

**KETTLE CREEK DRAINAGE BASIN  
OLD RANCH ROAD TRIBUTARY  
DRAINAGE BASIN PLANNING STUDY  
AND  
MASTER DEVELOPMENT DRAINAGE PLAN**

2001



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April 2001  
*(Minor Text Revisions, October 2002)*

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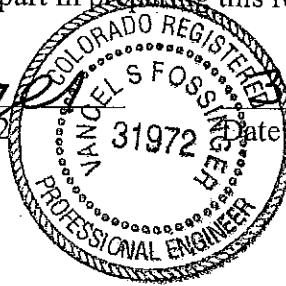


**DRAINAGE REPORT STATEMENT**

**ENGINEER'S STATEMENT:**

The attached drainage report was prepared under my direction and supervision and is correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the City for drainage reports. I accept responsibility for any liability caused by any negligent acts, errors, or omissions on my part in preparing this report.

Vancel Fossinger -13-03  
Vancel S. Fossinger, Colorado P.E. #31972 Date  
For and On Behalf of JR Engineering



**CITY OF COLORADO SPRINGS ONLY:**

Filed in accordance with Section 15-3-906 of the Code of the City of Colorado Springs, 1980, as amended.

Timothy R. Madsen Jr.  
City Engineer

March 18, 2003  
Date

Conditions:

## EXECUTIVE SUMMARY

Past efforts to have a Drainage Basin Planning Study (D.B.P.S.) completed for the Kettle Creek Drainage Basin have been abandoned for various reasons. Thus, the watershed remains relatively unstudied and lacks a unified plan for storm water management. Development activity is increasing in the basin. Within the past 7 years, approximately 100 acres of urban single family residential lots and a 41-acre public high school site have been developed in the Kettle Creek watershed. Drainage management for these developments has been planned in Master Development Drainage Plans (M.D.D.P.) and Final Drainage Reports (F.D.R.s) prepared for these sites.

It is anticipated that considerable development activity will occur within the portion of the Kettle Creek Watershed that lies close to Old Ranch Road in the near future. The purpose of this D.B.P.S./M.D.D.P. is to provide a unified drainage management plan for this area. The proposed plan is self contained and is able to be accomplished independent of development activity, or lack thereof, in the remainder of the Kettle Creek watershed. The study area lends itself to such a plan in that it consists of the entire watershed of a tributary to Kettle Creek and a small adjacent and related area.

The study area is approximately 812 acres in size. It includes much of the previously mentioned development, some developed city streets and county roads, as well as approximately 152 acres of unincorporated low-density rural residential development.

The drainage management plan proposed in this study calls for the major land owners/developers in the study area to construct the drainage infrastructure required to support the proposed development within the study area. The drainage infrastructure proposed by this plan includes several regional detention facilities to regulate peak runoff rates from future development proposed within the study area. The regulation of runoff will mitigate the potential impact that the proposed development will have on downstream Kettle Creek and the smaller tributaries that will receive runoff from the study area. It is proposed that the study area be considered a closed

drainage basin due to the self contained nature of the proposed plan. As a closed basin development would not be subject to drainage fees above the cost of the infrastructure proposed by this plan.

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**KETTLE CREEK DRAINAGE BASIN  
OLD RANCH ROAD TRIBUTARY  
MASTER DEVELOPMENT DRAINAGE PLAN**

**I. INTRODUCTION**

**A. Contract Authorization**

This document and associated analysis was prepared with private funds for LP47, LLC dba La Plata Investments and Vintage Communities by JR Engineering. La Plata Investments and Vintage Communities are the major landowners and developers within the study area.

**B. Purpose**

The purpose of this document is to identify an overall unified drainage plan for the study area. More specifically, the plan will address the following issues within the subject watershed:

- Identify historic drainage patterns and estimate peak historic runoff rates.
- Define the drainage criteria, general runoff patterns, and associated peak runoff rates for the proposed future fully developed condition.
- Identify approximate sizes and locations of major storm drains required to support the fully developed condition.
- Identify required storage volumes and approximate locations of detention facilities required to support the fully developed condition.

**C. Past Studies**

A Drainage Basin Planning Study (D.B.P.S.) has not been performed for the entire Kettle Creek Watershed. However, Master Development Drainage Plans (M.D.D.P.) and Final Drainage Reports (F.D.R.) have been prepared for areas within the study area that have been developed in the last decade. A number of previous studies and reports were reviewed during the preparation of the current study. The most relevant studies are listed below along with a brief synopsis of the relevance to the current study. Additional reports that were reviewed are noted in the reference section of this study.

- **“Amendment No. 2 to the Pine Creek Drainage Basin Planning Study and M.D.D.P. for Pine Creek Subdivision,”** October, 1998, by JR Engineering  
The Pine Creek Drainage Basin adjoins the current study area on the south side. This study defines the southern limits of the developed condition watershed for the current study.
- **“Master Development Drainage Plan Addendum for Creekside Estates”**, March 1994, by JR Engineering  
This M.D.D.P. defined the overall drainage concept for the now existing Creekside Estates residential development and offsite tributary areas.
- **“Final Drainage Report For Old Ranch Road”**, June 1997, by JR Engineering  
This FDR defined the drainage concept for a portion of Old Ranch Road and Thunder Mountain Road located near Pine Creek high School. This concept included construction of small drainage diversions (now existing) upstream of Thunder Mountain Road.
- **“Final Drainage Report For Academy High School No. 5”**, January 1997, by Martin and Martin, Inc.  
This FDR presented the plan for the treatment of storm water runoff from the School District 20, Pine Creek High School (existing). The plan included collection and conveyance of all storm water developed on the site to a detention pond constructed in the southwest corner of the site. According to the report, the pond is to control peak runoff rates from the site to  $Q_{10} = 10.5$  cfs and  $Q_{100} = 31$  cfs.

#### **D. Agency Jurisdictions**

The drainage improvements proposed in the current study as well as the majority of the included watershed are located within the Colorado Springs city limits. The extreme upper portions of the current study area are unincorporated areas of El Paso County. The unincorporated area consists primarily of large lots (5 acres or larger) containing single family residences. Runoff from the unincorporated areas of the watershed has been accounted for in the current study. It is anticipated that the City of Colorado Springs will be the sole agency for review and approval of this document. It is understood that other agencies such as F.E.M.A., the Corps of Engineers, the Wildlife Service, and the State

Engineer will have involvement in review and approval of more detailed plans for individual projects proposed in this study at the time that they are designed. Peak discharge criteria as requested by the United States Air Force Academy (U.S.A.F.A.) has been utilized in the preparation of this plan.

#### **E. Drainage Criteria**

Storm drainage design and management within the study area must conform to the current City of Colorado Springs criteria.

City Engineering is in the process of implementing a policy requiring peak flow rates be controlled to historic peak rates in 2, 5, 10, 25, 50 and 100-year storms for properties that discharge to water courses flowing onto United States Air Force Academy land. This study utilizes this criteria.

## **II. PROJECT DESCRIPTION, LOCATION AND DRAINAGE**

### **A. Basin Location and Size**

The study area that remains to be developed is a portion of the Briargate Community located in the northeast portion of Colorado Springs. The majority of the study area is made up by the watershed of an unnamed tributary to Kettle Creek that includes a large portion of Old Ranch Road. A small portion of the study area contributes runoff to an adjacent unnamed tributary to Kettle Creek. As shown on the vicinity map the study area is bounded by the Pine Creek Drainage Basin on the south and other basins tributary to Kettle Creek on the north. The lower or western limit of the study area is just upstream of Kettle Creek. The upper limit of the study area is located approximately 1600 feet to the east of El Paso County, Milam Road. The study area is approximately 812 acres or 1.26 square miles in size.

### **B. Existing Major Drainageways and Facilities**

#### **1. General**

An existing drainage facility map was prepared as a part of this study. A copy of this map is contained in the appendix of this report. As shown on the map, the existing public storm drain systems in the study area are limited to the area that has been developed as

Creekside Estates. Other constructed drainage facilities shown are existing culverts under roadways, small earthen diversion channels, an existing detention pond on the Pine Creek High School site and an existing Regional Detention Pond in Creekside Estates. Outside of the Creekside Estates area stormwater runoff is collected and conveyed overland and in natural channels.

## **2. Existing Storm Drain Systems**

The storm drain system in Creekside Estates originates in Lexington Drive near the existing Challenger Middle School. This storm drain is routed down Clear Creek Road to Kittyhawk Road, then down Kittyhawk Road to Monmouth Lane where runoff from Creekside Estates Filing No. 4 enters the system. The storm drain is then routed down Monmouth Lane to Old Ranch Road. At the intersection of Old Ranch Road and Monmouth Lane a 30" diameter storm drain allows for the runoff from a currently undeveloped basin located immediately east of Creekside Estates Filing No. 3 to enter the system. From this point the storm drain is routed west down Old Ranch Road, collecting runoff from Old Ranch Road along the way, to a point located approximately 650 linear feet east of Kettle Creek. At this point additional runoff from Old Road enters the system as well as a portion of the runoff from Creekside Estates Filing No. 1. The storm drain then turns north and is routed to the existing Creekside Estates detention pond collecting runoff from Creekside Estates Filing No. 3 along the way at two (2) junction points.

## **3. Existing Regional Detention Facility**

The existing Creekside Estates Regional Detention Facility was designed to impound approximately 6.2-acre feet of water in the 100-year event while controlling peak outflow to less than 87 cfs according to the F.D.R. for Creekside Estates Filing No. 3.

## **4. Existing Natural Channels**

The natural channels are mostly unimproved throughout the study area. For the purpose of discussion the two unnamed drainage tributaries to Kettle Creek that receive runoff from the study area have been labeled as "North Tributary" and "South Tributary" on the drainage basin maps contained in the appendix of this report. More specifically, for the purpose of this discussion the "North Tributary" shall refer to the natural channel that extends between Analysis Point H13 (historic condition) or proposed Regional Detention

Facility "G" (developed condition) and Kettle Creek. The "South Tributary" shall refer to the natural channel that extends between Analysis Point H9 (historic condition) or proposed Regional Detention Facility "E" (developed condition) and Kettle Creek. Existing improvement within the natural channels are limited to some small earthen dams constructed transverse across the channel along the South Tributary. The dams were likely constructed in the late 1940s to early 1950s when considerable soil and water conservation treatment measures were constructed in the watershed.

The North Tributary is located upstream of the study area. It will serve as an outfall for the northern 49 acres of the study area. Its' length between the outfall point and Kettle Creek is approximately 2,000 linear feet. The gradients along this reach are relatively steep ranging from 1.5 to 6.5 percent. The average gradient for this reach is approximately 3.3 percent. Bottom widths in the reach range from 10 to 30 feet. During the past year, the channel generally has been without free flowing water between storm events. Portions of the channel bottom appear to remain continually damp to wet. The vegetation on the bottom of the channel ranges from sparse to lush depending on the moisture condition at the location. The reach is deeply incised with steep side slopes generally composed of relatively soft eroding bedrock.

The South Tributary is contained within the study area. Per the current proposed plan it will be sheltered from receiving significant increases in flow from frequent rainfall runoff events. It will serve as an outfall for runoff generated on approximately 626 acres of the study area in 2 through 100-year rainfall events. The South Tributary is approximately 2,700 linear feet long between proposed Detention Facility "E" and Kettle Creek. The channel carries a small perennial flow that supports wetland type vegetation on the channel bottom throughout the reach. Characteristics change significantly between the lower 1,500 linear feet and upper 1,200 linear feet of channel. The lower reach is steeper with longitudinal slopes ranging from 2.7 to 6.4 percent and an overall average gradient of approximately 4.4 percent. The bottom is narrow throughout most of the lower reach ranging from close to a vee bottom in most of the reach, to 25 feet wide in a small segment. The side slopes are steep and the banks are high as the reach is deeply incised. The upper reach contains three of the previously mentioned dams. Existing slopes between the dams range from 1 percent to 10 percent. The downstream slopes of the

dams are steep and range from 10 to 23 feet high above the downstream channel bed. The average slope in the upper reach would be approximately 4.5 percent if the dams were not considered. Vegetation in the upper reach is short due to heavy grazing of the area. The channel currently appears to be relatively stable due to the presence of the vegetation throughout the reach. Some headcutting is evident at the steep earthen spillways from the small dams.

The existing stability in the natural channels is likely caused at least in part by the presence of the soil and water conservation measures that were constructed in the watershed several decades ago. Aerial photography of the study area indicates that considerable water conservation treatment was constructed in the watershed prior to 1955. The treatment consists of small ditch/dikes constructed on the contour in many of the steeper portions of the watershed and several small on line retention ponds constructed along small channels in the upper portion of the watershed. While a detailed analysis of this treatment has not been performed with the current study, it is speculated that the treatment has sheltered the downstream channels from frequent flows of significant magnitude. This environment has likely helped the vegetation in the channel to become well established.

Upstream of future Chapel Hills Drive, the character of existing natural channel changes as the presence of perennial water in the channel is greatly reduced. Reaches of poorly defined channels separate reaches of incised channels. Most areas of the channel bottoms are dry in all but large rainfall events. With the reduction of the available water in the channel bottoms, the quantity and quality of the vegetation in the channels is also less in the reaches located upstream of future Chapel Hills Drive. Due to the lack of special features, such as wetland vegetation, and their limited potential to serve as storm water conveyances for the developed condition without extensive treatment, the current plan is to eliminate most of the natural conveyances above future Chapel Hills Drive and convey storm water in proposed storm drains.

### **C. Existing and Proposed Land Use**

Approximately 268 acres of the 812-acre study area are currently developed. This includes 152 acres of rural residential development located in the unincorporated area.

The remainder of the area is currently undeveloped rangeland. Much of the remaining undeveloped area is expected to develop at a relatively fast pace in the coming years.

Most of the study area has been master planned for land use. Where available, the master plan land uses were utilized for this study. The exhibit contained in the appendix entitled "Subdivision and Land Use Identification Map" indicates the current land use assumptions. The following table is a summary of these land uses.

**PROPOSED LAND USE  
Fully Developed Condition**

<b>PROJECTED LAND USE</b>	<b>ASSUMED PERCENT IMPERVIOUS</b>	<b>AREA (acres)</b>	<b>PERCENT OF STUDY AREA</b>
GOLF COURSE	0	21	3%
OPEN SPACE	5	61	8%
SINGLE FAMILY DETACHED			
<1 DU/AC	5	145	18%
2 DU/AC	25	67	8%
3 DU/AC	30	175	21%
4 DU/AC	40	97	12%
SINGLE FAMILY ATTACHED			
5 DU/AC	70	2	-%
MULTI-FAMILY	70	39	5%
LIGHT INDUSTRIAL/OFFICE	83	26	3%
COMMERCIAL	95	39	5%
SCHOOL	50	56	7%
ARTERIAL STREET	85	84	10%
TOTAL		812	100%

#### **D. Existing and Proposed Utilities**

Several underground utility lines are in place within the study area. Many more will be constructed to support future development. Consideration was given to the fact that there will be several locations where storm drain facilities and other utilities must cross. The major anticipated crossings were investigated and no problems that are insurmountable were found. All future storm drains as well as other underground utilities should be designed and constructed with consideration for existing and future adjacent facilities.

#### **E. Soils/Erosion Potential**

A map showing the boundaries of soil mapping units as identified in the "Soil Survey of El Paso County Area, Colorado," published by the U.S.D.A. Soil Conservation Service (S.C.S.) in 1975 is included in appendix of this report. As shown on the map almost all of the soils in the study area belong to Hydrologic Soil Group "B". The soils located in a very small portion of the area located along the southern limits of the study area belong to the Hydrologic Group "A".

The erosion potential as reported in the S.C.S. "Soils Survey for El Paso County Area," varies from slight to high in the study area.

### **III. FIELD INVESTIGATIONS**

#### **A. Topographic Mapping**

Topographic data utilized in this study was obtained from the City of Colorado Springs F.I.M.S. program, where available. At the extreme upper end of the study area the F.I.M.S. topographic data was not available, so topography was obtained from the U.S.G.S. Quadrangle Map for the area.

#### **B. Subsurface Investigation**

No subsurface investigation was performed specifically for this project. Subsurface investigations will be required for individual projects as appropriate.



### **C. Environmental Considerations**

LP47, LLC dba La Plata Investments and Vintage Communities, the majority landowners in the study area, have contracted with environmental consultants to perform surveys to identify environmentally sensitive areas within the study area. Potential areas of concern are areas that meet the qualifications of wetlands and or water of the United States and areas that may contain the habitat of the Prebles Meadow Jumping Mouse.

In general, one of the goals of the overall plan proposed by this study is to minimize the peak flow rates contributed to the natural channels that are to be maintained in order to minimize impacts to the channels.

## **IV. HYDROLOGIC AND HYDRAULIC DESIGN EVALUATION**

### **A. Basin Hydrology**

#### **1. Analysis Purpose**

The following items were the goals of the hydrologic analysis performed for this study:

- Estimate peak runoff rates for the study area in a Historic (completely undeveloped condition) to provide a basis for comparison with the proposed fully developed condition release rates to natural channels that will be utilized in the proposed plan.
- Estimate peak runoff rates for Sub-Basins to be developed in the future.
- Provide peak flow rates to be used in the design of proposed major conveyances.
- Provide inflow and outflow hydrographs and required storage volumes to be used in the design of proposed regional detention facilities.
- Demonstrate the adequacy of the proposed plan to control the peak flow rates released to Kettle Creek from the study area to less than the estimated historic peak flows in the 2, 5, 10, 25, 50 and 100-year design storm.
- Estimate developed condition peak rates that are somewhat conservative so that some flexibility may be available for changes in land use planning. A

conservative approach is prudent when working with a drainage system that relies on detention basins and closed conduit conveyance systems with finite capacities.

## **2. Methodology**

The hydrologic analysis performed for this study was based on the Soil Conservation Service (S.C.S.) Dimensionless Unit Hydrograph utilizing the U.S. Army Corps. of Engineers HEC-1 computer program as modified by Haestad Methods Inc., May 1991 version.

### **a. Times of Concentration**

Times of Concentration ( $t_c$ ) were estimated based on actual flow paths in existing developed areas and undeveloped areas for the historic condition model only. Times of concentration for the fully developed condition model were based on estimated flow paths in areas where development has not occurred. Estimated flow paths were patterned after average flow paths for similar existing development located in the Briargate area. Summary sheets containing the data utilized in the  $t_c$  calculations are included in the appendix of this study. Lag time as utilized in the methodology was calculated as  $0.6 t_c$  (in hours).

### **b. Curve Numbers**

#### **1) Historic Condition Model**

A uniform curve number of 66 was utilized throughout the study area in the historic condition model. This reflects a value for pasture or rangeland in "fair" to "good" condition on soils belonging to S.C.S. Hydrologic Soils Group "B" with Antecedent Moisture Condition II according to tables prepared and published by the U.S. Soil Conservation Service.

#### **2) Developed Condition Model**

A problem that has been encountered in the past has been matching peak flow rates calculated in detailed analyses done for drainage reports to allowable flow rates calculated in non-detailed analysis based on general assumptions for drainage basin planning studies or master development drainage plans. A goal of the current analysis was to produce peak flow rates for individual sub-basins with

the HEC-1 model that are similar to peak flow rates that would be calculated by the rational method. In an effort to achieve this goal Curve Numbers (CN) utilized in the model were first estimated for individual sub-basins based on the anticipated land uses within the individual sub-basins assuming Antecedent Moisture Condition II. These estimated CNs were then entered into the model and peak 100-year flow rates were generated by the HEC-1 program for individual sub-basins. The peak 100-year flow rates calculated by the HEC-1 program were then entered into a spreadsheet and compared to 100-year peak flow rates generated by a rational method calculation for corresponding sub-basins. The CNs were then adjusted and the process was repeated until a reasonable agreement existed between the peak rates generated by the HEC-1 Model output and the peak rates generated by the rational method calculation. This adjustment caused an increase in the overall predicted peak rates and volumes generated in the study area. Copies of the spreadsheets utilized to calculate and adjust the curve numbers are contained in the appendix of this study.

**c. Design Storm**

The Type IIA 24 hour storm distribution was utilized in the HEC-I model. Rainfall depths of 4.4", 4.0", 3.6", 3.0", 2.6", and 2.0" were used for the 100, 50, 25, 10, 5 and 2-year storms respectively in the simulations. A calculation time interval of 3 minutes was used in order to satisfy the program recommendation that the time interval be less than or equal to .29 lag. A limitation of the Version of HEC-1 program that was used is that it can only generate 300 hydrograph points. At three-minute intervals output is only generated for the first 15 hours of the 24-hour storm. The peak inflow and outflow rates associated with all of the facilities included in the model occur well before 15 hours of the storm has passed so this is considered insignificant for the purpose of this study.

**d. Analysis Approach for Areas of Existing Development**

The primary importance of including the existing developed areas in the current analysis was to generate hydrographs from these areas that were produced with the same methodology as used in the remainder of the study area. In the current analysis, hydrographs from the areas of existing development were added to

hydrographs from the areas of future development to produce hydrographs at points of interest to the current proposed plan.

The current analysis does not include a detailed analysis of the existing storm drain systems in all locations. At points in the watershed, where runoff rates in excess of the existing downstream storm drain capacity would result in the excess flow being diverted out of the watershed an evaluation of the capacity of the existing storm drain was made. Where storm drain capacity was found to be less than the 100-year peak flow rates predicted by the current analysis, the HEC-1 model was revised to divert excess flow from the storm drain system.

**e. Alternative Analysis of Historic Peak Flow Rates**

In order to validate or at least provide a basis of comparison for evaluating the historic peak flow rates estimated for this study, several regional regression equations were also applied to the watershed to estimate peak flow rates. A copy of a spreadsheet used to perform this analysis is contained in the appendix of this report. The equations utilized are noted on the spreadsheet. The results of this analysis were varied as one might expect. Generally, the analysis indicates that the historic peak rates utilized in this study may be conservatively low.

**B. Major Drainageway Hydraulics**

**1. Floodplain Delineation Maps**

The Federal Emergency Management Agency Flood Insurance Study (F.I.S.) for El Paso County and Incorporated Areas was revised and reissued on March 17, 1997. Panels 506, 507 and 530 of the Flood Insurance Rate Maps (F.I.R.M.) produced as a part of the F.I.S. include portions of the study area. Only the extreme western edge of the study area is close to a F.E.M.A. "100-year special flood hazard zone" as shown on the F.I.R.M. This "special flood hazard zone" relates to Kettle Creek. The remainder of the study area is shown as "Zone X" (areas determined to be outside of the 100-year floodplain.)

An attempt was made to produce an overlay map showing the relationship of the F.E.M.A. floodplain to the study area for inclusion in this report. It was determined

that the FIRM is very distorted in this vicinity. Due to the fact that the floodplain does not impact the study area the effort was abandoned. A copy of the portions of panels 506 and 507 that contain the adjacent 100-year flood plain has been included in the appendix of this report.

## **2. Flood Profiles**

A detailed hydraulic analysis for the natural channels that are to be utilized in the proposed plan was not included in the scope of this study. A preliminary hydraulic grade line (HGL) calculation was performed for the existing storm drain system located in Old Ranch Road between Monmouth Lane and the existing Creekside Estates Regional Detention Facility. This HGL was calculated to demonstrate the capacity of the storm drain to convey additional flows from areas of future development with minor modifications. A copy of the spreadsheet calculation of the HGL is included in the appendix of this report. Hydraulic grade lines for proposed closed conduit conveyances will be prepared with and presented on the future construction drawings prepared for the same.

# **V. PROPOSED DRAINAGE PLAN**

## **A. General Description**

A proposed plan for the fully developed condition has been prepared as a part of this study. The plan is presented graphically on a map contained in the appendix of this study and is also described in the following text. The fully developed condition plan proposes the construction of six (6) additional regional detention facilities distributed throughout the study area and a storm drain collection and conveyance system. The plan also proposes to modify the inflow characteristics of the existing Creekside Estates Regional Detention Facility and modify its outlet.

The plan proposes three storm water discharge points from the study area. One point is the outfall from the existing Creekside Estates Regional Detention Facility. The two other points are on the natural channels labeled on the drainage basin maps as “North Tributary, proposed Regional Detention Facility “G” outfall, and South Tributary”, Analysis Point D23.

The proposed detention facilities are distributed throughout the watershed in order to mitigate high peak flow rates throughout the conveyance system and thus, limit the size of the required storm drains. The South Tributary will be utilized as an outfall for major flows from the area above proposed Regional Detention Facility "E", but the frequent flows from this area will be routed to Kettle Creek through a storm drain in Old Ranch Road in order to minimize impact to the natural channel of the South Tributary.

Due to concerns about preservation of downstream natural channels in their existing condition, this plan has been structured to regulate peaks release rates from the study area in the 2, 5, 10, 25, 50 and 100-year design storms. Generally accepted practice in this area has been to only regulate flows from large events. Recent regulatory actions such as the listing of the Prebles Meadow Jumping Mouse (PMJM) as a "threatened species" under the Endangered Species Act of 1973, has made it very difficult to modify or make improvements to natural channels that may contain habitat used by the Prebles Meadow Jumping Mouse. Thus, it appears to be prudent to take additional precautions in order to minimize impact to potentially sensitive areas located downstream of proposed development.

## **B. Fully Developed Condition Plan**

### **1. Sub-Basins D1 through D9A**

The study area begins east of future Powers Boulevard. Current land planning is very general for this area. Sub-Basins D1, D2 and D4 are assumed to remain at their current level of development. It is assumed that runoff patterns from this area will remain unchanged with the exception of the upsizing of the culverts under Old Ranch Road to pass the 100-year design storm. Sub-Basins D3 and D5 are planned for very low density residential development. The future street to be constructed along the southern boundary of these basins should be graded to provide the embankments required to detain water in the small proposed ponds labeled as Detention Facilities "A" and "B". Runoff from Sub-Basins D1 through D3 will be routed to and detained in Detention Facility "A" and runoff from Sub-Basins D4 and D5 will be routed to and detained in Detention Facility "B".

Proposed Regional Detention Facility "A" is planned to have a 100-year peak inflow of 165 cfs, a 100-year peak outflow of 65 cfs, and a 100-year storage volume requirement of 4-acre feet.

Proposed Regional Detention Facility "B" is planned to have a 100-year peak inflow of 103 cfs, a 100-year peak outflow of 57 cfs, and a 100-year storage volume requirement of 1-acre feet.

The outflow from Detention Facilities "A" and "B" will be conveyed in proposed storm drains along with runoff collected from Sub-Basins D6 and D7 to proposed Regional Detention Facility "C". Runoff from adjacent Sub-Basin D8 will also be routed to proposed Regional Detention Facility "C". Proposed Regional Detention Facility "C" is planned to have a 100-year peak inflow of 524 cfs, a 100-year peak outflow of 86 cfs, and a 100-year storage volume requirement of 21-acre feet. Outflow from proposed Regional Detention Facility "C" will be conveyed under Powers Boulevard and then to Analysis Point D4 in a proposed storm drain along with runoff from Sub-Basin D9A.

Detention Facility C will be configured such that the overflow that would occur from the 100-year flood being routed through the proposed pond (assuming the pond empty and the normal outlet is clogged at the beginning of the storm) will be routed under Powers Boulevard to Royal Pine Drive a 72" diameter culvert to be constructed with Powers Boulevard. In an overflow event, flow in excess of the capacity of the proposed storm sewer to be constructed in Royal Pine Drive will be conveyed in the street section of Royal Pine Drive to its low point, then across Basin D37 to Old Ranch Road near Chapel Hills Drive then west in Old Ranch Road to Kettle Creek. The excess stormwater will be diverted from the Royal Pine Drive storm drain via a proposed Junction 1 overflow box to be located on the storm drain between proposed Powers Boulevard and Royal Pine Drive. A concept detail of the proposed structure is contained in the appendix of this report. The proposed lots adjacent to proposed Royal Pine Drive should be graded to be a minimum of 1.5 feet above the flow line of adjacent Royal Pine Drive or have a solid wall separating them from Royal Pine

Drive. The purpose of this vertical separation is to protect the lots in the event that the overflow condition described above occurs. An emergency overflow corridor should be preserved across Basin D37 between the low point in Royal Pine Drive and Old Ranch Road with development sufficiently elevated.

## **2. Sub-Basins D9 through D17A, and Sub-Basins D36 and 37**

Sub-Basins D10 and D12 are assumed to remain at their current level of development. It is assumed that drainage patterns will remain the same in these areas with the exception that adequate culverts under Howells Road will be required if the roadway is reconstructed or expanded. Very low-density residential development is planned for Sub-Basin D11. Runoff from Sub-Basin D10 and D12 will be routed through or adjacent to Sub-Basin D11 via surface or storm drain conveyances. Runoff from Sub-Basins D10 through D12 will be combined at the northeast corner of the intersection of Old Ranch Road and Thunder Mountain Road (Analysis Point D5). The runoff at Analysis Point D5 will be conveyed under Old Ranch Road in an existing 48" diameter storm drain then on to Analysis Point D6 in a proposed storm drain.

At Analysis Point D6, the routed runoff from Analysis Point D5 and Sub-Basin D13 will be combined in a proposed storm drain and conveyed under proposed Powers Boulevard. Between proposed Powers Boulevard mainline and Ramp 'D' this flow will daylight into an open channel to be constructed in the gore area. Runoff from Sub-Basin D14 will be combined with this flow and it will be collected and conveyed to the Royal Pine Drive storm drain via two proposed laterals upstream of Analysis Point D7. Analysis Point 7 represents the total flow from Analysis Points D4 and D6 and Sub-Basins D9, D14 and D15. This flow will be conveyed to Analysis Point D7A in the Royal Pine Drive storm drain and in the Royal Pine Drive street section.

At Analysis Point D7A, flow from Analysis Point D7 will be combined with runoff flow from Sub-Basin D16A and D17. The combined intercepted flow will be conveyed to Analysis Point D8 on the proposed Royal Pine Drive storm drain.



At Analysis Point D8, flow from Analysis Point D7A will be combined with runoff flow from Sub-Basin D16 and Sub-Basin D17A. The combined intercepted flow will be conveyed to Analysis Point D9 in the proposed Royal Pine Drive storm drain across Old Ranch Road.

At Analysis Point D9, flow from Analysis Point D8 will be combined with runoff flow from Sub-Basin D36 and Sub-Basin D37 in the extension of the proposed Royal Pine Drive storm drain. The combined intercepted flow will be conveyed to the bottom of proposed Detention Facility "E" in the outfall of the proposed storm drain.

### **3. Sub-Basins D18 through D21 and D33**

Sub-Basin D18 is a fully developed school site. According to the Final Drainage Report (FDR) for the Academy High School No. 5, all of the runoff from this site is to be routed through the existing detention pond constructed on the site (labeled as Detention Facility "PCHS" on the drainage maps). It is assumed, for the purpose of this plan, that the site will conform to the FDR. The outflow from Detention Facility "PCHS" will be conveyed in a proposed storm drain under Future Powers Boulevard to Analysis Point D10 where it will be combined with the runoff from Sub-Basin D19. The combined flow at Analysis Point D10 will be routed through a proposed storm drain to Analysis D11 along with the runoff from Sub-Basin D20. The flow at Analysis Point D11 will be routed through a proposed storm drain along with the runoff from Sub-Basin D21 to proposed Regional Detention Facility "E" where it will be combined with the flow from Analysis Point D9. The proposed Regional Detention Facility "E" is planned to have a 100-year peak inflow of 1078 cfs, a total 100- year peak outflow of 600 cfs with a required estimated 100-year peak storage of 28 acre-feet.

Outflow from proposed Regional Detention Facility "E" will be divided between the existing natural channel labeled "South Tributary" and a proposed storm drain to be constructed downstream in Old Ranch Road. The downstream natural channel currently conveys a small perennial flow and contains considerable wetland vegetation. Over most of its' length it is very incised and is fairly steep. The natural channel has more than adequate conveyance capacity for the entire outflow from the

pond. However, due to its steep longitudinal slope and nearly vee shaped cross section it will not likely retain its' vegetated state and stability if it is exposed to the frequent increased flows that are expected to occur when the watershed is developed. In order to minimize the impact to the natural channel, the outflow structure(s) at proposed Detention Facility "E" should be designed to accomplish the following:

- Allow low perennial flow to continue to flow to the downstream natural channel in order to support the wetlands located there.
- Prevent significant flow rates above the perennial flow rates from entering the downstream natural channel in frequent runoff events.
- Regulate peak flows released to the natural channel in the 2-year and greater design rainfall events to approximate those estimated for the predevelopment condition in the watershed.
- Divert frequent flows and significant volumes of water from large rainfall events to a proposed storm drain system to be constructed in Old Ranch Road.

The planned 100-year peak outflow rates are 525 cfs to the downstream "South Tributary" (Analysis Point D12) and 75 cfs to the proposed Old Ranch Road storm drain (Analysis Point DFE). The planned 100-year storage volume requirement is 28 acre-feet as previously stated.

The flow released to the "South Tributary" along with the runoff from Sub-Basin D33 will be routed down the natural channel and enter Kettle Creek at Analysis Point D23. The estimated 100-year peak flow rate at Design Point D23 for the proposed condition is 543 cfs. The location of Analysis Point D23 equates to the location of historic condition Analysis Point H10. The 100-year peak flow rate estimated for historic Analysis Point H10 for the watershed in an undeveloped condition is 577 cfs.

The following table provides a comparison of peak flow rates for storm frequencies 2 through 100-year at historic Analysis Point H9 and developed conditions Analysis Point D12, discharge from proposed Regional Detention Facility "E", at the same location in the "South Tributary".

**HISTORIC CONDITION VERSES DEVELOPED CONDITION  
FLOW COMPARISON**

STORM FREQUENCY YEARS	ANALYSIS POINT – PEAK FLOW (cfs)		
	AP-H9/	AP-D12	NET DIFF
2	31	9	-22
5	107	77	-30
10	178	148	-30
25	320	297	-23
50	432	417	-15
100	557	525	-32

The tabulated analysis results indicate the ability of proposed Regional Detention Facility “E” with proposed staged outlet to effectively reduce peak outflows below historic levels.

**4. Sub-Basins D22 through D24**

The flow diverted to the proposed Old Ranch Road storm drain from proposed Regional Detention Facility “E” will be routed to Analysis Point D13 at the intersection with Lexington Drive where it will be joined with runoff from Sub-Basin D22. The combined flow will be routed down the proposed storm drain to Analysis Point D14 where it will be joined with the runoff from Sub-Basin D23. The combined flow will then be routed down the proposed storm drain to proposed Regional Detention Facility “F” where it will be joined with runoff from Sub-Basin D24.

Proposed Regional Detention Facility “F” is planned to have a 100-year peak inflow rate of 208 cfs, a 100-year peak outflow rate of 76 cfs, and a 100-year peak storage volume requirement of 9 acre-feet. The purpose of proposed Regional Detention Facility “F” is to reduce and lag peak flow rates released to the downstream storm drain system. Outflow from proposed Regional Detention Facility “F” will be routed through a proposed storm drain to Analysis Point D17 where it will enter an existing 42” diameter reinforced concrete storm drain in Old Ranch Road. The proposed

storm drain between Detention Facility "F" and the existing Old Ranch Road storm drain will replace an existing storm drain that was originally planned to drain much of the area contained in current Sub-Basin D24. The original design 100-year peak flow rate planned to enter the existing Old Ranch Road storm drain at Analysis Point D17 was 30 cfs, as indicated in the F.D.R. for Creekside Estates Filing No. 3. The original 100-year peak flow rate was 30 cfs, 46 cfs less than the current proposed 100-year peak outflow rate of 76 cfs from proposed Regional Detention Facility "F". The current analysis estimates the proposed 100-year peak flow rate at Analysis Point D17 to be 117 cfs. This is 30 cfs less than the original 100-year design flow rate of 147 cfs for the storm drain as shown on the construction plans for the storm drain, dated July 27, 1994. The decrease in the peak flow in the storm drain will be made possible by the significant lagging of peak flows that will occur in proposed Detention Facilities "E" and "F". This lagging will allow for peak flows from the local Sub-Basins D25 and D26 to clear the storm drain system prior to the occurrence of peak flows being released to the system from proposed Regional Detention Facility "F". A graph showing the relationship of the outflow hydrograph from Detention Facility "E" to the hydrographs at Analysis Points D16 and D17 is included in the appendix of this report.

##### **5. Sub-Basins D25 through D32**

Drainage patterns and criteria for the areas contained in the current Sub-Basins D25 through D32 are not proposed to be modified by the current plan. With the exception of a portion of the area contained in Sub-Basin D25, the areas contained in these Sub-Basins are currently developed. These sub-basins were included in the current analysis for the purpose of assessing the impact that the current plan will have on the existing storm drain facilities that have been constructed to handle storm water from these areas.

As indicated in previous drainage reports for the area, runoff from Sub-Basin D25 is collected in the existing storm drain system and conveyed to Design Point 16 where it is joined by runoff from Sub-Basin D26. From Design Point D16 the combined flow is conveyed in the existing 42" diameter storm drain to Design Point 17 where it will be combined with the outflow from proposed Regional Detention Facility "F".

The flow at Design Point D17 will be routed down the existing 42" diameter R.C.P. storm drain located in Old Ranch Road to Analysis Point D18 where it will be joined by flow from Sub-Basin D27 (intercepted by existing inlets in Old Ranch Road). The combined flow at Design Point D18 will then be routed down the existing storm drain in Old Ranch Road to Design Point 20 where it will be joined by flow from Sub-Basin D28 (collected in existing inlets located on the north and south sides of Old Ranch Road) and flow from a portion of Sub-Basin D29 (collected at Design Point 19). The existing 18" diameter storm drain connecting Design Point 19 and the existing inlet located on the south side of Old Ranch Road appears to be limited in capacity by its shallow inlet depth at Design Point 20. The approximate maximum capacity due to this constraint has been estimated at 20 cfs. Consistent with this, the maximum flow rate contributed to the existing Old Ranch Road storm drain from Sub-Basin D29 has been limited to 20 cfs in the current analysis.

The estimated 100-year peak flow rate for the proposed condition at Design Point 20 is 165 cfs. This compares favorably to the 100-year design flow rate of nearly 202 cfs as shown on the construction plans for the existing storm drain. The combined flow at Design Point 20 will be routed north down the existing 48" diameter storm drain to Design Point 21 located in Marble Creek Road at a wye in the existing storm drain system. Runoff from Sub-Basin D30 is conveyed to this point in an existing 24" diameter storm drain and enters the existing 48" diameter storm drain through the existing wye. At this point the proposed 100-year flow rates are in excess of the capacity of the existing down stream system. To remedy this capacity problem, it is recommended that a 30" diameter relief line be constructed from a point upstream Design Point 21 to the existing Creekside Estates Regional Detention Pond. The relief storm drain should have the capacity to divert at least 50 cfs from the down stream system. Construction of the relief line appears to be the most practical and economical solution to this problem. A copy of a spreadsheet used to estimate the hydraulic grade line in the system with the proposed condition design flow rates and the proposed relief line in place is included in the appendix of this report.

For the purpose of the existing hydrologic analysis it was assumed that all of the flow from Design Point 21 would be routed through the existing 48" diameter storm drain to Design Point 22. At Design Point 22, the runoff from Sub-Basin D31 will be added to the flow in the 48" diameter storm drain at an existing manhole. From Design Point 22, the combined flow will be routed down the existing 48" diameter storm drain to the existing Creekside Estates Regional Detention Facility where it will be joined by flow from Sub-Basin D32. The proposed condition for the existing Creekside Estates Regional Detention Facility will include a planned 100-year peak inflow rate of 221 cfs, a planned 100-year peak outflow rate of 90 cfs, and a planned 100-year storage volume requirement of 5 acre-feet. This can be compared to the planned 100-year peak inflow rate of 202 cfs, the planned 100-year outflow rate of 87 cfs, and the planned required peak 100-year storage requirement of 6.2 acre-feet as presented in the F.D.R. for Creekside Estates Filing No. 3. The existing emergency outlet structure and spillway outfall from the existing Creekside Estates Regional Detention Facility will require removal and replacement in order to function as planned in the proposed condition. With the proposed upgrade in place, the storage volume and freeboard available in the existing detention facility will be sufficient.

As noted above, the 100-year peak release rate from the Creekside Estates Regional Detention Facility will increase the 100-year peak release rate to 90 cfs, only 3 cfs greater than that was originally planned for the facility. This is due to the diversion of runoff from a significantly larger watershed to this point in combination with the peak flow rate reduction due to the lagging effect produced by proposed Detention Facilities "E" and "F".

Historic Analysis Point H11 compares to Creekside Estates Regional Detention Facility outfall to Kettle Creek. Analysis Points D24 (for the proposed developed condition) and H12 (for the historic or undeveloped condition) were created to represent the combined outflow from the South Tributary and the Creekside Estates Regional Detention Facility to Kettle Creek.

The following table compares the results of the historic and developed condition:

**HISTORIC CONDITION VERSES DEVELOPED CONDITION  
FLOW COMPARISON**

STORM FREQUENCY YEARS	ANALYSIS POINT – PEAK FLOW (cfs)					
	AP-H12/	AP-D24	NET DIFF.	AP-H11	DF “CS” OUT- FLOW	NET DIFF
2	37	40	+3	9	37	+28
5	129	111	-18	28	55	+27
10	219	188	-31	45	61	+16
25	398	347	-51	76	73	-3
50	535	501	-34	99	79	-20
100	693	630	-63	125	90	-35

As indicated in the tabulated results, the proposed discharge from Creekside Estates Regional Detention Facility exceeds historic rates at AP-H11 in the lesser storms while reducing the peak rate in 25-year through 100-year storms.

The comparison of Analysis Point H12 and Analysis Point D24 better reflects the net effect of the proposed storm drainage system on flows in Kettle Creek. As shown in the tabulated results, the only projected increase is 3 cfs, 37 cfs to 40 cfs, in the 2-year storm.

In order to put these flows in prospective, a review of the F.E.M.A. Floodway data indicates a 100-year flow rate of 9343 cfs at Section H downstream of the project and 7445 cfs at Section I upstream of the project site. On that basis, stream flow at Analysis Point H12/D24 would be at least 10 times the tabulated flow rate from the current study area. The 3 cfs increase in a flow rate of 350 to 400 cfs would be insignificant as well as less than the margin of error in this analysis.

**6. Sub-Basins D34 and D35**

The stormwater runoff from Sub-Basin D34 will be collected and conveyed in a proposed storm drain system along with runoff from Sub-Basin D35 to proposed

Regional Detention Facility "G". Outflow from this detention facility will be released to the natural channel labeled as the "North Tributary" on the drainage basin maps. Proposed Regional Detention Facility "G" is planned to have a 100-year peak inflow of 162 cfs, a 100-year peak outflow of 41cfs, and a 100-year storage volume requirement of 4 acre-feet. The estimated peak outflow rates from the proposed detention facility for the 2, 5, 10, 25, 50 and 100-year design storms for the fully developed condition are less than the estimated peak flow rates from these same storms that entered the north tributary channel at this point before development occurred in the watershed. The tabulated flow rate comparison follows:

**HISTORIC CONDITION VERSES DEVELOPED CONDITION  
FLOW COMPARISON**

STORM FREQUENCY YEARS	ANALYSIS POINT – PEAK FLOW (cfs)		NET DIFF.
	AP-H13	AP-DF"G"	
2	5	2	-3
5	14	11	-3
10	23	23	0
25	40	31	-9
50	52	36	-16
100	65	41	-24

**C. Major Proposed Facilities**

**1. Storm Drains**

Estimated required storm drain sizes are indicated on the Map titled "Fully Developed Condition Drainage Basin Map and Master Plan," contained in the appendix of this study. Design of these storm drains should include a detailed hydraulic analysis and sizes should be adjusted as required. Special attention should be given to the hydraulic grade line near the outlets of detention facilities to assure that backwater in the outfall lines will not interfere with the planned stage/discharge relationship.



## **2. Regional Detention Facilities**

### **a. General Design Criteria**

Design and construction of the regional detention facilities proposed by this plan shall conform to the requirements of the City of Colorado Springs and the State Engineer. To the extent practical the detention facilities shall be recessed into the ground rather than created behind large unarmored embankments. Where embankments are utilized above areas to be developed embankments widths should exceed the minimum required standards, or ideally the downstream development should be raised to or near to the level of the embankment where it is practical to do so. To the extent practical the detention facilities shall be located on the upstream side of street crossings and shall utilize the roadway embankments as dams. The general design criteria for the detention facilities shall include the following:

- The 100-year maximum water surface design elevation shall not exceed the height of the emergency spillway with the normal outlet operating normally.
- Each detention facility shall be fitted with an armored emergency spillway capable of passing 100-year routed design storm without damage to the structure assuming the facility is full and the outlet is totally clogged at the beginning of the storm. If the potential exists for a detention facility to receive overflow from an upstream detention facility consideration should be given to this condition in the design of the spillway for the downstream facility.
- The emergency spillways shall be oriented to direct flow in a manner that will minimize the potential for property damage and threat to human safety downstream if a spill occurs. In the case of proposed Detention Facilities "E", the emergency spillway should be configured to pass overflow to the downstream natural channel. Sufficient capacity should be maintained in the downstream South Tributary natural channel to allow the design overflow to pass without damage to structures. In the case of proposed Detention Facilities "F", the emergency spillway should be

oriented to pass overflow to the adjacent Old Ranch Road right-of-way and then to Kettle Creek. The potential for a large flow to occur down Old Ranch Road should be considered in the design of the roadway and adjacent development. In the case of proposed Detention Facility "C" the emergency spillway shall be configured to pass overflow to the capacity of the proposed 72" diameter culvert under Powers Boulevard to proposed Royal Pine Drive. This overflow should then be directed down Royal Pine Drive and then across Basin D37 to Old Ranch Road, then West down Old Ranch Road, to Kettle Creek. Overflow in excess of the proposed culvert's capacity should be diverted to the Powers Boulevard right-of-way.

- At least 2 feet of freeboard shall be provided above the peak water surface associated with the condition of having the normal outlet clogged, the pond full at the beginning of the design storm and discharge leaving the pond via the emergency spillway.

#### **b. Plan Assumptions for Individual Regional Detention Facilities**

The following assumptions were utilized in the hydrologic modeling performed in the preparation of the plan. If the final design of these detention facilities deviates from these assumptions the changes should be modeled in the context of the overall study area to verify that the changes do not negatively impact downstream facilities or planned peak flow rates downstream.

##### **1) Modified Creekside Estates Regional Detention Facility**

The modeled volume was based on the stage storage values shown in the Final Drainage Report for Creekside Estates Filing No. 3. The modeled outlet consists of a proposed staged outlet. The lowest opening was assumed to be a 2' diameter orifice with an invert elevation of 71.4. The upper outlet will be an 11' long weir and proposed emergency overflow channel which will replace the existing overflow channel. The HEC-1 Model predicts a maximum 100-year water surface elevation of 80.2 in the 100-year design storm. This maximum water surface is 1.8' lower than the

existing emergency spillway crest for the facility and 0.7' less than the planned 100-year maximum water surface elevation that is shown on the original construction plans for the facility.

**MODIFIED CREEKSIDE ESTATES REGIONAL DETENTION FACILITY  
Stage Storage Discharge Data**

<b>Water Surface Elevation (Feet)</b>	<b>Cumulative Storage Volume (AC/FT)</b>	<b>Outflow (cfs)</b>
72	0	0
73	0.050	4
74	0.398	15
75	1.026	28
76	1.723	32
77	2.488	35
78	3.325	38
79	4.235	41
80	5.221	78
81	6.283	143
82	7.423	226
83	8.643	324
84	9.946	435

**Normal  
Outlet Staged**

**Low Stage:** 2' Diameter Vertical Orifice, Invert = 6671.4

**High Stage:** 11' Long Horizontal Weir, Elevation = 6679.0

**2) Regional Detention Facility "A"**

The stage storage curve is based on an assumption that the pond will be created by building a roadway embankment across the existing broad natural swale at the site and letting the water pond on the upstream surface of the natural ground. Volumes were based on the existing F.I.M.S. topography. The stage discharge curve was based on the assumption that outflow would be controlled at the inlet end of a 30" diameter R.C.P. storm drain outfall line with an invert elevation of 54.0.

**DETENTION FACILITY "A"  
Stage Storage Discharge Data**

<b>Water Surface Elevation (Feet)</b>	<b>Cumulative Storage Volume (AC/FT)</b>	<b>Outflow (cfs)</b>
54	0	0
56	0.08	37
58	0.44	43
60	1.23	50
62	2.59	60
64	4.64	68
66	7.40	75

**Normal Outlet: 30" dia storm drain  
Normal Outlet Invert Elevation: 54.0**

### 3) Regional Detention Facility "B"

The stage storage curve is based on an assumption that the pond will be created by building a roadway embankment across the existing broad natural swale at the site and letting the water pond on the upstream surface of the natural ground. Volumes were based on the existing F.I.M.S. topography. The stage discharge curve was based on the assumption that outflow would be controlled at the inlet end of a 30" diameter R.C.P. storm drain outfall line with an invert elevation of 19.0.

#### DETENTION FACILITY "B" Stage Storage Discharge Data

<b>Water Surface Elevation (Feet)</b>	<b>Cumulative Storage Volume (AC/FT)</b>	<b>Outflow (cfs)</b>
19.0	0	0
20.0	0.02	38
22.0	0.18	43
24.0	0.69	50
26.0	1.44	60
28.0	3.23	68

**Normal Outlet: 30" Diameter Storm Drain**  
**Normal Outlet Invert Elevation: 19.0**

#### 4) Regional Detention Facility "C"

##### DETENTION FACILITY "C" Stage Storage Discharge Data

Water Surface Elevation (Feet)	Cumulative Storage Volume (AC/FT)	Normal Outlet Discharge (cfs)
52.0	0.0	0
54.0	0.9	28
55.0	2.1	37
56.0	3.4	45
58.0	6.3	58
60.0	9.7	66
62.0	13.6	74
64.0	17.8	81
66.0	22.6	88
68.0	27.8	94

**Normal Outlet:** 30" Diameter Storm Drain/Orifice  
**Normal Outlet Invert Elevation:** 51.0

NOTE: The above data reflects a generalized concept plan for a regular rectangular shaped pond. The current concept for the pond is to make it irregular in shape in order to avoid removing several large trees. The stage storage curve of the final design of the pond may vary from the above values. The final design should honor the outflow hydrograph for this pond as modeled for this study or the basin modeling should be updated to demonstrate that proposed changes do not adversely affect the downstream drainage system.

## 5) Regional Detention Facility “E”

The purpose of Regional Detention Facility “E” is twofold. It will reduce peak flow rates, and provide a point of diversion where flows from frequent storms will be diverted to a downstream storm drain in Old Ranch Road and large flows will be allowed to flow down the downstream natural channel. In order to minimize the impact to the natural channel, the outflow structure(s) at proposed Detention Facility “E” should be designed to accomplish the following:

- Allow low perennial flow to continue to flow to the downstream natural channel in order to support the wetlands located there.
- Prevent significant flow rates greater than the perennial flow rates from entering the downstream natural channel in frequent runoff events.
- Regulate peak flows released to the natural channel in the 2-year and greater design rainfall events to approximate those estimated for the predevelopment condition in the watershed. (See Table page 18)
- Divert frequent flows and significant volumes of water from large rainfall events to a proposed storm drain system to be constructed in Old Ranch Road.
- Lag peak flow released to the proposed Old Ranch Road storm drain.

**REGIONAL DETENTION FACILITY "E"**  
**Stage Storage Discharge Data**

<b>Water Surface Elevation (Feet)</b>	<b>Cumulative Storage Volume (AC/FT)</b>	<b>Normal Outlet to Storm Drain Discharge (cfs)</b>	<b>Normal Outlet to Natural Channel Discharge (cfs)</b>
22.5	0.0	0	0
23.0	0.1	0	0.7
24.0	0.7	0	1.2
26.0	2.8	18.0	1.8
28.0	5.1	32.5	2.2
30.0	7.8	42.3	2.6
32.0	10.8	50.2	5.4
33.0	12.5	53.7	17
34.0	14.2	57	41
35.0	16.0	60	81
36.0	18.0	63	138
37.0	19.8	66	170
38.0	22.0	69	240
39.0	24.1	71	364
40.0	26.4	74	456
41.0	28.8	76	556
42.0	31.2	79	671
43.0	33.8	81	796
44.0	36.4	83	933

**Normal Outlet To Old Ranch Road Storm Drain**

**Outlet:** 2.25' Diameter Vertical Orifice, Invert = 6824.0

**Normal Outlet Staged To Natural Channel**

**Low Stage:** 6" Diameter Vertical Orifice, Invert = 6822.25+/-

**High Stage:** 12" x 12' I.D. Reinforced Concrete Riser with 8' Diameter Outfall to the South Tributary Natural Channel, to Incorporate a 90° V-Notch Weir at Elevation 6831.0, Vertical at 6836.0 Forming a Broadcrested Weir to 6840.7, the Peak 100-year W.S.E.

In the emergency overflow condition the Q<sub>100</sub> inflow of 1078 cfs is planned to enter the 12' x 12' riser and outfall to the South Tributary through a proposed 8' diameter R.C.P.



**6) Regional Detention Facility "F"**

The purpose of Regional Detention Facility "F" is twofold. It will reduce peak flow rates and significantly lag peak outflows to allow local peak flows entering the downstream system to pass ahead of the peak pond outflow. The modeled outlet structure was assumed to be staged to accomplish this.

**DETENTION FACILITY "F"  
Stage Storage Discharge Data**

<b>Water Surface Elevation (Feet)</b>	<b>Cumulative Storage Volume (AC/FT)</b>	<b>Normal Outlet Discharge (cfs)</b>
58	0	0
58.5	0	1
60	0.4	4.6
62	1.6	7.1
64	3.04	8.9
66	4.76	10.4
68	6.78	11.7
70	9.13	98.4
72	11.81	135

**Normal Outlet (Staged)**

**Low Stage:** 12" Diameter Vertical Orifice, Pipe Invert = 6758.0

**High Stage:** 48" Diameter Horizontal Weir/Orifice, Elevation = 6768.0

**7) Regional Detention Facility “G”**

The purpose of proposed Regional Detention Facility “G” is to control developed condition peak flow rates released to the North Tributary from the contributing watershed to less than the estimated historic peak flow rates contributed to the North Tributary at the proposed outlet point in the 2, 5, 10, 25, 50 and 100-year design storms.

**DETENTION FACILITY “G”  
Stage Storage Discharge Data**

<b>Water Surface Elevation (Feet)</b>	<b>Cumulative Storage Volume (AC/FT)</b>	<b>Normal Outlet Discharge (cfs)</b>
60	0	0
61	0.081	0.8
62	0.262	1.3
64	0.732	1.8
66	1.366	2.3
68	2.179	24.0
70	3.195	33.2
72	4.211	40.3
74	5.630	46.3

**Normal Outlet (Staged)**

**Low Stage:** 12” Diameter Vertical Orifice, Invert = 6760.0

**High Stage:** 24” Diameter Horizontal Weir/Orifice, Elevation = 6766.0

**c. Regional Detention Facility Maintenance**

The six proposed and one existing Regional Detention Facilities discussed in this document are all proposed to be publicly owned and publicly maintained for functional purposes. Any aesthetic maintenance beyond the City's maintenance will be by and totally at the expense of others and will require an agreement with the City.

**3. Kettle Creek and North and South Tributary Channels**

**a. Kettle Creek**

No improvements to Kettle Creek are proposed in this plan other than the proposed modifications to the outfall storm drain from the existing Creekside Estates Regional Detention Facility. In order to mitigate the potential impact to Kettle Creek caused by future development of the study area, the current plan proposes extensive detention in the watershed in order to control release rates to the creek.

**b. North Tributary Channel**

No improvements to the North Tributary channel are proposed in this plan other than the construction of the outfall storm drain from proposed Regional Detention Facility "G". Regional Detention Facility "G" is planned to regulate peak release rates from the 2, 5, 10, 25, 50 and 100-year storms to less than those estimated for the historic condition in order to mitigate the impact of development on the downstream natural channel.

**c. South Tributary Channel**

Improvements to the South Tributary channel proposed in this plan are limited to the partial removal of three existing small earthen dams across the channel, limited construction of erosion control treatment in the vicinity of the dams to be modified, and construction of proposed Regional Detention Facility "E" and associated outfall structure near the upper limits of the defined channel. The partial removal of the existing dams is proposed in order to confine the proposed design flows to the channel. Limited erosion control treatment may be required in order to mitigate the potential for head cuts to occur in the vicinities of the

modified dams. The primary development impact mitigation measures proposed in this plan is the diversion of runoff from frequent storms to a storm drain system rather than allowing it to be conveyed down this relatively steep natural channel while allowing the perennial flow that supports the vegetation growing in the channel to continue flowing. The proposed outflow structures for the proposed Regional Detention Pond "E" are planned to limit both peak flow rates and volumes that will be released to the natural channel and thus, should minimize potential impacts that development of the study area may have on the channel.

#### **4. Proposed Constraints and Recommendations**

- a. The following discharge constraints are proposed for the study area:
  - Free discharge of developed condition drainage from the study area will be allowed provided that the following criteria is followed.
  - Adequate down stream conveyance facilities must exist or be provided in accordance with City of Colorado Springs policy and criteria.
  - Runoff must be routed through the regional detention facilities as proposed in this study unless a detailed drainage study demonstrates the adequacy of alternative routing to achieve the discharge goals of this study.
  - Land uses must be similar or less intensive than the land uses assumed for the purpose of this study unless a detailed drainage analysis indicates that free discharge from the more intensive land use will not have an adverse affect on the downstream drainage facilities.
  
- b. The following recommendations are made with regard to facilities and sites that emergency overflow from detention ponds will be diverted to:
  - Lots adjacent to proposed Royal Pine Drive located downstream or adjacent to the outfall from proposed Detention Facility "C" should be graded to be a minimum of 1.5 feet above the adjacent flow line of the street or be hydraulically isolated from the street by a wall or berm or combination of the two.
  - An overflow route should be planned and an easement recorded for the same across Basin D37 between the low point of proposed Royal Pine Drive and

Old Ranch Road at the time that the site is developed. Structures on the site should be elevated such that the overflow can pass without causing significant damage.

- Lots located adjacent to Old Ranch Road and downstream of Chapel Hills Drive should be graded to be a minimum of 1.5 feet above the adjacent flow line of the street or be hydraulically isolated from the street by a wall or berm or combination of the two.

## **5. Recommendations for Implementation**

The study area extends to the top of the included watershed. The study proposes adequate drainage improvements that are to be constructed by the major property owners/developers in the area, and proposes to limit the peak 2, 5, 10, 25, 50 and 100-year flow rates contributed to Kettle Creek from the study area in the proposed fully developed condition to less than or nearly equal to the estimated peak flow rates that were contributed to Kettle Creek by the study area in the historic (undeveloped) condition. This study area is to be considered a closed basin, with the developers of the properties within the basin being responsible for constructing the drainage improvements related to development within the basin. As a closed basin, development of property within the plan area is exempt from assessments of separate drainage fees.

Construction of the proposed modification to the existing Creekside Detention Pond should be done prior to discharging flow from proposed Regional Detention Facility "E" to the Old Ranch Road storm sewer system.

Construction of other required drainage improvements should be timed to coincide with or precede construction of the development that the improvements will support. It is anticipated that interim condition plans will be developed as required to identify facilities that are necessary in the relatively near future, to implement the drainage system outlined in this study. Prior to the development of the interim condition plans any storm drains that are to be located under streets that are to be paved should be constructed prior to the construction of the street improvements.

## 6. Requirements of Governmental Agencies Outside of the City of Colorado Springs

Several governmental agencies external to the City of Colorado Springs will have involvement in the review and approval process for individual construction projects proposed for the study area.

- The Federal Emergency Management Agency has jurisdiction over development within the regulatory 100-year floodplain. A floodplain development permit will likely be required for constructing the proposed modifications to the outfall storm drain from the existing Creekside Estates Regional Detention Facility. Floodplain development permits are generally issued by the local community's Floodplain Administrator.
- The U.S. Army Corps of Engineers has jurisdiction over development within or modifications to features defined as "waters of the United States." Construction within or that may impact these areas may require permitting by the U.S. Army Corps of Engineers.
- The Prebles Meadow Jumping Mouse is currently listed as a threatened species by the U.S. Fish and Wildlife Service. Portions of the study area may contain habitat for the mouse. Due to this, some or all of the proposed projects may be subject to review by local, state, and/or federal agencies in regards to potential impacts on the mouse.
- The office of the State Engineer has jurisdiction over many of the dams in the State. Depending upon final design, configurations of the proposed Regional Detention Facilities some may be "Jurisdictional Dams," and may be "exempt" or "nonexempt" from the rules of the State Engineer. Facilities should be evaluated on an individual basis at the time of design.

PREPARED BY:

**JR Engineering**



John R. Bessette, P.E.  
Senior Project Engineer II

**JR Engineering**



Vancel S. Fossinger, P.E.  
Project Manager

## REFERENCES

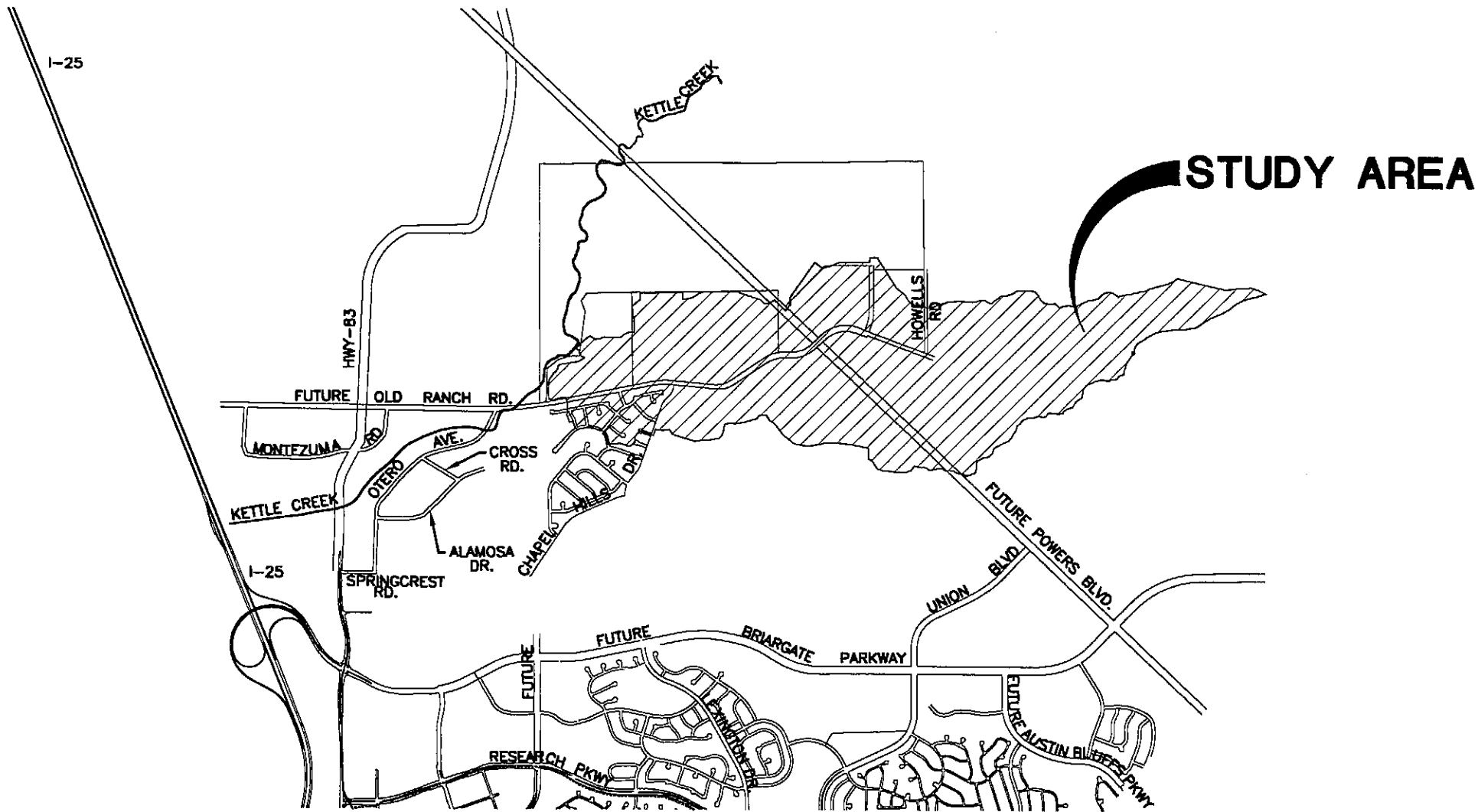
1. "City of Colorado Springs/County of El Paso Drainage Criteria Manual," dated November 1991.
2. Soils Survey of El Paso County Area, Colorado Soil Conservation Service.
3. "Flood Insurance Rate Study for El Paso County, Colorado and Incorporated Areas," Federal Emergency Management Agency, revised March 17, 1997.
4. "HEC-1 Flood Hydrographic Package Users Manual," U.S. Army Corps of Engineers, dated September 1990.
5. "Johnson Ranch Neighborhood Plan," by N.E.S. Inc., dated April 1997.
6. "Kettle Creek Neighborhood Plan," by N.E.S., Inc., dated April 1997.
7. "Master Plan, Pine Creek at Briargate," by Downing, Thorpe, James, drafts dated August 1, 1997.
8. "Briargate Master Plan," by N.E.S., Inc., dated May 1998.
9. Construction Plans for Creekside Estates Filings No. 1, 3 and 4, by JR Engineering, Ltd, various dates.
10. "Amendment No. 2 to the Pine Creek Drainage Basin Planning Study and M.D.D.P. for Pine Creek Subdivision," by JR Engineering, Ltd. dated October 1998.
11. "Master Development Drainage Plan Addendum for Creekside Estates," by JR Engineering, Ltd., dated March 1994.
12. "Final Drainage Report for Creekside Estates Filing No. 3," by JR Engineering, Ltd., dated July 1994.
13. "Final Drainage Report for Creekside Estates Filing No. 4," by JR Engineering, Ltd., dated September 1994.
14. "Final Drainage Report for Old Ranch Road," by JR Engineering, Ltd. dated June 1997.
15. "Final Drainage Report for Academy High School No. 5," by Martin and Martin, Inc., dated January 1997.
16. "Preliminary/Final Drainage Report for Royal Pine Drive," by JR Engineering, April 2001.
17. "Final Drainage Reports for Pine Creek Subdivision Filings 9, 14, 26, 28, 29 and 30," by JR Engineering, various dates.
18. "Drainage Letter to Amend The Final Drainage Report for Pine Creek Subdivision Filing No. 29," by JR Engineering, dated July 2002.

## **APPENDIX**



**A.**  
**VICINITY MAP**

X860000.ALL867710DRAWINGSVICINITYMAP.DWG DATE 6/8/89

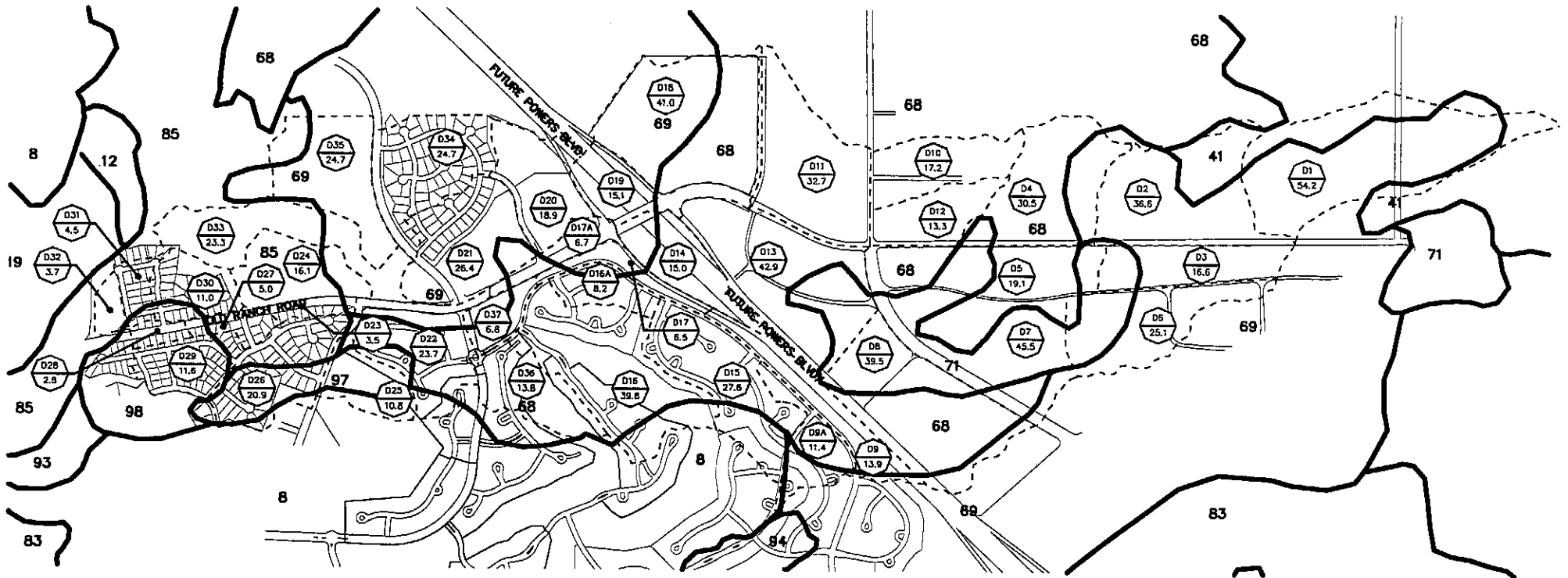


VICINITY MAP  
1" = 3000'






**B.**  
**S.C.S. SOIL MAP**

# S.C.S SOIL MAP



## LEGEND

-  SOIL MAP UNIT BOUNDARY
-  DEVELOPED DRAINAGE BASIN BOUNDARY
-  DRAINAGE BASIN ID
- 85 SOIL MAP SYMBOL

**\*NOTE:**  
SOIL MAP UNIT BOUNDARIES  
AND SOIL DATA WERE COPIED  
FROM S.C.S. SOIL SURVEY OF  
EL PASO COUNTY AREA, COLORADO.

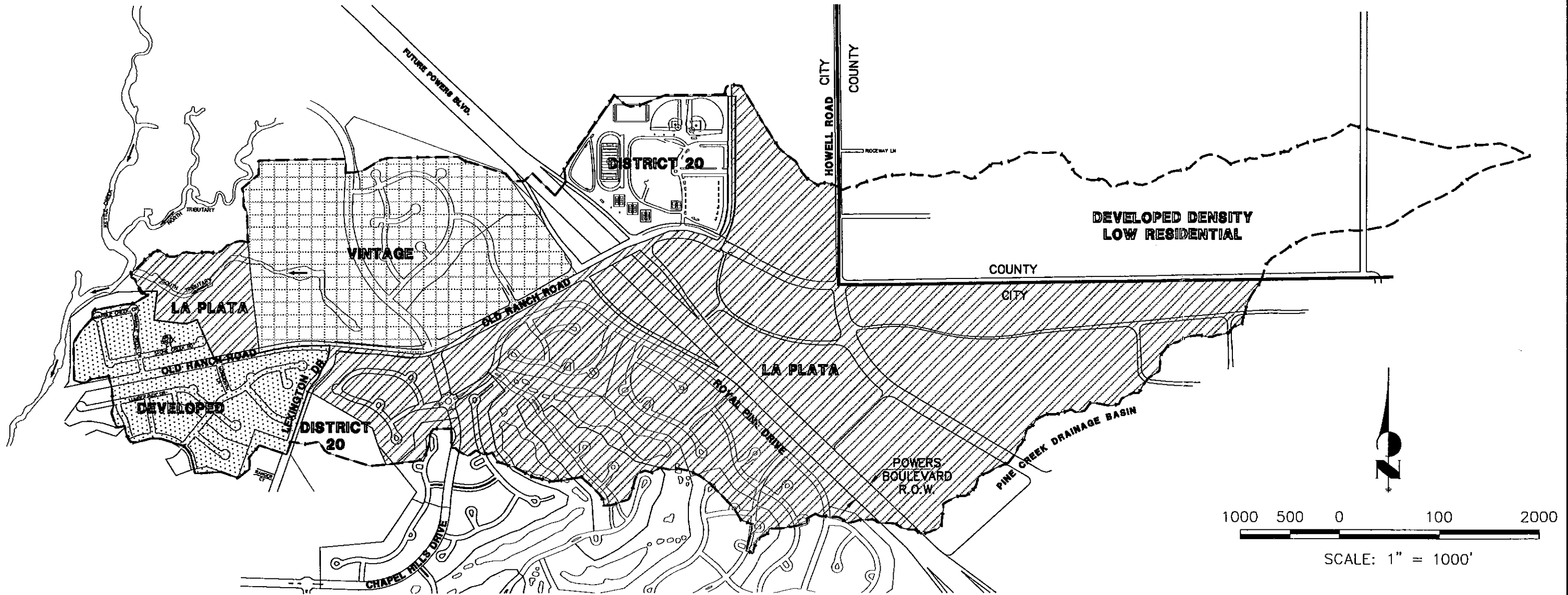
SOIL DATA		
SOIL MAP SYMBOL	SOIL NAME	HYDROLOGIC SOIL GROUP
8	BLAKELAND LOAMY SAND, 1 TO 9% SLOPES	A
41	KETTLE GRAVELY LOAMY SAND, 8 TO 40% SLOPES	B
68	PEYTON PRING COMPLEX, 3 TO 8% SLOPES	B
69	PEYTON PRING COMPLEX, 8 TO 15% SLOPES	B
71	PRING COURSE SANDY LOAM, 3 TO 8% SLOPES	B
85	STAPLETON BERNAL SANDY LOAM, 3 TO 20% SLOPES	B
97	TRUCKTON SANDY LOAM, 3 TO 9% SLOPES	B
98	TRUCKTON -BLAKELAND, 9 TO 20% SLOPES	B



SCALE: 1" = 1500'



**C.**  
**GENERAL LAND OWNERSHIP**

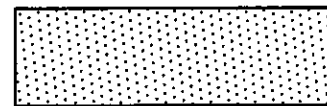


**LEGEND**

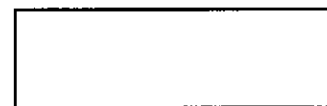
BASIN BOUNDARY



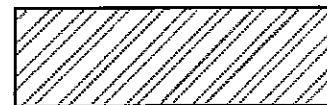
DEVELOPED AREA



DISTRICT 20 SCHOOL DISTRICT



LP47, LLC dba La Plata Investments



VINTAGE COMMUNITIES



KETTLE CREEK DRAINAGE BASIN  
 OLD RANCH ROAD TRIBUTARY  
 DRAINAGE BASIN PLANNING STUDY AND  
 MASTER DEVELOPMENT DRAINAGE PLAN  
 GENERAL LAND OWNERSHIP IN STUDY AREA

JOB NO. 8877.10  
 04/18/01  
 SHEET 1 OF 1

 **J-R ENGINEERING**  
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 719-593-2593 • Fax: 719-528-6613 • www.jrengineering.com

**D.**  
**F.E.M.A. FLOOD INSURANCE RATE MAP**

NATIONAL FLOOD INSURANCE PROGRAM

**FIRM**  
FLOOD INSURANCE RATE MAP


EL PASO COUNTY,  
COLORADO AND  
INCORPORATED AREAS

PANEL 506 OF 1300  
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS CITY OF	08000	0507	F
EL PASO COUNTY	08006	0507	F
UNINCORPORATED AREAS	08006	0507	F

MAP NUMBER  
08041C0506 F

EFFECTIVE DATE:  
MARCH 17, 1997



Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

**FIRM**  
FLOOD INSURANCE RATE MAP


EL PASO COUNTY,  
COLORADO AND  
INCORPORATED AREAS

PANEL 507 OF 1300  
(SEE MAP INDEX FOR PANELS NOT PRINTED)

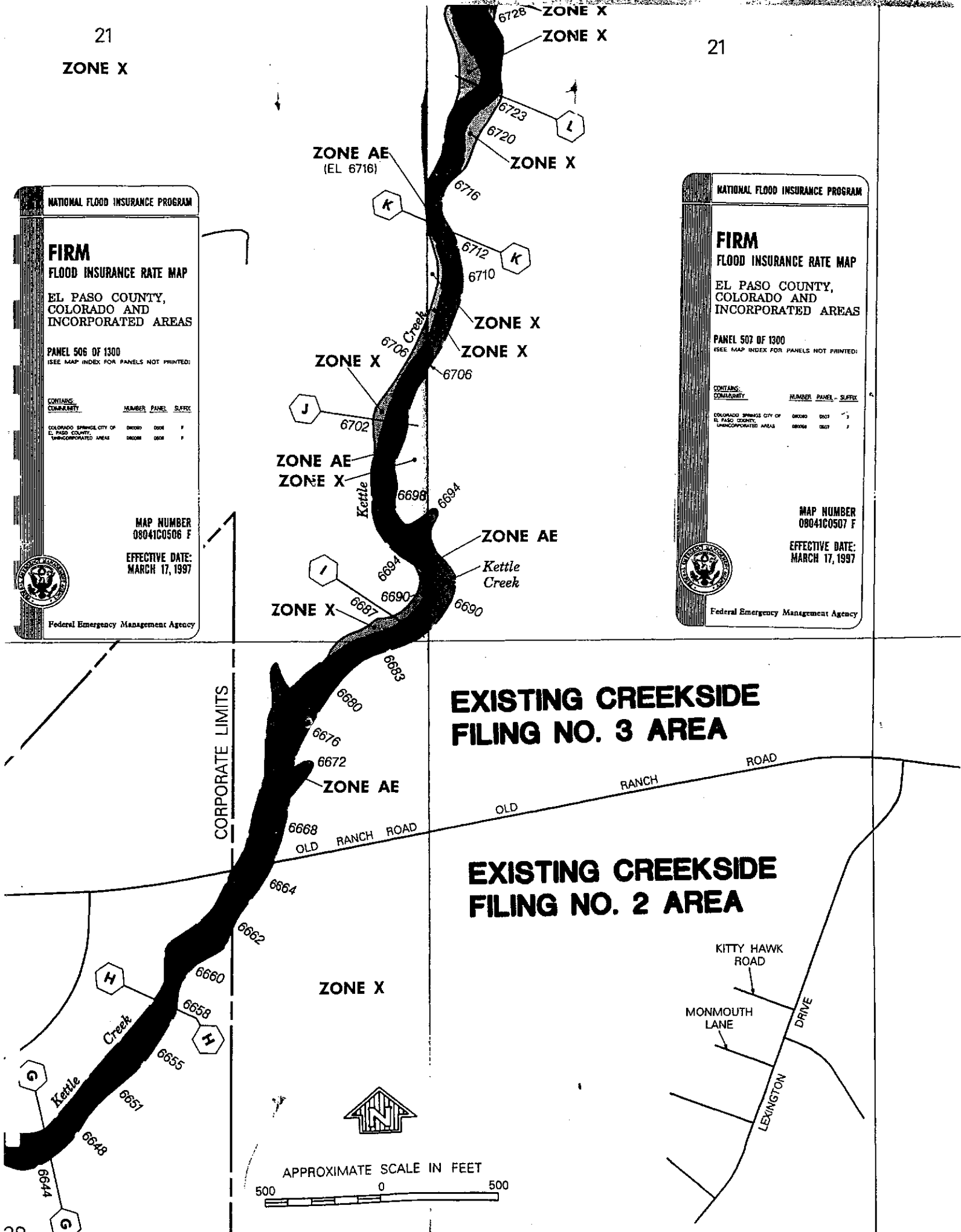
CONTAINS:	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS CITY OF	08000	0507	F
EL PASO COUNTY	08006	0507	F
UNINCORPORATED AREAS	08006	0507	F

MAP NUMBER  
08041C0507 F

EFFECTIVE DATE:  
MARCH 17, 1997



Federal Emergency Management Agency



**EXISTING CREEKSIDE  
FILING NO. 3 AREA**

**EXISTING CREEKSIDE  
FILING NO. 2 AREA**



**E.**

**HYDROLOGIC MODEL INPUT CALCULATIONS**

- **CURVE NUMBERS**
- **CURVE NUMBER ADJUSTMENT**
- **LAG TIME**

KETTLE CREEK DRAINAGE BASIN  
 OLD RANCH ROAD TRIBUTARY  
 MASTER DEVELOPMENT DRAINAGE PLAN

DEVELOPED CONDITION  
 ESTIMATED CURVE NUMBERS  
 4/3/2001

SUB-BASIN LABEL	SUB AREA ONE				SUB AREA TWO				SUB AREA THREE				SUB AREA FOUR				TOTAL AREA AC.	TOTAL AREA S.M.	WEIGHTED CN	WEIGHTED INPERV.
	ASSUMED LAND USE	ESTIMATED PERCENT IMPERVIOUS	ESTIMATED CN	AREA AC.	ASSUMED LAND USE	ESTIMATED PERCENT IMPERVIOUS	ESTIMATED CN	AREA AC.	ASSUMED LAND USE	ESTIMATED PERCENT IMPERVIOUS	ESTIMATED CN	AREA AC.	ASSUMED LAND USE	ESTIMATED PERCENT IMPERVIOUS	ESTIMATED CN	AREA AC.				
D1	<1 DU/AC	5.0	69.0	54.2													54.2	0.065	89.0	5.0
D2	<1 DU/AC	5.0	69.0	34.3													36.6	0.057	70.5	10.0
D3	2DU/AC	25.0	70.0	14.3	ART. STREET	85.0	93.0	2.3									16.6	0.026	73.2	33.3
D4	<1 DU/AC	5.0	69.0	28.9	ART. STREET	85.0	93.0	1.6									30.5	0.046	70.3	9.2
D5	2DU/AC	25.0	70.0	17.4	ART. STREET	85.0	93.0	1.7									19.1	0.030	72.0	30.3
D6	4DU/AC	40.0	76.0	18.4	SCHOOL	60.0	84.0	6.7									25.1	0.039	78.1	42.7
D7	4DU/AC	40.0	76.0	31.3	ART. STREET	85.0	93.0	8.7	2DU/AC	25.0	70.0	5.5					45.5	0.071	78.5	46.8
D8	MULT FAM	70.0	87.0	6.0	ART. STREET	85.0	93.0	3.4	L/O	83.0	92.0	25.6	OPEN SPACE	5.0	69.0	4.5	39.5	0.062	88.7	72.3
D9*					ART. ST. PAV.	100.0	99.0	4.9	OPEN SPACE	9.0	69.0	9.0					13.9	0.022	79.6	41.1
D9A	3 DU/AC	30.0	70.0	9.2	STREET PAV.	100.0	99.0	0.8	OPEN SPACE	5.0	69.0	1.4					11.4	0.018	71.9	31.8
D10	<1 DU/AC	5.0	69.0	16.5	ART. STREET	85.0	93.0	0.7									17.2	0.027	70.0	8.3
D11	2DU/AC	25.0	70.0	30.2	ART. STREET	85.0	93.0	2.5									32.7	0.051	71.8	29.6
D12	<1DU/AC	25.0	69.0	11.2	ART. STREET	85.0	93.0	2.1									13.3	0.021	72.8	34.5
D13*	COMMERCIAL	95.0	95.0	10.0	ART. ST. PAV.	100.0	99	4	MULT FAM	70.0	87.0	24.9	OPEN SPACE	5.0	69.0	4.0	42.9	0.067	88.3	72.6
D14*	INTERCHANGE	100.0	99.0	5.0	OPEN SPACE	5.0	69.0	10.0									15.0	0.023	79.0	36.7
D15*	3 DU/AC	30.0	72.0	26.5	OPEN SPACE	5.0	69.0	0.4	ART. ST. PAV.	85.0	93.0	0.7					27.6	0.043	72.5	31.0
D16*	3 DU/AC	30.0	72.0	26.2	GOLF CRS	0.0	61.0	13.1	ART. ST. PAV.	100.0	99.0	0.5					39.8	0.062	68.7	21.0
D16A	3 DU/AC	30.0	70.0	7.5	ART. ST. PAV.	100.0	99.0	0.7									8.2	0.013	72.5	36.0
D17*					ART. ST. PAV.	100.0	99.0	1.9	OPEN SPACE	5.0	69.0	4.6					6.5	0.010	77.8	32.8
D17A*					ART. ST. PAV.	100.0	99.0	3.5	COMMERCIAL	95.0	95.0	2.0	OPEN SPACE	5.0	69.0	1.3	6.8	0.011	92.3	80.9
D18	SCHOOL	38.0	80.0	41.0													41.0	0.064	80.0	38.0
D19	INTERCHANGE	40.0	80.0	15.1													15.1	0.024	80.0	40.0
D20	COMMERCIAL	95.0	95.0	9.2	OPEN SPACE	5.0	69.0	0.7	MULTI FAM	70.0	87.0	8.2	ART. STREET	85.0	93.0	0.8	18.9	0.030	90.5	80.4
D21*	COMMERCIAL	95.0	95.0	12.5	OPEN SPACE	5.0	69.0	4.5	4DU/AC	40.0	76.0	8.0	ART. STREET	85.0	93.0	1.4	26.4	0.041	84.7	62.5
D22*	3 DU/AC	30.0	72.0	19.0					ART STREET	85.0	93.0	4.7					23.7	0.037	76.2	40.9
D23	3 DU/AC	30.0	72.0	1.8	ART. STREET	85.0	93.0	1.7									3.5	0.005	82.2	56.7
D24	3 DU/AC	30.0	72.0	13.3	OPEN SPACE	5.0	69.0	2.8									16.1	0.025	71.5	25.7
D25*	4 DU/AC	40.0	76.0	0.7	SFA 5DU/AC	70.0	87.0	1.4	SCHOOL	60.0	80.0	8.3	ART STREET	85.0	93.0	0.4	10.8	0.017	81.1	53.2
D26	3 DU/AC	30.0	72.0	20.9													20.9	0.033	72.0	30.0
D27	3 DU/AC	30.0	72.0	3.5	ART. STREET	85.0	93.0	1.5									5.0	0.008	78.3	46.5
D28	3 DU/AC	30.0	72.0	1.8	ART. STREET	85.0	93.0	1.0									2.8	0.004	79.5	49.6
D29	3 DU/AC	30.0	72.0	2.5	4 DU/AC	40.0	76.0	9.1									11.6	0.018	75.1	37.8
D30	3 DU/AC	30.0	72.0	9.0	OPEN SPACE	5.0	69.0	2.0									11.0	0.017	71.5	25.5
D31	4 DU/AC	40.0	76.0	4.5													4.5	0.007	76.0	40.0
D32	OPEN SPACE	5.0	69.0	3.7													3.7	0.006	69.0	5.0
D33*	3 DU/AC	30.0	72.0	8.0	OPEN SPACE	5.0	76.0	18.3									23.3	0.036	75.1	10.4
D34	3 DU/AC	30.0	72.0	21.8	ART. STREET	85.0	93.0	2.9									24.7	0.039	74.5	36.5
D35	4 DU/AC	40.0	76.0	24.7													24.7	0.039	76.0	40.0
D36*	3 DU/AC	30.0	72.0	6.5	ART STREET	85.0	93.0	1.2	GOLF CRS	0.0	61.0	7.5					15.2	0.024	68.2	19.5
D37*	COMMERCIAL	95.0	95.0	5.5	ART STREET	85.0	93.0	1.3									6.8	0.011	94.6	93.1
																	812.0	1.3		

KETTLE CREEK DRAINAGE BASIN  
 OLD RANCH ROAD TRIBUTARY  
 MASTER DEVELOPMENT DRAINAGE PLAN  
 FULLY DEVELOPED CONDITION OUTPUT SUMMARY AND CURVE NUMBER ADJUSTMENT  
 3/27/2001

TYPE IIa 24HR STRM @3 MIN. TIME STEP

SUB BASIN I.D.	AREA (sq miles)	AREA (acres)	IMPERVIOUS PERCENT	COMPUTED CN	ADJUSTED CN	COMPUTED C <sub>100</sub>	TC (min)	LAG (hours)	HEC1 MODEL				I <sub>100</sub> (in/hr)	RATIONAL METHOD Q <sub>100</sub> (cfs/AC)	COMPUTED HEC1 VS. RATIONAL PERCENT	ADJUSTED HEC1 VS. RATIONAL PERCENT	COMPUTED RATIONAL Q100
									W/ COMPUTED CN		W/ ADJUSTED CN						
									Q <sub>100</sub> (cfs)	Q <sub>100</sub> /ACRE (cfs)	Q <sub>100</sub> (cfs)	Q <sub>100</sub> /ACRE (cfs)					
D1	0.085	54.2	5.0	69.0	67.5	0.38	38.34	0.383	78	1.44	72	1.33	3.49	1.33	8	0	72
D2	0.057	36.6	10.0	70.5	69.0	0.41	22.41	0.224	78	2.13	72	1.97	4.79	1.96	8	0	72
D3	0.026	16.6	33.3	73.2	75.0	0.55	26.70	0.267	37	2.23	40	2.41	4.34	2.38	-7	1	40
D4	0.048	30.5	9.2	70.3	68.2	0.41	24.46	0.245	62	2.03	56	1.84	4.56	1.85	9	-1	56
D5	0.030	19.1	30.3	72.0	74.5	0.53	23.90	0.239	42	2.20	47	2.46	4.62	2.46	-12	0	47
D6	0.039	25.1	42.7	78.1	79.2	0.61	16.43	0.164	82	3.27	86	3.43	5.63	3.41	-5	0	86
D7	0.071	45.5	46.8	78.5	79.8	0.63	17.31	0.173	149	3.27	157	3.45	5.49	3.46	-6	0	157
D8	0.062	39.5	72.3	88.7	92.2	0.78	11.12	0.111	193	4.89	208	5.27	6.76	5.30	-8	-1	209
D9*	0.022	13.9	41.1	79.6	77.0	0.60	25.09	0.251	42	3.02	37	2.66	4.49	2.68	11	-1	37
D9A*	0.018	11.4	31.8	71.9	74.5	0.54	21.27	0.213	27	2.37	30	2.63	4.92	2.66	-12	-1	30
D10	0.027	17.2	8.3	70.0	68.0	0.40	30.69	0.307	30	1.74	27	1.57	4.00	1.60	8	-2	27
D11	0.051	32.7	29.6	71.8	74.2	0.53	23.11	0.231	73	2.23	81	2.48	4.70	2.48	-11	0	81
D12	0.021	13.3	34.5	72.8	74.6	0.56	28.05	0.281	28	2.11	31	2.33	4.21	2.35	-11	-1	31
D13*	0.067	42.9	72.6	88.3	91.5	0.79	12.33	0.123	204	4.76	219	5.10	6.46	5.07	-7	1	218
D14*	0.023	15.0	36.7	79.0	78.0	0.57	15.83	0.158	51	3.40	49	3.27	5.74	3.27	4	0	49
D15*	0.043	27.6	31.0	72.5	75.0	0.54	19.99	0.200	68	2.46	75	2.72	5.09	2.73	-11	0	75
D16*	0.062	39.8	21.0	68.7	72.5	0.48	19.69	0.197	83	2.09	98	2.46	5.13	2.44	-17	1	97
D16A*	0.013	8.2	36.0	72.5	78.0	0.57	14.31	0.143	23	2.80	28	3.41	6.03	3.41	-22	0	28
D17*	0.010	6.5	32.8	77.8	76.5	0.55	11.65	0.117	22	3.38	25	3.85	6.63	3.62	-7	6	24
D17A	0.010	6.7	80.9	92.3	99.0	0.84	11.95	0.120	33	4.93	36	5.37	6.55	5.47	-11	-2	37
D18	0.064	41.0	38.0	80.0	76.3	0.58	25.24	0.252	123	3.00	106	2.59	4.48	2.59	14	0	106
D19	0.024	15.1	40.0	80.0	80.9	0.59	12.16	0.122	50	3.31	59	3.91	6.50	3.83	-16	2	58
D20	0.030	18.9	80.4	90.5	96.5	0.83	10.83	0.108	98	5.19	107	5.66	6.84	5.69	-10	-1	108
D21*	0.041	26.4	62.5	84.7	86.5	0.73	13.68	0.137	111	4.20	117	4.43	6.16	4.46	-6	-1	118
D22*	0.037	23.7	40.9	76.2	78.5	0.60	15.64	0.156	74	3.12	81	3.42	5.77	3.44	-10	-1	81
D23	0.005	3.5	56.7	82.2	88.0	0.69	11.05	0.111	13	3.71	15	4.29	6.78	4.68	-26	-9	16
D24	0.025	16.1	25.7	71.5	74.5	0.50	15.06	0.151	42	2.61	48	2.98	5.88	2.97	-14	1	48
D25	0.017	10.8	53.2	81.1	82.2	0.67	15.60	0.156	40	3.70	42	3.89	5.78	3.87	-4	1	42
D26	0.033	20.9	30.0	72.0	75.5	0.53	14.46	0.145	57	2.73	66	3.16	6.00	3.18	-17	-1	66
D27	0.008	5.0	46.5	78.3	80.0	0.63	14.35	0.144	18	3.60	19	3.80	6.02	3.79	-5	0	19
D28	0.004	2.8	49.6	79.5	84.0	0.65	13.71	0.137	9	3.21	11	3.93	6.15	3.98	-24	-1	11
D29	0.018	11.6	37.8	75.1	78.2	0.58	14.57	0.146	35	3.02	40	3.45	5.98	3.45	-14	0	40
D30	0.017	11.0	25.5	71.5	74.4	0.50	15.72	0.157	28	2.55	32	2.91	5.76	2.90	-14	0	32
D31	0.007	4.5	40.0	76.0	78.5	0.59	14.55	0.146	14	3.11	16	3.56	5.98	3.53	-13	1	16
D32	0.006	3.7	5.0	69.0	68.0	0.38	11.45	0.115	10	2.70	9	2.43	6.68	2.54	6	-4	9
D33*	0.036	23.3	10.4	75.1	70.2	0.41	13.83	0.138	72	3.09	59	2.53	6.13	2.53	18	0	59
D34	0.039	24.7	36.5	74.5	77.0	0.57	15.92	0.159	73	2.96	80	3.24	5.72	3.26	-10	-1	80
D35	0.039	24.7	40.0	76.0	78.0	0.59	16.11	0.161	77	3.12	83	3.36	5.69	3.36	-8	0	83
D36*	0.024	15.2	19.5	68.2	72.0	0.47	23.74	0.237	28	1.84	34	2.24	4.63	2.16	-17	3	33
D37	0.011	6.8	93.1	94.6	99.0	0.91	12.41	0.124	36	5.29	40	5.88	6.44	5.85	-11	1	40
TOTAL	1.258	812.000															40

**KETTLE CREEK DRAINAGE BASIN  
OLD RANCH ROAD TRIBUTARY  
MASTER DEVELOPMENT DRAINAGE PLAN**

**HISTORIC (UNDEVELOPED) CONDITION LAG TIME ESTIMATE**

5/6/1999

BASIN ID.	OVERLAND FLOW				GRASS LINED SWALE				NATURAL CHANNEL				TOTAL	TOTAL	TOTAL	
	L (ft)	C(10YR)	S (%)	TC(min)	L (ft)	S (%)	V (fps)	TC(min)	TYPE	L (ft)	S(%)	V (fps)	TC(min)	TC(min)	LAG(min.)	LAG(hrs)
H1	500	0.25	2.2	26.37	2060	4.1	3.0	11.44	1	1260	2.9	5.0	4.20	42.02	25.21	0.420
H2	500	0.25	5.6	19.38	1350	4.6	3.2	7.03	2	1510	2.4	6.5	3.87	30.28	18.17	0.303
H3	500	0.25	5.2	19.86	550	4.7	3.2	2.86	1	2350	3.1	4.5	8.70	31.42	18.85	0.314
H4	350	0.25	8.6	14.07				0.00	1	1900	2.9	6.7	4.73	18.80	11.28	0.188
H5	500	0.25	6.2	18.74	930	4.8	3.3	4.70	1	1540	4.5	5	5.13	28.57	17.14	0.286
H6	500	0.25	4.2	21.31	3330	4.3	3.1	17.90					0.00	39.21	23.53	0.392
H7	500	0.25	3.4	22.84	2040	3.1	2.6	13.08	3				0.00	35.92	21.55	0.359
H8	500	0.25	5	20.11	760	2.9	2.6	4.87	3	2140	3	3.7	9.64	34.63	20.78	0.346
H9	500	0.25	6.4	18.54	590	5.8	3.7	2.66	3	3230	2.9	6.3	8.54	29.74	17.85	0.297
H10	500	0.25	10	16.00	320	13	5.2	1.03	2	2170	4.6	8	4.52	21.55	12.93	0.215
H11	500	0.25	2.2	26.37	800	2.4	2.4	5.56	2	3750	5.6	6.8	9.19	41.12	24.67	0.411
H12	500	0.25	4.4	20.98	3250	3.8	3.1	17.47	2	600	8.3	8	1.25	39.70	23.82	0.397

UPPER OVERLAND FLOW (TC=1.8\*(1.1-C10)\*(L^0.5)\*S^-0.33)

GRASS LINED SWALE VELOCITIES BASED ON SCS TR 55 CHART  
FLOW RATE

NATURAL CHANNEL VELOCITIES BASED ON MANNINGS SOLUTION FOR AN APPROXIMATE AVERAGE  
SECTION CARRYING AN ESTIMATED FLOW RATE "n" VARIES FROM .040 TO .070 DEPENDING ON LOCATION

**KETTLE CREEK DRAINAGE BASIN  
 OLD RANCH ROAD TRIBUTARY  
 MASTER DEVELOPMENT DRAINAGE PLAN  
 DEVELOPED CONDITION LAG TIME ESTIMATE  
 3/8/2001**

BASIN ID.	OVERLAND FLOW				SWALE OR STREET				CHANNEL OR STORM DRAIN				TOTAL TC(min)	TOTAL LAG(min.)	TOTAL LAG(hrs)		
	L (ft)	C(10YR)	S (%)	TC(min)	TYPE	L (ft)	S (%)	V (fps)	TC(min)	TYPE	L (ft)	S(%)				V (fps)	TC(min)
D1	500	0.25	2.2	27.40	SWALE	2100	4.1	3.2	10.94					0.00	38.34	23.00	0.383
D2	500	0.25	7.8	18.04	SWALE	970	4.9	3.7	4.37					0.00	22.41	13.45	0.224
D3	300	0.25	2.7	19.84	SWALE	1400	4.4	3.4	6.86					0.00	26.70	16.02	0.267
D4	500	0.25	8	17.89	SWALE	1260	4.1	3.2	6.56					0.00	24.46	14.67	0.245
D5	300	0.25	3.3	18.57	SWALE	400	3.5	2.7	2.47	CHAN	1030	3.7	6	2.86	23.90	14.34	0.239
D6	100	0.25	2	12.65	STREET	1550	3.8	6.8	3.79					0.00	16.43	9.86	0.164
D7	100	0.25	2	12.65	STREET	1550	2.5	5.5	4.67					0.00	17.31	10.39	0.173
D8	300	0.75	3	7.89	STREET	830	3	6.1	2.28	SD	800	3	14	0.95	11.12	6.67	0.111
D9*	400	0.25	5	18.69	STREET	1900	2	4.9	6.40					0.00	25.09	15.05	0.251
D9A	150	0.25	2	15.49	STREET	1800	2.2	5.2	5.78					0.00	21.27	12.76	0.213
D10	500	0.25	4	22.49	SWALE	1230	2.6	2.5	8.20					0.00	30.69	18.42	0.307
D11	200	0.25	2	17.88	STREET	1300	1.4	4.1	5.23					0.00	23.11	13.87	0.231
D12	500	0.25	4	22.49	SWALE	900	3.4	2.7	5.56					0.00	28.05	16.83	0.280
D13*	300	0.75	2	9.02	STREET	1000	2.7	5.8	2.90	SD	300	2	12	0.42	12.33	7.40	0.123
D14*	100	0.25	2	12.65	STREET	780	2	4.9	2.63	SD	400	2	12	0.56	15.83	9.50	0.158
D15*	120	0.25	2	13.85	STREET	2000	2.5	5.5	6.02	SD	50	1	7	0.12	19.99	12.00	0.200
D16	120	0.25	2	13.85	SWALE	2100	3	6.0	5.83					0.00	19.69	11.81	0.197
D16A	100	0.25	2	12.65	SWALE	600	3	6.0	1.67					0.00	14.31	8.59	0.143
D17	50	0.25	10	5.26	STREET	1900	2	4.9	6.40					0.00	11.65	6.99	0.117
D17A	50	0.25	2	8.94	STREET	1000	2.5	5.5	3.01					0.00	11.95	7.17	0.120
D18	300	0.25	2.0	21.90						CHAN	1200	3	6.00	3.33	25.24	15.14	0.252
D19	300	0.8	1.7	8.16	STREET	1500	3.6	6.6	3.76	SD	200	3	14	0.24	12.16	7.30	0.122
D20	300	0.75	2	9.02	STREET	600	2.5	5.5	1.81					0.00	10.83	6.50	0.108
D21	300	0.68	2	10.82	STREET	950	2.5	5.5	2.86					0.00	13.68	8.21	0.137
D22	100	0.25	2	12.65	STREET	1100	3.6	6.6	2.76	SD	200	3	14	0.24	15.64	9.39	0.156
D23	100	0.25	5	9.35	STREET	800	5	7.8	1.70					0.00	11.05	6.63	0.110
D24	100	0.25	2	12.65	STREET	950	3.5	6.5	2.42					0.00	15.06	9.04	0.151
D25*	100	0.25	2	12.65	STREET	900	3	6.1	2.47	SD	400	2.5	14	0.48	15.60	9.36	0.156

KETTLE CREEK DRAINAGE BASIN  
 OLD RANCH ROAD TRIBUTARY  
**MASTER DEVELOPMENT DRAINAGE PLAN**  
**DEVELOPED CONDITION LAG TIME ESTIMATE**  
 3/8/2001

BASIN ID.	OVERLAND FLOW				SWALE OR STREET				CHANNEL OR STORM DRAIN				TOTAL TC(min)	TOTAL LAG(min.)	TOTAL LAG(hrs)		
	L (ft)	C(10YR)	S (%)	TC(min)	TYPE	L (ft)	S (%)	V (fps)	TC(min)	TYPE	L (ft)	S(%)				V (fps)	TC(min)
D26	100	0.25	2.0	12.65	STREET	850	5.0	7.8	1.81					0.00	14.46	8.67	0.145
D27	100	0.25	2.0	12.65	STREET	800	5.0	7.8	1.70					0.00	14.35	8.61	0.143
D28	100	0.25	2.0	12.65	STREET	500	5.0	7.8	1.06					0.00	13.71	8.23	0.137
D29	100	0.25	2.0	12.65	STREET	950	5.5	8.2	1.93					0.00	14.57	8.74	0.146
D30	120	0.25	2.0	13.85	STREET	850	4.7	7.6	1.87					0.00	15.72	9.43	0.157
D31	120	0.25	2.0	13.85	STREET	360	6.0	8.6	0.70					0.00	14.55	8.73	0.146
D32	150	0.25	5	11.45				0.0	0.00					0.00	11.45	6.87	0.114
D33	130	0.25	7	9.54				0.0	0.00	CHAN	2060	5.5	8	4.29	13.83	8.30	0.138
D34	100	0.25	2	12.65	STREET	1250	3.3	6.4	3.28					0.00	15.92	9.55	0.159
D35	100	0.25	2	12.65	STREET	1150	2.5	5.5	3.46					0.00	16.11	9.67	0.161
D36*	300	0.25	3	19.16						CHAN	1100	1.3	4	4.58	23.74	14.25	0.237
D37*	100	0.25	3	11.06	STREET	400	2	4.9	1.35					0.00	12.41	7.44	0.124

SHEET FLOW (TC=1.87\*(1.1-C10)\*(L^0.5)\*S^-0.33)

STREET AND SWALE VELOCITY PER MANNINGS BASED ON A ESTIMATED AVERAGE FLOW RATE

CHANNEL VELOCITY PER MANNINGS BASED ON APPROXIMATE SECTION AND FLOW RATE  
 STORM DRAIN VELOCITY PER MANNINGS BASED ON AN ESTIMATED STORM DRAIN SIZE

**F.**  
**HEC-1 MODEL OUTPUT**  
**FULLY DEVELOPED CONDITION**  
**• 100-YEAR STORM**

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*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* MAY 1991 *
* VERSION 4.0.1E *
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* RUN DATE 10/21/2002 TIME 15:02:17 *
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*
* U.S. ARMY CORPS OF ENGINEERS *
* HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 756-1104 *
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:::
::: Full Microcomputer Implementation :::
::: by :::
::: Haestad Methods, Inc. :::
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37 Brookside Road \* Waterbury, Connecticut 06708 \* (203) 755-1666

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

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

HEC-1 INPUT

LINE	ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
1	ID KETTLE CREEK OLD RANCH RD. TRIBUTARY WATERSHED IN PROJECTED FULLY DEVELOPED
2	ID CONDITION (100 YEAR 24 HOUR RAINFALL, TYPE IIa SCS DISTRIBUTION)
3	ID FILE NAME:KCD500.DAT
4	ID 3 MINUTE TIME STEP USED DUE TO SMALL SIZE OF BASINS, THIS LIMITS OUTPUT TO
5	ID FIRST 15 HOURS OF DESIGN STORM
6	ID *****
7	ID BEGIN CALCULATIONS IN THE SOUTH TRIBUTARY WATERSHED
8	ID *****
*** FREE ***	
	*DIAGRAM
9	IT 3 0 0 300
10	IO 5
11	PG 2 4.4
12	PG 1 0
13	IN 15
14	PC 0000 .0005 .0015 .0030 .0045 .0060 .0080 .0100 .0120 .0143
15	PC .0165 .0188 .0210 .0233 .0255 .0278 .0320 .0390 .0460 .0530
16	PC .0600 .0750 .1000 .4000 .7000 .7250 .7500 .7650 .7800 .7900
17	PC .8000 .8100 .8200 .8250 .8300 .8350 .8400 .8450 .8500 .8550
18	PC .8600 .8638 .8675 .8713 .8750 .8788 .8825 .8863 .8900 .8938



19	PC	.8975	.9013	.9050	.9083	.9115	.9148	.9180	.9210	.9240	.9270
20	PC	.9300	.9325	.9350	.9375	.9400	.9425	.9450	.9475	.9500	.9525
21	PC	.9550	.9575	.9600	.9625	.9650	.9675	.9700	.9725	.9750	.9775
22	PC	.9800	.9813	.9825	.9838	.9850	.9863	.9875	.9888	.9900	.9913
23	PC	.9925	.9938	.9950	.9963	.9975	.9988	1.000			

24	KK	SB-D1									
25	KM	COMPUTE HYDROGRAPH FOR BASIN D1									
26	BA	.085									
27	PR	1									
28	PW	1									
29	PT	2									
30	PW	1									
31	LS	0	67.5								
32	UD	.383									

33	KK	RT-SBD1									
34	KM	ROUTE THE FLOW FROM SB-D1 TO AP-D1									
35	RD	1200	.045	.029		TRAP	10	10			

36	KK	SB-D2									
37	KM	COMPUTE HYDROGRAPH FOR BASIN D2									
38	BA	0.057									
39	PR	1									
40	PW	1									
41	PT	2									
42	PW	1									
43	LS	0	69.0								
44	UD	.224									

HEC-1 INPUT

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

45	KK	AP-D1									
46	KM	COMBINE THE FLOW FROM BASIN D2 WITH THE ROUTED FLOW FROM BASIN D1 AT AP-D1									
47	HC	2									

48	KK	SB-D3									
49	KM	COMPUTE HYDROGRAPH FOR BASIN D3									
50	BA	0.026									
51	PR	1									
52	PW	1									
53	PT	2									
54	PW	1									
55	LS	0	75								
56	UD	.267									

57	KK	AP-DDA									
58	KM	COMBINE THE FLOW FROM BASIN D3 WITH THE FLOW FROM AP-D1									
59	HC	2									

60	KK	RR-DFA									
61	KM	ROUTE FLOW THROUGH A PROPOSED SMALL DETENTION FACILITY									
62	KM	ASSUME A 30" DIA OUTLET WITH INVERT AT EL. 54. OUTLET Q ESTIMATED WITH									
63	KM	BUREAU OF PUBLIC ROADS NOMOGRAPH FOR INLET CONTROL OF CULVERTS. VOLUME									
64	KM	BASED ON VERY CONCEPTUAL PLAN THAT ASSUMES A ROAD EMBANKMENT WILL SERVE									
65	KM	AS A DAM AND THE GRADING BEHIND THE EMBANKMENT WILL REMAIN AS IS.									
66	KO	1	1								
67	RS	1	STOR	0							
68	SV	0	.08	0.44	1.23	2.59	4.64	7.4			
69	SE	54	56	58	60	62	64	66			
70	SQ	0	37	43	50	60	68	75			

71	KKRT	APDFA									
72	KM	ROUTE THE FLOW FROM AP-DFA TO AP-D2									
73	RD	1000	.02	.013		CIRC	2.5				

74	KK	SB-D6									
75	KM	COMPUTE HYDROGRAPH FOR BASIN D6									
76	BA	0.039									
77	PR	1									
78	PW	1									
79	PT	2									
80	PW	1									
81	LS	0	79.2								
82	UD	.164									

83 KK AP-D2  
 84 KM COMBINE THE FLOW FROM BASIN D6 WITH THE ROUTED FLOW FROM DFA  
 85 HC 2

86 KK RT-APD2  
 87 KM ROUTE THE FLOW FROM AP-D2 TO AP-D3  
 88 RD 1600 .02 .013 CIRC 4  
 HEC-1 INPUT

PAGE 3

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

89 KK SB-D7  
 90 KM COMPUTE HYDROGRAPH FOR BASIN D7  
 91 BA 0.071  
 92 PR 1  
 93 PW 1  
 94 PT 2  
 95 PW 1  
 96 LS 0 79.8  
 97 UD .173

98 KK SB-D4  
 99 KM COMPUTE HYDROGRAPH FOR BASIN D4  
 100 BA 0.048  
 101 PR 1  
 102 PW 1  
 103 PT 2  
 104 PW 1  
 105 LS 0 68.2  
 106 UD .245

107 KK SB-D5  
 108 KM COMPUTE HYDROGRAPH FOR BASIN D5  
 109 BA 0.030  
 110 PR 1  
 111 PW 1  
 112 PT 2  
 113 PW 1  
 114 LS 0 74.5  
 115 UD .239

116 KK AP-DFB  
 117 KM COMBINE THE FLOW FROM BASIN D5 WITH THE FLOW FROM BASIN D4  
 118 HC 2

119 KK RR-DFB  
 120 KM ROUTE FLOW THROUGH A PROPOSED SMALL DETENTION FACILITY  
 121 KM ASSUME A 30' DIA OUTLET WITH INVERT AT EL.19. OUTLET Q ESTIMATED WITH  
 122 KM BUREAU OF PUBLIC ROADS NOMOGRAPH FOR INLET CONTROL OF CULVERTS. VOLUME  
 123 KM BASED ON VERY CONCEPTUAL PLAN THAT ASSUMES A ROAD EMBANKMENT WILL SERVE  
 124 KM AS A DAM AND THE GRADING BEHIND THE EMBANKMENT WILL REMAIN AS IS.  
 125 KO 1 1  
 126 RS 1 STOR 0  
 127 SV 0 .02 0.18 0.69 1.44 3.23  
 128 SE 19 20 22 24 26 28  
 129 SQ 0 37 43 50 60 68

130 KKRT-APDFB  
 131 KM ROUTE THE FLOW FROM DFB TO AP3  
 132 RD 800 .02 .013 CIRC 2.5  
 HEC-1 INPUT

PAGE 4

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

133 KK AP-D3  
 134 KM COMBINE THE ROUTED FLOW FROM DF-B WITH THE ROUTED FLOW FROM AP-D2 AND  
 135 KM BASIN D7  
 136 HC 3

137 KK RT-APD3  
 138 KM ROUTE THE FLOW FROM AP-D3 TO AP-DFC  
 139 RD 600 .02 .013 CIRC 5.5

140 KK SB-D8

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141      KM  COMPUTE HYDROGRAPH FOR BASIN D8
142      BA  0.062
143      PR  1
144      PW  1
145      PT  2
146      PW  1
147      LS  0    92.2
148      UD  .111

149      KK  AP-DFC
150      KM  COMBINE THE ROUTED FLOW FROM AP-3 WITH THE FLOW FROM BASIN D8
151      HC  2

152      KK  RR-DFC
153      KM  ROUTE FLOW THROUGH A PROPOSED REGIONAL DETENTION FACILITY ADJACENT TO POWERS
154      KM  BLVD. ASSUME A 30' DIA OUTLET WITH INVERT AT EL. 51. OUTLET Q ESTIMATED WITH
155      KM  BUREAU OF PUBLIC ROADS NOMOGRAPH FOR INLET CONTROL OF CULVERTS. VOLUME
156      KM  BASED ON VERY CONCEPTUAL GRADING PLAN.
157      KO  1    1
158      RS  1    STOR    0
159      SV  0    .9    2.1    3.4    6.3    9.7    13.6    17.8    22.6    27.8
160      SE  52   54    55    56    58    60    62    64    66    68
161      SQ  0    28    37    45    58    66    74    81    88    94

162      KK  RT-DFC
163      KM  ROUTE THE FLOW FROM DFC TO AP-D4
164      RD  950   0.01  0.013          CIRC    3.5

165      KK  SB-D9A
166      KM  COMPUTE HYDROGRAPH FOR BASIN D9A
167      BA  0.018
168      PR  1
169      PW  1
170      PT  2
171      PW  1
172      LS  0    74.5
173      UD  0.213

174      KK  AP-D4
175      KM  COMBINE THE FLOW FROM BASIN D9A WITH THE ROUTED FLOW FROM AP-DFC
176      HC  2

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HEC-1 INPUT

PAGE 5

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

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177      KK  RT-APD4
178      KM  ROUTE THE FLOW FROM AP-D4 TO THE DOWNSTREAM END OF BASIN D9
179      RD  700   .027   .013          CIRC    3.5

180      KK  SB-D9
181      KM  COMPUTE HYDROGRAPH FOR BASIN D9
182      BA  0.022
183      PR  1
184      PW  1
185      PT  2
186      PW  1
187      LS  0    77
188      UD  0.251

189      KK  AP-D4a
190      KM  COMBINE THE FLOW FROM BASIN D9 WITH THE ROUTED FLOW FROM AP-D4
191      HC  2

192      KKRT-APD4a
193      KM  ROUTE THE FLOW FROM THE DOWNSTREAM END OF BASIN D9 TO THE DOWNSTREAM END OF
194      KM  BASIN D15
195      RD  500   .027   .013          CIRC    3.5

196      KK  SB-D15
197      KM  COMPUTE HYDROGRAPH FOR BASIN D15
198      BA  0.043
199      PR  1
200      PW  1
201      PT  2
202      PW  1
203      LS  0    75

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204 UD 0.200  
 205 KK AP-D4b  
 206 KM COMBINE THE FLOW FROM BASIN D15 WITH THE ROUTED FLOW FROM AP4 AND BASIN D9  
 207 HC 2  
 208 KKRT-APD4b  
 209 KM ROUTE THE FLOW FROM THE DOWNSTREAM END OF BASIN D15 TO AP7  
 210 RD 500 .027 .013 CIRC 6.0  
 211 KK SB-D10  
 212 KM COMPUTE HYDROGRAPH FOR BASIN D10  
 213 BA 0.027  
 214 PR 1  
 215 PW 1  
 216 PT 2  
 217 PW 1  
 218 LS 0 68  
 219 UD .307

HEC-1 INPUT

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

220 KKRT-SBD10  
 221 KM ROUTE THE FLOW FROM SB-D10 TO AP-D5 ASSUME FLOW IS ROUTED IN A RESIDENTIAL  
 222 KM STREET SECTION USE A ROUGH EQUIVALENT TRAPAZOIDAL SECTION TO MODEL  
 223 RD 1200 .04 .017 TRAP 0 50  
 224 KK SB-D11  
 225 KM COMPUTE HYDROGRAPH FOR BASIN D11  
 226 BA 0.051  
 227 PR 1  
 228 PW 1  
 229 PT 2  
 230 PW 1  
 231 LS 0 74.2  
 232 UD .231  
 233 KK SB-D12  
 234 KM COMPUTE HYDROGRAPH FOR BASIN D12  
 235 BA 0.021  
 236 PR 1  
 237 PW 1  
 238 PT 2  
 239 PW 1  
 240 LS 0 74.6  
 241 UD .281  
 242 KKRT-SBD12  
 243 KM ROUTE THE FLOW FROM SB-D12 TO AP-D5 ASSUME FLOW IS ROUTED IN THE NORTH SIDE  
 244 KM OF THE OLD RANCH ROAD STREET SECTION USE A ROUGH EQUIVALENT TRAPAZOIDAL  
 245 KM SECTION TO MODEL  
 246 RD 1200 .038 .017 TRAP 0 25  
 247 KK AP-D5  
 248 KM COMBINE THE FLOW FROM BASIN D11 WITH THE ROUTED FLOW FROM BASINS D10 AND D12  
 249 KM AT THE INTERSECTION OF OLD RANCH RD. AND THE STREET TO THE HIGH SCHOOL  
 250 HC 3

251 KK RT-APD5  
 252 KM ROUTE THE FLOW FROM AP-D5 TO AP-D6  
 253 RD 700 .03 .013 CIRC 5.0  
 254 KK SB-D13  
 255 KM COMPUTE HYDROGRAPH FOR BASIN D13  
 256 BA 0.067  
 257 PR 1  
 258 PW 1  
 259 PT 2  
 260 PW 1  
 261 LS 0 91.5  
 262 UD .123

HEC-1 INPUT

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

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263      KK  AP-D6
264      KM  COMBINE THE ROUTED FLOW FROM AP-D5 WITH THE FLOW FROM BASIN D13 AT AP-D6
265      HC      2

266      KK  RT-APD6
267      KM  ROUTE THE FLOW FROM AP-D6 TO AP-D7
268      RD  1100  0.02  0.013          CIRC      6.0

269      KK  SB-D14
270      KM  COMPUTE HYDROGRAPH FOR BASIN D14
271      BA  0.023
272      PR  1
273      PW  1
274      PT  2
275      PW  1
276      LS  0      78
277      UD  0.158

278      KKRT-SBD14
279      KM  ROUTE THE FLOW FROM BASIN D14 TO AP-D7
280      RD  300   .02   .013          CIRC      2

281      KK  AP-D7
282      KM  COMBINE THE ROUTED FLOW FROM BASIN D14 WITH THE ROUTED FLOW AT AP-D7
283      HC      3

284      KK  RT-APD7
285      KM  ROUTE THE FLOW FROM AP-D7 TO AP-D7A
286      RD  850   0.02  0.013          CIRC      7

287      KK  SB-D17
288      KM  COMPUTE HYDROGRAPH FOR BASIN D17
289      BA  0.010
290      PR  1
291      PW  1
292      PT  2
293      PW  1
294      LS  0      80.5
295      UD  0.117

296      KK  AP-D7A
297      KM  COMBINE THE FLOW FROM BASIN D17 WITH THE ROUTED FLOW AT AP-D7A
298      HC      2

299      KK  SB-D16A
300      KM  COMPUTE HYDROGRAPH FOR BASIN D16A
301      BA  0.013
302      PR  1
303      PW  1
304      PT  2
305      PW  1
306      LS  0      78
307      UD  0.143

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HEC-1 INPUT

PAGE 8

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

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308      KK  AP-D7A
309      KM  COMBINE THE ROUTED FLOW FROM BASIN D16A WITH THE ROUTED FLOW AT AP-D7A
310      HC      2

311      KK  RT-APD8
312      KM  ROUTE THE FLOW FROM AP-D7A TO AP-D8
313      RD  500   0.015  0.013          CIRC      7

314      KK  SB-D17A
315      KM  COMPUTE HYDROGRAPH FOR BASIN D17A
316      BA  0.010
317      PR  1
318      PW  1
319      PT  2
320      PW  1
321      LS  0      99
322      UD  0.120

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323 KK AP-D8  
 324 KM COMBINE THE FLOW FROM BASIN D17A WITH THE ROUTED FLOW AT AP-D8  
 325 HC 2

326 KK SB-D16  
 327 KM COMPUTE HYDROGRAPH FOR BASIN D16  
 328 BA 0.062  
 329 PR 1  
 330 PW 1  
 331 PT 2  
 332 PW 1  
 333 LS 0 72.5  
 334 UD 0.197

335 KKRT-SBD16  
 336 KM ROUTE THE FLOW FROM BASIN D16 TO AP-D8  
 337 RD 400 0.02 0.013 CIRC 3

338 KK AP-D8  
 339 KM COMBINE THE ROUTED FLOW FROM BASIN D16 WITH THE ROUTED FLOW AT AP-D8  
 340 HC 2

341 KK RT-APD9  
 342 KM ROUTE THE FLOW FROM AP-D8 TO AP-D9  
 343 RD 430 0.02 0.013 CIRC 7

344 KK SB-D36  
 345 KM COMPUTE HYDROGRAGH FOR BASIN D36  
 346 BA 0.024  
 347 PR 1  
 348 PW 1  
 349 PT 2  
 350 PW 1  
 351 LS 0 72  
 352 UD 0.237

HEC-1 INPUT

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

353 KKRT-SBD36  
 354 KM ROUTE THE FLOW FROM BASIN D36 TO AP-D9  
 355 RD 750 0.02 0.013 CIRC 2.5

356 KK AP-D9  
 357 KM COMBINE THE ROUTED FLOW FROM BASIN D36 WITH THE ROUTED FLOW AT AP-D9  
 358 HC 2

359 KK SB-D37  
 360 KM COMPUTE HYDROGRAGH FOR BASIN D37  
 361 BA 0.011  
 362 PR 1  
 363 PW 1  
 364 PT 2  
 365 PW 1  
 366 LS 0 99  
 367 UD 0.124

368 KKRT-SBD37  
 369 KM ROUTE THE FLOW FROM BASIN D37 TO AP-D9  
 370 RD 200 0.02 0.013 CIRC 2.5

371 KK AP-D9  
 372 KM COMBINE THE ROUTED FLOW FROM BASIN D37 WITH THE ROUTED FLOW AT AP-D9  
 373 HC 2

374 KKRT-APDFE  
 375 KM ROUTE THE FLOW FROM AP-D9 TO DFE, ASSUME 96"PIPE  
 376 RD 350 0.01 .013 CIRC 8

377 KK SB-D18  
 378 KM COMPUTE HYDROGRAPH FOR BASIN D18  
 379 BA 0.064  
 380 PR 1  
 381 PW 1  
 382 PT 2  
 383 PW 1

384 LS 0 76.3  
 385 UD .252  
  
 386 KKRR-DFPCHS  
 387 KM ROUTE FLOW THROUGH THE EXISTING PINE CREEK HIGH SCHOOL DETENTION POND  
 388 KM STORAGE IS BASED ON A TAKEOFF MADE FROM THE GRADING PLAN FOR THE SITE  
 389 KM OUTLET DISCHARGE IS ESTIMATED BASED ON ON A VERY CRUDE FIELD SURVEY  
 390 KM OF THE POND OUTLET STRUCTURE  
 391 KO 1 1  
 392 RS 1 STOR 0  
 393 SV 0 .2 .44 .92 1.47 2.17 3.73  
 394 SE 16 18 19 20 21 22 24  
 395 SQ 0 0 0 0 7.9 30 40  
 HEC-1 INPUT

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

396 KKRT-RRDFPCHS  
 397 KM ROUTE THE FLOW FROM DFPCHS IN A STORM DRAIN TO AP-D10  
 398 RD 400 .04 .013 CIRC 2.0  
  
 399 KK SB-D19  
 400 KM COMPUTE HYDROGRAPH FOR BASIN D19  
 401 BA 0.024  
 402 PR 1  
 403 PW 1  
 404 PT 2  
 405 PW 1  
 406 LS 0 80.9  
 407 UD .122  
  
 408 KK AP-D10  
 409 KM COMBINE THE ROUTED FLOW FROM THE HIGH SCHOOL DETENTION POND WITH THE FLOW  
 410 KM FROM SB-D10  
 411 HC 2  
  
 412 KKRT-APD10  
 413 KM ROUTE THE FLOW FROM AP-D10 TO AP-D11  
 414 RD 800 .02 .013 CIRC 3.0  
  
 415 KK SB-D20  
 416 KM COMPUTE HYDROGRAPH FOR BASIN D20  
 417 BA 0.030  
 418 PR 1  
 419 PW 1  
 420 PT 2  
 421 PW 1  
 422 LS 0 96.5  
 423 UD .108  
  
 424 KK AP-D11  
 425 KM COMBINE THE ROUTED FLOW FROM AP-D10 WITH THE FLOW FROM SB-D20  
 426 HC 2  
  
 427 KKRT-APD11  
 428 KM ROUTE THE FLOW FROM AP-D11 TO PROPOSED DETENTION FACILITY "E"  
 429 RD 1300 .02 .013 CIRC 5.0  
  
 430 KK SB-D21  
 431 KM COMPUTE HYDROGRAPH FOR BASIN D21  
 432 BA 0.041  
 433 PR 1  
 434 PW 1  
 435 PT 2  
 436 PW 1  
 437 LS 0 86.5  
 438 UD .137  
 HEC-1 INPUT

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

439 KK AP-DFE  
 440 KM COMBINE THE ROUTED FLOW FROM AP-D11 WITH THE FLOW FROM SB-D21 AND AP-D8A  
 441 KM THIS IS THE TOTAL FLOW TO PROPOSED  
 442 KM DETENTION FACILITY "E"

443 HC 3

444 KK RR-DFE

445 KM ROUTE FLOW THROUGH THE PROPOSED DETENTION FACILITY "E". STORAGE IS BASED ON

446 KM A CONCEPTUAL GRADING PLAN DATED 11-21-00 WITH THE POND LOCATED AT THE NW

447 KM CORNER OF THE INTERSECTION OF OLD RANCH RD. AND CHAPEL HILLS DRIVE. OUTLET

448 KM CAPACITY IS BASED ON A 6" DIA ORIFICE OUTLET WITH INV AT EL 22.25, A 27" DIA

449 KM ORIFICE OUTLET AT INVERT ELEV. 24.00.

450 KM 90 DEGREE V-NOTCH WEIR INVERT ELEV. 31.0, TRIMMED VERT AT 10' WIDTH ELEV. 36.0

451 KM 6" DIA. OUTLET ALLOWS LOW FLOW TO CONTINUE DOWN THE HISTORIC NATURAL CHANNEL

452 KM 90 DEGREE V-NOTCH OUTFALLS TO THE HISTORIC NATURAL CHANNEL TO DIRECT SOME OF

453 KM THE PEAK FLOW FROM LARGE STORMS TO THE NATURAL CHANNEL

454 KM THE 27" DIA ORIFICE OUTLET OUTFALLS TO A PROPOSED STORM DRAIN IN OLD RANCH RD

455 KO 1 1

456 RS 1 STOR 0

457 SV 0 0.09 .74 2.79 5.13 7.78 10.82 12.47 14.21 16.03

458 SV 17.95 19.92 21.98 24.14 26.39 28.75 31.20 33.76 36.42

459 SE 22.5 23.0 24.0 26.0 28.0 30.0 32.0 33.0 34.0 35.0

460 SE 36 37.0 38.0 39.0 40.0 41.0 42.0 43.0 44.0

461 SQ 0.0 0.7 1.20 19.7 34.7 44.9 55.6 70.6 98 141

462 SQ 201 236 309 435 530 632 750 877 1016

463 KK AP-DFE

464 KM DIVERT OUT FLOW THAT PASSES THROUGH THE V-NOTCH AND THE 6" DIA OUTLET TO THE

465 KM NATURAL CHANNEL

466 KO 1 1

467 DT AP-D12

468 DI 0.0 0.7 1.20 19.7 34.7 44.9 55.6 70.6 98 141

469 DI 201 236 309 435 530 632 750 877 1016

470 DQ 0 0.7 1.2 1.8 2.2 2.6 5.4 16.9 41 80.5

471 DQ 137.7 169.6 240.7 363.8 456 556 671 796 932.4

472 KKRT-APD13

473 KM ROUTE THE FLOW FROM THE 24" DIA OUTLET IN DETENTION FACILITY "E" DOWN TO

474 KM AP-D13 IN THE PROPOSED OLD RANCH ROAD STORM DRAIN

475 RD 580 .02 .013 CIRC 3.5

476 KK SB-D22

477 KM COMPUTE HYDROGRAPH FOR BASIN D22

478 BA 0.037

479 PR 1

480 PW 1

481 PT 2

482 PW 1

483 LS 0 78.5

484 UD 0.156

HEC-1 INPUT

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

485 KK AP-D13

486 KM COMBINE FLOW FROM BASIN D22 WITH ROUTED FLOW TO AP D13

487 HC 2

488 KKRT-APD13

489 KM ROUTE THE FLOW FROM AP-13 TO AP D14

490 RD 850 .03 .013 CIRC 4

491 KK SB-D23

492 KM COMPUTE HYDROGRAPH FOR BASIN D23

493 BA 0.005

494 PR 1

495 PW 1

496 PT 2

497 PW 1

498 LS 0 88.0

499 UD .111

500 KK AP-D14

501 KM COMBINE ROUTED FLOW FROM AP-D13 WITH THE FLOW FROM BASIN D23

502 HC 2

503 KK AP-OFF

504 KM ROUTE THE FLOW FROM AP-14 TO PROPOSED DETENTION FACILITY "F"

505 RD 200 .03 .013 CIRC 4.5



506 KK SB-D24  
 507 KM COMPUTE HYDROGRAPH FOR BASIN D24  
 508 BA 0.025  
 509 PR 1  
 510 PW 1  
 511 PT 2  
 512 PW 1  
 513 LS 0 74.5  
 514 UD .151  
  
 515 KK AP-DFF  
 516 KM COMBINE ROUTED FLOW FROM AP-D14 WITH THE FLOW FROM BASIN D24  
 517 HC 2  
  
 518 KK RR-DFF  
 519 KM KM ROUTE FLOW THROUGH A POND EAST OF THE EXISTING CREEKSIDE FILING 3 AREA  
 520 KM STORAGE IS BASED ON THE CONSTRUCTION PLAN CONTOURS  
 521 KM OUTLET CAPACITY IS BASED ON A 12" DIA OUTLET PIPE WITH INVERT AT ELEV. 58  
 522 KM AND A SECOND OUTLET A 48" DIA STAND PIPE RIM AT ELEVATION 68  
 523 KM THE PROPOSED OUTLET FOR THIS POND IS DESIGNED TO SIGNIFICANTLY  
 524 KM LAG THE PEAK FLOWS TO THE DOWNSTREAM STORM DRAIN SYSTEM THUS OUTFLOW  
 525 KM IS VERY RESTRICTED UNTIL THE POND IS NEARLY FULL  
 526 KO 1 1  
 527 RS 1 STOR 0  
 528 SV 0 0.0 0.40 1.60 3.04 4.76 6.78 9.13 11.81  
 529 SE 58 58.5 60 62 64 66 68 70 72  
 530 SQ 0 0.5 4.6 7.1 8.9 10.4 11.7 98.4 135  
 HEC-1 INPUT

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

531 KK SB-D25  
 532 KM COMPUTE HYDROGRAPH FOR BASIN D25  
 533 BA 0.017  
 534 PR 1  
 535 PW 1  
 536 PT 2  
 537 PW 1  
 538 LS 0 82.2  
 539 UD .156  
  
 540 KKRR-SBD25  
 541 KM ROUTE FLOW FROM SB-D25 DOWN THE EXISTING STORM DRAIN FROM THE LOW POINT IN  
 542 KM LEXINGTON DR. TO THE LOW POINT IN MONMOUTH LANE AT AP-D16  
 543 RD 800 .05 .013 CIRC 3.0  
  
 544 KK SB-D26  
 545 KM COMPUTE HYDROGRAPH FOR BASIN D26  
 546 BA 0.033  
 547 PR 1  
 548 PW 1  
 549 PT 2  
 550 PW 1  
 551 LS 0 75.5  
 552 UD .145  
  
 553 KK AP-D16  
 554 KM COMBINE THE ROUTED FLOW FROM BASIN D26 WITH THE ROUTED FLOW FROM BASIN D25  
 555 HC 2  
  
 556 KKRT-APD16  
 557 KM ROUTE THE FLOW IN THE EXISTING STORM DRAIN FROM AP-D16 TO AP-D17 IN OLD  
 558 KM RANCH ROAD AND MAMOUTH LANE  
 559 KO 1 1  
 560 RD 400 .05 .013 CIRC 3.5  
  
 561 KK AP-D17  
 562 KM COMBINE THE ROUTED FLOW FROM AP-D16 WITH THE ROUTED FLOW FROM DETENTION  
 563 KM FACILITY F  
 564 KO 1 1  
 565 HC 2  
  
 566 KKRT-APD17  
 567 KM ROUTE THE COMBINED FLOW AT AP-D17 DOWN THE EXISTING OLD RANCH ROAD STORM  
 568 KM TO AP-D18  
 569 RD 500 .05 .013 CIRC 3.5

570 KK SB-D27  
 571 KM COMPUTE HYDROGRAPH FOR BASIN D27  
 572 BA 0.008  
 573 PR 1  
 574 PW 1  
 575 PT 2  
 576 PW 1  
 577 LS 0 80

HEC-1 INPUT

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

578 UD .144

579 KK AP-D18  
 580 KM COMBINE THE ROUTED FLOW FROM AP-D17 WITH THE FLOW FROM BASIN D27  
 581 HC 2

582 KKRT-APD18  
 583 KM ROUTE THE COMBINED FLOW AT AP-D18 DOWN THE EXISTING OLD RANCH ROAD STORM  
 584 KM TO AP-D20  
 585 RD 500 .05 .013 CIRC 3.5

586 KK SB-D29  
 587 KM COMPUTE HYDROGRAPH FOR BASIN D29  
 588 BA 0.018  
 589 PR 1  
 590 PW 1  
 591 PT 2  
 592 PW 1  
 593 LS 0 78.2  
 594 UD .146

595 KK AP-D19  
 596 KM THE EXISTING STORM DRAIN THAT CONNECTS BASIN D29 TO THE EXISTING OLD RANCH  
 597 KM ROAD STORM HAS LESS CAPACITY (DUE TO INLET CONTROL) THAN THE PREDICTED 100  
 598 KM YEAR PEAK FLOW FROM BASIN D29. THE MAXIMUM CAPACITY OF THE STORM DRAIN IS  
 599 KM 20 CFS. DIVERT OUT FLOW THAT EXCEEDS 20 CFS. THE EXCESS FLOW WILL CONTINUE  
 600 KM DOWN LUMBERJACK DRIVE AND WILL NOT BE ROUTED THROUGH THE CREEKSIDE DETENTION  
 601 KM POND  
 602 DT AP-D19a  
 603 DI 0 5 10 15 20 25 30 35 40 45  
 604 DI 50 55  
 605 DQ 0 0 0 0 0 5 10 15 20 25  
 606 DQ 30 35

607 KKRT-APD19  
 608 KM ROUTE FLOW COLLECTED IN THE STORM DRAIN AT D19 DOWN THE EXISTING STORM DRAIN  
 609 KM TO AP-D20 IN OLD RANCH ROAD  
 610 RD 150 .13 .013 CIRC 1.5

611 KK SB-D28  
 612 KM COMPUTE HYDROGRAPH FOR BASIN D28  
 613 BA 0.004  
 614 PR 1  
 615 PW 1  
 616 PT 2  
 617 PW 1  
 618 LS 0 84.0  
 619 UD .137

620 KK AP-D20  
 621 KM COMBINE THE ROUTED FLOW FROM AP-D18 AND AP-D20 WITH THE FLOW FROM BASIN D28  
 622 HC 3

HEC-1 INPUT

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

623 KKRT-APD20  
 624 KM ROUTE THE FLOW FROM AP-D20 TO AP-D21 IN THE EXISTING MARBLE CREEK STORM DRAIN  
 625 RD 420 .025 .013 CIRC 4.0

626 KK SB-D30  
 627 KM COMPUTE HYDROGRAPH FOR BASIN D30  
 628 BA 0.017

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629      PR      1
630      PW      1
631      PT      2
632      PW      1
633      LS      0      74.4
634      UD      .157

635      KKRT-SBD30
636      KM      ROUTE THE FLOW FROM BASIN D30 TO AP-D21 IN THE EXISTING EASEMENT STORM DRAIN
637      RD      330      .065      .013      CIRC      2.0

638      KK      AP-D21
639      KM      COMBINE THE ROUTED FLOW FROM SB-D30 WITH THE ROUTED FLOW FROM AP-D20
640      KO      1      1
641      HC      2

642      KK      SB-D31
643      KM      COMPUTE HYDROGRAPH FOR BASIN D31
644      BA      0.007
645      PR      1
646      PW      1
647      PT      2
648      PW      1
649      LS      0      78.5
650      UD      .146

651      KK      AP-D22
652      KM      COMBINE THE ROUTED FLOW FROM SB-D31 WITH THE ROUTED FLOW FROM AP-D21
653      HC      2

654      KK      SB-D32
655      KM      COMPUTE HYDROGRAPH FOR BASIN D32
656      BA      0.006
657      PR      1
658      PW      1
659      PT      2
660      PW      1
661      LS      0      68.0
662      UD      .115

663      KK      AP-D33
664      KM      COMBINE THE ROUTED FLOW FROM SB-D32 WITH THE ROUTED FLOW FROM AP-D22
665      KM      THIS IS THE TOTAL FLOW INTO THE EXISTING CREEKSIDE DETENTION FACILITY
666      KO      1      1
667      HC      2

                                HEC-1 INPUT

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

668      KK      RR-DFCS
669      KM      ROUTE FLOW THROUGH THE EXISTING CREEKSIDE POND (DF*CS*). STORAGE IS BASED
670      KM      ON THE STORAGE DATA PRESENTED IN THE FINAL DRAINAGE REPORT FOR CREEKSIDE
671      KM      FILING No.3. OUTFLOW IS BASED ON A PROPOSED OUTLET MODIFICATION TO INCLUDE
672      KM      A 11' LONG HORZ. WEIR AT ELEV 79 AND A 24' DIA OUTLET WITH AN INVERT
673      KM      ELEVATION OF 72.
674      KO      1      1
675      RS      1      STOR      0
676      SV      0      .050      .398      1.026      1.723      2.488      3.325      4.235      5.221      6.283
677      SV      7.423      8.643      9.946
678      SE      72      73      74      75      76      77      78      79      80      81
679      SE      82      83      84
680      SQ      0      4      15      28      32      35      38      41      78      143
681      SQ      226      324      435

682      KKDR-APD12
683      KM      RETRIEVE THE FLOW THAT IS DIVERTED TO THE HISTORIC CHANNEL AT DETENTION
684      KM      FACILITY "E"
685      DR      AP-D12

686      KKRT-APD12
687      KM      ROUTE THE FLOW FROM DETENTION FACILITY "E" TO KETTLE CREEK IN THE EXISTING
688      KM      NATURAL CHANNEL. USE GENERALIZED SECTION AND AVERAGE SLOPE
689      RD      3700      .040      .050      TRAP      5      5

690      KK      SB-033
691      KM      COMPUTE HYDROGRAPH FOR BASIN D33

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692      BA    0.036
693      PR     1
694      PW     1
695      PT     2
696      PW     1
697      LS     0    70.2
698      UD    .138

699      KK AP-D23
700      KM COMBINE THE ROUTED FLOW FROM SB-D33 WITH THE ROUTED FLOW FROM AP-D12
701      HC     2

702      KK AP-D24
703      KM COMBINE THE FLOW AT AP-D23 WITH THE OUTFLOW FROM THE MODIFIED CREEKSIDE
704      KM DETENTION FACILITY FOR THE PURPOSE OF COMPARISON TO HISTORIC FLOW RATES
705      KO     1    1
706      HC     2
707      KM *****
708      KM BEGIN CALCULATIONS IN THE NORTH TRIBUTARY WATERSHED
709      KM *****

710      KK SB-D34
711      KM COMPUTE HYDROGRAPH FOR BASIN D34
712      BA    0.039
713      PR     1
714      PW     1
715      PT     2

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HEC-1 INPUT

PAGE 17

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

716      PW     1
717      LS     0    77.0
718      UD    .159

719      KKRT-SBD34
720      KM ROUTE FLOW FROM BASIN D34 IN A STORM DRAIN TO PROPOSED DETENTION FACILITY "G"
721      RD    900    .03    .013    CIRC    3.5

722      KK SB-D35
723      KM COMPUTE HYDROGRAPH FOR BASIN D35
724      BA    0.039
725      PR     1
726      PW     1
727      PT     2
728      PW     1
729      LS     0    78.0
730      UD    .161

731      KK AP-DFG
732      KM COMBINE THE ROUTED FLOW FROM AP-D34 WITH THE FLOW FROM BASIN D35
733      HC     2

734      KK RR-DFG
735      KM ROUTE FLOW THROUGH PROPOSED DETENTION FACILITY "G". STORAGE IS BASED ON A
736      KM PRELIMINARY GRADING PLAN AND A TWO STAGE OUTLET WITH A 6" DIA OUTLET AT
737      KM INVERT ELEV. 60 AND A 24" DIA STANDPIPE WITH A TOP ELEV OF 66
738      KO     1    1
739      RS     1    STOR    0
740      SV     0    .081    .262    .732    1.366    2.179    3.195    4.211    5.63
741      SE     60    61    62    64    66    68    70    72    74
742      SQ     0    0.8    1.3    1.8    2.3    24.0    33.2    40.3    46.3
743      ZZ

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SCHEMATIC DIAGRAM OF STREAM NETWORK

```

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

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

24      SB-D1
        V
        V
33      RT-SBD1
        .
        .
36      .      SB-D2

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```

45     AP-D1.....
      .
      .
48     .          SB-D3
      .
      .
57     AP-DDA.....
      V
      V
60     RR-DFA
      V
      V
71     RT-APDFA
      .
      .
74     .          SB-D6
      .
      .
83     AP-D2.....
      V
      V
86     RT-APD2
      .
      .
89     .          SB-D7
      .
      .
98     .          SB-D4
      .
      .
107    .          SB-D5
      .
      .
116    .          AP-DFB.....
      .          V
      .          V
119    .          RR-DFB
      .          V
      .          V
130    .          RT-APDFB
      .
      .
133    AP-D3.....
      V
      V
137    RT-APD3
      .
      .
140    .          SB-D8
      .
      .
149    AP-DFC.....
      V
      V
152    RR-DFC
      V
      V
162    RT-DFC
      .
      .
165    .          SB-D9A
      .
      .
174    AP-D4.....
      V
      V
177    RT-APD4
      .
      .
180    .          SB-D9
      .
      .
189    AP-D4a.....
      V
      V

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```

192 RT-APD4a
    .
196 . SB-D15
    .
205 AP-D4b.....
    V
    V
208 RT-APD4b
    .
211 . SB-D10
    . V
    . V
220 . RT-SBD10
    .
224 . SB-D11
    .
233 . SB-D12
    . V
    . V
242 . RT-SBD12
    .
247 . AP-D5.....
    . V
    . V
251 . RT-APD5
    .
254 . SB-D13
    .
263 . AP-D6.....
    . V
    . V
266 . RT-APD6
    .
269 . SB-D14
    . V
    . V
278 . RT-SBD14
    .
281 . AP-D7.....
    . V
    . V
284 RT-APD7
    .
287 . SB-D17
    .
296 AP-D7A.....
    .
299 . SB-D16A
    .
308 AP-D7A.....
    . V
    . V
311 RT-APD8
    .
314 . SB-D17A
    .
323 AP-D8.....
    .
326 . SB-D16
    . V

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335      .      V
      .      RT-SBD16
      .      .
338      AP-D8 .....
      .      V
      .      V
341      RT-APD9
      .      .
344      .      SB-D36
      .      V
      .      V
353      .      RT-SB036
      .      .
356      AP-D9 .....
      .      .
359      .      SB-D37
      .      V
      .      V
368      .      RT-SB037
      .      .
371      AP-D9 .....
      .      V
      .      V
374      RT-APDFE
      .      .
377      .      SB-D18
      .      V
      .      V
386      .      RR-DFPCH
      .      V
      .      V
396      .      RT-RRDFP
      .      .
399      .      .      SB-D19
      .      .
408      .      AP-D10 .....
      .      V
      .      V
412      .      RT-APD10
      .      .
415      .      .      SB-D20
      .      .
424      .      AP-D11 .....
      .      V
      .      V
427      .      RT-APD11
      .      .
430      .      .      SB-D21
      .      .
439      AP-DFE .....
      .      V
      .      V
444      RR-DFE
      .      .
467      .      .      AP-D12
463      AP-DFE
      .      V
      .      V
472      RT-APD13
      .      .
476      .      SB-D22
      .      .

```

```

485     AP-D13.....
          V
          V
488     RT-APD13
          .
          .
491     .           SB-D23
          .
          .
500     AP-D14.....
          V
          V
503     AP-DFF
          .
          .
506     .           SB-D24
          .
          .
515     AP-DFF.....
          V
          V
518     RR-DFF
          .
          .
531     .           SB-D25
          .           V
          .           V
540     .           RR-SBD25
          .
          .
544     .           .           SB-D26
          .
          .
553     .           AP-D16.....
          .           V
          .           V
556     .           RT-APD16
          .
          .
561     AP-D17.....
          V
          V
566     RT-APD17
          .
          .
570     .           SB-D27
          .
          .
579     AP-D18.....
          V
          V
582     RT-APD18
          .
          .
586     .           SB-D29
          .
          .
602     .           .           -----> AP-D19a
595     .           AP-D19
          .           V
          .           V
607     .           RT-APD19
          .
          .
611     .           .           SB-D28
          .
          .
620     AP-D20.....
          V
          V
623     RT-APD20
          .
          .
626     .           SB-D30
          .           V
          .           V
635     .           RT-SBD30

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638 AP-D21.....
      .
642      SB-D31
      .
651 AP-D22.....
      .
654      SB-D32
      .
663 AP-DFCS.....
      V
      V
668 RR-DFCS
      .
685      .<----- AP-D12
682      DR-APD12
      V
      V
686      RT-APD12
      .
690      SB-D33
      .
699      AP-D23.....
      .
702 AP-D24.....
      .
710      SB-D34
      V
719      RT-SBD34
      .
722      SB-D35
      .
731      AP-DFG.....
      V
      V
734      RR-DFG

```

(\*\*\*) RUNOFF ALSO COMPUTED AT THIS LOCATION  
 HEC1 S/N: 1343000062 HMVersion: 6.33 Data File: KCD100.DAT

```

*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* MAY 1991 *
* VERSION 4.0.1E *
* RUN DATE 10/21/2002 TIME 15:02:17 *
*****

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*****
* U.S. ARMY CORPS OF ENGINEERS *
* HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 756-1104 *
*****

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KETTLE CREEK OLD RANCH RD. TRIBUTARY WATERSHED IN PROJECTED FULLY DEVELOPED
CONDITION (100 YEAR 24 HOUR RAINFALL, TYPE IIa SCS DISTRIBUTION)
FILE NAME:KCD500.DAT
3 MINUTE TIME STEP USED DUE TO SMALL SIZE OF BASINS, THIS LIMITS OUTPUT TO
FIRST 15 HOURS OF DESIGN STORM
*****
BEGIN CALCULATIONS IN THE SOUTH TRIBUTARY WATERSHED
*****

```

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

IT           HYDROGRAPH TIME DATA  
           NMIN            3 MINUTES IN COMPUTATION INTERVAL  
           IDATE           1 0 STARTING DATE  
           ITIME           0000 STARTING TIME  
           NQ              300 NUMBER OF HYDROGRAPH ORDINATES  
           NDDATE          1 0 ENDING DATE  
           NDTIME          1457 ENDING TIME  
           ICENT           19 CENTURY MARK

COMPUTATION INTERVAL   0.05 HOURS  
 TOTAL TIME BASE       14.95 HOURS

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

\*\*\*\*\*

\*\*\*\*\*  
 \*                   \*  
 60 KK           \*   RR-DFA   \*  
 \*                   \*  
 \*\*\*\*\*

66 KO           OUTPUT CONTROL VARIABLES  
           IPRNT           1 PRINT CONTROL  
           IPLOT           1 PLOT CONTROL  
           QSCAL           0. HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

67 RS           STORAGE ROUTING  
           NSTPS           1 NUMBER OF SUBREACHES  
           ITYP            STOR TYPE OF INITIAL CONDITION  
           RSVRIC          0.00 INITIAL CONDITION  
           X                0.00 WORKING R AND D COEFFICIENT

68 SV	STORAGE	0.0	0.1	0.4	1.2	2.6	4.6	7.4
69 SE	ELEVATION	54.00	56.00	58.00	60.00	62.00	64.00	66.00
70 SQ	DISCHARGE	0.	37.	43.	50.	60.	68.	75.

\*\*\*

\*\*\*\*\*  
 HYDROGRAPH AT STATION RR-DFA  
 \*\*\*\*\*

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1	0000	1	0.	0.0	54.0	*	1	0500	101	0.	0.0	54.0	*	1	1000	201	7.	0.0	54.4	
1	0003	2	0.	0.0	54.0	*	1	0503	102	0.	0.0	54.0	*	1	1003	202	7.	0.0	54.4	
1	0006	3	0.	0.0	54.0	*	1	0506	103	0.	0.0	54.0	*	1	1006	203	7.	0.0	54.4	
1	0009	4	0.	0.0	54.0	*	1	0509	104	0.	0.0	54.0	*	1	1009	204	7.	0.0	54.4	
1	0012	5	0.	0.0	54.0	*	1	0512	105	0.	0.0	54.0	*	1	1012	205	7.	0.0	54.4	
1	0015	6	0.	0.0	54.0	*	1	0515	106	0.	0.0	54.0	*	1	1015	206	6.	0.0	54.3	
1	0018	7	0.	0.0	54.0	*	1	0518	107	0.	0.0	54.0	*	1	1018	207	6.	0.0	54.3	
1	0021	8	0.	0.0	54.0	*	1	0521	108	0.	0.0	54.0	*	1	1021	208	6.	0.0	54.3	
1	0024	9	0.	0.0	54.0	*	1	0524	109	0.	0.0	54.0	*	1	1024	209	6.	0.0	54.3	
1	0027	10	0.	0.0	54.0	*	1	0527	110	0.	0.0	54.0	*	1	1027	210	6.	0.0	54.3	
1	0030	11	0.	0.0	54.0	*	1	0530	111	0.	0.0	54.0	*	1	1030	211	6.	0.0	54.3	

1	0033	12	0.	0.0	54.0 * 1	0533	112	0.	0.0	54.0 * 1	1033	212	6.	0.0	54.3
1	0036	13	0.	0.0	54.0 * 1	0536	113	0.	0.0	54.0 * 1	1036	213	6.	0.0	54.3
1	0039	14	0.	0.0	54.0 * 1	0539	114	1.	0.0	54.0 * 1	1039	214	5.	0.0	54.3
1	0042	15	0.	0.0	54.0 * 1	0542	115	3.	0.0	54.1 * 1	1042	215	5.	0.0	54.3
1	0045	16	0.	0.0	54.0 * 1	0545	116	7.	0.0	54.4 * 1	1045	216	5.	0.0	54.3
1	0048	17	0.	0.0	54.0 * 1	0548	117	15.	0.0	54.8 * 1	1048	217	5.	0.0	54.3
1	0051	18	0.	0.0	54.0 * 1	0551	118	28.	0.1	55.5 * 1	1051	218	5.	0.0	54.3
1	0054	19	0.	0.0	54.0 * 1	0554	119	38.	0.1	56.2 * 1	1054	219	5.	0.0	54.3
1	0057	20	0.	0.0	54.0 * 1	0557	120	40.	0.2	56.9 * 1	1057	220	5.	0.0	54.3
1	0100	21	0.	0.0	54.0 * 1	0600	121	43.	0.5	58.1 * 1	1100	221	5.	0.0	54.3
1	0103	22	0.	0.0	54.0 * 1	0603	122	46.	0.8	58.9 * 1	1103	222	5.	0.0	54.3
1	0106	23	0.	0.0	54.0 * 1	0606	123	50.	1.2	59.9 * 1	1106	223	5.	0.0	54.3
1	0109	24	0.	0.0	54.0 * 1	0609	124	53.	1.6	60.6 * 1	1109	224	5.	0.0	54.3
1	0112	25	0.	0.0	54.0 * 1	0612	125	56.	2.1	61.3 * 1	1112	225	5.	0.0	54.3
1	0115	26	0.	0.0	54.0 * 1	0615	126	59.	2.5	61.9 * 1	1115	226	5.	0.0	54.3
1	0118	27	0.	0.0	54.0 * 1	0618	127	61.	2.9	62.3 * 1	1118	227	5.	0.0	54.3
1	0121	28	0.	0.0	54.0 * 1	0621	128	62.	3.2	62.6 * 1	1121	228	5.	0.0	54.3
1	0124	29	0.	0.0	54.0 * 1	0624	129	63.	3.4	62.8 * 1	1124	229	5.	0.0	54.3
1	0127	30	0.	0.0	54.0 * 1	0627	130	64.	3.6	63.0 * 1	1127	230	5.	0.0	54.3
1	0130	31	0.	0.0	54.0 * 1	0630	131	64.	3.7	63.1 * 1	1130	231	5.	0.0	54.3
1	0133	32	0.	0.0	54.0 * 1	0633	132	65.	3.8	63.2 * 1	1133	232	5.	0.0	54.3
1	0136	33	0.	0.0	54.0 * 1	0636	133	65.	3.8	63.2 * 1	1136	233	5.	0.0	54.3
1	0139	34	0.	0.0	54.0 * 1	0639	134	65.	3.8	63.2 * 1	1139	234	5.	0.0	54.3
1	0142	35	0.	0.0	54.0 * 1	0642	135	65.	3.8	63.2 * 1	1142	235	5.	0.0	54.3
1	0145	36	0.	0.0	54.0 * 1	0645	136	65.	3.7	63.1 * 1	1145	236	5.	0.0	54.3
1	0148	37	0.	0.0	54.0 * 1	0648	137	64.	3.7	63.0 * 1	1148	237	5.	0.0	54.3
1	0151	38	0.	0.0	54.0 * 1	0651	138	64.	3.6	63.0 * 1	1151	238	5.	0.0	54.3
1	0154	39	0.	0.0	54.0 * 1	0654	139	63.	3.5	62.8 * 1	1154	239	5.	0.0	54.3
1	0157	40	0.	0.0	54.0 * 1	0657	140	63.	3.3	62.7 * 1	1157	240	5.	0.0	54.3
1	0200	41	0.	0.0	54.0 * 1	0700	141	62.	3.2	62.6 * 1	1200	241	5.	0.0	54.3
1	0203	42	0.	0.0	54.0 * 1	0703	142	62.	3.1	62.5 * 1	1203	242	5.	0.0	54.3
1	0206	43	0.	0.0	54.0 * 1	0706	143	61.	2.9	62.3 * 1	1206	243	5.	0.0	54.3
1	0209	44	0.	0.0	54.0 * 1	0709	144	61.	2.8	62.2 * 1	1209	244	5.	0.0	54.3
1	0212	45	0.	0.0	54.0 * 1	0712	145	60.	2.6	62.0 * 1	1212	245	5.	0.0	54.3
1	0215	46	0.	0.0	54.0 * 1	0715	146	59.	2.5	61.8 * 1	1215	246	5.	0.0	54.3
1	0218	47	0.	0.0	54.0 * 1	0718	147	58.	2.3	61.6 * 1	1218	247	5.	0.0	54.3
1	0221	48	0.	0.0	54.0 * 1	0721	148	57.	2.1	61.3 * 1	1221	248	5.	0.0	54.3
1	0224	49	0.	0.0	54.0 * 1	0724	149	56.	2.0	61.1 * 1	1224	249	5.	0.0	54.3
1	0227	50	0.	0.0	54.0 * 1	0727	150	54.	1.8	60.9 * 1	1227	250	5.	0.0	54.3
1	0230	51	0.	0.0	54.0 * 1	0730	151	53.	1.7	60.7 * 1	1230	251	5.	0.0	54.3
1	0233	52	0.	0.0	54.0 * 1	0733	152	52.	1.5	60.4 * 1	1233	252	5.	0.0	54.3
1	0236	53	0.	0.0	54.0 * 1	0736	153	51.	1.4	60.2 * 1	1236	253	5.	0.0	54.3
1	0239	54	0.	0.0	54.0 * 1	0739	154	50.	1.2	60.0 * 1	1239	254	5.	0.0	54.3
1	0242	55	0.	0.0	54.0 * 1	0742	155	49.	1.1	59.6 * 1	1242	255	5.	0.0	54.3
1	0245	56	0.	0.0	54.0 * 1	0745	156	47.	0.9	59.3 * 1	1245	256	5.	0.0	54.3
1	0248	57	0.	0.0	54.0 * 1	0748	157	46.	0.8	58.9 * 1	1248	257	5.	0.0	54.3
1	0251	58	0.	0.0	54.0 * 1	0751	158	45.	0.7	58.6 * 1	1251	258	5.	0.0	54.3
1	0254	59	0.	0.0	54.0 * 1	0754	159	44.	0.5	58.3 * 1	1254	259	5.	0.0	54.3
1	0257	60	0.	0.0	54.0 * 1	0757	160	43.	0.4	57.9 * 1	1257	260	5.	0.0	54.3
1	0300	61	0.	0.0	54.0 * 1	0800	161	41.	0.3	57.2 * 1	1300	261	5.	0.0	54.3
1	0303	62	0.	0.0	54.0 * 1	0803	162	39.	0.2	56.6 * 1	1303	262	5.	0.0	54.3
1	0306	63	0.	0.0	54.0 * 1	0806	163	37.	0.1	56.1 * 1	1306	263	5.	0.0	54.3
1	0309	64	0.	0.0	54.0 * 1	0809	164	16.	0.0	54.9 * 1	1309	264	5.	0.0	54.3
1	0312	65	0.	0.0	54.0 * 1	0812	165	13.	0.0	54.7 * 1	1312	265	5.	0.0	54.3
1	0315	66	0.	0.0	54.0 * 1	0815	166	12.	0.0	54.6 * 1	1315	266	5.	0.0	54.3
1	0318	67	0.	0.0	54.0 * 1	0818	167	11.	0.0	54.6 * 1	1318	267	5.	0.0	54.3
1	0321	68	0.	0.0	54.0 * 1	0821	168	11.	0.0	54.6 * 1	1321	268	5.	0.0	54.3
1	0324	69	0.	0.0	54.0 * 1	0824	169	10.	0.0	54.5 * 1	1324	269	5.	0.0	54.3
1	0327	70	0.	0.0	54.0 * 1	0827	170	10.	0.0	54.5 * 1	1327	270	5.	0.0	54.3
1	0330	71	0.	0.0	54.0 * 1	0830	171	9.	0.0	54.5 * 1	1330	271	5.	0.0	54.3
1	0333	72	0.	0.0	54.0 * 1	0833	172	9.	0.0	54.5 * 1	1333	272	5.	0.0	54.3
1	0336	73	0.	0.0	54.0 * 1	0836	173	8.	0.0	54.4 * 1	1336	273	5.	0.0	54.3
1	0339	74	0.	0.0	54.0 * 1	0839	174	8.	0.0	54.4 * 1	1339	274	5.	0.0	54.3
1	0342	75	0.	0.0	54.0 * 1	0842	175	8.	0.0	54.4 * 1	1342	275	5.	0.0	54.3
1	0345	76	0.	0.0	54.0 * 1	0845	176	7.	0.0	54.4 * 1	1345	276	5.	0.0	54.2
1	0348	77	0.	0.0	54.0 * 1	0848	177	7.	0.0	54.4 * 1	1348	277	5.	0.0	54.2
1	0351	78	0.	0.0	54.0 * 1	0851	178	7.	0.0	54.4 * 1	1351	278	5.	0.0	54.2
1	0354	79	0.	0.0	54.0 * 1	0854	179	7.	0.0	54.4 * 1	1354	279	5.	0.0	54.2
1	0357	80	0.	0.0	54.0 * 1	0857	180	7.	0.0	54.4 * 1	1357	280	5.	0.0	54.2
1	0400	81	0.	0.0	54.0 * 1	0900	181	7.	0.0	54.4 * 1	1400	281	5.	0.0	54.2
1	0403	82	0.	0.0	54.0 * 1	0903	182	7.	0.0	54.4 * 1	1403	282	5.	0.0	54.2
1	0406	83	0.	0.0	54.0 * 1	0906	183	7.	0.0	54.4 * 1	1406	283	5.	0.0	54.2
1	0409	84	0.	0.0	54.0 * 1	0909	184	7.	0.0	54.4 * 1	1409	284	5.	0.0	54.2
1	0412	85	0.	0.0	54.0 * 1	0912	185	7.	0.0	54.4 * 1	1412	285	4.	0.0	54.2
1	0415	86	0.	0.0	54.0 * 1	0915	186	7.	0.0	54.4 * 1	1415	286	4.	0.0	54.2
1	0418	87	0.	0.0	54.0 * 1	0918	187	7.	0.0	54.4 * 1	1418	287	4.	0.0	54.2
1	0421	88	0.	0.0	54.0 * 1	0921	188	7.	0.0	54.4 * 1	1421	288	4.	0.0	54.2

1	0424	89	0.	0.0	54.0	*	1	0924	189	7.	0.0	54.4	*	1	1424	289	4.	0.0	54.2
1	0427	90	0.	0.0	54.0	*	1	0927	190	7.	0.0	54.4	*	1	1427	290	4.	0.0	54.2
1	0430	91	0.	0.0	54.0	*	1	0930	191	7.	0.0	54.4	*	1	1430	291	4.	0.0	54.2
1	0433	92	0.	0.0	54.0	*	1	0933	192	7.	0.0	54.4	*	1	1433	292	4.	0.0	54.2
1	0436	93	0.	0.0	54.0	*	1	0936	193	7.	0.0	54.4	*	1	1436	293	4.	0.0	54.2
1	0439	94	0.	0.0	54.0	*	1	0939	194	7.	0.0	54.4	*	1	1439	294	4.	0.0	54.2
1	0442	95	0.	0.0	54.0	*	1	0942	195	7.	0.0	54.4	*	1	1442	295	4.	0.0	54.2
1	0445	96	0.	0.0	54.0	*	1	0945	196	7.	0.0	54.4	*	1	1445	296	4.	0.0	54.2
1	0448	97	0.	0.0	54.0	*	1	0948	197	7.	0.0	54.4	*	1	1448	297	4.	0.0	54.2
1	0451	98	0.	0.0	54.0	*	1	0951	198	7.	0.0	54.4	*	1	1451	298	4.	0.0	54.2
1	0454	99	0.	0.0	54.0	*	1	0954	199	7.	0.0	54.4	*	1	1454	299	4.	0.0	54.2
1	0457	100	0.	0.0	54.0	*	1	0957	200	7.	0.0	54.4	*	1	1457	300	4.	0.0	54.2

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PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW				
		6-HR	24-HR	72-HR	14.95-HR	
65.	6.60	25.	11.	11.	11.	
		(INCHES)	1.385	1.531	1.531	1.531
		(AC-FT)	12.	14.	14.	14.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	14.95-HR
4.	6.60	1.	0.	0.	0.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	14.95-HR
63.22	6.60	56.80	55.18	55.18	55.18

CUMULATIVE AREA = 0.17 SQ MI

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*          *
119 KK  * RR-DFB *
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125 KO      OUTPUT CONTROL VARIABLES
            IPRNT      1  PRINT CONTROL
            IPLOT      1  PLOT CONTROL
            QSCAL      0.  HYDROGRAPH PLOT SCALE

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HYDROGRAPH ROUTING DATA

STATION	ROUTING	STORAGE ROUTING					
		NSTPS	ITYP	RSVRIC	X	STOR	TYPE OF INITIAL CONDITION
126 RS	STORAGE	1	STOR	0.00	0.00	0.00	NUMBER OF SUBREACHES TYPE OF INITIAL CONDITION INITIAL CONDITION WORKING R AND D COEFFICIENT
127 SV	STORAGE	0.0	0.0	0.2	0.7	1.4	3.2
128 SE	ELEVATION	19.00	20.00	22.00	24.00	26.00	28.00
129 SQ	DISCHARGE	0.	37.	43.	50.	60.	68.

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\*\*\* WARNING \*\*\* MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 0. TO 37.  
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.  
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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HYDROGRAPH AT STATION RR-DFB

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DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	0.0	19.0	*	1		0500	101	0.	0.0	19.0	*	1		1000	201	3.	0.0	19.1
1		0003	2	0.	0.0	19.0	*	1		0503	102	0.	0.0	19.0	*	1		1003	202	3.	0.0	19.1
1		0006	3	0.	0.0	19.0	*	1		0506	103	0.	0.0	19.0	*	1		1006	203	3.	0.0	19.1
1		0009	4	0.	0.0	19.0	*	1		0509	104	0.	0.0	19.0	*	1		1009	204	3.	0.0	19.1
1		0012	5	0.	0.0	19.0	*	1		0512	105	0.	0.0	19.0	*	1		1012	205	3.	0.0	19.1
1		0015	6	0.	0.0	19.0	*	1		0515	106	0.	0.0	19.0	*	1		1015	206	3.	0.0	19.1
1		0018	7	0.	0.0	19.0	*	1		0518	107	0.	0.0	19.0	*	1		1018	207	3.	0.0	19.1
1		0021	8	0.	0.0	19.0	*	1		0521	108	0.	0.0	19.0	*	1		1021	208	3.	0.0	19.1
1		0024	9	0.	0.0	19.0	*	1		0524	109	0.	0.0	19.0	*	1		1024	209	3.	0.0	19.1
1		0027	10	0.	0.0	19.0	*	1		0527	110	0.	0.0	19.0	*	1		1027	210	3.	0.0	19.1
1		0030	11	0.	0.0	19.0	*	1		0530	111	0.	0.0	19.0	*	1		1030	211	3.	0.0	19.1
1		0033	12	0.	0.0	19.0	*	1		0533	112	0.	0.0	19.0	*	1		1033	212	3.	0.0	19.1
1		0036	13	0.	0.0	19.0	*	1		0536	113	0.	0.0	19.0	*	1		1036	213	3.	0.0	19.1
1		0039	14	0.	0.0	19.0	*	1		0539	114	1.	0.0	19.0	*	1		1039	214	2.	0.0	19.1
1		0042	15	0.	0.0	19.0	*	1		0542	115	3.	0.0	19.1	*	1		1042	215	2.	0.0	19.1
1		0045	16	0.	0.0	19.0	*	1		0545	116	9.	0.0	19.2	*	1		1045	216	2.	0.0	19.1
1		0048	17	0.	0.0	19.0	*	1		0548	117	17.	0.0	19.5	*	1		1048	217	2.	0.0	19.1
1		0051	18	0.	0.0	19.0	*	1		0551	118	29.	0.0	19.8	*	1		1051	218	2.	0.0	19.1
1		0054	19	0.	0.0	19.0	*	1		0554	119	38.	0.0	20.2	*	1		1054	219	2.	0.0	19.1
1		0057	20	0.	0.0	19.0	*	1		0557	120	40.	0.1	21.0	*	1		1057	220	2.	0.0	19.1
1		0100	21	0.	0.0	19.0	*	1		0600	121	43.	0.2	22.1	*	1		1100	221	2.	0.0	19.1
1		0103	22	0.	0.0	19.0	*	1		0603	122	46.	0.4	22.8	*	1		1103	222	2.	0.0	19.1
1		0106	23	0.	0.0	19.0	*	1		0606	123	49.	0.6	23.6	*	1		1106	223	2.	0.0	19.1
1		0109	24	0.	0.0	19.0	*	1		0609	124	52.	0.8	24.3	*	1		1109	224	2.	0.0	19.1
1		0112	25	0.	0.0	19.0	*	1		0612	125	54.	1.0	24.8	*	1		1112	225	2.	0.0	19.1
1		0115	26	0.	0.0	19.0	*	1		0615	126	56.	1.1	25.2	*	1		1115	226	2.	0.0	19.1
1		0118	27	0.	0.0	19.0	*	1		0618	127	57.	1.2	25.4	*	1		1118	227	2.	0.0	19.1
1		0121	28	0.	0.0	19.0	*	1		0621	128	57.	1.2	25.4	*	1		1121	228	2.	0.0	19.1
1		0124	29	0.	0.0	19.0	*	1		0624	129	57.	1.2	25.4	*	1		1124	229	2.	0.0	19.1
1		0127	30	0.	0.0	19.0	*	1		0627	130	56.	1.1	25.2	*	1		1127	230	2.	0.0	19.1
1		0130	31	0.	0.0	19.0	*	1		0630	131	55.	1.0	24.9	*	1		1130	231	2.	0.0	19.1
1		0133	32	0.	0.0	19.0	*	1		0633	132	53.	0.9	24.7	*	1		1133	232	2.	0.0	19.1
1		0136	33	0.	0.0	19.0	*	1		0636	133	52.	0.8	24.3	*	1		1136	233	2.	0.0	19.1
1		0139	34	0.	0.0	19.0	*	1		0639	134	50.	0.7	24.0	*	1		1139	234	2.	0.0	19.1
1		0142	35	0.	0.0	19.0	*	1		0642	135	48.	0.6	23.5	*	1		1142	235	2.	0.0	19.1
1		0145	36	0.	0.0	19.0	*	1		0645	136	47.	0.4	23.1	*	1		1145	236	2.	0.0	19.1
1		0148	37	0.	0.0	19.0	*	1		0648	137	45.	0.3	22.6	*	1		1148	237	2.	0.0	19.1
1		0151	38	0.	0.0	19.0	*	1		0651	138	43.	0.2	22.1	*	1		1151	238	2.	0.0	19.1
1		0154	39	0.	0.0	19.0	*	1		0654	139	39.	0.1	20.7	*	1		1154	239	2.	0.0	19.1
1		0157	40	0.	0.0	19.0	*	1		0657	140	17.	0.0	19.5	*	1		1157	240	2.	0.0	19.1
1		0200	41	0.	0.0	19.0	*	1		0700	141	7.	0.0	19.2	*	1		1200	241	2.	0.0	19.1
1		0203	42	0.	0.0	19.0	*	1		0703	142	12.	0.0	19.3	*	1		1203	242	2.	0.0	19.1
1		0206	43	0.	0.0	19.0	*	1		0706	143	9.	0.0	19.2	*	1		1206	243	2.	0.0	19.1
1		0209	44	0.	0.0	19.0	*	1		0709	144	10.	0.0	19.3	*	1		1209	244	2.	0.0	19.1
1		0212	45	0.	0.0	19.0	*	1		0712	145	8.	0.0	19.2	*	1		1212	245	2.	0.0	19.1
1		0215	46	0.	0.0	19.0	*	1		0715	146	9.	0.0	19.2	*	1		1215	246	2.	0.0	19.1
1		0218	47	0.	0.0	19.0	*	1		0718	147	8.	0.0	19.2	*	1		1218	247	2.	0.0	19.1
1		0221	48	0.	0.0	19.0	*	1		0721	148	7.	0.0	19.2	*	1		1221	248	2.	0.0	19.1
1		0224	49	0.	0.0	19.0	*	1		0724	149	7.	0.0	19.2	*	1		1224	249	2.	0.0	19.1
1		0227	50	0.	0.0	19.0	*	1		0727	150	7.	0.0	19.2	*	1		1227	250	2.	0.0	19.1
1		0230	51	0.	0.0	19.0	*	1		0730	151	7.	0.0	19.2	*	1		1230	251	2.	0.0	19.1
1		0233	52	0.	0.0	19.0	*	1		0733	152	7.	0.0	19.2	*	1		1233	252	2.	0.0	19.1
1		0236	53	0.	0.0	19.0	*	1		0736	153	6.	0.0	19.2	*	1		1236	253	2.	0.0	19.1
1		0239	54	0.	0.0	19.0	*	1		0739	154	6.	0.0	19.2	*	1		1239	254	2.	0.0	19.1
1		0242	55	0.	0.0	19.0	*	1		0742	155	6.	0.0	19.2	*	1		1242	255	2.	0.0	19.1
1		0245	56	0.	0.0	19.0	*	1		0745	156	6.	0.0	19.2	*	1		1245	256	2.	0.0	19.1
1		0248	57	0.	0.0	19.0	*	1		0748	157	6.	0.0	19.2	*	1		1248	257	2.	0.0	19.1
1		0251	58	0.	0.0	19.0	*	1		0751	158	6.	0.0	19.2	*	1		1251	258	3.	0.0	19.1
1		0254	59	0.	0.0	19.0	*	1		0754	159	6.	0.0	19.2	*	1		1254	259	3.	0.0	19.1
1		0257	60	0.	0.0	19.0	*	1		0757	160	6.	0.0	19.2	*	1		1257	260	3.	0.0	19.1
1		0300	61	0.	0.0	19.0	*	1		0800	161	6.	0.0	19.2	*	1		1300	261	2.	0.0	19.1
1		0303	62	0.	0.0	19.0	*	1		0803	162	6.	0.0	19.2	*	1		1303	262	2.	0.0	19.1
1		0306	63	0.	0.0	19.0	*	1		0806	163	6.	0.0	19.2	*	1		1306	263	2.	0.0	19.1
1		0309	64	0.	0.0	19.0	*	1		0809	164	6.	0.0	19.2	*	1		1309	264	2.	0.0	19.1
1		0312	65	0.	0.0	19.0	*	1		0812	165	6.	0.0	19.2	*	1		1312	265	2.	0.0	19.1
1		0315	66	0.	0.0	19.0	*	1		0815	166	5.	0.0	19.1	*	1		1315	266	2.	0.0	19.1
1		0318	67	0.	0.0	19.0	*	1		0818	167	5.	0.0	19.1	*	1		1318	267	2.	0.0	19.1
1		0321	68	0.	0.0	19.0	*	1		0821	168	4.	0.0	19.1	*	1		1321	268	2.	0.0	19.1
1		0324	69	0.	0.0	19.0	*	1		0824	169	4.	0.0	19.1	*	1		1324	269	2.	0.0	19.1
1		0327	70	0.	0.0	19.0	*	1		0827	170	4.	0.0	19.1	*	1		1327	270	2.	0.0	19.1
1		0330	71	0.	0.0	19.0	*	1		0830	171	4.	0.0	19.1	*	1		1330	271	2.	0.0	19.1
1		0333	72	0.	0.0	19.0	*	1		0833	172	4.	0.0	19.1	*	1		1333	272	2.	0.0	19.1
1		0336	73	0.	0.0	19.0	*	1		0836	173	3.	0.0	19.1	*	1		1336	273	2.	0.0	19.1
1		0339	74	0.	0.0	19.0	*	1		0839	174	3.	0.0	19.1	*	1		1339	274	2.	0.0	19.1

1	0342	75	0.	0.0	19.0	*	1	0842	175	3.	0.0	19.1	*	1	1342	275	2.	0.0	19.1
1	0345	76	0.	0.0	19.0	*	1	0845	176	3.	0.0	19.1	*	1	1345	276	2.	0.0	19.1
1	0348	77	0.	0.0	19.0	*	1	0848	177	3.	0.0	19.1	*	1	1348	277	2.	0.0	19.1
1	0351	78	0.	0.0	19.0	*	1	0851	178	3.	0.0	19.1	*	1	1351	278	2.	0.0	19.1
1	0354	79	0.	0.0	19.0	*	1	0854	179	3.	0.0	19.1	*	1	1354	279	2.	0.0	19.1
1	0357	80	0.	0.0	19.0	*	1	0857	180	3.	0.0	19.1	*	1	1357	280	2.	0.0	19.1
1	0400	81	0.	0.0	19.0	*	1	0900	181	3.	0.0	19.1	*	1	1400	281	2.	0.0	19.1
1	0403	82	0.	0.0	19.0	*	1	0903	182	3.	0.0	19.1	*	1	1403	282	2.	0.0	19.1
1	0406	83	0.	0.0	19.0	*	1	0906	183	3.	0.0	19.1	*	1	1406	283	2.	0.0	19.1
1	0409	84	0.	0.0	19.0	*	1	0909	184	3.	0.0	19.1	*	1	1409	284	2.	0.0	19.1
1	0412	85	0.	0.0	19.0	*	1	0912	185	3.	0.0	19.1	*	1	1412	285	2.	0.0	19.1
1	0415	86	0.	0.0	19.0	*	1	0915	186	3.	0.0	19.1	*	1	1415	286	2.	0.0	19.1
1	0418	87	0.	0.0	19.0	*	1	0918	187	3.	0.0	19.1	*	1	1418	287	2.	0.0	19.1
1	0421	88	0.	0.0	19.0	*	1	0921	188	3.	0.0	19.1	*	1	1421	288	2.	0.0	19.1
1	0424	89	0.	0.0	19.0	*	1	0924	189	3.	0.0	19.1	*	1	1424	289	2.	0.0	19.1
1	0427	90	0.	0.0	19.0	*	1	0927	190	3.	0.0	19.1	*	1	1427	290	2.	0.0	19.1
1	0430	91	0.	0.0	19.0	*	1	0930	191	3.	0.0	19.1	*	1	1430	291	2.	0.0	19.1
1	0433	92	0.	0.0	19.0	*	1	0933	192	3.	0.0	19.1	*	1	1433	292	2.	0.0	19.1
1	0436	93	0.	0.0	19.0	*	1	0936	193	3.	0.0	19.1	*	1	1436	293	2.	0.0	19.1
1	0439	94	0.	0.0	19.0	*	1	0939	194	3.	0.0	19.1	*	1	1439	294	2.	0.0	19.1
1	0442	95	0.	0.0	19.0	*	1	0942	195	3.	0.0	19.1	*	1	1442	295	2.	0.0	19.1
1	0445	96	0.	0.0	19.0	*	1	0945	196	3.	0.0	19.1	*	1	1445	296	2.	0.0	19.1
1	0448	97	0.	0.0	19.0	*	1	0948	197	3.	0.0	19.1	*	1	1448	297	2.	0.0	19.1
1	0451	98	0.	0.0	19.0	*	1	0951	198	3.	0.0	19.1	*	1	1451	298	2.	0.0	19.1
1	0454	99	0.	0.0	19.0	*	1	0954	199	3.	0.0	19.1	*	1	1454	299	2.	0.0	19.1
1	0457	100	0.	0.0	19.0	*	1	0957	200	3.	0.0	19.1	*	1	1457	300	2.	0.0	19.1

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PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW				
		6-HR	24-HR	72-HR	14.95-HR	
57.	6.35	(CFS)	12.	6.	6.	6.
		(INCHES)	1.489	1.641	1.641	1.641
		(AC-FT)	6.	7.	7.	7.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	14.95-HR
1.	6.35	0.	0.	0.	0.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	14.95-HR
25.45	6.35	19.91	19.38	19.38	19.38

CUMULATIVE AREA = 0.08 SQ MI

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152 KK *  RR-DFC *
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157 K0      OUTPUT CONTROL VARIABLES
          IPHNT      1  PRINT CONTROL
          IPLOT      1  PLOT CONTROL
          QSCAL      0. HYDROGRAPH PLOT SCALE

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HYDROGRAPH ROUTING DATA

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158 RS      STORAGE ROUTING
          NSTPS      1  NUMBER OF SUBREACHES
          ITYP       STOR TYPE OF INITIAL CONDITION
          RSVRIC     0.00 INITIAL CONDITION
          X          0.00 WORKING R AND D COEFFICIENT

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159 SV	STORAGE	0.0	0.9	2.1	3.4	6.3	9.7	13.6	17.8	22.6	27.8
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160 SE	ELEVATION	52.00	54.00	55.00	56.00	58.00	60.00	62.00	64.00	66.00	68.00
161 SQ	DISCHARGE	0.	28.	37.	45.	58.	66.	74.	81.	88.	94.

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HYDROGRAPH AT STATION RR-DFC

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1	0000	1	0.	0.0	52.0	*	1	0500	101	1.	0.0	52.0	*	1	1000	201	70.	11.9	61.1	
1	0003	2	0.	0.0	52.0	*	1	0503	102	1.	0.0	52.0	*	1	1003	202	70.	11.7	61.0	
1	0006	3	0.	0.0	52.0	*	1	0506	103	1.	0.0	52.1	*	1	1006	203	70.	11.4	60.9	
1	0009	4	0.	0.0	52.0	*	1	0509	104	1.	0.0	52.1	*	1	1009	204	69.	11.2	60.8	
1	0012	5	0.	0.0	52.0	*	1	0512	105	1.	0.0	52.1	*	1	1012	205	69.	11.0	60.7	
1	0015	6	0.	0.0	52.0	*	1	0515	106	1.	0.0	52.1	*	1	1015	206	68.	10.8	60.6	
1	0018	7	0.	0.0	52.0	*	1	0518	107	1.	0.0	52.1	*	1	1018	207	68.	10.6	60.5	
1	0021	8	0.	0.0	52.0	*	1	0521	108	2.	0.1	52.1	*	1	1021	208	67.	10.4	60.4	
1	0024	9	0.	0.0	52.0	*	1	0524	109	2.	0.1	52.2	*	1	1024	209	67.	10.2	60.2	
1	0027	10	0.	0.0	52.0	*	1	0527	110	3.	0.1	52.2	*	1	1027	210	67.	10.0	60.1	
1	0030	11	0.	0.0	52.0	*	1	0530	111	3.	0.1	52.2	*	1	1030	211	66.	9.8	60.0	
1	0033	12	0.	0.0	52.0	*	1	0533	112	4.	0.1	52.3	*	1	1033	212	66.	9.6	59.9	
1	0036	13	0.	0.0	52.0	*	1	0536	113	8.	0.2	52.6	*	1	1036	213	65.	9.3	59.8	
1	0039	14	0.	0.0	52.0	*	1	0539	114	16.	0.5	53.1	*	1	1039	214	65.	9.1	59.7	
1	0042	15	0.	0.0	52.0	*	1	0542	115	29.	1.0	54.1	*	1	1042	215	64.	8.9	59.6	
1	0045	16	0.	0.0	52.0	*	1	0545	116	34.	1.6	54.6	*	1	1045	216	64.	8.7	59.4	
1	0048	17	0.	0.0	52.0	*	1	0548	117	40.	2.6	55.4	*	1	1048	217	63.	8.5	59.3	
1	0051	18	0.	0.0	52.0	*	1	0551	118	46.	3.7	56.2	*	1	1051	218	63.	8.3	59.2	
1	0054	19	0.	0.0	52.0	*	1	0554	119	53.	5.2	57.2	*	1	1054	219	62.	8.1	59.1	
1	0057	20	0.	0.0	52.0	*	1	0557	120	59.	6.8	58.3	*	1	1057	220	62.	7.9	59.0	
1	0100	21	0.	0.0	52.0	*	1	0600	121	63.	8.6	59.3	*	1	1100	221	61.	7.7	58.9	
1	0103	22	0.	0.0	52.0	*	1	0603	122	68.	10.4	60.4	*	1	1103	222	61.	7.6	58.7	
1	0106	23	0.	0.0	52.0	*	1	0606	123	71.	12.2	61.3	*	1	1106	223	60.	7.4	58.6	
1	0109	24	0.	0.0	52.0	*	1	0609	124	74.	13.8	62.1	*	1	1109	224	60.	7.2	58.5	
1	0112	25	0.	0.0	52.0	*	1	0612	125	76.	15.0	62.7	*	1	1112	225	60.	7.0	58.4	
1	0115	26	0.	0.0	52.0	*	1	0615	126	78.	15.9	63.1	*	1	1115	226	59.	6.8	58.3	
1	0118	27	0.	0.0	52.0	*	1	0618	127	79.	16.7	63.5	*	1	1118	227	59.	6.6	58.2	
1	0121	28	0.	0.0	52.0	*	1	0621	128	80.	17.3	63.7	*	1	1121	228	58.	6.4	58.1	
1	0124	29	0.	0.0	52.0	*	1	0624	129	81.	17.8	64.0	*	1	1124	229	58.	6.3	58.0	
1	0127	30	0.	0.0	52.0	*	1	0627	130	82.	18.2	64.2	*	1	1127	230	57.	6.1	57.8	
1	0130	31	0.	0.0	52.0	*	1	0630	131	82.	18.6	64.3	*	1	1130	231	56.	5.9	57.7	
1	0133	32	0.	0.0	52.0	*	1	0633	132	83.	19.0	64.5	*	1	1133	232	55.	5.7	57.6	
1	0136	33	0.	0.0	52.0	*	1	0636	133	83.	19.3	64.6	*	1	1136	233	55.	5.6	57.5	
1	0139	34	0.	0.0	52.0	*	1	0639	134	84.	19.7	64.8	*	1	1139	234	54.	5.4	57.4	
1	0142	35	0.	0.0	52.0	*	1	0642	135	84.	19.9	64.9	*	1	1142	235	53.	5.2	57.3	
1	0145	36	0.	0.0	52.0	*	1	0645	136	85.	20.2	65.0	*	1	1145	236	53.	5.1	57.2	
1	0148	37	0.	0.0	52.0	*	1	0648	137	85.	20.5	65.1	*	1	1148	237	52.	4.9	57.1	
1	0151	38	0.	0.0	52.0	*	1	0651	138	85.	20.7	65.2	*	1	1151	238	51.	4.8	56.9	
1	0154	39	0.	0.0	52.0	*	1	0654	139	85.	20.9	65.3	*	1	1154	239	50.	4.6	56.8	
1	0157	40	0.	0.0	52.0	*	1	0657	140	86.	21.0	65.4	*	1	1157	240	50.	4.5	56.7	
1	0200	41	0.	0.0	52.0	*	1	0700	141	86.	21.1	65.4	*	1	1200	241	49.	4.3	56.6	
1	0203	42	0.	0.0	52.0	*	1	0703	142	86.	21.2	65.4	*	1	1203	242	49.	4.2	56.5	
1	0206	43	0.	0.0	52.0	*	1	0706	143	86.	21.3	65.4	*	1	1206	243	48.	4.1	56.4	
1	0209	44	0.	0.0	52.0	*	1	0709	144	86.	21.3	65.5	*	1	1209	244	47.	3.9	56.4	
1	0212	45	0.	0.0	52.0	*	1	0712	145	86.	21.3	65.5	*	1	1212	245	47.	3.8	56.3	
1	0215	46	0.	0.0	52.0	*	1	0715	146	86.	21.4	65.5	*	1	1215	246	46.	3.6	56.2	
1	0218	47	0.	0.0	52.0	*	1	0718	147	86.	21.4	65.5	*	1	1218	247	46.	3.5	56.1	
1	0221	48	0.	0.0	52.0	*	1	0721	148	86.	21.4	65.5	*	1	1221	248	45.	3.4	56.0	
1	0224	49	0.	0.0	52.0	*	1	0724	149	86.	21.3	65.5	*	1	1224	249	44.	3.3	55.9	
1	0227	50	0.	0.0	52.0	*	1	0727	150	86.	21.3	65.5	*	1	1227	250	43.	3.1	55.8	
1	0230	51	0.	0.0	52.0	*	1	0730	151	86.	21.3	65.5	*	1	1230	251	43.	3.0	55.7	
1	0233	52	0.	0.0	52.0	*	1	0733	152	86.	21.3	65.4	*	1	1233	252	42.	2.9	55.6	
1	0236	53	0.	0.0	52.0	*	1	0736	153	86.	21.2	65.4	*	1	1236	253	41.	2.8	55.5	
1	0239	54	0.	0.0	52.0	*	1	0739	154	86.	21.2	65.4	*	1	1239	254	41.	2.7	55.5	
1	0242	55	0.	0.0	52.0	*	1	0742	155	86.	21.2	65.4	*	1	1242	255	40.	2.6	55.4	
1	0245	56	0.	0.0	52.0	*	1	0745	156	86.	21.1	65.4	*	1	1245	256	39.	2.5	55.3	
1	0248	57	0.	0.0	52.0	*	1	0748	157	86.	21.0	65.4	*	1	1248	257	39.	2.4	55.2	
1	0251	58	0.	0.0	52.0	*	1	0751	158	86.	21.0	65.3	*	1	1251	258	38.	2.3	55.1	
1	0254	59	0.	0.0	52.0	*	1	0754	159	86.	20.9	65.3	*	1	1254	259	38.	2.2	55.1	
1	0257	60	0.	0.0	52.0	*	1	0757	160	85.	20.9	65.3	*	1	1257	260	37.	2.1	55.0	
1	0300	61	0.	0.0	52.0	*	1	0800	161	85.	20.8	65.2	*	1	1300	261	36.	2.0	54.9	

1	0303	62	0.	0.0	52.0	*	1	0803	162	85.	20.7	65.2	*	1	1303	262	36.	1.9	54.8
1	0306	63	0.	0.0	52.0	*	1	0806	163	85.	20.6	65.2	*	1	1306	263	35.	1.8	54.8
1	0309	64	0.	0.0	52.0	*	1	0809	164	85.	20.5	65.1	*	1	1309	264	34.	1.7	54.7
1	0312	65	0.	0.0	52.0	*	1	0812	165	85.	20.3	65.1	*	1	1312	265	34.	1.7	54.6
1	0315	66	0.	0.0	52.0	*	1	0815	166	84.	20.1	65.0	*	1	1315	266	33.	1.6	54.6
1	0318	67	0.	0.0	52.0	*	1	0818	167	84.	19.9	64.9	*	1	1318	267	33.	1.5	54.5
1	0321	68	0.	0.0	52.0	*	1	0821	168	84.	19.7	64.8	*	1	1321	268	32.	1.4	54.4
1	0324	69	0.	0.0	52.0	*	1	0824	169	83.	19.4	64.7	*	1	1324	269	31.	1.4	54.4
1	0327	70	0.	0.0	52.0	*	1	0827	170	83.	19.2	64.6	*	1	1327	270	31.	1.3	54.3
1	0330	71	0.	0.0	52.0	*	1	0830	171	83.	18.9	64.5	*	1	1330	271	30.	1.2	54.3
1	0333	72	0.	0.0	52.0	*	1	0833	172	82.	18.7	64.4	*	1	1333	272	30.	1.1	54.2
1	0336	73	0.	0.0	52.0	*	1	0836	173	82.	18.5	64.3	*	1	1336	273	29.	1.1	54.1
1	0339	74	0.	0.0	52.0	*	1	0839	174	82.	18.2	64.2	*	1	1339	274	29.	1.0	54.1
1	0342	75	0.	0.0	52.0	*	1	0842	175	81.	18.0	64.1	*	1	1342	275	28.	0.9	54.0
1	0345	76	0.	0.0	52.0	*	1	0845	176	81.	17.7	64.0	*	1	1345	276	27.	0.9	54.0
1	0348	77	0.	0.0	52.0	*	1	0848	177	80.	17.5	63.8	*	1	1348	277	26.	0.8	53.8
1	0351	78	0.	0.0	52.0	*	1	0851	178	80.	17.2	63.7	*	1	1351	278	24.	0.8	53.7
1	0354	79	0.	0.0	52.0	*	1	0854	179	80.	17.0	63.6	*	1	1354	279	23.	0.7	53.6
1	0357	80	0.	0.0	52.0	*	1	0857	180	79.	16.7	63.5	*	1	1357	280	22.	0.7	53.5
1	0400	81	0.	0.0	52.0	*	1	0900	181	79.	16.5	63.4	*	1	1400	281	20.	0.7	53.5
1	0403	82	0.	0.0	52.0	*	1	0903	182	78.	16.2	63.2	*	1	1403	282	20.	0.6	53.4
1	0406	83	0.	0.0	52.0	*	1	0906	183	78.	16.0	63.1	*	1	1406	283	19.	0.6	53.3
1	0409	84	0.	0.0	52.0	*	1	0909	184	78.	15.7	63.0	*	1	1409	284	18.	0.6	53.3
1	0412	85	0.	0.0	52.0	*	1	0912	185	77.	15.5	62.9	*	1	1412	285	17.	0.6	53.2
1	0415	86	0.	0.0	52.0	*	1	0915	186	77.	15.3	62.8	*	1	1415	286	17.	0.5	53.2
1	0418	87	0.	0.0	52.0	*	1	0918	187	76.	15.0	62.7	*	1	1418	287	16.	0.5	53.2
1	0421	88	0.	0.0	52.0	*	1	0921	188	76.	14.8	62.6	*	1	1421	288	16.	0.5	53.1
1	0424	89	0.	0.0	52.0	*	1	0924	189	76.	14.5	62.5	*	1	1424	289	15.	0.5	53.1
1	0427	90	0.	0.0	52.0	*	1	0927	190	75.	14.3	62.3	*	1	1427	290	15.	0.5	53.1
1	0430	91	0.	0.0	52.0	*	1	0930	191	75.	14.1	62.2	*	1	1430	291	15.	0.5	53.0
1	0433	92	0.	0.0	52.0	*	1	0933	192	74.	13.9	62.1	*	1	1433	292	14.	0.5	53.0
1	0436	93	0.	0.0	52.0	*	1	0936	193	74.	13.6	62.0	*	1	1436	293	14.	0.4	53.0
1	0439	94	0.	0.0	52.0	*	1	0939	194	74.	13.4	61.9	*	1	1439	294	14.	0.4	53.0
1	0442	95	0.	0.0	52.0	*	1	0942	195	73.	13.2	61.8	*	1	1442	295	14.	0.4	53.0
1	0445	96	0.	0.0	52.0	*	1	0945	196	73.	13.0	61.7	*	1	1445	296	13.	0.4	53.0
1	0448	97	0.	0.0	52.0	*	1	0948	197	72.	12.7	61.6	*	1	1448	297	13.	0.4	52.9
1	0451	98	0.	0.0	52.0	*	1	0951	198	72.	12.5	61.4	*	1	1451	298	13.	0.4	52.9
1	0454	99	0.	0.0	52.0	*	1	0954	199	71.	12.3	61.3	*	1	1454	299	13.	0.4	52.9
1	0457	100	1.	0.0	52.0	*	1	0957	200	71.	12.1	61.2	*	1	1457	300	13.	0.4	52.9

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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
(CFS)	(HR)	(CFS)	6-HR	24-HR	72-HR	14.95-HR
86.	7.30	74.	74.	37.	37.	37.
		(INCHES)	1.654	2.036	2.036	2.036
		(AC-FT)	37.	45.	45.	45.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
(AC-FT)	(HR)		6-HR	24-HR	72-HR	14.95-HR
21.	7.30		15.	6.	6.	6.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
(FEET)	(HR)		6-HR	24-HR	72-HR	14.95-HR
65.48	7.30		62.30	56.70	56.70	56.70

CUMULATIVE AREA = 0.42 SQ MI

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 386 KK \* RR-DFPCH \* S  
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391 KO OUTPUT CONTROL VARIABLES  
 IPRNT 1 PRINT CONTROL  
 IPLIT 1 PLOT CONTROL



QSCAL 0. HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

392 RS	STORAGE ROUTING							
	NSTPS	1	NUMBER OF SUBREACHES					
	ITYP		STOR TYPE OF INITIAL CONDITION					
	RSVRIC	0.00	INITIAL CONDITION					
	X	0.00	WORKING R AND D COEFFICIENT					
393 SV	STORAGE	0.0	0.2	0.4	0.9	1.5	2.2	3.7
394 SE	ELEVATION	16.00	18.00	19.00	20.00	21.00	22.00	24.00
395 SQ	DISCHARGE	0.	0.	0.	0.	8.	30.	40.

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HYDROGRAPH AT STATION RR-DFPCH

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1	0000	1	0.	0.0	16.0	*	1	0500	101	0.	0.0	16.0	*	1	1000	201	4.	1.2	20.5			
1	0003	2	0.	0.0	16.0	*	1	0503	102	0.	0.0	16.0	*	1	1003	202	4.	1.2	20.5			
1	0006	3	0.	0.0	16.0	*	1	0506	103	0.	0.0	16.0	*	1	1006	203	4.	1.2	20.5			
1	0009	4	0.	0.0	16.0	*	1	0509	104	0.	0.0	16.0	*	1	1009	204	4.	1.2	20.4			
1	0012	5	0.	0.0	16.0	*	1	0512	105	0.	0.0	16.0	*	1	1012	205	3.	1.2	20.4			
1	0015	6	0.	0.0	16.0	*	1	0515	106	0.	0.0	16.0	*	1	1015	206	3.	1.2	20.4			
1	0018	7	0.	0.0	16.0	*	1	0518	107	0.	0.0	16.0	*	1	1018	207	3.	1.2	20.4			
1	0021	8	0.	0.0	16.0	*	1	0521	108	0.	0.0	16.0	*	1	1021	208	3.	1.2	20.4			
1	0024	9	0.	0.0	16.0	*	1	0524	109	0.	0.0	16.0	*	1	1024	209	3.	1.2	20.4			
1	0027	10	0.	0.0	16.0	*	1	0527	110	0.	0.0	16.0	*	1	1027	210	3.	1.1	20.4			
1	0030	11	0.	0.0	16.0	*	1	0530	111	0.	0.0	16.0	*	1	1030	211	3.	1.1	20.4			
1	0033	12	0.	0.0	16.0	*	1	0533	112	0.	0.0	16.0	*	1	1033	212	3.	1.1	20.4			
1	0036	13	0.	0.0	16.0	*	1	0536	113	0.	0.0	16.0	*	1	1036	213	3.	1.1	20.4			
1	0039	14	0.	0.0	16.0	*	1	0539	114	0.	0.0	16.1	*	1	1039	214	3.	1.1	20.4			
1	0042	15	0.	0.0	16.0	*	1	0542	115	0.	0.0	16.3	*	1	1042	215	3.	1.1	20.4			
1	0045	16	0.	0.0	16.0	*	1	0545	116	0.	0.1	16.7	*	1	1045	216	3.	1.1	20.4			
1	0048	17	0.	0.0	16.0	*	1	0548	117	0.	0.2	17.5	*	1	1048	217	3.	1.1	20.4			
1	0051	18	0.	0.0	16.0	*	1	0551	118	0.	0.3	18.3	*	1	1051	218	3.	1.1	20.4			
1	0054	19	0.	0.0	16.0	*	1	0554	119	0.	0.5	19.1	*	1	1054	219	3.	1.1	20.4			
1	0057	20	0.	0.0	16.0	*	1	0557	120	0.	0.7	19.6	*	1	1057	220	3.	1.1	20.4			
1	0100	21	0.	0.0	16.0	*	1	0600	121	2.	1.0	20.2	*	1	1100	221	3.	1.1	20.4			
1	0103	22	0.	0.0	16.0	*	1	0603	122	7.	1.4	20.9	*	1	1103	222	3.	1.1	20.4			
1	0106	23	0.	0.0	16.0	*	1	0606	123	17.	1.8	21.4	*	1	1106	223	3.	1.1	20.3			
1	0109	24	0.	0.0	16.0	*	1	0609	124	28.	2.1	21.9	*	1	1109	224	3.	1.1	20.3			
1	0112	25	0.	0.0	16.0	*	1	0612	125	32.	2.4	22.3	*	1	1112	225	3.	1.1	20.3			
1	0115	26	0.	0.0	16.0	*	1	0615	126	33.	2.7	22.6	*	1	1115	226	3.	1.1	20.3			
1	0118	27	0.	0.0	16.0	*	1	0618	127	34.	2.8	22.9	*	1	1118	227	3.	1.1	20.3			
1	0121	28	0.	0.0	16.0	*	1	0621	128	35.	3.0	23.0	*	1	1121	228	3.	1.1	20.3			
1	0124	29	0.	0.0	16.0	*	1	0624	129	36.	3.0	23.1	*	1	1124	229	3.	1.1	20.3			
1	0127	30	0.	0.0	16.0	*	1	0627	130	36.	3.1	23.1	*	1	1127	230	3.	1.1	20.3			
1	0130	31	0.	0.0	16.0	*	1	0630	131	36.	3.1	23.1	*	1	1130	231	3.	1.1	20.3			
1	0133	32	0.	0.0	16.0	*	1	0633	132	36.	3.0	23.1	*	1	1133	232	3.	1.1	20.3			
1	0136	33	0.	0.0	16.0	*	1	0636	133	35.	3.0	23.1	*	1	1136	233	3.	1.1	20.3			
1	0139	34	0.	0.0	16.0	*	1	0639	134	35.	2.9	23.0	*	1	1139	234	3.	1.1	20.3			
1	0142	35	0.	0.0	16.0	*	1	0642	135	35.	2.9	22.9	*	1	1142	235	3.	1.1	20.3			
1	0145	36	0.	0.0	16.0	*	1	0645	136	34.	2.8	22.8	*	1	1145	236	3.	1.1	20.3			
1	0148	37	0.	0.0	16.0	*	1	0648	137	34.	2.7	22.7	*	1	1148	237	2.	1.1	20.3			
1	0151	38	0.	0.0	16.0	*	1	0651	138	33.	2.7	22.6	*	1	1151	238	2.	1.1	20.3			
1	0154	39	0.	0.0	16.0	*	1	0654	139	33.	2.6	22.5	*	1	1154	239	2.	1.1	20.3			
1	0157	40	0.	0.0	16.0	*	1	0657	140	32.	2.5	22.4	*	1	1157	240	2.	1.1	20.3			
1	0200	41	0.	0.0	16.0	*	1	0700	141	31.	2.4	22.3	*	1	1200	241	2.	1.1	20.3			
1	0203	42	0.	0.0	16.0	*	1	0703	142	31.	2.3	22.2	*	1	1203	242	2.	1.1	20.3			
1	0206	43	0.	0.0	16.0	*	1	0706	143	30.	2.2	22.1	*	1	1206	243	2.	1.1	20.3			
1	0209	44	0.	0.0	16.0	*	1	0709	144	29.	2.1	22.0	*	1	1209	244	2.	1.1	20.3			
1	0212	45	0.	0.0	16.0	*	1	0712	145	27.	2.1	21.8	*	1	1212	245	2.	1.1	20.3			
1	0215	46	0.	0.0	16.0	*	1	0715	146	24.	2.0	21.7	*	1	1215	246	2.	1.1	20.3			
1	0218	47	0.	0.0	16.0	*	1	0718	147	22.	1.9	21.7	*	1	1218	247	2.	1.1	20.3			
1	0221	48	0.	0.0	16.0	*	1	0721	148	20.	1.9	21.6	*	1	1221	248	2.	1.1	20.3			
1	0224	49	0.	0.0	16.0	*	1	0724	149	19.	1.8	21.5	*	1	1224	249	2.	1.1	20.3			
1	0227	50	0.	0.0	16.0	*	1	0727	150	17.	1.8	21.4	*	1	1227	250	2.	1.1	20.3			
1	0230	51	0.	0.0	16.0	*	1	0730	151	16.	1.7	21.4	*	1	1230	251	2.	1.1	20.3			

1	0233	52	0.	0.0	16.0	*	1	0733	152	15.	1.7	21.3	*	1	1233	252	2.	1.1	20.3
1	0236	53	0.	0.0	16.0	*	1	0736	153	14.	1.7	21.3	*	1	1236	253	2.	1.1	20.3
1	0239	54	0.	0.0	16.0	*	1	0739	154	13.	1.6	21.2	*	1	1239	254	2.	1.1	20.3
1	0242	55	0.	0.0	16.0	*	1	0742	155	12.	1.6	21.2	*	1	1242	255	2.	1.1	20.3
1	0245	56	0.	0.0	16.0	*	1	0745	156	11.	1.6	21.2	*	1	1245	256	2.	1.1	20.3
1	0248	57	0.	0.0	16.0	*	1	0748	157	11.	1.6	21.1	*	1	1248	257	2.	1.1	20.3
1	0251	58	0.	0.0	16.0	*	1	0751	158	10.	1.5	21.1	*	1	1251	258	2.	1.1	20.3
1	0254	59	0.	0.0	16.0	*	1	0754	159	10.	1.5	21.1	*	1	1254	259	2.	1.1	20.3
1	0257	60	0.	0.0	16.0	*	1	0757	160	9.	1.5	21.1	*	1	1257	260	2.	1.1	20.3
1	0300	61	0.	0.0	16.0	*	1	0800	161	9.	1.5	21.0	*	1	1300	261	2.	1.1	20.3
1	0303	62	0.	0.0	16.0	*	1	0803	162	8.	1.5	21.0	*	1	1303	262	2.	1.1	20.3
1	0306	63	0.	0.0	16.0	*	1	0806	163	8.	1.5	21.0	*	1	1306	263	2.	1.1	20.3
1	0309	64	0.	0.0	16.0	*	1	0809	164	8.	1.5	21.0	*	1	1309	264	2.	1.1	20.3
1	0312	65	0.	0.0	16.0	*	1	0812	165	8.	1.5	21.0	*	1	1312	265	2.	1.1	20.3
1	0315	66	0.	0.0	16.0	*	1	0815	166	8.	1.4	21.0	*	1	1315	266	2.	1.1	20.3
1	0318	67	0.	0.0	16.0	*	1	0818	167	7.	1.4	20.9	*	1	1318	267	2.	1.1	20.3
1	0321	68	0.	0.0	16.0	*	1	0821	168	7.	1.4	20.9	*	1	1321	268	2.	1.1	20.3
1	0324	69	0.	0.0	16.0	*	1	0824	169	7.	1.4	20.9	*	1	1324	269	2.	1.1	20.3
1	0327	70	0.	0.0	16.0	*	1	0827	170	7.	1.4	20.9	*	1	1327	270	2.	1.1	20.3
1	0330	71	0.	0.0	16.0	*	1	0830	171	7.	1.4	20.8	*	1	1330	271	2.	1.1	20.3
1	0333	72	0.	0.0	16.0	*	1	0833	172	6.	1.4	20.8	*	1	1333	272	2.	1.1	20.3
1	0336	73	0.	0.0	16.0	*	1	0836	173	6.	1.4	20.8	*	1	1336	273	2.	1.1	20.3
1	0339	74	0.	0.0	16.0	*	1	0839	174	6.	1.3	20.8	*	1	1339	274	2.	1.1	20.3
1	0342	75	0.	0.0	16.0	*	1	0842	175	6.	1.3	20.7	*	1	1342	275	2.	1.1	20.3
1	0345	76	0.	0.0	16.0	*	1	0845	176	6.	1.3	20.7	*	1	1345	276	2.	1.1	20.3
1	0348	77	0.	0.0	16.0	*	1	0848	177	6.	1.3	20.7	*	1	1348	277	2.	1.1	20.3
1	0351	78	0.	0.0	16.0	*	1	0851	178	5.	1.3	20.7	*	1	1351	278	2.	1.1	20.3
1	0354	79	0.	0.0	16.0	*	1	0854	179	5.	1.3	20.7	*	1	1354	279	2.	1.1	20.3
1	0357	80	0.	0.0	16.0	*	1	0857	180	5.	1.3	20.7	*	1	1357	280	2.	1.1	20.3
1	0400	81	0.	0.0	16.0	*	1	0900	181	5.	1.3	20.6	*	1	1400	281	2.	1.1	20.3
1	0403	82	0.	0.0	16.0	*	1	0903	182	5.	1.3	20.6	*	1	1403	282	2.	1.1	20.3
1	0406	83	0.	0.0	16.0	*	1	0906	183	5.	1.3	20.6	*	1	1406	283	2.	1.1	20.3
1	0409	84	0.	0.0	16.0	*	1	0909	184	5.	1.2	20.6	*	1	1409	284	2.	1.1	20.3
1	0412	85	0.	0.0	16.0	*	1	0912	185	5.	1.2	20.6	*	1	1412	285	2.	1.1	20.3
1	0415	86	0.	0.0	16.0	*	1	0915	186	5.	1.2	20.6	*	1	1415	286	2.	1.1	20.3
1	0418	87	0.	0.0	16.0	*	1	0918	187	4.	1.2	20.6	*	1	1418	287	2.	1.1	20.3
1	0421	88	0.	0.0	16.0	*	1	0921	188	4.	1.2	20.6	*	1	1421	288	2.	1.1	20.3
1	0424	89	0.	0.0	16.0	*	1	0924	189	4.	1.2	20.5	*	1	1424	289	2.	1.1	20.3
1	0427	90	0.	0.0	16.0	*	1	0927	190	4.	1.2	20.5	*	1	1427	290	2.	1.1	20.3
1	0430	91	0.	0.0	16.0	*	1	0930	191	4.	1.2	20.5	*	1	1430	291	2.	1.1	20.3
1	0433	92	0.	0.0	16.0	*	1	0933	192	4.	1.2	20.5	*	1	1433	292	2.	1.1	20.3
1	0436	93	0.	0.0	16.0	*	1	0936	193	4.	1.2	20.5	*	1	1436	293	2.	1.1	20.3
1	0439	94	0.	0.0	16.0	*	1	0939	194	4.	1.2	20.5	*	1	1439	294	2.	1.1	20.3
1	0442	95	0.	0.0	16.0	*	1	0942	195	4.	1.2	20.5	*	1	1442	295	2.	1.1	20.3
1	0445	96	0.	0.0	16.0	*	1	0945	196	4.	1.2	20.5	*	1	1445	296	2.	1.1	20.3
1	0448	97	0.	0.0	16.0	*	1	0948	197	4.	1.2	20.5	*	1	1448	297	2.	1.1	20.3
1	0451	98	0.	0.0	16.0	*	1	0951	198	4.	1.2	20.5	*	1	1451	298	2.	1.1	20.3
1	0454	99	0.	0.0	16.0	*	1	0954	199	4.	1.2	20.5	*	1	1454	299	2.	1.1	20.3
1	0457	100	0.	0.0	16.0	*	1	0957	200	4.	1.2	20.5	*	1	1457	300	2.	1.1	20.3

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PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW				
		6-HR	24-HR	72-HR	14.95-HR	
36.	6.45	11.	5.	5.	5.	
		(INCHES)	1.587	1.749	1.749	1.749
		(AC-FT)	5.	6.	6.	6.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	14.95-HR
3.	6.45	2.	1.	1.	1.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	14.95-HR
23.15	6.45	21.02	18.91	18.91	18.91

CUMULATIVE AREA = 0.06 SQ MI

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 \* RR-DFE \*  
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455 KO OUTPUT CONTROL VARIABLES  
 IPRNT 1 PRINT CONTROL  
 IPLOT 1 PLOT CONTROL  
 QSCAL 0. HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

456 RS STORAGE ROUTING  
 NSTPS 1 NUMBER OF SUBREACHES  
 ITYP STOR TYPE OF INITIAL CONDITION  
 RSVRIC 0.00 INITIAL CONDITION  
 X 0.00 WORKING R AND D COEFFICIENT

STATION	TYPE	0.0	0.1	0.7	2.8	5.1	7.8	10.8	12.5	14.2	16.0
457 SV	STORAGE	18.0	19.9	22.0	24.1	26.4	28.8	31.2	33.8	36.4	
459 SE	ELEVATION	22.50	23.00	24.00	26.00	28.00	30.00	32.00	33.00	34.00	35.00
		36.00	37.00	38.00	39.00	40.00	41.00	42.00	43.00	44.00	
461 SQ	DISCHARGE	0.	1.	1.	20.	35.	45.	56.	71.	98.	141.
		201.	236.	309.	435.	530.	632.	750.	877.	1016.	

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HYDROGRAPH AT STATION RR-DFE

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1	0000	1	0.	0.0	22.5	* 1	0500	101	1.	0.2	23.2	* 1	1000	201	105.	14.5	34.2			
1	0003	2	0.	0.0	22.5	* 1	0503	102	1.	0.2	23.2	* 1	1003	202	105.	14.5	34.2			
1	0006	3	0.	0.0	22.5	* 1	0506	103	1.	0.3	23.3	* 1	1006	203	104.	14.5	34.1			
1	0009	4	0.	0.0	22.5	* 1	0509	104	1.	0.3	23.3	* 1	1009	204	104.	14.4	34.1			
1	0012	5	0.	0.0	22.5	* 1	0512	105	1.	0.3	23.3	* 1	1012	205	103.	14.4	34.1			
1	0015	6	0.	0.0	22.5	* 1	0515	106	1.	0.3	23.4	* 1	1015	206	102.	14.4	34.1			
1	0018	7	0.	0.0	22.5	* 1	0518	107	1.	0.4	23.4	* 1	1018	207	101.	14.4	34.1			
1	0021	8	0.	0.0	22.5	* 1	0521	108	1.	0.4	23.5	* 1	1021	208	100.	14.3	34.1			
1	0024	9	0.	0.0	22.5	* 1	0524	109	1.	0.5	23.6	* 1	1024	209	100.	14.3	34.0			
1	0027	10	0.	0.0	22.5	* 1	0527	110	1.	0.5	23.7	* 1	1027	210	99.	14.2	34.0			
1	0030	11	0.	0.0	22.5	* 1	0530	111	1.	0.6	23.8	* 1	1030	211	98.	14.2	34.0			
1	0033	12	0.	0.0	22.5	* 1	0533	112	1.	0.7	24.0	* 1	1033	212	97.	14.2	34.0			
1	0036	13	0.	0.0	22.5	* 1	0536	113	3.	1.0	24.2	* 1	1036	213	97.	14.1	34.0			
1	0039	14	0.	0.0	22.5	* 1	0539	114	8.	1.5	24.7	* 1	1039	214	96.	14.1	33.9			
1	0042	15	0.	0.0	22.5	* 1	0542	115	17.	2.5	25.7	* 1	1042	215	96.	14.1	33.9			
1	0045	16	0.	0.0	22.5	* 1	0545	116	27.	4.0	27.0	* 1	1045	216	95.	14.0	33.9			
1	0048	17	0.	0.0	22.5	* 1	0548	117	38.	6.0	28.6	* 1	1048	217	94.	14.0	33.9			
1	0051	18	0.	0.0	22.5	* 1	0551	118	47.	8.4	30.4	* 1	1051	218	94.	14.0	33.9			
1	0054	19	0.	0.0	22.5	* 1	0554	119	60.	11.4	32.3	* 1	1054	219	93.	13.9	33.8			
1	0057	20	0.	0.0	22.5	* 1	0557	120	107.	14.6	34.2	* 1	1057	220	93.	13.9	33.8			
1	0100	21	0.	0.0	22.5	* 1	0600	121	201.	18.0	36.0	* 1	1100	221	92.	13.8	33.8			
1	0103	22	0.	0.0	22.5	* 1	0603	122	285.	21.3	37.7	* 1	1103	222	92.	13.8	33.8			
1	0106	23	0.	0.0	22.5	* 1	0606	123	437.	24.2	39.0	* 1	1106	223	91.	13.8	33.7			
1	0109	24	0.	0.0	22.5	* 1	0609	124	525.	26.3	40.0	* 1	1109	224	91.	13.7	33.7			
1	0112	25	0.	0.0	22.5	* 1	0612	125	579.	27.5	40.5	* 1	1112	225	90.	13.7	33.7			
1	0115	26	0.	0.0	22.5	* 1	0615	126	600.	28.0	40.7	* 1	1115	226	89.	13.7	33.7			
1	0118	27	0.	0.0	22.5	* 1	0618	127	599.	28.0	40.7	* 1	1118	227	89.	13.6	33.7			
1	0121	28	0.	0.0	22.5	* 1	0621	128	582.	27.6	40.5	* 1	1121	228	88.	13.6	33.6			
1	0124	29	0.	0.0	22.5	* 1	0624	129	556.	27.0	40.3	* 1	1124	229	88.	13.6	33.6			
1	0127	30	0.	0.0	22.5	* 1	0627	130	526.	26.3	40.0	* 1	1127	230	87.	13.5	33.6			
1	0130	31	0.	0.0	22.5	* 1	0630	131	495.	25.6	39.6	* 1	1130	231	87.	13.5	33.6			
1	0133	32	0.	0.0	22.5	* 1	0633	132	465.	24.9	39.3	* 1	1133	232	86.	13.5	33.6			
1	0136	33	0.	0.0	22.5	* 1	0636	133	436.	24.2	39.0	* 1	1136	233	86.	13.4	33.6			
1	0139	34	0.	0.0	22.5	* 1	0639	134	400.	23.5	38.7	* 1	1139	234	85.	13.4	33.5			
1	0142	35	0.	0.0	22.5	* 1	0642	135	368.	23.0	38.5	* 1	1142	235	85.	13.4	33.5			
1	0145	36	0.	0.0	22.5	* 1	0645	136	339.	22.5	38.2	* 1	1145	236	84.	13.3	33.5			
1	0148	37	0.	0.0	22.5	* 1	0648	137	314.	22.1	38.0	* 1	1148	237	83.	13.3	33.5			
1	0151	38	0.	0.0	22.5	* 1	0651	138	299.	21.7	37.9	* 1	1151	238	83.	13.2	33.4			

1	0154	39	0.	0.0	22.5 *	1	0654	139	286.	21.3	37.7 *	1	1154	239	82.	13.2	33.4
1	0157	40	0.	0.0	22.5 *	1	0657	140	275.	21.0	37.5 *	1	1157	240	82.	13.2	33.4
1	0200	41	0.	0.0	22.5 *	1	0700	141	265.	20.7	37.4 *	1	1200	241	81.	13.1	33.4
1	0203	42	0.	0.0	22.5 *	1	0703	142	255.	20.5	37.3 *	1	1203	242	80.	13.1	33.4
1	0206	43	0.	0.0	22.5 *	1	0706	143	247.	20.2	37.1 *	1	1206	243	80.	13.0	33.3
1	0209	44	0.	0.0	22.5 *	1	0709	144	239.	20.0	37.0 *	1	1209	244	79.	13.0	33.3
1	0212	45	0.	0.0	22.6 *	1	0712	145	233.	19.8	36.9 *	1	1212	245	78.	13.0	33.3
1	0215	46	0.	0.0	22.6 *	1	0715	146	229.	19.5	36.8 *	1	1215	246	78.	12.9	33.3
1	0218	47	0.	0.0	22.6 *	1	0718	147	225.	19.3	36.7 *	1	1218	247	77.	12.9	33.2
1	0221	48	0.	0.0	22.6 *	1	0721	148	221.	19.1	36.6 *	1	1221	248	77.	12.8	33.2
1	0224	49	0.	0.0	22.6 *	1	0724	149	217.	18.8	36.5 *	1	1224	249	76.	12.8	33.2
1	0227	50	0.	0.0	22.6 *	1	0727	150	213.	18.6	36.3 *	1	1227	250	75.	12.8	33.2
1	0230	51	0.	0.0	22.6 *	1	0730	151	209.	18.4	36.2 *	1	1230	251	75.	12.7	33.1
1	0233	52	0.	0.0	22.6 *	1	0733	152	205.	18.2	36.1 *	1	1233	252	74.	12.7	33.1
1	0236	53	0.	0.0	22.6 *	1	0736	153	201.	17.9	36.0 *	1	1236	253	73.	12.6	33.1
1	0239	54	0.	0.0	22.6 *	1	0739	154	195.	17.7	35.9 *	1	1239	254	73.	12.6	33.1
1	0242	55	0.	0.0	22.6 *	1	0742	155	189.	17.6	35.8 *	1	1242	255	72.	12.6	33.1
1	0245	56	0.	0.0	22.6 *	1	0745	156	184.	17.4	35.7 *	1	1245	256	71.	12.5	33.0
1	0248	57	0.	0.0	22.6 *	1	0748	157	179.	17.3	35.6 *	1	1248	257	71.	12.5	33.0
1	0251	58	0.	0.0	22.6 *	1	0751	158	175.	17.1	35.6 *	1	1251	258	70.	12.4	33.0
1	0254	59	0.	0.0	22.6 *	1	0754	159	172.	17.0	35.5 *	1	1254	259	70.	12.4	33.0
1	0257	60	0.	0.0	22.6 *	1	0757	160	168.	16.9	35.5 *	1	1257	260	70.	12.4	32.9
1	0300	61	0.	0.0	22.6 *	1	0800	161	165.	16.8	35.4 *	1	1300	261	69.	12.3	32.9
1	0303	62	0.	0.0	22.6 *	1	0803	162	163.	16.7	35.4 *	1	1303	262	69.	12.3	32.9
1	0306	63	0.	0.0	22.6 *	1	0806	163	160.	16.6	35.3 *	1	1306	263	68.	12.2	32.8
1	0309	64	0.	0.0	22.7 *	1	0809	164	157.	16.6	35.3 *	1	1309	264	68.	12.2	32.8
1	0312	65	0.	0.0	22.7 *	1	0812	165	155.	16.5	35.2 *	1	1312	265	67.	12.1	32.8
1	0315	66	0.	0.0	22.7 *	1	0815	166	152.	16.4	35.2 *	1	1315	266	67.	12.1	32.8
1	0318	67	0.	0.0	22.7 *	1	0818	167	149.	16.3	35.1 *	1	1318	267	66.	12.0	32.7
1	0321	68	0.	0.0	22.7 *	1	0821	168	146.	16.2	35.1 *	1	1321	268	66.	12.0	32.7
1	0324	69	0.	0.0	22.7 *	1	0824	169	143.	16.1	35.0 *	1	1324	269	65.	11.9	32.7
1	0327	70	0.	0.0	22.7 *	1	0827	170	140.	16.0	35.0 *	1	1327	270	65.	11.8	32.6
1	0330	71	0.	0.0	22.7 *	1	0830	171	138.	15.9	34.9 *	1	1330	271	64.	11.8	32.6
1	0333	72	0.	0.0	22.7 *	1	0833	172	136.	15.8	34.9 *	1	1333	272	64.	11.7	32.5
1	0336	73	0.	0.0	22.7 *	1	0836	173	134.	15.7	34.8 *	1	1336	273	63.	11.7	32.5
1	0339	74	0.	0.0	22.7 *	1	0839	174	132.	15.7	34.8 *	1	1339	274	63.	11.6	32.5
1	0342	75	0.	0.0	22.7 *	1	0842	175	130.	15.6	34.8 *	1	1342	275	62.	11.5	32.4
1	0345	76	0.	0.0	22.7 *	1	0845	176	129.	15.5	34.7 *	1	1345	276	62.	11.5	32.4
1	0348	77	0.	0.0	22.7 *	1	0848	177	127.	15.4	34.7 *	1	1348	277	61.	11.4	32.4
1	0351	78	0.	0.0	22.8 *	1	0851	178	126.	15.4	34.6 *	1	1351	278	61.	11.4	32.3
1	0354	79	0.	0.0	22.8 *	1	0854	179	124.	15.3	34.6 *	1	1354	279	60.	11.3	32.3
1	0357	80	0.	0.0	22.8 *	1	0857	180	123.	15.3	34.6 *	1	1357	280	59.	11.2	32.2
1	0400	81	0.	0.1	22.8 *	1	0900	181	122.	15.2	34.6 *	1	1400	281	59.	11.2	32.2
1	0403	82	0.	0.1	22.8 *	1	0903	182	121.	15.2	34.5 *	1	1403	282	58.	11.1	32.2
1	0406	83	0.	0.1	22.8 *	1	0906	183	119.	15.1	34.5 *	1	1406	283	57.	11.0	32.1
1	0409	84	1.	0.1	22.9 *	1	0909	184	118.	15.1	34.5 *	1	1409	284	57.	10.9	32.1
1	0412	85	1.	0.1	22.9 *	1	0912	185	117.	15.0	34.4 *	1	1412	285	56.	10.8	32.0
1	0415	86	1.	0.1	22.9 *	1	0915	186	116.	15.0	34.4 *	1	1415	286	55.	10.8	32.0
1	0418	87	1.	0.1	23.0 *	1	0918	187	115.	14.9	34.4 *	1	1418	287	55.	10.7	31.9
1	0421	88	1.	0.1	23.0 *	1	0921	188	115.	14.9	34.4 *	1	1421	288	55.	10.6	31.9
1	0424	89	1.	0.1	23.0 *	1	0924	189	114.	14.9	34.4 *	1	1424	289	55.	10.5	31.8
1	0427	90	1.	0.1	23.0 *	1	0927	190	113.	14.8	34.3 *	1	1427	290	54.	10.4	31.7
1	0430	91	1.	0.1	23.0 *	1	0930	191	112.	14.8	34.3 *	1	1430	291	54.	10.3	31.7
1	0433	92	1.	0.1	23.1 *	1	0933	192	111.	14.8	34.3 *	1	1433	292	54.	10.2	31.6
1	0436	93	1.	0.1	23.1 *	1	0936	193	111.	14.7	34.3 *	1	1436	293	53.	10.2	31.6
1	0439	94	1.	0.1	23.1 *	1	0939	194	110.	14.7	34.3 *	1	1439	294	53.	10.1	31.5
1	0442	95	1.	0.2	23.1 *	1	0942	195	109.	14.7	34.2 *	1	1442	295	53.	10.0	31.4
1	0445	96	1.	0.2	23.1 *	1	0945	196	109.	14.7	34.2 *	1	1445	296	52.	9.9	31.4
1	0448	97	1.	0.2	23.1 *	1	0948	197	108.	14.6	34.2 *	1	1448	297	52.	9.8	31.3
1	0451	98	1.	0.2	23.1 *	1	0951	198	107.	14.6	34.2 *	1	1451	298	52.	9.7	31.3
1	0454	99	1.	0.2	23.2 *	1	0954	199	107.	14.6	34.2 *	1	1454	299	51.	9.6	31.2
1	0457	100	1.	0.2	23.2 *	1	0957	200	106.	14.6	34.2 *	1	1457	300	51.	9.5	31.2

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PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW				
		6-HR	24-HR	72-HR	14.95-HR	
600.	6.25	180.	86.	86.	86.	
		(INCHES)	1.710	2.041	2.041	2.041
		(AC-FT)	89.	107.	107.	107.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	14.95-HR
28.	6.25	17.	9.	9.	9.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	14.95-HR
40.69	6.25	35.38	29.91	29.91	29.91

CUMULATIVE AREA = 0.98 SQ MI

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463 KK * AP-DFE *
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466 KO OUTPUT CONTROL VARIABLES
      IPRNT      1 PRINT CONTROL
      IPLOT      1 PLOT CONTROL
      QSCAL      0. HYDROGRAPH PLOT SCALE

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DT	DIVERSION ISTAD	AP-D12 DIVERSION HYDROGRAPH IDENTIFICATION									
		0.00	0.70	1.20	19.70	34.70	44.90	55.60	70.60	98.00	141.00
DI	INFLOW	201.00	236.00	309.00	435.00	530.00	632.00	750.00	877.00	1016.00	
DQ	DIVERTED FLOW	137.70	169.60	240.70	363.80	456.00	556.00	671.00	796.00	932.40	80.50

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DIVERSION HYDROGRAPH AP-D12

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DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW
1	0000	1	0.	*	1	0345	76	0.	*	1	0730	151	145.	*	1	1115	226	33.				
1	0003	2	0.	*	1	0348	77	0.	*	1	0733	152	141.	*	1	1118	227	33.				
1	0006	3	0.	*	1	0351	78	0.	*	1	0736	153	138.	*	1	1121	228	33.				
1	0009	4	0.	*	1	0354	79	0.	*	1	0739	154	132.	*	1	1124	229	32.				
1	0012	5	0.	*	1	0357	80	0.	*	1	0742	155	126.	*	1	1127	230	32.				
1	0015	6	0.	*	1	0400	81	0.	*	1	0745	156	122.	*	1	1130	231	31.				
1	0018	7	0.	*	1	0403	82	0.	*	1	0748	157	117.	*	1	1133	232	31.				
1	0021	8	0.	*	1	0406	83	0.	*	1	0751	158	113.	*	1	1136	233	30.				
1	0024	9	0.	*	1	0409	84	1.	*	1	0754	159	110.	*	1	1139	234	30.				
1	0027	10	0.	*	1	0412	85	1.	*	1	0757	160	107.	*	1	1142	235	29.				
1	0030	11	0.	*	1	0415	86	1.	*	1	0800	161	104.	*	1	1145	236	29.				
1	0033	12	0.	*	1	0418	87	1.	*	1	0803	162	101.	*	1	1148	237	28.				
1	0036	13	0.	*	1	0421	88	1.	*	1	0806	163	99.	*	1	1151	238	28.				
1	0039	14	0.	*	1	0424	89	1.	*	1	0809	164	96.	*	1	1154	239	27.				
1	0042	15	0.	*	1	0427	90	1.	*	1	0812	165	93.	*	1	1157	240	27.				
1	0045	16	0.	*	1	0430	91	1.	*	1	0815	166	91.	*	1	1200	241	26.				
1	0048	17	0.	*	1	0433	92	1.	*	1	0818	167	88.	*	1	1203	242	25.				
1	0051	18	0.	*	1	0436	93	1.	*	1	0821	168	85.	*	1	1206	243	25.				
1	0054	19	0.	*	1	0439	94	1.	*	1	0824	169	82.	*	1	1209	244	24.				
1	0057	20	0.	*	1	0442	95	1.	*	1	0827	170	80.	*	1	1212	245	24.				
1	0100	21	0.	*	1	0445	96	1.	*	1	0830	171	78.	*	1	1215	246	23.				
1	0103	22	0.	*	1	0448	97	1.	*	1	0833	172	76.	*	1	1218	247	23.				
1	0106	23	0.	*	1	0451	98	1.	*	1	0836	173	74.	*	1	1221	248	22.				
1	0109	24	0.	*	1	0454	99	1.	*	1	0839	174	72.	*	1	1224	249	22.				
1	0112	25	0.	*	1	0457	100	1.	*	1	0842	175	71.	*	1	1227	250	21.				
1	0115	26	0.	*	1	0500	101	1.	*	1	0845	176	69.	*	1	1230	251	20.				
1	0118	27	0.	*	1	0503	102	1.	*	1	0848	177	68.	*	1	1233	252	20.				
1	0121	28	0.	*	1	0506	103	1.	*	1	0851	178	66.	*	1	1236	253	19.				
1	0124	29	0.	*	1	0509	104	1.	*	1	0854	179	65.	*	1	1239	254	19.				
1	0127	30	0.	*	1	0512	105	1.	*	1	0857	180	64.	*	1	1242	255	18.				
1	0130	31	0.	*	1	0515	106	1.	*	1	0900	181	63.	*	1	1245	256	18.				
1	0133	32	0.	*	1	0518	107	1.	*	1	0903	182	62.	*	1	1248	257	17.				
1	0136	33	0.	*	1	0521	108	1.	*	1	0906	183	61.	*	1	1251	258	17.				

1	0139	34	0.	*	1	0524	109	1.	*	1	0909	184	60.	*	1	1254	259	16.
1	0142	35	0.	*	1	0527	110	1.	*	1	0912	185	59.	*	1	1257	260	16.
1	0145	36	0.	*	1	0530	111	1.	*	1	0915	186	58.	*	1	1300	261	16.
1	0148	37	0.	*	1	0533	112	1.	*	1	0918	187	57.	*	1	1303	262	15.
1	0151	38	0.	*	1	0536	113	1.	*	1	0921	188	56.	*	1	1306	263	15.
1	0154	39	0.	*	1	0539	114	1.	*	1	0924	189	55.	*	1	1309	264	15.
1	0157	40	0.	*	1	0542	115	2.	*	1	0927	190	55.	*	1	1312	265	14.
1	0200	41	0.	*	1	0545	116	2.	*	1	0930	191	54.	*	1	1315	266	14.
1	0203	42	0.	*	1	0548	117	2.	*	1	0933	192	53.	*	1	1318	267	14.
1	0206	43	0.	*	1	0551	118	3.	*	1	0936	193	53.	*	1	1321	268	13.
1	0209	44	0.	*	1	0554	119	9.	*	1	0939	194	52.	*	1	1324	269	13.
1	0212	45	0.	*	1	0557	120	49.	*	1	0942	195	51.	*	1	1327	270	13.
1	0215	46	0.	*	1	0600	121	138.	*	1	0945	196	51.	*	1	1330	271	12.
1	0218	47	0.	*	1	0603	122	217.	*	1	0948	197	50.	*	1	1333	272	12.
1	0221	48	0.	*	1	0606	123	366.	*	1	0951	198	50.	*	1	1336	273	11.
1	0224	49	0.	*	1	0609	124	451.	*	1	0954	199	49.	*	1	1339	274	11.
1	0227	50	0.	*	1	0612	125	504.	*	1	0957	200	48.	*	1	1342	275	10.
1	0230	51	0.	*	1	0615	126	525.	*	1	1000	201	48.	*	1	1345	276	10.
1	0233	52	0.	*	1	0618	127	523.	*	1	1003	202	47.	*	1	1348	277	10.
1	0236	53	0.	*	1	0621	128	507.	*	1	1006	203	47.	*	1	1351	278	9.
1	0239	54	0.	*	1	0624	129	481.	*	1	1009	204	46.	*	1	1354	279	9.
1	0242	55	0.	*	1	0627	130	452.	*	1	1012	205	46.	*	1	1357	280	8.
1	0245	56	0.	*	1	0630	131	422.	*	1	1015	206	45.	*	1	1400	281	8.
1	0248	57	0.	*	1	0633	132	393.	*	1	1018	207	44.	*	1	1403	282	7.
1	0251	58	0.	*	1	0636	133	365.	*	1	1021	208	43.	*	1	1406	283	7.
1	0254	59	0.	*	1	0639	134	330.	*	1	1024	209	43.	*	1	1409	284	6.
1	0257	60	0.	*	1	0642	135	298.	*	1	1027	210	42.	*	1	1412	285	6.
1	0300	61	0.	*	1	0645	136	270.	*	1	1030	211	41.	*	1	1415	286	5.
1	0303	62	0.	*	1	0648	137	246.	*	1	1033	212	40.	*	1	1418	287	5.
1	0306	63	0.	*	1	0651	138	231.	*	1	1036	213	40.	*	1	1421	288	5.
1	0309	64	0.	*	1	0654	139	219.	*	1	1039	214	39.	*	1	1424	289	5.
1	0312	65	0.	*	1	0657	140	208.	*	1	1042	215	39.	*	1	1427	290	5.
1	0315	66	0.	*	1	0700	141	198.	*	1	1045	216	38.	*	1	1430	291	5.
1	0318	67	0.	*	1	0703	142	188.	*	1	1048	217	38.	*	1	1433	292	5.
1	0321	68	0.	*	1	0706	143	180.	*	1	1051	218	37.	*	1	1436	293	5.
1	0324	69	0.	*	1	0709	144	172.	*	1	1054	219	37.	*	1	1439	294	5.
1	0327	70	0.	*	1	0712	145	167.	*	1	1057	220	36.	*	1	1442	295	5.
1	0330	71	0.	*	1	0715	146	164.	*	1	1100	221	36.	*	1	1445	296	5.
1	0333	72	0.	*	1	0718	147	160.	*	1	1103	222	35.	*	1	1448	297	4.
1	0336	73	0.	*	1	0721	148	156.	*	1	1106	223	35.	*	1	1451	298	4.
1	0339	74	0.	*	1	0724	149	152.	*	1	1109	224	34.	*	1	1454	299	4.
1	0342	75	0.	*	1	0727	150	148.	*	1	1112	225	34.	*	1	1457	300	4.

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PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	14.95-HR
525.	6.25	(CFS) 119.	51.	51.	51.
		(INCHES) 1.130	1.197	1.197	1.197
		(AC-FT) 59.	63.	63.	63.

CUMULATIVE AREA = 0.98 SQ MI

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HYDROGRAPH AT STATION AP-DFE

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DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*
1		0000	1	0.	*	1		0345	76	0.	*	1		0730	151	64.	*	1		1115	226	56.	*
1		0003	2	0.	*	1		0348	77	0.	*	1		0733	152	64.	*	1		1118	227	56.	*
1		0006	3	0.	*	1		0351	78	0.	*	1		0736	153	63.	*	1		1121	228	56.	*
1		0009	4	0.	*	1		0354	79	0.	*	1		0739	154	63.	*	1		1124	229	56.	*
1		0012	5	0.	*	1		0357	80	0.	*	1		0742	155	63.	*	1		1127	230	56.	*
1		0015	6	0.	*	1		0400	81	0.	*	1		0745	156	63.	*	1		1130	231	56.	*
1		0018	7	0.	*	1		0403	82	0.	*	1		0748	157	62.	*	1		1133	232	56.	*
1		0021	8	0.	*	1		0406	83	0.	*	1		0751	158	62.	*	1		1136	233	56.	*
1		0024	9	0.	*	1		0409	84	0.	*	1		0754	159	62.	*	1		1139	234	55.	*
1		0027	10	0.	*	1		0412	85	0.	*	1		0757	160	62.	*	1		1142	235	55.	*
1		0030	11	0.	*	1		0415	86	0.	*	1		0800	161	62.	*	1		1145	236	55.	*
1		0033	12	0.	*	1		0418	87	0.	*	1		0803	162	62.	*	1		1148	237	55.	*
1		0036	13	0.	*	1		0421	88	0.	*	1		0806	163	61.	*	1		1151	238	55.	*

1	0039	14	0.	*	1	0424	89	0.	*	1	0809	164	61.	*	1	1154	239	55.
1	0042	15	0.	*	1	0427	90	0.	*	1	0812	165	61.	*	1	1157	240	55.
1	0045	16	0.	*	1	0430	91	0.	*	1	0815	166	61.	*	1	1200	241	55.
1	0048	17	0.	*	1	0433	92	0.	*	1	0818	167	61.	*	1	1203	242	55.
1	0051	18	0.	*	1	0436	93	0.	*	1	0821	168	61.	*	1	1206	243	55.
1	0054	19	0.	*	1	0439	94	0.	*	1	0824	169	61.	*	1	1209	244	55.
1	0057	20	0.	*	1	0442	95	0.	*	1	0827	170	60.	*	1	1212	245	55.
1	0100	21	0.	*	1	0445	96	0.	*	1	0830	171	60.	*	1	1215	246	55.
1	0103	22	0.	*	1	0448	97	0.	*	1	0833	172	60.	*	1	1218	247	54.
1	0106	23	0.	*	1	0451	98	0.	*	1	0836	173	60.	*	1	1221	248	54.
1	0109	24	0.	*	1	0454	99	0.	*	1	0839	174	60.	*	1	1224	249	54.
1	0112	25	0.	*	1	0457	100	0.	*	1	0842	175	60.	*	1	1227	250	54.
1	0115	26	0.	*	1	0500	101	0.	*	1	0845	176	60.	*	1	1230	251	54.
1	0118	27	0.	*	1	0503	102	0.	*	1	0848	177	59.	*	1	1233	252	54.
1	0121	28	0.	*	1	0506	103	0.	*	1	0851	178	59.	*	1	1236	253	54.
1	0124	29	0.	*	1	0509	104	0.	*	1	0854	179	59.	*	1	1239	254	54.
1	0127	30	0.	*	1	0512	105	0.	*	1	0857	180	59.	*	1	1242	255	54.
1	0130	31	0.	*	1	0515	106	0.	*	1	0900	181	59.	*	1	1245	256	54.
1	0133	32	0.	*	1	0518	107	0.	*	1	0903	182	59.	*	1	1248	257	54.
1	0136	33	0.	*	1	0521	108	0.	*	1	0906	183	59.	*	1	1251	258	54.
1	0139	34	0.	*	1	0524	109	0.	*	1	0909	184	59.	*	1	1254	259	54.
1	0142	35	0.	*	1	0527	110	0.	*	1	0912	185	59.	*	1	1257	260	53.
1	0145	36	0.	*	1	0530	111	0.	*	1	0915	186	58.	*	1	1300	261	53.
1	0148	37	0.	*	1	0533	112	0.	*	1	0918	187	58.	*	1	1303	262	53.
1	0151	38	0.	*	1	0536	113	2.	*	1	0921	188	58.	*	1	1306	263	53.
1	0154	39	0.	*	1	0539	114	7.	*	1	0924	189	58.	*	1	1309	264	53.
1	0157	40	0.	*	1	0542	115	15.	*	1	0927	190	58.	*	1	1312	265	53.
1	0200	41	0.	*	1	0545	116	25.	*	1	0930	191	58.	*	1	1315	266	53.
1	0203	42	0.	*	1	0548	117	36.	*	1	0933	192	58.	*	1	1318	267	53.
1	0206	43	0.	*	1	0551	118	44.	*	1	0936	193	58.	*	1	1321	268	53.
1	0209	44	0.	*	1	0554	119	51.	*	1	0939	194	58.	*	1	1324	269	52.
1	0212	45	0.	*	1	0557	120	58.	*	1	0942	195	58.	*	1	1327	270	52.
1	0215	46	0.	*	1	0600	121	63.	*	1	0945	196	58.	*	1	1330	271	52.
1	0218	47	0.	*	1	0603	122	68.	*	1	0948	197	58.	*	1	1333	272	52.
1	0221	48	0.	*	1	0606	123	71.	*	1	0951	198	58.	*	1	1336	273	52.
1	0224	49	0.	*	1	0609	124	74.	*	1	0954	199	58.	*	1	1339	274	52.
1	0227	50	0.	*	1	0612	125	75.	*	1	0957	200	58.	*	1	1342	275	52.
1	0230	51	0.	*	1	0615	126	75.	*	1	1000	201	58.	*	1	1345	276	52.
1	0233	52	0.	*	1	0618	127	75.	*	1	1003	202	58.	*	1	1348	277	51.
1	0236	53	0.	*	1	0621	128	75.	*	1	1006	203	58.	*	1	1351	278	51.
1	0239	54	0.	*	1	0624	129	75.	*	1	1009	204	57.	*	1	1354	279	51.
1	0242	55	0.	*	1	0627	130	74.	*	1	1012	205	57.	*	1	1357	280	51.
1	0245	56	0.	*	1	0630	131	73.	*	1	1015	206	57.	*	1	1400	281	51.
1	0248	57	0.	*	1	0633	132	72.	*	1	1018	207	57.	*	1	1403	282	51.
1	0251	58	0.	*	1	0636	133	71.	*	1	1021	208	57.	*	1	1406	283	51.
1	0254	59	0.	*	1	0639	134	70.	*	1	1024	209	57.	*	1	1409	284	50.
1	0257	60	0.	*	1	0642	135	70.	*	1	1027	210	57.	*	1	1412	285	50.
1	0300	61	0.	*	1	0645	136	69.	*	1	1030	211	57.	*	1	1415	286	50.
1	0303	62	0.	*	1	0648	137	68.	*	1	1033	212	57.	*	1	1418	287	50.
1	0306	63	0.	*	1	0651	138	68.	*	1	1036	213	57.	*	1	1421	288	50.
1	0309	64	0.	*	1	0654	139	68.	*	1	1039	214	57.	*	1	1424	289	49.
1	0312	65	0.	*	1	0657	140	67.	*	1	1042	215	57.	*	1	1427	290	49.
1	0315	66	0.	*	1	0700	141	67.	*	1	1045	216	57.	*	1	1430	291	49.
1	0318	67	0.	*	1	0703	142	67.	*	1	1048	217	57.	*	1	1433	292	49.
1	0321	68	0.	*	1	0706	143	67.	*	1	1051	218	57.	*	1	1436	293	48.
1	0324	69	0.	*	1	0709	144	66.	*	1	1054	219	56.	*	1	1439	294	48.
1	0327	70	0.	*	1	0712	145	66.	*	1	1057	220	56.	*	1	1442	295	48.
1	0330	71	0.	*	1	0715	146	66.	*	1	1100	221	56.	*	1	1445	296	48.
1	0333	72	0.	*	1	0718	147	65.	*	1	1103	222	56.	*	1	1448	297	48.
1	0336	73	0.	*	1	0721	148	65.	*	1	1106	223	56.	*	1	1451	298	47.
1	0339	74	0.	*	1	0724	149	65.	*	1	1109	224	56.	*	1	1454	299	47.
1	0342	75	0.	*	1	0727	150	64.	*	1	1112	225	56.	*	1	1457	300	47.

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PEAK FLOW (CFS)	TIME (HR)	6-HR (CFS)	MAXIMUM AVERAGE FLOW 24-HR	72-HR	14.95-HR
75.	6.25	61.	36.	36.	36.
		(INCHES) 0.580	0.843	0.843	0.843
		(AC-FT) 30.	44.	44.	44.
CUMULATIVE AREA =			0.98 SQ MI		

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 518 KK \* RR-DFF \*  
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526 KO OUTPUT CONTROL VARIABLES  
 IPRNT 1 PRINT CONTROL  
 IPLOT 1 PLOT CONTROL  
 QSCAL 0. HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

527 RS STORAGE ROUTING  
 NSTPS 1 NUMBER OF SUBREACHES  
 ITYP STOR TYPE OF INITIAL CONDITION  
 RSVRIC 0.00 INITIAL CONDITION  
 X 0.00 WORKING R AND D COEFFICIENT

528 SV	STORAGE	0.0	0.0	0.4	1.6	3.0	4.8	6.8	9.1	11.8
529 SE	ELEVATION	58.00	58.50	60.00	62.00	64.00	66.00	68.00	70.00	72.00
530 SQ	DISCHARGE	0.	1.	5.	7.	9.	10.	12.	98.	135.

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HYDROGRAPH AT STATION RR-DFF

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DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1	0000	1	1.	0.0	58.5	* 1	0500	101	0.	0.0	58.0	* 1	1000	201	61.	8.1	69.1			
1	0003	2	0.	0.0	58.0	* 1	0503	102	0.	0.0	58.0	* 1	1003	202	61.	8.1	69.1			
1	0006	3	0.	0.0	58.0	* 1	0506	103	0.	0.0	58.0	* 1	1006	203	61.	8.1	69.1			
1	0009	4	0.	0.0	58.0	* 1	0509	104	0.	0.0	58.0	* 1	1009	204	61.	8.1	69.1			
1	0012	5	0.	0.0	58.0	* 1	0512	105	0.	0.0	58.0	* 1	1012	205	61.	8.1	69.1			
1	0015	6	0.	0.0	58.0	* 1	0515	106	0.	0.0	58.1	* 1	1015	206	61.	8.1	69.1			
1	0018	7	0.	0.0	58.0	* 1	0518	107	0.	0.0	58.1	* 1	1018	207	61.	8.1	69.1			
1	0021	8	0.	0.0	58.0	* 1	0521	108	0.	0.0	58.1	* 1	1021	208	61.	8.1	69.1			
1	0024	9	0.	0.0	58.0	* 1	0524	109	0.	0.0	58.2	* 1	1024	209	60.	8.1	69.1			
1	0027	10	0.	0.0	58.0	* 1	0527	110	0.	0.0	58.2	* 1	1027	210	60.	8.1	69.1			
1	0030	11	0.	0.0	58.0	* 1	0530	111	0.	0.0	58.2	* 1	1030	211	60.	8.1	69.1			
1	0033	12	0.	0.0	58.0	* 1	0533	112	1.	0.0	58.5	* 1	1033	212	60.	8.1	69.1			
1	0036	13	0.	0.0	58.0	* 1	0536	113	1.	0.0	58.5	* 1	1036	213	60.	8.1	69.1			
1	0039	14	0.	0.0	58.0	* 1	0539	114	1.	0.0	58.7	* 1	1039	214	60.	8.1	69.1			
1	0042	15	0.	0.0	58.0	* 1	0542	115	2.	0.2	59.1	* 1	1042	215	60.	8.1	69.1			
1	0045	16	0.	0.0	58.0	* 1	0545	116	4.	0.3	59.8	* 1	1045	216	60.	8.1	69.1			
1	0048	17	0.	0.0	58.0	* 1	0548	117	5.	0.7	60.4	* 1	1048	217	60.	8.1	69.1			
1	0051	18	0.	0.0	58.0	* 1	0551	118	6.	1.1	61.2	* 1	1051	218	60.	8.1	69.1			
1	0054	19	0.	0.0	58.0	* 1	0554	119	7.	1.6	62.1	* 1	1054	219	59.	8.1	69.1			
1	0057	20	0.	0.0	58.0	* 1	0557	120	8.	2.3	63.0	* 1	1057	220	59.	8.1	69.1			
1	0100	21	0.	0.0	58.0	* 1	0600	121	9.	3.0	64.0	* 1	1100	221	59.	8.1	69.1			
1	0103	22	0.	0.0	58.0	* 1	0603	122	10.	3.8	64.9	* 1	1103	222	59.	8.1	69.1			
1	0106	23	0.	0.0	58.0	* 1	0606	123	10.	4.6	65.9	* 1	1106	223	59.	8.1	69.1			
1	0109	24	0.	0.0	58.0	* 1	0609	124	11.	5.4	66.6	* 1	1109	224	59.	8.1	69.1			
1	0112	25	0.	0.0	58.0	* 1	0612	125	11.	6.0	67.3	* 1	1112	225	59.	8.1	69.1			
1	0115	26	0.	0.0	58.0	* 1	0615	126	12.	6.6	67.8	* 1	1115	226	59.	8.1	69.1			
1	0118	27	0.	0.0	58.0	* 1	0618	127	20.	7.0	68.2	* 1	1118	227	59.	8.1	69.1			
1	0121	28	0.	0.0	58.0	* 1	0621	128	33.	7.4	68.5	* 1	1121	228	59.	8.1	69.1			
1	0124	29	0.	0.0	58.0	* 1	0624	129	43.	7.6	68.7	* 1	1124	229	59.	8.1	69.1			
1	0127	30	0.	0.0	58.0	* 1	0627	130	51.	7.8	68.9	* 1	1127	230	59.	8.1	69.1			
1	0130	31	0.	0.0	58.0	* 1	0630	131	57.	8.0	69.0	* 1	1130	231	59.	8.1	69.1			
1	0133	32	0.	0.0	58.0	* 1	0633	132	62.	8.1	69.2	* 1	1133	232	59.	8.0	69.1			
1	0136	33	0.	0.0	58.0	* 1	0636	133	66.	8.2	69.2	* 1	1136	233	58.	8.0	69.1			
1	0139	34	0.	0.0	58.0	* 1	0639	134	69.	8.3	69.3	* 1	1139	234	58.	8.0	69.1			
1	0142	35	0.	0.0	58.0	* 1	0642	135	71.	8.4	69.4	* 1	1142	235	58.	8.0	69.1			
1	0145	36	0.	0.0	58.0	* 1	0645	136	72.	8.4	69.4	* 1	1145	236	58.	8.0	69.1			
1	0148	37	0.	0.0	58.0	* 1	0648	137	73.	8.5	69.4	* 1	1148	237	58.	8.0	69.1			
1	0151	38	0.	0.0	58.0	* 1	0651	138	74.	8.5	69.4	* 1	1151	238	58.	8.0	69.1			



1	0154	39	0.	0.0	58.0	*	1	0654	139	75.	8.5	69.5	*	1	1154	239	58.	8.0	69.1
1	0157	40	0.	0.0	58.0	*	1	0657	140	75.	8.5	69.5	*	1	1157	240	58.	8.0	69.1
1	0200	41	0.	0.0	58.0	*	1	0700	141	75.	8.5	69.5	*	1	1200	241	58.	8.0	69.1
1	0203	42	0.	0.0	58.0	*	1	0703	142	76.	8.5	69.5	*	1	1203	242	58.	8.0	69.1
1	0206	43	0.	0.0	58.0	*	1	0706	143	76.	8.5	69.5	*	1	1206	243	58.	8.0	69.1
1	0209	44	0.	0.0	58.0	*	1	0709	144	76.	8.5	69.5	*	1	1209	244	58.	8.0	69.1
1	0212	45	0.	0.0	58.0	*	1	0712	145	75.	8.5	69.5	*	1	1212	245	58.	8.0	69.1
1	0215	46	0.	0.0	58.0	*	1	0715	146	75.	8.5	69.5	*	1	1215	246	58.	8.0	69.1
1	0218	47	0.	0.0	58.0	*	1	0718	147	75.	8.5	69.5	*	1	1218	247	57.	8.0	69.1
1	0221	48	0.	0.0	58.0	*	1	0721	148	74.	8.5	69.4	*	1	1221	248	57.	8.0	69.1
1	0224	49	0.	0.0	58.0	*	1	0724	149	74.	8.5	69.4	*	1	1224	249	57.	8.0	69.1
1	0227	50	0.	0.0	58.0	*	1	0727	150	74.	8.5	69.4	*	1	1227	250	57.	8.0	69.1
1	0230	51	0.	0.0	58.0	*	1	0730	151	73.	8.4	69.4	*	1	1230	251	57.	8.0	69.0
1	0233	52	0.	0.0	58.0	*	1	0733	152	73.	8.4	69.4	*	1	1233	252	57.	8.0	69.0
1	0236	53	0.	0.0	58.0	*	1	0736	153	72.	8.4	69.4	*	1	1236	253	57.	8.0	69.0
1	0239	54	0.	0.0	58.0	*	1	0739	154	72.	8.4	69.4	*	1	1239	254	57.	8.0	69.0
1	0242	55	0.	0.0	58.0	*	1	0742	155	72.	8.4	69.4	*	1	1242	255	57.	8.0	69.0
1	0245	56	0.	0.0	58.0	*	1	0745	156	71.	8.4	69.4	*	1	1245	256	57.	8.0	69.0
1	0248	57	0.	0.0	58.0	*	1	0748	157	71.	8.4	69.4	*	1	1248	257	57.	8.0	69.0
1	0251	58	0.	0.0	58.0	*	1	0751	158	71.	8.4	69.4	*	1	1251	258	57.	8.0	69.0
1	0254	59	0.	0.0	58.0	*	1	0754	159	70.	8.4	69.4	*	1	1254	259	57.	8.0	69.0
1	0257	60	0.	0.0	58.0	*	1	0757	160	70.	8.4	69.3	*	1	1257	260	56.	8.0	69.0
1	0300	61	0.	0.0	58.0	*	1	0800	161	70.	8.4	69.3	*	1	1300	261	56.	8.0	69.0
1	0303	62	0.	0.0	58.0	*	1	0803	162	70.	8.3	69.3	*	1	1303	262	56.	8.0	69.0
1	0306	63	0.	0.0	58.0	*	1	0806	163	69.	8.3	69.3	*	1	1306	263	56.	8.0	69.0
1	0309	64	0.	0.0	58.0	*	1	0809	164	69.	8.3	69.3	*	1	1309	264	56.	8.0	69.0
1	0312	65	0.	0.0	58.0	*	1	0812	165	69.	8.3	69.3	*	1	1312	265	56.	8.0	69.0
1	0315	66	0.	0.0	58.0	*	1	0815	166	68.	8.3	69.3	*	1	1315	266	56.	8.0	69.0
1	0318	67	0.	0.0	58.0	*	1	0818	167	68.	8.3	69.3	*	1	1318	267	56.	8.0	69.0
1	0321	68	0.	0.0	58.0	*	1	0821	168	67.	8.3	69.3	*	1	1321	268	56.	8.0	69.0
1	0324	69	0.	0.0	58.0	*	1	0824	169	67.	8.3	69.3	*	1	1324	269	56.	8.0	69.0
1	0327	70	0.	0.0	58.0	*	1	0827	170	66.	8.3	69.3	*	1	1327	270	55.	8.0	69.0
1	0330	71	0.	0.0	58.0	*	1	0830	171	66.	8.2	69.2	*	1	1330	271	55.	8.0	69.0
1	0333	72	0.	0.0	58.0	*	1	0833	172	66.	8.2	69.2	*	1	1333	272	55.	8.0	69.0
1	0336	73	0.	0.0	58.0	*	1	0836	173	65.	8.2	69.2	*	1	1336	273	55.	8.0	69.0
1	0339	74	0.	0.0	58.0	*	1	0839	174	65.	8.2	69.2	*	1	1339	274	55.	8.0	69.0
1	0342	75	0.	0.0	58.0	*	1	0842	175	65.	8.2	69.2	*	1	1342	275	55.	7.9	69.0
1	0345	76	0.	0.0	58.0	*	1	0845	176	64.	8.2	69.2	*	1	1345	276	55.	7.9	69.0
1	0348	77	0.	0.0	58.0	*	1	0848	177	64.	8.2	69.2	*	1	1348	277	55.	7.9	69.0
1	0351	78	0.	0.0	58.0	*	1	0851	178	64.	8.2	69.2	*	1	1351	278	54.	7.9	69.0
1	0354	79	0.	0.0	58.0	*	1	0854	179	64.	8.2	69.2	*	1	1354	279	54.	7.9	69.0
1	0357	80	0.	0.0	58.0	*	1	0857	180	64.	8.2	69.2	*	1	1357	280	54.	7.9	69.0
1	0400	81	0.	0.0	58.0	*	1	0900	181	63.	8.2	69.2	*	1	1400	281	54.	7.9	69.0
1	0403	82	0.	0.0	58.0	*	1	0903	182	63.	8.2	69.2	*	1	1403	282	54.	7.9	69.0
1	0406	83	0.	0.0	58.0	*	1	0906	183	63.	8.2	69.2	*	1	1406	283	54.	7.9	69.0
1	0409	84	0.	0.0	58.0	*	1	0909	184	63.	8.2	69.2	*	1	1409	284	54.	7.9	69.0
1	0412	85	0.	0.0	58.0	*	1	0912	185	63.	8.2	69.2	*	1	1412	285	53.	7.9	69.0
1	0415	86	0.	0.0	58.0	*	1	0915	186	63.	8.2	69.2	*	1	1415	286	53.	7.9	69.0
1	0418	87	0.	0.0	58.0	*	1	0918	187	62.	8.2	69.2	*	1	1418	287	53.	7.9	69.0
1	0421	88	0.	0.0	58.0	*	1	0921	188	62.	8.2	69.2	*	1	1421	288	53.	7.9	69.0
1	0424	89	0.	0.0	58.0	*	1	0924	189	62.	8.2	69.2	*	1	1424	289	53.	7.9	68.9
1	0427	90	0.	0.0	58.0	*	1	0927	190	62.	8.1	69.2	*	1	1427	290	53.	7.9	68.9
1	0430	91	0.	0.0	58.0	*	1	0930	191	62.	8.1	69.2	*	1	1430	291	52.	7.9	68.9
1	0433	92	0.	0.0	58.0	*	1	0933	192	62.	8.1	69.2	*	1	1433	292	52.	7.9	68.9
1	0436	93	0.	0.0	58.0	*	1	0936	193	62.	8.1	69.2	*	1	1436	293	52.	7.9	68.9
1	0439	94	0.	0.0	58.0	*	1	0939	194	62.	8.1	69.2	*	1	1439	294	52.	7.9	68.9
1	0442	95	0.	0.0	58.0	*	1	0942	195	62.	8.1	69.2	*	1	1442	295	52.	7.9	68.9
1	0445	96	0.	0.0	58.0	*	1	0945	196	62.	8.1	69.2	*	1	1445	296	51.	7.9	68.9
1	0448	97	0.	0.0	58.0	*	1	0948	197	62.	8.1	69.1	*	1	1448	297	51.	7.8	68.9
1	0451	98	0.	0.0	58.0	*	1	0951	198	61.	8.1	69.1	*	1	1451	298	51.	7.8	68.9
1	0454	99	0.	0.0	58.0	*	1	0954	199	61.	8.1	69.1	*	1	1454	299	51.	7.8	68.9
1	0457	100	0.	0.0	58.0	*	1	0957	200	61.	8.1	69.1	*	1	1457	300	50.	7.8	68.9

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PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW				
		6-HR	24-HR	72-HR	14.95-HR	
76.	7.10	64.	36.	36.	36.	
		(INCHES)	0.569	0.787	0.787	0.787
		(AC-FT)	32.	44.	44.	44.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	14.95-HR
9.	7.10	8.	5.	5.	5.

PEAK STAGE      TIME  
 (FEET)      (HR)  
 69.47      7.10  
 6-HR      69.21      24-HR      64.69      72-HR      64.69      14.95-HR      64.69  
 CUMULATIVE AREA =      1.05 SQ MI

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 556 KK      \* RT-APD16 \*  
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559 KO      OUTPUT CONTROL VARIABLES  
 IPRNT      1      PRINT CONTROL  
 IPLOT      1      PLOT CONTROL  
 QSCAL      0.      HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

560 RD      MUSKINGUM-CUNGE CHANNEL ROUTING  
 L      400.      CHANNEL LENGTH  
 S      0.0500      SLOPE  
 N      0.013      CHANNEL ROUGHNESS COEFFICIENT  
 CA      0.00      CONTRIBUTING AREA  
 SHAPE      CIRC      CHANNEL SHAPE  
 WD      3.50      BOTTOM WIDTH OR DIAMETER  
 Z      0.00      SIDE SLOPE

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 COMPUTED MUSKINGUM-CUNGE PARAMETERS  
 COMPUTATION TIME STEP

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	MAXIMUM CELERITY (FPS)
MAIN	17.04	1.25	0.25	200.00	107.30	363.15	2.19	26.80

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	17.04	1.25	3.00		107.14	363.00	2.19	
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CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5842E+01 EXCESS=0.0000E+00 OUTFLOW=0.5841E+01 BASIN STORAGE=0.1310E-02 PERCENT ERROR= 0.0

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HYDROGRAPH AT STATION RT-APD16

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DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1	0000	1	0.	*	1	0345	76	0.	*	1	0730	151	5.	*	1	1115	226.	2.	
1	0003	2	0.	*	1	0348	77	0.	*	1	0733	152	5.	*	1	1118	227	2.	
1	0006	3	0.	*	1	0351	78	0.	*	1	0736	153	5.	*	1	1121	228	2.	
1	0009	4	0.	*	1	0354	79	0.	*	1	0739	154	5.	*	1	1124	229	2.	
1	0012	5	0.	*	1	0357	80	0.	*	1	0742	155	5.	*	1	1127	230	2.	
1	0015	6	0.	*	1	0400	81	0.	*	1	0745	156	5.	*	1	1130	231	2.	
1	0018	7	0.	*	1	0403	82	0.	*	1	0748	157	5.	*	1	1133	232	2.	
1	0021	8	0.	*	1	0406	83	0.	*	1	0751	158	5.	*	1	1136	233	2.	
1	0024	9	0.	*	1	0409	84	0.	*	1	0754	159	5.	*	1	1139	234	2.	
1	0027	10	0.	*	1	0412	85	0.	*	1	0757	160	5.	*	1	1142	235	2.	
1	0030	11	0.	*	1	0415	86	0.	*	1	0800	161	5.	*	1	1145	236	2.	
1	0033	12	0.	*	1	0418	87	0.	*	1	0803	162	5.	*	1	1148	237	2.	
1	0036	13	0.	*	1	0421	88	0.	*	1	0806	163	4.	*	1	1151	238	2.	

1	0039	14	0.	*	1	0424	99	0.	*	1	0809	164	4.	*	1	1154	239	2.
1	0042	15	0.	*	1	0427	90	0.	*	1	0812	165	4.	*	1	1157	240	2.
1	0045	16	0.	*	1	0430	91	0.	*	1	0815	166	3.	*	1	1200	241	2.
1	0048	17	0.	*	1	0433	92	0.	*	1	0818	167	3.	*	1	1203	242	2.
1	0051	18	0.	*	1	0436	93	0.	*	1	0821	168	3.	*	1	1206	243	2.
1	0054	19	0.	*	1	0439	94	0.	*	1	0824	169	3.	*	1	1209	244	2.
1	0057	20	0.	*	1	0442	95	0.	*	1	0827	170	3.	*	1	1212	245	2.
1	0100	21	0.	*	1	0445	96	0.	*	1	0830	171	2.	*	1	1215	246	2.
1	0103	22	0.	*	1	0448	97	0.	*	1	0833	172	2.	*	1	1218	247	2.
1	0106	23	0.	*	1	0451	98	0.	*	1	0836	173	2.	*	1	1221	248	2.
1	0109	24	0.	*	1	0454	99	0.	*	1	0839	174	2.	*	1	1224	249	2.
1	0112	25	0.	*	1	0457	100	0.	*	1	0842	175	2.	*	1	1227	250	2.
1	0115	26	0.	*	1	0500	101	0.	*	1	0845	176	2.	*	1	1230	251	2.
1	0118	27	0.	*	1	0503	102	0.	*	1	0848	177	2.	*	1	1233	252	2.
1	0121	28	0.	*	1	0506	103	0.	*	1	0851	178	2.	*	1	1236	253	2.
1	0124	29	0.	*	1	0509	104	0.	*	1	0854	179	2.	*	1	1239	254	2.
1	0127	30	0.	*	1	0512	105	0.	*	1	0857	180	2.	*	1	1242	255	2.
1	0130	31	0.	*	1	0515	106	0.	*	1	0900	181	2.	*	1	1245	256	2.
1	0133	32	0.	*	1	0518	107	0.	*	1	0903	182	2.	*	1	1248	257	2.
1	0136	33	0.	*	1	0521	108	0.	*	1	0906	183	2.	*	1	1251	258	2.
1	0139	34	0.	*	1	0524	109	0.	*	1	0909	184	2.	*	1	1254	259	2.
1	0142	35	0.	*	1	0527	110	0.	*	1	0912	185	2.	*	1	1257	260	2.
1	0145	36	0.	*	1	0530	111	0.	*	1	0915	186	2.	*	1	1300	261	2.
1	0148	37	0.	*	1	0533	112	0.	*	1	0918	187	2.	*	1	1303	262	2.
1	0151	38	0.	*	1	0536	113	2.	*	1	0921	188	2.	*	1	1306	263	2.
1	0154	39	0.	*	1	0539	114	7.	*	1	0924	189	2.	*	1	1309	264	2.
1	0157	40	0.	*	1	0542	115	18.	*	1	0927	190	2.	*	1	1312	265	2.
1	0200	41	0.	*	1	0545	116	32.	*	1	0930	191	2.	*	1	1315	266	2.
1	0203	42	0.	*	1	0548	117	49.	*	1	0933	192	2.	*	1	1318	267	2.
1	0206	43	0.	*	1	0551	118	64.	*	1	0936	193	2.	*	1	1321	268	2.
1	0209	44	0.	*	1	0554	119	79.	*	1	0939	194	2.	*	1	1324	269	2.
1	0212	45	0.	*	1	0557	120	91.	*	1	0942	195	2.	*	1	1327	270	2.
1	0215	46	0.	*	1	0600	121	102.	*	1	0945	196	2.	*	1	1330	271	2.
1	0218	47	0.	*	1	0603	122	107.	*	1	0948	197	2.	*	1	1333	272	2.
1	0221	48	0.	*	1	0606	123	100.	*	1	0951	198	2.	*	1	1336	273	2.
1	0224	49	0.	*	1	0609	124	81.	*	1	0954	199	2.	*	1	1339	274	2.
1	0227	50	0.	*	1	0612	125	60.	*	1	0957	200	2.	*	1	1342	275	2.
1	0230	51	0.	*	1	0615	126	42.	*	1	1000	201	2.	*	1	1345	276	2.
1	0233	52	0.	*	1	0618	127	31.	*	1	1003	202	2.	*	1	1348	277	2.
1	0236	53	0.	*	1	0621	128	24.	*	1	1006	203	2.	*	1	1351	278	2.
1	0239	54	0.	*	1	0624	129	19.	*	1	1009	204	2.	*	1	1354	279	2.
1	0242	55	0.	*	1	0627	130	16.	*	1	1012	205	2.	*	1	1357	280	2.
1	0245	56	0.	*	1	0630	131	15.	*	1	1015	206	2.	*	1	1400	281	2.
1	0248	57	0.	*	1	0633	132	13.	*	1	1018	207	2.	*	1	1403	282	2.
1	0251	58	0.	*	1	0636	133	12.	*	1	1021	208	2.	*	1	1406	283	2.
1	0254	59	0.	*	1	0639	134	11.	*	1	1024	209	2.	*	1	1409	284	2.
1	0257	60	0.	*	1	0642	135	9.	*	1	1027	210	2.	*	1	1412	285	2.
1	0300	61	0.	*	1	0645	136	8.	*	1	1030	211	2.	*	1	1415	286	2.
1	0303	62	0.	*	1	0648	137	8.	*	1	1033	212	2.	*	1	1418	287	2.
1	0306	63	0.	*	1	0651	138	8.	*	1	1036	213	2.	*	1	1421	288	2.
1	0309	64	0.	*	1	0654	139	7.	*	1	1039	214	2.	*	1	1424	289	1.
1	0312	65	0.	*	1	0657	140	7.	*	1	1042	215	2.	*	1	1427	290	1.
1	0315	66	0.	*	1	0700	141	7.	*	1	1045	216	2.	*	1	1430	291	1.
1	0318	67	0.	*	1	0703	142	7.	*	1	1048	217	2.	*	1	1433	292	1.
1	0321	68	0.	*	1	0706	143	7.	*	1	1051	218	2.	*	1	1436	293	1.
1	0324	69	0.	*	1	0709	144	6.	*	1	1054	219	2.	*	1	1439	294	1.
1	0327	70	0.	*	1	0712	145	6.	*	1	1057	220	2.	*	1	1442	295	1.
1	0330	71	0.	*	1	0715	146	5.	*	1	1100	221	2.	*	1	1445	296	1.
1	0333	72	0.	*	1	0718	147	5.	*	1	1103	222	2.	*	1	1448	297	1.
1	0336	73	0.	*	1	0721	148	5.	*	1	1106	223	2.	*	1	1451	298	1.
1	0339	74	0.	*	1	0724	149	5.	*	1	1109	224	2.	*	1	1454	299	1.
1	0342	75	0.	*	1	0727	150	5.	*	1	1112	225	2.	*	1	1457	300	1.

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PEAK FLOW (CFS)	TIME (HR)	(CFS)	6-HR	MAXIMUM AVERAGE FLOW 24-HR	72-HR	14.95-HR
107.	6.05		11.	5.	5.	5.
		(INCHES)	2.013	2.191	2.191	2.191
		(AC-FT)	5.	6.	6.	6.

CUMULATIVE AREA = 0.05 SQ MI



1	0224	49	0.	*	1	0609	124	92.	*	1	0954	199	64.	*	1	1339	274	57.
1	0227	50	0.	*	1	0612	125	71.	*	1	0957	200	64.	*	1	1342	275	56.
1	0230	51	0.	*	1	0615	126	54.	*	1	1000	201	64.	*	1	1345	276	56.
1	0233	52	0.	*	1	0618	127	51.	*	1	1003	202	64.	*	1	1348	277	56.
1	0236	53	0.	*	1	0621	128	57.	*	1	1006	203	64.	*	1	1351	278	56.
1	0239	54	0.	*	1	0624	129	62.	*	1	1009	204	63.	*	1	1354	279	56.
1	0242	55	0.	*	1	0627	130	67.	*	1	1012	205	63.	*	1	1357	280	56.
1	0245	56	0.	*	1	0630	131	72.	*	1	1015	206	63.	*	1	1400	281	56.
1	0248	57	0.	*	1	0633	132	75.	*	1	1018	207	63.	*	1	1403	282	55.
1	0251	58	0.	*	1	0636	133	78.	*	1	1021	208	63.	*	1	1406	283	55.
1	0254	59	0.	*	1	0639	134	79.	*	1	1024	209	62.	*	1	1409	284	55.
1	0257	60	0.	*	1	0642	135	80.	*	1	1027	210	62.	*	1	1412	285	55.
1	0300	61	0.	*	1	0645	136	81.	*	1	1030	211	62.	*	1	1415	286	55.
1	0303	62	0.	*	1	0648	137	81.	*	1	1033	212	62.	*	1	1418	287	55.
1	0306	63	0.	*	1	0651	138	82.	*	1	1036	213	62.	*	1	1421	288	54.
1	0309	64	0.	*	1	0654	139	82.	*	1	1039	214	62.	*	1	1424	289	54.
1	0312	65	0.	*	1	0657	140	82.	*	1	1042	215	62.	*	1	1427	290	54.
1	0315	66	0.	*	1	0700	141	83.	*	1	1045	216	62.	*	1	1430	291	54.
1	0318	67	0.	*	1	0703	142	83.	*	1	1048	217	61.	*	1	1433	292	54.
1	0321	68	0.	*	1	0706	143	82.	*	1	1051	218	61.	*	1	1436	293	53.
1	0324	69	0.	*	1	0709	144	82.	*	1	1054	219	61.	*	1	1439	294	53.
1	0327	70	0.	*	1	0712	145	81.	*	1	1057	220	61.	*	1	1442	295	53.
1	0330	71	0.	*	1	0715	146	81.	*	1	1100	221	61.	*	1	1445	296	53.
1	0333	72	0.	*	1	0718	147	80.	*	1	1103	222	61.	*	1	1448	297	53.
1	0336	73	0.	*	1	0721	148	79.	*	1	1106	223	61.	*	1	1451	298	52.
1	0339	74	0.	*	1	0724	149	79.	*	1	1109	224	61.	*	1	1454	299	52.
1	0342	75	0.	*	1	0727	150	78.	*	1	1112	225	61.	*	1	1457	300	52.

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*****
PEAK FLOW      TIME
(CFS)          (HR)
117.           6.05
(CFS)
(INCHES)       0.591
(AC-FT)        35.
MAXIMUM AVERAGE FLOW
6-HR           70.
24-HR          40.
72-HR          40.
14.95-HR       40.
(INCHES)       0.851
(AC-FT)        50.
CUMULATIVE AREA = 1.10 SQ MI

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638 KK * AP-D21 *
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640 KO OUTPUT CONTROL VARIABLES
      IPRNT      1 PRINT CONTROL
      IPLOT      1 PLOT CONTROL
      QSCAL      0. HYDROGRAPH PLOT SCALE

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641 HC HYDROGRAPH COMBINATION
      ICOMP      2 NUMBER OF HYDROGRAPHS TO COMBINE

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HYDROGRAPH AT STATION AP-D21  
SUM OF 2 HYDROGRAPHS

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1	0000	1	1.	*	1	0345	76	0.	*	1	0730	151	83.	*	1	1115	226	63.	
1	0003	2	0.	*	1	0348	77	0.	*	1	0733	152	82.	*	1	1118	227	62.	
1	0006	3	0.	*	1	0351	78	0.	*	1	0736	153	82.	*	1	1121	228	62.	
1	0009	4	0.	*	1	0354	79	0.	*	1	0739	154	81.	*	1	1124	229	62.	
1	0012	5	0.	*	1	0357	80	0.	*	1	0742	155	81.	*	1	1127	230	62.	
1	0015	6	0.	*	1	0400	81	0.	*	1	0745	156	81.	*	1	1130	231	62.	

1	0018	7	0.	*	1	0403	82	0.	*	1	0748	157	80.	*	1	1133	232	62.
1	0021	8	0.	*	1	0406	83	0.	*	1	0751	158	80.	*	1	1136	233	62.
1	0024	9	0.	*	1	0409	84	0.	*	1	0754	159	80.	*	1	1139	234	62.
1	0027	10	0.	*	1	0412	85	0.	*	1	0757	160	79.	*	1	1142	235	62.
1	0030	11	0.	*	1	0415	86	0.	*	1	0800	161	79.	*	1	1145	236	62.
1	0033	12	0.	*	1	0418	87	0.	*	1	0803	162	79.	*	1	1148	237	62.
1	0036	13	0.	*	1	0421	88	0.	*	1	0806	163	78.	*	1	1151	238	62.
1	0039	14	0.	*	1	0424	89	0.	*	1	0809	164	77.	*	1	1154	239	62.
1	0042	15	0.	*	1	0427	90	0.	*	1	0812	165	76.	*	1	1157	240	62.
1	0045	16	0.	*	1	0430	91	0.	*	1	0815	166	74.	*	1	1200	241	61.
1	0048	17	0.	*	1	0433	92	0.	*	1	0818	167	73.	*	1	1203	242	61.
1	0051	18	0.	*	1	0436	93	0.	*	1	0821	168	73.	*	1	1206	243	61.
1	0054	19	0.	*	1	0439	94	0.	*	1	0824	169	72.	*	1	1209	244	61.
1	0057	20	0.	*	1	0442	95	0.	*	1	0827	170	71.	*	1	1212	245	61.
1	0100	21	0.	*	1	0445	96	0.	*	1	0830	171	71.	*	1	1215	246	61.
1	0103	22	0.	*	1	0448	97	0.	*	1	0833	172	71.	*	1	1218	247	61.
1	0106	23	0.	*	1	0451	98	0.	*	1	0836	173	70.	*	1	1221	248	61.
1	0109	24	0.	*	1	0454	99	0.	*	1	0839	174	70.	*	1	1224	249	61.
1	0112	25	0.	*	1	0457	100	0.	*	1	0842	175	69.	*	1	1227	250	61.
1	0115	26	0.	*	1	0500	101	0.	*	1	0845	176	69.	*	1	1230	251	61.
1	0118	27	0.	*	1	0503	102	0.	*	1	0848	177	69.	*	1	1233	252	61.
1	0121	28	0.	*	1	0506	103	0.	*	1	0851	178	69.	*	1	1236	253	61.
1	0124	29	0.	*	1	0509	104	0.	*	1	0854	179	69.	*	1	1239	254	61.
1	0127	30	0.	*	1	0512	105	0.	*	1	0857	180	68.	*	1	1242	255	60.
1	0130	31	0.	*	1	0515	106	0.	*	1	0900	181	68.	*	1	1245	256	60.
1	0133	32	0.	*	1	0518	107	0.	*	1	0903	182	68.	*	1	1248	257	60.
1	0136	33	0.	*	1	0521	108	0.	*	1	0906	183	68.	*	1	1251	258	60.
1	0139	34	0.	*	1	0524	109	0.	*	1	0909	184	68.	*	1	1254	259	60.
1	0142	35	0.	*	1	0527	110	0.	*	1	0912	185	67.	*	1	1257	260	60.
1	0145	36	0.	*	1	0530	111	0.	*	1	0915	186	67.	*	1	1300	261	60.
1	0148	37	0.	*	1	0533	112	1.	*	1	0918	187	67.	*	1	1303	262	60.
1	0151	38	0.	*	1	0536	113	4.	*	1	0921	188	67.	*	1	1306	263	60.
1	0154	39	0.	*	1	0539	114	14.	*	1	0924	189	67.	*	1	1309	264	60.
1	0157	40	0.	*	1	0542	115	33.	*	1	0927	190	67.	*	1	1312	265	59.
1	0200	41	0.	*	1	0545	116	62.	*	1	0930	191	67.	*	1	1315	266	59.
1	0203	42	0.	*	1	0548	117	94.	*	1	0933	192	67.	*	1	1318	267	59.
1	0206	43	0.	*	1	0551	118	122.	*	1	0936	193	67.	*	1	1321	268	59.
1	0209	44	0.	*	1	0554	119	146.	*	1	0939	194	66.	*	1	1324	269	59.
1	0212	45	0.	*	1	0557	120	167.	*	1	0942	195	66.	*	1	1327	270	59.
1	0215	46	0.	*	1	0600	121	186.	*	1	0945	196	66.	*	1	1330	271	58.
1	0218	47	0.	*	1	0603	122	196.	*	1	0948	197	66.	*	1	1333	272	58.
1	0221	48	0.	*	1	0606	123	188.	*	1	0951	198	66.	*	1	1336	273	58.
1	0224	49	0.	*	1	0609	124	163.	*	1	0954	199	66.	*	1	1339	274	58.
1	0227	50	0.	*	1	0612	125	131.	*	1	0957	200	66.	*	1	1342	275	58.
1	0230	51	0.	*	1	0615	126	98.	*	1	1000	201	66.	*	1	1345	276	58.
1	0233	52	0.	*	1	0618	127	81.	*	1	1003	202	66.	*	1	1348	277	58.
1	0236	53	0.	*	1	0621	128	77.	*	1	1006	203	66.	*	1	1351	278	58.
1	0239	54	0.	*	1	0624	129	78.	*	1	1009	204	65.	*	1	1354	279	57.
1	0242	55	0.	*	1	0627	130	81.	*	1	1012	205	65.	*	1	1357	280	57.
1	0245	56	0.	*	1	0630	131	84.	*	1	1015	206	65.	*	1	1400	281	57.
1	0248	57	0.	*	1	0633	132	86.	*	1	1018	207	65.	*	1	1403	282	57.
1	0251	58	0.	*	1	0636	133	88.	*	1	1021	208	64.	*	1	1406	283	57.
1	0254	59	0.	*	1	0639	134	89.	*	1	1024	209	64.	*	1	1409	284	57.
1	0257	60	0.	*	1	0642	135	89.	*	1	1027	210	64.	*	1	1412	285	56.
1	0300	61	0.	*	1	0645	136	89.	*	1	1030	211	64.	*	1	1415	286	56.
1	0303	62	0.	*	1	0648	137	88.	*	1	1033	212	64.	*	1	1418	287	56.
1	0306	63	0.	*	1	0651	138	89.	*	1	1036	213	64.	*	1	1421	288	56.
1	0309	64	0.	*	1	0654	139	89.	*	1	1039	214	63.	*	1	1424	289	56.
1	0312	65	0.	*	1	0657	140	89.	*	1	1042	215	63.	*	1	1427	290	56.
1	0315	66	0.	*	1	0700	141	89.	*	1	1045	216	63.	*	1	1430	291	55.
1	0318	67	0.	*	1	0703	142	89.	*	1	1048	217	63.	*	1	1433	292	55.
1	0321	68	0.	*	1	0706	143	89.	*	1	1051	218	63.	*	1	1436	293	55.
1	0324	69	0.	*	1	0709	144	88.	*	1	1054	219	63.	*	1	1439	294	55.
1	0327	70	0.	*	1	0712	145	87.	*	1	1057	220	63.	*	1	1442	295	54.
1	0330	71	0.	*	1	0715	146	86.	*	1	1100	221	63.	*	1	1445	296	54.
1	0333	72	0.	*	1	0718	147	85.	*	1	1103	222	63.	*	1	1448	297	54.
1	0336	73	0.	*	1	0721	148	84.	*	1	1106	223	63.	*	1	1451	298	54.
1	0339	74	0.	*	1	0724	149	84.	*	1	1109	224	63.	*	1	1454	299	54.
1	0342	75	0.	*	1	0727	150	83.	*	1	1112	225	63.	*	1	1457	300	53.

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PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	14.95-HR
196.	6.05	79.	44.	44.	44.