14.6 520.0

25.2 680.0 38.5 830.0 54.5 1000.0 73.3 1080.0

0 102 22 12 2 .1 1.0 0.010 .0 .0 .016 0.1

0.0 0.0 5.5 100.0 11.1 120.0 16.7 220.0

22.4 320.0 28.1 380.0 34.0 450.0 40.5 500.0

41.4 642.0 42.1 892.0 42.9 1234.0 44.4 2165.0

0 103 23 8 2 .1 1.0 0.010 .0 .0 .016 0.1

0.0 0.0 0.1 20.0 0.5 60.0 1.2 140.0

2.2 210.0 3.2 260.0 5.3 300.0 7.0 560.0

0 104 28 4 2 .1 1.0 0.010 .0 .0 .016 0.1

0.0 0.0 1.7 220.0 4.1 350.0 5.0 600.0

0

32

1 2 3 4 10 11 12 13 141 142 143 144 151 152 15 16

17 18 19 20 21 22 23 24 25 26 27 28 101 102 103 104

ENDPROGRAM

RED ROCK CANYON DRAINAGE BASIN DESIGN PLAN - 10 YEAR DEVELOPED
FERBER ENGINEERING COMPANY, MARCH 15, 1993

NUMBER OF TIME STEPS 50
INTEGRATION TIME INTERVAL (MINUTES), 5.00

25.0 PERCENT OF IMPERVIOUS AREA HAS ZERO DETENTION DEPTH
1

RED ROCK CANYON DRAINAGE BASIN DESIGN PLAN - 10 YEAR DEVELOPED
FERBER ENGINEERING COMPANY, MARCH 15, 1993

HYDROGRAPHS FROM CUHPE/PC ARE LISTED FOR THE FOLLOWING 14 SUBCATCHMENTS

TIME(HR/MIN)	1 11	2 12	3 13	4 14	5	6	7	8	9	10
0 0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0 5.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0 10.	0. 1.	2. 1.	0. 0.	0. 1.	0.	0.	0.	0.	0.	2.
0 15.	1. 7.	8. 3.	1. 1.	2. 3.	0.	0.	2.	2.	2.	12.
0 20.	4. 18.	21. 10.	3. 3.	5. 9.	1.	1.	7.	4.	5.	31.
0 25.	11. 60.	58. 43.	8. 11.	20. 46.	7.	8.	35.	21.	25.	94.
0 30.	26. 123.	103. 97.	17. 30.	48. 107.	19.	22.	79.	51.	61.	171.
0 35.	42. 166.	123. 138.	21. 54.	71. 152.	31.	34.	108.	74.	93.	208.
0 40.	54. 176.	118. 152.	21. 79.	78. 167.	38.	41.	112.	82.	112.	202.
0 45.	61. 169.	106. 149.	19. 100.	76. 163.	40.	41.	104.	79.	117.	182.

0	50.	63. 157.	94. 142.	18. 115.	69. 156.	39.	39.	97.	72.	113.	161.
0	55.	61. 146.	82. 136.	16. 123.	65. 149.	36.	35.	90.	68.	107.	141.
1	0.	58. 133.	72. 129.	15. 126.	62. 141.	33.	34.	81.	64.	105.	125.
1	5.	55. 122.	65. 122.	14. 126.	58. 132.	32.	32.	73.	60.	103.	112.
1	10.	54. 112.	58. 114.	13. 123.	53. 124.	32.	30.	66.	55.	99.	101.
1	15.	54. 105.	53. 108.	12. 120.	49. 117.	30.	28.	60.	50.	95.	92.
1	20.	52. 97.	49. 101.	11. 117.	45. 110.	29.	26.	55.	47.	90.	84.
1	25.	51. 89.	44. 94.	10. 117.	42. 101.	27.	24.	50.	43.	85.	75.
1	30.	48. 81.	39. 85.	9. 115.	39. 92.	25.	22.	45.	40.	79.	66.
1	35.	46. 73.	35. 78.	9. 112.	36. 84.	24.	21.	41.	37.	74.	59.
1	40.	44. 67.	32. 71.	8. 109.	34. 76.	22.	19.	37.	34.	69.	53.
1	45.	42. 61.	29. 65.	7. 105.	31. 69.	21.	18.	34.	32.	64.	48.
1	50.	40. 56.	27. 60.	7. 100.	29. 63.	20.	17.	31.	29.	60.	43.
1	55.	39. 51.	25. 55.	6. 96.	27. 58.	19.	16.	28.	27.	57.	40.
2	0.	37. 47.	23. 50.	6. 92.	25. 53.	18.	15.	26.	25.	53.	36.
2	5.	35. 43.	20. 46.	5. 87.	23. 48.	17.	14.	23.	23.	49.	32.
2	10.	34. 38.	16. 41.	5. 83.	21. 43.	16.	13.	21.	21.	46.	27.

2	15.	32. 33.	12. 37.	4. 80.	20. 38.	15.	12.	19.	19.	42.	21.
2	20.	30. 29.	9. 33.	4. 76.	18. 34.	14.	11.	16.	18.	39.	16.
2	25.	28. 25.	7. 30.	3. 72.	16. 30.	13.	10.	15.	16.	36.	12.
2	30.	26. 22.	6. 26.	3. 68.	15. 27.	12.	9.	13.	14.	33.	9.
2	35.	24. 19.	5. 24.	2. 65.	13. 24.	12.	9.	11.	13.	30.	8.
2	40.	23. 17.	4. 21.	0. 62.	12. 22.	11.	8.	10.	12.	28.	6.
2	45.	21. 15.	3. 19.	0. 58.	11. 19.	10.	7.	9.	11.	26.	5.
2	50.	20. 13.	3. 17.	0. 55.	10. 17.	9.	7.	8.	10.	24.	4.
2	55.	19. 11.	2. 15.	0. 53.	9. 15.	9.	6.	7.	9.	22.	3.
3	0.	18. 7.	2. 14.	0. 50.	8. 14.	8.	6.	6.	8.	20.	2.
3	5.	16. 5.	0. 12.	0. 47.	7. 12.	8.	5.	4.	7.	18.	2.
3	10.	15. 4.	0. 11.	0. 45.	7. 11.	7.	5.	2.	7.	17.	1.
3	15.	14. 4.	0. 9.	0. 43.	6. 10.	7.	4.	2.	6.	16.	0.
3	20.	13. 3.	0. 6.	0. 41.	5. 8.	6.	4.	0.	5.	14.	0.
3	25.	13. 2.	0. 4.	0. 38.	5. 5.	6.	4.	0.	5.	13.	0.
3	30.	12. 2.	0. 3.	0. 36.	4. 4.	6.	3.	0.	3.	12.	0.
3	35.	11. 2.	0. 3.	0. 35.	4. 3.	5.	3.	0.	1.	11.	0.

3	40.	10.	0.	0.	2.	5.	3.	0.	0.	10.	0.
		0.	2.	33.	2.						
3	45.	10.	0.	0.	0.	5.	3.	0.	0.	9.	0.
		0.	2.	31.	2.						
3	50.	9.	0.	0.	0.	4.	0.	0.	0.	9.	0.
		0.	2.	30.	2.						
3	55.	8.	0.	0.	0.	4.	0.	0.	0.	8.	0.
		0.	0.	28.	0.						
4	0.	8.	0.	0.	0.	4.	0.	0.	0.	5.	0.
		0.	0.	27.	0.						
4	5.	7.	0.	0.	0.	3.	0.	0.	0.	3.	0.
		0.	0.	25.	0.						
4	10.	7.	0.	0.	0.	2.	0.	0.	0.	2.	0.
		0.	0.	24.	0.						

RED ROCK CANYON DRAINAGE BASIN DESIGN PLAN - 10 YEAR DEVELOPED
FERBER ENGINEERING COMPANY, MARCH 15, 1993

GUTTER NUMBER	GUTTER CONNECTION	NDP	NP	WIDTH OR DIAM (FT)	LENGTH (FT)	INVERT SLOPE (FT/FT)	SIDE SLOPES		OVERBANK/SURCHARGE			
							HORIZ	TO VERT	MANNING N	DEPTH (FT)	JK	
1	0	0	3	.0	0.	.0010	.0	.0	.001	10.00	0	
2	101	0	3	.0	0.	.0010	.0	.0	.001	10.00	0	
3	102	0	3	.0	0.	.0010	.0	.0	.001	10.00	0	
4	104	0	3	.0	0.	.0010	.0	.0	.001	10.00	0	
10	1	0	1	CHANNEL	40.0	.1220.	.0100	4.0	4.0	.035	8.00	0
11	10	0	1	CHANNEL	40.0	.520.	.0100	4.0	4.0	.035	8.00	0
12	11	0	1	CHANNEL	40.0	.800.	.0100	4.0	4.0	.035	8.00	0
13	12	0	1	CHANNEL	40.0	.1580.	.0100	4.0	4.0	.035	6.00	0
141	13	0	1	CHANNEL	32.0	.1510.	.0150	2.0	2.0	.056	7.50	0
142	141	0	1	CHANNEL	20.0	.500.	.0180	2.0	..0	.056	9.50	0
143	142	0	1	CHANNEL	32.0	.980.	.0100	3.5	3.5	.044	7.00	0
144	143	0	1	CHANNEL	20.0	.670.	.0170	1.0	1.0	.044	9.50	0
151	144	0	4	CHANNEL	.1	.600.	.0170	4.0	4.0	.056	3.00	0
				OVERFLOW	50.0	.600.	.0170	4.0	1.5	.056	10.00	
152	151	0	4	CHANNEL	5.0	.410.	.0170	1.0	8.0	.050	2.50	0
				OVERFLOW	34.5	.410.	.0170	1.0	2.5	.050	6.00	
15	152	0	4	CHANNEL	.1	.1410.	.0170	5.0	5.0	.062	1.00	0
				OVERFLOW	11.0	.1410.	.0170	2.0	2.0	.062	12.00	
16	15	0	4	CHANNEL	.1	.880.	.0210	5.0	5.0	.062	1.00	0
				OVERFLOW	11.0	.880.	.0210	2.0	2.0	.062	12.00	
17	16	0	4	CHANNEL	.1	.560.	.0180	5.0	5.0	.062	1.00	0
				OVERFLOW	11.0	.560.	.0180	2.0	2.0	.062	12.00	
18	17	0	4	CHANNEL	.1	.620.	.0190	5.0	5.0	.062	1.00	0
				OVERFLOW	11.0	.620.	.0190	2.0	2.0	.062	12.00	
19	18	0	4	CHANNEL	.1	.5420.	.0240	5.0	5.0	.062	1.00	0
				OVERFLOW	11.0	.5420.	.0240	2.0	2.0	.062	12.00	
20	19	0	4	CHANNEL	.1	.970.	.0190	5.0	5.0	.062	1.00	0
				OVERFLOW	11.0	.970.	.0190	2.0	2.0	.062	12.00	
21	20	0	4	CHANNEL	8.0	.3890.	.0150	1.0	1.0	.050	2.50	0
				OVERFLOW	25.0	.3890.	.0150	1.0	2.0	.050	12.00	
22	2	0	4	CHANNEL	.1	.3600.	.0140	2.0	3.0	.050	5.00	0
				OVERFLOW	105.0	.3600.	.0140	1.5	15.0	.050	10.00	
23	3	0	4	CHANNEL	.1	.2080.	.0180	8.0	4.0	.050	8.00	0
				OVERFLOW	96.0	.2080.	.0180	15.0	35.0	.050	8.00	
24	2	0	1	CHANNEL	.1	.6340.	.0220	5.0	10.0	.050	20.00	0
25	18	0	1	CHANNEL	.1	.1340.	.0290	2.5	1.5	.062	20.00	0
26	25	0	4	CHANNEL	.1	.3680.	.0240	6.0	6.0	.062	2.50	0
				OVERFLOW	30.0	.3680.	.0240	2.0	10.0	.062	10.00	
27	26	0	4	CHANNEL	.1	.780.	.0280	5.0	5.0	.062	3.00	0
				OVERFLOW	30.0	.780.	.0280	2.5	1.5	.062	10.00	
28	103	0	4	CHANNEL	.1	.1000.	.0180	8.0	4.0	.050	8.00	0
				OVERFLOW	96.0	.1000.	.0180	15.0	35.0	.050	8.00	

101	21	8	2	PIPE	.1	1.	.0100	.0	.0	.016	.10	0	
		RESERVOIR STORAGE IN ACRE-FEET VS SPILLWAY OUTFLOW											
		.0	80.0	1.8	192.0	6.8	360.0	14.6	520.0	25.2	680.0	38.5	830.0
		54.5	1000.0	73.3	1080.0								
102	22	12	2	PIPE	.1	1.	.0100	.0	.0	.016	.10	0	
		RESERVOIR STORAGE IN ACRE-FEET VS SPILLWAY OUTFLOW											
		.0	.0	5.5	100.0	11.1	120.0	16.7	220.0	22.4	320.0	28.1	380.0
		34.0	450.0	40.5	500.0	41.4	642.0	42.1	892.0	42.9	1234.0	44.4	2165.0
103	23	8	2	PIPE	.1	1.	.0100	.0	.0	.016	.10	0	
		RESERVOIR STORAGE IN ACRE-FEET VS SPILLWAY OUTFLOW											
		.0	.0	.1	20.0	.5	60.0	1.2	140.0	2.2	210.0	3.2	260.0
		5.3	300.0	7.0	560.0								
104	28	4	2	PIPE	.1	1.	.0100	.0	.0	.016	.10	0	
		RESERVOIR STORAGE IN ACRE-FEET VS SPILLWAY OUTFLOW											
		.0	.0	1.7	220.0	4.1	350.0	5.0	600.0				

OTOTAL NUMBER OF GUTTERS/PIPES, 32

1

**RED ROCK CANYON DRAINAGE BASIN DESIGN PLAN - 10 YEAR DEVELOPED
FERBER ENGINEERING COMPANY, MARCH 15, 1993**

ARRANGEMENT OF SUBCATCHMENTS AND GUTTERS/PIPES

104	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	266.9
141	142	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2737.3
142	143	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2737.3
143	144	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2737.3
144	151	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	2737.3
151	152	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2628.5
152	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2628.5

RED ROCK CANYON DRAINAGE BASIN DESIGN PLAN - 10 YEAR DEVELOPED
 FERBER ENGINEERING COMPANY, MARCH 15, 1993

HYDROGRAPHS ARE LISTED FOR THE FOLLOWING 32 CONVEYANCE ELEMENTS

THE UPPER NUMBER IS DISCHARGE IN CFS

THE LOWER NUMBER IS ONE OF THE FOLLOWING CASES:

() DENOTES DEPTH ABOVE INVERT IN FEET

(S) DENOTES STORAGE IN AC-FT FOR DETENTION DAM. DISCHARGE INCLUDES SPILLWAY OUTFLOW.

(I) DENOTES GUTTER INFLOW IN CFS FROM SPECIFIED INFLOW HYDROGRAPH

(D) DENOTES DISCHARGE IN CFS DIVERTED FROM THIS GUTTER

(O) DENOTES STORAGE IN AC-FT FOR SURCHARGED GUTTER

TIME(HR/MIN)	1	2	3	4	10	11	12	13	141	142
	143	144	151	152	15	16	17	18	19	20
	21	22	23	24	25	26	27	28	101	102
	103	104								
0 5.	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()
	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()
	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0(s)	0. .0(s)
	0. .0(s)	0. .0(s)								
0 10.	2. .0()	3. .0()	1. .0()	1. .0()	0. .0()					
	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .1()	0. .1()	0. .0()
	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .2()	0. .1()	3. .0(s)	0. .0(s)
	0. .0(s)	0. .0(s)								
0 15.	9. .0()	13. .0()	3. .0()	3. .0()	0. .0()					
	0. .0()	0. .0()	0. .0()	0. .0()	0. .1()	0. .0()	0. .2()	1. .3()	0. .2()	0. .1()

		1. .1()	0. .1()	0. .0()	0. .1()	0. .0()	0. .1()	2. .5()	0. .2()	13. .0(s)	0. .0(s)
0	20.	25. .0()	36. .0()	10. .0()	9. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()
		0. .0()	1. .1()	0. .0()	0. .0()	0. .2()	0. .2()	1. .4()	3. .6()	1. .3()	1. .3()
		4. .3()	0. .1()	0. .1()	0. .1()	0. .2()	1. .3()	9. .9()	1. .4()	36. .0(s)	1. .1(s)
		1. .0(s)	4. .0(s)								
0	25.	70. .0()	120. .0()	43. .0()	46. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()
		0. .0()	3. .1()	0. .1()	0. .1()	1. .5()	2. .5()	7. .9()	15. .11()	4. .7()	5. .8()
		17. .7()	0. .3()	0. .2()	0. .2()	1. .4()	4. .6()	34. .15()	6. .7()	87. .1(s)	4. .2(s)
		3. .0(s)	19. .1(s)								
0	30.	129. .0()	235. .0()	99. .0()	107. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()
		2. .1()	10. .3()	1. .5()	4. .4()	8. .9()	12. .10()	33. .14()	60. .17()	18. .11()	19. .12()
		44. 1.3()	1. .6()	2. .5()	2. .4()	5. .10()	15. .10()	90. .21()	26. .12()	119. .6(s)	12. .7(s)
		14. .1(s)	54. .4(s)								
0	35.	165. .0()	312. .0()	147. .0()	152. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	2. .1()
		7. .2()	23. .4()	9. .10()	20. .9()	30. .14()	56. .16()	109. .21()	144. .23()	51. .15()	51. .16()
		83. 1.9()	4. .9()	9. .8()	6. .6()	19. .1.7()	42. .1.5()	147. .2.5()	67. .1.7()	174. .1.5(s)	25. .1.4(s)

1	0.	136. .0()	369. .0()	260. .0()	141. .0()	6. .1()	45. .4()	88. .7()	162. 1.0()	299. 1.9()	412. 2.9()
		435. 2.2()	486. 2.8()	484. 3.9()	502. 3.3()	514. 4.0()	510. 3.8()	523. 4.0()	531. 4.0()	304. 2.9()	229. 2.7()
		242. 3.1()	69. 2.6()	130. 2.2()	70. 1.6()	140. 3.5()	142. 2.4()	138. 2.5()	152. 2.4()	298. 4.9(S)	103. 6.3(S)
		147. 1.3(S)	149. 1.1(S)								
1	5.	193. .0()	378. .0()	262. .0()	132. .0()	73. .6()	197. 1.1()	253. 1.2()	324. 1.4()	436. 2.3()	509. 3.3()
		520. 2.4()	543. 3.0()	538. 4.0()	552. 3.4()	558. 4.2()	545. 3.9()	554. 4.1()	558. 4.1()	333. 3.1()	255. 2.9()
		266. 3.2()	82. 2.8()	140. 2.3()	82. 1.7()	140. 3.5()	138. 2.4()	127. 2.4()	145. 2.3()	314. 5.4(S)	107. 7.4(S)
		147. 1.3(S)	141. 1.1(S)								
1	10.	369. .0()	384. .0()	258. .0()	124. .0()	256. 1.2()	383. 1.6()	416. 1.7()	459. 1.7()	524. 2.6()	560. 3.5()
		566. 2.5()	582. 3.1()	575. 4.0()	582. 3.5()	587. 4.3()	566. 4.0()	571. 4.1()	573. 4.1()	357. 3.2()	279. 3.0()
		288. 3.2()	92. 2.9()	144. 2.3()	92. 1.7()	136. 3.5()	132. 2.3()	117. 2.3()	138. 2.3()	328. 5.8(S)	110. 8.4(S)
		145. 1.3(S)	133. 1.0(S)								
1	15.	545. .0()	385. .0()	251. .0()	117. .0()	438. 1.7()	502. 1.8()	518. 1.9()	539. 1.9()	571. 2.7()	592. 3.6()
		596. 2.6()	605. 3.2()	596. 4.1()	601. 3.5()	602. 4.3()	577. 4.0()	580. 4.2()	581. 4.1()	376. 3.2()	299. 3.1()
		307. 3.3()	100. 3.0()	143. 2.3()	98. 1.8()	129. 3.4()	125. 2.3()	108. 2.2()	130. 2.2()	339. 6.2(S)	114. 9.4(S)
		141. 1.2(S)	126. 1.0(S)								
1	20.	636. .0()	383. .0()	241. .0()	110. .0()	535. 1.9()	563. 2.0()	571. 2.0()	581. 2.0()	599. 2.8()	611. 3.7()

	612.	617.	607.	609.	609.	583.	584.	584.	391.	316.
	2.7()	3.2()	4.1()	3.5()	4.3()	4.0()	4.2()	4.1()	3.3()	3.1()
	322.	106.	140.	103.	122.	118.	101.	123.	349.	117.
	3.4()	3.1()	2.3()	1.8()	3.4()	2.2()	2.2()	2.2()	6.5(s)	10.3(s)
	133.	118.								
	1.1(s)	.9(s)								
1 25.	675.	377.	227.	101.	581.	594.	599.	604.	613.	618.
	.0()	.0()	.0()	.0()	2.0()	2.0()	2.0()	2.0()	2.8()	3.7()
	619.	621.	611.	611.	611.	584.	584.	584.	403.	330.
	2.7()	3.2()	4.1()	3.5()	4.3()	4.0()	4.2()	4.1()	3.3()	3.2()
	335.	111.	133.	106.	115.	110.	93.	115.	355.	120.
	3.4()	3.1()	2.3()	1.8()	3.3()	2.2()	2.1()	2.1()	6.7(s)	11.1(s)
	125.	110.								
	1.1(s)	.9(s)								
1 30.	691.	371.	212.	92.	604.	611.	613.	615.	619.	621.
	.0()	.0()	.0()	.0()	2.0()	2.1()	2.1()	2.1()	2.8()	3.7()
	621.	620.	611.	610.	610.	583.	582.	581.	411.	341.
	2.7()	3.2()	4.1()	3.5()	4.3()	4.0()	4.2()	4.1()	3.4()	3.3()
	345.	117.	126.	108.	108.	103.	85.	107.	359.	131.
	3.4()	3.2()	2.2()	1.9()	3.2()	2.1()	2.0()	2.1()	6.8(s)	11.7(s)
	117.	102.								
	1.0(s)	.8(s)								
1 35.	696.	367.	197.	84.	615.	618.	619.	619.	620.	619.
	.0()	.0()	.0()	.0()	2.1()	2.1()	2.1()	2.1()	2.8()	3.7()
	618.	617.	608.	606.	606.	579.	577.	576.	417.	349.
	2.7()	3.2()	4.1()	3.5()	4.3()	4.0()	4.2()	4.1()	3.4()	3.3()
	351.	125.	119.	110.	100.	95.	77.	99.	361.	140.
	3.5()	3.3()	2.2()	1.9()	3.1()	2.0()	2.0()	2.0()	6.8(s)	12.2(s)
	109.	93.								
	.9(s)	.7(s)								
1 40.	695.	363.	182.	76.	619.	619.	619.	618.	617.	615.
	.0()	.0()	.0()	.0()	2.1()	2.1()	2.1()	2.1()	2.8()	3.7()
	614.	611.	602.	600.	599.	573.	570.	569.	421.	354.
	2.7()	3.2()	4.1()	3.5()	4.3()	4.0()	4.1()	4.1()	3.4()	3.3()

		356.	132.	111.	110.	93.	88.	70.	90.	361.	146.
		3.5()	3.3()	2.1()	1.9()	3.0()	2.0()	1.9()	2.0()	6.9(s)	12.5(s)
		101.	85.								
		.9(s)	.7(s)								
1	45.	689.	360.	168.	69.	618.	617.	616.	615.	612.	608.
		.0()	.0()	.0()	.0()	2.1()	2.1()	2.1()	2.1()	2.8()	3.7()
		607.	603.	594.	592.	591.	565.	562.	560.	422.	357.
		2.6()	3.2()	4.1()	3.5()	4.3()	4.0()	4.1()	4.1()	3.4()	3.3()
		358.	138.	103.	109.	86.	81.	64.	82.	361.	149.
		3.5()	3.4()	2.1()	1.9()	2.9()	1.9()	1.8()	1.9()	6.9(s)	12.7(s)
		93.	77.								
		.8(s)	.6(s)								
1	50.	681.	355.	155.	63.	614.	612.	610.	608.	604.	599.
		.0()	.0()	.0()	.0()	2.1()	2.1()	2.1()	2.1()	2.8()	3.7()
		598.	594.	585.	582.	581.	555.	552.	549.	422.	359.
		2.6()	3.1()	4.1()	3.5()	4.2()	4.0()	4.1()	4.0()	3.4()	3.3()
		359.	143.	95.	108.	79.	75.	59.	75.	361.	150.
		3.5()	3.4()	2.0()	1.8()	2.8()	1.9()	1.8()	1.8()	6.8(s)	12.8(s)
		85.	71.								
		.7(s)	.5(s)								
1	55.	671.	348.	142.	58.	608.	604.	603.	600.	595.	589.
		.0()	.0()	.0()	.0()	2.1()	2.0()	2.0()	2.0()	2.8()	3.6()
		587.	583.	575.	571.	569.	544.	541.	539.	420.	360.
		2.6()	3.1()	4.0()	3.4()	4.2()	3.9()	4.0()	4.0()	3.4()	3.3()
		360.	146.	88.	105.	73.	69.	54.	69.	359.	150.
		3.5()	3.5()	1.9()	1.8()	2.8()	1.8()	1.7()	1.8()	6.8(s)	12.8(s)
		78.	64.								
		.7(s)	.5(s)								
2	0.	659.	339.	131.	53.	599.	595.	593.	591.	585.	578.
		.0()	.0()	.0()	.0()	2.0()	2.0()	2.0()	2.0()	2.7()	3.6()
		576.	571.	563.	560.	558.	533.	530.	527.	417.	359.
		2.6()	3.1()	4.0()	3.4()	4.2()	3.9()	4.0()	4.0()	3.4()	3.3()
		359.	148.	80.	103.	67.	63.	50.	63.	356.	149.
		3.5()	3.5()	1.9()	1.8()	2.7()	1.8()	1.7()	1.7()	6.7(s)	12.7(s)

		71.	59.								
		.6(\$)	.5(\$)								
2	5.	645. .0()	328. .0()	119. .0()	48. .0()	590. 2.0()	585. 2.0()	583. 2.0()	580. 2.0()	573. 2.7()	566. 3.5()
		564. 2.5()	559. 3.0()	551. 4.0()	548. 3.4()	545. 4.1()	522. 3.8()	518. 4.0()	516. 3.9()	413. 3.4()	357. 3.3()
		357. 3.5()	147. 3.5()	74. 1.8()	100. 1.8()	62. 2.6()	58. 1.7()	45. 1.6()	57. 1.6()	351. 6.5(\$)	146. 12.5(\$)
		65. .5(\$)	53. .4(\$)								
2	10.	629. .0()	315. .0()	109. .0()	43. .0()	579. 2.0()	574. 2.0()	571. 2.0()	568. 2.0()	561. 2.7()	553. 3.5()
		551. 2.5()	546. 3.0()	539. 4.0()	535. 3.4()	533. 4.1()	510. 3.8()	506. 3.9()	503. 3.9()	408. 3.3()	354. 3.3()
		353. 3.5()	146. 3.5()	67. 1.8()	96. 1.8()	57. 2.5()	54. 1.7()	41. 1.5()	52. 1.6()	345. 6.4(\$)	142. 12.3(\$)
		59. .5(\$)	48. .4(\$)								
2	15.	611. .0()	300. .0()	99. .0()	38. .0()	567. 2.0()	562. 2.0()	559. 2.0()	556. 2.0()	548. 2.6()	540. 3.4()
		538. 2.5()	532. 2.9()	526. 3.9()	522. 3.3()	519. 4.0()	496. 3.8()	492. 3.9()	489. 3.8()	402. 3.3()	350. 3.3()
		348. 3.5()	143. 3.4()	62. 1.7()	93. 1.8()	53. 2.4()	49. 1.6()	36. 1.5()	47. 1.5()	337. 6.1(\$)	138. 12.1(\$)
		54. .4(\$)	43. .3(\$)								
2	20.	594. .0()	284. .0()	90. .0()	34. .0()	555. 1.9()	549. 1.9()	547. 1.9()	543. 1.9()	535. 2.6()	527. 3.4()
		524. 2.4()	518. 2.9()	512. 3.9()	507. 3.3()	505. 4.0()	482. 3.7()	478. 3.8()	475. 3.8()	394. 3.3()	344. 3.3()
		341. 3.4()	140. 3.4()	57. 1.6()	90. 1.7()	48. 2.4()	45. 1.5()	31. 1.4()	42. 1.5()	328. 5.8(\$)	133. 11.8(\$)
		49. .4(\$)	39. .3(\$)								

2	25.	577. .0()	270. .0()	82. .0()	30. .0()	542. 1.9()	536. 1.9()	533. 1.9()	529. 1.9()	521. 2.6()	512. 3.3()
		509. 2.4()	503. 2.9()	497. 3.9()	492. 3.3()	489. 3.9()	468. 3.7()	463. 3.8()	459. 3.7()	386. 3.3()	336. 3.2()
		333. 3.4()	136. 3.4()	52. 1.6()	86. 1.7()	44. 2.3()	40. 1.5()	28. 1.3()	38. 1.4()	317. 5.5(S)	127. 11.5(S)
		45. .3(\$)	35. .3(\$)								
2	30.	560. .0()	256. .0()	74. .0()	27. .0()	528. 1.9()	522. 1.9()	519. 1.9()	515. 1.9()	506. 2.5()	497. 3.3()
		494. 2.3()	487. 2.8()	481. 3.9()	476. 3.2()	473. 3.9()	452. 3.6()	447. 3.7()	443. 3.7()	376. 3.2()	328. 3.2()
		324. 3.4()	131. 3.3()	47. 1.5()	83. 1.7()	40. 2.2()	36. 1.4()	24. 1.3()	34. 1.4()	306. 5.2(S)	122. 11.2(S)
		40. .3(\$)	31. .2(\$)								
2	35.	543. .0()	244. .0()	67. .0()	24. .0()	514. 1.9()	507. 1.9()	504. 1.8()	500. 1.8()	490. 2.5()	481. 3.2()
		478. 2.3()	471. 2.7()	465. 3.8()	460. 3.2()	457. 3.8()	436. 3.5()	431. 3.7()	427. 3.6()	365. 3.2()	318. 3.2()
		314. 3.3()	127. 3.3()	43. 1.5()	79. 1.6()	36. 2.1()	33. 1.4()	21. 1.2()	31. 1.3()	294. 4.8(S)	119. 10.8(S)
		36. .3(\$)	28. .2(\$)								
2	40.	526. .0()	233. .0()	60. .0()	22. .0()	499. 1.8()	492. 1.8()	489. 1.8()	484. 1.8()	474. 2.4()	463. 3.1()
		460. 2.3()	452. 2.7()	449. 3.8()	443. 3.2()	440. 3.7()	419. 3.5()	414. 3.6()	410. 3.5()	354. 3.1()	308. 3.1()
		303. 3.3()	123. 3.2()	39. 1.4()	76. 1.6()	32. 2.0()	29. 1.3()	19. 1.2()	27. 1.2()	283. 4.5(S)	118. 10.5(S)
		33. .2(\$)	25. .2(\$)								
2	45.	508. .0()	224. .0()	54. .0()	19. .0()	484. 1.8()	476. 1.8()	473. 1.8()	467. 1.8()	457. 2.4()	446. 3.1()

		443.	435.	432.	426.	423.	403.	397.	393.	342.	297.
		2.2()	2.6()	3.8()	3.1()	3.7()	3.4()	3.5()	3.5()	3.1()	3.1()
		293.	121.	35.	72.	29.	26.	16.	25.	271.	116.
		3.3()	3.2()	1.4()	1.6()	1.9()	1.3()	1.1()	1.2()	4.2(s)	10.0(s)
		29.	22.								
		.2(s)	.2(s)								
2	50.	490.	215.	49.	17.	467.	459.	456.	450.	439.	429.
		.0()	.0()	.0()	.0()	1.8()	1.7()	1.7()	1.7()	2.3()	3.0()
		426.	418.	415.	409.	406.	386.	380.	377.	330.	286.
		2.2()	2.6()	3.7()	3.1()	3.6()	3.4()	3.5()	3.4()	3.1()	3.0()
		282.	119.	32.	69.	26.	23.	14.	22.	261.	115.
		3.2()	3.2()	1.3()	1.6()	1.9()	1.2()	1.0()	1.1()	3.8(s)	9.6(s)
		26.	20.								
		.2(s)	.2(s)								
2	55.	471.	207.	44.	15.	450.	442.	439.	433.	423.	412.
		.0()	.0()	.0()	.0()	1.7()	1.7()	1.7()	1.7()	2.3()	2.9()
		409.	401.	398.	392.	388.	370.	364.	360.	318.	276.
		2.1()	2.5()	3.7()	3.1()	3.5()	3.3()	3.4()	3.3()	3.0()	3.0()
		271.	117.	29.	66.	23.	21.	12.	20.	250.	113.
		3.2()	3.2()	1.3()	1.5()	1.8()	1.2()	1.0()	1.1()	3.5(s)	9.1(s)
		23.	18.								
		.1(s)	.1(s)								
3	0.	453.	200.	39.	14.	434.	425.	422.	417.	406.	395.
		.0()	.0()	.0()	.0()	1.7()	1.7()	1.7()	1.7()	2.2()	2.8()
		392.	384.	381.	375.	372.	353.	348.	344.	306.	266.
		2.1()	2.4()	3.7()	3.0()	3.5()	3.2()	3.3()	3.3()	3.0()	2.9()
		261.	115.	26.	63.	21.	18.	10.	18.	241.	111.
		3.1()	3.2()	1.2()	1.5()	1.7()	1.1()	.9()	1.1()	3.3(s)	8.7(s)
		21.	16.								
		.1(s)	.1(s)								
3	5.	433.	193.	35.	12.	417.	409.	405.	400.	389.	379.
		.0()	.0()	.0()	.0()	1.7()	1.6()	1.6()	1.6()	2.2()	2.8()
		375.	368.	364.	359.	355.	338.	332.	328.	293.	256.
		2.0()	2.4()	3.6()	3.0()	3.4()	3.2()	3.3()	3.2()	2.9()	2.9()

		252.	113.	23.	60.	18.	16.	7.	16.	232.	109.
		3.1()	3.1()	1.2()	1.5()	1.6()	1.0()	.8()	1.0()	3.0(s)	8.2(s)
		18.	14.								
		.1(s)	.1(s)								
3	10.	416.	187.	31.	11.	401.	393.	389.	384.	373.	362.
		.0()	.0()	.0()	.0()	1.6()	1.6()	1.6()	1.6()	2.1()	2.7()
		359.	352.	348.	343.	339.	322.	317.	313.	281.	246.
		2.0()	2.3()	3.6()	2.9()	3.3()	3.1()	3.2()	3.1()	2.9()	2.8()
		242.	111.	20.	57.	16.	14.	6.	14.	223.	108.
		3.1()	3.1()	1.1()	1.5()	1.6()	1.0()	.7()	1.0()	2.7(s)	7.6(s)
		15.	13.								
		.1(s)	.1(s)								
3	15.	399.	180.	27.	10.	385.	377.	373.	368.	357.	347.
		.0()	.0()	.0()	.0()	1.6()	1.6()	1.6()	1.5()	2.1()	2.6()
		344.	336.	333.	327.	324.	307.	302.	298.	270.	238.
		1.9()	2.2()	3.5()	2.9()	3.3()	3.0()	3.1()	3.1()	2.8()	2.8()
		234.	109.	18.	55.	14.	12.	4.	13.	215.	106.
		3.0()	3.1()	1.1()	1.4()	1.5()	.9()	.7()	.9()	2.5(s)	7.1(s)
		14.	11.								
		.1(s)	.1(s)								
3	20.	382.	174.	22.	8.	369.	361.	357.	352.	342.	331.
		.0()	.0()	.0()	.0()	1.5()	1.5()	1.5()	1.5()	2.0()	2.6()
		328.	321.	318.	312.	309.	293.	288.	284.	259.	229.
		1.9()	2.2()	3.5()	2.9()	3.2()	3.0()	3.1()	3.0()	2.8()	2.7()
		225.	108.	16.	52.	12.	10.	4.	11.	207.	104.
		3.0()	3.1()	1.0()	1.4()	1.4()	.9()	.6()	.9()	2.2(s)	6.5(s)
		12.	10.								
		.1(s)	.1(s)								
3	25.	366.	168.	19.	5.	354.	346.	342.	337.	327.	316.
		.0()	.0()	.0()	.0()	1.5()	1.5()	1.5()	1.5()	2.0()	2.5()
		313.	306.	303.	298.	294.	280.	275.	271.	249.	221.
		1.8()	2.1()	3.5()	2.8()	3.1()	2.9()	3.0()	2.9()	2.7()	2.7()
		217.	106.	14.	50.	11.	9.	3.	10.	199.	102.
		2.9()	3.1()	1.0()	1.4()	1.3()	.8()	.6()	.8()	2.0(s)	6.0(s)

3	50.	293. .0()	127. .0()	8. .0()	2. .0()	284. 1.3()	277. 1.3()	274. 1.3()	270. 1.3()	261. 1.7()	252. 2.2()
		250. 1.6()	244. 1.8()	241. 3.3()	235. 2.6()	232. 2.8()	219. 2.6()	214. 2.7()	210. 2.6()	201. 2.5()	180. 2.5()
		175. 2.7()	80. 2.7()	7. .7()	39. 1.3()	5. 1.0()	4. .6()	0. .3()	3. .5()	150. 1.1(s)	64. 3.5(s)
		4. .0(s)	2. .0(s)								
3	55.	280. .0()	117. .0()	6. .0()	0. .0()	272. 1.3()	265. 1.3()	262. 1.3()	258. 1.3()	249. 1.7()	240. 2.1()
		238. 1.5()	232. 1.8()	229. 3.3()	223. 2.6()	219. 2.8()	207. 2.6()	203. 2.6()	200. 2.6()	193. 2.4()	171. 2.4()
		166. 2.7()	73. 2.7()	6. .7()	37. 1.2()	4. 1.0()	4. .6()	0. .2()	2. .5()	140. 1.0(s)	57. 3.2(s)
		3. .0(s)	1. .0(s)								
4	0.	268. .0()	106. .0()	5. .0()	0. .0()	260. 1.3()	254. 1.2()	251. 1.2()	246. 1.2()	238. 1.6()	229. 2.0()
		226. 1.5()	220. 1.7()	217. 3.2()	212. 2.6()	208. 2.7()	197. 2.5()	193. 2.6()	191. 2.5()	184. 2.4()	162. 2.4()
		157. 2.6()	66. 2.6()	5. .6()	35. 1.2()	4. .9()	3. .6()	0. .2()	2. .4()	130. .8(s)	51. 2.8(s)
		2. .0(s)	1. .0(s)								
4	5.	256. .0()	96. .0()	4. .0()	0. .0()	249. 1.2()	242. 1.2()	239. 1.2()	235. 1.2()	226. 1.6()	218. 2.0()
		215. 1.5()	209. 1.7()	207. 3.2()	201. 2.5()	198. 2.6()	188. 2.5()	184. 2.5()	181. 2.5()	175. 2.3()	153. 2.3()
		149. 2.6()	60. 2.5()	4. .6()	34. 1.2()	3. .8()	3. .5()	0. .2()	1. .4()	120. .6(s)	46. 2.5(s)
		2. .0(s)	0. .0(s)								
4	10.	245. .0()	88. .0()	3. .0()	0. .0()	238. 1.2()	231. 1.2()	228. 1.2()	224. 1.2()	215. 1.5()	207. 1.9()

205.	199.	196.	190.	188.	179.	175.	172.	167.	145.
1.4()	1.6()	3.1()	2.5()	2.6()	2.4()	2.5()	2.4()	2.3()	2.3()
141.	54.	3.	32.	3.	2.	0.	1.	110.	41.
2.5()	2.4()	.5()	1.2()	.8()	.5()	.1()	.3()	.5(s)	2.2(s)
1.	0.								
.0(s)	.0(s)								

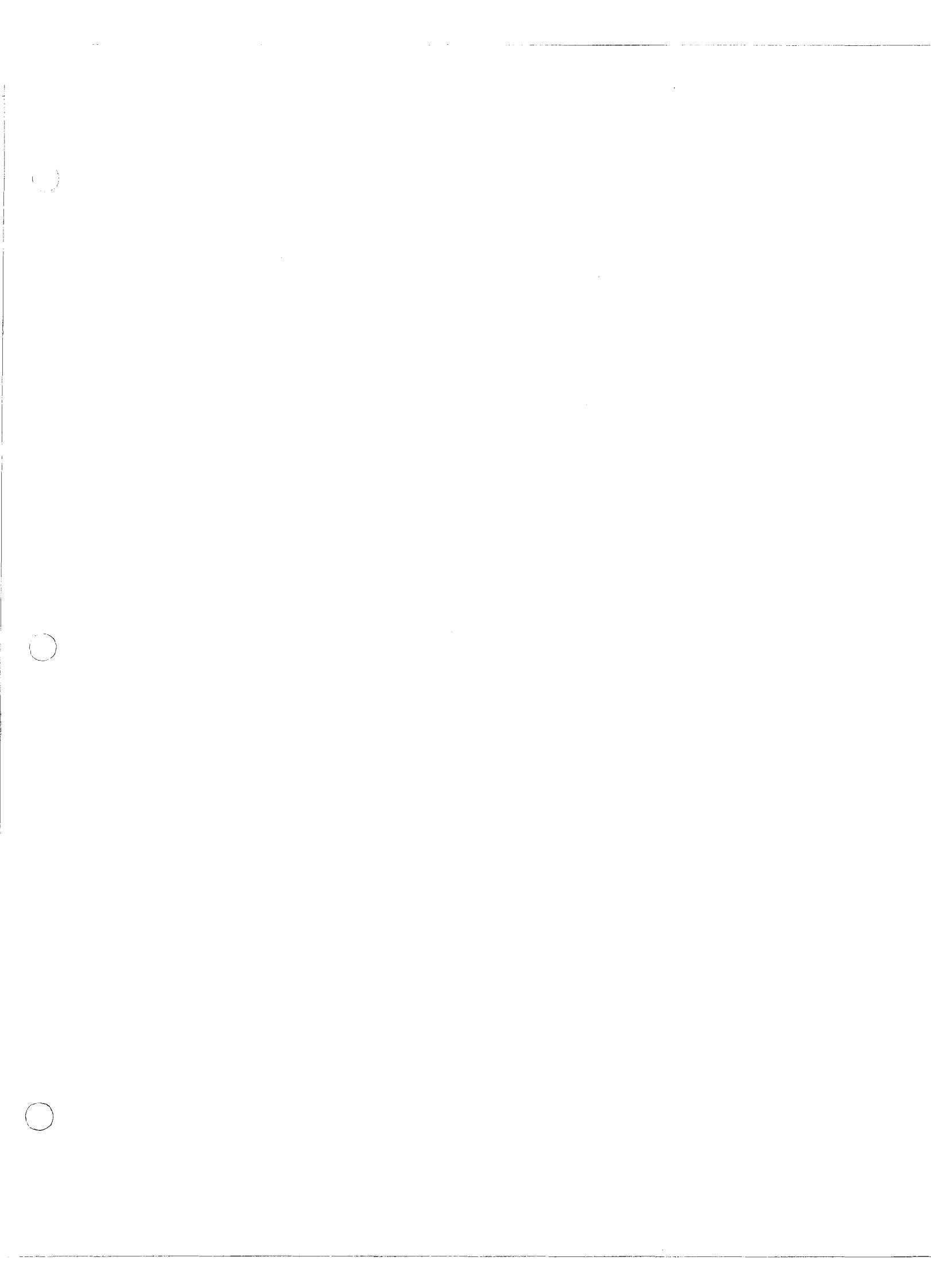
RED ROCK CANYON DRAINAGE BASIN DESIGN PLAN - 10 YEAR DEVELOPED
FERBER ENGINEERING COMPANY, MARCH 15, 1993

*** PEAK FLOWS, STAGES AND STORAGE OF GUTTERS AND DETENTION DAMS ***

CONVEYANCE ELEMENT	PEAK (CFS)	STAGE (FT)	STORAGE (AC-FT)	TIME (HR/MIN)
4	167.	(DIRECT FLOW)	0	40.
104	157.	.1	1.2	0 50.
28	156.	2.4		0 55.
103	147.	.1	1.3	1 5.
23	144.	2.3		1 10.
3	262.	(DIRECT FLOW)	1	5.
102	150.	.1	12.8	1 50.
24	110.	1.9		1 40.
22	148.	3.5		2 0.
2	385.	(DIRECT FLOW)	1	15.
101	361.	.1	6.9	1 45.
27	173.	2.7		0 40.
21	360.	3.5		1 55.
26	142.	2.4		1 0.
20	360.	3.3		1 55.
25	140.	3.5		1 0.
19	422.	3.4		1 45.
18	584.	4.1		1 25.
17	584.	4.2		1 25.
16	584.	4.0		1 25.
15	611.	4.3		1 25.
152	611.	3.5		1 25.
151	611.	4.1		1 25.
144	621.	3.2		1 25.
143	621.	2.7		1 30.
142	621.	3.7		1 30.
141	620.	2.8		1 35.
13	619.	2.1		1 35.
12	619.	2.1		1 40.
11	619.	2.1		1 40.
10	619.	2.1		1 40.
1	696.	(DIRECT FLOW)	1	35.

1

ENDPROGRAM PROGRAM CALLED



2 1 1 2
3 4

WATERSHED 1

RED ROCK CANYON DRAINAGE BASIN DESIGN PLAN - 100 YEAR DEVELOPED
FERBER ENGINEERING COMPANY, MARCH 15, 1993

70 0 0 5.0

1

1 1
2 1
3 144
4 18
5 15
6 18
7 19
8 19
9 2
10 2
11 27
12 3
13 24
14 4

0 1 0 0 3	0 2 101 0 3	0 3 102 0 3	0 4 104 0 3	0 10 1 0 1	40.0 1220.0 0.010	4.0 4.0 .035	8.0
0 11 10 0 1	40.0 520.0 0.010	4.0 4.0 .035	8.0				
0 12 11 0 1	40.0 800.0 0.010	4.0 4.0 .035	8.0				
0 13 12 0 1	40.0 1580.0 0.010	4.0 4.0 .035	6.0				
0 141 13 0 1	32.0 1510.0 0.015	2.0 2.0 .056	7.5				
0 142 141 0 1	20.0 500.0 0.018	2.0 0.0 .056	9.5				
0 143 142 0 1	32.0 980.0 0.010	3.5 3.5 .044	7.0				
0 144 143 0 1	20.0 670.0 0.017	1.0 1.0 .044	9.5				
0 151 144 0 4	0.1 600.0 0.017	4.0 4.0 .056	3.0				
	50.0 600.0 0.017	4.0 1.5 .056	10.0				
0 152 151 0 4	5.0 410.0 0.017	1.0 8.0 .050	2.5				
	34.5 410.0 0.017	1.0 2.5 .050	6.0				
0 15 152 0 4	0.1 1410.0 0.017	5.0 5.0 .062	1.0				
	11.0 1410.0 0.017	2.0 2.0 .062	12.0				
0 16 15 0 4	0.1 880.0 0.021	5.0 5.0 .062	1.0				
	11.0 880.0 0.021	2.0 2.0 .062	12.0				
0 17 16 0 4	0.1 560.0 0.018	5.0 5.0 .062	1.0				
	11.0 560.0 0.018	2.0 2.0 .062	12.0				
0 18 17 0 4	0.1 620.0 0.019	5.0 5.0 .062	1.0				
	11.0 620.0 0.019	2.0 2.0 .062	12.0				
0 19 18 0 4	0.1 5420.0 0.024	5.0 5.0 .062	1.0				
	11.0 5420.0 0.024	2.0 2.0 .062	12.0				
0 20 19 0 4	0.1 970.0 0.019	5.0 5.0 .062	1.0				
	11.0 970.0 0.019	2.0 2.0 .062	12.0				
0 21 20 0 4	8.0 3890.0 0.015	1.0 1.0 .050	2.5				
	25.0 3890.0 0.015	1.0 2.0 .050	12.0				
0 22 20 0 4	0.1 3600.0 0.014	2.0 3.0 .050	5.0				
	105.0 3600.0 0.014	1.5 15.0 .050	10.0				
0 23 3 0 4	0.1 2080.0 0.018	8.0 4.0 .050	8.0				
	96.0 2080.0 0.018	15.0 35.0 .050	8.0				
0 24 2 0 1	0.1 6340.0 0.022	5.0 10.0 .050	20.0				
0 25 18 0 1	0.1 1340.0 0.029	2.5 1.5 .062	20.0				
0 26 25 0 4	0.1 3680.0 0.024	6.0 6.0 .062	2.5				
	30.0 3680.0 0.024	2.0 10.0 .062	10.0				
0 27 26 0 4	0.1 780.0 0.028	5.0 5.0 .062	3.0				
	30.0 780.0 0.028	2.5 1.5 .062	10.0				
0 28 103 0 4	0.1 1000.0 0.018	8.0 4.0 .050	8.0				
	96.0 1000.0 0.018	15.0 35.0 .050	8.0				
0 101 21 8 2	.1 1.0 0.010	.0 .0 .016	0.1				
0.0 80.0	1.8 192.0 6.8 360.0 14.6 520.0						
25.2 680.0	38.5 830.0 54.5 1000.0 73.3 1080.0						
0 102 22 12 2	.1 1.0 0.010	.0 .0 .016	0.1				
0.0 0.0	5.5 100.0 11.1 120.0 16.7 220.0						
22.4 320.0	28.1 380.0 34.0 450.0 40.5 500.0						
41.4 642.0	42.1 892.0 42.9 1234.0 44.4 2165.0						
0 103 23 8 2	.1 1.0 0.010	.0 .0 .016	0.1				
0.0 0.0	0.1 20.0 0.5 60.0 1.2 140.0						
2.2 210.0	3.2 260.0 5.3 300.0 7.0 560.0						
0 104 28 4 2	.1 1.0 0.010	.0 .0 .016	0.1				
0.0 0.0	1.7 220.0 4.1 350.0 5.0 600.0						

0

32

1 2 3 4 10 11 12 13 141 142 143 144 151 152 15 16	17 18 19 20 21 22 23 24 25 26 27 28 101 102 103 104
---	---

ENDPROGRAM

RED ROCK CANYON DRAINAGE BASIN DESIGN PLAN - 100 YEAR DEVELOPED
FERBER ENGINEERING COMPANY, MARCH 15, 1993

NUMBER OF TIME STEPS 50
INTEGRATION TIME INTERVAL (MINUTES), 5.00

25.0 PERCENT OF IMPERVIOUS AREA HAS ZERO DETENTION DEPTH
1

RED ROCK CANYON DRAINAGE BASIN DESIGN PLAN - 100 YEAR DEVELOPED
FERBER ENGINEERING COMPANY, MARCH 15, 1993

HYDROGRAPHS FROM CUHPE/PC ARE LISTED FOR THE FOLLOWING 14 SUBCATCHMENTS

TIME(HR/MIN)	1 11	2 12	3 13	4 14	5	6	7	8	9	10
0 0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0 5.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0 10.	0.	2.	0.	0.	0.	0.	1.	0.	0.	3.
0 15.	1.	8.	1.	2.	0.	0.	3.	2.	2.	12.
0 20.	4.	19.	3.	5.	1.	1.	6.	4.	5.	29.
0 25.	8.	45.	6.	13.	5.	5.	25.	15.	19.	75.
0 30.	35.	145.	43.	68.	25.	31.	110.	69.	71.	221.
0 35.	91.	261.	96.	162.	62.	82.	228.	154.	153.	390.
0 40.	156.	315.	124.	241.	100.	130.	305.	224.	228.	477.
0 45.	211.	315.	125.	282.	128.	162.	328.	257.	274.	482.
0 50.	248.	300.	120.	290.	143.	175.	324.	261.	293.	456.

		461.	389.	286.	427.						
0	55.	265. 447.	276. 383.	114. 332.	281. 421.	146.	173.	319.	255.	292.	419.
1	0.	268. 426.	251. 376.	105. 362.	277. 412.	142.	166.	307.	252.	287.	380.
1	5.	262. 401.	230. 364.	96. 378.	268. 398.	137.	163.	291.	246.	288.	347.
1	10.	253. 372.	206. 344.	87. 381.	255. 376.	135.	157.	270.	234.	282.	310.
1	15.	249. 337.	178. 318.	77. 376.	236. 346.	133.	149.	244.	217.	270.	270.
1	20.	242. 300.	152. 289.	68. 366.	215. 315.	127.	138.	218.	197.	254.	229.
1	25.	232. 265.	129. 261.	61. 355.	195. 283.	119.	127.	194.	179.	235.	194.
1	30.	219. 235.	110. 236.	54. 347.	177. 255.	112.	116.	173.	163.	217.	165.
1	35.	206. 208.	95. 212.	48. 336.	162. 229.	104.	107.	154.	149.	200.	140.
1	40.	193. 184.	82. 191.	43. 323.	147. 205.	96.	99.	137.	135.	185.	120.
1	45.	181. 163.	71. 172.	38. 309.	134. 184.	90.	91.	122.	123.	171.	103.
1	50.	170. 146.	62. 155.	34. 295.	122. 166.	85.	84.	109.	112.	159.	90.
1	55.	160. 130.	54. 140.	30. 281.	111. 149.	79.	78.	98.	102.	147.	78.
2	0.	150. 116.	48. 127.	27. 268.	102. 134.	74.	72.	88.	94.	136.	69.
2	5.	141. 103.	41. 115.	24. 254.	93. 121.	70.	66.	78.	85.	126.	59.
2	10.	133. 91.	34. 103.	21. 241.	84. 108.	65.	61.	69.	78.	116.	50.
2	15.	125.	27.	19.	76.	61.	56.	62.	70.	107.	41.

		80.	92.	229.	97.						
2	20.	117. 70.	19. 82.	17. 217.	69. 86.	57.	52.	55.	64.	99.	32.
2	25.	109. 61.	13. 74.	15. 206.	63. 77.	53.	48.	48.	58.	91.	22.
2	30.	102. 53.	10. 66.	13. 195.	57. 69.	50.	44.	43.	53.	84.	16.
2	35.	96. 47.	8. 59.	11. 185.	51. 61.	47.	41.	38.	48.	77.	12.
2	40.	90. 41.	6. 53.	6. 176.	47. 55.	44.	37.	34.	43.	71.	9.
2	45.	84. 35.	4. 47.	4. 167.	42. 49.	41.	34.	30.	39.	65.	7.
2	50.	79. 31.	3. 42.	2. 158.	38. 44.	38.	32.	26.	35.	60.	5.
2	55.	74. 27.	2. 38.	2. 150.	35. 39.	36.	29.	23.	32.	55.	4.
3	0.	69. 22.	2. 34.	0. 142.	31. 35.	34.	27.	20.	29.	51.	3.
3	5.	64. 15.	0. 30.	0. 135.	28. 31.	31.	25.	17.	26.	47.	2.
3	10.	60. 10.	0. 27.	0. 128.	26. 28.	29.	23.	11.	24.	43.	2.
3	15.	56. 8.	0. 24.	0. 122.	23. 25.	28.	21.	7.	22.	40.	0.
3	20.	53. 6.	0. 20.	0. 116.	21. 22.	26.	19.	5.	20.	37.	0.
3	25.	49. 4.	0. 13.	0. 110.	19. 18.	24.	18.	4.	18.	34.	0.
3	30.	46. 3.	0. 9.	0. 104.	17. 12.	23.	16.	3.	15.	31.	0.
3	35.	43. 2.	0. 6.	0. 99.	16. 8.	21.	15.	2.	9.	28.	0.
3	40.	41.	0.	0.	14.	20.	14.	0.	6.	26.	0.

		1.	5.	94.	6.					
3	45.	38. 0.	0. 4.	0. 89.	8. 4.	19.	13.	0.	4.	24.
3	50.	36. 0.	0. 3.	0. 84.	5. 3.	17.	11.	0.	3.	22.
3	55.	33. 0.	0. 2.	0. 80.	4. 2.	16.	6.	0.	2.	20.
4	0.	31. 0.	0. 0.	0. 76.	3. 1.	15.	4.	0.	2.	17.
4	5.	29. 0.	0. 0.	0. 72.	2. 0.	14.	3.	0.	0.	11.
4	10.	27. 0.	0. 0.	0. 69.	0. 0.	12.	2.	0.	0.	7.

RED ROCK CANYON DRAINAGE BASIN DESIGN PLAN - 100 YEAR DEVELOPED
 FERBER ENGINEERING COMPANY, MARCH 15, 1993

GUTTER NUMBER	GUTTER CONNECTION	NDP	NP		WIDTH OR DIAM (FT)	LENGTH (FT)	INVERT SLOPE (FT/FT)	SIDE SLOPES		OVERBANK/SURCHARGE		
								HORIZ	VERT	MANNING N	DEPTH (FT)	JK
1	0	0	3		.0	0.	.0010	.0	.0	.001	10.00	0
2	101	0	3		.0	0.	.0010	.0	.0	.001	10.00	0
3	102	0	3		.0	0.	.0010	.0	.0	.001	10.00	0
4	104	0	3		.0	0.	.0010	.0	.0	.001	10.00	0
10	1	0	1	CHANNEL	40.0	1220.	.0100	4.0	4.0	.035	8.00	0
11	10	0	1	CHANNEL	40.0	520.	.0100	4.0	4.0	.035	8.00	0
12	11	0	1	CHANNEL	40.0	800.	.0100	4.0	4.0	.035	8.00	0
13	12	0	1	CHANNEL	40.0	1580.	.0100	4.0	4.0	.035	6.00	0
141	13	0	1	CHANNEL	32.0	1510.	.0150	2.0	2.0	.056	7.50	0
142	141	0	1	CHANNEL	20.0	500.	.0180	2.0	.0	.056	9.50	0
143	142	0	1	CHANNEL	32.0	980.	.0100	3.5	3.5	.044	7.00	0
144	143	0	1	CHANNEL	20.0	670.	.0170	1.0	1.0	.044	9.50	0
151	144	0	4	CHANNEL	.1	600.	.0170	4.0	4.0	.056	3.00	0
				OVERFLOW	50.0	600.	.0170	4.0	1.5	.056	10.00	
152	151	0	4	CHANNEL	5.0	410.	.0170	1.0	8.0	.050	2.50	0
				OVERFLOW	34.5	410.	.0170	1.0	2.5	.050	6.00	
15	152	0	4	CHANNEL	.1	1410.	.0170	5.0	5.0	.062	1.00	0
				OVERFLOW	11.0	1410.	.0170	2.0	2.0	.062	12.00	
16	15	0	4	CHANNEL	.1	880.	.0210	5.0	5.0	.062	1.00	0
				OVERFLOW	11.0	880.	.0210	2.0	2.0	.062	12.00	
17	16	0	4	CHANNEL	.1	560.	.0180	5.0	5.0	.062	1.00	0
				OVERFLOW	11.0	560.	.0180	2.0	2.0	.062	12.00	
18	17	0	4	CHANNEL	.1	620.	.0190	5.0	5.0	.062	1.00	0
				OVERFLOW	11.0	620.	.0190	2.0	2.0	.062	12.00	
19	18	0	4	CHANNEL	.1	5420.	.0240	5.0	5.0	.062	1.00	0
				OVERFLOW	11.0	5420.	.0240	2.0	2.0	.062	12.00	
20	19	0	4	CHANNEL	.1	970.	.0190	5.0	5.0	.062	1.00	0
				OVERFLOW	11.0	970.	.0190	2.0	2.0	.062	12.00	
21	20	0	4	CHANNEL	8.0	3890.	.0150	1.0	1.0	.050	2.50	0
				OVERFLOW	25.0	3890.	.0150	1.0	2.0	.050	12.00	
22	2	0	4	CHANNEL	.1	3600.	.0140	2.0	3.0	.050	5.00	0
				OVERFLOW	105.0	3600.	.0140	1.5	15.0	.050	10.00	
23	3	0	4	CHANNEL	.1	2080.	.0180	8.0	4.0	.050	8.00	0
				OVERFLOW	96.0	2080.	.0180	15.0	35.0	.050	8.00	
24	2	0	1	CHANNEL	.1	6340.	.0220	5.0	10.0	.050	20.00	0
25	18	0	1	CHANNEL	.1	1340.	.0290	2.5	1.5	.062	20.00	0
26	25	0	4	CHANNEL	.1	3680.	.0240	6.0	6.0	.062	2.50	0
				OVERFLOW	30.0	3680.	.0240	2.0	10.0	.062	10.00	
27	26	0	4	CHANNEL	.1	780.	.0280	5.0	5.0	.062	3.00	0
				OVERFLOW	30.0	780.	.0280	2.5	1.5	.062	10.00	
28	103	0	4	CHANNEL	.1	1000.	.0180	8.0	4.0	.050	8.00	0
				OVERFLOW	96.0	1000.	.0180	15.0	35.0	.050	8.00	

101	21	8	2	PIPE	.1	1.	.0100	.0	.0	.016	.10	0	
		RESERVOIR STORAGE IN ACRE-FEET VS SPILLWAY OUTFLOW											
		.0	80.0	1.8	192.0	6.8	360.0	14.6	520.0	25.2	680.0	38.5	830.0
		54.5	1000.0	73.3	1080.0								
102	22	12	2	PIPE	.1	1.	.0100	.0	.0	.016	.10	0	
		RESERVOIR STORAGE IN ACRE-FEET VS SPILLWAY OUTFLOW											
		.0	.0	5.5	100.0	11.1	120.0	16.7	220.0	22.4	320.0	28.1	380.0
		34.0	450.0	40.5	500.0	41.4	642.0	42.1	892.0	42.9	1234.0	44.4	2165.0
103	23	8	2	PIPE	.1	1.	.0100	.0	.0	.016	.10	0	
		RESERVOIR STORAGE IN ACRE-FEET VS SPILLWAY OUTFLOW											
		.0	.0	.1	20.0	.5	60.0	1.2	140.0	2.2	210.0	3.2	260.0
		5.3	300.0	7.0	560.0								
104	28	4	2	PIPE	.1	1.	.0100	.0	.0	.016	.10	0	
		RESERVOIR STORAGE IN ACRE-FEET VS SPILLWAY OUTFLOW											
		.0	.0	1.7	220.0	4.1	350.0	5.0	600.0				

OTOTAL NUMBER OF GUTTERS/PIPES, 32

1

FERBER ENGINEERING COMPANY, MARCH 15, 1993

ARRANGEMENT OF SUBCATCHMENTS AND GUTTERS/PIPES

141	142	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2737.3
142	143	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2737.3
143	144	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2737.3
144	151	0	0	0	0	0	0	0	0	3	0	0	0	0	0	2737.3
151	152	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2628.5
152	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2628.5

FERBER ENGINEERING COMPANY, MARCH 15, 1993

HYDROGRAPHS ARE LISTED FOR THE FOLLOWING 32 CONVEYANCE ELEMENTS

THE UPPER NUMBER IS DISCHARGE IN CFS

THE LOWER NUMBER IS ONE OF THE FOLLOWING CASES:

() DENOTES DEPTH ABOVE INVERT IN FEET

(S) DENOTES STORAGE IN AC-FT FOR DETENTION DAM. DISCHARGE INCLUDES SPILLWAY OUTFLOW.

(I) DENOTES GUTTER INFLOW IN CFS FROM SPECIFIED INFLOW HYDROGRAPH

(D) DENOTES DISCHARGE IN CFS DIVERTED FROM THIS GUTTER

(O) DENOTES STORAGE IN AC-FT FOR SURCHARGED GUTTER

TIME(HR/MIN)	1 143	2 21	3 23	4 24	10 25	11 26	12 27	13 28	141 101	142 102
0 5.	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()
	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()
	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0(s)	0. .0(s)
	0. .0(s)	0. .0(s)								
0 10.	2. .0()	3. .0()	1. .0()	1. .0()	0. .0()					
	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .1()	0. .1()	0. .0()
	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .0()	0. .2()	0. .1()	3. .0(s)	0. .0(s)
	0. .0(s)	0. .0(s)								
0 15.	10. .0()	14. .0()	4. .0()	3. .0()	0. .0()					
	0. .0()	0. .0()	0. .0()	0. .0()	0. .1()	0. .1()	0. .2()	1. .3()	0. .2()	0. .1()
	1.	0.	0.	0.	0.	0.	2.	0.	14.	0.

		.3(s)	1.1(s)									
0	40.	470. .0()	747. .0()	376. .0()	381. .0()	0. .0()	0. .0()	0. .0()	0. .0()	12. .3()	79. 1.1()	
		117. 1.0()	204. 1.7()	122. 2.7()	196. 2.5()	257. 3.0()	385. 3.4()	522. 4.0()	601. 4.2()	226. 2.6()	113. 2.1()	
		152. 2.6()	16. 1.5()	32. 1.3()	26. 1.1()	85. 2.9()	145. 2.4()	378. 3.4()	187. 2.6()	305. 5.2(s)	67. 3.7(s)	
		92. .8(s)	240. 2.1(s)									
0	45.	526. .0()	849. .0()	463. .0()	423. .0()	0. .0()	0. .0()	2. .1()	16. .2()	97. 1.0()	267. 2.2()	
		320. 1.8()	457. 2.7()	401. 3.7()	567. 3.4()	669. 4.5()	784. 4.6()	893. 5.1()	960. 5.2()	406. 3.3()	181. 2.5()	
		213. 2.9()	36. 2.0()	78. 1.9()	56. 1.4()	177. 3.9()	231. 2.8()	455. 3.6()	265. 2.9()	390. 8.3(s)	102. 6.0(s)	
		159. 1.5(s)	291. 3.0(s)									
0	50.	549. .0()	907. .0()	527. .0()	427. .0()	2. .1()	22. .3()	59. .5()	147. .9()	375. 2.1()	652. 3.8()	
		737. 2.9()	950. 4.2()	935. 4.6()	1062. 4.2()	1106. 5.7()	1135. 5.5()	1214. 5.9()	1260. 5.9()	573. 3.9()	256. 2.9()	
		293. 3.3()	60. 2.5()	138. 2.3()	99. 1.8()	269. 4.5()	315. 3.0()	464. 3.6()	313. 3.1()	454. 11.4(s)	111. 8.6(s)	
		209. 2.2(s)	333. 3.8(s)									
0	55.	621. .0()	942. .0()	576. .0()	421. .0()	79. .6()	256. 1.2()	372. 1.5()	548. 1.9()	878. 3.5()	1188. 5.5()	
		1262. 3.9()	1417. 5.2()	1341. 5.1()	1393. 4.7()	1432. 6.4()	1395. 6.0()	1445. 6.4()	1475. 6.3()	708. 4.3()	341. 3.3()	
		376. 3.5()	82. 2.8()	193. 2.6()	149. 2.1()	343. 5.0()	372. 3.1()	452. 3.6()	362. 3.3()	516. 14.4(s)	129. 11.6(s)	
		247. 2.9(s)	387. 4.2(s)									
1	0.	1032.	978.	611.	412.	514.	841.	957.	1117.	1386.	1571.	

.0() .0() .0() .0() 1.9() 2.5() 2.7() 2.9() 4.5() 6.4()
1599. 1658. 1584. 1630. 1646. 1571. 1606. 1627. 819. 422.
4.5() 5.7() 5.4() 5.0() 6.8() 6.4() 6.7() 6.6() 4.6() 3.6()
451. 111. 235. 200. 388. 401. 434. 403. 561. 183.
3.8() 3.1() 2.8() 2.3() 5.2() 3.2() 3.5() 3.4() 17.3(s) 14.6(s)
271. 416.
3.8(s) 4.3(s)

1	5.	1677.	1032.	628.	398.	1186.	1405.	1467.	1552.	1681.	1760.
		.0()	.0()	.0()	.0()	3.0()	3.3()	3.4()	3.5()	5.0()	6.9()
		1780.	1831.	1753.	1772.	1787.	1694.	1717.	1731.	907.	492.
		4.7()	6.1()	5.6()	5.1()	7.1()	6.6()	6.9()	6.8()	4.8()	3.8()
		515.	151.	264.	246.	406.	410.	410.	411.	605.	233.
		4.0()	3.5()	2.9()	2.5()	5.3()	3.2()	3.5()	3.5()	20.2(s)	17.5(s)
		288.	405.								
		4.7(s)	4.3(s)								
1	10.	2084.	1074.	632.	376.	1625.	1713.	1739.	1775.	1837.	1893.
		.0()	.0()	.0()	.0()	3.6()	3.7()	3.7()	3.7()	5.3()	7.2()
		1906.	1930.	1853.	1871.	1878.	1769.	1781.	1787.	972.	552.
		4.9()	6.3()	5.7()	5.2()	7.3()	6.7()	7.0()	6.9()	5.0()	4.0()
		572.	197.	288.	284.	407.	405.	383.	395.	649.	278.
		4.1()	3.9()	3.0()	2.7()	5.3()	3.2()	3.4()	3.4()	23.2(s)	20.0(s)
		312.	387.								
		5.4(s)	4.2(s)								
1	15.	2246.	1095.	639.	346.	1819.	1860.	1875.	1897.	1937.	1966.
		.0()	.0()	.0()	.0()	3.8()	3.8()	3.9()	3.9()	5.4()	7.3()
		1972.	1986.	1914.	1919.	1922.	1797.	1799.	1798.	1016.	605.
		5.0()	6.4()	5.8()	5.3()	7.4()	6.8()	7.0()	6.9()	5.1()	4.2()
		622.	244.	321.	311.	396.	389.	351.	373.	689.	319.
		4.2()	4.2()	3.2()	2.8()	5.2()	3.2()	3.3()	3.3()	26.0(s)	22.4(s)
		362.	362.								
		5.7(s)	4.1(s)								
1	20.	2315.	1097.	639.	315.	1921.	1947.	1955.	1967.	1984.	1995.
		.0()	.0()	.0()	.0()	3.9()	3.9()	3.9()	4.0()	5.5()	7.4()
		1996.	1996.	1925.	1924.	1922.	1787.	1781.	1777.	1041.	651.
		5.0()	6.4()	5.8()	5.3()	7.4()	6.8()	7.0()	6.9()	5.1()	4.3()
		666.	285.	349.	329.	377.	366.	315.	352.	720.	342.
		4.3()	4.4()	3.3()	2.8()	5.1()	3.1()	3.2()	3.3()	28.7(s)	24.5(s)
		362.	344.								
		5.7(s)	4.0(s)								
1	25.	2337.	1085.	615.	283.	1976.	1985.	1987.	1989.	1989.	1983.
		.0()	.0()	.0()	.0()	4.0()	4.0()	4.0()	4.0()	5.5()	7.4()

X	1978. 5.0()	1967. 6.3()	1902. 5.8()	1893. 5.3()	1889. 7.3()	1752. 6.7()	1742. 6.9()	1735. 6.8()	1053. 5.1()	690. 4.5()
	702. 4.4()	317. 4.6()	354. 3.3()	338. 2.8()	351. 5.0()	338. 3.0()	281. 3.1()	336. 3.2()	747. 31.2(S)	362. 26.4(S)
	350. 5.6(S)	330. 3.7(S)								
1 30.	2314. .0()	1067. .0()	581. .0()	255. .0()	1984. 4.0()	1981. 4.0()	1978. 4.0()	1972. 4.0()	1958. 5.4()	1939. 7.3()
	1932. 4.9()	1916. 6.2()	1854. 5.7()	1844. 5.2()	1838. 7.2()	1704. 6.6()	1692. 6.8()	1683. 6.7()	1057. 5.1()	723. 4.6()
	734. 4.5()	344. 4.8()	346. 3.2()	342. 2.9()	324. 4.8()	310. 3.0()	250. 3.1()	320. 3.1()	772. 33.4(S)	378. 27.9(S)
	335. 5.5(S)	311. 3.4(S)								
1 35.	2259. .0()	1047. .0()	545. .0()	229. .0()	1958. 3.9()	1945. 3.9()	1939. 3.9()	1928. 3.9()	1905. 5.4()	1881. 7.1()
	1873. 4.9()	1853. 6.1()	1797. 5.7()	1785. 5.1()	1779. 7.1()	1651. 6.5()	1639. 6.7()	1630. 6.6()	1057. 5.1()	752. 4.6()
	761. 4.6()	365. 4.9()	332. 3.2()	342. 2.9()	296. 4.7()	282. 2.9()	220. 2.9()	299. 3.1()	793. 35.2(S)	393. 29.2(S)
	317. 5.4(S)	289. 3.0(S)								
1 40.	2184. .0()	1025. .0()	507. .0()	205. .0()	1909. 3.9()	1891. 3.9()	1882. 3.9()	1870. 3.8()	1843. 5.3()	1816. 7.0()
	1808. 4.8()	1788. 6.0()	1736. 5.6()	1725. 5.1()	1719. 7.0()	1598. 6.4()	1586. 6.6()	1578. 6.5()	1055. 5.1()	777. 4.7()
	784. 4.6()	381. 5.0()	316. 3.1()	338. 2.8()	268. 4.5()	254. 2.8()	193. 2.8()	277. 3.0()	811. 36.9(S)	403. 30.0(S)
	300. 5.3(S)	266. 2.6(S)								
1 45.	2100. .0()	997. .0()	476. .0()	184. .0()	1849. 3.8()	1829. 3.8()	1820. 3.8()	1806. 3.8()	1779. 5.2()	1752. 6.9()
	1743. 4.7()	1724. 5.9()	1678. 5.5()	1666. 5.0()	1660. 6.9()	1547. 6.3()	1535. 6.5()	1527. 6.4()	1051. 5.1()	797. 4.8()

	803.	391.	303.	332.	242.	229.	172.	255.	826.	410.
	4.7()	5.0()	3.1()	2.8()	4.3()	2.7()	2.7()	2.9()	38.2(s)	30.6(s)
	295.	244.								
	5.1(s)	2.1(s)								
1 50.	2017.	966.	451.	166.	1786.	1765.	1756.	1743.	1716.	1689.
	.0()	.0()	.0()	.0()	3.8()	3.7()	3.7()	3.7()	5.1()	6.7()
	1682.	1663.	1621.	1610.	1604.	1497.	1486.	1478.	1045.	815.
	4.6()	5.7()	5.5()	4.9()	6.8()	6.2()	6.4()	6.3()	5.1()	4.8()
	819.	394.	296.	323.	219.	207.	153.	233.	838.	414.
	4.7()	5.0()	3.1()	2.8()	4.2()	2.7()	2.5()	2.8()	39.2(s)	31.0(s)
	289.	222.								
	4.7(s)	1.7(s)								
1 55.	1937.	936.	429.	149.	1723.	1703.	1695.	1682.	1656.	1630.
	.0()	.0()	.0()	.0()	3.7()	3.7()	3.6()	3.6()	5.0()	6.6()
	1623.	1605.	1567.	1557.	1551.	1451.	1441.	1433.	1039.	828.
	4.5()	5.6()	5.4()	4.9()	6.7()	6.1()	6.3()	6.3()	5.1()	4.9()
	832.	398.	288.	313.	198.	187.	136.	204.	846.	416.
	4.7()	5.0()	3.0()	2.8()	4.0()	2.6()	2.4()	2.7()	40.0(s)	31.2(s)
	280.	184.								
	4.3(s)	1.4(s)								
2 0.	1862.	908.	406.	134.	1664.	1644.	1636.	1624.	1599.	1575.
	.0()	.0()	.0()	.0()	3.6()	3.6()	3.6()	3.6()	4.9()	6.5()
	1568.	1552.	1517.	1508.	1502.	1409.	1399.	1392.	1032.	838.
	4.4()	5.5()	5.3()	4.8()	6.6()	6.1()	6.3()	6.2()	5.1()	4.9()
	841.	402.	279.	302.	180.	170.	122.	172.	851.	416.
	4.8()	5.0()	3.0()	2.7()	3.9()	2.5()	2.3()	2.5()	40.5(s)	31.2(s)
	269.	158.								
	3.7(s)	1.2(s)								
2 5.	1790.	880.	381.	121.	1607.	1589.	1581.	1569.	1546.	1524.
	.0()	.0()	.0()	.0()	3.5()	3.5()	3.5()	3.5()	4.8()	6.3()
	1517.	1502.	1471.	1462.	1456.	1368.	1359.	1352.	1023.	846.
	4.4()	5.4()	5.3()	4.8()	6.5()	6.0()	6.2()	6.1()	5.1()	4.9()
	848.	404.	266.	290.	163.	153.	109.	150.	854.	415.
	4.8()	5.0()	2.9()	2.7()	3.7()	2.5()	2.2()	2.4()	40.8(s)	31.0(s)

2	30.	1479.	728.	203.	69.	1367.	1351.	1344.	1334.	1314.	1294.
		.0()	.0()	.0()	.0()	3.2()	3.2()	3.2()	3.2()	4.4()	5.8()
		1288.	1274.	1255.	1247.	1242.	1175.	1167.	1161.	964.	846.
		4.0()	4.9()	5.0()	4.5()	6.0()	5.6()	5.8()	5.7()	4.9()	4.9()
		845.	397.	137.	231.	90.	83.	57.	85.	837.	372.
		4.8()	5.0()	2.3()	2.5()	3.0()	1.9()	1.8()	1.9()	39.2(s)	27.3(s)
		108.	79.								
		.9(s)	.6(s)								
2	35.	1426.	700.	175.	61.	1323.	1307.	1301.	1291.	1272.	1253.
		.0()	.0()	.0()	.0()	3.2()	3.2()	3.2()	3.1()	4.3()	5.6()
		1247.	1234.	1217.	1209.	1204.	1141.	1133.	1127.	949.	840.
		3.9()	4.8()	5.0()	4.4()	5.9()	5.5()	5.7()	5.6()	4.9()	4.9()
		838.	392.	116.	220.	80.	73.	50.	76.	828.	359.
		4.7()	5.0()	2.1()	2.4()	2.9()	1.9()	1.7()	1.8()	38.4(s)	26.1(s)
		93.	70.								
		.8(s)	.5(s)								
2	40.	1376.	667.	152.	55.	1281.	1266.	1260.	1250.	1231.	1212.
		.0()	.0()	.0()	.0()	3.1()	3.1()	3.1()	3.1()	4.2()	5.5()
		1207.	1193.	1180.	1173.	1168.	1109.	1100.	1095.	934.	832.
		3.8()	4.7()	4.9()	4.4()	5.8()	5.4()	5.6()	5.5()	4.9()	4.9()
		830.	378.	100.	209.	71.	65.	44.	68.	818.	346.
		4.7()	4.9()	2.0()	2.4()	2.7()	1.8()	1.6()	1.8()	37.4(s)	24.8(s)
		81.	63.								
		.7(s)	.5(s)								
2	45.	1328.	629.	134.	49.	1240.	1226.	1220.	1210.	1191.	1173.
		.0()	.0()	.0()	.0()	3.1()	3.0()	3.0()	3.0()	4.1()	5.4()
		1167.	1154.	1145.	1138.	1133.	1077.	1069.	1063.	918.	823.
		3.8()	4.7()	4.9()	4.3()	5.8()	5.4()	5.5()	5.4()	4.8()	4.8()
		819.	358.	87.	199.	63.	58.	38.	61.	805.	331.
		4.7()	4.8()	1.9()	2.3()	2.6()	1.7()	1.5()	1.7()	36.3(s)	23.5(s)
		72.	56.								
		.6(s)	.4(s)								
2	50.	1282.	595.	119.	44.	1201.	1187.	1181.	1171.	1153.	1136.
		.0()	.0()	.0()	.0()	3.0()	3.0()	3.0()	3.0()	4.0()	5.3()

	1131.	1119.	1111.	1104.	1099.	1046.	1038.	1033.	901.	811.
	3.7()	4.6()	4.8()	4.3()	5.7()	5.3()	5.5()	5.4()	4.8()	4.8()
	807.	341.	77.	189.	56.	51.	34.	54.	791.	315.
	4.7()	4.8()	1.8()	2.3()	2.5()	1.6()	1.4()	1.6()	35.0(S)	22.1(S)
	64.	50.								
	.5(S)	.4(S)								
2 55.	1238.	561.	106.	39.	1163.	1149.	1143.	1135.	1118.	1101.
	.0()	.0()	.0()	.0()	3.0()	2.9()	2.9()	2.9()	4.0()	5.2()
	1096.	1085.	1078.	1071.	1066.	1016.	1008.	1002.	883.	798.
	3.7()	4.5()	4.8()	4.2()	5.6()	5.2()	5.4()	5.3()	4.7()	4.8()
	793.	322.	68.	180.	50.	45.	29.	49.	775.	292.
	4.6()	4.7()	1.8()	2.2()	2.4()	1.5()	1.4()	1.5()	33.6(S)	20.8(S)
	57.	45.								
	.5(S)	.3(S)								
3 0.	1197.	527.	95.	35.	1127.	1114.	1108.	1100.	1084.	1067.
	.0()	.0()	.0()	.0()	2.9()	2.9()	2.9()	2.9()	3.9()	5.1()
	1063.	1051.	1045.	1038.	1034.	986.	978.	972.	864.	783.
	3.6()	4.4()	4.8()	4.2()	5.5()	5.1()	5.3()	5.2()	4.7()	4.7()
	778.	302.	61.	171.	44.	40.	25.	44.	757.	270.
	4.6()	4.5()	1.7()	2.2()	2.3()	1.5()	1.3()	1.5()	32.1(S)	19.6(S)
	51.	40.								
	.4(S)	.3(S)								
3 5.	1157.	494.	85.	31.	1093.	1080.	1075.	1067.	1051.	1034.
	.0()	.0()	.0()	.0()	2.9()	2.8()	2.8()	2.8()	3.8()	5.0()
	1030.	1018.	1013.	1006.	1002.	956.	948.	942.	844.	767.
	3.5()	4.3()	4.7()	4.2()	5.4()	5.1()	5.2()	5.2()	4.6()	4.7()
	762.	282.	55.	163.	39.	35.	19.	39.	739.	250.
	4.6()	4.4()	1.6()	2.2()	2.2()	1.4()	1.2()	1.4()	30.4(S)	18.4(S)
	46.	36.								
	.4(S)	.3(S)								
3 10.	1120.	462.	76.	28.	1060.	1047.	1042.	1034.	1018.	1002.
	.0()	.0()	.0()	.0()	2.8()	2.8()	2.8()	2.8()	3.8()	5.0()
	998.	987.	982.	974.	970.	925.	917.	911.	822.	750.
	3.5()	4.2()	4.7()	4.1()	5.4()	5.0()	5.2()	5.1()	4.6()	4.6()

		744.	262.	49.	155.	34.	30.	14.	35.	719.	230.
		4.5()	4.3()	1.6()	2.1()	2.1()	1.3()	1.0()	1.4()	28.7(s)	17.3(s)
		41.	32.								
		.3(s)	.2(s)								
3	15.	1084.	430.	68.	25.	1027.	1015.	1010.	1002.	986.	971.
		.0()	.0()	.0()	.0()	2.8()	2.7()	2.7()	2.7()	3.7()	4.9()
		966.	954.	949.	941.	937.	894.	885.	879.	799.	731.
		3.4()	4.2()	4.6()	4.1()	5.3()	4.9()	5.1()	5.0()	4.5()	4.6()
		725.	243.	45.	148.	30.	25.	10.	31.	699.	212.
		4.5()	4.2()	1.5()	2.1()	2.0()	1.2()	.9()	1.3()	26.9(s)	16.3(s)
		37.	28.								
		.3(s)	.2(s)								
3	20.	1049.	402.	60.	22.	996.	984.	978.	970.	954.	938.
		.0()	.0()	.0()	.0()	2.7()	2.7()	2.7()	2.7()	3.6()	4.8()
		933.	921.	916.	908.	903.	862.	853.	847.	775.	711.
		3.3()	4.1()	4.6()	4.0()	5.2()	4.8()	5.0()	4.9()	4.5()	4.5()
		705.	225.	40.	140.	25.	21.	7.	28.	677.	195.
		4.4()	4.1()	1.4()	2.0()	1.8()	1.2()	.8()	1.3()	25.0(s)	15.3(s)
		33.	25.								
		.2(s)	.2(s)								
3	25.	1014.	375.	49.	18.	964.	952.	947.	938.	922.	905.
		.0()	.0()	.0()	.0()	2.7()	2.6()	2.6()	2.6()	3.6()	4.7()
		900.	888.	883.	875.	870.	830.	822.	816.	751.	690.
		3.3()	4.0()	4.5()	4.0()	5.1()	4.7()	4.9()	4.8()	4.4()	4.5()
		682.	207.	36.	134.	21.	18.	6.	25.	649.	179.
		4.4()	3.9()	1.4()	2.0()	1.7()	1.1()	.7()	1.2()	23.1(s)	14.4(s)
		30.	22.								
		.2(s)	.2(s)								
3	30.	978.	349.	41.	12.	932.	920.	914.	906.	889.	872.
		.0()	.0()	.0()	.0()	2.6()	2.6()	2.6()	2.6()	3.5()	4.6()
		867.	855.	850.	842.	837.	799.	790.	784.	726.	665.
		3.2()	3.9()	4.5()	3.9()	5.0()	4.7()	4.8()	4.7()	4.3()	4.4()
		657.	191.	32.	127.	18.	15.	4.	21.	620.	163.
		4.3()	3.8()	1.3()	2.0()	1.6()	1.0()	.7()	1.1()	21.2(s)	13.5(s)

3	55.	804. .0()	247. .0()	15. .0()	2. .0()	771. 2.4()	757. 2.3()	751. 2.3()	742. 2.3()	723. 3.1()	703. 4.0()
		697. 2.8()	683. 3.4()	677. 4.2()	667. 3.6()	661. 4.5()	627. 4.2()	616. 4.3()	609. 4.2()	584. 3.9()	531. 4.0()
		520. 4.0()	128. 3.3()	13. 1.0()	99. 1.8()	8. 1.2()	6. .7()	0. .3()	5. .7()	475. 12.4(s)	116. 9.9(s)
		7. .0(s)	3. .0(s)								
4	0.	768. .0()	234. .0()	11. .0()	1. .0()	737. 2.3()	722. 2.3()	716. 2.3()	706. 2.2()	687. 3.0()	667. 3.9()
		661. 2.8()	647. 3.3()	641. 4.2()	631. 3.5()	626. 4.4()	592. 4.1()	582. 4.2()	575. 4.1()	555. 3.8()	501. 3.9()
		490. 3.9()	122. 3.2()	11. .9()	94. 1.8()	6. 1.1()	5. .7()	0. .2()	4. .6()	444. 10.9(s)	113. 9.2(s)
		5. .0(s)	2. .0(s)								
4	5.	731. .0()	219. .0()	9. .0()	0. .0()	702. 2.2()	687. 2.2()	681. 2.2()	671. 2.2()	652. 2.9()	632. 3.8()
		626. 2.7()	612. 3.2()	606. 4.1()	597. 3.5()	591. 4.3()	559. 4.0()	549. 4.1()	543. 4.0()	526. 3.7()	472. 3.8()
		461. 3.8()	118. 3.2()	9. .8()	90. 1.7()	5. 1.0()	4. .6()	0. .2()	3. .5()	415. 9.5(s)	111. 8.5(s)
		4. .0(s)	1. .0(s)								
4	10.	695. .0()	208. .0()	7. .0()	0. .0()	668. 2.2()	653. 2.1()	646. 2.1()	637. 2.1()	617. 2.8()	598. 3.6()
		592. 2.6()	579. 3.1()	573. 4.0()	563. 3.4()	558. 4.2()	528. 3.9()	518. 4.0()	511. 3.9()	497. 3.7()	443. 3.7()
		433. 3.7()	115. 3.2()	7. .7()	86. 1.7()	4. 1.0()	3. .6()	0. .2()	2. .5()	389. 8.2(s)	108. 7.8(s)
		3. .0(s)	1. .0(s)								

4	15.	659. .0()	198. .0()	5. .0()	0. .0()	633. 2.1()	619. 2.1()	613. 2.1()	603. 2.0()	584. 2.7()	565. 3.5()
		559. 2.5()	545. 3.0()	539. 4.0()	529. 3.4()	523. 4.0()	496. 3.8()	486. 3.9()	480. 3.8()	469. 3.6()	417. 3.6()
		407. 3.6()	112. 3.1()	5. .7()	81. 1.7()	4. .9()	3. .5()	0. .1()	1. .4()	364. 7.0(s)	106. 7.1(s)
		2. .0(s)	0. .0(s)								
4	20.	624. .0()	190. .0()	4. .0()	0. .0()	600. 2.0()	586. 2.0()	580. 2.0()	570. 2.0()	551. 2.6()	531. 3.4()
		526. 2.4()	512. 2.9()	505. 3.9()	495. 3.3()	489. 3.9()	467. 3.7()	458. 3.8()	452. 3.7()	442. 3.5()	390. 3.5()
		380. 3.6()	109. 3.1()	4. .6()	78. 1.6()	3. .8()	2. .5()	0. .1()	1. .3()	331. 5.9(s)	103. 6.4(s)
		1. .0(s)	0. .0(s)								
4	25.	590. .0()	183. .0()	3. .0()	0. .0()	568. 2.0()	553. 1.9()	547. 1.9()	538. 1.9()	518. 2.6()	499. 3.3()
		493. 2.3()	479. 2.8()	473. 3.8()	464. 3.2()	459. 3.8()	439. 3.6()	431. 3.7()	425. 3.6()	415. 3.4()	363. 3.3()
		352. 3.5()	106. 3.1()	3. .6()	74. 1.6()	3. .8()	2. .5()	0. .1()	1. .3()	301. 5.1(s)	101. 5.7(s)
		1. .0(s)	0. .0(s)								
4	30.	557. .0()	175. .0()	3. .0()	0. .0()	536. 1.9()	522. 1.9()	515. 1.9()	506. 1.8()	487. 2.5()	468. 3.2()
		463. 2.3()	450. 2.7()	445. 3.8()	436. 3.2()	431. 3.7()	413. 3.5()	404. 3.5()	398. 3.5()	389. 3.3()	335. 3.2()
		324. 3.4()	102. 3.0()	3. .5()	70. 1.6()	2. .7()	2. .5()	0. .1()	0. .2()	276. 4.3(s)	92. 5.1(s)
		1. .0(s)	0. .0(s)								
4	35.	525. .0()	165. .0()	2. .0()	0. .0()	505. 1.8()	491. 1.8()	485. 1.8()	475. 1.8()	457. 2.4()	440. 3.0()

		435.	423.	418.	409.	404.	386.	377.	371.	363.	310.
		2.2()	2.6()	3.7()	3.1()	3.6()	3.4()	3.4()	3.4()	3.2()	3.1()
		299.	96.	2.	67.	2.	2.	0.	0.	254.	82.
		3.3()	3.0()	.5()	1.5()	.7()	.4()	.1()	.2()	3.6(s)	4.5(s)
		0.	0.								
		.0(s)	.0(s)								
4	40.	494.	153.	2.	0.	475.	462.	456.	447.	430.	413.
		.0()	.0()	.0()	.0()	1.8()	1.8()	1.7()	1.7()	2.3()	2.9()
		408.	397.	391.	382.	377.	361.	352.	346.	337.	286.
		2.1()	2.5()	3.7()	3.0()	3.5()	3.3()	3.3()	3.3()	3.1()	3.0()
		277.	89.	2.	64.	2.	1.	0.	0.	234.	72.
		3.2()	2.9()	.4()	1.5()	.7()	.4()	.1()	.2()	3.1(s)	4.0(s)
		0.	0.								
		.0(s)	.0(s)								
4	45.	465.	142.	1.	0.	448.	435.	429.	421.	404.	387.
		.0()	.0()	.0()	.0()	1.7()	1.7()	1.7()	1.7()	2.2()	2.8()
		382.	371.	365.	356.	351.	336.	327.	322.	314.	265.
		2.0()	2.4()	3.6()	3.0()	3.4()	3.2()	3.2()	3.2()	3.0()	2.9()
		257.	81.	1.	61.	2.	1.	0.	0.	216.	64.
		3.1()	2.8()	.4()	1.5()	.6()	.4()	.1()	.2()	2.5(s)	3.5(s)
		0.	0.								
		.0(s)	.0(s)								
4	50.	438.	131.	1.	0.	421.	409.	403.	395.	379.	362.
		.0()	.0()	.0()	.0()	1.7()	1.6()	1.6()	1.6()	2.1()	2.7()
		357.	346.	341.	332.	327.	313.	305.	299.	292.	246.
		2.0()	2.3()	3.6()	2.9()	3.3()	3.1()	3.1()	3.1()	2.9()	2.8()
		238.	73.	1.	58.	1.	1.	0.	0.	200.	57.
		3.0()	2.7()	.4()	1.5()	.6()	.4()	.1()	.1()	2.0(s)	3.1(s)
		0.	0.								
		.0(s)	.0(s)								
4	55.	411.	121.	1.	0.	396.	384.	379.	371.	354.	338.
		.0()	.0()	.0()	.0()	1.6()	1.6()	1.6()	1.5()	2.0()	2.6()
		334.	323.	318.	310.	305.	291.	284.	279.	272.	228.
		1.9()	2.2()	3.5()	2.9()	3.2()	3.0()	3.0()	3.0()	2.8()	2.7()

		220. 3.0()	66. 2.6()	1. .3()	55. 1.4()	1. .6()	1. .4()	0. .1()	0. .1()	179. 1.6(s)	50. 2.8(s)
		0. .0(s)	0. .0(s)								
5	0.	386. .0()	112. .0()	1. .0()	0. .0()	372. 1.5()	360. 1.5()	355. 1.5()	347. 1.5()	332. 2.0()	316. 2.5()
		312. 1.8()	302. 2.1()	297. 3.5()	289. 2.8()	284. 3.1()	271. 2.9()	264. 2.9()	259. 2.9()	253. 2.7()	210. 2.6()
		202. 2.9()	59. 2.5()	1. .3()	52. 1.4()	1. .5()	1. .3()	0. .1()	0. .1()	157. 1.2(s)	44. 2.4(s)
		0. .0(s)	0. .0(s)								
5	5.	362. .0()	103. .0()	1. .0()	0. .0()	349. 1.5()	338. 1.5()	333. 1.5()	325. 1.4()	310. 1.9()	296. 2.4()
		292. 1.7()	282. 2.0()	278. 3.4()	270. 2.7()	265. 3.0()	253. 2.8()	246. 2.9()	241. 2.8()	235. 2.6()	193. 2.6()
		184. 2.8()	53. 2.4()	1. .3()	50. 1.4()	1. .5()	1. .3()	0. .0()	0. .1()	139. 1.0(s)	39. 2.1(s)
		0. .0(s)	0. .0(s)								
5	10.	335. .0()	95. .0()	0. .0()	0. .0()	328. 1.4()	316. 1.4()	312. 1.4()	305. 1.4()	291. 1.8()	277. 2.3()
		273. 1.7()	264. 1.9()	259. 3.3()	252. 2.7()	247. 2.9()	235. 2.7()	228. 2.8()	223. 2.7()	217. 2.6()	176. 2.5()
		168. 2.7()	48. 2.3()	0. .3()	47. 1.4()	1. .5()	1. .3()	0. .0()	0. .1()	125. .7(s)	35. 1.9(s)
		0. .0(s)	0. .0(s)								
5	15.	312. .0()	88. .0()	0. .0()	0. .0()	307. 1.4()	297. 1.4()	292. 1.3()	285. 1.3()	272. 1.8()	259. 2.2()
		255. 1.6()	246. 1.9()	242. 3.3()	234. 2.6()	229. 2.8()	218. 2.6()	211. 2.7()	206. 2.6()	201. 2.5()	161. 2.4()
		154. 2.6()	43. 2.2()	0. .2()	45. 1.3()	1. .5()	1. .3()	0. .0()	0. .1()	113. .5(s)	31. 1.7(s)

5	40.	223. .0()	60. .0()	0. .0()	0. .0()	223. 1.1()	214. 1.1()	210. 1.1()	204. 1.1()	193. 1.4()	181. 1.8()
		178. 1.3()	170. 1.5()	167. 3.0()	158. 2.3()	155. 2.4()	145. 2.2()	139. 2.3()	135. 2.2()	130. 2.1()	93. 1.9()
		84. 1.9()	24. 1.8()	0. .2()	35. 1.2()	0. .4()	0. .2()	0. .0()	0. .1()	47. .0(s)	16. .9(s)
		0. .0(s)	0. .0(s)								
5	45.	208. .0()	56. .0()	0. .0()	0. .0()	208. 1.1()	200. 1.1()	196. 1.1()	190. 1.0()	179. 1.4()	168. 1.7()
		164. 1.3()	156. 1.4()	152. 2.9()	145. 2.2()	142. 2.3()	132. 2.2()	126. 2.2()	122. 2.1()	117. 2.0()	80. 1.8()
		73. 1.7()	22. 1.7()	0. .2()	34. 1.2()	0. .4()	0. .2()	0. .0()	0. .1()	69. .0(s)	15. .8(s)
		0. .0(s)	0. .0(s)								
5	50.	195. .0()	52. .0()	0. .0()	0. .0()	195. 1.1()	186. 1.0()	182. 1.0()	177. 1.0()	166. 1.3()	154. 1.6()
		150. 1.2()	141. 1.3()	137. 2.8()	133. 2.1()	130. 2.2()	120. 2.1()	114. 2.1()	110. 2.0()	105. 1.9()	71. 1.7()
		66. 1.6()	19. 1.6()	0. .2()	32. 1.2()	0. .4()	0. .2()	0. .0()	0. .1()	38. .0(s)	13. .7(s)
		0. .0(s)	0. .0(s)								

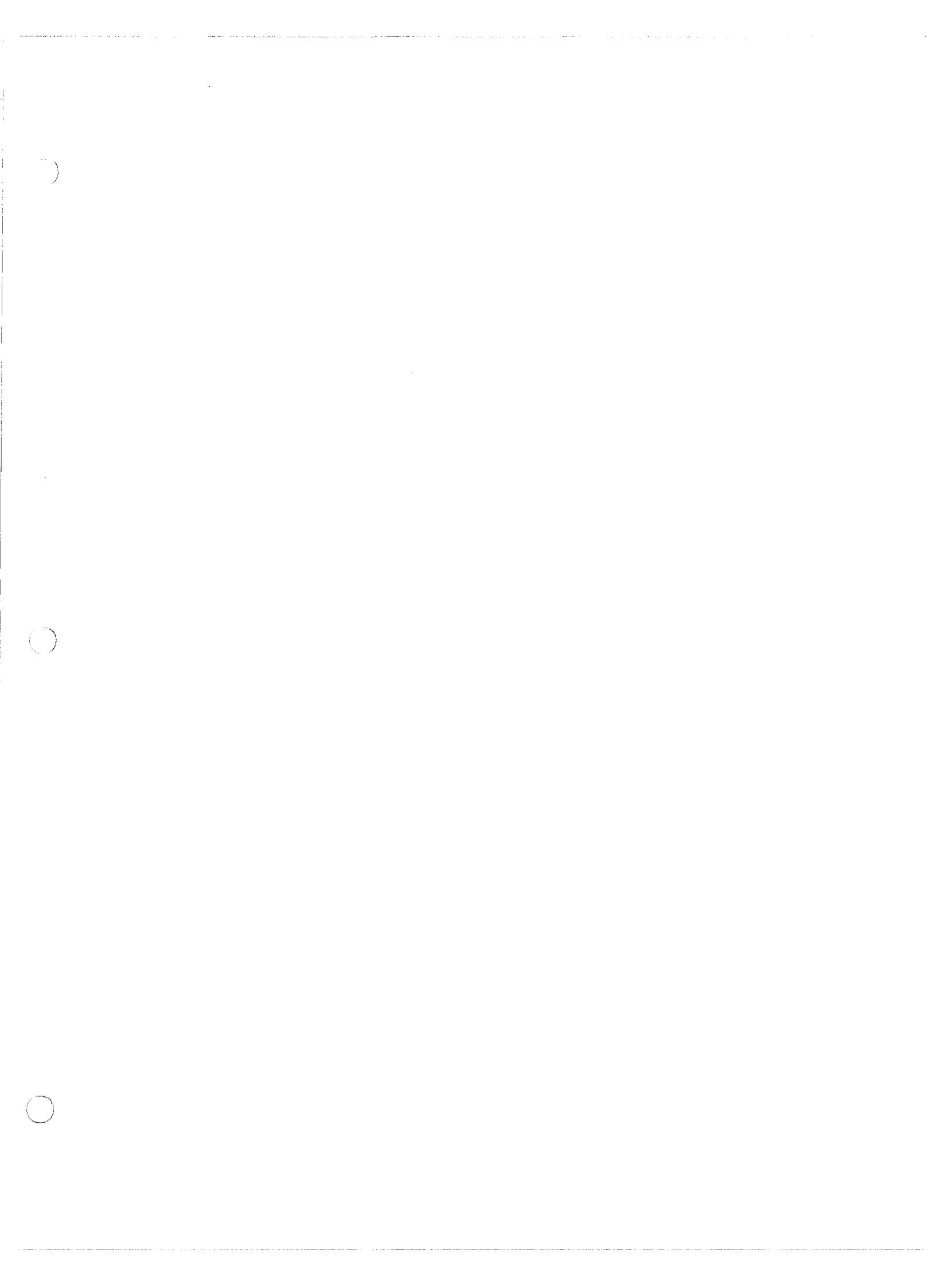
FERBER ENGINEERING COMPANY, MARCH 15, 1993

*** PEAK FLOWS, STAGES AND STORAGE OF GUTTERS AND DETENTION DAMS ***

CONVEYANCE ELEMENT	PEAK (CFS)	STAGE (FT)	STORAGE (AC-FT)	TIME (HR/MIN)
4	427.	(DIRECT FLOW)	0	50.
104	416.	.1	4.3	1 0.
28	411.	3.5		1 5.
103	362.	.1	5.7	1 20.
23	354.	3.3		1 25.
3	639.	(DIRECT FLOW)	1	15.
102	416.	.1	31.2	2 0.
24	342.	2.9		1 30.
22	406.	5.1		2 15.
2	1097.	(DIRECT FLOW)	1	20.
101	855.	.1	40.8	2 10.
27	464.	3.6		0 50.
21	853.	4.8		2 15.
26	410.	3.2		1 5.
20	853.	4.9		2 15.
25	407.	5.3		1 10.
19	1057.	5.1		1 35.
18	1798.	6.9		1 15.
17	1799.	7.0		1 15.
16	1797.	6.8		1 15.
15	1922.	7.4		1 15.
152	1924.	5.3		1 20.
151	1925.	5.8		1 20.
144	1996.	6.4		1 20.
143	1996.	5.0		1 20.
142	1995.	7.4		1 20.
141	1989.	5.5		1 25.
13	1989.	4.0		1 25.
12	1987.	4.0		1 25.
11	1985.	4.0		1 25.
10	1984.	4.0		1 30.
1	2337.	(DIRECT FLOW)	1	25.

1

ENDPROGRAM PROGRAM CALLED



2 RED ROCK CANYON DRAINAGE BASIN 10 YEAR EXISTING DRAINAGE ANALYSIS
0110-YEAR 010 1.86

7001015.0RRCSBA001 RED ROCK CANYON SUBBASIN A
0.494 1.61 1.15 9.80 .030 0.35 0.05 4.80.0011 .837
7001015.0RRCSBB002 RED ROCK CANYON SUBBASIN B
0.225 1.14 0.46 25.7 .040 0.35 0.05 4.57.0015 .696
7001015.0RRCSBC003 RED ROCK CANYON SUBBASIN C
0.170 0.88 0.44 4.80 .056 0.30 0.05 4.89.0008 .956
7001015.0RRCSBD004 RED ROCK CANYON SUBBASIN D
0.378 1.30 0.66 2.70 .047 0.30 0.05 4.79.0012 .835
7001015.0RRCSBE005 RED ROCK CANYON SUBBASIN E
0.241 1.52 0.89 2.00 .048 0.25 0.05 4.79.0012 .831
7001015.0RRCSBF006 RED ROCK CANYON SUBBASIN F
0.278 1.31 0.62 2.00 .032 0.25 0.05 4.84.0010 .876
7001015.0RRCSBG007 RED ROCK CANYON SUBBASIN G
0.330 1.03 0.57 2.00 .052 0.30 0.05 4.43.0015 .686
7001015.0RRCSBH008 RED ROCK CANYON SUBBASIN H
0.316 1.25 0.59 2.00 .040 0.30 0.05 4.68.0014 .742
7001015.0RRCSBI009 RED ROCK CANYON SUBBASIN I
0.350 1.34 0.79 2.00 .029 0.30 0.05 3.98.0018 .566
7001015.0RRCSBJ010 RED ROCK CANYON SUBBASIN J
0.317 0.94 0.54 2.00 .023 0.30 0.05 4.54.0017 .636
7001015.0RRCSBK011 RED ROCK CANYON SUBBASIN K
0.408 1.13 0.57 2.00 .027 0.40 0.05 4.55.0017 .638
7001015.0RRCSBL012 RED ROCK CANYON SUBBASIN L
0.384 1.28 0.61 12.6 .041 0.35 0.05 3.79.0018 .553
7001015.0RRCSBM013 RED ROCK CANYON SUBBASIN M
0.688 1.95 1.35 2.10 .018 0.40 0.05 4.22.0018 .581
7001015.0RRCSBN014 RED ROCK CANYON SUBBASIN N
0.417 1.14 0.49 7.80 .026 0.35 0.05 3.57.0018 .538

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U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN 10 YEAR EXISTING DRAINAGE ANALYSIS

BASIN ID: RRCSBA -- BASIN COMMENT: RED ROCK CANYON SUBBASIN A

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.49	1.61	1.15	9.80	.0300	5.00

COEFFICIENT (REFLECTING TIME TO PEAK)	COEFFICIENT (RELATED TO PEAK RATE OF RUNOFF)
0.127	0.259

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH (CFS)	PEAK (CFS)	VOLUME OF RUNOFF (AF)
26.19	420.56	207.76	26.35	

WIDTH AT 50 = 71. MIN. WIDTH AT 75 = 37. MIN. K50 = 0.22 K75 = 0.30

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.35 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.80 IN./HR. DECAY = 0.00110/SECOND FNINFL = 0.84 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	100.	82.	*	200.	23.	*
5.	34.	*	105.	77.	*	205.	21.	*
10.	98.	*	110.	72.	*	210.	20.	*
15.	155.	*	115.	68.	*	215.	19.	*
20.	193.	*	120.	64.	*	220.	18.	*
25.	207.	*	125.	60.	*	225.	17.	*
30.	204.	*	130.	56.	*	230.	16.	*
35.	189.	*	135.	53.	*	235.	15.	*
40.	172.	*	140.	49.	*	240.	14.	*
45.	157.	*	145.	46.	*	245.	13.	*
50.	153.	*	150.	43.	*	250.	12.	*
55.	151.	*	155.	41.	*	255.	11.	*
60.	142.	*	160.	38.	*	260.	11.	*
65.	133.	*	165.	36.	*	265.	10.	*
70.	125.	*	170.	34.	*	270.	9.	*
75.	116.	*	175.	32.	*	275.	9.	*
80.	107.	*	180.	30.	*	280.	8.	*
85.	100.	*	185.	28.	*	285.	8.	*
90.	94.	*	190.	26.	*	290.	0.	*
95.	88.	*	195.	24.	*	0.	0.	*

BASIN ID: RRCBSA -- BASIN COMMENT: RED ROCK CANYON SUBBASIN A

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 10-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	155.	0.00	0.000	23.	*
5.	0.04	0.000	0.	*	160.	0.00	0.000	21.	*
10.	0.07	0.005	0.	*	165.	0.00	0.000	20.	*
15.	0.15	0.014	1.	*	170.	0.00	0.000	19.	*
20.	0.28	0.026	3.	*	175.	0.00	0.000	18.	*
25.	0.47	0.112	10.	*	180.	0.00	0.000	16.	*
30.	0.22	0.111	22.	*	185.	0.00	0.000	15.	*
35.	0.10	0.010	37.	*	190.	0.00	0.000	14.	*
40.	0.08	0.007	49.	*	195.	0.00	0.000	14.	*
45.	0.07	0.007	56.	*	200.	0.00	0.000	13.	*
50.	0.06	0.006	58.	*	205.	0.00	0.000	12.	*
55.	0.06	0.006	56.	*	210.	0.00	0.000	11.	*
60.	0.06	0.006	54.	*	215.	0.00	0.000	10.	*
65.	0.06	0.006	51.	*	220.	0.00	0.000	10.	*
70.	0.06	0.006	49.	*	225.	0.00	0.000	9.	*
75.	0.06	0.006	49.	*	230.	0.00	0.000	9.	*
80.	0.05	0.004	48.	*	235.	0.00	0.000	8.	*
85.	0.04	0.003	46.	*	240.	0.00	0.000	8.	*
90.	0.04	0.003	45.	*	245.	0.00	0.000	7.	*
95.	0.04	0.003	43.	*	250.	0.00	0.000	7.	*
100.	0.04	0.003	40.	*	255.	0.00	0.000	6.	*
105.	0.04	0.003	38.	*	260.	0.00	0.000	6.	*
110.	0.04	0.003	37.	*	265.	0.00	0.000	6.	*
115.	0.03	0.003	35.	*	270.	0.00	0.000	5.	*
120.	0.02	0.002	34.	*	275.	0.00	0.000	5.	*
125.	0.00	0.000	32.	*	280.	0.00	0.000	5.	*
130.	0.00	0.000	31.	*	285.	0.00	0.000	4.	*
135.	0.00	0.000	29.	*	290.	0.00	0.000	4.	*
140.	0.00	0.000	27.	*	295.	0.00	0.000	4.	*
145.	0.00	0.000	26.	*	300.	0.00	0.000	3.	*
150.	0.00	0.000	24.	*	305.	0.00	0.000	3.	*

TOTAL PRECIP. = 2.15 (1-HOUR RAIN = 1.86) EXCESS PRECIP. = 0.354 INCHES

VOLUME OF EXCESS PRECIP = 9. ACRE-FEET

PEAK Q = 58. CFS TIME OF PEAK = 50. MIN.

INFILT.= 4.80 IN/HR DECAY=0.00110 FNINF = 0.84 IN/HR

MAX.PERV.RET.=0.35 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN 10 YEAR EXISTING DRAINAGE ANALYSIS

BASIN ID: RRCSSB -- BASIN COMMENT: RED ROCK CANYON SUBBASIN B

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.22	1.14	0.46	25.70	.0400	5.00

COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.104 0.287

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH (CFS)	PEAK (CFS)	VOLUME OF RUNOFF (AF)
12.38	1117.81	251.51	251.51	12.00

WIDTH AT 50 = 27. MIN. WIDTH AT 75 = 14. MIN. K50 = 0.28 K75 = 0.38

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.35 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.57 IN./HR. DECAY = 0.00150/SECOND FNINFL = 0.70 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	40.	94.	*	80.	22.	*
5.	127.	*	45.	78.	*	85.	19.	*
10.	240.	*	50.	65.	*	90.	15.	*
15.	241.	*	55.	55.	*	95.	13.	*
20.	197.	*	60.	46.	*	100.	11.	*
25.	166.	*	65.	38.	*	105.	9.	*
30.	136.	*	70.	32.	*	110.	8.	*
35.	112.	*	75.	27.	*	115.	0.	*

BASIN ID: RRCSBB -- BASIN COMMENT: RED ROCK CANYON SUBBASIN B

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 10-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	90.	0.04	0.009	39.	*
5.	0.04	0.000	0.	*	95.	0.04	0.009	35.	*
10.	0.07	0.014	2.	*	100.	0.04	0.009	32.	*
15.	0.15	0.037	8.	*	105.	0.04	0.009	29.	*
20.	0.28	0.068	21.	*	110.	0.04	0.009	27.	*
25.	0.47	0.239	58.	*	115.	0.03	0.008	25.	*
30.	0.22	0.157	103.	*	120.	0.02	0.006	23.	*
35.	0.10	0.047	123.	*	125.	0.00	0.000	20.	*
40.	0.08	0.028	118.	*	130.	0.00	0.000	16.	*
45.	0.07	0.021	106.	*	135.	0.00	0.000	12.	*
50.	0.06	0.015	94.	*	140.	0.00	0.000	9.	*
55.	0.06	0.015	82.	*	145.	0.00	0.000	7.	*
60.	0.06	0.015	72.	*	150.	0.00	0.000	6.	*
65.	0.06	0.015	65.	*	155.	0.00	0.000	5.	*
70.	0.06	0.015	58.	*	160.	0.00	0.000	4.	*
75.	0.06	0.015	53.	*	165.	0.00	0.000	3.	*
80.	0.05	0.011	49.	*	170.	0.00	0.000	3.	*
85.	0.04	0.009	44.	*	175.	0.00	0.000	2.	*

TOTAL PRECIP. = 2.15 (1-HOUR RAIN = 1.86) EXCESS PRECIP. = 0.776 INCHES

VOLUME OF EXCESS PRECIP = 9. ACRE-FEET

PEAK Q = 123. CFS TIME OF PEAK = 35. MIN.

INFILT.= 4.57 IN/HR DECAY=0.00150 FNINF = 0.70 IN/HR

MAX.PERV.RET.=0.35 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN 10 YEAR EXISTING DRAINAGE ANALYSIS

BASIN ID: RRCSC -- BASIN COMMENT: RED ROCK CANYON SUBBASIN C

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.17	0.88	0.44	4.80	.0560	5.00

COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.145 0.240

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH PEAK (CFS)	VOLUME OF RUNOFF (AF)
13.53	836.23	142.16	9.07

WIDTH AT 50 = 36. MIN. WIDTH AT 75 = 19. MIN. K50 = 0.23 K75 = 0.31

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.30 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.89 IN./HR. DECAY = 0.00080/SECOND FNINFL = 0.96 IN./HR.

TIME	UNIT	TIME	UNIT	TIME	UNIT
	HYDROGRAPH	*	HYDROGRAPH	*	HYDROGRAPH
0.	0.	*	50.	57.	*
5.	64.	*	55.	51.	*
10.	130.	*	60.	45.	*
15.	141.	*	65.	40.	*
20.	121.	*	70.	35.	*
25.	105.	*	75.	31.	*
30.	98.	*	80.	27.	*
35.	86.	*	85.	24.	*
40.	74.	*	90.	22.	*
45.	65.	*	95.	19.	*

BASIN ID: RRCSC -- BASIN COMMENT: RED ROCK CANYON SUBBASIN C

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 10-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	80.	0.05	0.002	9.	*
5.	0.04	0.000	0.	*	85.	0.04	0.002	8.	*
10.	0.07	0.003	0.	*	90.	0.04	0.002	8.	*
15.	0.15	0.007	1.	*	95.	0.04	0.002	7.	*
20.	0.28	0.013	2.	*	100.	0.04	0.002	6.	*
25.	0.47	0.051	6.	*	105.	0.04	0.002	6.	*
30.	0.22	0.063	14.	*	110.	0.04	0.002	6.	*
35.	0.10	0.005	18.	*	115.	0.03	0.001	5.	*
40.	0.08	0.004	18.	*	120.	0.02	0.001	5.	*
45.	0.07	0.003	16.	*	125.	0.00	0.000	4.	*
50.	0.06	0.003	15.	*	130.	0.00	0.000	4.	*
55.	0.06	0.003	14.	*	135.	0.00	0.000	3.	*
60.	0.06	0.003	13.	*	140.	0.00	0.000	3.	*
65.	0.06	0.003	12.	*	145.	0.00	0.000	3.	*
70.	0.06	0.003	11.	*	150.	0.00	0.000	2.	*
75.	0.06	0.003	10.	*	155.	0.00	0.000	2.	*

TOTAL PRECIP. = 2.15 (1-HOUR RAIN = 1.86) EXCESS PRECIP. = 0.179 INCHES

VOLUME OF EXCESS PRECIP = 2. ACRE-FEET

PEAK Q = 18. CFS TIME OF PEAK = 35. MIN.

INFILT.= 4.89 IN/HR DECAY=0.00080 FNINF = 0.96 IN/HR

MAX.PERV.RET.=0.30 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN 10 YEAR EXISTING DRAINAGE ANALYSIS

BASIN ID: RRCSD --- BASIN COMMENT: RED ROCK CANYON SUBBASIN D

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.38	1.30	0.66	2.70	.0470	5.00

COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.153 0.284

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAP (CFS)	PEAK (AF)
20.26	613.13	231.76	20.16

WIDTH AT 50 = 49. MIN. WIDTH AT 75 = 25. MIN. K50 = 0.25 K75 = 0.34

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVERIOUS RET. = 0.30 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.79 IN./HR. DECAY = 0.00120/SECOND FNINFL = 0.83 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	70.	90.	*	140.	23.	*
5.	57.	*	75.	82.	*	145.	21.	*
10.	150.	*	80.	74.	*	150.	19.	*
15.	212.	*	85.	67.	*	155.	17.	*
20.	232.	*	90.	61.	*	160.	16.	*
25.	221.	*	95.	56.	*	165.	14.	*
30.	197.	*	100.	51.	*	170.	13.	*
35.	177.	*	105.	46.	*	175.	12.	*
40.	165.	*	110.	42.	*	180.	11.	*
45.	151.	*	115.	38.	*	185.	10.	*
50.	136.	*	120.	34.	*	190.	9.	*
55.	122.	*	125.	31.	*	195.	8.	*
60.	109.	*	130.	28.	*	200.	0.	*
65.	99.	*	135.	26.	*	0.	0.	*

BASIN ID: RRCBSB -- BASIN COMMENT: RED ROCK CANYON SUBBASIN D

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 10-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	110.	0.04	0.001	21.	*
5.	0.04	0.000	0.	*	115.	0.03	0.001	19.	*
10.	0.07	0.001	0.	*	120.	0.02	0.001	18.	*
15.	0.15	0.004	0.	*	125.	0.00	0.000	16.	*
20.	0.28	0.007	1.	*	130.	0.00	0.000	15.	*
25.	0.47	0.154	11.	*	135.	0.00	0.000	13.	*
30.	0.22	0.111	32.	*	140.	0.00	0.000	12.	*
35.	0.10	0.005	52.	*	145.	0.00	0.000	11.	*
40.	0.08	0.002	63.	*	150.	0.00	0.000	10.	*
45.	0.07	0.002	64.	*	155.	0.00	0.000	9.	*
50.	0.06	0.002	59.	*	160.	0.00	0.000	8.	*
55.	0.06	0.002	53.	*	165.	0.00	0.000	7.	*
60.	0.06	0.002	49.	*	170.	0.00	0.000	7.	*
65.	0.06	0.002	46.	*	175.	0.00	0.000	6.	*
70.	0.06	0.002	42.	*	180.	0.00	0.000	6.	*
75.	0.06	0.002	38.	*	185.	0.00	0.000	5.	*
80.	0.05	0.001	35.	*	190.	0.00	0.000	5.	*
85.	0.04	0.001	32.	*	195.	0.00	0.000	4.	*
90.	0.04	0.001	29.	*	200.	0.00	0.000	4.	*
95.	0.04	0.001	27.	*	205.	0.00	0.000	3.	*
100.	0.04	0.001	25.	*	210.	0.00	0.000	3.	*
105.	0.04	0.001	23.	*	215.	0.00	0.000	3.	*

TOTAL PRECIP. = 2.15 (1-HOUR RAIN = 1.86) EXCESS PRECIP. = 0.304 INCHES

VOLUME OF EXCESS PRECIP = 6. ACRE-FEET

PEAK Q = 64. CFS TIME OF PEAK = 45. MIN.

INFILT.= 4.79 IN/HR DECAY = 0.00120 FNINF = 0.83 IN/HR

MAX.PERV.RET.=0.30 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN 10 YEAR EXISTING DRAINAGE ANALYSIS

BASIN ID: RRCSBE -- BASIN COMMENT: RED ROCK CANYON SUBBASIN E

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
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0.24	1.52	0.89	2.00	.0480	5.00
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COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.156	0.270
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CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH (CFS)	PEAK (CFS)	VOLUME OF RUNOFF (AF)
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24.87	463.00	111.58	111.58	12.85
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WIDTH AT 50 = 65. MIN. WIDTH AT 75 = 34. MIN. K50 = 0.23 K75 = 0.31

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.25 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.79 IN./HR. DECAY = 0.00120/SECOND FNINFL = 0.83 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	80.	52.	*	160.	18.	*
5.	20.	*	85.	49.	*	165.	17.	*
10.	56.	*	90.	46.	*	170.	16.	*
15.	88.	*	95.	43.	*	175.	15.	*
20.	106.	*	100.	40.	*	180.	14.	*
25.	112.	*	105.	37.	*	185.	13.	*
30.	107.	*	110.	35.	*	190.	12.	*
35.	98.	*	115.	33.	*	195.	11.	*
40.	89.	*	120.	31.	*	200.	11.	*
45.	83.	*	125.	29.	*	205.	10.	*
50.	82.	*	130.	27.	*	210.	9.	*
55.	76.	*	135.	25.	*	215.	9.	*
60.	71.	*	140.	23.	*	220.	8.	*
65.	66.	*	145.	22.	*	225.	8.	*
70.	61.	*	150.	20.	*	230.	0.	*
75.	56.	*	155.	19.	*	0.	0.	*

BASIN ID: RRCBSBE -- BASIN COMMENT: RED ROCK CANYON SUBBASIN E

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 10-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	125.	0.00	0.000	14.	*
5.	0.04	0.000	0.	*	130.	0.00	0.000	13.	*
10.	0.07	0.001	0.	*	135.	0.00	0.000	12.	*
15.	0.15	0.003	0.	*	140.	0.00	0.000	11.	*
20.	0.28	0.005	0.	*	145.	0.00	0.000	10.	*
25.	0.47	0.202	5.	*	150.	0.00	0.000	10.	*
30.	0.22	0.110	14.	*	155.	0.00	0.000	9.	*
35.	0.10	0.005	25.	*	160.	0.00	0.000	9.	*
40.	0.08	0.002	32.	*	165.	0.00	0.000	8.	*
45.	0.07	0.001	36.	*	170.	0.00	0.000	7.	*
50.	0.06	0.001	36.	*	175.	0.00	0.000	7.	*
55.	0.06	0.001	33.	*	180.	0.00	0.000	7.	*
60.	0.06	0.001	31.	*	185.	0.00	0.000	6.	*
65.	0.06	0.001	28.	*	190.	0.00	0.000	6.	*
70.	0.06	0.001	28.	*	195.	0.00	0.000	5.	*
75.	0.06	0.001	26.	*	200.	0.00	0.000	5.	*
80.	0.05	0.001	25.	*	205.	0.00	0.000	5.	*
85.	0.04	0.001	23.	*	210.	0.00	0.000	4.	*
90.	0.04	0.001	21.	*	215.	0.00	0.000	4.	*
95.	0.04	0.001	20.	*	220.	0.00	0.000	4.	*
100.	0.04	0.001	18.	*	225.	0.00	0.000	4.	*
105.	0.04	0.001	17.	*	230.	0.00	0.000	3.	*
110.	0.04	0.001	16.	*	235.	0.00	0.000	3.	*
115.	0.03	0.001	15.	*	240.	0.00	0.000	3.	*
120.	0.02	0.000	14.	*	245.	0.00	0.000	3.	*

TOTAL PRECIP. = 2.15 (1-HOUR RAIN = 1.86) EXCESS PRECIP. = 0.342 INCHES

VOLUME OF EXCESS PRECIP = 4. ACRE-FEET

PEAK Q = 36. CFS TIME OF PEAK = 45. MIN.

INFILT.= 4.79 IN/HR DECAY=0.00120 FNINF = 0.83 IN/HR

MAX.PERV.RET.=0.25 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN 10 YEAR EXISTING DRAINAGE ANALYSIS

BASIN ID: RRCSBF -- BASIN COMMENT: RED ROCK CANYON SUBBASIN F

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.28	1.31	0.62	2.00	.0320	5.00

COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.156 0.276

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH PEAK (CFS)	VOLUME OF RUNOFF (AF)
21.80	548.24	152.41	14.83

WIDTH AT 50 = 55. MIN. WIDTH AT 75 = 28. MIN. K50 = 0.24 K75 = 0.32

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.25 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.84 IN./HR. DECAY = 0.00100/SECOND FNINFL = 0.88 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	70.	68.	*	140.	21.	*
5.	33.	*	75.	63.	*	145.	20.	*
10.	91.	*	80.	58.	*	150.	18.	*
15.	133.	*	85.	53.	*	155.	17.	*
20.	151.	*	90.	49.	*	160.	15.	*
25.	149.	*	95.	45.	*	165.	14.	*
30.	137.	*	100.	42.	*	170.	13.	*
35.	122.	*	105.	38.	*	175.	12.	*
40.	114.	*	110.	35.	*	180.	11.	*
45.	108.	*	115.	32.	*	185.	10.	*
50.	99.	*	120.	30.	*	190.	9.	*
55.	91.	*	125.	27.	*	195.	9.	*
60.	82.	*	130.	25.	*	200.	8.	*
65.	74.	*	135.	23.	*	205.	0.	*

BASIN ID: RRCBSF -- BASIN COMMENT: RED ROCK CANYON SUBBASIN F

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 10-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME: (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	110.	0.04	0.001	14.	*
5.	0.04	0.000	0.	*	115.	0.03	0.001	13.	*
10.	0.07	0.001	0.	*	120.	0.02	0.000	12.	*
15.	0.15	0.003	0.	*	125.	0.00	0.000	11.	*
20.	0.28	0.005	1.	*	130.	0.00	0.000	10.	*
25.	0.47	0.153	6.	*	135.	0.00	0.000	10.	*
30.	0.22	0.089	18.	*	140.	0.00	0.000	9.	*
35.	0.10	0.002	30.	*	145.	0.00	0.000	8.	*
40.	0.08	0.002	37.	*	150.	0.00	0.000	8.	*
45.	0.07	0.001	38.	*	155.	0.00	0.000	7.	*
50.	0.06	0.001	36.	*	160.	0.00	0.000	6.	*
55.	0.06	0.001	33.	*	165.	0.00	0.000	6.	*
60.	0.06	0.001	30.	*	170.	0.00	0.000	5.	*
65.	0.06	0.001	29.	*	175.	0.00	0.000	5.	*
70.	0.06	0.001	27.	*	180.	0.00	0.000	5.	*
75.	0.06	0.001	25.	*	185.	0.00	0.000	4.	*
80.	0.05	0.001	23.	*	190.	0.00	0.000	4.	*
85.	0.04	0.001	21.	*	195.	0.00	0.000	4.	*
90.	0.04	0.001	19.	*	200.	0.00	0.000	3.	*
95.	0.04	0.001	18.	*	205.	0.00	0.000	3.	*
100.	0.04	0.001	16.	*	210.	0.00	0.000	3.	*
105.	0.04	0.001	15.	*	215.	0.00	0.000	3.	*

TOTAL PRECIP. = 2.15 (1-HOUR RAIN = 1.86) EXCESS PRECIP. = 0.269 INCHES

VOLUME OF EXCESS PRECIP = 4. ACRE-FEET

PEAK Q = 38. CFS TIME OF PEAK = 45. MIN.

INFILT.= 4.84 IN/HR DECAY=0.00100 FNINF = 0.88 IN/HR

MAX.PERV.RET.=0.25 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN 10 YEAR EXISTING DRAINAGE ANALYSIS

BASIN ID: RRCBSG -- BASIN COMMENT: RED ROCK CANYON SUBBASIN G

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.33	1.03	0.57	2.00	.0520	5.00

COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.156 0.283

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH PEAK (CFS)	VOLUME OF RUNOFF (AF)
17.20	738.59	243.74	17.60

WIDTH AT 50 = 41. MIN. WIDTH AT 75 = 21. MIN. K50 = 0.25 K75 = 0.35

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.30 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.43 IN./HR. DECAY = 0.00150/SECOND FNINFL = 0.69 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	60.	91.	*	120.	22.	*
5.	77.	*	65.	81.	*	125.	20.	*
10.	185.	*	70.	72.	*	130.	18.	*
15.	239.	*	75.	64.	*	135.	16.	*
20.	238.	*	80.	57.	*	140.	14.	*
25.	210.	*	85.	51.	*	145.	12.	*
30.	185.	*	90.	45.	*	150.	11.	*
35.	168.	*	95.	40.	*	155.	10.	*
40.	150.	*	100.	36.	*	160.	9.	*
45.	131.	*	105.	32.	*	165.	8.	*
50.	115.	*	110.	28.	*	170.	0.	*
55.	102.	*	115.	25.	*	0.	0.	*

BASIN ID: RRCSBG -- BASIN COMMENT: RED ROCK CANYON SUBBASIN G

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 10-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	95.	0.04	0.001	32.	*
5.	0.04	0.000	0.	*	100.	0.04	0.001	29.	*
10.	0.07	0.001	0.	*	105.	0.04	0.001	26.	*
15.	0.15	0.003	0.	*	110.	0.04	0.001	23.	*
20.	0.28	0.005	1.	*	115.	0.03	0.001	21.	*
25.	0.47	0.228	20.	*	120.	0.02	0.000	19.	*
30.	0.22	0.141	55.	*	125.	0.00	0.000	17.	*
35.	0.10	0.032	85.	*	130.	0.00	0.000	15.	*
40.	0.08	0.013	97.	*	135.	0.00	0.000	13.	*
45.	0.07	0.008	94.	*	140.	0.00	0.000	12.	*
50.	0.06	0.001	86.	*	145.	0.00	0.000	11.	*
55.	0.06	0.001	78.	*	150.	0.00	0.000	9.	*
60.	0.06	0.002	70.	*	155.	0.00	0.000	8.	*
65.	0.06	0.002	63.	*	160.	0.00	0.000	7.	*
70.	0.06	0.003	56.	*	165.	0.00	0.000	7.	*
75.	0.06	0.003	50.	*	170.	0.00	0.000	6.	*
80.	0.05	0.001	45.	*	175.	0.00	0.000	5.	*
85.	0.04	0.001	40.	*	180.	0.00	0.000	5.	*
90.	0.04	0.001	36.	*	185.	0.00	0.000	4.	*

TOTAL PRECIP. = 2.15 (1-HOUR RAIN = 1.86) EXCESS PRECIP. = 0.450 INCHES

VOLUME OF EXCESS PRECIP = 8. ACRE-FEET

PEAK Q = 97. CFS TIME OF PEAK = 40. MIN.

INFILT.= 4.43 IN/HR DECAY=0.00150 FNINF = 0.69 IN/HR

MAX.PERV.RET.=0.30 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN 10 YEAR EXISTING DRAINAGE ANALYSIS

BASIN ID: RRCSBH -- BASIN COMMENT: RED ROCK CANYON SUBBASIN H

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.32	1.25	0.59	2.00	.0400	5.00

COEFFICIENT (REFLECTING TIME TO PEAK)	COEFFICIENT (RELATED TO PEAK RATE OF RUNOFF)
0.156	0.281

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH (CFS)	PEAK (CFS)	VOLUME OF RUNOFF (AF)
19.96	617.58	195.15	195.15	16.85

WIDTH AT 50 = 49. MIN. WIDTH AT 75 = 25. MIN. K50 = 0.25 K75 = 0.34

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVERIOUS RET. = 0.30 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.68 IN./HR. DECAY = 0.00140/SECOND FNINFL = 0.74 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	70.	75.	*	140.	20.	*
5.	49.	*	75.	68.	*	145.	18.	*
10.	128.	*	80.	62.	*	150.	16.	*
15.	180.	*	85.	56.	*	155.	15.	*
20.	195.	*	90.	51.	*	160.	13.	*
25.	185.	*	95.	47.	*	165.	12.	*
30.	164.	*	100.	42.	*	170.	11.	*
35.	148.	*	105.	38.	*	175.	10.	*
40.	138.	*	110.	35.	*	180.	9.	*
45.	126.	*	115.	32.	*	185.	8.	*
50.	114.	*	120.	29.	*	190.	7.	*
55.	101.	*	125.	26.	*	195.	0.	*
60.	91.	*	130.	24.	*	0.	0.	*
65.	83.	*	135.	22.	*	0.	0.	*

BASIN ID: RRCBSH -- BASIN COMMENT: RED ROCK CANYON SUBBASIN H

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 10-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	110.	0.04	0.001	21.	*
5.	0.04	0.000	0.	*	115.	0.03	0.001	20.	*
10.	0.07	0.001	0.	*	120.	0.02	0.000	18.	*
15.	0.15	0.003	0.	*	125.	0.00	0.000	16.	*
20.	0.28	0.005	1.	*	130.	0.00	0.000	15.	*
25.	0.47	0.200	11.	*	135.	0.00	0.000	14.	*
30.	0.22	0.130	34.	*	140.	0.00	0.000	12.	*
35.	0.10	0.022	56.	*	145.	0.00	0.000	11.	*
40.	0.08	0.006	67.	*	150.	0.00	0.000	10.	*
45.	0.07	0.001	69.	*	155.	0.00	0.000	9.	*
50.	0.06	0.001	64.	*	160.	0.00	0.000	8.	*
55.	0.06	0.001	58.	*	165.	0.00	0.000	8.	*
60.	0.06	0.001	54.	*	170.	0.00	0.000	7.	*
65.	0.06	0.001	49.	*	175.	0.00	0.000	6.	*
70.	0.06	0.001	45.	*	180.	0.00	0.000	6.	*
75.	0.06	0.001	41.	*	185.	0.00	0.000	5.	*
80.	0.05	0.001	37.	*	190.	0.00	0.000	5.	*
85.	0.04	0.001	34.	*	195.	0.00	0.000	4.	*
90.	0.04	0.001	31.	*	200.	0.00	0.000	4.	*
95.	0.04	0.001	28.	*	205.	0.00	0.000	3.	*
100.	0.04	0.001	26.	*	210.	0.00	0.000	3.	*
105.	0.04	0.001	23.	*	215.	0.00	0.000	1.	*

TOTAL PRECIP. = 2.15 (1-HOUR RAIN = 1.86) EXCESS PRECIP. = 0.382 INCHES

VOLUME OF EXCESS PRECIP = 6. ACRE-FEET

PEAK Q = 69. CFS TIME OF PEAK = 45. MIN.

INFILT.= 4.68 IN/HR DECAY = 0.00140 FNINF = 0.74 IN/HR

MAX.PERV.RET.=0.30 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN 10 YEAR EXISTING DRAINAGE ANALYSIS

BASIN ID: RRCBSI -- BASIN COMMENT: RED ROCK CANYON SUBBASIN I

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.35	1.34	0.79	2.00	.0290	5.00

COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.156 0.285

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH PEAK (CFS)	VOLUME OF RUNOFF (AF)
24.94	488.07	170.83	18.67

WIDTH AT 50 = 61. MIN. WIDTH AT 75 = 32. MIN. K50 = 0.24 K75 = 0.33

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.30 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 3.98 IN./HR. DECAY = 0.00180/SECOND FNINFL = 0.57 IN./HR.

TIME	UNIT	TIME	UNIT	TIME	UNIT
	HYDROGRAPH	*	HYDROGRAPH	*	HYDROGRAPH
0.	0.	*	85.	70.	*
5.	30.	*	90.	65.	*
10.	86.	*	95.	60.	*
15.	134.	*	100.	56.	*
20.	163.	*	105.	52.	*
25.	171.	*	110.	48.	*
30.	165.	*	115.	45.	*
35.	151.	*	120.	41.	*
40.	137.	*	125.	38.	*
45.	128.	*	130.	36.	*
50.	122.	*	135.	33.	*
55.	113.	*	140.	31.	*
60.	105.	*	145.	28.	*
65.	96.	*	150.	26.	*
70.	88.	*	155.	24.	*
75.	81.	*	160.	23.	*
80.	75.	*	165.	21.	*

BASIN ID: RRCSBI -- BASIN COMMENT: RED ROCK CANYON SUBBASIN I

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 10-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	135.	0.00	0.000	35.	*
5.	0.04	0.000	0.	*	140.	0.00	0.000	32.	*
10.	0.07	0.001	0.	*	145.	0.00	0.000	30.	*
15.	0.15	0.003	0.	*	150.	0.00	0.000	28.	*
20.	0.28	0.005	1.	*	155.	0.00	0.000	26.	*
25.	0.47	0.316	11.	*	160.	0.00	0.000	24.	*
30.	0.22	0.162	33.	*	165.	0.00	0.000	22.	*
35.	0.10	0.049	59.	*	170.	0.00	0.000	20.	*
40.	0.08	0.029	80.	*	175.	0.00	0.000	19.	*
45.	0.07	0.022	92.	*	180.	0.00	0.000	18.	*
50.	0.06	0.012	95.	*	185.	0.00	0.000	16.	*
55.	0.06	0.012	93.	*	190.	0.00	0.000	15.	*
60.	0.06	0.013	88.	*	195.	0.00	0.000	14.	*
65.	0.06	0.013	85.	*	200.	0.00	0.000	13.	*
70.	0.06	0.013	82.	*	205.	0.00	0.000	12.	*
75.	0.06	0.013	79.	*	210.	0.00	0.000	11.	*
80.	0.05	0.001	76.	*	215.	0.00	0.000	10.	*
85.	0.04	0.001	72.	*	220.	0.00	0.000	10.	*
90.	0.04	0.001	67.	*	225.	0.00	0.000	9.	*
95.	0.04	0.001	62.	*	230.	0.00	0.000	8.	*
100.	0.04	0.001	58.	*	235.	0.00	0.000	8.	*
105.	0.04	0.001	54.	*	240.	0.00	0.000	7.	*
110.	0.04	0.001	50.	*	245.	0.00	0.000	7.	*
115.	0.03	0.001	46.	*	250.	0.00	0.000	6.	*
120.	0.02	0.000	43.	*	255.	0.00	0.000	6.	*
125.	0.00	0.000	40.	*	260.	0.00	0.000	3.	*
130.	0.00	0.000	37.	*	265.	0.00	0.000	2.	*

TOTAL PRECIP. = 2.15 (1-HOUR RAIN = 1.86) EXCESS PRECIP. = 0.669 INCHES

VOLUME OF EXCESS PRECIP = 12. ACRE-FEET

PEAK Q = 95. CFS TIME OF PEAK = 50. MIN.

INFILT.= 3.98 IN/HR DECAY = 0.00180 FNINF = 0.57 IN/HR

MAX.PERV.RET.=0.30 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN 10 YEAR EXISTING DRAINAGE ANALYSIS

BASIN ID: RRCBJ -- BASIN COMMENT: RED ROCK CANYON SUBBASIN J

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.32	0.94	0.54	2.00	.0230	5.00

COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.156 0.281

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH PEAK (CFS)	VOLUME OF RUNOFF (AF)
19.17	647.28	205.19	16.91

WIDTH AT 50 = 46. MIN. WIDTH AT 75 = 24. MIN. K50 = 0.25 K75 = 0.34

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.30 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.54 IN./HR. DECAY = 0.00170/SECOND FNINFL = 0.64 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	65.	82.	*	130.	22.	*
5.	55.	*	70.	74.	*	135.	20.	*
10.	141.	*	75.	67.	*	140.	18.	*
15.	193.	*	80.	61.	*	145.	16.	*
20.	205.	*	85.	55.	*	150.	15.	*
25.	190.	*	90.	50.	*	155.	13.	*
30.	167.	*	95.	45.	*	160.	12.	*
35.	154.	*	100.	41.	*	165.	11.	*
40.	141.	*	105.	37.	*	170.	10.	*
45.	127.	*	110.	33.	*	175.	9.	*
50.	114.	*	115.	30.	*	180.	8.	*
55.	101.	*	120.	27.	*	185.	0.	*
60.	91.	*	125.	24.	*	0.	0.	*

BASIN ID: RRC SBJ -- BASIN COMMENT: RED ROCK CANYON SUBBASIN J

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 10-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	105.	0.04	0.001	35.	*
5.	0.04	0.000	0.	*	110.	0.04	0.001	32.	*
10.	0.07	0.001	0.	*	115.	0.03	0.001	29.	*
15.	0.15	0.003	0.	*	120.	0.02	0.000	26.	*
20.	0.28	0.005	1.	*	125.	0.00	0.000	24.	*
25.	0.47	0.263	16.	*	130.	0.00	0.000	22.	*
30.	0.22	0.152	47.	*	135.	0.00	0.000	20.	*
35.	0.10	0.041	76.	*	140.	0.00	0.000	18.	*
40.	0.08	0.021	92.	*	145.	0.00	0.000	16.	*
45.	0.07	0.014	94.	*	150.	0.00	0.000	14.	*
50.	0.06	0.005	89.	*	155.	0.00	0.000	13.	*
55.	0.06	0.006	83.	*	160.	0.00	0.000	12.	*
60.	0.06	0.007	77.	*	165.	0.00	0.000	11.	*
65.	0.06	0.007	72.	*	170.	0.00	0.000	10.	*
70.	0.06	0.007	66.	*	175.	0.00	0.000	9.	*
75.	0.06	0.007	61.	*	180.	0.00	0.000	8.	*
80.	0.05	0.001	56.	*	185.	0.00	0.000	7.	*
85.	0.04	0.001	51.	*	190.	0.00	0.000	6.	*
90.	0.04	0.001	47.	*	195.	0.00	0.000	6.	*
95.	0.04	0.001	43.	*	200.	0.00	0.000	5.	*
100.	0.04	0.001	39.	*	205.	0.00	0.000	3.	*

TOTAL PRECIP. = 2.15 (1-HOUR RAIN = 1.86) EXCESS PRECIP. = 0.545 INCHES

VOLUME OF EXCESS PRECIP = 9. ACRE-FEET

PEAK Q = 94. CFS TIME OF PEAK = 45. MIN.

INFILT.= 4.54 IN/HR DECAY=0.00170 FNINF = 0.64 IN/HR

MAX.PERV.RET.=0.30 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN 10 YEAR EXISTING DRAINAGE ANALYSIS

BASIN ID: RRCBSK -- BASIN COMMENT: RED ROCK CANYON SUBBASIN K

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.41	1.13	0.57	2.00	.0270	5.00

COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.156 0.292

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH PEAK (CFS)	VOLUME OF RUNOFF (AF)
20.48	623.16	254.25	21.76

WIDTH AT 50 = 48. MIN. WIDTH AT 75 = 25. MIN. K50 = 0.26 K75 = 0.35

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.40 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.55 IN./HR. DECAY = 0.00170/SECOND FNINFL = 0.64 IN./HR.

TIME	UNIT	TIME	UNIT	TIME	UNIT
	HYDROGRAPH	*	HYDROGRAPH	*	HYDROGRAPH
0.	0.	*	70.	*	140.
5.	62.	*	75.	*	145.
10.	162.	*	80.	*	150.
15.	231.	*	85.	*	155.
20.	254.	*	90.	*	160.
25.	244.	*	95.	*	165.
30.	218.	*	100.	*	170.
35.	195.	*	105.	*	175.
40.	180.	*	110.	*	180.
45.	164.	*	115.	*	185.
50.	148.	*	120.	*	190.
55.	131.	*	125.	*	195.
60.	118.	*	130.	*	200.
65.	107.	*	135.	*	0.

BASIN ID: RRCBSK -- BASIN COMMENT: RED ROCK CANYON SUBBASIN K

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 10-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	110.	0.04	0.001	35.	*
5.	0.04	0.000	0.	*	115.	0.03	0.001	32.	*
10.	0.07	0.001	0.	*	120.	0.02	0.000	29.	*
15.	0.15	0.003	0.	*	125.	0.00	0.000	26.	*
20.	0.28	0.005	1.	*	130.	0.00	0.000	24.	*
25.	0.47	0.164	12.	*	135.	0.00	0.000	22.	*
30.	0.22	0.152	38.	*	140.	0.00	0.000	20.	*
35.	0.10	0.040	67.	*	145.	0.00	0.000	18.	*
40.	0.08	0.021	87.	*	150.	0.00	0.000	16.	*
45.	0.07	0.014	94.	*	155.	0.00	0.000	15.	*
50.	0.06	0.005	92.	*	160.	0.00	0.000	13.	*
55.	0.06	0.006	86.	*	165.	0.00	0.000	12.	*
60.	0.06	0.006	81.	*	170.	0.00	0.000	11.	*
65.	0.06	0.007	75.	*	175.	0.00	0.000	10.	*
70.	0.06	0.007	70.	*	180.	0.00	0.000	9.	*
75.	0.06	0.007	65.	*	185.	0.00	0.000	8.	*
80.	0.05	0.001	61.	*	190.	0.00	0.000	7.	*
85.	0.04	0.001	56.	*	195.	0.00	0.000	7.	*
90.	0.04	0.001	51.	*	200.	0.00	0.000	6.	*
95.	0.04	0.001	46.	*	205.	0.00	0.000	5.	*
100.	0.04	0.001	42.	*	210.	0.00	0.000	5.	*
105.	0.04	0.001	38.	*	215.	0.00	0.000	4.	*

TOTAL PRECIP. = 2.15 (1-HOUR RAIN = 1.86) EXCESS PRECIP. = 0.444 INCHES

VOLUME OF EXCESS PRECIP = 10. ACRE-FEET

PEAK Q = 94. CFS TIME OF PEAK = 45. MIN.

INFILT.= 4.55 IN/HR DECAY = 0.00170 FNINF = 0.64 IN/HR

MAX.PERV.RET.=0.40 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN 10 YEAR EXISTING DRAINAGE ANALYSIS

BASIN ID: RRCBSL -- BASIN COMMENT: RED ROCK CANYON SUBBASIN L

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.38	1.28	0.61	12.60	.0410	5.00

COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.121 0.252

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH (CFS)	PEAK (CFS)	VOLUME OF RUNOFF (AF)
16.43	695.48	267.06	267.06	20.48

WIDTH AT 50 = 43. MIN. WIDTH AT 75 = 22. MIN. K50 = 0.23 K75 = 0.31

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.35 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 3.79 IN./HR. DECAY = 0.00180/SECOND FNINFL = 0.55 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	65.	96.	*	130.	23.	*
5.	91.	*	70.	86.	*	135.	21.	*
10.	211.	*	75.	77.	*	140.	19.	*
15.	265.	*	80.	69.	*	145.	17.	*
20.	256.	*	85.	62.	*	150.	15.	*
25.	222.	*	90.	56.	*	155.	14.	*
30.	199.	*	95.	50.	*	160.	12.	*
35.	189.	*	100.	45.	*	165.	11.	*
40.	170.	*	105.	40.	*	170.	10.	*
45.	151.	*	110.	36.	*	175.	9.	*
50.	133.	*	115.	32.	*	180.	8.	*
55.	119.	*	120.	29.	*	185.	0.	*
60.	107.	*	125.	26.	*	0.	0.	*

BASIN ID: RRCBSL -- BASIN COMMENT: RED ROCK CANYON SUBBASIN L

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 10-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
				*					*
				*					*
0.	0.00	0.000	0.	*	120.	0.02	0.003	50.	*
5.	0.04	0.000	0.	*	125.	0.00	0.000	46.	*
10.	0.07	0.007	1.	*	130.	0.00	0.000	41.	*
15.	0.15	0.018	3.	*	135.	0.00	0.000	37.	*
20.	0.28	0.033	9.	*	140.	0.00	0.000	33.	*
25.	0.47	0.295	40.	*	145.	0.00	0.000	30.	*
30.	0.22	0.169	93.	*	150.	0.00	0.000	27.	*
35.	0.10	0.056	133.	*	155.	0.00	0.000	24.	*
40.	0.08	0.035	148.	*	160.	0.00	0.000	22.	*
45.	0.07	0.028	145.	*	165.	0.00	0.000	19.	*
50.	0.06	0.017	138.	*	170.	0.00	0.000	17.	*
55.	0.06	0.018	133.	*	175.	0.00	0.000	16.	*
60.	0.06	0.018	126.	*	180.	0.00	0.000	14.	*
65.	0.06	0.019	119.	*	185.	0.00	0.000	13.	*
70.	0.06	0.019	112.	*	190.	0.00	0.000	11.	*
75.	0.06	0.019	106.	*	195.	0.00	0.000	10.	*
80.	0.05	0.006	100.	*	200.	0.00	0.000	9.	*
85.	0.04	0.004	92.	*	205.	0.00	0.000	6.	*
90.	0.04	0.004	84.	*	210.	0.00	0.000	4.	*
95.	0.04	0.004	77.	*	215.	0.00	0.000	3.	*
100.	0.04	0.004	71.	*	220.	0.00	0.000	3.	*
105.	0.04	0.004	65.	*	225.	0.00	0.000	2.	*
110.	0.04	0.004	59.	*	230.	0.00	0.000	2.	*
115.	0.03	0.004	55.	*	235.	0.00	0.000	1.	*

TOTAL PRECIP. = 2.15 (1-HOUR RAIN = 1.86) EXCESS PRECIP. = 0.790 INCHES

VOLUME OF EXCESS PRECIP = 16. ACRE-FEET

PEAK Q = 148. CFS TIME OF PEAK = 40. MIN.

INFILT.= 3.79 IN/HR DECAY = 0.00180 FNINF = 0.55 IN/HR

MAX.PERV.RET.=0.35 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN 10 YEAR EXISTING DRAINAGE ANALYSIS

BASIN ID: RRCB -- BASIN COMMENT: RED ROCK CANYON SUBBASIN M

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.69	1.95	1.35	2.10	.0180	5.00

COEFFICIENT
(REFLECTING TIME TO PEAK) COEFFICIENT
(RELATED TO PEAK RATE OF RUNOFF)

0.155 0.315

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAP (CFS)	PEAK (CFS)	VOLUME OF RUNOFF (AF)
41.37	311.07	214.02	36.69	

WIDTH AT 50 = 96. MIN. WIDTH AT 75 = 50. MIN. K50 = 0.26 K75 = 0.35

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.40 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.22 IN./HR. DECAY = 0.00180/SECOND FNINFL = 0.58 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	130.	91.	*	260.	25.	*
5.	17.	*	135.	86.	*	265.	24.	*
10.	51.	*	140.	82.	*	270.	23.	*
15.	94.	*	145.	78.	*	275.	22.	*
20.	135.	*	150.	74.	*	280.	21.	*
25.	168.	*	155.	71.	*	285.	20.	*
30.	194.	*	160.	67.	*	290.	19.	*
35.	208.	*	165.	64.	*	295.	18.	*
40.	214.	*	170.	61.	*	300.	17.	*
45.	212.	*	175.	58.	*	305.	16.	*
50.	206.	*	180.	55.	*	310.	15.	*
55.	196.	*	185.	53.	*	315.	15.	*
60.	185.	*	190.	50.	*	320.	14.	*
65.	174.	*	195.	48.	*	325.	13.	*
70.	165.	*	200.	45.	*	330.	13.	*
75.	159.	*	205.	43.	*	335.	12.	*
80.	152.	*	210.	41.	*	340.	11.	*
85.	145.	*	215.	39.	*	345.	11.	*
90.	139.	*	220.	37.	*	350.	10.	*
95.	132.	*	225.	36.	*	355.	10.	*
100.	125.	*	230.	34.	*	360.	9.	*
105.	118.	*	235.	32.	*	365.	9.	*
110.	111.	*	240.	31.	*	370.	9.	*
115.	105.	*	245.	29.	*	375.	8.	*
120.	100.	*	250.	28.	*	380.	8.	*
125.	95.	*	255.	26.	*	385.	0.	*

BASIN ID: RRCBSM -- BASIN COMMENT: RED ROCK CANYON SUBBASIN M

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 10-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	205.	0.00	0.000	32.	*
5.	0.04	0.000	0.	*	210.	0.00	0.000	30.	*
10.	0.07	0.001	0.	*	215.	0.00	0.000	29.	*
15.	0.15	0.003	0.	*	220.	0.00	0.000	27.	*
20.	0.28	0.006	0.	*	225.	0.00	0.000	26.	*
25.	0.47	0.205	4.	*	230.	0.00	0.000	25.	*
30.	0.22	0.160	14.	*	235.	0.00	0.000	24.	*
35.	0.10	0.048	30.	*	240.	0.00	0.000	23.	*
40.	0.08	0.027	47.	*	245.	0.00	0.000	21.	*
45.	0.07	0.020	64.	*	250.	0.00	0.000	20.	*
50.	0.06	0.010	79.	*	255.	0.00	0.000	19.	*
55.	0.06	0.011	90.	*	260.	0.00	0.000	19.	*
60.	0.06	0.011	98.	*	265.	0.00	0.000	18.	*
65.	0.06	0.012	102.	*	270.	0.00	0.000	17.	*
70.	0.06	0.012	103.	*	275.	0.00	0.000	16.	*
75.	0.06	0.012	102.	*	280.	0.00	0.000	15.	*
80.	0.05	0.001	100.	*	285.	0.00	0.000	14.	*
85.	0.04	0.001	98.	*	290.	0.00	0.000	14.	*
90.	0.04	0.001	94.	*	295.	0.00	0.000	13.	*
95.	0.04	0.001	92.	*	300.	0.00	0.000	13.	*
100.	0.04	0.001	89.	*	305.	0.00	0.000	12.	*
105.	0.04	0.001	86.	*	310.	0.00	0.000	11.	*
110.	0.04	0.001	82.	*	315.	0.00	0.000	11.	*
115.	0.03	0.001	79.	*	320.	0.00	0.000	10.	*
120.	0.02	0.000	75.	*	325.	0.00	0.000	10.	*
125.	0.00	0.000	71.	*	330.	0.00	0.000	9.	*
130.	0.00	0.000	67.	*	335.	0.00	0.000	9.	*
135.	0.00	0.000	64.	*	340.	0.00	0.000	8.	*
140.	0.00	0.000	61.	*	345.	0.00	0.000	8.	*
145.	0.00	0.000	58.	*	350.	0.00	0.000	8.	*
150.	0.00	0.000	55.	*	355.	0.00	0.000	7.	*
155.	0.00	0.000	52.	*	360.	0.00	0.000	7.	*
160.	0.00	0.000	50.	*	365.	0.00	0.000	7.	*
165.	0.00	0.000	47.	*	370.	0.00	0.000	6.	*
170.	0.00	0.000	45.	*	375.	0.00	0.000	6.	*
175.	0.00	0.000	43.	*	380.	0.00	0.000	6.	*
180.	0.00	0.000	41.	*	385.	0.00	0.000	5.	*
185.	0.00	0.000	39.	*	390.	0.00	0.000	5.	*
190.	0.00	0.000	37.	*	395.	0.00	0.000	5.	*
195.	0.00	0.000	35.	*	400.	0.00	0.000	5.	*
200.	0.00	0.000	33.	*	405.	0.00	0.000	3.	*

TOTAL PRECIP. = 2.15 (1-HOUR RAIN = 1.86) EXCESS PRECIP. = 0.545 INCHES

VOLUME OF EXCESS PRECIP = 20. ACRE-FEET

PEAK Q = 103. CFS TIME OF PEAK = 70. MIN.

INFILT.= 4.22 IN/HR DECAY = 0.00180 FNINF = 0.58 IN/HR

MAX.PERV.RET.=0.40 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN 10 YEAR EXISTING DRAINAGE ANALYSIS

BASIN ID: RRCBSN -- BASIN COMMENT: RED ROCK CANYON SUBBASIN N

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.42	1.14	0.49	7.80	.0260	5.00

COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.134 0.260

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH (CFS)	PEAK (CFS)	VOLUME OF RUNOFF (AF)
17.10	684.93	285.62	285.62	22.24

WIDTH AT 50 = 44. MIN. WIDTH AT 75 = 23. MIN. K50 = 0.23 K75 = 0.32

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.35 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 3.57 IN./HR. DECAY = 0.00180/SECOND FNINFL = 0.54 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	65.	105.	*	130.	26.	*
5.	91.	*	70.	94.	*	135.	23.	*
10.	217.	*	75.	84.	*	140.	21.	*
15.	281.	*	80.	76.	*	145.	19.	*
20.	278.	*	85.	68.	*	150.	17.	*
25.	245.	*	90.	61.	*	155.	15.	*
30.	216.	*	95.	55.	*	160.	14.	*
35.	205.	*	100.	49.	*	165.	12.	*
40.	185.	*	105.	44.	*	170.	11.	*
45.	165.	*	110.	40.	*	175.	10.	*
50.	145.	*	115.	36.	*	180.	9.	*
55.	130.	*	120.	32.	*	185.	8.	*
60.	117.	*	125.	29.	*	190.	0.	*

BASIN ID: RRCBSN -- BASIN COMMENT: RED ROCK CANYON SUBBASIN N

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 10-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	115.	0.03	0.002	55.	*
5.	0.04	0.000	0.	*	120.	0.02	0.002	50.	*
10.	0.07	0.004	0.	*	125.	0.00	0.000	46.	*
15.	0.15	0.011	2.	*	130.	0.00	0.000	41.	*
20.	0.28	0.021	6.	*	135.	0.00	0.000	37.	*
25.	0.47	0.298	36.	*	140.	0.00	0.000	33.	*
30.	0.22	0.169	90.	*	145.	0.00	0.000	30.	*
35.	0.10	0.055	135.	*	150.	0.00	0.000	27.	*
40.	0.08	0.034	154.	*	155.	0.00	0.000	24.	*
45.	0.07	0.027	153.	*	160.	0.00	0.000	22.	*
50.	0.06	0.017	145.	*	165.	0.00	0.000	19.	*
55.	0.06	0.017	140.	*	170.	0.00	0.000	17.	*
60.	0.06	0.017	133.	*	175.	0.00	0.000	16.	*
65.	0.06	0.018	126.	*	180.	0.00	0.000	14.	*
70.	0.06	0.018	118.	*	185.	0.00	0.000	13.	*
75.	0.06	0.018	111.	*	190.	0.00	0.000	11.	*
80.	0.05	0.005	105.	*	195.	0.00	0.000	10.	*
85.	0.04	0.003	97.	*	200.	0.00	0.000	9.	*
90.	0.04	0.003	88.	*	205.	0.00	0.000	8.	*
95.	0.04	0.003	80.	*	210.	0.00	0.000	5.	*
100.	0.04	0.003	73.	*	215.	0.00	0.000	3.	*
105.	0.04	0.003	66.	*	220.	0.00	0.000	3.	*
110.	0.04	0.003	61.	*	225.	0.00	0.000	2.	*

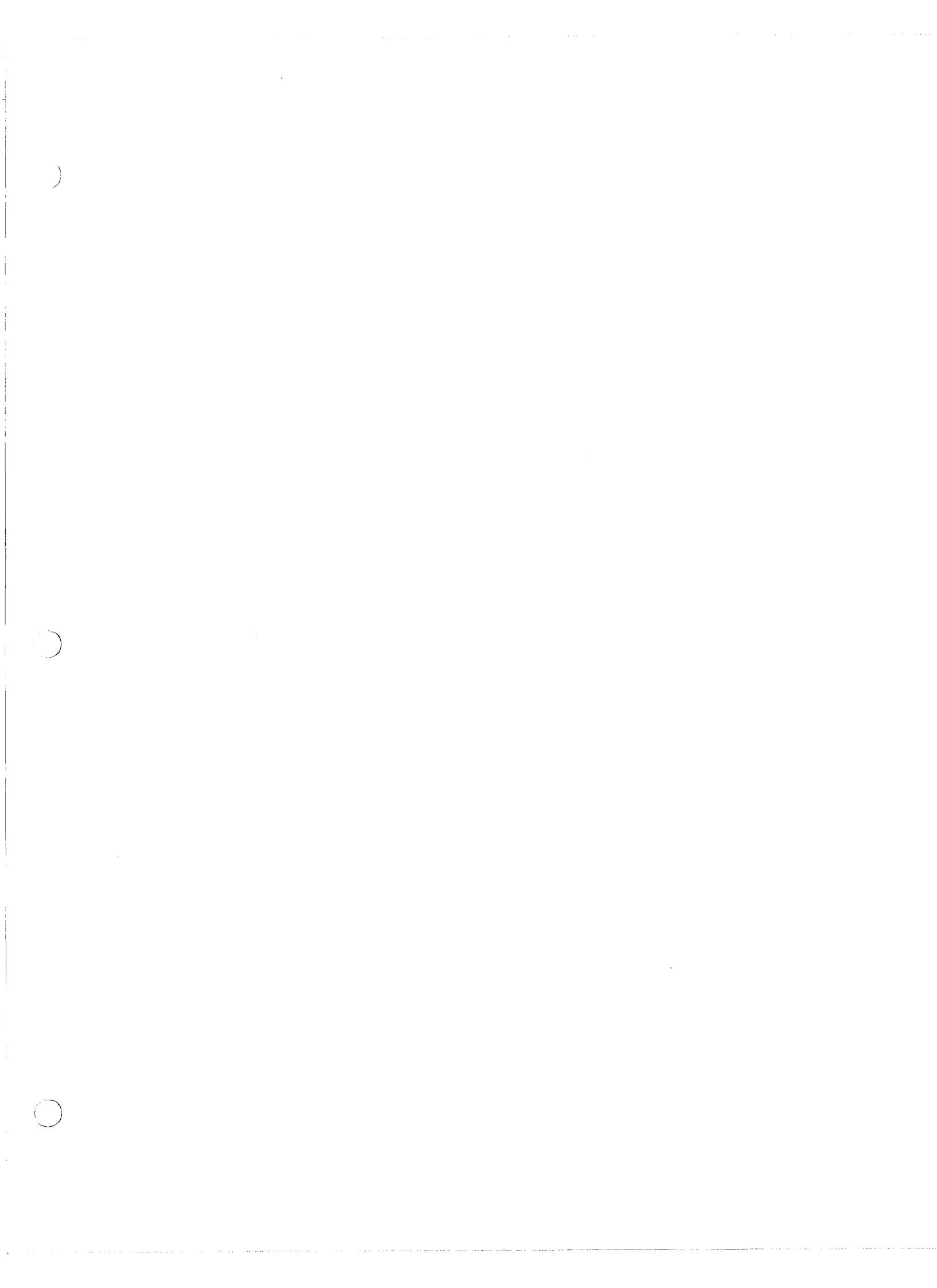
TOTAL PRECIP. = 2.15 (1-HOUR RAIN = 1.86) EXCESS PRECIP. = 0.749 INCHES

VOLUME OF EXCESS PRECIP = 17. ACRE-FEET

PEAK Q = 154. CFS TIME OF PEAK = 40. MIN.

INFILT.= 3.57 IN/HR DECAY=0.00180 FNINF = 0.54 IN/HR

MAX.PERV.RET.=0.35 IN. MAX.IMP.RET.=0.05 IN.



2 RED ROCK CANYON DRAINAGE BASIN 100 YEAR EXISTING DRAINAGE ANALYSIS
01100-YEAR 100 2.95

7001015.0RRCSBA001 RED ROCK CANYON SUBBASIN A
0.494 1.61 1.15 9.80 .030 0.35 0.05 4.80.0011 .837
7001015.0RRCSBB002 RED ROCK CANYON SUBBASIN B
0.225 1.14 0.46 25.7 .040 0.35 0.05 4.57.0015 .696
7001015.0RRCSBC003 RED ROCK CANYON SUBBASIN C
0.170 0.88 0.44 4.80 .056 0.30 0.05 4.89.0008 .956
7001015.0RRCSBD004 RED ROCK CANYON SUBBASIN D
0.378 1.30 0.66 2.70 .047 0.30 0.05 4.79.0012 .835
7001015.0RRCSBE005 RED ROCK CANYON SUBBASIN E
0.241 1.52 0.89 2.00 .048 0.25 0.05 4.79.0012 .831
7001015.0RRCSBF006 RED ROCK CANYON SUBBASIN F
0.278 1.31 0.62 2.00 .032 0.25 0.05 4.84.0010 .876
7001015.0RRCSBG007 RED ROCK CANYON SUBBASIN G
0.330 1.03 0.57 2.00 .052 0.30 0.05 4.43.0015 .686
7001015.0RRCSBH008 RED ROCK CANYON SUBBASIN H
0.316 1.25 0.59 2.00 .040 0.30 0.05 4.68.0014 .742
7001015.0RRCSBI009 RED ROCK CANYON SUBBASIN I
0.350 1.34 0.79 2.00 .029 0.30 0.05 3.98.0018 .566
7001015.0RRCSBJ010 RED ROCK CANYON SUBBASIN J
0.317 0.94 0.54 2.00 .023 0.30 0.05 4.54.0017 .636
7001015.0RRCSBK011 RED ROCK CANYON SUBBASIN K
0.408 1.13 0.57 2.00 .027 0.40 0.05 4.55.0017 .638
7001015.0RRCSBL012 RED ROCK CANYON SUBBASIN L
0.384 1.28 0.61 12.6 .041 0.35 0.05 3.79.0018 .553
7001015.0RRCSBM013 RED ROCK CANYON SUBBASIN M
0.688 1.95 1.35 2.10 .018 0.40 0.05 4.22.0018 .581
7001015.0RRCSBN014 RED ROCK CANYON SUBBASIN N
0.417 1.14 0.49 7.80 .026 0.35 0.05 3.57.0018 .538
E

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN 100 YEAR EXISTING DRAINAGE ANALYSIS

BASIN ID: RRCBSA -- BASIN COMMENT: RED ROCK CANYON SUBBASIN A

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.49	1.61	1.15	9.80	.0300	5.00

COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.127 0.259

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH (CFS)	PEAK (CFS)	VOLUME OF RUNOFF (AF)
26.19	420.56	207.76	207.76	26.35

WIDTH AT 50 = 71. MIN. WIDTH AT 75 = 37. MIN. K50 = 0.22 K75 = 0.30

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.35 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.80 IN./HR. DECAY = 0.00110/SECOND FNINFL = 0.84 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	100.	82.	*	200.	23.	*
5.	34.	*	105.	77.	*	205.	21.	*
10.	98.	*	110.	72.	*	210.	20.	*
15.	155.	*	115.	68.	*	215.	19.	*
20.	193.	*	120.	64.	*	220.	18.	*
25.	207.	*	125.	60.	*	225.	17.	*
30.	204.	*	130.	56.	*	230.	16.	*
35.	189.	*	135.	53.	*	235.	15.	*
40.	172.	*	140.	49.	*	240.	14.	*
45.	157.	*	145.	46.	*	245.	13.	*
50.	153.	*	150.	43.	*	250.	12.	*
55.	151.	*	155.	41.	*	255.	11.	*
60.	142.	*	160.	38.	*	260.	11.	*
65.	133.	*	165.	36.	*	265.	10.	*
70.	125.	*	170.	34.	*	270.	9.	*
75.	116.	*	175.	32.	*	275.	9.	*
80.	107.	*	180.	30.	*	280.	8.	*
85.	100.	*	185.	28.	*	285.	8.	*
90.	94.	*	190.	26.	*	290.	0.	*
95.	88.	*	195.	24.	*	0.	0.	*

BASIN ID: RRCSBA -- BASIN COMMENT: RED ROCK CANYON SUBBASIN A

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT	TOTAL	STORM	*	TIME (MIN.)	INCREMENT	TOTAL	STORM	*
	RAINFALL (IN)	EXCESS PRECIP	HYDROGRAPH (CFS)	*		RAINFALL (IN)	EXCESS PRECIP	HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	170.	0.00	0.000	78.	*
5.	0.03	0.000	0.	*	175.	0.00	0.000	74.	*
10.	0.09	0.006	0.	*	180.	0.00	0.000	69.	*
15.	0.14	0.013	1.	*	185.	0.00	0.000	65.	*
20.	0.24	0.022	3.	*	190.	0.00	0.000	61.	*
25.	0.41	0.038	7.	*	195.	0.00	0.000	57.	*
30.	0.74	0.605	31.	*	200.	0.00	0.000	53.	*
35.	0.41	0.313	84.	*	205.	0.00	0.000	50.	*
40.	0.24	0.147	145.	*	210.	0.00	0.000	47.	*
45.	0.18	0.101	199.	*	215.	0.00	0.000	44.	*
50.	0.15	0.071	236.	*	220.	0.00	0.000	41.	*
55.	0.12	0.045	255.	*	225.	0.00	0.000	39.	*
60.	0.12	0.048	258.	*	230.	0.00	0.000	36.	*
65.	0.12	0.050	253.	*	235.	0.00	0.000	34.	*
70.	0.06	0.005	245.	*	240.	0.00	0.000	32.	*
75.	0.06	0.005	239.	*	245.	0.00	0.000	30.	*
80.	0.04	0.003	234.	*	250.	0.00	0.000	28.	*
85.	0.04	0.003	225.	*	255.	0.00	0.000	26.	*
90.	0.04	0.003	213.	*	260.	0.00	0.000	25.	*
95.	0.04	0.003	201.	*	265.	0.00	0.000	23.	*
100.	0.04	0.003	189.	*	270.	0.00	0.000	22.	*
105.	0.04	0.003	177.	*	275.	0.00	0.000	20.	*
110.	0.04	0.003	167.	*	280.	0.00	0.000	19.	*
115.	0.04	0.003	157.	*	285.	0.00	0.000	18.	*
120.	0.04	0.003	148.	*	290.	0.00	0.000	17.	*
125.	0.00	0.000	139.	*	295.	0.00	0.000	16.	*
130.	0.00	0.000	131.	*	300.	0.00	0.000	15.	*
135.	0.00	0.000	123.	*	305.	0.00	0.000	14.	*
140.	0.00	0.000	115.	*	310.	0.00	0.000	13.	*
145.	0.00	0.000	108.	*	315.	0.00	0.000	7.	*
150.	0.00	0.000	101.	*	320.	0.00	0.000	5.	*
155.	0.00	0.000	95.	*	325.	0.00	0.000	3.	*
160.	0.00	0.000	89.	*	330.	0.00	0.000	2.	*
165.	0.00	0.000	84.	*	335.	0.00	0.000	2.	*

TOTAL PRECIP. = 3.41 (1-HOUR RAIN = 2.95) EXECCESS PRECIP. = 1.500 INCHES

VOLUME OF EXCESS PRECIP = 40. ACRE-FEET

PEAK Q = 258. CFS TIME OF PEAK = 60. MIN.

INFILT.= 4.80 IN/HR DECAY =0.00110 FNINF = 0.84 IN/HR

MAX.PERV.RET.=0.35 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN 100 YEAR EXISTING DRAINAGE ANALYSIS

BASIN ID: RRCSSB -- BASIN COMMENT: RED ROCK CANYON SUBBASIN B

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.22	1.14	0.46	25.70	.0400	5.00

COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.104 0.287

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH PEAK (CFS)	VOLUME OF RUNOFF (AF)
12.38	1117.81	251.51	12.00

WIDTH AT 50 = 27. MIN. WIDTH AT 75 = 14. MIN. K50 = 0.28 K75 = 0.38

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.35 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.57 IN./HR. DECAY = 0.00150/SECOND FNINFL = 0.70 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	40.	94.	*	80.	22.	*
5.	127.	*	45.	78.	*	85.	19.	*
10.	240.	*	50.	65.	*	90.	15.	*
15.	241.	*	55.	55.	*	95.	13.	*
20.	197.	*	60.	46.	*	100.	11.	*
25.	166.	*	65.	38.	*	105.	9.	*
30.	136.	*	70.	32.	*	110.	8.	*
35.	112.	*	75.	27.	*	115.	0.	*

BASIN ID: RRCSSB -- BASIN COMMENT: RED ROCK CANYON SUBBASIN B

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH *(CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	90.	0.04	0.009	110.	*
5.	0.03	0.000	0.	*	95.	0.04	0.009	95.	*
10.	0.09	0.017	2.	*	100.	0.04	0.009	82.	*
15.	0.14	0.033	8.	*	105.	0.04	0.009	71.	*
20.	0.24	0.058	19.	*	110.	0.04	0.009	62.	*
25.	0.41	0.155	45.	*	115.	0.04	0.009	54.	*
30.	0.74	0.665	145.	*	120.	0.04	0.009	48.	*
35.	0.41	0.352	261.	*	125.	0.00	0.000	41.	*
40.	0.24	0.182	315.	*	130.	0.00	0.000	34.	*
45.	0.18	0.132	315.	*	135.	0.00	0.000	27.	*
50.	0.15	0.099	300.	*	140.	0.00	0.000	19.	*
55.	0.12	0.071	276.	*	145.	0.00	0.000	13.	*
60.	0.12	0.072	251.	*	150.	0.00	0.000	10.	*
65.	0.12	0.073	230.	*	155.	0.00	0.000	8.	*
70.	0.06	0.015	206.	*	160.	0.00	0.000	6.	*
75.	0.06	0.015	178.	*	165.	0.00	0.000	4.	*
80.	0.04	0.009	152.	*	170.	0.00	0.000	3.	*
85.	0.04	0.009	129.	*	175.	0.00	0.000	2.	*

TOTAL PRECIP. = 3.41 (1-HOUR RAIN = 2.95) EXCESS PRECIP. = 2.015 INCHES

VOLUME OF EXCESS PRECIP = 24. ACRE-FEET

PEAK Q = 315. CFS TIME OF PEAK = 45. MIN.

INFILT.= 4.57 IN/HR DECAY=0.00150 FNINF = 0.70 IN/HR

MAX.PERV.RET.=0.35 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN 100 YEAR EXISTING DRAINAGE ANALYSIS

BASIN ID: RRCSC -- BASIN COMMENT: RED ROCK CANYON SUBBASIN C

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.17	0.88	0.44	4.80	.0560	5.00

COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.145 0.240

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH (CFS)	PEAK (CFS)	VOLUME OF RUNOFF (AF)
13.53	836.23		142.16	9.07

WIDTH AT 50 = 36. MIN. WIDTH AT 75 = 19. MIN. K50 = 0.23 K75 = 0.31

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.30 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.89 IN./HR. DECAY = 0.00080/SECOND FNINFL = 0.96 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	50.	57.	*	100.	17.	*
5.	64.	*	55.	51.	*	105.	15.	*
10.	130.	*	60.	45.	*	110.	13.	*
15.	141.	*	65.	40.	*	115.	12.	*
20.	121.	*	70.	35.	*	120.	10.	*
25.	105.	*	75.	31.	*	125.	9.	*
30.	98.	*	80.	27.	*	130.	8.	*
35.	86.	*	85.	24.	*	135.	0.	*
40.	74.	*	90.	22.	*	0.	0.	*
45.	65.	*	95.	19.	*	0.	0.	*

BASIN ID: RRC SBC -- BASIN COMMENT: RED ROCK CANYON SUBBASIN C

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	90.	0.04	0.002	53.	*
5.	0.03	0.000	0.	*	95.	0.04	0.002	47.	*
10.	0.09	0.003	0.	*	100.	0.04	0.002	42.	*
15.	0.14	0.006	1.	*	105.	0.04	0.002	37.	*
20.	0.24	0.011	2.	*	110.	0.04	0.002	33.	*
25.	0.41	0.019	4.	*	115.	0.04	0.002	29.	*
30.	0.74	0.516	38.	*	120.	0.04	0.002	26.	*
35.	0.41	0.271	89.	*	125.	0.00	0.000	23.	*
40.	0.24	0.108	119.	*	130.	0.00	0.000	21.	*
45.	0.18	0.066	122.	*	135.	0.00	0.000	18.	*
50.	0.15	0.039	117.	*	140.	0.00	0.000	16.	*
55.	0.12	0.017	111.	*	145.	0.00	0.000	14.	*
60.	0.12	0.022	102.	*	150.	0.00	0.000	13.	*
65.	0.12	0.026	93.	*	155.	0.00	0.000	11.	*
70.	0.06	0.003	84.	*	160.	0.00	0.000	6.	*
75.	0.06	0.003	75.	*	165.	0.00	0.000	3.	*
80.	0.04	0.002	67.	*	170.	0.00	0.000	2.	*
85.	0.04	0.002	59.	*	175.	0.00	0.000	1.	*

TOTAL PRECIP. = 3.41 (1-HOUR RAIN = 2.95) EXCESS PRECIP. = 1.124 INCHES

VOLUME OF EXCESS PRECIP = 10. ACRE-FEET

PEAK Q = 122. CFS TIME OF PEAK = 45. MIN.

INFILT.= 4.89 IN/HR DECAY = 0.00080 FNINF = 0.96 IN/HR

MAX.PERV.RET.=0.30 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN 100 YEAR EXISTING DRAINAGE ANALYSIS

BASIN ID: RRCSD -- BASIN COMMENT: RED ROCK CANYON SUBBASIN D

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.38	1.30	0.66	2.70	.0470	5.00

COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.153 0.284

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH PEAK (CFS)	VOLUME OF RUNOFF (AF)
20.26	613.13	231.76	20.16

WIDTH AT 50 = 49. MIN. WIDTH AT 75 = 25. MIN. K50 = 0.25 K75 = 0.34

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.30 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.79 IN./HR. DECAY = 0.00120/SECOND FNINFL = 0.83 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	70.	90.	*	140.	23.	*
5.	57.	*	75.	82.	*	145.	21.	*
10.	150.	*	80.	74.	*	150.	19.	*
15.	212.	*	85.	67.	*	155.	17.	*
20.	232.	*	90.	61.	*	160.	16.	*
25.	221.	*	95.	56.	*	165.	14.	*
30.	197.	*	100.	51.	*	170.	13.	*
35.	177.	*	105.	46.	*	175.	12.	*
40.	165.	*	110.	42.	*	180.	11.	*
45.	151.	*	115.	38.	*	185.	10.	*
50.	136.	*	120.	34.	*	190.	9.	*
55.	122.	*	125.	31.	*	195.	8.	*
60.	109.	*	130.	28.	*	200.	0.	*
65.	99.	*	135.	26.	*	0.	0.	*

BASIN ID: RRCSBD -- BASIN COMMENT: RED ROCK CANYON SUBBASIN D

*** STORM NO. = 1 *** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	120.	0.04	0.001	96.	*
5.	0.03	0.000	0.	*	125.	0.00	0.000	87.	*
10.	0.09	0.002	0.	*	130.	0.00	0.000	79.	*
15.	0.14	0.003	0.	*	135.	0.00	0.000	72.	*
20.	0.24	0.006	1.	*	140.	0.00	0.000	65.	*
25.	0.41	0.060	5.	*	145.	0.00	0.000	59.	*
30.	0.74	0.625	47.	*	150.	0.00	0.000	54.	*
35.	0.41	0.314	127.	*	155.	0.00	0.000	49.	*
40.	0.24	0.146	204.	*	160.	0.00	0.000	44.	*
45.	0.18	0.100	254.	*	165.	0.00	0.000	40.	*
50.	0.15	0.069	275.	*	170.	0.00	0.000	37.	*
55.	0.12	0.043	273.	*	175.	0.00	0.000	33.	*
60.	0.12	0.045	263.	*	180.	0.00	0.000	30.	*
65.	0.12	0.047	255.	*	185.	0.00	0.000	27.	*
70.	0.06	0.002	243.	*	190.	0.00	0.000	25.	*
75.	0.06	0.002	227.	*	195.	0.00	0.000	23.	*
80.	0.04	0.001	207.	*	200.	0.00	0.000	20.	*
85.	0.04	0.001	188.	*	205.	0.00	0.000	19.	*
90.	0.04	0.001	170.	*	210.	0.00	0.000	17.	*
95.	0.04	0.001	154.	*	215.	0.00	0.000	15.	*
100.	0.04	0.001	140.	*	220.	0.00	0.000	13.	*
105.	0.04	0.001	127.	*	225.	0.00	0.000	8.	*
110.	0.04	0.001	116.	*	230.	0.00	0.000	5.	*
115.	0.04	0.001	105.	*	235.	0.00	0.000	3.	*

TOTAL PRECIP. = 3.41 (1-HOUR RAIN = 2.95) EXCESS PRECIP. = 1.471 INCHES

VOLUME OF EXCESS PRECIP = 30. ACRE-FEET

PEAK Q = 275. CFS TIME OF PEAK = 50. MIN.

INFILT.= 4.79 IN/HR DECAY = 0.00120 FNINF = 0.83 IN/HR

MAX.PERV.RET.=0.30 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN 100 YEAR EXISTING DRAINAGE ANALYSIS

BASIN ID: RRCBSE -- BASIN COMMENT: RED ROCK CANYON SUBBASIN E

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
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0.24	1.52	0.89	2.00	.0480	5.00
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COEFFICIENT (REFLECTING TIME TO PEAK)	COEFFICIENT (RELATED TO PEAK RATE OF RUNOFF)
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0.156	0.270
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CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH (CFS)	PEAK (CFS)	VOLUME OF RUNOFF (AF)
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24.87	463.00	111.58	111.58	12.85
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WIDTH AT 50 = 65. MIN. WIDTH AT 75 = 34. MIN. K50 = 0.23 K75 = 0.31

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.25 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.79 IN./HR. DECAY = 0.00120/SECOND FNINFL = 0.83 IN./HR.

TIME	UNIT	TIME	UNIT	TIME	UNIT
HYDROGRAPH	*	HYDROGRAPH	*	HYDROGRAPH	*
0.	0.	80.	52.	160.	18.
5.	20.	85.	49.	165.	17.
10.	56.	90.	46.	170.	16.
15.	88.	95.	43.	175.	15.
20.	106.	100.	40.	180.	14.
25.	112.	105.	37.	185.	13.
30.	107.	110.	35.	190.	12.
35.	98.	115.	33.	195.	11.
40.	89.	120.	31.	200.	11.
45.	83.	125.	29.	205.	10.
50.	82.	130.	27.	210.	9.
55.	76.	135.	25.	215.	9.
60.	71.	140.	23.	220.	8.
65.	66.	145.	22.	225.	8.
70.	61.	150.	20.	230.	0.
75.	56.	155.	19.	0.	*

BASIN ID: RRCSBE -- BASIN COMMENT: RED ROCK CANYON SUBBASIN E

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
				*					*
				*					*
0.	0.00	0.000	0.	*	135.	0.00	0.000	58.	*
5.	0.03	0.000	0.	*	140.	0.00	0.000	54.	*
10.	0.09	0.001	0.	*	145.	0.00	0.000	51.	*
15.	0.14	0.003	0.	*	150.	0.00	0.000	48.	*
20.	0.24	0.004	0.	*	155.	0.00	0.000	45.	*
25.	0.41	0.107	3.	*	160.	0.00	0.000	42.	*
30.	0.74	0.624	19.	*	165.	0.00	0.000	39.	*
35.	0.41	0.314	52.	*	170.	0.00	0.000	36.	*
40.	0.24	0.146	88.	*	175.	0.00	0.000	34.	*
45.	0.18	0.100	117.	*	180.	0.00	0.000	32.	*
50.	0.15	0.069	135.	*	185.	0.00	0.000	30.	*
55.	0.12	0.043	142.	*	190.	0.00	0.000	28.	*
60.	0.12	0.045	142.	*	195.	0.00	0.000	26.	*
65.	0.12	0.046	137.	*	200.	0.00	0.000	24.	*
70.	0.06	0.001	133.	*	205.	0.00	0.000	23.	*
75.	0.06	0.001	130.	*	210.	0.00	0.000	21.	*
80.	0.04	0.001	124.	*	215.	0.00	0.000	20.	*
85.	0.04	0.001	117.	*	220.	0.00	0.000	19.	*
90.	0.04	0.001	109.	*	225.	0.00	0.000	18.	*
95.	0.04	0.001	101.	*	230.	0.00	0.000	16.	*
100.	0.04	0.001	94.	*	235.	0.00	0.000	15.	*
105.	0.04	0.001	87.	*	240.	0.00	0.000	14.	*
110.	0.04	0.001	81.	*	245.	0.00	0.000	13.	*
115.	0.04	0.001	76.	*	250.	0.00	0.000	12.	*
120.	0.04	0.001	71.	*	255.	0.00	0.000	7.	*
125.	0.00	0.000	67.	*	260.	0.00	0.000	4.	*
130.	0.00	0.000	62.	*	265.	0.00	0.000	3.	*

TOTAL PRECIP. = 3.41 (1-HOUR RAIN = 2.95) EXCESS PRECIP. = 1.511 INCHES

VOLUME OF EXCESS PRECIP = 19. ACRE-FEET

PEAK Q = 142. CFS TIME OF PEAK = 55. MIN.

INFILT.= 4.79 IN/HR DECAY = 0.00120 FNINF = 0.83 IN/HR

MAX.PERV.RET.=0.25 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN 100 YEAR EXISTING DRAINAGE ANALYSIS

BASIN ID: RRCBSF -- BASIN COMMENT: RED ROCK CANYON SUBBASIN F

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
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0.28	1.31	0.62	2.00	.0320	5.00
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COEFFICIENT (REFLECTING TIME TO PEAK)	COEFFICIENT (RELATED TO PEAK RATE OF RUNOFF)
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0.156	0.276
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CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH (CFS)	PEAK (CFS)	VOLUME OF RUNOFF (AF)
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21.80	548.24	152.41	152.41	14.83
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WIDTH AT 50 = 55. MIN. WIDTH AT 75 = 28. MIN. K50 = 0.24 K75 = 0.32

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.25 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.84 IN./HR. DECAY = 0.00100/SECOND FNINFL = 0.88 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	70.	68.	*	140.	21.	*
5.	33.	*	75.	63.	*	145.	20.	*
10.	91.	*	80.	58.	*	150.	18.	*
15.	133.	*	85.	53.	*	155.	17.	*
20.	151.	*	90.	49.	*	160.	15.	*
25.	149.	*	95.	45.	*	165.	14.	*
30.	137.	*	100.	42.	*	170.	13.	*
35.	122.	*	105.	38.	*	175.	12.	*
40.	114.	*	110.	35.	*	180.	11.	*
45.	108.	*	115.	32.	*	185.	10.	*
50.	99.	*	120.	30.	*	190.	9.	*
55.	91.	*	125.	27.	*	195.	9.	*
60.	82.	*	130.	25.	*	200.	8.	*
65.	74.	*	135.	23.	*	205.	0.	*

BASIN ID: RRCSBF -- BASIN COMMENT: RED ROCK CANYON SUBBASIN F

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH *(CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	125.	0.00	0.000	63.	*
5.	0.03	0.000	0.	*	130.	0.00	0.000	59.	*
10.	0.09	0.001	0.	*	135.	0.00	0.000	54.	*
15.	0.14	0.003	0.	*	140.	0.00	0.000	50.	*
20.	0.24	0.004	1.	*	145.	0.00	0.000	46.	*
25.	0.41	0.059	3.	*	150.	0.00	0.000	42.	*
30.	0.74	0.603	27.	*	155.	0.00	0.000	39.	*
35.	0.41	0.295	74.	*	160.	0.00	0.000	36.	*
40.	0.24	0.130	121.	*	165.	0.00	0.000	33.	*
45.	0.18	0.086	155.	*	170.	0.00	0.000	30.	*
50.	0.15	0.057	171.	*	175.	0.00	0.000	28.	*
55.	0.12	0.032	172.	*	180.	0.00	0.000	26.	*
60.	0.12	0.036	165.	*	185.	0.00	0.000	24.	*
65.	0.12	0.039	160.	*	190.	0.00	0.000	22.	*
70.	0.06	0.001	154.	*	195.	0.00	0.000	20.	*
75.	0.06	0.001	146.	*	200.	0.00	0.000	18.	*
80.	0.04	0.001	136.	*	205.	0.00	0.000	17.	*
85.	0.04	0.001	125.	*	210.	0.00	0.000	16.	*
90.	0.04	0.001	114.	*	215.	0.00	0.000	14.	*
95.	0.04	0.001	104.	*	220.	0.00	0.000	13.	*
100.	0.04	0.001	96.	*	225.	0.00	0.000	12.	*
105.	0.04	0.001	88.	*	230.	0.00	0.000	6.	*
110.	0.04	0.001	81.	*	235.	0.00	0.000	4.	*
115.	0.04	0.001	75.	*	240.	0.00	0.000	2.	*
120.	0.04	0.001	69.	*	245.	0.00	0.000	2.	*

TOTAL PRECIP. = 3.41 (1-HOUR RAIN = 2.95) EXCESS PRECIP. = 1.354 INCHES

VOLUME OF EXCESS PRECIP = 20. ACRE-FEET

PEAK Q = 172. CFS TIME OF PEAK = 55. MIN.

INFILT.= 4.84 IN/HR DECAY=0.00100 FNINF = 0.88 IN/HR

MAX.PERV.RET.=0.25 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN 100 YEAR EXISTING DRAINAGE ANALYSIS

BASIN ID: RRCBSG -- BASIN COMMENT: RED ROCK CANYON SUBBASIN G

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.33	1.03	0.57	2.00	.0520	5.00

COEFFICIENT (REFLECTING TIME TO PEAK)	COEFFICIENT (RELATED TO PEAK RATE OF RUNOFF)
0.156	0.283

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH (CFS)	PEAK (CFS)	VOLUME OF RUNOFF (AF)
17.20	738.59	243.74	243.74	17.60

WIDTH AT 50 = 41. MIN. WIDTH AT 75 = 21. MIN. K50 = 0.25 K75 = 0.35

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.30 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.43 IN./HR. DECAY = 0.00150/SECOND FNINFL = 0.69 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	60.	91.	*	120.	22.	*
5.	77.	*	65.	81.	*	125.	20.	*
10.	185.	*	70.	72.	*	130.	18.	*
15.	239.	*	75.	64.	*	135.	16.	*
20.	238.	*	80.	57.	*	140.	14.	*
25.	210.	*	85.	51.	*	145.	12.	*
30.	185.	*	90.	45.	*	150.	11.	*
35.	168.	*	95.	40.	*	155.	10.	*
40.	150.	*	100.	36.	*	160.	9.	*
45.	131.	*	105.	32.	*	165.	8.	*
50.	115.	*	110.	28.	*	170.	0.	*
55.	102.	*	115.	25.	*	0.	0.	*

BASIN ID: RRCSBG -- BASIN COMMENT: RED ROCK CANYON SUBBASIN G

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH *(CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH *(CFS)	*
0.	0.00	0.000	0.	*	110.	0.04	0.001	105.	*
5.	0.03	0.000	0.	*	115.	0.04	0.001	94.	*
10.	0.09	0.001	0.	*	120.	0.04	0.001	84.	*
15.	0.14	0.003	0.	*	125.	0.00	0.000	75.	*
20.	0.24	0.004	1.	*	130.	0.00	0.000	66.	*
25.	0.41	0.134	12.	*	135.	0.00	0.000	59.	*
30.	0.74	0.655	77.	*	140.	0.00	0.000	53.	*
35.	0.41	0.340	181.	*	145.	0.00	0.000	47.	*
40.	0.24	0.169	266.	*	150.	0.00	0.000	42.	*
45.	0.18	0.120	307.	*	155.	0.00	0.000	37.	*
50.	0.15	0.087	314.	*	160.	0.00	0.000	33.	*
55.	0.12	0.059	306.	*	165.	0.00	0.000	29.	*
60.	0.12	0.060	295.	*	170.	0.00	0.000	26.	*
65.	0.12	0.061	281.	*	175.	0.00	0.000	23.	*
70.	0.06	0.002	262.	*	180.	0.00	0.000	21.	*
75.	0.06	0.002	238.	*	185.	0.00	0.000	18.	*
80.	0.04	0.001	213.	*	190.	0.00	0.000	15.	*
85.	0.04	0.001	189.	*	195.	0.00	0.000	9.	*
90.	0.04	0.001	168.	*	200.	0.00	0.000	6.	*
95.	0.04	0.001	150.	*	205.	0.00	0.000	4.	*
100.	0.04	0.001	133.	*	210.	0.00	0.000	3.	*
105.	0.04	0.001	118.	*	215.	0.00	0.000	2.	*

TOTAL PRECIP. = 3.41 (1-HOUR RAIN = 2.95) EXECCESS PRECIP. = 1.705 INCHES

VOLUME OF EXCESS PRECIP = 30. ACRE-FEET

PEAK Q = 314. CFS TIME OF PEAK = 50. MIN.

INFILT.= 4.43 IN/HR DECAY = 0.00150 FNINF = 0.69 IN/HR

MAX.PERV.RET.=0.30 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN 100 YEAR EXISTING DRAINAGE ANALYSIS

BASIN ID: RRCSBH -- BASIN COMMENT: RED ROCK CANYON SUBBASIN H

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.32	1.25	0.59	2.00	.0400	5.00

COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.156 0.281

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAP (CFS)	PEAK (CFS)	VOLUME OF RUNOFF (AF)
19.96	617.58	195.15	195.15	16.85

WIDTH AT 50 = 49. MIN. WIDTH AT 75 = 25. MIN. K50 = 0.25 K75 = 0.34

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.30 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.68 IN./HR. DECAY = 0.00140/SECOND FNINFL = 0.74 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	70.	75.	*	140.	20.	*
5.	49.	*	75.	68.	*	145.	18.	*
10.	128.	*	80.	62.	*	150.	16.	*
15.	180.	*	85.	56.	*	155.	15.	*
20.	195.	*	90.	51.	*	160.	13.	*
25.	185.	*	95.	47.	*	165.	12.	*
30.	164.	*	100.	42.	*	170.	11.	*
35.	148.	*	105.	38.	*	175.	10.	*
40.	138.	*	110.	35.	*	180.	9.	*
45.	126.	*	115.	32.	*	185.	8.	*
50.	114.	*	120.	29.	*	190.	7.	*
55.	101.	*	125.	26.	*	195.	0.	*
60.	91.	*	130.	24.	*	0.	0.	*
65.	83.	*	135.	22.	*	0.	0.	*

BASIN ID: RRCSBH -- BASIN COMMENT: RED ROCK CANYON SUBBASIN H

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH *(CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH *(CFS)	*
0.	0.00	0.000	0.	*	120.	0.04	0.001	88.	*
5.	0.03	0.000	0.	*	125.	0.00	0.000	80.	*
10.	0.09	0.001	0.	*	130.	0.00	0.000	73.	*
15.	0.14	0.003	0.	*	135.	0.00	0.000	66.	*
20.	0.24	0.004	1.	*	140.	0.00	0.000	60.	*
25.	0.41	0.106	7.	*	145.	0.00	0.000	55.	*
30.	0.74	0.644	47.	*	150.	0.00	0.000	50.	*
35.	0.41	0.331	120.	*	155.	0.00	0.000	45.	*
40.	0.24	0.161	189.	*	160.	0.00	0.000	41.	*
45.	0.18	0.113	233.	*	165.	0.00	0.000	37.	*
50.	0.15	0.081	250.	*	170.	0.00	0.000	34.	*
55.	0.12	0.053	248.	*	175.	0.00	0.000	31.	*
60.	0.12	0.055	241.	*	180.	0.00	0.000	28.	*
65.	0.12	0.056	235.	*	185.	0.00	0.000	25.	*
70.	0.06	0.001	225.	*	190.	0.00	0.000	23.	*
75.	0.06	0.001	210.	*	195.	0.00	0.000	21.	*
80.	0.04	0.001	191.	*	200.	0.00	0.000	19.	*
85.	0.04	0.001	173.	*	205.	0.00	0.000	17.	*
90.	0.04	0.001	157.	*	210.	0.00	0.000	16.	*
95.	0.04	0.001	142.	*	215.	0.00	0.000	13.	*
100.	0.04	0.001	129.	*	220.	0.00	0.000	8.	*
105.	0.04	0.001	118.	*	225.	0.00	0.000	5.	*
110.	0.04	0.001	107.	*	230.	0.00	0.000	3.	*
115.	0.04	0.001	97.	*	235.	0.00	0.000	2.	*

TOTAL PRECIP. = 3.41 (1-HOUR RAIN = 2.95) EXECESS PRECIP. = 1.617 INCHES

VOLUME OF EXCESS PRECIP = 27. ACRE-FEET

PEAK Q = 250. CFS TIME OF PEAK = 50. MIN.

INFILT.= 4.68 IN/HR DECAY=0.00140 FNINF = 0.74 IN/HR

MAX.PERV.RET.=0.30 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN 100 YEAR EXISTING DRAINAGE ANALYSIS

BASIN ID: RRCBSI -- BASIN COMMENT: RED ROCK CANYON SUBBASIN I

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.35	1.34	0.79	2.00	.0290	5.00

COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.156 0.285

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH (CFS)	PEAK (CFS)	VOLUME OF RUNOFF (AF)
24.94	488.07	170.83	170.83	18.67

WIDTH AT 50 = 61. MIN. WIDTH AT 75 = 32. MIN. K50 = 0.24 K75 = 0.33

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.30 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 3.98 IN./HR. DECAY = 0.00180/SECOND FNINFL = 0.57 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	85.	70.	*	170.	20.	*
5.	30.	*	90.	65.	*	175.	18.	*
10.	86.	*	95.	60.	*	180.	17.	*
15.	134.	*	100.	56.	*	185.	16.	*
20.	163.	*	105.	52.	*	190.	15.	*
25.	171.	*	110.	48.	*	195.	13.	*
30.	165.	*	115.	45.	*	200.	12.	*
35.	151.	*	120.	41.	*	205.	12.	*
40.	137.	*	125.	38.	*	210.	11.	*
45.	128.	*	130.	36.	*	215.	10.	*
50.	122.	*	135.	33.	*	220.	9.	*
55.	113.	*	140.	31.	*	225.	9.	*
60.	105.	*	145.	28.	*	230.	8.	*
65.	96.	*	150.	26.	*	235.	7.	*
70.	88.	*	155.	24.	*	240.	0.	*
75.	81.	*	160.	23.	*	0.	0.	*
80.	75.	*	165.	21.	*	0.	0.	*

BASIN ID: RRCSBI -- BASIN COMMENT: RED ROCK CANYON SUBBASIN I

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	145.	0.00	0.000	90.	*
5.	0.03	0.000	0.	*	150.	0.00	0.000	83.	*
10.	0.09	0.001	0.	*	155.	0.00	0.000	77.	*
15.	0.14	0.003	0.	*	160.	0.00	0.000	72.	*
20.	0.24	0.004	1.	*	165.	0.00	0.000	67.	*
25.	0.41	0.205	7.	*	170.	0.00	0.000	62.	*
30.	0.74	0.676	39.	*	175.	0.00	0.000	57.	*
35.	0.41	0.358	98.	*	180.	0.00	0.000	53.	*
40.	0.24	0.185	161.	*	185.	0.00	0.000	49.	*
45.	0.18	0.134	214.	*	190.	0.00	0.000	46.	*
50.	0.15	0.099	248.	*	195.	0.00	0.000	43.	*
55.	0.12	0.071	263.	*	200.	0.00	0.000	39.	*
60.	0.12	0.071	265.	*	205.	0.00	0.000	37.	*
65.	0.12	0.071	261.	*	210.	0.00	0.000	34.	*
70.	0.06	0.013	256.	*	215.	0.00	0.000	32.	*
75.	0.06	0.013	249.	*	220.	0.00	0.000	29.	*
80.	0.04	0.001	238.	*	225.	0.00	0.000	27.	*
85.	0.04	0.001	224.	*	230.	0.00	0.000	25.	*
90.	0.04	0.001	208.	*	235.	0.00	0.000	23.	*
95.	0.04	0.001	192.	*	240.	0.00	0.000	22.	*
100.	0.04	0.001	177.	*	245.	0.00	0.000	20.	*
105.	0.04	0.001	164.	*	250.	0.00	0.000	19.	*
110.	0.04	0.001	152.	*	255.	0.00	0.000	17.	*
115.	0.04	0.001	141.	*	260.	0.00	0.000	15.	*
120.	0.04	0.001	131.	*	265.	0.00	0.000	9.	*
125.	0.00	0.000	121.	*	270.	0.00	0.000	6.	*
130.	0.00	0.000	113.	*	275.	0.00	0.000	4.	*
135.	0.00	0.000	104.	*	280.	0.00	0.000	3.	*
140.	0.00	0.000	97.	*	285.	0.00	0.000	2.	*

TOTAL PRECIP. = 3.41 (1-HOUR RAIN = 2.95) EXCESS PRECIP. = 1.910 INCHES

VOLUME OF EXCESS PRECIP = 36. ACRE-FEET

PEAK Q = 265. CFS TIME OF PEAK = 60. MIN.

INFILT.= 3.98 IN/HR DECAY=0.00180 FNINF = 0.57 IN/HR

MAX.PERV.RET.=0.30 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN 100 YEAR EXISTING DRAINAGE ANALYSIS

BASIN ID: RRC SBJ -- BASIN COMMENT: RED ROCK CANYON SUBBASIN J

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.32	0.94	0.54	2.00	.0230	5.00

COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.156 0.281

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAP (CFS)	PEAK (CFS)	VOLUME OF RUNOFF (AF)
19.17	647.28	205.19	16.91	

WIDTH AT 50 = 46. MIN. WIDTH AT 75 = 24. MIN. K50 = 0.25 K75 = 0.34

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.30 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.54 IN./HR. DECAY = 0.00170/SECOND FNINFL = 0.64 IN./HR.

TIME	UNIT	TIME	UNIT	TIME	UNIT
	HYDROGRAPH	*	HYDROGRAPH	*	HYDROGRAPH
0.	0.	*	65.	82.	*
5.	55.	*	70.	74.	*
10.	141.	*	75.	67.	*
15.	193.	*	80.	61.	*
20.	205.	*	85.	55.	*
25.	190.	*	90.	50.	*
30.	167.	*	95.	45.	*
35.	154.	*	100.	41.	*
40.	141.	*	105.	37.	*
45.	127.	*	110.	33.	*
50.	114.	*	115.	30.	*
55.	101.	*	120.	27.	*
60.	91.	*	125.	24.	*

BASIN ID: RRCSBJ -- BASIN COMMENT: RED ROCK CANYON SUBBASIN J

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	115.	0.04	0.001	106.	*
5.	0.03	0.000	0.	*	120.	0.04	0.001	96.	*
10.	0.09	0.001	0.	*	125.	0.00	0.000	87.	*
15.	0.14	0.003	0.	*	130.	0.00	0.000	79.	*
20.	0.24	0.004	1.	*	135.	0.00	0.000	71.	*
25.	0.41	0.160	10.	*	140.	0.00	0.000	64.	*
30.	0.74	0.666	61.	*	145.	0.00	0.000	58.	*
35.	0.41	0.349	145.	*	150.	0.00	0.000	53.	*
40.	0.24	0.177	222.	*	155.	0.00	0.000	48.	*
45.	0.18	0.127	267.	*	160.	0.00	0.000	43.	*
50.	0.15	0.093	283.	*	165.	0.00	0.000	39.	*
55.	0.12	0.064	281.	*	170.	0.00	0.000	35.	*
60.	0.12	0.065	275.	*	175.	0.00	0.000	32.	*
65.	0.12	0.065	267.	*	180.	0.00	0.000	29.	*
70.	0.06	0.007	254.	*	185.	0.00	0.000	26.	*
75.	0.06	0.007	236.	*	190.	0.00	0.000	23.	*
80.	0.04	0.001	215.	*	195.	0.00	0.000	21.	*
85.	0.04	0.001	195.	*	200.	0.00	0.000	19.	*
90.	0.04	0.001	176.	*	205.	0.00	0.000	16.	*
95.	0.04	0.001	159.	*	210.	0.00	0.000	10.	*
100.	0.04	0.001	144.	*	215.	0.00	0.000	6.	*
105.	0.04	0.001	130.	*	220.	0.00	0.000	4.	*
110.	0.04	0.001	117.	*	225.	0.00	0.000	3.	*

TOTAL PRECIP. = 3.41 (1-HOUR RAIN = 2.95) EXECCESS PRECIP. = 1.794 INCHES

VOLUME OF EXCESS PRECIP = 30. ACRE-FEET

PEAK Q = 283. CFS TIME OF PEAK = 50. MIN.

INFILT.= 4.54 IN/HR DECAY =0.00170 FNINF = 0.64 IN/HR

MAX.PERV.RET.=0.30 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS

EXECUTED ON DATE

AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN 100 YEAR EXISTING DRAINAGE ANALYSIS

BASIN ID: RRCBSK -- BASIN COMMENT: RED ROCK CANYON SUBBASIN K

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.41	1.13	0.57	2.00	.0270	5.00

COEFFICIENT
(REFLECTING TIME TO PEAK) COEFFICIENT
(RELATED TO PEAK RATE OF RUNOFF)

0.156 0.292

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAP (CFS)	PEAK (CFS)	VOLUME OF RUNOFF (AF)
20.48	623.16	254.25	254.25	21.76

WIDTH AT 50 = 48. MIN. WIDTH AT 75 = 25. MIN. K50 = 0.26 K75 = 0.35

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.40 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.55 IN./HR. DECAY = 0.00170/SECOND FNINFL = 0.64 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	70.	97.	*	140.	24.	*
5.	62.	*	75.	88.	*	145.	22.	*
10.	162.	*	80.	79.	*	150.	20.	*
15.	231.	*	85.	72.	*	155.	18.	*
20.	254.	*	90.	65.	*	160.	16.	*
25.	244.	*	95.	59.	*	165.	15.	*
30.	218.	*	100.	53.	*	170.	13.	*
35.	195.	*	105.	48.	*	175.	12.	*
40.	180.	*	110.	44.	*	180.	11.	*
45.	164.	*	115.	40.	*	185.	10.	*
50.	148.	*	120.	36.	*	190.	9.	*
55.	131.	*	125.	33.	*	195.	8.	*
60.	118.	*	130.	29.	*	200.	0.	*
65.	107.	*	135.	27.	*	0.	0.	*

BASIN ID: RRCSBK -- BASIN COMMENT: RED ROCK CANYON SUBBASIN K

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	125.	0.00	0.000	109.	*
5.	0.03	0.000	0.	*	130.	0.00	0.000	99.	*
10.	0.09	0.001	0.	*	135.	0.00	0.000	90.	*
15.	0.14	0.003	0.	*	140.	0.00	0.000	81.	*
20.	0.24	0.004	1.	*	145.	0.00	0.000	74.	*
25.	0.41	0.062	5.	*	150.	0.00	0.000	67.	*
30.	0.74	0.665	53.	*	155.	0.00	0.000	60.	*
35.	0.41	0.349	146.	*	160.	0.00	0.000	55.	*
40.	0.24	0.177	239.	*	165.	0.00	0.000	49.	*
45.	0.18	0.126	303.	*	170.	0.00	0.000	45.	*
50.	0.15	0.093	333.	*	175.	0.00	0.000	41.	*
55.	0.12	0.064	336.	*	180.	0.00	0.000	37.	*
60.	0.12	0.065	329.	*	185.	0.00	0.000	33.	*
65.	0.12	0.065	322.	*	190.	0.00	0.000	30.	*
70.	0.06	0.007	309.	*	195.	0.00	0.000	27.	*
75.	0.06	0.007	290.	*	200.	0.00	0.000	25.	*
80.	0.04	0.001	266.	*	205.	0.00	0.000	22.	*
85.	0.04	0.001	241.	*	210.	0.00	0.000	20.	*
90.	0.04	0.001	218.	*	215.	0.00	0.000	18.	*
95.	0.04	0.001	198.	*	220.	0.00	0.000	16.	*
100.	0.04	0.001	179.	*	225.	0.00	0.000	10.	*
105.	0.04	0.001	162.	*	230.	0.00	0.000	6.	*
110.	0.04	0.001	147.	*	235.	0.00	0.000	4.	*
115.	0.04	0.001	133.	*	240.	0.00	0.000	3.	*
120.	0.04	0.001	120.	*	245.	0.00	0.000	2.	*

TOTAL PRECIP. = 3.41 (1-HOUR RAIN = 2.95) EXCESS PRECIP. = 1.694 INCHES

VOLUME OF EXCESS PRECIP = 37. ACRE-FEET

PEAK Q = 336. CFS TIME OF PEAK = 55. MIN.

INFILT.= 4.55 IN/HR DECAY = 0.00170 FNINF = 0.64 IN/HR

MAX.PERV.RET.=0.40 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN 100 YEAR EXISTING DRAINAGE ANALYSIS

BASIN ID: RRCBSL -- BASIN COMMENT: RED ROCK CANYON SUBBASIN L

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.38	1.28	0.61	12.60	.0410	5.00

COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.121 0.252

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH PEAK (CFS)	VOLUME OF RUNOFF (AF)
16.43	695.48	267.06	20.48

WIDTH AT 50 = 43. MIN. WIDTH AT 75 = 22. MIN. K50 = 0.23 K75 = 0.31

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.35 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 3.79 IN./HR. DECAY = 0.00180/SECOND FNINFL = 0.55 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	65.	96.	*	130.	23.	*
5.	91.	*	70.	86.	*	135.	21.	*
10.	211.	*	75.	77.	*	140.	19.	*
15.	265.	*	80.	69.	*	145.	17.	*
20.	256.	*	85.	62.	*	150.	15.	*
25.	222.	*	90.	56.	*	155.	14.	*
30.	199.	*	95.	50.	*	160.	12.	*
35.	189.	*	100.	45.	*	165.	11.	*
40.	170.	*	105.	40.	*	170.	10.	*
45.	151.	*	110.	36.	*	175.	9.	*
50.	133.	*	115.	32.	*	180.	8.	*
55.	119.	*	120.	29.	*	185.	0.	*
60.	107.	*	125.	26.	*	0.	0.	*

BASIN ID: RRCBBL -- BASIN COMMENT: RED ROCK CANYON SUBBASIN L

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	120.	0.04	0.004	129.	*
5.	0.03	0.000	0.	*	125.	0.00	0.000	116.	*
10.	0.09	0.008	1.	*	130.	0.00	0.000	105.	*
15.	0.14	0.016	3.	*	135.	0.00	0.000	94.	*
20.	0.24	0.028	8.	*	140.	0.00	0.000	84.	*
25.	0.41	0.191	30.	*	145.	0.00	0.000	76.	*
30.	0.74	0.680	115.	*	150.	0.00	0.000	68.	*
35.	0.41	0.363	240.	*	155.	0.00	0.000	61.	*
40.	0.24	0.190	334.	*	160.	0.00	0.000	55.	*
45.	0.18	0.139	376.	*	165.	0.00	0.000	49.	*
50.	0.15	0.105	380.	*	170.	0.00	0.000	44.	*
55.	0.12	0.076	375.	*	175.	0.00	0.000	40.	*
60.	0.12	0.077	369.	*	180.	0.00	0.000	36.	*
65.	0.12	0.077	358.	*	185.	0.00	0.000	32.	*
70.	0.06	0.018	340.	*	190.	0.00	0.000	29.	*
75.	0.06	0.018	315.	*	195.	0.00	0.000	25.	*
80.	0.04	0.004	287.	*	200.	0.00	0.000	23.	*
85.	0.04	0.004	260.	*	205.	0.00	0.000	19.	*
90.	0.04	0.004	235.	*	210.	0.00	0.000	12.	*
95.	0.04	0.004	212.	*	215.	0.00	0.000	8.	*
100.	0.04	0.004	192.	*	220.	0.00	0.000	6.	*
105.	0.04	0.004	173.	*	225.	0.00	0.000	5.	*
110.	0.04	0.004	157.	*	230.	0.00	0.000	3.	*
115.	0.04	0.004	142.	*	235.	0.00	0.000	2.	*

TOTAL PRECIP. = 3.41 (1-HOUR RAIN = 2.95) EXCESS PRECIP. = 2.025 INCHES

VOLUME OF EXCESS PRECIP = 41. ACRE-FEET

PEAK Q = 380. CFS TIME OF PEAK = 50. MIN.

INFILT.= 3.79 IN/HR DECAY=0.00180 FNINF = 0.55 IN/HR

MAX.PERV.RET.=0.35 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN 100 YEAR EXISTING DRAINAGE ANALYSIS

BASIN ID: RRCBM -- BASIN COMMENT: RED ROCK CANYON SUBBASIN M

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.69	1.95	1.35	2.10	.0180	5.00

COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.155 0.315

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAPH PEAK (CFS)	VOLUME OF RUNOFF (AF)
41.37	311.07	214.02	36.69

WIDTH AT 50 = 96. MIN. WIDTH AT 75 = 50. MIN. K50 = 0.26 K75 = 0.35

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.40 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 4.22 IN./HR. DECAY = 0.00180/SECOND FNINFL = 0.58 IN./HR.

TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*	TIME	UNIT HYDROGRAPH	*
0.	0.	*	130.	91.	*	260.	25.	*
5.	17.	*	135.	86.	*	265.	24.	*
10.	51.	*	140.	82.	*	270.	23.	*
15.	94.	*	145.	78.	*	275.	22.	*
20.	135.	*	150.	74.	*	280.	21.	*
25.	168.	*	155.	71.	*	285.	20.	*
30.	194.	*	160.	67.	*	290.	19.	*
35.	208.	*	165.	64.	*	295.	18.	*
40.	214.	*	170.	61.	*	300.	17.	*
45.	212.	*	175.	58.	*	305.	16.	*
50.	206.	*	180.	55.	*	310.	15.	*
55.	196.	*	185.	53.	*	315.	15.	*
60.	185.	*	190.	50.	*	320.	14.	*
65.	174.	*	195.	48.	*	325.	13.	*
70.	165.	*	200.	45.	*	330.	13.	*
75.	159.	*	205.	43.	*	335.	12.	*
80.	152.	*	210.	41.	*	340.	11.	*
85.	145.	*	215.	39.	*	345.	11.	*
90.	139.	*	220.	37.	*	350.	10.	*
95.	132.	*	225.	36.	*	355.	10.	*
100.	125.	*	230.	34.	*	360.	9.	*
105.	118.	*	235.	32.	*	365.	9.	*
110.	111.	*	240.	31.	*	370.	9.	*
115.	105.	*	245.	29.	*	375.	8.	*
120.	100.	*	250.	28.	*	380.	8.	*
125.	95.	*	255.	26.	*	385.	0.	*

BASIN ID: RRCBSM -- BASIN COMMENT: RED ROCK CANYON SUBBASIN M

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	215.	0.00	0.000	98.	*
5.	0.03	0.000	0.	*	220.	0.00	0.000	93.	*
10.	0.09	0.001	0.	*	225.	0.00	0.000	89.	*
15.	0.14	0.003	0.	*	230.	0.00	0.000	84.	*
20.	0.24	0.005	0.	*	235.	0.00	0.000	80.	*
25.	0.41	0.095	2.	*	240.	0.00	0.000	76.	*
30.	0.74	0.674	17.	*	245.	0.00	0.000	73.	*
35.	0.41	0.356	51.	*	250.	0.00	0.000	69.	*
40.	0.24	0.183	99.	*	255.	0.00	0.000	66.	*
45.	0.18	0.132	154.	*	260.	0.00	0.000	63.	*
50.	0.15	0.098	207.	*	265.	0.00	0.000	60.	*
55.	0.12	0.069	255.	*	270.	0.00	0.000	57.	*
60.	0.12	0.070	294.	*	275.	0.00	0.000	54.	*
65.	0.12	0.070	322.	*	280.	0.00	0.000	52.	*
70.	0.06	0.011	340.	*	285.	0.00	0.000	49.	*
75.	0.06	0.011	349.	*	290.	0.00	0.000	47.	*
80.	0.04	0.001	348.	*	295.	0.00	0.000	45.	*
85.	0.04	0.001	341.	*	300.	0.00	0.000	42.	*
90.	0.04	0.001	330.	*	305.	0.00	0.000	40.	*
95.	0.04	0.001	318.	*	310.	0.00	0.000	38.	*
100.	0.04	0.001	306.	*	315.	0.00	0.000	37.	*
105.	0.04	0.001	294.	*	320.	0.00	0.000	35.	*
110.	0.04	0.001	281.	*	325.	0.00	0.000	33.	*
115.	0.04	0.001	268.	*	330.	0.00	0.000	32.	*
120.	0.04	0.001	255.	*	335.	0.00	0.000	30.	*
125.	0.00	0.000	243.	*	340.	0.00	0.000	29.	*
130.	0.00	0.000	231.	*	345.	0.00	0.000	27.	*
135.	0.00	0.000	219.	*	350.	0.00	0.000	26.	*
140.	0.00	0.000	207.	*	355.	0.00	0.000	25.	*
145.	0.00	0.000	196.	*	360.	0.00	0.000	23.	*
150.	0.00	0.000	187.	*	365.	0.00	0.000	22.	*
155.	0.00	0.000	177.	*	370.	0.00	0.000	21.	*
160.	0.00	0.000	169.	*	375.	0.00	0.000	20.	*
165.	0.00	0.000	160.	*	380.	0.00	0.000	19.	*
170.	0.00	0.000	152.	*	385.	0.00	0.000	18.	*
175.	0.00	0.000	145.	*	390.	0.00	0.000	17.	*
180.	0.00	0.000	138.	*	395.	0.00	0.000	17.	*
185.	0.00	0.000	131.	*	400.	0.00	0.000	16.	*
190.	0.00	0.000	125.	*	405.	0.00	0.000	14.	*
195.	0.00	0.000	119.	*	410.	0.00	0.000	9.	*
200.	0.00	0.000	113.	*	415.	0.00	0.000	6.	*
205.	0.00	0.000	108.	*	420.	0.00	0.000	4.	*
210.	0.00	0.000	103.	*	425.	0.00	0.000	3.	*

TOTAL PRECIP. = 3.41 (1-HOUR RAIN = 2.95) EXECCESS PRECIP. = 1.786 INCHES

VOLUME OF EXCESS PRECIP = 66. ACRE-FEET

PEAK Q = 349. CFS TIME OF PEAK = 75. MIN.

INFILT.= 4.22 IN/HR DECAY =0.00180 FNINF = 0.58 IN/HR

MAX.PERV.RET.=0.40 IN. MAX.IMP.RET.=0.05 IN.

U.D.F.C.D. CUHP RUNOFF ANALYSIS EXECUTED ON DATE AT TIME

CUHPE/PC VERSION MODIFIED IN JANUARY 1985

PRINT OPTION NUMBER SELECTED FOR THIS BASIN IS 7

RED ROCK CANYON DRAINAGE BASIN 100 YEAR EXISTING DRAINAGE ANALYSIS

BASIN ID: RRCBSN -- BASIN COMMENT: RED ROCK CANYON SUBBASIN N

AREA OF BASIN (SQMI)	LENGTH OF BASIN (MI)	DIST TO CENTROID (MI)	IMPERVIOUS AREA (PCT)	SLOPE (FT/FT)	UNIT DURATION (MIN)
0.42	1.14	0.49	7.80	.0260	5.00

COEFFICIENT COEFFICIENT
(REFLECTING TIME TO PEAK) (RELATED TO PEAK RATE OF RUNOFF)

0.134 0.260

CALCULATED UNIT HYDROGRAPH

TIME TO PEAK (MIN)	PEAK RATE OF RUNOFF (CFS/SQMI)	UNIT HYDROGRAP (CFS)	PEAK (CFS)	VOLUME OF RUNOFF (AF)
17.10	684.93	285.62	22.24	

WIDTH AT 50 = 44. MIN. WIDTH AT 75 = 23. MIN. K50 = 0.23 K75 = 0.32

RAINFALL LOSSES INPUT W/ BASIN DATA

MAX. PERVIOUS RET. = 0.35 IN. MAX. IMPERVIOUS RET. = 0.05 IN.
INFILTRATION = 3.57 IN./HR. DECAY = 0.00180/SECOND FNINFL = 0.54 IN./HR.

TIME	UNIT	TIME	UNIT	TIME	UNIT
	HYDROGRAPH	*	HYDROGRAPH	*	HYDROGRAPH
0.	0.	*	65.	105.	*
5.	91.	*	70.	94.	*
10.	217.	*	75.	84.	*
15.	281.	*	80.	76.	*
20.	278.	*	85.	68.	*
25.	245.	*	90.	61.	*
30.	216.	*	95.	55.	*
35.	205.	*	100.	49.	*
40.	185.	*	105.	44.	*
45.	165.	*	110.	40.	*
50.	145.	*	115.	36.	*
55.	130.	*	120.	32.	*
60.	117.	*	125.	29.	*

BASIN ID: RRCBSN -- BASIN COMMENT: RED ROCK CANYON SUBBASIN N

**** STORM NO. = 1 **** DATE OR RETURN PERIOD = 100-YEAR

TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*	TIME (MIN.)	INCREMENT RAINFALL (IN)	TOTAL EXCESS PRECIP	STORM HYDROGRAPH (CFS)	*
0.	0.00	0.000	0.	*	120.	0.04	0.003	136.	*
5.	0.03	0.000	0.	*	125.	0.00	0.000	123.	*
10.	0.09	0.005	0.	*	130.	0.00	0.000	111.	*
15.	0.14	0.010	2.	*	135.	0.00	0.000	99.	*
20.	0.24	0.017	5.	*	140.	0.00	0.000	89.	*
25.	0.41	0.191	25.	*	145.	0.00	0.000	80.	*
30.	0.74	0.681	113.	*	150.	0.00	0.000	72.	*
35.	0.41	0.363	243.	*	155.	0.00	0.000	65.	*
40.	0.24	0.190	348.	*	160.	0.00	0.000	58.	*
45.	0.18	0.138	399.	*	165.	0.00	0.000	52.	*
50.	0.15	0.104	408.	*	170.	0.00	0.000	47.	*
55.	0.12	0.075	402.	*	175.	0.00	0.000	42.	*
60.	0.12	0.076	396.	*	180.	0.00	0.000	38.	*
65.	0.12	0.076	385.	*	185.	0.00	0.000	34.	*
70.	0.06	0.017	366.	*	190.	0.00	0.000	30.	*
75.	0.06	0.017	340.	*	195.	0.00	0.000	27.	*
80.	0.04	0.003	310.	*	200.	0.00	0.000	24.	*
85.	0.04	0.003	280.	*	205.	0.00	0.000	22.	*
90.	0.04	0.003	253.	*	210.	0.00	0.000	18.	*
95.	0.04	0.003	228.	*	215.	0.00	0.000	12.	*
100.	0.04	0.003	206.	*	220.	0.00	0.000	8.	*
105.	0.04	0.003	185.	*	225.	0.00	0.000	6.	*
110.	0.04	0.003	167.	*	230.	0.00	0.000	4.	*
115.	0.04	0.003	151.	*	235.	0.00	0.000	3.	*

TOTAL PRECIP. = 3.41 (1-HOUR RAIN = 2.95) EXCESS PRECIP. = 1.986 INCHES

VOLUME OF EXCESS PRECIP = 44. ACRE-FEET

PEAK Q = 408. CFS TIME OF PEAK = 50. MIN.

INFILT.= 3.57 IN/HR DECAY=0.00180 FNINF = 0.54 IN/HR

MAX.PERV.RET.=0.35 IN. MAX.IMP.RET.=0.05 IN.