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

April 2001
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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 3-13-03

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

COLORADO REGISTERED VANCEL S FOSSINGER 31972 PROFESSIONAL ENGINEER

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.

Tim Mitro Jr

City Engineer

March 18, 2003

Date

Conditions:

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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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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

PROJECTED LAND USE	ASSUMED PERCENT IMPERVIOUS	AREA (acres)	PERCENT OF STUDY AREA
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 (tc) 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 tc calculations are included in the appendix of this study. Lag time as utilized in the methodology was calculated as 0.6 tc (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 potions 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)		
	AP-H13	AP-DF"G'"	NET DIFF.
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

Water Surface Elevation (Feet)	Cumulative Storage Volume (AC/FT)	Outflow (cfs)
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 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

Water Surface Elevation (Feet)	Cumulative Storage Volume (AC/FT)	Outflow (cfs)
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 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

Water Surface Elevation (Feet)	Cumulative Storage Volume (AC/FT)	Outflow (cfs)
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

Water Surface Elevation (Feet)	Cumulative Storage Volume (AC/FT)	Normal Outlet to Storm Drain Discharge (cfs)	Normal Outlet to Natural Channel Discharge (cfs)
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_{100} 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

Water Surface Elevation (Feet)	Cumulative Storage Volume (AC/FT)	Normal Outlet Discharge (cfs)
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

Water Surface Elevation (Feet)	Cumulative Storage Volume (AC/FT)	Normal Outlet Discharge (cfs)
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

\kd\887710\DBPS-MDDP Oct 2002

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.

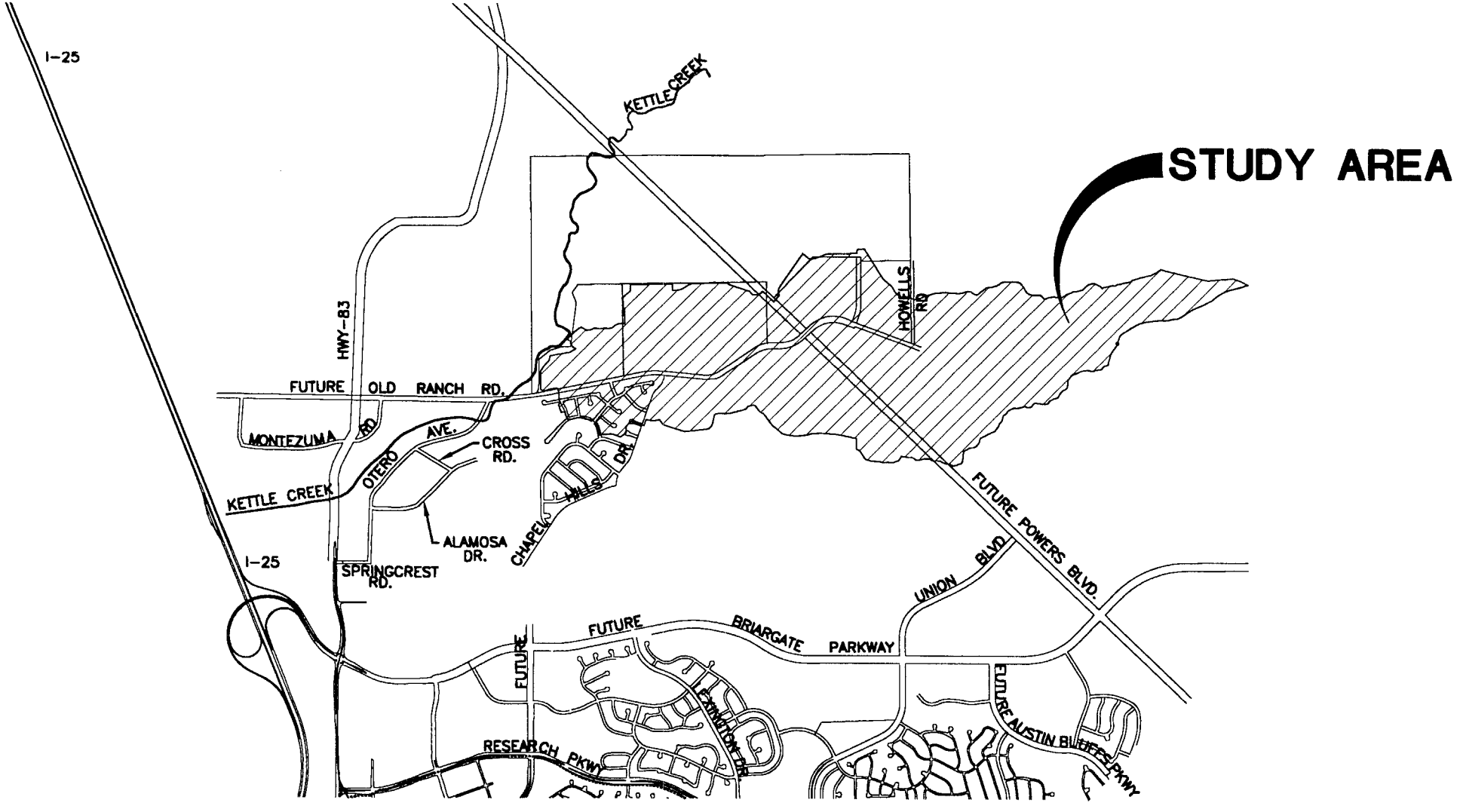
17. "Final Drainage Reports for Pine Creek Subdivision Filings 9, 14, 26, 28, 29 and 30," by JR Engineering, various dates.

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



VICINITY MAP

1" = 3000'

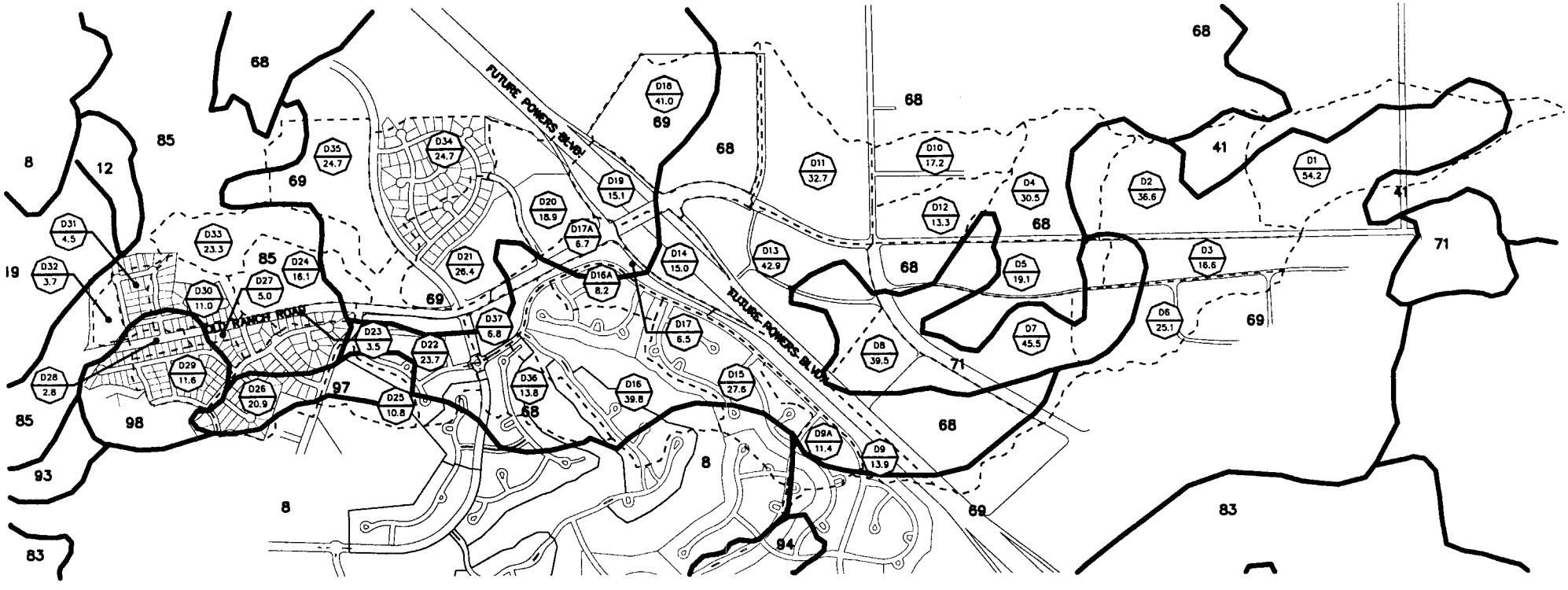
N

X:\80000.ALL\80771\DRAWINGS\VICINITYMAP.DWG DATE 6/8/99

B.

S.C.S. SOIL MAP

S.C.S SOIL MAP



LEGEND

- SOIL MAP UNIT BOUNDARY
- DEVELOPED DRAINAGE BASIN BOUNDARY
- D25 / 19.8 — DRAINAGE BASIN ID
- 85 — SOIL MAP SYMBOL

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

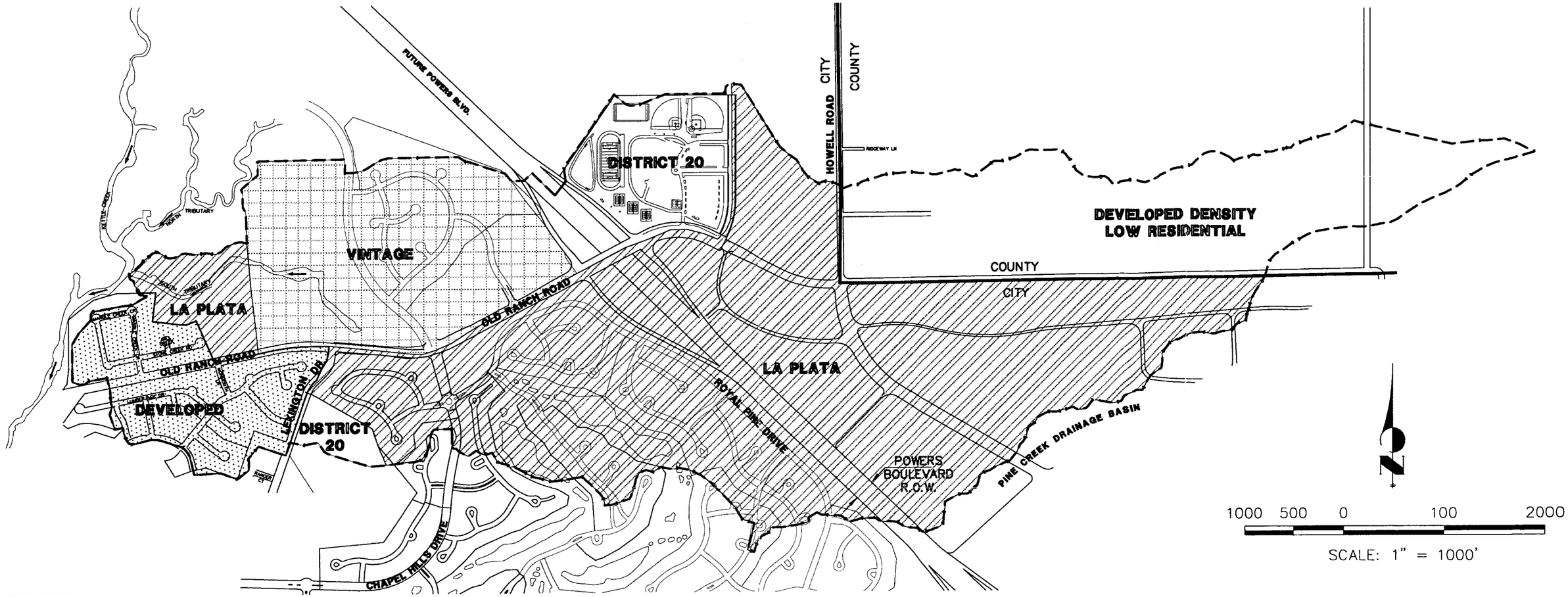
*NOTE:
SOIL MAP UNIT BOUNDARIES AND SOIL DATA WERE COPIED FROM S.C.S. SOIL SURVEY OF EL PASO COUNTY AREA, COLORADO.

1500 750 0 1500 3000

SCALE: 1" = 1500'

C.

GENERAL LAND OWNERSHIP



LEGEND

BASIN BOUNDARY

DEVELOPED AREA

DISTRICT 20 SCHOOL DISTRICT

LP47, LLC dba La Plata Investments

VINTAGE COMMUNITIES

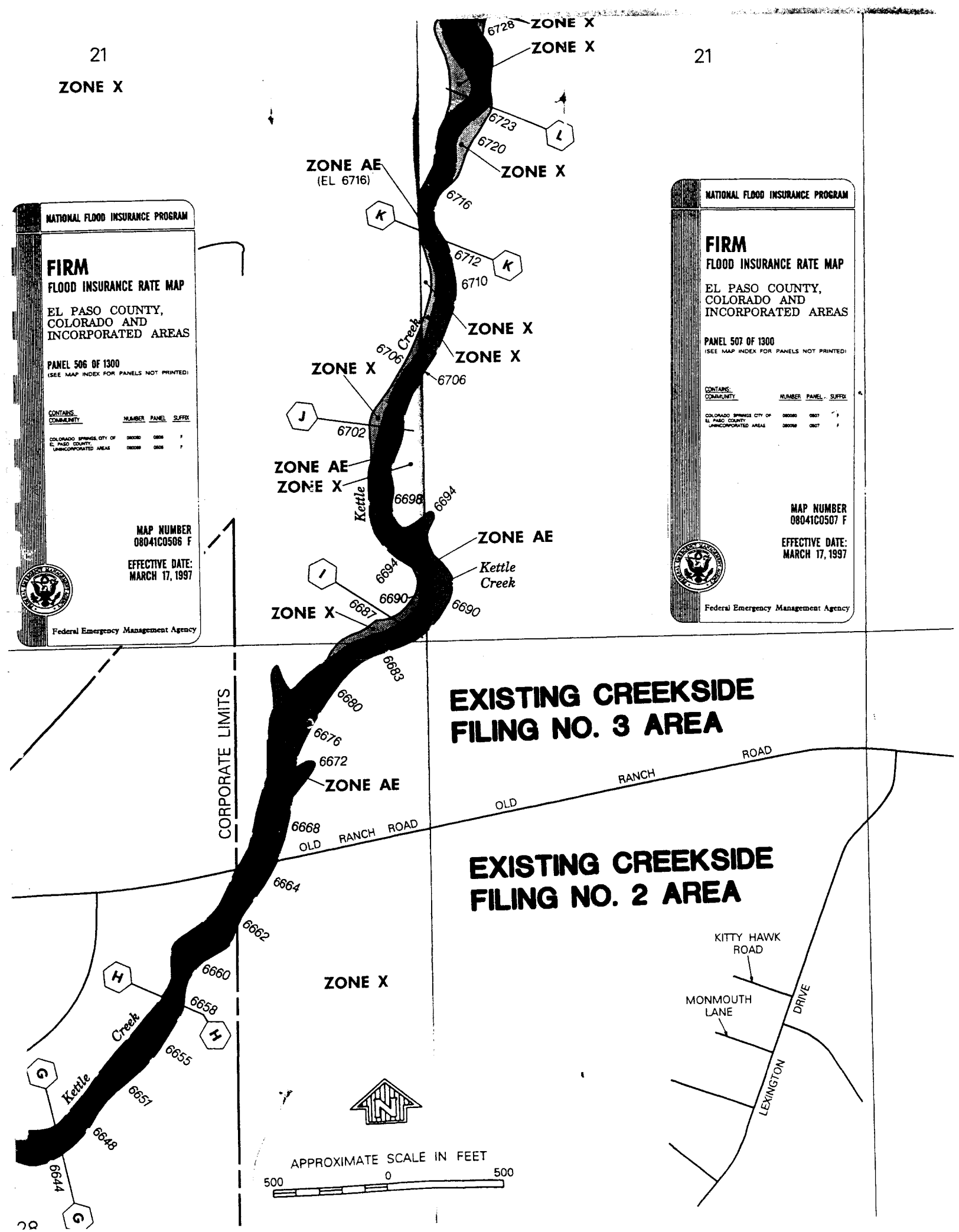
KETTLE CREEK DRAINAGE BASIN
OLD RANCH ROAD TRIBUTARY
DRAINAGE BASIN PLANNING STUDY AND
MASTER DEVELOPMENT DRAINAGE PLAN
GENERAL LAND OWNERSHIP IN STUDY AREA

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

J·R ENGINEERING
A Subsidiary of Westrian
4310 ArrowsWest Drive • Colorado Springs, CO 80907
719-593-2593 • Fax 719-528-6613 • www.jrengineering.com

D.

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


21
ZONE X
21
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:
COMMUNITY
NUMBER
PANEL
SUFFIX
COLORADO SPRINGS, CITY OF 080060 0506 F
EL PASO COUNTY, UNINCORPORATED AREAS 080059 0506 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:
COMMUNITY
NUMBER
PANEL
SUFFIX
COLORADO SPRINGS, CITY OF 080060 0507 F
EL PASO COUNTY, UNINCORPORATED AREAS 080059 0507 F
MAP NUMBER 08041C0507 F
EFFECTIVE DATE: MARCH 17, 1997
Federal Emergency Management Agency
6728
ZONE X
ZONE X
6723
L
6720
ZONE X
ZONE AE
(EL 6716)
6716
K
6712
K
6710
ZONE X
6706 Creek
ZONE X
ZONE X
6706
J
6702
ZONE AE
ZONE X
Kettle
6698
6694
ZONE AE
Kettle Creek
I
6694
6690
6690
ZONE X
6687
6683
6680
6676
6672
ZONE AE
6668
OLD RANCH ROAD
6664
6662
6660
H
6658
H
Creek
6655
G
Kettle
6651
6648
6644
G
ZONE X
CORPORATE LIMITS
EXISTING CREEKSIDE FILING NO. 3 AREA
EXISTING CREEKSIDE FILING NO. 2 AREA
OLD RANCH ROAD
KITTY HAWK ROAD
MONMOUTH LANE
DRIVE
LEXINGTON
APPROXIMATE SCALE IN FEET
500
0
500

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 AREA ONE				SUB AREA TWO				SUB AREA THREE				SUB AREA FOUR							
SUB-BASIN LABEL	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.	TOTAL AREA AC.	TOTAL AREA S.M.	WEIGHTED CN	WEIGHTED INPERV.
D1	<1 DU/AC	5.0	69.0	54.2													54.2	0.085	69.0	5.0
D2	<1 DU/AC	5.0	69.0	34.3	ART. STREET	85.0	93.0	2.3									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	0.048	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	50.0	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	LI/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	50.0	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	5.0	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

									HEC1 MODEL					RATIONAL METHOD	COMPUTED HEC1 VS.	ADJUSTED HEC1 VS.	COMPUTED
									W/ COMPUTED CN		W/ ADJUSTED CN						
SUB BASIN I.D.	AREA (sq miles)	AREA (acres)	IMPERVIOUS PERCENT	COMPUTED CN	ADJUSTED CN	COMPUTED C_{100}	TC (min)	LAG (hours)	Q_{100} (cfs)	Q_{100}/ACRE (cfs)	Q_{100} (cfs)	Q_{100}/ACRE (cfs)	I_{100} (in/hr)	Q_{100} (cfs/AC)	RATIONAL PERCENT	RATIONAL PERCENT	RATIONAL Q100
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															

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

HISTORIC (UNDEVELOPED) CONDITION LAG TIME ESTIMATE

5/6/1999

BASIN	OVERLAND FLOW				GRASS LINED SWALE				NATURAL CHANNEL					TOTAL	TOTAL	TOTAL
ID.	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^.5)*S^-.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	OVERLAND FLOW				SWALE OR STREET					CHANNEL OR STORM DRAIN					TOTAL	TOTAL	TOTAL
ID.	L (ft)	C(10YR)	S (%)	TC(min)	TYPE	L (ft)	S (%)	V (fps)	TC(min)	TYPE	L (ft)	S(%)	V (fps)	TC(min)	TC(min)	LAG(min.)	LAG(hrs)
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	OVERLAND FLOW				SWALE OR STREET					CHANNEL OR STORM DRAIN					TOTAL	TOTAL	TOTAL
ID.	L (ft)	C(10YR)	S (%)	TC(min)	TYPE	L (ft)	S (%)	V (fps)	TC(min)	TYPE	L (ft)	S(%)	V (fps)	TC(min)	TC(min)	LAG(min.)	LAG(hrs)
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^.5)*S^-.33)

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

CHANNEL VELOCITY PER MANNINGS BASED ON APPROXMATE 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              *
*                                       *
*  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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X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
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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 -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

HEC-1 INPUT PAGE 1

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

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

 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
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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
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 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                                    PAGE 10

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                                    PAGE 11

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"
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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 RO
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
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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-DFF
504          KM   ROUTE THE FLOW FROM AP-14 TO PROPOSED DETENTION FACILITY "F"
505          RD     200     .03    .013            CIRC     4.5
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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                                      PAGE 13

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
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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
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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
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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-DFCS
 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
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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-D33
 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
```



```
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

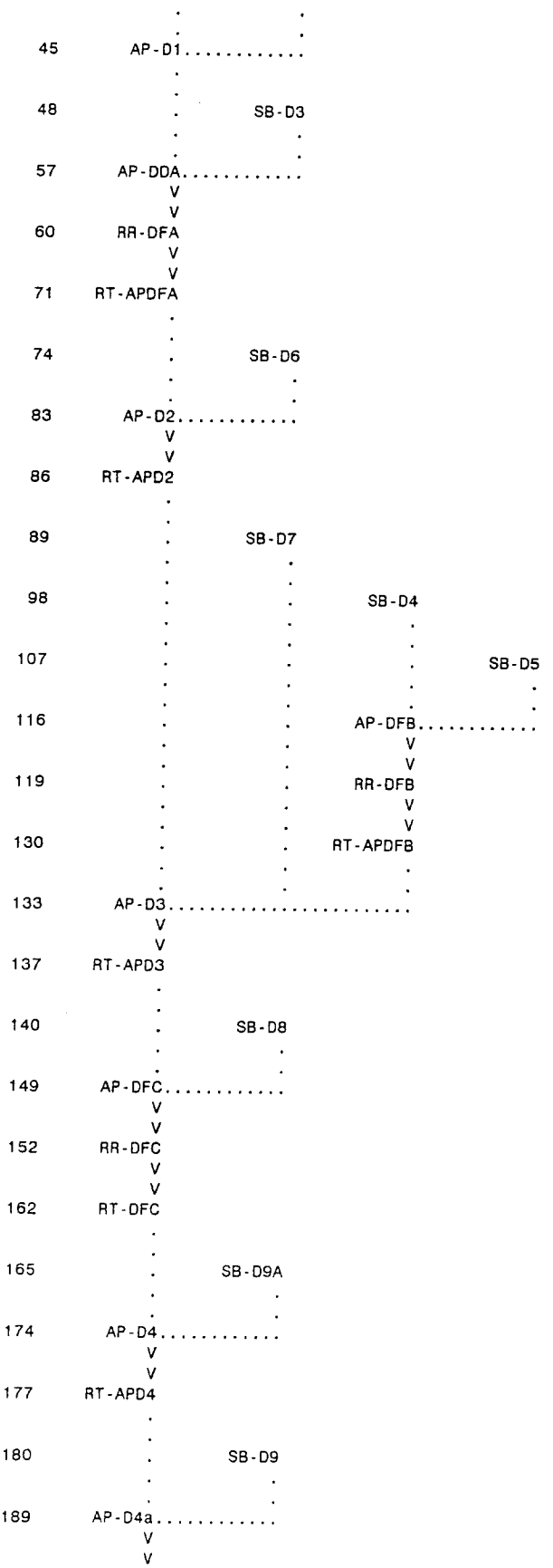
 734          KK  RR-DFG
 735          KM   ROUTE FLOW THROUGH PROPOSED DETENTION FACILITY "G". STORAGE IS BASED ON A
 736          KM   PRELIMINARY GRADING PLAN AND A TWO STAGE OUTLET WITH A 6" DIA OUTLET AT
 737          KM   INVERT ELEV. 60 AND A 24" DIA STANDPIPE WITH A TOP ELEV OF 66
 738          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
```

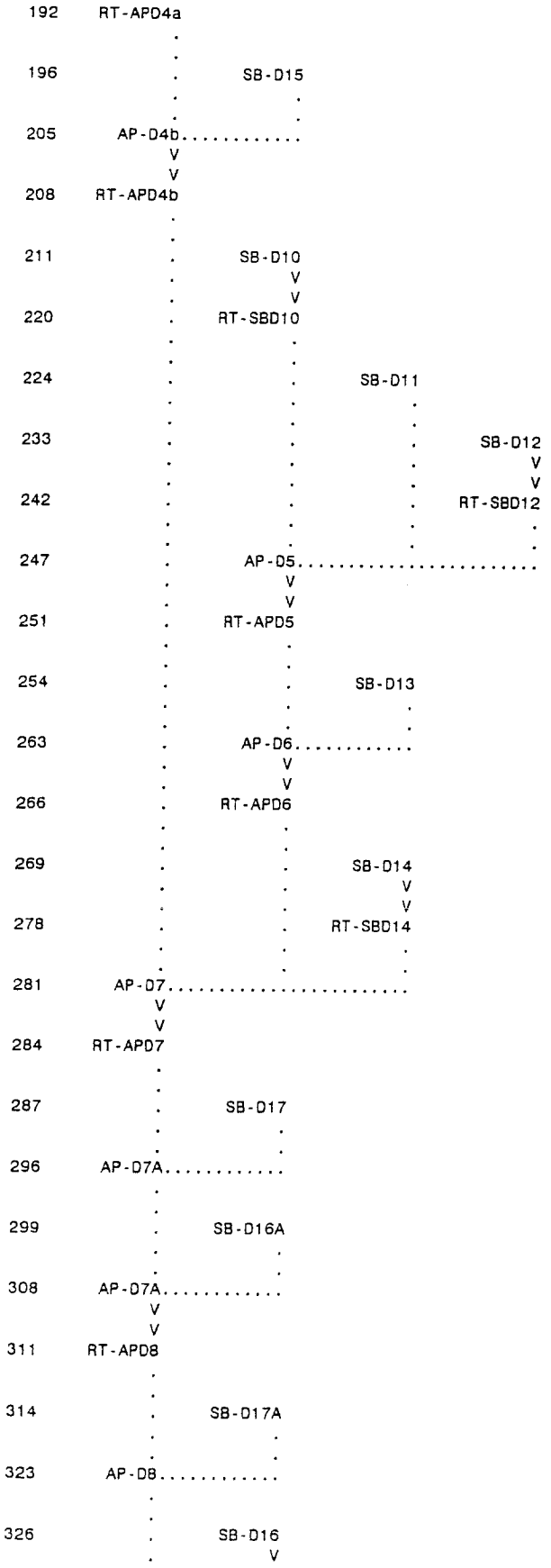
SCHEMATIC DIAGRAM OF STREAM NETWORK

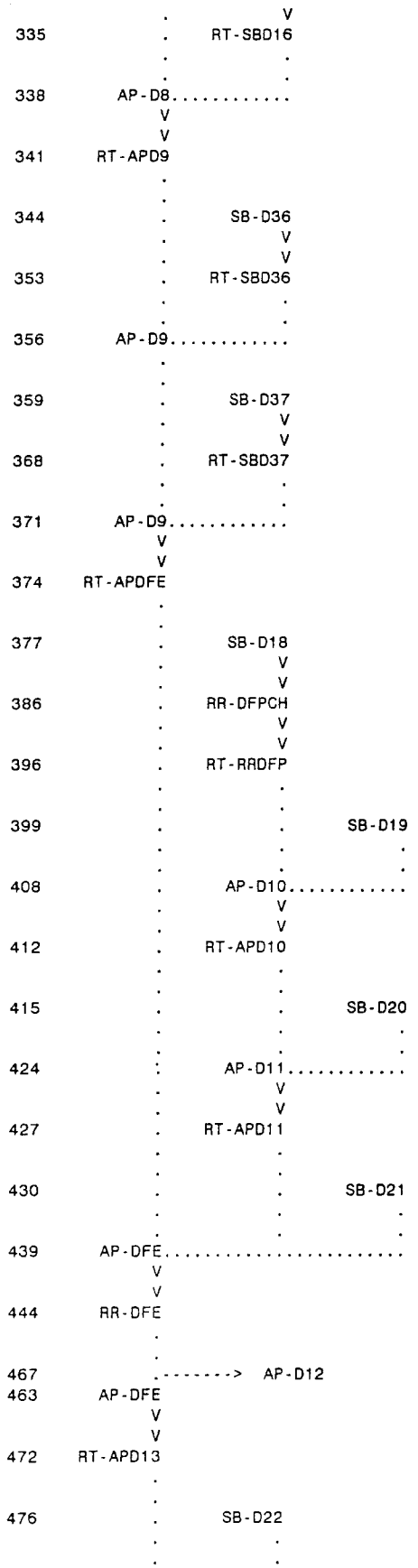
```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

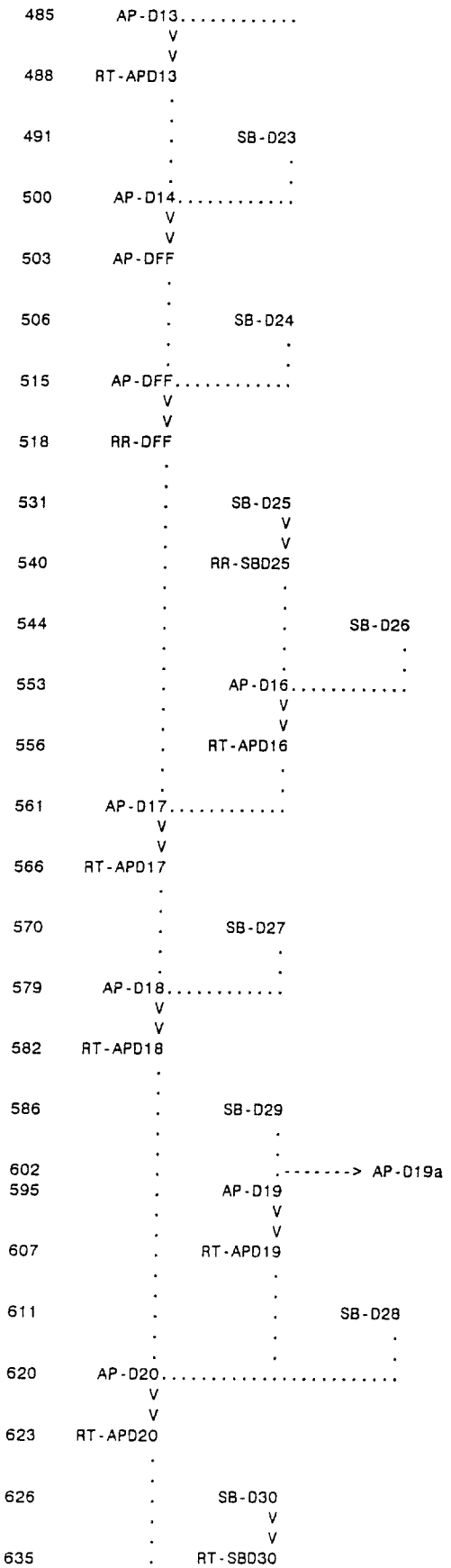
  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

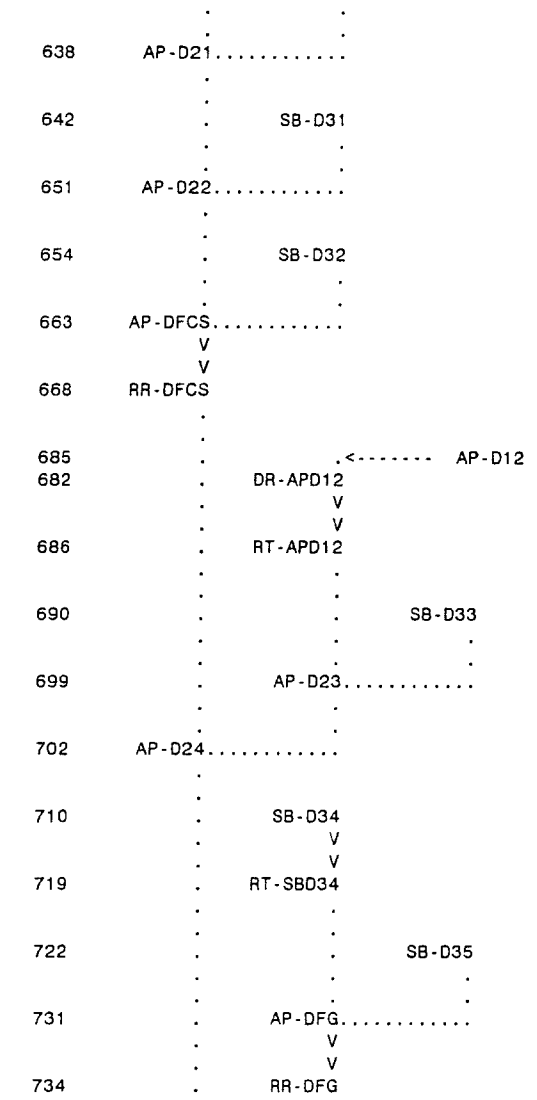
   24       SB-D1
              V
              V
   33     RT-SBD1
              .
              .
   36         .        SB-D2
```


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


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


335 RT-SBD16
338 AP-D8
341 RT-APD9
344 SB-D36
353 RT-SBD36
356 AP-D9
359 SB-D37
368 RT-SBD37
371 AP-D9
374 RT-APDFE
377 SB-D18
386 RR-DFPCH
396 RT-RRDFP
399 SB-D19
408 AP-D10
412 RT-APD10
415 SB-D20
424 AP-D11
427 RT-APD11
430 SB-D21
439 AP-DFE
444 RR-DFE
467 AP-D12
463 AP-DFE
472 RT-APD13
476 SB-D22


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



(***) 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 *
*                                       *
*****************************************
```

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

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

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

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	14.95-HR
(FEET)	(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

HYDROGRAPH ROUTING DATA

126 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

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

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

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	14.95-HR
(FEET)	(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 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          1  PRINT CONTROL
                     IPLOT          1  PLOT CONTROL
                     QSCAL          0. HYDROGRAPH PLOT SCALE

              HYDROGRAPH ROUTING DATA

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

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			
			6-HR	24-HR	72-HR	14.95-HR
(CFS)	(HR)					
		(CFS)				
86.	7.30		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			
		6-HR	24-HR	72-HR	14.95-HR
(AC-FT)	(HR)				
21.	7.30	15.	6.	6.	6.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	14.95-HR
(FEET)	(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
                     IPLOT          1  PLOT CONTROL
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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	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	14.95-HR
(CFS)	(HR)					
		(CFS)				
36.	6.45		11.	5.	5.	5.
		(INCHES)	1.587	1.749	1.749	1.749
		(AC-FT)	5.	6.	6.	6.

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

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

CUMULATIVE AREA = 0.06 SQ MI

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          *            *
444 KK    *   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

457 SV          STORAGE      0.0     0.1     0.7     2.8     5.1     7.8    10.8    12.5    14.2    16.0
                            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

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

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

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE		
		6-HR	24-HR	72-HR	14.95-HR
(FEET)	(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

DT DIVERSION

ISTAD	AP-D12	DIVERSION HYDROGRAPH IDENTIFICATION

DI	INFLOW	0.00	0.70	1.20	19.70	34.70	44.90	55.60	70.60	98.00	141.00
		201.00	236.00	309.00	435.00	530.00	632.00	750.00	877.00	1016.00	
DQ	DIVERTED FLOW	0.00	0.70	1.20	1.80	2.20	2.60	5.40	16.90	41.00	80.50
		137.70	169.60	240.70	363.80	456.00	556.00	671.00	796.00	932.40	

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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.

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	14.95-HR
(CFS)	(HR)					
		(CFS)				
525.	6.25		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

HYDROGRAPH AT STATION AP-DFE

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	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	14.95-HR
(CFS)	(HR)					
		(CFS)				
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*
            *        *
            **********

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

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.	8.3	69.3	*	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	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	14.95-HR
(CFS)	(HR)					
		(CFS)				
76.	7.10		64.	36.	36.	36.
		(INCHES)	0.569	0.787	0.787	0.787
		(AC-FT)	32.	44.	44.	44.

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

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	14.95-HR
(FEET)	(HR)				
69.47	7.10	69.21	64.69	64.69	64.69

CUMULATIVE AREA = 1.05 SQ MI

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556 KK

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* *
* 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	

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	89	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	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	14.95-HR
(CFS)	(HR)					
		(CFS)				
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

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              *            *
561 KK        *   AP-D17   *
              *            *
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564 KO             OUTPUT CONTROL VARIABLES
                        IPRNT             1  PRINT CONTROL
                        IPLOT             1  PLOT CONTROL
                        QSCAL            0.  HYDROGRAPH PLOT SCALE

565 HC             HYDROGRAPH COMBINATION
                        ICOMP             2  NUMBER OF HYDROGRAPHS TO COMBINE
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HYDROGRAPH AT STATION AP-D17
SUM OF 2 HYDROGRAPHS

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DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW
1		0000	1	1.	*	1		0345	76	0.	*	1		0730	151	78.	*	1		1115	226	61.
1		0003	2	0.	*	1		0348	77	0.	*	1		0733	152	78.	*	1		1118	227	61.
1		0006	3	0.	*	1		0351	78	0.	*	1		0736	153	77.	*	1		1121	228	61.
1		0009	4	0.	*	1		0354	79	0.	*	1		0739	154	77.	*	1		1124	229	61.
1		0012	5	0.	*	1		0357	80	0.	*	1		0742	155	76.	*	1		1127	230	60.
1		0015	6	0.	*	1		0400	81	0.	*	1		0745	156	76.	*	1		1130	231	60.
1		0018	7	0.	*	1		0403	82	0.	*	1		0748	157	76.	*	1		1133	232	60.
1		0021	8	0.	*	1		0406	83	0.	*	1		0751	158	75.	*	1		1136	233	60.
1		0024	9	0.	*	1		0409	84	0.	*	1		0754	159	75.	*	1		1139	234	60.
1		0027	10	0.	*	1		0412	85	0.	*	1		0757	160	75.	*	1		1142	235	60.
1		0030	11	0.	*	1		0415	86	0.	*	1		0800	161	75.	*	1		1145	236	60.
1		0033	12	0.	*	1		0418	87	0.	*	1		0803	162	74.	*	1		1148	237	60.
1		0036	13	0.	*	1		0421	88	0.	*	1		0806	163	74.	*	1		1151	238	60.
1		0039	14	0.	*	1		0424	89	0.	*	1		0809	164	73.	*	1		1154	239	60.
1		0042	15	0.	*	1		0427	90	0.	*	1		0812	165	72.	*	1		1157	240	60.
1		0045	16	0.	*	1		0430	91	0.	*	1		0815	166	71.	*	1		1200	241	60.
1		0048	17	0.	*	1		0433	92	0.	*	1		0818	167	71.	*	1		1203	242	60.
1		0051	18	0.	*	1		0436	93	0.	*	1		0821	168	70.	*	1		1206	243	60.
1		0054	19	0.	*	1		0439	94	0.	*	1		0824	169	69.	*	1		1209	244	60.
1		0057	20	0.	*	1		0442	95	0.	*	1		0827	170	69.	*	1		1212	245	59.
1		0100	21	0.	*	1		0445	96	0.	*	1		0830	171	68.	*	1		1215	246	59.
1		0103	22	0.	*	1		0448	97	0.	*	1		0833	172	68.	*	1		1218	247	59.
1		0106	23	0.	*	1		0451	98	0.	*	1		0836	173	68.	*	1		1221	248	59.
1		0109	24	0.	*	1		0454	99	0.	*	1		0839	174	67.	*	1		1224	249	59.
1		0112	25	0.	*	1		0457	100	0.	*	1		0842	175	67.	*	1		1227	250	59.
1		0115	26	0.	*	1		0500	101	0.	*	1		0845	176	67.	*	1		1230	251	59.
1		0118	27	0.	*	1		0503	102	0.	*	1		0848	177	67.	*	1		1233	252	59.
1		0121	28	0.	*	1		0506	103	0.	*	1		0851	178	66.	*	1		1236	253	59.
1		0124	29	0.	*	1		0509	104	0.	*	1		0854	179	66.	*	1		1239	254	59.
1		0127	30	0.	*	1		0512	105	0.	*	1		0857	180	66.	*	1		1242	255	59.
1		0130	31	0.	*	1		0515	106	0.	*	1		0900	181	66.	*	1		1245	256	59.
1		0133	32	0.	*	1		0518	107	0.	*	1		0903	182	66.	*	1		1248	257	59.
1		0136	33	0.	*	1		0521	108	0.	*	1		0906	183	65.	*	1		1251	258	59.
1		0139	34	0.	*	1		0524	109	0.	*	1		0909	184	65.	*	1		1254	259	58.
1		0142	35	0.	*	1		0527	110	0.	*	1		0912	185	65.	*	1		1257	260	58.
1		0145	36	0.	*	1		0530	111	0.	*	1		0915	186	65.	*	1		1300	261	58.
1		0148	37	0.	*	1		0533	112	1.	*	1		0918	187	65.	*	1		1303	262	58.
1		0151	38	0.	*	1		0536	113	2.	*	1		0921	188	65.	*	1		1306	263	58.
1		0154	39	0.	*	1		0539	114	8.	*	1		0924	189	65.	*	1		1309	264	58.
1		0157	40	0.	*	1		0542	115	20.	*	1		0927	190	65.	*	1		1312	265	58.
1		0200	41	0.	*	1		0545	116	37.	*	1		0930	191	64.	*	1		1315	266	58.
1		0203	42	0.	*	1		0548	117	54.	*	1		0933	192	64.	*	1		1318	267	57.
1		0206	43	0.	*	1		0551	118	70.	*	1		0936	193	64.	*	1		1321	268	57.
1		0209	44	0.	*	1		0554	119	86.	*	1		0939	194	64.	*	1		1324	269	57.
1		0212	45	0.	*	1		0557	120	99.	*	1		0942	195	64.	*	1		1327	270	57.
1		0215	46	0.	*	1		0600	121	111.	*	1		0945	196	64.	*	1		1330	271	57.
1		0218	47	0.	*	1		0603	122	117.	*	1		0948	197	64.	*	1		1333	272	57.
1		0221	48	0.	*	1		0606	123	110.	*	1		0951	198	64.	*	1		1336	273	57.