AMENDMENT NO. 2
To
PINE CREEK DRAINAGE BASIN
PLANNING STUDY
And
MASTER DEVELOPMENT DRAINAGE PLAN
For
PINE CREEK SUBDIVISION
(Portion Contributing to Pine Creek)
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To
PINE CREEK DRAINAGE BASIN
PLANNING STUDY
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For
PINE CREEK SUBDIVISION
(portion contributing to Pine Creek)

October 1998

Prepared For:

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Job No. 8716.11
AMENDMENT NO. 2 TO
PINE CREEK DRAINAGE BASIN PLANNING STUDY AND
MASTER DEVELOPMENT DRAINAGE PLAN FOR
PINE CREEK SUBDIVISION
(PORTION CONTRIBUTING TO PINE CREEK)

DRAINAGE REPORT STATEMENT

ENGINEER'S STATEMENT:
The attached amendment to the approved drainage basin planning study 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 damage caused by any negligent acts, errors, or omissions on my
part in preparing this report.

Vancel S. Fossinger, Colorado
For and On Behalf of JR Engineering, Ltd.

DEVELOPER'S STATEMENT:
I, the developer, have read and will comply with all of the requirements specified in this
amendment to the approved Pine Creek Drainage Basin Planning Study.

Business Name:  
LP47, LLC
dba La Plata Investments

By:  
Bob Ingels

Title:  

Address:  
7150 Campus Drive, Suite 365
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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.

City Engineer
Conditions

Date
EXECUTIVE SUMMARY

The "Pine Creek Drainage Basin Planning Study," by Obering, Wurth and Associates, approved June 20, 1989, implemented a stormwater management concept that included use of both private and public detention facilities to limit the fully developed condition peak 100-year flow rate in Pine Creek at Highway 83 to a maximum of 2536 cfs. The study identified the historic peak 100-year flow rate for this location as 1210 cfs and required the Developer of the Briargate area to make improvements to the reach of channel downstream of Highway 83 before the historic rate was exceeded. The study provided a phased approach for the construction of the required drainage improvements. In the initial phase, construction of Regional Detention Facility No. 1 was to occur and the Detention Facility was to be fitted with a restricted outlet to allow an estimated 1000 to 1500 acres of the watershed to develop before the historic flow rate was exceeded and downstream improvements were required. The study also recommended that a re-analysis of the basin be done when approximately 1000 acres of the basin had occurred.

Approximately 600 acres of the basin have been developed to date. Regional Detention Facility No. 1 has been constructed with the proposed restricted outlet. Several on-site detention facilities have also been constructed on commercial and office sites. It is estimated that development within the basin is approaching a level where the historic discharge from the watershed above Highway 83 will be exceeded and either the improvements required for the downstream channel must be constructed or additional detention facilities must be constructed within the basin above Highway 83 to limit the peak 100-year discharge to the historic 100-year peak rate. Heightened environmental concerns about construction of extensive improvements within historic watercourses as well as changes in drainage criteria and drainage management philosophy by government agencies and the current major land owner in the basin have driven a re-analysis and formulation of a revised Stormwater Management Plan for the portion of the basin located upstream of Highway 83.
The Stormwater Management Plan contained within this Amendment 2 to the Pine Creek Drainage Basin Planning Study requires additional regional detention facilities be constructed within the basin in order to limit the fully developed condition 100-year peak flow rate at Highway 83 to the previously defined historic 100-year peak flow rate of 1210 cfs. This is consistent with the goals of the effective DBPS as set forth in the section titled “Implementation.” In addition, the plan contained within this Amendment eliminates the requirements of on-site detention within the basin except where downstream conveyance capacity is inadequate. This will be made possible by accomplishing more detention within the proposed regional detention facilities. This is consistent with current City policy.

As reported in the “Pine Creek Drainage Basin Planning Study,” the Pine Creek Drainage Basin has been approved by jurisdictional agencies as a “No-Fee” basin as it relates to respective City ordinances and County resolutions. This Amendment is intended to serve as the stormwater management guideline for the portion of Pine Creek Drainage Basin located upstream of Highway 83.
# AMENDMENT NO. 2 TO
PINE CREEK DRAINAGE BASIN PLANNING STUDY AND
MASTER DEVELOPMENT DRAINAGE PLAN FOR
PINE CREEK SUBDIVISION
(PORTION CONTRIBUTING TO PINE CREEK)

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MASTER DEVELOPMENT DRAINAGE PLAN FOR  
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(PORTION CONTRIBUTING TO PINE CREEK)

I. INTRODUCTION

A. Contract Authorization
   This document and associated analysis was prepared with private funds for LP47, LLC  
d.b.a. La Plata Investments by JR Engineering, Ltd. La Plata Investments is the major  
landowner and developer within the study area.

B. Purpose and Scope
   This document is to serve as an update and second amendment to the Pine Creek  
Drainage Basin Planning Study (DBPS) prepared by Obering, Wurth and Associates as  
approved June 20, 1989, by the City of Colorado Springs. This document will also serve  
as the Master Development Drainage Plan for the portion of the Pine Creek Subdivision  
located within the Pine Creek drainage basin.

1. In regards to providing an update and amendment to the Pine Creek DBPS this  
document will provide:
   a. An updated hydrological analysis of the portion of the Pine Creek Basin located  
east of State Highway 83 (the study area)
   b. Identification of the drainage facilities that have been constructed within the  
portion of the basin located east of Highway 83
   c. Identification of the current proposed land uses within the portion of the Pine  
Creek Basin located east of Highway 83
   d. Revised proposed drainage treatment within the portion of the Pine Creek  
drainage basin located east of Highway 83. The treatment revisions consist  
primarily of:
• Eliminating the requirement for on-site detention except in areas where existing outfall lines do not have sufficient capacity to convey free discharge.

• Increasing the overall detention storage volume to be provided in the proposed regional detention ponds, thus reducing the design storm flow in several locations of Pine Creek including the point that it flows under Highway 83 and onto the grounds of the Air Force Academy.

• Replacing proposed lined open channel conveyances with underground storm drains in several locations.

• Relocation and reconfiguration of previously proposed regional detention facilities and adding additional regional detention facilities.

2. These revisions are proposed as a result of changes in land use planning in the basin, changes in drainage criteria by the governing agencies, and changes in overall drainage treatment philosophies by the governing agencies and by the major land owner in the basin.

3. In regards to the Pine Creek Subdivision this document will estimate the peak flow rates of storm water runoff and identify the overall concept for treatment of the runoff within the portion of the subdivision that will contribute runoff to Pine Creek when it is developed. The identified treatment will consist of:

   a. Indicating the general proposed direction of flow for developed condition drainage.

   b. The major components of proposed storm drain systems including outfall points, proposed detention basin locations and sizes.

   c. General guidelines for the proposed treatment of the portion of Pine Creek Channel that is contained within the subdivision.

More specific and detailed analysis and drainage treatment plans will be provided with the submittal of individual drainage reports for each subdivision filing within the Pine Creek Subdivision.
C. Past Studies

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. Additional, reports that were reviewed are noted in the reference section of this study.

"Pine Creek Drainage Basin Planning Study," June 1988 revised October 1988, by Obering, Wurth and Associates. This study included all of the Pine Creek drainage basin above Academy Boulevard. Key items of this study included the following:

- Major drainage conveyances were primarily to be open channels.
- Required onsite detention to achieve a 35 percent reduction in the peak flow rate resulting from development (the difference between the historic and developed peak rates) on all office, research and development, commercial, and school properties.
- Free discharge from all other properties was proposed.
- The 100-year historic peak flow rate in Pine creek as it crosses under Highway 83 was estimated at 1210 cfs.
- Improvements were to be made to the portion of Pine Creek between Highway 83 and Academy Boulevard to allow it to convey a proposed 100-year peak flow rate from above Highway 83 of 2536 cfs. These improvements were to be made to the channel before the historic flow rate from the area above Highway 83 was exceeded.
- Five regional detention ponds were to be constructed above Highway 83 to regulate the peak 100-year discharge rate to 2536 cfs.
- Detention Facility No. 1 was to be constructed on the Pine Creek Main Channel near the intersection of Briargate Parkway and Highway 83 and fitted with a restricter plate to temporarily reduce the planned outflow. The purpose of the reduced outflow was to regulate the down stream 100-year flow in Pine Creek to less than the historic 100-year peak rate. This was to be done to allow development to begin in the watershed before the portion of channel between Academy Boulevard and Highway 83 was improved.

- This amendment proposed the addition of a sixth regional detention pond. The proposed 100-year peak flow rate from the area above Highway 83 was to remain at 2536 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 watershed included in this study are unincorporated areas of El Paso County. Runoff from the unincorporated areas of the watershed has been accounted for in the current study.

The portion of Pine Creek that is located immediately downstream of the area included in this proposed Amendment No. 2 to the Pine Creek Drainage Basin Planning Study is located on the grounds of the United States Air Force Academy (USAF). The effective Pine Creek Drainage Basin Planning Study (DBPS) was reviewed by and contains a letter of approval from the (USAF).

Section VIII of the effective Pine Creek (DBPS) is titled “Implementation.” The second paragraph of this section states that “the primary basin management goal for this particular drainage basin is one of limiting a peak discharge from the study area at State Highway 83 to historic or below for as long a period as possible.” Later in the text the “historic peak discharge” is mentioned as the 100-year historic rate of 1210 cfs.

The drainage plan contained in this current proposed Amendment No. 2 to the Pine Creek (DBPS) proposes to restrict the peak 100-year flow rate in Pine Creek at Highway 83 to a maximum of 1210 cfs with the upstream watershed in a fully developed condition. As this change in the plan is consistent with the stated goal of the effective (DBPS), and the
improvements required to accomplish this change will be constructed at the expense of and on land owned by La Plata Investments, the major land owner in the study area, it is anticipated that the City of Colorado Springs will be the sole agency for review and approval of this Amendment to the (DBPS).

It is understood that other agencies such as FEMA, the Corps of Engineers, and the Wildlife Service 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.

E. Drainage Criteria
Storm drainage design and management within the study area must conform to the current City Colorado Springs Criteria. In addition, the original D.B.P.S imposed a requirement for onsite detention to achieve a 35 percent reduction in the peak flow rate resulting from development (the difference between the historic and developed peak rates) on all office, research and development, commercial, and school properties. The current study proposes to eliminate this requirement for certain properties within the study area (refer to Section V).

II. PROJECT DESCRIPTION, LOCATION AND DRAINAGE

A. Basin Location and Size
The study area is a portion of the Briargate Community located in the northeast portion of Colorado Springs. As shown on the vicinity map the study area is bounded by the Kettle Creek Drainage Basin on the north and the Cottonwood Creek Drainage Basin on the south. The lower or western limit of the study area is defined by the crown of Highway 83. The upper limit of the study area is located approximately 22,000 feet to the east of Highway 83 and coincides with the upper limit of the Pine Creek Drainage Basin. The study area is approximately 2,930-acres or 4.58 square miles in size.
B. Major Drainageways and Facilities

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 a considerable amount of drainage improvement have been constructed to support the existing development. Three significant storm drain systems have been constructed in the study area to date. For the purpose of this study they will be referenced to as the Focus on the Family storm drain system, the South Chapel Hills Drive Storm Drain System and the North Chapel Hills Drive Storm Drain System.

The initial phase of the Focus on the Family Storm Drain System was constructed to serve as an outfall from the Focus on the Family Site. The system begins in Summer Field Subdivision Filings No. 5 and 6, is routed through the existing Summer Field Detention Pond, then south in Summerset Drive, west in Research Parkway, west across the Focus on the Family site, then north in Explorer Drive and finally west in Briargate Parkway to outfall into Detention Facility No. 1.

The South Chapel Hills Drive storm drain begins in Dynamic Drive east of Chapel Hills Drive. It is then routed north in Chapel Hills Drive to outfall into Pine Creek on the west side of Chapel Hills Drive.

The North Chapel Hills Drive storm drain begins in Lexington Drive just north of Chapel Hills Drive. It is the routed southwest in Chapel Hills Drive to outfall into Pine Creek on the west side of Chapel Hills Drive.

Pine Creek is an unimproved natural channel throughout most of the study area. At the downstream end of the study area a concrete box culvert with three (3) 14 foot span by 10-foot rise cells carries the creek under Highway 83. Upstream, a single cell 12-foot span by 10-foot rise concrete box culvert carries the outflow from Detention Facility No. 1 under Briargate Parkway and back to the Pine Creek Channel. On the upstream (north) side of Briargate Parkway, existing Detention Facility No. 1 accepts and detains all of the flow from the upstream Pine Creek Channel. A new bridge is expected to be constructed to carry Pine Creek under Chapel Hills Drive within the year.
The portion of Pine Creek that begins at Highway 83 and extends approximately 8,500 feet upstream to the historic confluence of the north and south fork of Pine Creek is for the most part heavily vegetated with willows and cattails and appears to be quite stable. This portion of channel is identified as Reaches 1, 2 and 3 on the drainage maps prepared for this study. This portion of channel has existed in a unique environment for several years in that it has been sheltered from significant frequent flows and has a minor base flow that provides the moisture required to support the vegetation. 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 at frequent intervals along both the north and south forks of Pine Creek upstream of the confluence. There are also several small retention basins spread throughout the watershed to intercept small concentrated flows upstream of the defined Pine Creek Channel. 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 channel from all but large infrequent flows. This environment has allowed the vegetation in the channel to become well established.

Upstream of the confluence of the north and south forks the character of the Pine Creek Channel changes as the presence of perennial water in the channel is greatly reduced. Several areas of the channel bottom are dry in all but large rainfall events. Other areas are kept moist by small springs and water impounded in the online retention basins. With the reduction of the available water in the channel the quantity and quality of the vegetation in the channel is also less in the reaches upstream of the confluence than found in the lower reaches of the channel.

C. Existing and Proposed Land Use
Approximately 600-acres of the 2,930-acre study area are currently developed. 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 assumption. The following table is a summary of these land uses.

### PROJECTED LAND USE
**Fully Developed Condition**

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Assumed Percent Impervious</th>
<th>Area (acres)</th>
<th>Percent of Study Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Golf Course</td>
<td></td>
<td>204</td>
<td>7%</td>
</tr>
<tr>
<td>Park</td>
<td></td>
<td>128</td>
<td>4%</td>
</tr>
<tr>
<td>Open Space</td>
<td></td>
<td>151</td>
<td>5%</td>
</tr>
<tr>
<td>Residential</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-2 DU/AC</td>
<td>20-25</td>
<td>150</td>
<td>5%</td>
</tr>
<tr>
<td>3 DU/AC</td>
<td>30</td>
<td>422</td>
<td>14%</td>
</tr>
<tr>
<td>4 DU/AC</td>
<td>37</td>
<td>115</td>
<td>4%</td>
</tr>
<tr>
<td>2-6 DU/AC</td>
<td>44</td>
<td>189</td>
<td>6%</td>
</tr>
<tr>
<td>5 DU/AC</td>
<td>44</td>
<td>78</td>
<td>3%</td>
</tr>
<tr>
<td>6-18 DU/AC</td>
<td>56-70</td>
<td>228</td>
<td>8%</td>
</tr>
<tr>
<td>Light Industrial/Office</td>
<td>83</td>
<td>498</td>
<td>17%</td>
</tr>
<tr>
<td>Commercial</td>
<td>95</td>
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<td>8%</td>
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<tr>
<td>Church</td>
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<td>20</td>
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<tr>
<td>Misc. Other</td>
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<td>7%</td>
</tr>
<tr>
<td>Arterial Street</td>
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<td>173</td>
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</tr>
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<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>2932</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

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 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 Hydrologic Soils Group Map was provided in the original Pine Creek DBPS. This map shows the hydrologic soil group limits and the 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 (SCS) in 1975. The map indicates that the majority of the soils in the study area belong to Hydrologic Soil Groups “A” and “B”. A portion of the Briargate Business Campus contains soils in the Hydrologic Group “C”. A small portion of Subbasins PN7, PN10, and PN13 contain soils identified as belonging to Hydrologic Soil Group “D”.

The erosion potential as reported in the SCS “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 FIMS program, where available. At the extreme upper end of the study area the FIMS 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, the majority landowner in the study area, has contracted with an environmental consultant to perform a survey to identify environmentally sensitive areas within the study area. Potential areas of concern are areas that meet the qualifications of wetlands 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 Pine Creek in order to minimize impacts to the channel.

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:

a. Estimate peak runoff rates for sub-basins to be developed in the future

b. Provide peak flow rates to be used in the design of proposed major conveyances and the evaluation of the ability Pine Creek to convey developed condition flows.

c. Provide inflow and outflow hydrographic and required storage volumes to be used in the design of proposed regional detention facilities and the evaluation of existing regional detention facilities.

d. Demonstrate the adequacy of the proposed plan to control the 100-year peak flow rate in Pine Creek as it crosses under Highway 83 to a maximum of 1210 cfs (the historic 100-year peak flow rate established by the effective DBPS).

e. Estimate 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 (SCS) Dimensionless Unit Hydrograph utilizing the U.S. Army Corps. Of Engineers HEC-1 computer program as modified by Haestad Methods Inc., May 1991 version. The original Pine Creek DBPS also utilized the HEC-1 program. Due to a multitude of changes that have occurred in the study area since the original study was performed the original model HEC-1 model was reviewed but not utilized in the
current study. A new basin map was created along with new sub-basin boundaries, lag times, and estimated curve numbers. A new HEC-1 Model was created to evaluate the basin in an anticipated fully developed condition with the new data. A second model was then created from the first with the upper part of the watershed evaluated in the "existing condition" in order to evaluate a partially developed or "interim" condition.

a. Times of Concentration

Times of Concentration (TC) were estimated based on actual flow paths in existing developed areas and undeveloped areas for the existing 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

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 analyses based on general assumptions for drainage basin planning studies. 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 CN's 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 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. No effort was made to adjust Curve Numbers for the undeveloped basins in the Interim condition model, as future design calculations by rational method for the condition are unlikely. 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” for the 100-year storm and 2.6” for the 5-year storm were used 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-I 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 somewhat conservative methodology used for the current analysis has produced hydrographs in some of these areas of existing development that are larger than predicted by the existing approved MDDPs and final drainage reports for these areas. This is not necessarily indicative of problems with the previous
analyses but rather is the result of utilizing a different and potentially more conservative approach of analysis that was chosen to allow some tolerance for the unknowns that exist at the DBPS level of analysis.

One approach that was considered for modeling the existing areas was to revise the "curve numbers" and "lag times" used in the areas of existing development to produce peak flow rates similar to those produced by previous analyses. This approach was not used, as the resulting hydrographs would be skewed in volume and or in time in comparison with the remainder of the model. Both time and volume are very important when modeling detention facilities so it was determined that it was more appropriate to universally apply the chosen methods of calculating lag times and applying curve numbers than it was to match the output of several previous analyses performed by several individuals using varying methodologies and criteria.

The current analysis does not include a detailed analysis of the existing storm drain systems. 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 or conveyed to a substantially different outfall into Pine Creek, a simplistic evaluation of the capacity of the existing storm drain was made. The downstream capacity was assumed to be equal to the full pipe conveyance capacity of the most restricted segment of the downstream storm drain of interest. Where storm drain capacity was found to be less than the 100 year peak flow rates predicted by the current analysis, the HEC I model was revised to divert excess flow from the storm drain system and route, it to Pine Creek via an approximate surface route or out of the watershed as appropriate for the location. This serves to provide a conservative estimate of the total flows that will be conveyed in Pine Creek through and out of the study area.
B. Major Drainageway Hydraulics

1. Floodplain Delineation Maps

The Federal Emergency Management Agency, Flood Insurance Study (FIS) for El-Paso County and Incorporated Areas was revised and reissued on March 17, 1997. Six Panels of the Flood Insurance Rate Maps (FIRMs) produced as a part of the FIS include portions of the Pine Creek study area. A Map entitled “Pine Creek FEMA 100-Year Flood Zone Limits” is included in the appendix of this report. The map contains the FEMA 100-year flood zone limits for all of the Pine Creek Study area as well as references to the individual FIRM panels that the information was obtained from. The floodzone limits were digitized into the map from the FIRM panels. It should be noted that some adjustments were made to the alignment of some segments of the boundaries in order to get them to generally line up with the Pine Creek Channel Topography because a direct overlay indicates that the overall accuracy of the FIRMS is not good. Due to this, the map should not be used to determine the specific location of the FEMA 100-year floodplain. Specific location of the FEMA floodplain should be determined from the FIRMs.

The 1997 FIRMs appear to contain the same base flood elevation data as the 1986 FIRMS contained for the Pine Creek Study area. It is assumed that no new study of the Pine Creek study area was performed for the 1997 revision.

2. Flood Profiles

A detailed hydraulic analysis for Pine Creek or major proposed storm drains was not included in the scope of this study. A detailed hydraulic analysis of Pine Creek between Chapel Hills Drive and Detention Facility No. 1 is presented in the “Final Drainage Report for Pine Creek Channel – Phase 1,” dated April 1996, additions February 1997, by JR Engineering, Ltd. It is anticipated that similar reports will be prepared for the remainder of Pine Creek that is proposed to remain as an open channel. Hydraulic grade lines for proposed closed conduit conveyances will be prepared with and presented on the construction drawings for the same.
V. PROPOSED DRAINAGE PLAN

A. General Description

A proposed plan for the fully developed condition and an interim, partially developed condition has been prepared as a part of this study. Both plans are presented graphically on maps contained in the appendix of this study and are described in the following text. The fully developed condition plan proposes the construction of seven (7) additional regional detention facilities distributed throughout the study area. The plan also proposes to expand existing Regional Detention Facility No. 1 and modify its outlet. The proposed detention facilities will limit the 100-year peak outflow in Pine Creek from the study area to 1210 cfs. Proposed major conveyance facilities throughout the watershed consist of closed conduits and portions of the Pine Creek Natural Channel. The proposed detention facilities are distributed to mitigate high peak flow rates throughout the conveyance system in order to limit the size of the required storm drains and the erosion potential in the natural channels. The Interim Plan indicates the portion of the proposed facilities that are required to support a certain level of development in the study area.

B. Fully Developed Condition Plan

1. Pine Creek North Fork (Sub-basins PN1 through PN14)

The watershed begins east of future Powers Boulevard. Current land planing is very general for this area. It was assumed for the purpose of this plan that the runoff from Sub-basins PN1 through PN6 including a portion of Powers Boulevard will be collected in future streets and storm drains and conveyed to and routed through proposed Regional Detention Facility “G”. Regional Detention Facility “G” is planned to have a 100-year peak inflow of 1747cfs, a 100-year peak outflow of 250 cfs, and a 100-year storage volume requirement of 60-acre feet. Outflow from Regional Detention Facility “G” will be passed under future Powers Boulevard and released into the Pine Creek North Fork Channel where it will be conveyed downstream to proposed Regional Detention Facility “F”. In the future as more detailed planning in the watershed occurs consideration should
be given to an additional detention basin in located further up in the watershed to reduce the required size of Detention Facility “G” and the upstream conveyance facilities.

Regional Detention Facility “F” is planned to receive the routed outflow from Regional Detention Facility “G” as well as all of the runoff from Sub-basins PN7 and PN8. Regional Detention Facility “F” is planned to have a 100-year peak inflow of 578 cfs, a 100-year peak outflow of 239 cfs, and a 100-year storage volume requirement of 18-acre feet. Outflow from Regional Detention Facility “F” will be passed under a future collector street and released into Pine Creek North Fork Channel where it will be conveyed downstream to proposed Regional Facility “E”. To the extent practical, the runoff from Sub-basins PN 7 and PN8 should be routed directly to Detention Facility “F” rather than into the upstream Pine Creek Channel in order to limit the potential for erosion in the channel.

Proposed Regional Detention Facility “E” is planned to receive the routed outflow from Regional Detention Facility “F” as well as all of the runoff from Sub-basins PN9 through PN13. Regional Detention Facility “E” is planned to have a 100-year peak inflow of 724 cfs, a 100-year peak outflow of 265 cfs, and a 100-year storage volume requirement of 19-acre feet. Outflow from Regional Detention Facility “E” will be conveyed in a storm drain to Analysis Point 5 located at the western limit of Sub-basin PN15. At Analysis Point 5, the runoff from Sub-basins PN14 and PN15 is planned to enter the storm drain. To the extent practical, the runoff from Sub-basins PN9 and PN10 should be collected and conveyed within the future development and released to the Pine Creek Channel near Analysis Point 4. Likewise, the runoff from Sub-basins PN11 should be collected and conveyed within the future development and released directly to Detention Facility “E”. Sub-Basin PN12 is expected to remain mostly undeveloped with its runoff continuing to enter Pine Creek along historic flow paths.
2. Pine Creek South Fork (Basins PS1 through PS13)

The watershed begins east of future Powers Boulevard. Current land planning is very general for this area. It was assumed for the purpose of this plan that the runoff from Sub-basins PS1 through PS3 will be collected in future streets and storm drains and conveyed to and routed through proposed Regional Detention Facility "D". Regional Detention Facility "D" is planned to have a 100-year peak inflow of approximately 1,073 cfs, a 100-year peak outflow of 99 cfs, and a 100-year storage volume requirement of 41 acre feet. Outflow from Regional Detention Facility "D" will be routed down a proposed storm drain in the Briargate Parkway right-of-way to Analysis Point 6 at future Powers Boulevard. All of the runoff from Sub-basins PS4 and PS5 including a portion of Powers Boulevard is planned to enter the proposed storm drain at or above Powers Boulevard. In the future as more detailed planning in the watershed occurs consideration should be given to an additional detention basin located further up in the watershed to reduce the required size of Detention Facility "D" and the upstream conveyance facilities.

The storm drain planned for the Briargate Parkway right-of-way will extend downstream from Powers Boulevard to proposed Regional Detention Facility "C". For the purpose of this analysis, it was assumed that all of the runoff from Sub-basin PS6 would be included in the storm drain flow at or before Analysis Point 7 and the flow from Sub-basin PS7 would be included in the storm drain flow at or before Analysis Point 7A. The runoff from Sub-basin PS8 was assumed to enter the storm drain at or before Analysis Point 8 at the intersection of Briargate Parkway and Union Boulevard. Runoff from Sub-basins PS9 is expected to be piped directly to Detention Facility "C" but may share a common outlet with the proposed Briargate Parkway storm drain. Analysis Point 9 represents the combined flow from the Briargate Parkway storm drain and Sub-basin PS9. Sub-basin PS10 is planned to outfall directly to Detention Facility "C". Regional Detention Facility "C" is planned to have a 100-year peak inflow
rate of 1,840 cfs, a 100-year peak outflow rate of 227 cfs, and a 100-year peak storage volume requirement of 69-acre feet. Outflow from Regional Detention Facility “C” will be routed to proposed Regional Detention Facility “B” in a proposed storm drain to be located in or adjacent to the Briargate Parkway right-of-way.

It was assumed for the purpose of this analysis that the runoff from Sub-basin PS11 will combine with the outflow from Detention Facility “C” before the proposed Briargate Parkway storm drain outfalls into Regional Detention Facility “B”. Analysis Point 10 represents this combined flow. The runoff from Sub-basin PS12 is planned to be routed through Detention Facility “B”. Regional Detention Facility “B” is planned to have a 100-year peak inflow rate of 506 cfs, a 100-year peak outflow rate of 247 cfs, and a 100-year peak storage volume requirement of 14-acre feet. Outflow from Regional Detention Facility “B” will be routed in a storm drain to a storm drain junction to be located near Analysis Point 11.

At Analysis Point 11 runoff from Sub-basin PS13 is expected to be combined with the outflow from Regional Detention Facility “B”. The flow at Analysis Point 11 will then be routed in a storm drain to a storm drain junction at Analysis Point 5A. At Analysis Point 5A this flow will be combined with the flow in the storm drain from the North Fork of Pine Creek (Analysis Point 5). The combined flow will be routed in a storm drain to an outfall in the existing Pine Creek Channel then down the natural channel to Analysis Point 12.

3. Pine Creek Main Channel (Basins PM1 through PM4)

As indicated in the approved “Master Development Drainage Plan for Village Center at Pine Creek and Preliminary/Final Drainage Report for Village Center at Pine Creek Filing No. 2 and Pine Creek Village Center Filing No. 1,” by JR Engineering, Ltd., February 1998, the runoff from Sub-basins PM 1 and PM3 will
enter the Pine Creek Channel at or upstream of analysis point 12. The runoff from Sub-basin PM2 will also enter the Pine Creek channel at or just upstream of Analysis Point 12. The estimated peak flow rates at Analysis Point 12 are $Q_5 = 408$ cfs and $Q_{100} = 985$ cfs. The combined flow will be routed in the natural Pine Creek Channel from Analysis Point 12 to Analysis Point 13 at the east side of Chapel Hills Drive.

Runoff from Sub-basin PM4 is planned to outfall into Pine Creek at two locations between Analysis Points 12 and 13. Runoff from Sub-basin PM4 is included in the peak flow rates estimated at Analysis Point 13 of $Q_5 = 437$ cfs and $Q_{100} = 1115$ cfs. The combined flow will be routed under Chapel Hills Drive to Analysis Point 19.

4. **Chapel Hills Drive South (Sub-basins CS1 through CS4)**
Analysis Point 16 represents the flow collected in Chapel Hills Drive and the existing South Chapel Hills Drive Storm Drain System located south of the Pine Creek Channel. All or portions of the drainage area contributing to Analysis Point 16 has been included in the “MDDP for Briargate Business Campus,” the “MDDP for Village Center at Pine Creek and Preliminary/Final Drainage Report for Village Center at Pine Creek Filing No. 2 and Pine Creek Village Center Filing No. 1,” the “Final Drainage Report for Chapel Hills Drive,” and or the “Final Drainage Report for Briargate Parkway.” This flow will enter the Pine Creek Channel at Analysis Point 19 on the west side of Chapel Hills Drive.

5. **Chapel Hills Drive North (Sub-basins CN1 through CN3)**
Runoff from Sub-basin CN1 will be routed through proposed Regional Detention Facility “A”. Regional Detention Facility “A” is planned to have a 100-year peak inflow rate of 275 cfs, a 100-year peak outflow rate of 9 cfs, and a 100-year peak storage volume requirement of 11-acre feet. Outflow from Regional Detention Facility “A” will be routed to Pine Creek Channel in the existing North Chapel Hills Drive Storm Drain System located in the Chapel Hills Drive right-of-way.
Regional Detention Facility “A” has been designed to facilitate park uses as well as serving as a drainage facility. Regional Detention Facility “A” represents a revision to the “MDDP for Charter Greens,” dated January 1993, as well as the “Final Drainage Report for Chapel Hills Drive,” dated January 1997. Detailed analysis of proposed Regional Detention Facility “A” is provided in the “Preliminary/Final Drainage Report for Park Site at Chapel Hills Drive and Amendment to Final Drainage Report for Chapel Hills Drive,” dated December 1997.

Analysis Point 18 represents the flow collected in Chapel Hills Drive and the North Chapel Hills Drive Storm Drain System north of the Pine Creek Channel. This flow includes the outflow from Regional Detention Facility “A” as discussed above. All or portions of the drainage area contributing to Analysis Point 18 have been included in the “MDDP for Charter Greens,” dated January 1993, the “Final Drainage Report for Chapel Hills Drive,” dated January 1993 and/or the “Preliminary/Final Drainage Report for Park Site at Chapel Hills Drive and Amendment to Final Drainage Report for Chapel Hills Drive,” dated December 1997. This flow will enter the Pine Creek Channel just upstream of Analysis Point 19 on the west side of Chapel Hills Drive.

6. Pine Creek Main Channel (Basins PM5 through PM7)

Analysis Point 19 represents the total estimated flow from the upstream Pine Creek Channel as well as the flow from Chapel Hills Drive and associated storm drain systems. The peak flow rates in the Pine Creek Channel at Analysis Point 19 are estimated at of Q₅ = 656 cfs and Q₅₀ = 1753 cfs. This flow will be routed down the natural Pine Creek Channel to Regional Detention Facility No. 1. Runoff from Sub-basin PM5 will enter the Pine Creek Channel between Analysis Point 19 and Detention Facility No. 1. The flow from Sub-basin PM5 is included with the flow in the Pine Creek Channel at Analysis Point 20. The peak flow rates in the Pine Creek Channel at Analysis Point 20 are estimated at Q₅ = 712 cfs and Q₅₀ = 1978 cfs.
Runoff from Sub-basin PM6 is planned to be collected in a future storm drain or storm drains and outfall to the Pine Creek Channel near Regional Detention Facility No. 1. The area included in Sub-basin PM6 was included in the approved "MDDP for Briargate Business Campus," dated October 1996. As discussed elsewhere in this study contrary to the approved MDDP the analysis done for the current study assumed free discharge from this sub-basin. Because some development in the sub-basin has proceeded this study at least some of the constructed outfall lines from the sub-basin may not be adequate to convey free discharge from developing properties. Discharge from future development in the sub-basin should be limited only by fitting within the land use assumptions made for this current study and the availability of an adequate outfall to Pine Creek.

Runoff from Sub-basin PM6 is assumed to be included in the flow in Pine Creek Channel at Analysis Point 21. The peak flow rates at Analysis Point 21 are estimated at $Q_5 = 797$ cfs and $Q_{100} = 2149$ cfs. This is the total estimated flow to Regional Detention Facility No. 1 from Pine Creek Channel.

Runoff from Sub-basin PM7 is planned to be collected and conveyed to Regional Detention Facility No.1 in a proposed storm drain and open channel system that will originate at the intersection of Highway 83 and Springcrest Road. Free discharge was assumed from the sub-basin. Discharge from future development within the sub-basin should be limited only by fitting within the land use assumptions made for this current study and the availability of an adequate outfall to Regional Detention Facility No. 1.

For the purpose of this analysis it is assumed that all of the runoff from Sub-basin PM8, a portion of the Briargate Parkway right-of-way will be routed through Detention Facility No. 1.

7. **Focus on the Family Storm Drain System (Sub-basins F1 through F7)**

   The current study does not propose changes to the drainage criteria implemented with previous plans for this area. Due to the capacity limitations of the outfall
line from this area onsite detention as called for in the “MDDP for Briargate Business Campus,” dated October 1996, will remain a requirement for this area. As discussed in Section IV, Part A and this area was included in the current study so that hydrographs for this area could be produced with methodology consistent with the methodology applied to the remainder of the study area. These hydrographs were needed for addition to hydrographs from the remainder of the study area to evaluate the capacity of Regional Detention Facility No. 1 and the total outflow from the study area.

The more conservative hydrology methodology utilized for the current study generated 100-year storm hydrographs from portions of this area that were in excess of the existing downstream storm drain capacity. At Analysis Point 22 the excess flow was assumed to flow out of the Pine Creek Drainage Basin into Cottonwood Creek Drainage Basin. At Analysis Point 24 the excess flow was assumed to be routed on the surface to enter Pine Creek Channel near Analysis Point 27. At Analysis Point 25 the excess flow was assumed to be routed on the surface down Briargate Parkway to enter Pine Creek Channel near Analysis Point 26. Flow within the full pipe capacity of the storm drain system was routed within the HEC 1 model to Regional Detention Facility No. 1. The flow from the Focus on the Family storm drain combined with the flow from Pine Creek (Analysis Point 21) and flow from Sub-basins PM7 and PM8 represents the total planned inflow to Regional Detention Facility No. 1. The existing Regional Detention No. 1 is to be expanded in volume and fitted with a modified outlet structure. Regional Detention Facility No. 1 is planned to have a 100-year peak inflow rate of 2809 cfs, a 100-year peak outflow rate of 1147 cfs, and a 100-year peak storage volume requirement of 96-acre feet. Outflow from Regional Detention Facility No. 1 will be routed under existing Briargate Parkway to Analysis Point 26 in Pine Creek Channel via an existing 12’ span by 10’ rise concrete box culvert. At Analysis Point 26 the excess flow that was assumed to be routed in the street from Analysis Point 25 will enter Pine Creek Channel. This flow combined with the outflow from Regional Detention Facility No. 1 will
result in peak flow rates estimated at $Q_5 = 488$ cfs and $Q_{100} = 1147$ cfs. The combined flow will be routed down the Pine Creek natural channel to Analysis Point 27 on the east side of Highway 83.

8. Pine Creek Main Channel (Basins PM9, PM10, and PM11)
Sub-basins PM9 and PM11 will be allowed free discharge of the 100-year peak rate to Pine Creek through appropriate conveyance and outlet facilities. Free discharge of the 100-year peak rate from these areas is conducive to limiting the 100-year peak discharge in Pine Creek at Highway 83 to less than 1,210 cfs. Free discharge of the 100-year runoff will allow the bulk of the runoff from these areas to pass downstream ahead of significant discharge from upstream Detention Facility No. 1. Detention Facility No. 1 will be modified per this plan to facilitate greater lag of the discharge from the facility than is provided by the existing facility. Due to the proximity of Sub-basins PM9 and PM11 to the discharge point of the DBPS area, limited detention of storm water from these sub-basins may be required in order to mitigate local peak flows from frequent events and or improve storm water quality. The detention requirements will be determined at the time of Final Drainage Report as each sub-basin develops. If facilities to accomplish the above are required they should be designed to not significantly lag the discharge of the larger storms.

Runoff from Sub-basin PM10 is to be controlled to a maximum 100-year peak flow rate of 140 cfs as required by the Final Drainage Report for “Briargate Business Campus Filing No. 13,” approved October 31, 1996.

Runoff from Sub-basin PM9 is planned to enter Pine Creek Channel upstream or at Analysis Point 27. The HEC-I Model for this study assumes that runoff from Sub-basin PM10 and PM11 will enter Pine Creek below Analysis Point 27. Analysis Point 28, at the east side of Highway 83 includes the flow from Analysis Point 27 and Sub-basins PM10 and PM11. The model predicts peak flow rates in the Pine Creek Channel at Analysis Point 28 will be $Q_5 = 633$ cfs, $Q_{100} = 1207$ cfs. This is the total planned discharge to Pine Creek from the study area.
C. Interim Condition Drainage Plan

Current development projections for the study area call for construction of Regional Detention Facilities “A” Regional Detention Facilities “B” and “E” and their storm drain outfalls to Pine Creek, and Regional Detention Facility “C” without an outfall, and expansion in volume and modifications to the outlet of existing Regional Detention Facility No. 1. in the near future. The interim condition plan demonstrates the need for these facilities and indicates the amount of development that these facilities will support. In the future as plans for development further upstream solidify, additional interim condition planning will be required.

The map titled “Interim Condition Basin Map and Master Plan,” contained in the appendix indicates the upstream limits of the land assumed to be fully developed for the interim condition plan. Land located upstream of the indicated limits is considered to be mostly undeveloped in the interim condition plan. Interim condition sub-basins were delineated for the interim condition analysis. The labels for these sub-basins begin with the letter “I”. Assumed development in the interim condition basins was limited to the following:

- 12.4-acres of the Powers Boulevard Corridor at 85% impervious area
- 30-acres north of Old Ranch Road at 1 DU/AC
- 26.5-acres of Basin IPS9 at 4 DU/AC (portion of Sagewood)
- 10-acres of Basin IPS10 at 50% impervious area (YMCA)
- 16-acres of Basin IPS10 at 3 DU/AC (portion of existing Gatehouse Filing No. 5)

1. Pine Creek North Fork (Sub-basins IPN1 through IPN5 and PN9)

Runoff patterns in IPN1 through IPN5 are assumed to remain unchanged from the existing condition. The 100-peak flow rate from these sub-basins in addition to the fully developed condition runoff from Sub-basin PN9 will be concentrated at Analysis Point 4 in the Pine Creek Channel. The 100-year peak flow rates associated with Analysis Point 4 are estimated at $Q_5 = 56$ cfs and $Q_{100} = 355$ cfs.
The flow will be routed down the Pine Creek Channel to proposed Regional Detention Facility “E”.

2. Pine Creek North Fork (Sub-basins PN11 through PN13 and all downstream)
Runoff from fully developed condition PN11 through PN13 will be routed through Regional Detention Facility “E” as described in the fully developed conditional plan. Regional Detention Facility “E” is planned to have a 100-year peak inflow rate of 643 cfs, a 100-year peak outflow rate of 267 cfs, and a 100-year peak storage volume requirement of 19-acre feet. The storage volume requirement for the interim condition is greater than the storage volume requirement in the fully developed condition. Region Detention Facility “E” should be designed to provide the required interim condition storage volume as well as meeting the required outflow criteria for both interim and fully developed conditions.

Downstream the plan is unchanged from the plan presented for the fully developed condition with the exception that peak flow rates in the major facilities are slightly less than for the fully developed condition. Estimated peak flow rates are shown on the “Interim Condition Basin Map and Master Plan.”

3. Pine Creek South Fork (Sub-basins IPS1 through IPS5)
Runoff patterns in IPS1 through IPS5 are assumed to remain unchanged from the existing condition. Two temporary diversions are proposed to be constructed to direct the runoff generated in these basins to Regional Detention Facility “C”. One of these diversions is proposed to be constructed at the lower end of Sub-basin IPS5 as an expansion of an existing small dam. The second diversion is proposed to be constructed at the lower end of Sub-basin IPS2 in or adjacent to the future Briargate Parkway right of way. Runoff from Sub-basins IPS1 and IPS2 will concentrate near Analysis Point I6 as it does in the existing condition. Runoff from Sub-basins IPS3 through IPS5 will concentrate at an existing stock pond near Analysis Point I5. The 100 peak flow rated associated with Analysis
Point I5 are estimated at $Q_5 = 39$ cfs and $Q_{100} = 265$ cfs. The proposed berm at this location will provide positive diversion of the flow from Analysis Point I5 through Sub-basin IPS2 to Analysis Point I6. At Analysis Point I6 the estimated peak flow rates are estimated at $Q_5 = 55$ cfs and $Q_{100} = 399$ cfs. This flow will enter Regional Detention Facility “C” via a temporary inlet structure and will be combined with developed condition runoff from Sub-basin PS10. Regional Detention Facility “C” is expected to be constructed to meet the fully developed condition storage volume requirements in the “interim condition” but not be fitted with an outlet in the “interim condition.” The outfall line from Detention Facility “C” will be constructed prior to paving of the adjacent portion of Briargate Parkway or when predicted runoff exceeds its capacity as a retention pond. Regional Detention Facility “C” is planned to have an interim condition 100-year peak inflow rate of 409 cfs, a 100-year peak outflow rate of 0 cfs, and a 100-year peak storage volume requirement of 42-acre feet.

4. Pine Creek South Fork (Sub-basins IPS6 through IPS10)

Runoff patterns in Sub-basins IPS6 through IPS8 are assumed to remain unchanged from the existing condition. Runoff from these Sub-basins will be concentrated at Analysis Point I7 in the future Briargate Parkway right-of-way. Estimated peak flow rates associated with Analysis Point I7 are $Q_5 = 8$ cfs and $Q_{100} = 186$ cfs. This flow will follow the historic flow path to Analysis Point I8. At or above Analysis Point I8 it is assumed that the runoff from undeveloped Sub-basin IPS8 and partially developed Sub-basin IPS9 is added to the routed flow from Analysis Point I7. The combined flow at Analysis Point I8 will have estimated peak flow rates of $Q_5 = 49$ cfs and $Q_{100} = 281$ cfs. Runoff at Analysis Point I8 will be routed in the natural Pine Creek South Fork Channel to Analysis Point I9. At or near Analysis Point I9 runoff from partially developed Sub-basin IPS10 will enter the Pine Creek South Fork Channel. The combined flow at Analysis Point I9 will have estimated peak flow rates of $Q_5 = 99$ cfs and $Q_{100} = 427$ cfs. This compares well to the 100-year historic flow rate of 476 cfs presented for this portion of the watershed in “Amendment No. 1 to the Pine Creek Drainage Basin Planning Study,” dated July 29, 1992. The flow at
Analysis Point 19 will be routed down the Pine Creek South Fork Channel to proposed Regional Detention Facility “B”.

5. Pine Creek South Fork (Sub-basins PS11 and PS12 and Downstream)
Runoff from fully developed condition Sub-basins PS11 and PS12 will be collected and routed through Regional Detention Facility “B” as described in the fully developed condition plan. Regional Detention Facility “B” is planned to have an interim condition 100-year peak inflow rate of 663 cfs, a 100-year peak outflow rate of 266 cfs, and a 100-year peak storage volume requirement of 17-acre feet. The storage volume requirement for the interim condition is greater than the storage volume requirement in the fully developed condition. Region Detention Facility “B” should be designed to provide the required interim condition storage volume as well as meeting the required outflow criteria for both interim and fully developed conditions.

Downstream the plan is unchanged from the plan presented for the fully developed condition with the exception that peak flow rates in the major facilities are slightly less than for the fully developed condition. Estimated peak flow rates are shown on the “Interim Condition Basin Map and Master Plan.”

D. Major Proposed Facilities

1. Storm Drains
Estimated required storm drain sizes are indicated on the Maps titled “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 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. 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 the full 100-year peak inflow rate. In the case of Regional Detention Facilities “E” and “F” located downstream of Regional Detention Facility “G” the emergency spillways shall be capable of passing the highest inflow rate associated with the proposed detention facilities located upstream.

- 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 Detention Facilities “E”, “F” and “G” the emergency spillways should be oriented to pass overflow to downstream Pine Creek Channel. Sufficient capacity should be maintained in the Pine Creek Channel to allow the design overflow to pass without damage to structures. In the case of Detention Facilities “B”, “C” and “D” the emergency spillways should be oriented to pass overflow to the adjacent Briargate Parkway right-of-way. The potential for a large
flow to occur down Briargate Parkway should be considered in the design of the roadway and adjacent development.

- At least 2 feet of freeboard shall be provided above the water surface associated with the normal outlet clogged and the emergency spillway passing the full 100-year peak inflow rate.

**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 overall study done for this plan to verify that the changes do not negatively impact downstream facilities or planned peak flow rates downstream.

- **Regional Detention Facility No. 1**

  The modeled volume was based on the contours shown on the FIMs Topographic Map with 0.65 acre of surface area added. The proposed expansion will result in a storage volume increase of approximately 11.5-acre feet below elevation 6578.0. Modeled outflow was based on a modified outlet structure instead of the existing outlet. The modeled outlet consists of a staged outlet. The lowest opening was assumed to consist of the bottom 2.5' of the existing box culvert. The remainder of the upstream end of the existing box culvert was assumed to be blocked. The upper opening of the assumed outlet was assumed to be a sharp crested weir with a crest elevation of 6567.2. The upper opening weir length was assumed to be equal to 12.77' (the skewed width of the CBC) adjusted for edge contractions. It is assumed that the upper opening will discharge into the existing box culvert. It is assumed that the upper opening will be created with construction of a three-sided structure on top of or a reconstructed portion of the existing CBC. The three-sides were assumed to terminate at elevation 6573.0 to allow flow over all walls of the structure above the terminal elevation.
The HEC-1 Model predicts a maximum 100-year water surface elevation of 6573.1 in the 100-year design storm. This maximum water surface is 1.9 lower than the existing emergency spillway crest for the facility.

MODIFIED DETENTION FACILITY NO.1
Stage Storage Discharge Data

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Normal Outlet Staged

Low Stage: 12.77' Wide X 2.50' High Vertical Orifice, Invert = 6553.00
High Stage: 12.77' Wide Weir, Invert = 6567.20
Regional Detention Facility “A”
The stage storage discharge curve is based on the design drawings for the proposed facility. The bottom of the pond is staged in order to maintain certain portions of the pond bottom dry in frequent rainfall events in order to facilitate park uses.

DETENTION FACILITY “A”
Stage Storage Discharge Data

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Normal Outlet: 12” dia storm drain
Normal Outlet Invert Elevation: 95.0
• **Regional Detention Facility “B”**
  The modeled volume was based on a preliminary grading plan prepared for the facility. In order to facilitate obtaining a flood plain development permit to construct the facility it is planned to have a maximum 100-year water surface that is below the FEMA base flood elevation and is mostly contained within the FEMA regulatory 100-year floodplain. The requirements associated with facilitating construction in the FEMA Regulatory Floodplain have resulted in a design that will produce peak 100-year water surface elevations well below the emergency spillway crest in the fully developed condition with upstream detention facilities in place.

### DETENTION FACILITY “B”
**Stage Storage Discharge Data**

<table>
<thead>
<tr>
<th>Water Surface Elevation (Feet)</th>
<th>Cumulative Storage Volume (AC/FT)</th>
<th>Normal Outlet Discharge (cfs)</th>
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**Normal Outlet:** 54” dia storm drain  
**Normal Outlet Invert Elevation:** 70.2
- Regional Detention Facility “C”

**DETENTION FACILITY “C”**

**Stage Storage Discharge Data**

<table>
<thead>
<tr>
<th>Water Surface Elevation (Feet)</th>
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<th>Normal Outlet Discharge (cfs)</th>
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<tr>
<td>82</td>
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</tbody>
</table>

Normal Outlet: 48” dia storm drain
Normal Outlet Invert Elevation: 62.0

- Regional Detention Facility “D”

**DETENTION FACILITY “D”**

**Stage Storage Discharge Data**

<table>
<thead>
<tr>
<th>Water Surface Elevation (Feet)</th>
<th>Cumulative Storage Volume (AC/FT)</th>
<th>Normal Outlet Discharge (cfs)</th>
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</tbody>
</table>

Normal Outlet: 36” dia storm drain
Normal Outlet Invert Elevation: 100.0
- Regional Detention Facility “E”

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

<table>
<thead>
<tr>
<th>Water Surface Elevation (Feet)</th>
<th>Cumulative Storage Volume (AC/FT)</th>
<th>Normal Outlet Discharge (cfs)</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

Normal Outlet: 54” dia storm drain
Normal Outlet Invert Elevation: 84.0

- Regional Detention Facility ”F”

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

<table>
<thead>
<tr>
<th>Water Surface Elevation (Feet)</th>
<th>Cumulative Storage Volume (AC/FT)</th>
<th>Normal Outlet Discharge (cfs)</th>
</tr>
</thead>
<tbody>
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<tr>
<td>110</td>
<td>26.4</td>
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</table>

Normal Outlet: 48” dia storm drain
Normal Outlet Invert Elevation: 90.0
- **Regional Detention Facility “G”**
  The normal outlet was modeled based on a 48” diameter storm drain. A 10’ by 10’ box culvert to be constructed under future Powers Boulevard with a weir box on the upstream end has been evaluated as a means to carry the pond outflow from the 48” diameter normal outlet as well as providing an emergency spillway. Due to the large vertical distance between the likely grade of Powers Boulevard and the Pine Creek Channel on the downstream side of the crossing the cost of armoring the downstream embankment slope will likely offset the cost of constructing a box culvert.

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

<table>
<thead>
<tr>
<th>Water Surface Elevation (Feet)</th>
<th>Cumulative Storage Volume (AC/FT)</th>
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</thead>
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<tr>
<td>82</td>
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</tbody>
</table>

**Normal Outlet:** 48” dia storm drain  
**Normal Outlet Invert Elevation:** 59.0

c. **Regional Detention Facility Maintenance**
   The eight Regional Detention Facilities proposed 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. Pine Creek Channel
   a. General
   As discussed elsewhere in this report the character of the Pine Creek Channel varies considerably throughout the study area. Portions of the channel are well defined, well vegetated, and are aligned in a manner that allows reasonable development of adjacent land. Other portions are not well defined, lack significant vegetation, lack adequate conveyance capacity, and or are not aligned in a manner that allows reasonable development of adjacent properties. The plan for the majority of Pine Creek Channel between Powers Boulevard and Highway 83 is to preserve it at as a natural channel or a natural channel with some man made stabilization that will serve as the major drainage conveyance. In other portions of the study area storm drains will serve as the major drainage conveyances and the natural channel will be eliminated.

   The following is a brief discussion of Pine Creek Channel reaches PC1 through PC7 as shown on the maps titled “Basin Map and Master Plan,” contained in the appendix of this report.

   • Reach PC1
     Treatments proposed in past studies for this reach have included replacing the natural channel with a closed conduit. Due to current concerns about the Prebles Meadow Jumping Mouse, it is likely the channel will be required to be preserved in its natural condition with or without some man made stabilization. Further analysis to demonstrate the adequacy of the natural channel or proposed treatment and potentially an agreement between the developer of the property and the City will be required in the future when the desired treatment is known.

   • Reaches PC2 and PC3
     These two reaches are well vegetated and appear to be quite stable at the current time. It is expected that treatment in these reaches will be limited to energy dissipaters at the outfalls of storm drains contributing to the channel and potentially minor bank and channel stabilization. The current plan is for LP47,L.L.C. dba La Plata Investments to maintain ownership of the channel and to be responsible for
maintenance of the same, excepting the public street crossings. A detailed Hydraulic Analysis and Report has been prepared for Reach PC2 ("Pine Creek Channel-Phase 2," dated February 1997). La Plata is currently working to complete a maintenance agreement with the City for Reach PC2. A detailed Hydraulic Analysis of Reach PC3 will be required in the future as well as a maintenance agreement with the City of Colorado Springs.

- **Reach PC4**
  This reach is contained in a valley floor alluvial fan and is characterized by multiple, ill-defined flow paths lacking significant vegetation, natural stability, and adequate conveyance capacity. Due to this an underground storm drain is proposed to provide conveyance of runoff up to the 100-year planned discharge through this reach. It is also proposed that the corridor that the land above the proposed storm drain be graded into a broad swale recessed below the adjacent development. This swale will provide an emergency relief channel for the storm drain and the detention facilities that will be constructed upstream. In keeping with the proposed design criteria for the proposed detention facilities, the swale should be designed to allow passage of the largest peak 100-year inflow rate of the facilities to be located upstream. The proposed swale will also maintain continuity of the greenway or openspace that will occur along the upstream and downstream reaches of Pine Creek Channel. It is expected that the City of Colorado Springs will be responsible for the maintenance of the proposed storm drain.

- **Reaches PC5 through PC6**
  These reaches are generally well defined and contain some natural vegetation to aid in their stability. However, given the relatively steep natural slopes of these reaches and the lack of heavy vegetation it is anticipated that these reaches will require construction of grade control and potentially some spot armoring of banks in order to allow them to convey developed condition flows. The current plan proposes 100-year peak flow rates in these reaches that are similar or lower than historic 100-year flow rates. However, peak flow rates in smaller more frequent events will be increased and the frequency of flows in the channel will be much greater that in the existing condition when the contributing watershed is developed. Development of the
watershed will also reduce the sediment inflow into the channel. These factors will increase the potential for erosion of the channel. Detailed hydraulic analysis of the channel and the proposed treatment will be provided prior to significant development of areas contributing to these reaches. At the current time, with concerns about the Prebles Meadow Jumping Mouse, it is unknown what type of treatment will be allowed in the channel.

4. Proposed Drainage Discharge Constraints

The following discharge constraints are proposed for the study area:

a. The requirement for onsite detention to achieve a 35 percent reduction in the peak flow rate resulting from development (the difference between the historic and developed peak rates) on all office, research and development, commercial, and school properties as implemented with the original DB.P.S. will remain in effect for all existing developed properties and for future developing properties within Basins CS2, CS3, F1, F4, F5, F6, F7, PM6 and PM10 as shown on the Fully Developed Condition Drainage Map included in this study unless the following conditions are met.

- A separate detailed drainage analysis or the analysis done for this study demonstrates that the downstream existing or proposed drainage conveyance facilities are adequate to allow a greater discharge rate from the property.
- A detailed drainage analysis or the analysis performed for this study demonstrates that the greater discharge rate will not negatively impact downstream detention facilities or the overall discharge peak discharge goals of this study.

b. Runoff from Basin CS4 as shown on the Fully Developed Condition Drainage Map included in this study shall be routed through a common offsite private detention pond as proposed in the approved “Master Development Drainage Plan
for Village Center at Pine Creek and Preliminary /Final Drainage Report for Village Center at Pine Creek Filing No. 2 and Pine Creek Village Center Filing No. 1,” by JR Engineering, Ltd., dated February 11, 1998 unless the following conditions are met:

- A detailed drainage analysis demonstrates that the downstream existing or proposed drainage conveyance facilities are adequate to allow a greater discharge rate from the drainage basin.
- A separate detailed drainage analysis or the analysis performed for this study demonstrates that the greater discharge rate will not negatively impact downstream detention facilities or the overall discharge peak discharge goals of this study.

c. Free discharge of the 100-year runoff from Sub-basins PM9 and PM11 will be allowed provided that the following criteria is followed:

- Adequate downstream conveyance facilities exist or be provided in accordance with City of Colorado Springs policy and criteria.
- 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.

Due to the proximity of Sub-basins PM9 and PM11 to the discharge point of the DBPS area, limited detention of storm water from these sub-basins may be required in order to mitigate local peak rates from frequent runoff events and or improve the storm water quality. The detention requirement will be determined at the time of Final Drainage Report as each sub-basin develops. If facilities to accomplish the above are required, they should be designed to not significantly lag the discharge of the larger storms.

d. Free discharge of drainage from the remainder of the study area will be allowed provided that the following criteria is followed:
• Adequate downstream 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.

5. Recommendations for Implementation

The portion of the Pine Creek drainage basin located east of Highway 83 is considered a closed basin thus, the developer of the properties within the basin is responsible for constructing the drainage improvements related to development within the basin. Construction of required drainage improvements should be timed to coincide with or precede construction of the development that the improvement will support. Several major proposed facilities have been identified in the interim drainage plan included in this study. A summary of these major proposed facilities and the development that the improvements will be required for follows:

• Regional Detention Facility “A” and the associated inflow collection system will be required to support future development in Sub-basin CN1

• Regional Detention Facilities “B” and “E”, their proposed outfall storms drains to Pine Creek and collection systems in the developing area will be required to support development in Sub-basins PN9, PN11 through PN15 and PS10 through PS13.

• Regional Detention Facility “C” (constructed to serve, as a temporary retention facility) will be required to support development in Sub-basins PN9, PN11 through PN15 and PS10 through PS13.

It should be noted that the requirement for construction of Regional Detention Facilities “B” and “C” to support development in Sub-basins PN9 through PN15 and PS10 through PS13 is related in part to the need to eliminate the
FEMA 100-year flood zone that Briargate Parkway must cross to support development in this area.

- La Plata Investments plans to construct the proposed modifications to existing Regional Detention Facility No. 1 prior to May 1999. Construction of the modifications in this time frame is contingent upon timely receipt of the required permits and approvals.

- Pine Creek Channel Stabilization in Reach PC5 as determined by future analysis will be required to support development in Sub-basin PN9. Development in Sub-basin PN 11 will not contribute significant runoff to the channel and thus will not create an immediate need for improvements in Reach PC5.

- Additional storm drains shall be constructed as needed to provide collection systems and outfalls for individual development or prior to pavement construction in the roadways they are planned to be located in.

- Prior to development extending beyond the areas considered to be developed in the interim drainage plan, a revised interim plan should be prepared to identify the drainage facilities required to support additional development.

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. The developer will be required to obtain Letter of Map Revisions for modifications that the proposed development will make to the floodplain within the study area.
The U.S. Army Corps of Engineers has jurisdiction over development within or modifications to features defined as “waters of the United States.” Some or potentially all of the modifications proposed to the Pine Creek Channel 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.
REFERENCES


APPENDIX

VICINITY MAP

HYDROLOGIC MODEL INPUT CALCULATIONS
- Curve Numbers
- Curve Number Adjustment
- Lag Time

HYDROLOGIC MODEL (HEC-1) OUTPUT
FULLY DEVELOPED CONDITION
- 5-Year Storm
- 100-Year Storm

INTERIM CONDITION
- 5-Year Storm
- 100-Year Storm

MAPS (FOLDED IN POCKETS)
- FULLY DEVELOPED CONDITION BASIN MAP AND MASTER PLAN
- INTERIM CONDITION BASIN MAP AND MASTER PLAN
- F.E.M.A. 100-YEAR FLOOD FACILITY MAP
- SUBDIVISION AND LAND USE IDENTIFICATION MAP
  EXISTING DRAINAGE FACILITIES MAP
VICINITY MAP
HYDROLOGIC MODEL INPUT CALCULATIONS

- CURVE NUMBERS
- CURVE NUMBER ADJUSTMENT
- LAG TIME
| SUB BASIN I.D. | AREA (acres) | IMPERVIOUS | COMputed CN | ADJUSTED CN | COMPUTED C100 | LAG (min) | Q100 (cfs) | Q100ACRE | Q100 (cfs) | Q100ACRE | T100 (in/hr) | Q100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100ACRE | T100 | Q100AReLU  

SUMMARY.xls
# AMENDMENT No. 2
TO
PINE CREEK DRAINAGE BASIN PLANNING STUDY
INTERIM CONDITION CURVE NUMBERS

4/14/96

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INTERIM SUMMARY
## AMENDMENT No. 2 TO
PINE CREEK DRAINAGE BASIN PLANNING STUDY

**FULLY DEVELOPED CONDITION LAG TIME ESTIMATE**

5/5/98

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### Amendment No. 2 to
Pine Creek Drainage Basin Planning Study

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<td>100</td>
<td>0.25</td>
<td>2.0</td>
<td>12.65</td>
<td>ST</td>
<td>1200</td>
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<tr>
<td>PS11</td>
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<td>2.0</td>
<td>12.65</td>
<td>ST</td>
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<tr>
<td>PS12</td>
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<td>0.75</td>
<td>9.0</td>
<td>13.33</td>
<td>SW</td>
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<tr>
<td>PS13</td>
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<td>0.25</td>
<td>12.0</td>
<td>12.13</td>
<td>SW</td>
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</tbody>
</table>

**Overland Flow (TC=1.87*(1.1-C10)/[(L^0.5)*S^-.33])**

**Street and Swale Velocity per Mannings Based on a Estimated Average Flow Rate**

**Channel Velocity per Mannings Based on Approximate Section and Flow Rate**

**Storm Drain Velocity per Mannings Based on an Estimated Storm Drain Size**
# AMENDMENT No. 2
TO
PINE CREEK DRAINAGE BASIN PLANNING STUDY

INTERIM CONDITION LAG TIME ESTIMATE

4/10/98

<table>
<thead>
<tr>
<th>BASIN ID</th>
<th>OVERLAND FLOW</th>
<th>SHALLOW CONCENTRATED FLOW</th>
<th>CHANNEL FLOW</th>
<th>TOTAL LAG(min)</th>
<th>TOTAL LAG(hrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L (ft)</td>
<td>C(10YR)</td>
<td>S (%)</td>
<td>TC(min)</td>
<td>L (ft)</td>
<td>S(%)</td>
</tr>
<tr>
<td>IPN1</td>
<td>300</td>
<td>0.25</td>
<td>10.0</td>
<td>12.88</td>
<td>GRASS CHAN</td>
</tr>
<tr>
<td>IPN2</td>
<td>300</td>
<td>0.25</td>
<td>4.7</td>
<td>16.52</td>
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<tr>
<td>IPN3</td>
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<td>4.7</td>
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<tr>
<td>IPN4</td>
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<td>IPN5</td>
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<td>IPS1</td>
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<tr>
<td>IPS2</td>
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<td>IPS3</td>
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<td>13.6</td>
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</tr>
<tr>
<td>IPS4</td>
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</tr>
<tr>
<td>IPS5</td>
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<td>0.25</td>
<td>3.3</td>
<td>18.57</td>
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<td>IPS6</td>
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<td>5.3</td>
<td>15.88</td>
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<tr>
<td>IPS7</td>
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<td>0.25</td>
<td>3.5</td>
<td>18.21</td>
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<tr>
<td>IPS8</td>
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<td>0.25</td>
<td>3.7</td>
<td>17.88</td>
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<tr>
<td>IPS9</td>
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<td>0.25</td>
<td>2.0</td>
<td>12.65</td>
<td>STREET</td>
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</tbody>
</table>

NOTE: LAG TIMES IN SUB-BASINS NOT INCLUDED IN THE TABLE ABOVE ARE NOT CHANGED FROM THE FULLY DEVELOPED CONDITION.
HYDROLOGIC MODEL (HEC-1) OUTPUT
FULLY DEVELOPED CONDITION
- 5-YEAR STORM
- 100-YEAR STORM

INTERIM CONDITION
- 5-YEAR STORM
- 100-YEAR STORM
HEC-1 MODEL OUTPUT

FULLY DEVELOPED CONDITION

* 5-YEAR STORM
FLOOD HYDROGRAPH PACKAGE (HEC-1)
MAY 1991
VERSION 4.0.1E
RUN DATE 08/05/1998 TIME 17:41:14

X  X  XXXXXX  XXXX  X
X  X  X  X  X  XX
X  X  X  X  X
XXXXXXXX  XXXX  X  XXX
X  X  X  X  X
X  X  X  X  X  X
X  X  XXXXXX  XXXX  XXX

-------------------------------
:::  
:::  Full Microcomputer Implementation  
:::  by  
:::  Haestad Methods, Inc.  
:::  
:::  
-------------------------------

37 Brookside Road * Waterbury, Connecticut 06708 * (203) 755-1666

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC10B, AND HEC1KW.

HEC-1 INPUT

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

1 ID PINE CREEK DRAINAGE BASIN - 24HR, FULL DEVELOPED CONDITION (TYPE IIA5 YEAR)
2 ID FILE:PCDBPS05.DAT
3 ID FULLY DEVELOPED CONDITION MODEL
4 ID 998 REVISION
5 ID NOTE: THE DIVERSION ROUTINES WERE REMOVED FROM THE MODEL FOR THE 5 YR STORM
6 ID NOTE: THE OUTFLOW CURVE FOR THE SUMMER FIELD DETENTION POND WAS MODIFIED
7 ID SLIGHTLY TO ALLOW THE 5 YR MODEL TO RUN.
8 ID CN VALUES HAVE BEEN ADJUSTED TO PRODUCE PEAK 100 YEAR FLOW RATES SIMILAR TO
9 ID 100 YEAR FLOW RATES PRODUCED BY RATIONAL METHOD.
10 ID ************************************************************************************
11 ID BEGIN CALCULATIONS IN THE PINE CREEK NORTH FORK WATERSHED
12 ID ************************************************************************************

* FREE ***

*DIAGRAM

IT  3  0  0  300
IO  5

15 KK SB-PN1
16 KM COMPUTE HYDROGRAPH FOR BASIN PN1
17 BA .164
18 IN 15
19 PB 2.6
20 PC 0000  0.0005  0.0015  0.0030  0.0065  0.0100  0.0120  0.0143
21 PC .0165  .0188  .0210  .0233  .0255  .0278  .0320  .0390  .0460  .0530
22 PC .0600  .0750  .1000  .1400  .1700  .2100  .2500  .2900  .3300  .3700
23 PC .8000  .8100  .8200  .8300  .8500  .8700  .8700  .8800  .8900  .9000
24 PC .8900  .9013  .9050  .9083  .9115  .9148  .9180  .9210  .9240  .9270
25 PC .9300  .9325  .9350  .9375  .9400  .9425  .9450  .9475  .9500  .9525
26 PC .9550  .9575  .9600  .9625  .9650  .9675  .9700  .9725  .9750  .9775
27 PC .9800  .9813  .9825  .9838  .9850  .9863  .9875  .9888  .9900  .9913
28 PC .9925  .9938  .9950  .9963  .9975  .9988  1.000
30 LS  0  80.2
31 UD .188

32 KK SB-PN2
33 KM COMPUTE HYDROGRAPH FOR BASIN PN2
34 BA .149
35 LS  0  79
36 UD .192

37 KK RT-PN2
38 KM ROUTE FLOW FROM PN2 TO AP1
39 RD  1000  .03  .013  CIRC  4.5

40 KK AP1
41 KM COMBINE THE FLOW FROM BASIN PN1 TO THE ROUTED FLOW FROM BASIN PN2 AT AP1
42 NC  2

43 KK RT-AP1
44 KM ROUTE AP1 TO AP2
45 RD  2600  .033  .013  CIRC  6
HEC-1 INPUT

LINE

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

46  KK  SB-PN3
47  KM  COMPUTE HYDROGRAPH FOR BASIN PN3
48  BA  .083
49  LS  0   85.8
50  UD  .196

51  KK  AP2
52  KM  COMBINE ROUTED FLOW FROM AP1 WITH FLOW FROM BASIN PN3
53  HC  2

54  KK  RT-AP2
55  KM  ROUTE FLOW FROM AP2 TO AP3
56  RD  800  .025  .013  CIRC  7

57  KK  SB-PN4
58  KM  COMPUTE HYDROGRAPH FOR BASIN PN4
59  BA  .114
60  LS  0   78.5
61  UD  .105

62  KK  RT-PN4
63  KM  ROUTE FLOW FROM BASIN PN4 TO AP3
64  RD  1000  .040  .013  CIRC  4

65  KK  SB-PN5
66  KM  COMPUTE HYDROGRAPH FOR BASIN PN5
67  BA  .074
68  LS  0   86.2
69  UD  .175

70  KK  AP3
71  KM  COMBINE ROUTED FLOW RT-PN4 WITH ROUTED FLOW RT-AP2 AND FLOW FROM BASIN PN5
72  HC  3

73  KK  RT-AP3
74  KM  ROUTE FLOW FROM AP3 TO DETENTION FACILITY "G"
75  RD  1100  .025  0.013  CIRC  8.5

76  KK  SB-PN6
77  KM  COMPUTE HYDROGRAPH FOR BASIN PN6
78  BA  .146
79  LS  0   95.0
80  UD  .127

81  KK  APD6
82  KM  COMBINE ROUTED FLOW FROM AP3 WITH FLOW FROM BASIN PN6 AT REGIONAL DETENTION
83  KM  FACILITY "G"
84  HC  2
HEC-1 INPUT

LINE ID......8........9........10

85 KK RR-DFF
86 KM ROUTE FLOW THROUGH A REGIONAL DETENTION FACILITY. ASSUME A 48" DIA OUTLET
87 KM WITH INVERT AT EL. 59. OUTLET Q ESTIMATED WITH BUREAU OF PUBLIC ROADS
88 KM NOMOGRAPH FOR INLET CONTROL OF CULVERTS. VOLUME BASED ON CONCEPTUAL
89 KM GRADING PLAN.
90 KO 3 1 100
91 RS 1 STOR 0
92 SV 0 .1 2.8 8.0 14.1 20.9 28.4 36.6 45.5 55.1
93 SV 65.3 76.3 88.2
94 SE 59 60 62 64 66 68 70 72 74 76
95 SE 78 80 82
96 SQ 0 10 47 93 130 160 180 203 222 240
97 SQ 262 280 295

98 KK RT-DFF
99 KM ROUTE THE FLOW IN PINE CREEK MAIN CHANNEL DOWN THE CHANNEL FROM POWERS BLVD.
100 KM 1000 FEET WEST TO DETENTION FACILITY "F"
101 RD 1800 .023 .045 TRAP 15 3
102 KK SB-PN7
103 KM COMPUTE HYDROGRAPH FOR BASIN PN7
104 BA .078
105 LS 0 74.6
106 UD .165
107 KK SB-PN8
108 KM COMPUTE HYDROGRAPH FOR BASIN PN8
109 BA .113
110 LS 0 80.9
111 UD .176
112 KK APOFF
113 KM COMBINE ROUTED FLOW RT-DFF AND FLOW FROM BASINS PN7 AND PN8 AT REGIONAL
114 KM DETENTION FACILITY "F"
115 HC 3
116 KK RR-DFF
117 KM ROUTE FLOW THRU A REGIONAL DETENTION FACILITY. ASSUME A 48 DIA OUTLET WITH
118 KM THE INVERT DEPRESSED 2' BELOW POND INVERT. OUTLET Q ESTIMATED WITH BUREAU
119 KM OF PUBLIC ROADS NOMOGRAPH FOR INLET CONTROL OF CULVERTS
120 KO 3 1 100
121 RS 1 STOR 0
122 SV 0 0 0.1 0.7 1.5 4.4 7.8 11.7 16.1 21.0
123 SV 26.4
124 SE 90 92 94 96 98 100 102 104 106 108
125 SE 110
126 SQ 0 22 70 112 143 170 190 210 230 250
127 SQ 265
HEC-1 INPUT

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

128  KK RT-OFF
129  KM ROUTE THE FLOW IN PINE CREEK MAIN CHANNEL DOWN THE CHANNEL FROM DETENTION
130  KM FACILITY "E" AT THE COLLECTOR STREET CROSSING TO AP-4 AT THE WEST SIDE OF
131  KM BASINS PN9 AND PN10
132  RD 1600 .02 .045 TRAP 20 3

133  KK SB-PN9
134  KM COMPUTE HYDROGRAPH FOR BASIN PN9
135  BA .036
136  LS 0 72.8
137  UD .170

138  KK SB-PN10
139  KM COMPUTE HYDROGRAPH FOR BASIN PN10
140  BA .043
141  LS 0 72.7
142  UD .141

143  KK AP4
144  KM COMBINE ROUTED FLOW RT-OFF WITH FLOW FROM BASINS PN9 AND PN10
145  HC 3

146  KK RT-AP4
147  KM ROUTE THE FLOW IN PINE CREEK MAIN CHANNEL DOWN THE CHANNEL FROM AP4
148  KM TO DETENTION FACILITY "E" AT THE COLLECTOR STREET CROSSING
149  RD 1400 .032 .045 TRAP 20 3

150  KK SB-PN11
151  KM COMPUTE HYDROGRAPH FOR BASIN PN11
152  BA 0.079
153  LS 0 76.7
154  UD .169

155  KK SB-PN12
156  KM COMPUTE HYDROGRAPH FOR BASIN PN12
157  BA 0.059
158  LS 0 68.2
159  UD .129

160  KK SB-PN13
161  KM COMPUTE HYDROGRAPH FOR BASIN PN13
162  BA 0.127
163  LS 0 74
164  UD .195

165  KK AP0DFE
166  KM COMBINE ROUTED FLOW RT-AP4 WITH FLOW FROM BASINS PN11, PN12, AND PN13
167  KM AT REGIONAL DETENTION FACILITY "E"
168  HC 4
HEC-1 INPUT

LINE

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

169    KK    RR-DFE
170    KM    NOTE: THE INPUT POND VOLUME REFLECTS THE DESIGN POND VOLUME ON 7-23-98
171    KM    ROUTE FLOW THRU A DETENTION FACILITY. ASSUME A 54" DIA OUTLET WITH
172    KM    THE INVERT DEPRESSED 2' BELOW POND INVERT (INV EL=84). OUTLET Q ESTIMATED
173    KM    WITH BUREAU OF PUBLIC ROADS NOMOGRAPH FOR INLET CONTROL OF CULVERTS
174    KM    DISCHARGE ABOVE EL 100.3 INCLUDES FLOW OVER EMERGENCY SPILLWAY
175    KM    SCALE 1
176    KO    3    1
177    RS    1    STOR    0
178    SV    0    0    1.25    3.91    6.93    10.31    14.07    18.24    22.83    27.87
179    SE    784    786    788    790    792    794    796    798    800    802
180    SQ    0    25    80    136    173    210    240    263    280    1431

181    KK    RT-DFE
182    KM    ROUTE THE OUTFLOW FROM DETENTION FACILITY "G" IN A STORM DRAIN TO AP-5
183    RD    1800    .025    .013    CIRC    4.5
184    KK    SB-PN14
185    KM    COMPUTE HYDROGRAPH FOR BASIN PN14
186    BA    .027
187    LS    0    74.3
188    UD    .157
189    KK    RT-PN14
190    KM    ROUTE FLOW FROM BASIN PN14 IN A STORM DRAIN TO AP5
191    RD    1600    .055    .013    CIRC    2
192    KK    SB-PN15
193    KM    COMPUTE HYDROGRAPH FOR BASIN PN15
194    BA    .074
195    LS    0    72.7
196    UD    .186
197    KK    AP5
198    KM    COMBINE ROUTED FLOW RT-PN14 TO FLOW FROM BASIN PN15
199    HC    3

200    KK    RT-AP5
201    KM    ROUTE THE FLOW AT AP5 TO AP5A AT THE CONFLUENCE OF THE FLOWS FROM THE
202    KM    NORTH AND SOUTH FORKS OF PINE CREEK
203    RD    400    .025    .013    CIRC    5
204    KM    ********************************************
205    KM    **** BEGIN CALCULATIONS FOR THE SOUTH FORK OF PINE CREEK WATERSHED ****
206    KM    ******************************************************

207    KK    SB-PS1
208    KM    COMPUTE HYDROGRAPH FOR BASIN PS1
209    BA    .150
210    LS    0    78.4
211    UD    .205
HEC-1 INPUT

LINE

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

212  KK  RT-PS1
213  KM  ROUTE FLOW FROM BASIN PS1 TO REGIONAL DETENTION FACILITY "C"
214  RD  2100  .03  .013  CIRC  4.5

215  KK  SB-PS2
216  KM  COMPUTE HYDROGRAPH FOR BASIN PS2
217  BA  .154
218  LS  0  85.2
219  UD  .188

220  KK  SB-PS3
221  KM  COMPUTE HYDROGRAPH FOR BASIN PS3
222  BA  .162
223  LS  0  84.8
224  UD  .205

225  KK  APDFD
226  KM  COMBINE ROUTED FLOW RT-PS1 TO FLOW FROM BASINS PS2 AND PS3
227  HC  3

228  KK  RR-DFD
229  KM  ROUTE FLOW THRU A DETENTION FACILITY
230  KM  ASSUME BOTTOM TO BE 240' WIDE X 590' LONG W 4:1 SIDE SLOPES
231  KM  ASSUME A 36 DIA OUTLET WITH INVERT AT POND INVERT.
232  KM  OUTLET Q ESTIMATED WITH ORIFICE EQUATION ASSUMING c=0.60
233  KM  AND DOWNSTREAM STORM DRAIN IN NON PRESSURE FLOW
234  KM  2,2,100
235  RS  1  STOR  0
236  KD  3  1  100
237  SV  0  6.8  14.3  22.4  31.1  40.6  50.8  61.8
238  SE  100  102  104  106  108  110  112  114
239  SQ  0  18  54  72  87  99  110  120

240  KK  RT-DFD
241  KM  ROUTE FLOW FROM DFD TO AP-6 AT POWERS BLVD.
242  RD  1000  .025  .013  CIRC  3

243  KK  SB-PS4
244  KM  COMPUTE HYDROGRAPH FOR BASIN PS4
245  BA  .054
246  LS  0  93.2
247  UD  .134

248  KK  SB-PS5
249  KM  COMPUTE HYDROGRAPH FOR BASIN PS5
250  BA  .066
251  LS  0  98.0
252  UD  .135
HEC-1 INPUT

253  KK  AP6
254  KM  COMBINE ROUTED FLOW RT-DID WITH FLOW FROM BASINS PS4 AND PS5
255  HC  3

256  KK  RT-AP6
257  KM  ROUTE FLOW FROM AP6 TO AP7 AT THE BRIARGATE BLVD./AUSTIN BLUFFS PKWY.
258  KM  INTERSECTION
259  RD  2800  .025  .013  CIRC  5.5

260  KK  SB-PS6
261  KM  COMPUTE HYDROGRAPH FOR BASIN PS6
262  BA  .075
263  LS  0  86.5
264  UD  .123

265  KK  AP-7
266  KM  COMBINE ROUTED FLOW RT-AP6 TO FLOW FROM BASIN PS6
267  HC  2

268  KK  SB-PS7
269  KM  COMPUTE HYDROGRAPH FOR BASIN PS7
270  BA  .089
271  LS  0  98.0
272  UD  .119

273  KK  AP7A
274  KM  COMBINE FLOW AT AP-7 TO FLOW FROM BASIN PS7
275  HC  2

276  KK  RT-AP7A
277  KM  ROUTE FLOW FROM AP7A TO AP8 AT THE BRIARGATE PARKWAY AND UNION BLVD.
278  KM  INTERSECTION
279  RD  2100  .017  .013  CIRC  7.5

280  KK  SB-PS8
281  KM  COMPUTE HYDROGRAPH FOR BASIN PS8
282  BA  .122
283  LS  0  86.0
284  UD  .127

285  KK  AP8
286  KM  COMBINE ROUTED FLOW RT-AP7 TO FLOW FROM BASIN PS8 AT AP8
287  HC  2

288  KK  SB-PS9
289  KM  COMPUTE HYDROGRAPH FOR BASIN PS9
290  BA  .128
291  LS  0  95.3
292  UD  .130
293  KK  AP9
294  KM  COMBINE FLOW AT AP-9 TO FLOW FROM BASIN PS9 AT AP9
295  HC  2

296  KK  SB-PS10
297  KM  COMPUTE HYDROGRAPH FOR BASIN PS10
298  BA  .038
299  LS  0   72.9
300  UD  .160

301  KK  APDFC
302  KM  COMBINE FLOW AT AP-9 TO FLOW FROM SB-PS10 IN REGIONAL DETENTION FACILITY "C"
303  KM  THIS IS THE TOTAL INFLOW TO DETENTION FACILITY "C"
304  HC  2

305  KK  RR-DFC
306  KM  ROUTE FLOW THRU A DETENTION FACILITY.  ASSUME A 48 DIA OUTLET WITH THE
307  KM  INVERT AT EL 62.  CULVERT 0 ESTIMATED WITH BUREAU OF PUBLIC ROADS NOMOGRAPH
308  KM  FOR INLET CONTROL OF CULVERTS, SCALE 1.
309  KD  3   1  100
310  RS  1   STOR  0
311  SV  0   2.73  9.72  18.56  28.03  38.15  48.95  60.45  72.75  85.85
312  SV  99.66
313  SE  62  64   66   68   70   72   74   76   78   80
314  SE  82
315  SQ  0   23   70  110  140  160  190  215  232  245
316  SQ  258

317  KK  RT-DFC
318  KM  ROUTE OUTFLOW FROM POND "C" WEST DOWN A STORM DRAIN IN BRIARGATE PKWY.
319  KM  TO AP10 AT DETENTION FACILITY "B"
320  RD  2400  .035  .013  CIRC  4

321  KK  SB-PS11
322  KM  COMPUTE HYDROGRAPH FOR BASIN PS11
323  BA  .056
324  LS  0   80.3
325  UD  .172

326  KK  AP10
327  KM  COMBINE ROUTED FLOW RT-DFC TO FLOW FROM SB-PS11
328  HC  2

329  KK  SB-PS12
330  KM  COMPUTE HYDROGRAPH FOR BASIN PS12
331  BA  .153
332  LS  0   69.0
333  UD  .233
HEC-1 INPUT

LINE

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

334 KK  APDFB
335 KM  COMBINE FLOW AT AP10 TO FLOW FROM BASIN PS12
336 HC  2

337 KK  RR-DFB
338 KM  ROUTE FLOW THROUGH REGIONAL DETENTION POND "B"
339 KM  THIS VOLUME REFLECTS THE DESIGN VOLUME PER PRELIMINARY PLANS ON 7-23-98
340 KM  WITH 54" DIA OUTLET SET AT INVERT ELEV. 70.2. OUTLET Q ESTIMATED WITH
341 KM  BUREAU OF PUBLIC ROADS NOMO GRAPH FOR INLET CONTROL OF CONCRETE PIPE
342 KM  DISCHARGE ABOVE 87.6 INCLUDES FLOW OVER 80' LONG EMERGENCY SPILLWAY
343 KM  SCALE 1
344 KO  3  1
345 RS  1 STOR  0
346 SV  0  0.06  1.17  3.30  5.82  8.73  12.07  15.85  20.07  23.60
347 SV  24.76  29.96
348 SE  71.2  72.0  74  76  78  80  82  84  86  87.6
349 SE  88  90
350 SQ  0  22  73  130  169  202  236  260  285  301
351 SQ  371  1222

352 KK  RT-DFB
353 KM  ROUTE FLOW 1000 LF NORTHWEST IN A STORM DRAIN FROM DETENTION FACILITY "B"
354 KM  TO AP-11
355 RD  1000  .021  .013  CIRC  4.5

356 KK  SB-PS13
357 KM  COMPUTE HYDROGRAPH FOR BASIN PS13
358 BA  .065
359 LS  0  74.1
360 UD  .149

361 KK  AP11
362 KM  COMBINE ROUTED FLOW RT-DFB TO FLOW FROM BASIN PS13 AT AP11
363 HC  2

364 KK  RT-AP11
365 KM  ROUTE FLOW 600 LF NORTHWEST IN A STORM DRAIN FROM AP11 TO AP5A (THE
366 KM  CONFLUENCE OF FLOWS FROM THE NORTH AND SOUTH FORKS OF PINE CREEK)
367 RD  600  .021  .013  CIRC  5

368 KK  AP5A
369 KM  COMBINE ROUTED FLOW AP5 (FLOW FROM THE NORTH FORK OF PINE CREEK) TO ROUTED
370 KM  FLOW RT-AP11 (FLOW FROM THE SOUTH FORK OF PINE CREEK)
371 HC  2

372 KK  RT-AP5A
373 KM  ROUTE THE FLOW IN PINE CREEK MAIN CHANNEL 1300 FEET DOWN THE CHANNEL FROM
374 KM  AP5A NEAR THE HISTORIC CONFLUENCE OF PINE CREEK TO AP12 AT THE CONFLUENCE
375 KM  OF THE MAIN CHANNEL AND THE LEXINGTON DRIVE STORM DRAIN OUTFALL. USE AN
376 KM  APPROXIMATE AVERAGE CHANNEL SECTION AND SLOPE FOR ROUTING.
377 RD  1300  .023  .045  TRAP  50  2
HEC-1 INPUT

LINE

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

378      KK SB-PM1
379      KM COMPUTE HYDROGRAPH FOR BASIN PM1
380      BA  .054
381      LS  0    78.5
382      UD  .203

383      KK RT-PM1
384      KM ROUTE THE FLOW FROM BASIN PM1 1200 LF NORTH IN THE LEXINGTON DR. S.D. TO
385      KM PINE CREEK MAIN CHANNEL.
386      RD  1200  .08    .013  CIR  3.5

387      KK SB-PM2
388      KM COMPUTE HYDROGRAPH FOR BASIN PM2, AN AREA OF THE GOLF COURSE
389      BA  .154
390      LS  0    66.0
391      UD  .310

392      KK SB-PM3
393      KM COMPUTE HYDROGRAPH FOR BASIN PM3
394      BA  .067
395      LS  0    73.5
396      UD  .248

397      KK AP12
398      KM COMBINE ROUTED FLOW RT-PM1 WITH THE ROUTED FLOW IN PINE CREEK MAIN CHANNEL
399      KM AND THE FLOW FROM BASINS PM2 AND PM3
400      HC  4

401      KK RT-AP12
402      KM ROUTE THE FLOW IN PINE CREEK MAIN CHANNEL DOWN THE CHANNEL FROM AP12 NEAR THE
403      KM OUTFALL OF LEXINGTON DRIVE STORM DRAIN TO THE CROSSING AT CHAPEL HILLS DRIVE
404      KM USE AN APPROXIMATE AVERAGE CHANNEL SECTION AND SLOPE FOR ROUTING.
405      RD  1600  .018  .045  TRAP  30    2

406      KK SB-PM4
407      KM COMPUTE HYDROGRAPH FOR BASIN PM4
408      BA  .111
409      LS  0    71.9
410      UD  .170

411      KK AP13
412      KM COMBINE FLOW FROM BASIN PM4 TO THE ROUTED FLOW RT-AP12 IN PINE CREEK MAIN
413      KM CHANNEL ON THE EAST SIDE OF THE CHAPEL HILLS DRIVE CROSSING
414      HC  2
415      KM *********************************************************
416      KM *********************************************************
417      KM *********************************************************

418      KK SB-CS1
419      KM COMPUTE HYDROGRAPH FOR BASIN CS1
420      BA  .053
421      LS  0    73.6
422      UD  .181
HEC-1 INPUT

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

423  KK  RT-CS1
424  KM  ROUTE FLOW 1300 LF WEST IN DYNAMIC DR.  ASSUME BULK OF FLOW IS ON THE SURFACE
425  RD  1300  .021  .013  TRAP  32  .01

426  KK  SB-CS2
427  KM  COMPUTE HYDROGRAPH FOR BASIN CS1
428  BA  .070
429  LS  0  98.0
430  UD  .101

431  KKR-DFCS2
432  KM  ROUTE FLOW THRU AN ASSUMED DETENTION FACILITY TO REFLECT DETENTION OF 1.6cfs
433  KM /ACRE FROM THE LI/O PROPERTY AS ASSUMED IN THE MDDP FOR BRIARGATE BUSINESS
434  KM CAMPUS. BECAUSE THE DISCHARGE CONFIGURATION IS UNKNOWN AT THIS TIME ASSUME
435  KM THAT THE PEAK DISCHARGE RATE MAY BE DISCHARGED AS SOON AS IT IS AVAILABLE AT
436  KM THE POND TO REFLECT POTENTIAL FREE DISCHARGE FROM A PORTION OF THE SUBBASIN
437  KM DISCHARGE REDUCTION ASSUMED AT 1.6 cfs x 37ac=60 cfs
438  RS  1  STOR  0
439  SV  0  .001  6  10
440  SE  100  102  104  106
441  SQ  0  194  194  194

442  KK  AP14
443  KM  COMBINE ROUTED FLOW RT-CS1 TO CONTROLLED FLOW FROM BASIN CS2 AT THE
444  KM INTERSECTION OF CHAPEL HILLS DR. AND DYNAMIC DR.
445  HC  2

446  KK  RT-AP14
447  KM  ROUTE FLOW 1100 LF NORTH IN THE CHAPEL HILLS DR. S.D. TO BRIARGATE PKWY.
448  KM NOTE: THE CALCULATED 100 YEAR FLOW IS IN EXCESS OF THE FULL PIPE CAPACITY
449  KM OF THE STORM DRAIN BETWEEN DYNAMIC DRIVE AND BRIARGATE PARKWAY. SOME OF
450  KM THE FLOW MAY BE ON THE SURFACE IN CHAPEL HILLS DRIVE.
451  RD  1100  .02  .013  CIR  4

452  KK  SB-CS3
453  KM  COMPUTE HYDROGRAPH FOR BASIN CH3
454  BA  .053
455  LS  0  84.8
456  UD  .177

457  KKR-DFCS3
458  KM  ROUTE FLOW THRU AN ASSUMED DETENTION FACILITY TO REFLECT DETENTION REDUCING
459  KM THE PEAK 100YR FLOW RATE FROM THE 9 ACRES OF THE BASIN THAT ARE DESIGNATED
460  KM AS LI/O USE AS ASSUMED IN MDDP FOR BRIARGATE BUSINESS CAMPUS.
461  KM BECAUSE THE DISCHARGE CONFIGURATION IS UNKNOWN AT THIS TIME ASSUME
462  KM THAT THE PEAK DISCHARGE RATE MAY BE DISCHARGED AS SOON AS IT IS AVAILABLE AT
463  KM THE POND TO REFLECT FREE DISCHARGE FROM A PORTION OF THE SUB BASIN.
464  KM DISCHARGE REDUCTION ASSUMED AT 1.6 cfs x 9=14 cfs
465  RS  1  STOR  0
466  SV  0  .001  6  10
467  SE  100  102  104  106
468  SQ  0  123  123  123
LINE  ID........1........2........3........4........5........6........7........8........9........10

469  KK  AP15
470  KM  COMBINE ROUTED FLOW RT-AP14 WITH CONTROLLED FLOW FROM BASIN CS3 AT THE
471  KM  INTERSECTION OF CHAPEL HILLS DR. AND BRIARGATE PARKWAY. NOTE A SMALL PORTION
472  KM  OF BASIN CS3 IS LOCATED DOWNSTREAM OF THIS POINT. FOR THIS MODELING PURPOSE
473  KM  THIS IS CONSIDERED INSIGNIFICANT.
474  HC  2

475  KK  RT-AP15
476  KM  ROUTE FLOW 1400 LF NORTH IN THE CHAPEL HILLS DR. S.D.
477  KM  NOTE: THE CALCULATED 100 YEAR FLOW IS IN EXCESS OF THE FULL PIPE CAPACITY
478  KM  OF THE STORM DRAIN BETWEEN BRIARGATE PARKWAY AND PINE CREEK. SOME OF
479  KM  THE FLOW MAY BE ON THE SURFACE IN CHAPEL HILLS DRIVE. A SMALL PORTION OF
480  KM  THE SURFACE FLOW MAY BE DIVERTED DOWN BRIARGATE PARKWAY, BUT FOR THE PURPOSE
481  KM  OF THIS ANALYSIS ALL OF THE FLOW FROM THE CHAPEL HILLS DRIVE/BRIARGATE PKY.
482  KM  INTERSECTION IS ASSUMED TO REACH PINE CREEK AT CHAPEL HILLS DRIVE.
483  RD  1400  .045  .013  CIR  4.5

484  KK  SB-CS4
485  KM  COMPUTE HYDROGRAPH FOR BASIN CS4
486  BA  .053
487  LS  0    95.5
488  UD  .101

489  KK  RR-DFVC
490  KM  ROUTE FLOW THRU THE PROPOSED VILLAGE CENTER DETENTION FACILITY
491  KM  POND GRADING PER THE PRELIMINARY GRADING SHOWN IN THE MDP FOR VILLAGE
492  KM  CENTER. DISCHARGE ASSUMES USE OF THE EXISTING 10" DIAMETER STUB.
493  KM  WITH THE INVERT SET AT ELEVATION 73. BUREAU OF PUBLIC ROADS NOMOGRAPH
494  KM  USED TO ESTIMATE OUTFLOW RATES ASSUMING INLET CONTROL.
495  RS  1    STOR  0
496  SV  000  .032  1.67  3.23  5.00  7.00
497  SE  73  74  76  78  80  82
498  SQ  0  3  13  17  20  22

499  KK  AP16
500  KM  COMBINE ROUTED FLOW RT-AP15 WITH THE DISCHARGE FROM THE VILLAGE CENTER POND
501  HC  2

502  KK  RT-AP16
503  KM  ROUTE THE FLOW IN THE CHAPEL HILLS DRIVE STORM DRAIN FROM AP16 TO AP19 IN
504  KM  PINE CREEK MAIN CHANNEL ON THE DOWNSTREAM SIDE OF THE CHAPEL HILLS DRIVE
505  KM  CROSSING
506  RD  300  .03  .013  CIR  4.5
507  KM  *********************************************************************************
508  KM  ***BEGIN CALCULATION OF THE NORTH CHAPEL HILLS DR. STORM DRAIN WATERSHED***
509  KM  *********************************************************************************

510  KK  SB-CN1
511  KM  COMPUTE RUNOFF FROM BASIN CN1 THE WATERSHED CONTRIBUTING TO THE PARK SITE AT
512  KM  CHAPEL HILLS DRIVE POND (REGIONAL DETENTION FACILITY "A").
513  BA  .145
514  LS  0    76.8
515  UD  .190
HEC-1 INPUT

LINE

KK RR-DFA

KM ROUTE THE FLOW FROM CN1 THROUGH THE PROPOSED DETENTION POND AT THE PARK

KM SITE AT CHAPEL HILLS DRIVE. STAGE STORAGE CURVE PER THE 12/22/97 GRADING PLAN

KM DISCHARGE CURVE REFLECTS 12" DIAMETER OUTLET PIPE CONTROL FOR NORMAL DISCHARG

KM AND A 100' LONG EMERGENCY SPILLWAY SET AT ELEVATION 6805.5

KO 3.1 100

RS 1 STOR 0

SV 0 .01 .22 .99 1.95 2.80 4.25 5.31 6.51 11.64

SV 15.36

SQ 2.35 2.56 3.00 3.73 4.35 4.75 5.36 5.50 8.39 9.01

SQ 279

SE 6796.6 6797.0 6798.0 6800.0 6802.0 6803.5 6803.51 6804 6804.1 6805.5

SE 6806.5

KK RT-DFA

KM ROUTE OUTFLOW FROM REGIONAL DETENTION POND "A" DOWN THE CHAPEL HILLS STORM

KM DRAIN FROM LEXINGTON DRIVE TO TAEELAKE DRIVE

RD 950 .04 .013 CIRC 1.5

KK SB-CN2

KM COMPUTE RUNOFF FROM BASIN CN2

BA .078

LS 0 75.5

UD .214

KK AP17

KM COMBINE ROUTED FLOW RT-DFA AND FLOW FROM BASIN CN2 AT THE INTERSECTION OF

KM CHAPEL HILLS DRIVE AND TAEELAKE DRIVE

HC 2

KK RT-AP17

KM ROUTE FLOW AT AP17 DOWN THE CHAPEL HILLS DRIVE STORM DRAIN TO MULLIGAN DR.

RD 1400 .05 .013 CIRC 3.5

KK SB-CN3

KM COMPUTE RUNOFF FROM BASIN CN3

BA .043

LS 0 80.0

UD .157

KK AP18

KM COMBINE ROUTED FLOW RT-AP17 TO FLOW FROM BASIN CN3 AT INTERSECTION OF CHAPEL

KM HILLS DR. AND MULLIGAN DR.

HC 2

KK RT-AP18

KM ROUTE FLOW AT AP18 DOWN THE CHAPEL HILLS DRIVE STORM DRAIN TO AP19 IN THE

KM PINE CREEK MAIN CHANNEL ON THE DOWNSTREAM SIDE OF THE CHAPEL HILLS DRIVE

KM CROSSING. NOTE A SMALL PORTION OF BASIN CN3 IS LOCATED SOUTH OF AP18. THIS

KM IS CONSIDERED INSIGNIFICANT FOR THE PURPOSE OF THIS ANALYSIS.

RD 600 .04 .013 CIRC 3.5
LINE  ID    1    2    3    4    5    6    7    8    9    10

560  KK    AP19
561  KM    COMBINE ROUTED FLOW RT-AP18 FROM THE NORTH CHAPEL HILLS DR. STORM DRAIN
562  KM    WITH THE ROUTED FLOW RT-AP16 FROM THE SOUTH CHAPEL HILLS DRIVE STORM DRAIN
563  KM    AND THE FLOW IN PINE CREEK MAIN CHANNEL (AP13) AT THE WEST SIDE OF THE CHAPEL
564  KM    HILLS DRIVE CROSSING. FLOW THAT IS TAKEN INTO THE PINE CREEK CHANNEL FORM THE
565  KM    STREET AT THIS POINT HAS BEEN ACCOUNTED FOR IN BASINS GN3 AND GS3. THIS WAS
566  KM    DONE TO REDUCE THE COMPLEXITY OF THE MODEL.
567  HC    3

568  KK    RT-AP19
569  KM    ROUTE THE FLOW IN PINE CREEK MAIN CHANNEL FROM AP19 AT THE CHAPEL HILLS DRIVE
570  KM    CROSSING TO AP20 AT REGIONAL DETENTION FACILITY 1 AT BRIARGATE PARKWAY AND
571  KM    HIGHWAY 83. USE AVERAGE SLOPES AND APPROXIMATE CROSS SECTIONS FOR ROUTING.
572  RD    750  .035  .045  TRAP  30  2
573  RD    1000  .025  .045  TRAP  120  2
574  RD    1400  .026  .045  TRAP  60  2

575  KK    SB-PM5
576  KM    COMPUTE HYDROGRAPH FOR BASIN PM5
577  BA    .183
578  LS    0    70.0
579  UD    .185

580  KK    AP20
581  KM    COMBINE FLOW FROM BASIN PM6 WITH THE ROUTED FLOW IN PINE CREEK
582  HC    2

583  KK    SB-PM6
584  KM    COMPUTE HYDROGRAPH FOR PM6 THE AREA BETWEEN CHAPEL HILLS DR. AND DETENTION
585  KM    FACILITY 1 BOUNDED BY THE GOLF COURSE AND BRIARGATE PARKWAY. NOTE: THE MDP
586  KM    FOR BRIARGATE BUSINESS CAMPUS REQUIRES DETENTION IN THIS SUBBASIN. FOR THE
587  KM    PURPOSE OF THIS ANALYSIS NO DETENTION IS ASSUMED TO ALLOW THE DEVELOPER THE
588  KM    OPTION OF CONSTRUCTING LARGER CONVEYANCE FACILITIES TO DETENTION FACILITY
589  KM    NO. 1 AND ALLOWING FREE DISCHARGE FROM THE BASIN.
590  BA    .088
591  LS    0    98
592  UD    .110

593  KK    AP21
594  KM    COMBINE FLOW FROM PM6 WITH THE FLOW IN PINE CREEK AT AP21 FOR THE TOTAL FLOW
595  KM    IN PINE CREEK CHANNEL AS IT ENTERS DETENTION FACILITY No 1
596  HC    2

597  KK    SB-PM7
598  KM    COMPUTE HYDROGRAPH FOR BASIN PM7 THE AREA NORTH OF DETENTION FACILITY 1
599  KM    NOTE: THE MDP FOR THE BRIARGATE BUSINESS CAMPUS REQUIRES DETENTION IN
600  KM    THE NON RESIDENTIAL PORTIONS OF THIS AREA. FOR THE PURPOSE OF THIS ANALYSIS
601  KM    FREE DISCHARGE FROM THE BASIN IS ASSUMED. THE RESIDENTIAL PORTION OF THE
602  KM    BASIN LOCATED OUTSIDE THE CITY LIMITS IS ASSUMED TO BE FULLY DEVELOPED
603  KM    AS 1 DU PER ACRE RESIDENTIAL.
604  BA    .138
605  LS    0    76.3
606  UD    .353
607  KM    ********************

**HEC-1 INPUT**

**PAGE 15**

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

608 KM ****BEGIN CALCULATIONS FOR THE FOCUS ON THE FAMILY STORM DRAIN WATERSHED****

609 KM **********************************************************************************************************

610 KK SB-F1
611 KM COMPUTE HYDROGRAPH FOR BASIN F1
612 BA .119
613 LS 0 78.3
614 UD .208

615 KK RT-F1P
616 KM ROUTE FLOW IN THE STORM DRAIN 1300 LF WEST FROM THE SAG PT. IN LEXINGTON
617 KM DRIVE TO SUMMER FIELD POND
618 RD 1300 .036 .013 CIRC 3

619 KK SB-F2
620 KM COMPUTE HYDROGRAPH FOR BASIN F2
621 BA .039
622 LS 0 74
623 UD .171

624 KK AP-DFS
625 KM COMBINE ROUTED FLOW RT-F1P WITH FLOW FROM F2 AT THE SUMMER
626 KM FIELD POND. THIS IS THE TOTAL FLOW TO THE POND
627 HC 2

628 KK RR-DFS
629 KM ROUTE THE FLOW AT AP-DFS THROUGH THE SUMMER FIELD DETENTION BASIN.
630 KM THE INFLOW/OUTFLOW S.D. FOR THIS FACILITY IS BURIED BELOW THE POND BOTTOM.
631 KM THE POND FILLS WHEN THE CAPACITY OF THE DOWNSTREAM REACH OF S.D. IS
632 KM EXCEEDED. THIS CONFIGURATION PRESENTS A COMPLEX HYDRAULIC PROBLEM. IT IS
633 KM ASSUMED THAT UNTIL INFLOW >120cfs FLOW WILL PASS THROUGH THE STORM DRAIN.
634 KM WHEN INFLOW > 120cfs BACKWATER WILL FORM AT THE OUTLET AND THE LID ON THE
635 KM UPSTREAM MANHOLE WILL LIKELY BE LIFTED OFF AND SOME FLOW WILL ENTER THE POND
636 KM FROM THAT POINT. WHEN INFLOW>120cfs IT IS ASSUMED THAT THE HEAD LOSS AT
637 KM THE OUTLET WILL BE APPROXIMATELY 1*VELOCITY HEAD FOR THE PURPOSE OF
638 KM CALCULATING THE DISCHARGE CURVE.
639 KM NOTE: THE OUTFLOW CURVE WAS MODIFIED IN THIS MODEL TO ALLOW THE 5 YEAR
640 KM STORM TO RUN. AT ELEV. 92 SQ OF 80 WAS SUBSTITUTED FOR 120. THIS CHANGE
641 KM IS CONSIDERED INSIGNIFICANT AT THE 5 YEAR Q
642 KO 3 1 100
643 RS 1 STOR 0
644 SV 0 0.57 4.63 6.87 10.32
645 SE 92 94 96 98 100
646 SQ 80 126 131 137 144

647 KK RT-DFS
648 KM ROUTE OUTFLOW FROM THE DETENTION BASIN IN A 68" S.D. TO RESEARCH PKWY.
649 RD 800 .018 .013 CIRC 4

650 KK SB-F3
651 KM COMPUTE HYDROGRAPH FOR BASIN F3
652 BA .114
653 LS 0 77.0
654 UD .215
LINE                        | ID...1...2...3...4...5...6...7...8...9...10
---                          | ---
655 KG                       | AP22
656 KM                       | COMBINE ROUTED FLOW RT-DTSF TO FLOW FROM BASIN F3 AT THE INTERSECTION OF
657 KM                       | RESEARCH PARKWAY AND SUMMERSSET DRIVE.
658 HC                       | 2
659 KKRT-AP22P                |
660 KM                       | ROUTE THE S.D.FLOW FROM THE BRIARGATE PKWY/ SUMMERSSET INTERSECTION TO THE
661 KM                       | INTERSECTION OF RESEARCH PKWY. AND CHAPEL HILLS DR.
662 RD                       | 2100 .02 .013 CIRC 5
663 KG                       | SB-F4
664 KM                       | COMPUTE HYDROGRAPH FOR BASIN F4
665 BA                       | .038
666 LS                       | 0 83.0
667 UD                       | .197
668 KG                       | RR-DFF4
669 KM                       | ROUTE FLOW THRU A POND ROUTING ROUTINE TO REFLECT REDUCTION IN PEAK FLOW
670 KM                       | RATE OF 1.6 CFS/ACRE FROM THE 11.5 AC THAT WILL BE DEVELOPED AS LI/O
671 KM                       | DISCHARGE REDUCTION PER ACRE IS DETERMINED PER THE RATE AND AREA INCLUDED
672 KM                       | IN THE HUDD FOR BRIARGATE BUSINESS CAMPUS
673 KM                       | THE ROUTING ROUTINE ONLY REGULATES THE PEAK DISCHARGE AND DOES NOT LAG
674 KM                       | THE DISCHARGE. THIS IS APPROPRIATE AS A PORTION OF THE SITE WILL LIKELY
675 KM                       | FREE DISCHARGE TO THE ADJACENT STREET
676 KM                       | DISCHARGE REDUCTION = LI/O AREA (acres)11.5 x 1.6 cfs = 18.4 cfs
677 RS                       | 1 STOR 0
678 SV                       | 0 .001 6 10
679 SE                       | 100 102 104 106
680 SQ                       | 0 70.6 70.6 70.6
681 KG                       | AP23
682 KM                       | COMBINE ROUTED FLOW RT-AP22P TO FLOW FROM BASIN F4 AT THE INTERSECTION OF
683 KM                       | RESEARCH PARKWAY AND CHAPEL HILLS DR.
684 HC                       | 2
685 KKRT-AP23P                |
686 KM                       | ROUTE THE FLOW IN THE STORM DRAIN FROM THE RESEARCH PKWY/CHAPEL HILLS DR.
687 KM                       | INTERSECTION TO THE INTERSECTION OF EXPLORER DRIVE AND THE FOCUS ON THE
688 KM                       | FAMILY S.D.
689 RD                       | 2100 .044 .013 CIRC 4
690 KG                       | SB-F5
691 KM                       | COMPUTE HYDROGRAPH FOR BASIN F5
692 BA                       | .064
693 LS                       | 0 95.5
694 UD                       | .121
695 KG                       | RR-DFF5
696 KM                       | ROUTE FLOW THRU A POND ROUTING ROUTINE TO REFLECT REDUCTION IN PEAK FLOW
697 KM                       | RATE BASED ON APPROXIMATELY 35% OF THE DIFFERENCE BETWEEN THE DEVELOPED
698 KM                       | AND HISTORIC PEAK 100 YR FLOW RATE PER THE ORIGINAL DBPS CRITERIA FOR LI/O
699 KM                       | LAND USE. HISTORIC 100 YR PEAK ESTIMATED AT 1.5 CFS/AC. FULLY DEVELOPED 100
700 KM                       | YR PEAK ESTIMATED AT 5.6 CFS/AC. ESTIMATED REQUIRED DETENTION =
701 KM                       | (5.6-1.5)*.35*55AC=50cfs TOTAL Qin=225cfs
RECYCLED INPUT

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

702 KM THE ROUTING ROUTINE ONLY REGULATES THE PEAK DISCHARGE AND DOES NOT LAG
703 KM THE DISCHARGE. THIS IS APPROPRIATE AS A PORTION OF THE BASIN DISCHARGES
704 KM DIRECTLY TO THE ADJACENT STREET AND STORM DRAIN
705 RS 1 STOR 0
706 SV 0 .001 6 10
707 SE 100 102 104 106
708 SQ 0 175 175 175

709 KK AP24
710 KM COMBINE THE ROUTED FLOW IN THE S.O.(RTAP102) TO FLOW FROM FF1
711 HC 2

712 PKRT-AP24P
713 KM ROUTE THE FLOW IN THE FOCUS STORM DRAIN FROM AP24 AT THE INTERSECTION OF
714 KM EXPLORER DRIVE AND THE FOCUS S.O. TO AP25 AT THE INTERSECTION OF EXPLORER
715 KM DRIVE & BRIARGATE PKWY
716 RD 800 .011 .013 CIRC 5.5

717 KK SB-F6
718 KM COMPUTE HYDROGRAPH FOR BASIN F6
719 BA .038
720 LS 0 98.0
721 UD .106

722 KK RR-DF6
723 KM ROUTE FLOW THRU A POND ROUTING ROUTINE TO REFLECT REDUCTION IN PEAK FLOW
724 KM RATE BASED ON APPROXIMATELY 35% OF THE DIFFERENCE BETWEEN THE DEVELOPED
725 KM AND HISTORIC PEAK 100 YR FLOW RATE. HISTORIC ESTIMATED AT 1.5 CFS/AC.
726 KM FULLY DEVELOPED ESTIMATED AT 6.0 CFS/AC. ESTIMATED REQUIRED DETENTION =
727 KM (6.0-1.5)*.35*21.5AC=34cfs TOTAL Qin=138cfs
728 KM THE ROUTING ROUTINE ONLY REGULATES THE PEAK DISCHARGE AND DOES NOT LAG
729 KM THE DISCHARGE. THIS IS APPROPRIATE AS A PORTION OF THE BASIN DISCHARGES
730 KM DIRECTLY TO THE ADJACENT STREET AND STORM DRAIN
731 RS 1 STOR 0
732 SV 0 .001 6 10
733 SE 100 102 104 106
734 SQ 0 104 104 104

735 KK SB-F7
736 KM COMPUTE HYDROGRAPH FOR BASIN F7
737 BA .052
738 LS 0 93.0
739 UD .137

740 KK RR-DF7
741 KM ROUTE FLOW THRU A POND ROUTING ROUTINE TO REFLECT REDUCTION IN PEAK FLOW
742 KM RATE BASED ON APPROXIMATELY 35% OF THE DIFFERENCE BETWEEN THE DEVELOPED
743 KM AND HISTORIC PEAK 100 YR FLOW RATE. HISTORIC ESTIMATED AT 1.5 CFS/AC.
744 KM FULLY DEVELOPED ESTIMATED AT 5.2 CFS/AC. ESTIMATED REQUIRED DETENTION =
745 KM (5.2-1.5)*.35*29AC=38cfs TOTAL Qin=170cfs
746 KM THE ROUTING ROUTINE ONLY REGULATES THE PEAK DISCHARGE AND DOES NOT LAG
747 KM THE DISCHARGE. THIS IS APPROPRIATE AS A PORTION OF THE BASIN DISCHARGES
748 KM DIRECTLY TO THE ADJACENT STREET AND STORM DRAIN
749 RS 1 STOR 0
750 SV 0 .001 6 10
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<th>ID........1........2........3........4........5........6........7........8........9........10</th>
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<td>753</td>
<td>KK   AP25</td>
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<tr>
<td>754</td>
<td>KM   AT THE INTERSECTION OF EXPLORER DR AND BRIARGATE PKWY.</td>
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<tr>
<td>755</td>
<td>HC   3</td>
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<tr>
<td>757</td>
<td>KKRT-AP25P</td>
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<tr>
<td>758</td>
<td>KM   PARKWAY TO DETENTION FACILITY 1 AT BRIARGATE PKWY &amp; HIGHWAY B3</td>
</tr>
<tr>
<td>760</td>
<td>RD   1250 .011 .013 CIRC 5.5</td>
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<td>761</td>
<td>KK   SB-PMB</td>
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<tr>
<td>762</td>
<td>KM   COMPUTE HYDROGRAPH FOR BASIN PM8 THE PORTION OF BRIARGATE PARKWAY BETWEEN</td>
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<tr>
<td>763</td>
<td>KM   EXPLORER DR. AND HIGHWAY B3</td>
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<tr>
<td>764</td>
<td>BA   .014</td>
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<tr>
<td>765</td>
<td>LS   0 98</td>
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<td>766</td>
<td>UD   .100</td>
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<tr>
<td>767</td>
<td>KK AP-DF#1</td>
</tr>
<tr>
<td>768</td>
<td>KM   ADD THE FLOW FROM THE FOCUS ON THE FAMILY STORM DRAIN, BASINS PM7 AND PM8,</td>
</tr>
<tr>
<td>769</td>
<td>KM   AND FLOW IN PINE CREEK FOR THE TOTAL INFLOW TO DETENTION FACILITY 1</td>
</tr>
<tr>
<td>770</td>
<td>HC   4</td>
</tr>
<tr>
<td>771</td>
<td>KK RR-DF#1</td>
</tr>
<tr>
<td>772</td>
<td>KM   ROUTE FLOW THRU DETENTION FACILITY NO.1. VOLUME MODIFIED TO REFLECT PROPOSED</td>
</tr>
<tr>
<td>773</td>
<td>KM   ENLARGEMENT. PROPOSED ENLARGEMENT IS TO ADD A MINIMUM OF 0.7 ACRES OF SURFACE</td>
</tr>
<tr>
<td>774</td>
<td>KM   AREA TO EACH OF THE CONTOURS AT OR ABOVE ELEVATION 58, OUTLET MODELED</td>
</tr>
<tr>
<td>775</td>
<td>KM   ASSUMING THE TOP 7.5' OF THE ENTRANCE TO THE 10'X 12'X HIGH BOX CULVERT IS</td>
</tr>
<tr>
<td>776</td>
<td>KM   BLOCKED AND A NEW 12' WIDE OPENING IS CREATED W/ INVERT AT 67.2</td>
</tr>
<tr>
<td>777</td>
<td>KM   OUTFLOW CURVE CALCULATED WITH A SPREADSHEET TREATING THE LOWER OPENING AS</td>
</tr>
<tr>
<td>778</td>
<td>KM   A SUBMERGED ORIFICE WITH C=.60, h=POD DEPTH - NORMAL DEPTH IN THE OUTFALL</td>
</tr>
<tr>
<td>779</td>
<td>KM   AND THE UPPER OPENING TO ELEVATION 73.0 TREATED AS A SHARP CRESTED WEIR WITH</td>
</tr>
<tr>
<td>780</td>
<td>KM   A FULL LENGTH OF 12.77' (THE SKEW LENGTH) ADJUSTED 0.2h FOR END CONTRACTIONS</td>
</tr>
<tr>
<td>781</td>
<td>KM   AND C=3.22+0.40(h/P) WHERE P=14.2. ABOVE ELEVATION 73.0 THE TOP OUTLET</td>
</tr>
<tr>
<td>782</td>
<td>KM   STRUCTURE IS ASSUMED TO TERMINATE WITHOUT A TOP AND THUS ADDITIONAL FLOW CAN</td>
</tr>
<tr>
<td>783</td>
<td>KM   OVER TOP THE SIDES AND BACK OF THE ASSUMED 3 SIDED STRUCTURE 12.77 x 10</td>
</tr>
<tr>
<td>784</td>
<td>KD   3 1</td>
</tr>
<tr>
<td>785</td>
<td>RS   1 STOR 0</td>
</tr>
<tr>
<td>786</td>
<td>SA   0 0.18 0.48 4.83 5.23 5.52 5.83 6.13 6.44 6.78</td>
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<tr>
<td>787</td>
<td>SA   7.14 7.34 7.53 7.73 7.95</td>
</tr>
<tr>
<td>788</td>
<td>SE   54.0 55.0 56.0 58.0 60.0 62.0 64.0 66.0 68.0 70.0</td>
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<tr>
<td>789</td>
<td>SE   72.0 73.0 74.0 75.0 76.0</td>
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<tr>
<td>790</td>
<td>SQ   0 105 194 275 344 401 451 496 560 747</td>
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<tr>
<td>791</td>
<td>SQ   998 1142 1247 1750 2100</td>
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<tr>
<td>792</td>
<td>KK RT-AP26</td>
</tr>
<tr>
<td>793</td>
<td>KM   ROUTE THE COMBINED FLOW FROM AP26 AT BRIARGATE PARKWAY DOWN PINE CREEK TO</td>
</tr>
<tr>
<td>794</td>
<td>KM   THE INTERSECTION OF PINE CREEK AND HIGHWAY B3. USE AVERAGE</td>
</tr>
<tr>
<td>795</td>
<td>KM   APPROXIMATE SECTION AND SLOPE FOR ROUTING</td>
</tr>
<tr>
<td>796</td>
<td>RD   1450 .019 .045 TRAP 40 2</td>
</tr>
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LINE

797  KK  SB-PM9
798  KM  COMPUTE HYDROGRAPH FOR BASIN PM9
799  BA  .068
800  LS  0  93
801  UD  .120

802  KK  AP27
803  KM  COMBINE THE FLOW FROM BASIN PM9 AND THE ROUTED FLOW IN PINE CREEK (RT-AP26) AT
804  KM  THE UPSTREAM SIDE OF HIGHWAY 83.
805  HC  2

806  KK  SB-PM10
807  KM  COMPUTE HYDROGRAPH FOR BASIN PM10
808  BA  .048
809  LS  0  98
810  UD  .092

811  KKRRDFPM10
812  KM  ROUTE FLOW THRU A POND ROUTING ROUTINE TO REFLECT REDUCTION IN PEAK FLOW
813  KM  RATE TO THE APPROXIMATE PEAK FLOW RATE DISCHARGE GOAL FROM THE BASIN
814  KM  AS SHOWN IN THE FINAL DRAINAGE REPORT FOR BRIARGATE BUSINESS CAMPUS
815  KM  FILING 13 AS APPROVED OCT 31, 1996
816  KM  THE ROUTING ROUTINE ONLY REGULATES THE PEAK DISCHARGE AND DOES NOT LAG
817  KM  THE DISCHARGE. THIS IS APPROPRIATE AS A PORTION OF THE BASIN MAY DISCHARGE
818  KM  DIRECTLY TO THE ADJACENT STREET AND STORM DRAIN.
819  KM  DISCHARGE FROM THE BASIN PER THE FINAL DRAINAGE REPORT = 140 cfs
820  RS  1  STOR  0
821  SV  0  001  .6  1.5
822  SE  100  102  104  106
823  SQ  0  140  140  140

824  KK  RT-PM10
825  KM  ROUTE THE FLOW IN THE S.D.FROM THE LOW POINT IN TELESTAR DR. TO THE EXISTING
826  KM  CUTFALL TO PINE CREEK JUST UPSTREAM OF HIGHWAY 83.
827  RD  1000  .025  .013  CIRC  4.0

828  KK  SB-PM11
829  KM  COMPUTE HYDROGRAPH FOR BASIN PM11
830  BA  .041
831  LS  0  98
832  UD  .096

833  KK  AP28
834  KM  COMBINE THE FLOW FROM BASIN PM11 WITH THE FLOW IN PINE CREEK AT AP27,
835  KM  AND THE ROUTED FLOW FROM BASIN PM10. FLOW IS COMBINED IN PINE CREEK AT
836  KM  THE UPSTREAM SIDE OF THE BOX CULVERT UNDER HIGHWAY 83. THIS REPRESENTS THE
837  KM  TOTAL FLOW TO PINE CREEK FROM THE BRIARGATE AREA
838  KO  3  1
839  HC  3
840  ZZ
SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

15 SB-PN1

32 . SB-PN2
    V
    V

37 . RT-PN2
    .
    .

40 AP1...........
    V
    V

43 RT-AP1

46 . SB-PN3
    .
    .

51 AP2...........
    V
    V

54 RT-AP2

57 . SB-PN4
    V
    V

62 . RT-PN4
    .
    .

65 . . SB-PN5
    .
    .

70 AP3................
    V
    V

73 RT-AP3

76 . SB-PN6
    .
    .

81 APDFG...........
    V
    V

85 RR-DFFG
    V
    V

98 RT-DFFG

102 . SB-PN7
    .
    .
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<td>116</td>
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<td>V</td>
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<tr>
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802  AP27............
     .
     .

806  .  SB-PM10
     .  V
     .  V

811  .  RRFPM10
     .  V
     .  V

824  .  RT-PM10
     .  .
     .  .

828  .  .  SB-PM11
     .  .
     .  .

833  AP28................

/***) RUNOFF ALSO COMPUTED AT THIS LOCATION
PINE CREEK DRAINAGE BASIN - 24HR, FULL DEVELOPED CONDITION (TYPE Ia5 YEAR)
FILE:PCDBPSD5.DAT
FULLY DEVELOPED CONDITION MODEL
998 REVISION
NOTE: THE DIVERSION ROUTINES WERE REMOVED FROM THE MODEL FOR THE 5 YR STORM
NOTE: THE OUTFLOW CURVE FOR THE SUMMER FIELD DETENTION POND WAS MODIFIED
SLIGHTLY TO ALLOW THE 3 YR MODEL TO RUN.
CN VALUES HAVE BEEN ADJUSTED TO PRODUCE PEAK 100 YEAR FLOW RATES SIMILAR TO
100 YEAR FLOW RATES PRODUCED BY RATIONAL METHOD.
******************************************************************************
BEGIN CALCULATIONS IN THE PINE CREEK NORTH FORK WATERSHED
******************************************************************************

14 IO
OUTPUT CONTROL VARIABLES
IPRINT 5 PRINT CONTROL
IPLT 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
NO 300 NUMBER OF HYDROGRAPH ORDINATES
NDATE 1 0 ENDING DATE
NDTME 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

******************************************************************************

*** END ***
85 KK  RR-DFFG  *
*  *

90 KO  OUTPUT CONTROL VARIABLES
   PRNT  3  PRINT CONTROL
   IPRINT  1  PLOT CONTROL
   QSCAL  100  HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

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

92 SV  STORAGE  0.0  0.1  2.8  8.0  14.1  20.9  28.4  36.6  45.5  55.1
       65.3  76.3  88.2

94 SE  ELEVATION  59.00  60.00  62.00  64.00  66.00  68.00  70.00  72.00  74.00  76.00
       78.00  80.00  82.00

96 SQ  DISCHARGE  0.  10.  47.  93.  130.  160.  180.  203.  222.  240.
       262.  280.  295.

***  ***  ***  ***  ***

HYDROGRAPH AT STATION  RR-DFFG

PEAK FLOW  TIME  MAXIMUM AVERAGE FLOW
  (CFS)  (HR)  6-HR  24-HR  72-HR  14.95-HR
  165.  6.45  87.  38.  38.  38.

PEAK STORAGE  TIME  MAXIMUM AVERAGE STORAGE
  (AC-FT)  (HR)  6-HR  24-HR  72-HR  14.95-HR
  23.  6.45  43.  48.  48.  48.

PEAK STAGE  TIME  MAXIMUM AVERAGE STAGE
  (FEET)  (HR)  6-HR  24-HR  72-HR  14.95-HR
  68.53  6.45  63.96  61.30  61.30  61.30

CUMULATIVE AREA =  0.73 SQ MI

***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***
OUTPUT CONTROL VARIABLES

IPRINT  3  PRINT CONTROL
IPLT    1  PLOT CONTROL
GSCAL   100.  HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

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

STORAGE  0.0  0.0  0.1  0.7  1.5  4.4  7.8  11.7  16.1  21.0
          26.4

ELEVATION  90.00  92.00  94.00  96.00  98.00  100.00  102.00  104.00  106.00  108.00
            110.00

DISCHARGE  0.  22.  70.  112.  143.  170.  190.  210.  230.  250.
            265.

    ***    ***    ***    ***    ***

HYDROGRAPH AT STATION  RR-DFE

PEAK FLOW  TIME  MAXIMUM AVERAGE FLOW
(CFS)     (HR)    6-HR  24-HR  72-HR  14.95-HR
170.  7.00  (CFS)    103.  46.  46.  46.
     (INCHES)  1.037  1.147  1.147  1.147
     (AC-FT)   51.   56.   56.   56.

PEAK STORAGE  TIME  MAXIMUM AVERAGE STORAGE
(AC-FT)  (HR)    6-HR  24-HR  72-HR  14.95-HR
    4.  7.00       2.   1.   1.   1.

PEAK STAGE  TIME  MAXIMUM AVERAGE STAGE
(FEET)  (HR)    6-HR  24-HR  72-HR  14.95-HR
100.03  7.00    96.07   92.83   92.83   92.83

CUMULATIVE AREA = 0.92 SQ MI

    ***    ***    ***    ***    ***    ***    ***    ***    ***    ***    ***    ***    ***    ***    ***    ***    ***    ***    ***    ***    ***    ***    ***    ***    ***    ***    ***    ***    ***    ***    ***    ***    ***    ***    ***    ***    ***    ***    ***    ***    ***    ***
**HYDROGRAPH ROUTING DATA**

77 RS  
**STORAGE ROUTING**

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<th>ITYP</th>
<th>RSRVIC</th>
<th>X</th>
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<tr>
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<td>STOR</td>
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<td>0.00</td>
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</table>

78 SV  
**STORAGE**

| 0.0 | 0.0 | 1.3 | 3.9 | 6.9 | 10.3 | 14.1 | 18.2 | 22.8 | 27.9 |

79 SE  
**ELEVATION**

| 784.00 | 786.00 | 788.00 | 790.00 | 792.00 | 794.00 | 796.00 | 798.00 | 800.00 | 802.00 |

'80 SQ  
**DISCHARGE**

| 0.0 | 25.0 | 80.0 | 135.0 | 173.0 | 210.0 | 240.0 | 263.0 | 280.0 | 1431.0 |

***  

**HYDROGRAPH AT STATION RR-DFE**

**PEAK FLOW**

<table>
<thead>
<tr>
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<th>MAXIMUM AVERAGE FLOW</th>
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<tbody>
<tr>
<td>(CFS)</td>
<td>6-HR</td>
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<td>177.70</td>
<td>122.0</td>
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</tbody>
</table>

| TIME | MAXIMUM AVERAGE STORAGE |
| (INCHES) | 6-HR | 24-HR | 72-HR | 14.95-HR |
| 0.913 | 1.019 | 1.019 | 1.019 |

| TIME | MAXIMUM AVERAGE STAGE |
| (AC-FT) | 6-HR | 24-HR | 72-HR | 14.95-HR |
| 61.0 | 68.0 | 68.0 | 68.0 |

| PEAK STAGE | MAXIMUM AVERAGE STAGE |
| (FEET) | 6-HR | 24-HR | 72-HR | 14.95-HR |
| 792.24 | 789.81 | 786.77 | 786.77 | 786.77 |

**CUMULATIVE AREA** = 1.25 SQ MI

**228 KK**  
**RR-DFD**  
**236 KO**  
**OUTPUT CONTROL VARIABLES**

| IPRINT | 3 PRINT CONTROL |
| IPRINT | 1 PLOT CONTROL |
| GSCAL | 100 HYDROGRAPH PLOT SCALE |
HYDROGRAPH ROUTING DATA

235 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

237 SV
STORAGE  0.0  6.8  14.3  22.4  31.1  40.6  50.8  61.8

238 SE
ELEVATION  100.00  102.00  104.00  106.00  108.00  110.00  112.00  114.00

239 SQ
DISCHARGE  0.  18.  54.  72.  87.  99. 110. 120.

***
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***

HYDROGRAPH AT STATION RR-DFD

PEAK FLOW
(CFS) (HR) MAXIMUM AVERAGE FLOW
57.  6.70 (CFS) 38.  18.  18.  18.
(INCHES) 0.758 0.919 0.919 0.919
(AC-FT) 19.  23.  23. 23.

PEAK STORAGE
(AC-FT) (HR) MAXIMUM AVERAGE STORAGE
16.  6.70 (AC-FT) 11.  6.  6.  6.

PEAK STAGE
(FEET) (HR) MAXIMUM AVERAGE STAGE
104.36 6.70 103.13 101.62 101.62 101.62

CUMULATIVE AREA = 0.47 SQ MI

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* * *
305 KK * RR-DFD *
* * *
**************

309 KO
OUTPUT CONTROL VARIABLES
IPRINT  3 PRINT CONTROL
IPLT  1 PLOT CONTROL
QSCALE 100. HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

310 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
11 SV
STORAGE  0.0  2.7  9.7  18.6  28.0  38.2  49.0  60.5  72.8  85.8  
          99.7

713 SE
ELEVATION  62.00  64.00  66.00  68.00  70.00  72.00  74.00  76.00  78.00  80.00  
            82.00

315 SQ
DISCHARGE  0.  23.  70.  110.  140.  168.  190.  215.  232.  245.  
        258.

***
***
***
***

HYDROGRAPH AT STATION  RR-DFC

EAK FLOW  TIME  MAXIMUM AVERAGE FLOW
(CFS)  (HR)  6-HR  24-HR  72-HR  14.95-HR
153.  6.55  119.  59.  59.  59.  59.
(INCHES)  1.061  1.310  1.310  1.310
(AC-FT)  59.  73.  73.  73.

AK STORAGE  TIME  MAXIMUM AVERAGE STORAGE
(AC-FT)  (HR)  6-HR  24-HR  72-HR  14.95-HR
33.  6.55  22.  10.  10.  10.

EAK STAGE  TIME  MAXIMUM AVERAGE STAGE
(FEET)  (HR)  6-HR  24-HR  72-HR  14.95-HR
70.96  6.55  68.71  65.40  65.40  65.40

CUMULATIVE AREA  =  1.04 SQ MI

*  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***

**************
*  *
337 KK  *
*  RR-DFB  *
*  *
**************

344 KO
OUTPUT CONTROL VARIABLES
IPRINT  3  PRINT CONTROL
IPLLOT  1  PLOT CONTROL
QSCAL  0.  HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

345 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

346 SV
STORAGE  0.0  0.1  1.2  3.3  5.8  8.7  12.1  15.9  20.1  23.6  
        24.8  30.0
348 SE  ELEVATION  71.20  72.00  74.00  76.00  78.00  80.00  82.00  84.00  86.00  87.60
     88.00  90.00
350 SQ  DISCHARGE  0.  22.  73.  130.  169.  202.  236.  260.  285.  301. 371.  1222.

***  ***  ***  ***  ***  ***

HYDROGRAPH AT STATION  RR-DF8

<table>
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<tr>
<th>PEAK FLOW</th>
<th>TIME</th>
<th>MAXIMUM AVERAGE FLOW</th>
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<td>(HR)</td>
<td>6-HR</td>
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<tr>
<td>159.</td>
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<td>64.</td>
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<tr>
<td>(INCHES)</td>
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<td>0.958 1.182 1.182</td>
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<td>(AC-FT)</td>
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<td>64. 79.</td>
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<table>
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<th>MAXIMUM AVERAGE STORAGE</th>
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<td>(AC-FT)</td>
<td>(HR)</td>
<td>6-HR 24-HR 72-HR 14.95-HR</td>
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<td>5.</td>
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<th>MAXIMUM AVERAGE STAGE</th>
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<td>(FEET)</td>
<td>(HR)</td>
<td>6-HR 24-HR 72-HR 14.95-HR</td>
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<td>77.49</td>
<td>7.15</td>
<td>76.12 73.63 73.63 73.63</td>
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CUMULATIVE AREA = 1.25 SQ MI

***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***

***************
*  *
516 KK  * RR-DF8 *
*  *
***************

521 KG  OUTPUT CONTROL VARIABLES
IPRINT  3  PRINT CONTROL
I PLOT  1  PLOT CONTROL
O SCAL  100.  HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

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

523 SV  STORAGE  0.0  0.0  0.2  1.0  2.0  2.8  4.3  5.3  6.5  11.6
        15.4

525 SQ  DISCHARGE  2.  3.  3.  4.  4.  5.  5.  6.  8.  9.
        279.

527 SE  ELEVATION  6796.60  6797.00  6798.00  6800.00  6802.00  6803.50  6803.51  6804.00  6804.10  6805.50
HYDROGRAPH AT STATION RR-DFS

PEAK FLOW       TIME            MAXIMUM AVERAGE FLOW
               (CFS)       (HR)       6-HR      24-HR      72-HR      14.95-HR
5.0           8.10             5.0       4.0       4.0       4.0
 (INCHES)       0.321     0.619      0.619      0.619
  (AC-FT)         2.0       5.0       5.0       5.0

PEAK STORAGE    TIME            MAXIMUM AVERAGE STORAGE
               (AC-FT)   (HR)        6-HR      24-HR      72-HR      14.95-HR
4.0           8.15             3.0       2.0       2.0       2.0

PEAK STAGE      TIME            MAXIMUM AVERAGE STAGE
               (FEET)    (HR)        6-HR      24-HR      72-HR      14.95-HR
6803.51        7.65             6803.48   6800.68   6800.68   6800.68

CUMULATIVE AREA = 0.14 SQ MI

*********************************
*    *                        *
* 528 KK * RR-DFS *           *
*    *                        *
*********************************

542 KO
OUTPUT CONTROL VARIABLES
  IPRINT          3 PRINT CONTROL
  IPLT            1 PLOT CONTROL
  QSCAL           100. HYDROGRAPH PLOT SCALE

543 RS
STORAGE ROUTING
  NSTPS          1 NUMBER OF SUBREACHES
  ITP            1 TYPE OF INITIAL CONDITION
  RSVR           0.00 INITIAL CONDITION
  X              0.00 WORKING R AND D COEFFICIENT

544 SV
STORAGE        0.0   0.6   4.6   6.9    10.3

545 SE
ELEVATION      92.00  94.00  96.00  98.00  100.00

546 SQ
DISCHARGE      80.    126.   131.   137.   144.

*********************************
** HYDROGRAPH AT STATION RR-DFS **
### PEAK FLOW

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<tr>
<th>TIME (HR)</th>
<th>MAXIMUM AVERAGE FLOW</th>
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<td>92.</td>
<td>6-HR 24-HR 72-HR 14.95-HR</td>
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#### PEAK STORAGE

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<th>MAXIMUM AVERAGE STORAGE</th>
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</thead>
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#### PEAK STAGE

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<th>MAXIMUM AVERAGE STAGE</th>
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<td>92.50</td>
<td>6-HR 24-HR 72-HR 14.95-HR</td>
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</tbody>
</table>

CUMULATIVE AREA = 0.16 SQ MI

---

### 771 KK

* **RR-DF#1** *

---

### 784 KO

**OUTPUT CONTROL VARIABLES**

IPRINT 3 PRINT CONTROL
IPLT 1 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE

### HYDROGRAPH ROUTING DATA

#### 785 RS

**STORAGE ROUTING**

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<th>NSTPS</th>
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<tr>
<td>ITYP</td>
<td>STOR TYPE OF INITIAL CONDITION</td>
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<tr>
<td>RSVR</td>
<td>0.00 INITIAL CONDITION</td>
</tr>
<tr>
<td>X</td>
<td>0.00 WORKING R AND D COEFFICIENT</td>
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#### 786 SA

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<th>AREA</th>
<th>0.0 0.2 0.5 4.8 5.2 5.5 5.8 6.1 6.4 6.8</th>
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<tr>
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<td>7.1 7.3 7.5 7.7 7.9</td>
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#### 788 SE

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<tr>
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<tr>
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<td>72.00 73.00 74.00 75.00 76.00</td>
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#### 790 SQ

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<th>DISCHARGE</th>
<th>0.0 105.194.275.344.401.451.496.560.747.</th>
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<td>998.1142.1247.1750.2100.</td>
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### COMPUTED STORAGE-ELEVATION DATA

<table>
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<tr>
<th>STORAGE</th>
<th>0.00 0.06 0.38 4.93 14.99 25.74 37.09 49.05 61.62 74.83</th>
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<tr>
<td>ELEVATION</td>
<td>54.00 55.00 56.00 58.00 60.00 62.00 64.00 66.00 68.00 70.00</td>
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#### STORAGE

<table>
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<tr>
<th>ELEVATION</th>
<th>88.75 95.99 103.43 111.06 118.90</th>
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</thead>
<tbody>
<tr>
<td>ELEVATION</td>
<td>72.00 73.00 74.00 75.00 76.00</td>
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</table>
** WARNING ** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 0. TO 105.
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.)

---

HYDROGRAPH AT STATION RR-DF#1

<table>
<thead>
<tr>
<th>PEAK FLOW</th>
<th>TIME</th>
<th>MAXIMUM AVERAGE FLOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>(CFS)</td>
<td>(HR)</td>
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<tr>
<td>408.</td>
<td>8.20</td>
<td>6-HR 24-HR 72-HR 14.95-HR</td>
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<tr>
<td>(INCHES)</td>
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<td>0.949 1.434 1.434 1.434</td>
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<td>(AC-FT)</td>
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<td>224. 338. 338. 338.</td>
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</table>

<table>
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</thead>
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<td>(AC-FT)</td>
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<tr>
<td>47.</td>
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<table>
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<th>PEAK STAGE</th>
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<th>MAXIMUM AVERAGE STAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>(FEET)</td>
<td>(HR)</td>
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<tr>
<td>65.64</td>
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<td>64.11 59.24 59.24 59.24</td>
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</tbody>
</table>

CUMULATIVE AREA = 4.43 SQ MI

---

** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

**************
*             *
J33 KK  AP28  *
*             *
**************

838 KO
OUTPUT CONTROL VARIABLES
IPRINT = 3 PRINT CONTROL
IPLLOT = 1 PLOT CONTROL
QSCAL = 0. HYDROGRAPH PLOT SCALE

139 HC
HYDROGRAPH COMBINATION
ICOMP = 3 NUMBER OF HYDROGRAPHS TO COMBINE

---

** *** *** *** *** *** *** ***

HYDROGRAPH AT STATION AP28

<table>
<thead>
<tr>
<th>PEAK FLOW</th>
<th>TIME</th>
<th>MAXIMUM AVERAGE FLOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>(CFS)</td>
<td>(HR)</td>
<td></td>
</tr>
<tr>
<td>633.</td>
<td>6.05</td>
<td>6-HR 24-HR 72-HR 14.95-HR</td>
</tr>
<tr>
<td>(INCHES)</td>
<td></td>
<td>0.966 1.453 1.453 1.453</td>
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<tr>
<td>(AC-FT)</td>
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<td>236. 355. 355. 355.</td>
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CUMULATIVE AREA = 4.58 SQ MI
### Runoff Summary

**Flow in Cubic Feet per Second**

**Time in Hours, Area in Square Miles**

<table>
<thead>
<tr>
<th>Operation</th>
<th>Station</th>
<th>Peak Flow</th>
<th>Time of Peak</th>
<th>Average Flow for Maximum Period</th>
<th>Basin Area</th>
<th>Maximum Stage</th>
<th>Time of Max Stage</th>
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</thead>
<tbody>
<tr>
<td>Hydrograph At</td>
<td>SB-PN1</td>
<td>143.0</td>
<td>6.10</td>
<td>15.0</td>
<td>0.16</td>
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<tr>
<td>Hydrograph At</td>
<td>SB-PN2</td>
<td>120.0</td>
<td>6.10</td>
<td>13.0</td>
<td>0.15</td>
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</tr>
<tr>
<td>Routed To</td>
<td>RT-PN2</td>
<td>119.0</td>
<td>6.10</td>
<td>13.0</td>
<td>0.15</td>
<td></td>
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<tr>
<td>2 Combined At</td>
<td>AP1</td>
<td>262.0</td>
<td>6.10</td>
<td>28.0</td>
<td>0.31</td>
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<tr>
<td>Routed To</td>
<td>RT-AP1</td>
<td>259.0</td>
<td>6.10</td>
<td>28.0</td>
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<tr>
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<td>97.0</td>
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<td>39.0</td>
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<tr>
<td>Routed To</td>
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<td>6.10</td>
<td>39.0</td>
<td>0.40</td>
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<tr>
<td>Hydrograph At</td>
<td>SB-PN4</td>
<td>90.0</td>
<td>6.10</td>
<td>10.0</td>
<td>0.11</td>
<td></td>
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<tr>
<td>Routed To</td>
<td>RT-PN4</td>
<td>90.0</td>
<td>6.10</td>
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<td>AP3</td>
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<td>0.73</td>
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<td>6.45</td>
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<td>RT-DFFG</td>
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<td>6.50</td>
<td>87.0</td>
<td>0.73</td>
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<td>Hydrograph At</td>
<td>SB-PN8</td>
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<td>0.11</td>
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<tr>
<td>3 Combined At</td>
<td>APDFF</td>
<td>269.0</td>
<td>6.10</td>
<td>103.0</td>
<td>0.92</td>
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<tr>
<td>Routed To</td>
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<td>7.00</td>
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<td>7.05</td>
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<td>AP4</td>
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<td>SB-PN11</td>
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<td>6.</td>
<td>3.</td>
<td>3.</td>
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<tr>
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<td>4 Combined At</td>
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<td>307.</td>
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<td>7.70</td>
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<td>7.70</td>
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<td>0.03</td>
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<td>SB-PN15</td>
<td>39.</td>
<td>6.10</td>
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**CONTINUITY SUMMARY (AC-FT)** - INFLOW=0.7146E+01 EXCESS=0.0000E+00 OUTFLOW=0.7142E+01 BASIN STORAGE=0.5301E-02 PERCENT ERROR= 0.0

| RT-AP1 | MANE    | 1.49| 259.34| 367.15 | 0.93  | 3.00| 258.63| 366.00 | 0.93   |

**CONTINUITY SUMMARY (AC-FT)** - INFLOW=0.1557E+02 EXCESS=0.0000E+00 OUTFLOW=0.1555E+02 BASIN STORAGE=0.2347E-01 PERCENT ERROR= 0.0

| RT-AP2 | MANE    | 0.47| 354.83| 366.53 | 1.01  | 3.00| 352.76| 366.00 | 1.01   |

**CONTINUITY SUMMARY (AC-FT)** - INFLOW=0.2132E+02 EXCESS=0.0000E+00 OUTFLOW=0.2131E+02 BASIN STORAGE=0.9832E-02 PERCENT ERROR= 0.0

| RT-PN4 | MANE    | 0.69| 89.89 | 366.54 | 0.87  | 3.00| 89.82 | 366.00 | 0.87   |

**CONTINUITY SUMMARY (AC-FT)** - INFLOW=0.5312E+01 EXCESS=0.0000E+00 OUTFLOW=0.5308E+01 BASIN STORAGE=0.3826E-02 PERCENT ERROR= 0.0

| RT-AP3 | MANE    | 0.58| 529.45| 366.28 | 1.02  | 3.00| 527.53| 366.00 | 1.02   |

**CONTINUITY SUMMARY (AC-FT)** - INFLOW=0.3189E+02 EXCESS=0.0000E+00 OUTFLOW=0.3188E+02 BASIN STORAGE=0.1805E-01 PERCENT ERROR= 0.0

| RT-DFF | MANE    | 3.00| 165.38| 390.00 | 1.22  | 3.00| 165.38| 390.00 | 1.22   |

**CONTINUITY SUMMARY (AC-FT)** - INFLOW=0.4759E+02 EXCESS=0.0000E+00 OUTFLOW=0.4742E+02 BASIN STORAGE=0.2226E+00 PERCENT ERROR= -0.1

| RT-DFF | MANE    | 3.00| 170.34| 423.00 | 1.15  | 3.00| 170.34| 423.00 | 1.15   |

**CONTINUITY SUMMARY (AC-FT)** - INFLOW=0.5642E+02 EXCESS=0.0000E+00 OUTFLOW=0.5649E+02 BASIN STORAGE=-.6064E-01 PERCENT ERROR= 0.0

| RT-AP4 | MANE    | 1.05| 179.45| 370.65 | 1.11  | 3.00| 179.16| 372.00 | 1.11   |

**CONTINUITY SUMMARY (AC-FT)** - INFLOW=0.5899E+02 EXCESS=0.0000E+00 OUTFLOW=0.5903E+02 BASIN STORAGE=-.3669E-01 PERCENT ERROR= 0.0

<p>| RT-DFF | MANE    | 1.26| 177.35| 463.15 | 1.02  | 3.00| 177.35| 462.00 | 1.02   |</p>
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### Continuity Summary (AC-F1) - Inflow=0.1927E+03 Excess=0.0000E+00 Outflow=0.1923E+03 Basin Storage=0.4095E+00 Percent Error= 0.0

| RT-F1P MANE | 0.98  | 88.15 | 366.75 | 0.86 | 3.00  | 86.90  | 366.00 | 0.86 |

### Continuity Summary (AC-F1) - Inflow=0.5475E+01 Excess=0.0000E+00 Outflow=0.5471E+01 Basin Storage=0.5551E-02 Percent Error= 0.0

| RT-DFSF MANE | 0.45  | 91.34 | 373.05 | 11.74 | 3.00  | 90.80  | 372.00 | 11.75 |

### Continuity Summary (AC-F1) - Inflow=0.9901E+02 Excess=0.0000E+00 Outflow=0.9901E+02 Basin Storage=0.6495E-09 Percent Error= 0.0

| RT-AP22P MANE | 1.53  | 159.79 | 369.99 | 7.15  | 3.00  | 158.71 | 372.00 | 7.16  |

### Continuity Summary (AC-F1) - Inflow=0.1039E+03 Excess=0.0000E+00 Outflow=0.1039E+03 Basin Storage=0.3607E-02 Percent Error= 0.0

| RT-AP23P MANE | 1.12  | 193.03 | 369.58 | 6.41  | 3.00  | 193.01 | 369.00 | 6.42  |

### Continuity Summary (AC-F1) - Inflow=0.1061E+03 Excess=0.0000E+00 Outflow=0.1061E+03 Basin Storage=0.3787E-02 Percent Error= 0.0

| RT-AP24P MANE | 0.67  | 296.41 | 363.82 | 5.68  | 3.00  | 294.97 | 363.00 | 5.68  |

### Continuity Summary (AC-F1) - Inflow=0.1133E+03 Excess=0.0000E+00 Outflow=0.1133E+03 Basin Storage=0.3872E-02 Percent Error= 0.0

| RT-AP25P MANE | 0.97  | 459.13 | 362.99 | 4.98  | 3.00  | 459.12 | 363.00 | 4.98  |

### Continuity Summary (AC-F1) - Inflow=0.1233E+03 Excess=0.0000E+00 Outflow=0.1233E+03 Basin Storage=0.9228E-02 Percent Error= 0.0

| RT-AP26 MANE  | 3.00  | 487.92 | 495.00 | 1.43  | 3.00  | 487.92 | 495.00 | 1.43  |

### Continuity Summary (AC-F1) - Inflow=0.3388E+03 Excess=0.0000E+00 Outflow=0.3376E+03 Basin Storage=0.1373E+01 Percent Error= -0.1

| RT-PN10 MANE  | 0.82  | 98.84  | 361.40 | 2.36  | 3.00  | 98.36  | 360.00 | 2.36  |

### Continuity Summary (AC-F1) - Inflow=0.6049E+01 Excess=0.0000E+00 Outflow=0.6047E+01 Basin Storage=0.3163E-02 Percent Error= 0.0

---

*** Normal end of HEC-1 ***
HEC-1 MODEL OUTPUT
FULLY DEVELOPED CONDITION
• 100-YEAR STORM
FLOOD HYDROGRAPH PACKAGE (HEC-1) * MAY 1991 * VERSION 4.0.1E *
RUN DATE 08/05/1998 TIME 17:34:42 *

X X XXXXX XXXXX X
X X X XX X XX
X X X XX X
XXXXXX XXXX X XXXXX X
X X X X X
X X X X X
X X XXXXX XXXXX XXX

37 Brookside Road * Waterbury, Connecticut 06708 * (203) 755-1666

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1QS, HEC1DB, AND HEC1KW.

ID PINE CREEK DRAINAGE BASIN - 24HR, FULL DEVELOPED CONDITION (TYPE IIa100 YEAR)
ID FILE:PCDBP5D.DAT
ID FULLY DEVELOPED CONDITION MODEL
ID 998 REVISION, LAST MODEL REVISION DATE: 8/5/98
ID CN VALUES HAVE BEEN ADJUSTED TO PRODUCE PEAK 100 YEAR FLOW RATES SIMILAR TO
ID 100 YEAR FLOW RATES PRODUCED BY RATIONAL METHOD.
ID ************************************************************************************
ID BEGIN CALCULATIONS IN THE PINE CREEK NORTH FORK WATERSHED
ID ************************************************************************************

*** FREE ***

*DIAGRAM
IT 3 0 0 300
IO 5

KK SB-PN1
KM COMPUTE HYDROGRAPH FOR BASIN PN1
BA .164
IN 15
PB 4.4
PC 0000 .0005 .0015 .0030 .0045 .0060 .0080 .0100 .0120 .0143
PC .0165 .0188 .0210 .0233 .0255 .0278 .0300 .0320 .0340 .0360
PC .0390 .0460 .0530
PC .0600 .0750 .1000 .4000 .7000 .7250 .7500 .7650 .7800 .7900
PC .8000 .8100 .8200 .8250 .8300 .8350 .8400 .8450 .8500 .8550
PC .8600 .8638 .8675 .8713 .8750 .8788 .8825 .8863 .8900 .8938
PC .8975 .9013 .9050 .9083 .9115 .9148 .9180 .9210 .9240 .9270
PC .9300 .9325 .9350 .9375 .9400 .9425 .9450 .9475 .9500 .9525
PC .9550 .9575 .9600 .9625 .9650 .9675 .9700 .9725 .9750 .9775
PC .9800 .9813 .9825 .9838 .9850 .9863 .9875 .9888 .9900 .9913
PC .9925 .9938 .9950 .9963 .9975 .9988 1.000
LS 0 80.2
UD .188

KK SB-PN2
KM COMPUTE HYDROGRAPH FOR BASIN PN2
BA .169
LS 0 79
UD .192

KK RT-PN2
KM ROUTE FLOW FROM PN2 TO AP1
RD 1000 .03 .013 CIRC 4.5

KK AP1
KM COMBINE THE FLOW FROM BASIN PN1 TO THE ROUTED FLOW FROM BASIN PN2 AT AP1
HC 2

KK RT-AP1
KM ROUTE AP1 TO AP2
RD 2600 .033 .013 CIRC 6
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<td>RD 1100 .025 0.013 CIRC 8.5</td>
</tr>
<tr>
<td>73</td>
<td>KK SB-PN6</td>
</tr>
<tr>
<td>74</td>
<td>KM COMPUTE HYDROGRAPH FOR BASIN PN6</td>
</tr>
<tr>
<td>75</td>
<td>BA .146</td>
</tr>
<tr>
<td>76</td>
<td>LS 0 95.0</td>
</tr>
<tr>
<td>77</td>
<td>UD .127</td>
</tr>
<tr>
<td>78</td>
<td>KK APDFG</td>
</tr>
<tr>
<td>79</td>
<td>KM COMBINE ROUTED FLOW FROM AP3 WITH FLOW FROM BASIN PN6 AT REGIONAL DETENITION</td>
</tr>
<tr>
<td>80</td>
<td>KM FACILITY &quot;G&quot;</td>
</tr>
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<td>81</td>
<td>HC 2</td>
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HFR-1 INPUT

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

82

KM RR-DFFG

83

KM ROUTE FLOW THROUGH A REGIONAL DETENTION FACILITY. ASSUME A 48" DIA OUTLET

84

KM WITH INVERT AT EL. 59. OUTLET Q ESTIMATED WITH BUREAU OF PUBLIC ROADS

85

KM NOMOGRAM FOR INLET CONTROL OF CULVERTS. VOLUME BASED ON CONCEPTUAL

86

KM GRADING PLAN.

87

KD 3 1

88

RS 1 STOR 0

89

SV 0 0 1 2.0 8.0 14.1 20.9 28.4 36.6 45.5 55.1

90

SV 65.3 76.3 88.2

91

SE 59 60 62 64 66 68 70 72 74 76

92

SE 78 80 82

93

SQ 0 0 47 93 130 160 180 203 222 240

94

SQ 262 280 295

95

KM RT-DFF

96

KM ROUTE THE FLOW IN PINE CREEK MAIN CHANNEL DOWN THE CHANNEL FROM POWERS BLVD.

97

KM 1800 FEET WEST TO DETENTION FACILITY "F"

98

RD 1800 .023 .045 TRAP 15 3

99

KM SB-PN7

100

KM COMPUTE HYDROGRAPH FOR BASIN PN7

101

BA .078

102

LS 0 74.6

103

UD .165

104

KM SB-PN8

105

KM COMPUTE HYDROGRAPH FOR BASIN PN8

106

BA .113

107

LS 0 80.9

108

UD .176

109

KM APDFF

110

KM COMBINE ROUTED FLOW RT-DFF AND FLOW FROM BASINS PN7 AND PN8 AT REGIONAL

111

KM DETENTION FACILITY "F"

112

HC 3

113

KM RR-DFF

114

KM ROUTE FLOW THRU A REGIONAL DETENTION FACILITY. ASSUME A 48 DIA OUTLET WITH

115

KM THE INVERT DEPRESSED 2' BELOW POND INVERT. OUTLET Q ESTIMATED WITH BUREAU

116

KM OF PUBLIC ROADS NOMOGRAM FOR INLET CONTROL OF CULVERTS

117

KD 3 1

118

RS 1 STOR 0

119

SV 0 0 0 0.1 0.7 1.5 4.4 7.8 11.7 16.1 21.0

120

SV 26.4

121

SE 90 92 94 96 98 100 102 104 106 108

122

SE 110

123

SQ 0 22 70 112 143 170 190 210 230 250

124

SQ 265
HEC-1 INPUT

LINE

125  KK  RT-DF
126  KM  ROUTE THE FLOW IN PINE CREEK MAIN CHANNEL DOWN THE CHANNEL FROM DETENTION
127  KM  FACILITY "F" AT THE COLLECTOR STREET CROSSING TO AP-4 AT THE WEST SIDE OF
128  KM  BASINS PN9 AND PN10
129  RD  1600  .02  .045  TRAP  20  3

130  KK  SB-PN9
131  KM  COMPUTE HYDROGRAPH FOR BASIN PN9
132  BA  .036
133  LS  0  72.8
134  UD  .170

135  KK  SB-PN10
136  KM  COMPUTE HYDROGRAPH FOR BASIN PN10
137  BA  .043
138  LS  0  72.7
139  UD  .141

140  KK  AP4
141  KM  COMBINE ROUTED FLOW RT-DF WITH FLOW FROM BASINS PN9 AND PN10
142  HC  3

143  KK  RT-AP4
144  KM  ROUTE THE FLOW IN PINE CREEK MAIN CHANNEL DOWN THE CHANNEL FROM AP4
145  KM  TO DETENTION FACILITY "E" AT THE COLLECTOR STREET CROSSING
146  RD  1400  .032  .045  TRAP  20  3

147  KK  SB-PN11
148  KM  COMPUTE HYDROGRAPH FOR BASIN PN11
149  BA  .079
150  LS  0  76.7
151  UD  .189

152  KK  SB-PN12
153  KM  COMPUTE HYDROGRAPH FOR BASIN PN12
154  BA  .039
155  LS  0  68.2
156  UD  .129

157  KK  SB-PN13
158  KM  COMPUTE HYDROGRAPH FOR BASIN PN13
159  BA  .127
160  LS  0  74
161  UD  .195

162  KK  APDFE
163  KM  COMBINE ROUTED FLOW RT-AP4 WITH FLOW FROM BASINS PN11, PN12, AND PN13
164  KM  AT REGIONAL DETENTION FACILITY "E"
165  HC  4
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<tr>
<td>166</td>
<td>KK RR-DFE</td>
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<tr>
<td>167</td>
<td>KM NOTE: THE INPUT POND VOLUME REFLECTS THE DESIGN POND VOLUME ON 7-23-98</td>
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<td>168</td>
<td>KM ROUTE FLOW THRU A DETENTION FACILITY. ASSUME A 54&quot; DIA OUTLET WITH</td>
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<td>169</td>
<td>KM THE INVERT DEPRESSED 2' BELOW POND INVERT (INV EL=84. OUTLET Q ESTIMATED</td>
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<td>170</td>
<td>KM WITH BUREAU OF PUBLIC ROADS NOMOGRAPH FOR INLET CONTROL OF CULVERTS</td>
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<tr>
<td>171</td>
<td>KM DISCHARGE ABOVE EL 100.3 INCLUDES FLOW OVER EMERGENCY SPILLWAY</td>
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<td>172</td>
<td>KM SCALE 1</td>
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<tr>
<td>173</td>
<td>KD 3 1</td>
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<tr>
<td>174</td>
<td>RS 1 STOR 0</td>
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<tr>
<td>175</td>
<td>SV 0 0 1.25 3.91 6.93 10.31 14.07 18.24 22.83 27.87</td>
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<td>176</td>
<td>SE 784 786 788 790 792 794 796 798 800 802</td>
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<tr>
<td>177</td>
<td>SQ 0 25 80 136 173 210 240 263 280 1431</td>
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<td>178</td>
<td>KK RT-DFE</td>
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<tr>
<td>179</td>
<td>KM ROUTE THE OUTFLOW FROM DETENTION FACILITY &quot;E&quot; IN A STORM DRAIN TO AP-5</td>
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<td>180</td>
<td>RD 1800 .025 .013 CIRC 4.5</td>
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<td>KM COMPUTE HYDROGRAPH FOR BASIN PN14</td>
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<td>BA .027</td>
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<td>186</td>
<td>KK RT-PN14</td>
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<td>187</td>
<td>KM ROUTE FLOW FROM BASIN PN14 IN A STORM DRAIN TO AP5</td>
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<tr>
<td>188</td>
<td>RD 1400 .055 .013 CIRC 2</td>
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<tr>
<td>189</td>
<td>KK SB-PN15</td>
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<td>190</td>
<td>KM COMPUTE HYDROGRAPH FOR BASIN PN15</td>
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<td>191</td>
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<td>LS 0 72.7</td>
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<td>193</td>
<td>UD .186</td>
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<td>194</td>
<td>KK AP5</td>
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<tr>
<td>195</td>
<td>KM COMBINE ROUTED FLOW RT-PN14 TO FLOW FROM BASIN PN15</td>
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<tr>
<td>196</td>
<td>RC 3</td>
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<tr>
<td>197</td>
<td>KK RT-AP5</td>
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<tr>
<td>198</td>
<td>KM ROUTE THE FLOW AT AP5 TO AP5A AT THE CONFLUENCE OF THE FLOWS FROM THE</td>
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<tr>
<td>199</td>
<td>KM NORTH AND SOUTH FORKS OF PINE CREEK</td>
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<td>200</td>
<td>RD 400 .025 .013 CIRC 5</td>
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<td>201</td>
<td>KM ***************************************************************************************************</td>
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<td>202</td>
<td>KM **** BEGIN CALCULATIONS FOR THE SOUTH FORK OF PINE CREEK WATERSHIP ****</td>
</tr>
<tr>
<td>203</td>
<td>KM ***************************************************************************************************</td>
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<td>KK SB-PS1</td>
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<tr>
<td>205</td>
<td>KM COMPUTE HYDROGRAPH FOR BASIN PS1</td>
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<tr>
<td>206</td>
<td>BA .150</td>
</tr>
<tr>
<td>207</td>
<td>LS 0 78.4</td>
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<tr>
<td>208</td>
<td>UD .205</td>
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</tbody>
</table>
HEC-1 INPUT

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

209    KK RT-PS1
210    KM ROUTE FLOW FROM BASIN PS1 TO REGIONAL DETENTION FACILITY “G”
211    RD  2100 .03 .013 CIRC 4.5

212    KK SB-PS2
213    KM COMPUTE HYDROGRAPH FOR BASIN PS2
214    BA   .154
215    LS   0  85.2
216    UD   .188

217    KK SB-PS3
218    KM COMPUTE HYDROGRAPH FOR BASIN PS3
219    BA   .162
220    LS   0  84.8
221    UD   .205

222    KK APDFD
223    KM COMBINE ROUTED FLOW RT-PS1 TO FLOW FROM BASINS PS2 AND PS3
224    HC    3

225    KK RR-DFD
226    KM ROUTE FLOW THRU A DETENTION FACILITY
227    KM ASSUME BOTTOM TO BE 240' WIDE X 590' LONG W 4:1 SIDE SLOPES
228    KM ASSUME A 36 DIA OUTLET WITH INVERT AT POND INVERT.
229    KM OUTLET Q ESTIMATED WITH ORIFICE EQUATION ASSUMING C=0.50
230    KM AND DOWNTHEM STREET DRAIN IN NON PRESSURE FLOW
231    RS    1 STOR 0
232    KO    3 1
233    SV    0  6.8 14.3 22.4 31.1 40.6 50.8 61.8
234    SE   100  102  104  106  108  110  112  114
235    SQ    0  18  54  72  87  99  110  120

236    KK RT-DFD
237    KM ROUTE FLOW FROM DFD TO AP-6 AT POWERS BLVD.
238    RD  1000 .025 .013 CIRC 3

239    KK SB-PS4
240    KM COMPUTE HYDROGRAPH FOR BASIN PS4
241    BA   .054
242    LS   0  93.2
243    UD   .134

244    KK SB-PS5
245    KM COMPUTE HYDROGRAPH FOR BASIN PS5
246    BA   .066
247    LS   0  98.0
248    UD   .135

249    KK AP6
250    KM COMBINE ROUTED FLOW RT-DFD WITH FLOW FROM BASINS PS4 AND PS5
251    HC    3
HEC-1 INPUT

252  KK  RT-AP6
253  KM  ROUTE FLOW FROM AP6 TO AP7 AT THE BRIARGATE BLVD./ AUSTIN BLUFFS PKWY.
254  KM  INTERSECTION
255  RD  2000 .025 .013  CIRC  5.5

256  KK  SB-PS6
257  KM  COMPUTE HYDROGRAPH FOR BASIN PS6
258  BA  .075
259  LS  0  86.5
260  UD  .123

261  KK  AP-7
262  KM  COMBINE ROUTED FLOW RT-AP6 TO FLOW FROM BASIN PS6
263  HC  2

264  KK  SB-PS7
265  KM  COMPUTE HYDROGRAPH FOR BASIN PS7
266  BA  .089
267  LS  0  98.0
268  UD  .119

269  KK  AP7A
270  KM  COMBINE FLOW AT AP-7 TO FLOW FROM BASIN PS7
271  HC  2

272  KK  RT-AP7A
273  KM  ROUTE FLOW FROM AP7A TO AP8 AT THE BRIARGATE PARKWAY AND UNION BLVD.
274  KM  INTERSECTION
275  RD  2100 .017 .013  CIRC  7.5

276  KK  SB-PS8
277  KM  COMPUTE HYDROGRAPH FOR BASIN PS8
278  BA  .122
279  LS  0  86.0
280  UD  .127

281  KK  AP8
282  KM  COMBINE ROUTED FLOW RT-AP7 TO FLOW FROM BASIN PS8 AT AP8
283  HC  2

284  KK  SB-PS9
285  KM  COMPUTE HYDROGRAPH FOR BASIN PS9
286  BA  .128
287  LS  0  95.3
288  UD  .130

289  KK  AP9
290  KM  COMBINE FLOW AT AP-8 TO FLOW FROM BASIN PS9 AT AP9
291  HC  2
HEC-1 INPUT

LINE

292  KK SB-P510
293  KM  COMPUTE HYDROGRAPH FOR BASIN PS10
294  BA  .038
295  LS  0  72.9
296  UD  .160

297  KK APDFC
298  KM  COMBINE FLOW AT AP-9 TO FLOW FROM SB-PS10 IN REGIONAL DETENTION FACILITY "C"
299  KM  THIS IS THE TOTAL INFLOW TO DETENTION FACILITY "C"
300  HC  2

301  KK RR-DFC
302  KM  ROUTE FLOW THRU A DETENTION FACILITY.  ASSUME A 48 DIA OUTLET WITH THE
303  KM  INVERT AT EL 62.  OUTLET Q ESTIMATED WITH BUREAU OF PUBLIC ROADS NOMOGRAPH
304  KM  FOR INLET CONTROL OF CULVERTS, SCALE 1.
305  KO  3  1
306  RS  1  STOR  0
307  SV  0  2.73  9.72  18.56  28.03  38.15  48.95  60.45  72.75  85.85
308  SV  99.66
309  SE  62  64  66  68  70  72  74  76  78  80
310  SE  82
311  SQ  0  23  70  110  140  168  190  215  232  245
312  SQ  258

313  KK RT-DFC
314  KM  ROUTE OUTFLOW FROM POND "C" WEST DOWN A STORM DRAIN IN BRIARGATE PKWY.
315  KM  TO AP10 AT DETENTION FACILITY "B"
316  RD  2600  .035  .013  CIRC  4

317  KK SB-P511
318  KM  COMPUTE HYDROGRAPH FOR BASIN PS11
319  BA  .056
320  LS  0  80.3
321  UD  .172

322  KK AP10
323  KM  COMBINE ROUTED FLOW RT-DFC TO FLOW FROM SB-PS11
324  HC  2

325  KK SB-PS12
326  KM  COMPUTE HYDROGRAPH FOR BASIN PS12
327  BA  .153
328  LS  0  69.0
329  UD  .233

330  KK APDFB
331  KM  COMBINE FLOW AT AP10 TO FLOW FROM BASIN PS12
332  HC  2
HEC-1 INPUT

LINE

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

333
334  KK  RR-DFB
335  KM  ROUTE FLOW THROUGH REGIONAL DETENTION POND "B"
336  KM  THIS VOLUME REFLECTS THE DESIGN VOLUME PER PRELIMINARY PLANS ON 7-23-98
337  KM  WITH 54' DIA OUTLET SET AT INVERT ELEV. 70.2. OUTLET Q ESTIMATED WITH
338  KM  BUREAU OF PUBLIC ROADS NOMO GRAPH FOR INLET CONTROL OF CONCRETE PIPE
339  KM  DISCHARGE ABOVE 87.6 INCLUDES FLOW OVER 80' LONG EMERGENCY SPILLWAY
340  KM  SCALE 1
341  KO  3  1
342  RS  1  STOR  0
343  SV  0  0.06  1.17  3.30  5.82  8.73  12.07  15.85  20.07  23.60
344  SV  24.76  29.96
345  SE  71.2  72.0  74  76  78  80  82  84  86  87.6
346  SE  88  90
347  SQ  0  22  73  130  169  202  236  260  285  301
348  SQ  371  1222

349  KK  RT-DFB
350  KM  ROUTE FLOW 1000 LF NORTHWEST IN A STORM DRAIN FROM DETENTION FACILITY "B"
351  KM  TO AP-11
352  RD  1000  .021  .013  CIRC  4.5

353  KK  SB-PS13
354  KM  COMPUTE HYDROGRAPH FOR BASIN PS13
355  BA  .065
356  LS  0  74.1
357  UD  .169

358  KK  AP11
359  KM  COMBINE ROUTED FLOW RT-DFB TO FLOW FROM BASIN PS13 AT AP11
360  HC  2

361  KK  RT-AP11
362  KM  ROUTE FLOW 600 LF NORTHWEST IN A STORM DRAIN FROM AP11 TO AP5A (THE
363  KM  CONFLUENCE OF FLOWS FROM THE NORTH AND SOUTH FORKS OF PINE CREEK)
364  RD  600  .021  .013  CIRC  5

365  KK  AP5A
366  KM  COMBINE ROUTED FLOW AP5 (FLOW FROM THE NORTH FORK OF PINE CREEK) TO ROUTED
367  KM  FLOW RT-AP11 (FLOW FROM THE SOUTH FORK OF PINE CREEK)
368  HC  2

369  KK  RT-AP5A
370  KM  ROUTE THE FLOW IN PINE CREEK MAIN CHANNEL 1300 FEET DOWN THE CHANNEL FROM
371  KM  AP5A NEAR THE HISTORIC CONFLUENCE OF PINE CREEK TO AP12 AT THE CONFLUENCE
372  KM  OF THE MAIN CHANNEL AND THE LEXINGTON DRIVE STORM DRAIN OUTFALL. USE AN
373  KM  APPROXIMATE AVERAGE CHANNEL SECTION AND SLOPE FOR ROUTING.
374  RD  1300  .023  .045  TRAP  50  2

375  KK  SB-PM1
376  KM  COMPUTE HYDROGRAPH FOR BASIN PM1
377  BA  .054
378  LS  0  78.5
379  UD  .203
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<tr>
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<td>ROUTE THE FLOW FROM BASIN PM1 1200 LF NORTH IN THE LEXINGTON DR. S.D. TO</td>
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<td>381</td>
<td>KM</td>
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<td>AND THE FLOW FROM BASINS PM2 AND PM3</td>
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<tr>
<td>397</td>
<td>KK</td>
<td>RT-AP12</td>
<td></td>
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<tr>
<td>398</td>
<td>KM</td>
<td>ROUTE THE FLOW IN PINE CREEK MAIN CHANNEL DOWN THE CHANNEL FROM AP12 NEAR THE</td>
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<tr>
<td>399</td>
<td>KM</td>
<td>QUiFALL OF LEXINGTON DRIVE STORM DRAIN IT THE CROSSING AT CHAPEL HILLS DRIVE</td>
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<tr>
<td>400</td>
<td>KM</td>
<td>USE AN APPROXIMATE AVERAGE CHANNEL SECTION AND SLOPE FOR ROUTING.</td>
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<tr>
<td>401</td>
<td>RD</td>
<td>1600</td>
<td>0.018</td>
<td>0.045</td>
<td>TRAP</td>
<td>30</td>
<td>2</td>
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<tr>
<td>402</td>
<td>KK</td>
<td>SB-PM4</td>
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<tr>
<td>403</td>
<td>KM</td>
<td>COMPUTE HYDROGRAPH FOR BASIN PM4</td>
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<tr>
<td>404</td>
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<td>405</td>
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<td>407</td>
<td>KK</td>
<td>AP13</td>
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<tr>
<td>408</td>
<td>KM</td>
<td>COMBINE FLOW FROM BASIN PM4 TO THE ROUTED FLOW RT-AP12 IN PINE CREEK MAIN</td>
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<tr>
<td>409</td>
<td>KM</td>
<td>CHANNEL ON THE EAST SIDE OF THE CHAPEL HILLS DRIVE CROSSING</td>
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<td>411</td>
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<td>414</td>
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<td>COMPUTE HYDROGRAPH FOR BASIN CS1</td>
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<tr>
<td>416</td>
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<td>417</td>
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<td>418</td>
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<tr>
<td>419</td>
<td>KK</td>
<td>RT-CS1</td>
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<tr>
<td>420</td>
<td>KM</td>
<td>ROUTE FLOW 1300 LF WEST IN DYNAMIC DR. ASSUME BULK OF FLOW IS ON THE SURFACE</td>
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<tr>
<td>421</td>
<td>RD</td>
<td>1300</td>
<td>0.021</td>
<td>0.013</td>
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<td>32</td>
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HEC-1 INPUT

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

422      KK      SB-CS2
423      KM      COMPUTE HYDROGRAPH FOR BASIN CS1
424      BA      .070
425      LS      0      98.0
426      UD      .101

427      KXRK-DFCS2
428      KM      ROUTE FLOW THRU AN ASSUMED DETENTION FACILITY TO REFLECT DETENTION OF 1.6 cfs
429      KM      /ACRE FROM THE LI/O PROPERTY AS ASSUMED IN THE MMDP FOR BRIARGATE BUSINESS
430      KM      CAMPUS. BECAUSE THE DISCHARGE CONFIGURATION IS UNKNOWN AT THIS TIME ASSUME
431      KM      THAT THE PEAK DISCHARGE RATE MAY BE DISCHARGED AS SOON AS IT IS AVAILABLE AT
432      KM      THE POND TO REFLECT POTENTIAL FREE DISCHARGE FROM A PORTION OF THE SUBBASIN
433      KM      DISCHARGE REDUCTION ASSUMED AT 1.6 cfs x 37ac=60 cfs
434      RS      1      STOR      0
435      SV      0      .001      6      10
436      SE      100      102      104      106
437      SQ      0      194      194      194

438      KK      AP14
439      KM      COMBINE ROUTED FLOW RT-CS1 TO CONTROLLED FLOW FROM BASIN CS2 AT THE
440      KM      INTERSECTION OF CHAPEL HILLS DR. AND DYNAMIC DR.
441      HC      2

442      KK      RT-AP14
443      KM      ROUTE FLOW 1100 LF NORTH IN THE CHAPEL HILLS DR. S.D. TO BRIARGATE PKWY.
444      KM      NOTE: THE CALCULATED 100 YEAR FLOW IS IN EXCESS OF THE FULL PIPE CAPACITY
445      KM      OF THE STORM DRAIN BETWEEN DYNAMIC DRIVE AND BRIARGATE PARKWAY. SOME OF
446      KM      THE FLOW MAY BE ON THE SURFACE IN CHAPEL HILLS DRIVE.
447      RD      1100      .02      .013      CIR      4

448      KK      SB-CS3
449      KM      COMPUTE HYDROGRAPH FOR BASIN CH3
450      BA      .053
451      LS      0      84.8
452      UD      .177

453      KXRK-DFCS3
454      KM      ROUTE FLOW THRU AN ASSUMED DETENTION FACILITY TO REFLECT DETENTION REDUCING
455      KM      THE PEAK 100YR FLOW RATE FROM THE 9 ACRES OF THE BASIN THAT ARE DESIGNATED
456      KM      AS LI/O USE AS ASSUMED IN MMDP FOR BRIARGATE BUSINESS CAMPUS.
457      KM      BECAUSE THE DISCHARGE CONFIGURATION IS UNKNOWN AT THIS TIME ASSUME
458      KM      THAT THE PEAK DISCHARGE RATE MAY BE DISCHARGED AS SOON AS IT IS AVAILABLE
459      KM      AT THE POND TO REFLECT FREE DISCHARGE FROM A PORTION OF THE SUB BASIN.
460      KM      DISCHARGE REDUCTION ASSUMED AT 1.6 cfs x 9=14 cfs
461      RS      1      STOR      0
462      SV      0      .001      6      10
463      SE      100      102      104      106
464      SQ      0      123      123      123
465   KK  AP15
466   KM  COMBINE ROUTED FLOW RT-AP14 WITH CONTROLLED FLOW FROM BASIN CS3 AT THE
467   KM  INTERSECTION OF CHAPEL HILLS DR. AND BRIARGATE PARKWAY. NOTE A SMALL PORTION
468   KM  OF BASIN CS3 IS LOCATED DOWNSTEAM OF THIS POINT. FOR THIS MODELING PURPOSE
469   KM  THIS IS CONSIDERED INSIGNIFICANT.
470   HC  2
471   KK  RT-AP15
472   KM  ROUTE FLOW 1400 LF NORTH IN THE CHAPEL HILLS DR. S.D.
473   KM  NOTE: THE CALCULATED 100 YEAR FLOW IS IN EXCESS OF THE FULL PIPE CAPACITY
474   KM  OF THE STORM DRAIN BETWEEN BRIARGATE PARKWAY AND PINE CREEK. SOME OF
475   KM  THE FLOW MAY BE ON THE SURFACE IN CHAPEL HILLS DRIVE. A SMALL PORTION OF
476   KM  THE SURFACE FLOW MAY BE DIVERTED DOWN BRIARGATE PARKWAY, BUT FOR THE PURPOSE
477   KM  OF THIS ANALYSIS ALL OF THE FLOW FROM THE CHAPEL HILLS DRIVE/BRIARGATE PKY.
478   KM  INTERSECTION IS ASSUMED TO REACH PINE CREEK AT CHAPEL HILLS DRIVE.
479   RD  1400  .043  .013   CIR  4.5
480   KK  SB-CS4
481   KM  COMPUTE HYDROGRAPH FOR BASIN CS4
482   BA  .053
483   LS  0   95.5
484   UD  .101
485   KK  RR-DFVC
486   KM  ROUTE FLOW THRU THE PROPOSED VILLAGE CENTER DETENTION FACILITY
487   KM  POND GRADING PER THE PRELIMINARY GRADING SHOWN IN THE MDDP FOR VILLAGE
488   KM  CENTER. DISCHARGE ASSUMES USE OF THE EXISTING 18" DIAMETER STUB.
489   KM  WITH THE INVERT SET AT ELEVATION 73. BUREAU OF PUBLIC ROADS NOMOGRAPH
490   KM  USED TO ESTIMATE OUTFLOW RATES ASSUMING INLET CONTROL.
491   RS  1   STOR  0
492   SV  000  .032  1.67  3.23  5.00  7.00
493   SE  73  74  76  78  80  82
494   SQ  0   3  13 17 20 22
495   KK  AP16
496   KM  COMBINE ROUTED FLOW RT-AP15 WITH THE DISCHARGE FROM THE VILLAGE CENTER POND
497   HC  2
498   KK  RT-AP16
499   KM  ROUTE THE FLOW IN THE CHAPEL HILLS DRIVE STORM DRAIN FROM AP16 TO AP19 IN
500   KM  PINE CREEK MAIN CHANNEL ON THE DOWNSTREAM SIDE OF THE CHAPEL HILLS DRIVE
501   KM  CROSSING
502   RD  300  .03  .013   CIR  4.5
503   KM  *****************************************
504   KM  ***BEGIN CALCULATION OF THE NORTH CHAPEL HILLS DR. STORM DRAIN WATERSHED***
505   KM  *****************************************
506   KK  SB-CN1
507   KM  COMPUTE RUNOFF FROM BASIN CN1 THE WATERSHED CONTRIBUTING TO THE PARK SITE AT
508   KM  CHAPEL HILLS DRIVE POND (REGIONAL DETENTION FACILITY "A").
509   BA  .145
510   LS  0   76.8
511   UD  .190
LINE 10...11...12...13...14...15...16...17...18...19...20

512  KK  RR-DFA
513  KM  ROUTE THE FLOW FROM CN1 THROUGH THE PROPOSED DETENTION POND AT THE PARK
514  KM  SITE AT CHAPEL HILLS DRIVE. STAGE STORAGE CURVE PER THE 12/22/97 GRADING PLAN
515  KM  DISCHARGE CURVE REFLECTS 12" DIAMETER OUTLET PIPE CONTROL FOR NORMAL DISCHARG
516  KM  AND A 100' LONG EMERGENCY SPILLWAY SET AT ELEVATION 6805.5
517  X0  3  1
518  RS  1  STOR  0
519  SV  0  .01  .22  .99  1.95  2.80  4.25  5.31  6.51  11.64
520  SV  15.36
521  SQ  2.35  2.54  3.00  3.73  4.35  4.75  5.36  5.50  8.39  9.01
522  SQ  279
523  SE  6796.6  6797.0  6798.0  6800.0  6802.0  6803.5  6803.51  6804  6804.1  6805.5
524  SE  6806.5

525  KK  RT-DFA
526  KM  ROUTE OUTFLOW FROM REGIONAL DETENTION POND "A" DOWN THE CHAPEL HILLS STORM
527  KM  DRAIN FROM LEXINGTON DRIVE TO TREELAKE DRIVE
528  RD  930  .04  .013  CIRC  1.5

529  KK  SB-CN2
530  KM  COMPUTE RUNOFF FROM BASIN CN2
531  BA  .078
532  LS  0  75.5
533  UD  .214

534  KK  AP17
535  KM  COMBINE ROUTED FLOW RT-DFA AND FLOW FROM BASIN CN2 AT THE INTERSECTION OF
536  KM  CHAPEL HILLS DRIVE AND TREELAKE DRIVE
537  HC  2

538  KK  RT-AP17
539  KM  ROUTE FLOW AT AP17 DOWN THE CHAPEL HILLS DRIVE STORM DRAIN TO MULLIGAN DR.
540  RD  1400  .05  .013  CIRC  3.5

541  KK  SB-CN3
542  KM  COMPUTE RUNOFF FROM BASIN CN3
543  BA  .043
544  LS  0  80.0
545  UD  .157

546  KK  AP18
547  KM  COMBINE ROUTED FLOW RT-AP17 TO FLOW FROM BASIN CN3 AT INTERSECTION OF CHAPEL
548  KM  HILLS DR. AND MULLIGAN DR.
549  HC  2

550  KK  RT-AP18
551  KM  ROUTE FLOW AT AP18 DOWN THE CHAPEL HILLS DRIVE STORM DRAIN TO AP19 IN THE
552  KM  PINE CREEK MAIN CHANNEL ON THE DOWNSTREAM SIDE OF THE CHAPEL HILLS DRIVE
553  KM  CROSSING. NOTE A SMALL PORTION OF BASIN CN3 IS LOCATED SOUTH OF AP18. THIS
554  KM  IS CONSIDERED INSIGNIFICANT FOR THE PURPOSE OF THIS ANALYSIS.
555  RD  600  .04  .013  CIRC  3.5
ID........1........2........3........4........5........6........7........8........9........10

556  KK  AP19
557  KM  COMBINE ROUTED FLOW RT-AP18 FROM THE NORTH CHAPEL HILLS DR. STORM DRAIN
558  KM  WITH THE ROUTED FLOW RT-AP16 FROM THE SOUTH CHAPEL HILLS DRIVE STORM DRAIN
559  KM  AND THE FLOW IN PINE CREEK MAIN CHANNEL (AP13) AT THE WEST SIDE OF THE CHAPEL
560  KM  HILLS DRIVE CROSSING. FLOW THAT IS TAKEN INTO THE PINE CREEK CHANNEL FORM THE
561  KM  STREET AT THIS POINT HAS BEEN ACCOUNTED FOR IN BASINS CN3 AND CS3. THIS WAS
562  KM  DONE TO REDUCE THE COMPLEXITY OF THE MODEL.
563  HC  3

564  KK RT-AP19
565  KM  ROUTE THE FLOW IN PINE CREEK MAIN CHANNEL FROM AP19 AT THE CHAPEL HILLS DRIVE
566  KM  CROSSING TO AP20 AT REGIONAL DETENTION FACILITY 1 AT BRIARGATE PARKWAY AND
567  KM  HIGHWAY 83. USE AVERAGE SLOPES AND APPROXIMATE CROSS SECTIONS FOR ROUTING.
568  RD   750  .035  .045  TRAP   30  2
569  RD   1000  .025  .045  TRAP   120  2
570  RD   1400  .026  .045  TRAP   60  2

571  KK SB-PN5
572  KM  COMPUTE HYDROGRAPH FOR BASIN PN5
573  BA  .183
574  LS   0  70.0
575  UD  .185

576  KK AP20
577  */*  KM  COMBINE FLOW FROM BASIN PM5 WITH THE ROUTED FLOW IN PINE CREEK
578  HC  2

579  KK SB-PN6
580  KM  COMPUTE HYDROGRAPH FOR PM6 THE AREA BETWEEN CHAPEL HILLS DR. AND DETENTION
581  KM  FACILITY 1 BOUNDED BY THE GOLF COURSE AND BRIARGATE PARKWAY. NOTE: THE MDDP
582  KM  FOR BRIARGATE BUSINESS CAMPUS REQUIRES DETENTION IN THIS SUBBASIN. FOR THE
583  KM  PURPOSE OF THIS ANALYSIS NO DETENTION IS ASSUMED TO ALLOW THE DEVELOPER THE
584  KM  OPTION OF CONSTRUCTING LARGER CONVEYANCE FACILITIES TO DETENTION FACILITY
585  KM  NO. 1 AND ALLOWING FREE DISCHARGE FROM THE BASIN.
586  BA  .088
587  LS   0   98
588  UD  .110

589  KK AP21
590  KM  COMBINE FLOW FROM PM6 WITH THE FLOW IN PINE CREEK AT AP21 FOR THE TOTAL FLOW
591  KM  IN PINE CREEK CHANNEL AS IT ENTERS DETENTION FACILITY NO 1
592  HC  2

593  KK SB-PN7
594  KM  COMPUTE HYDROGRAPH FOR BASIN PM7 THE AREA NORTH OF DETENTION FACILITY 1
595  KM  NOTE: THE MDDP FOR THE BRIARGATE BUSINESS CAMPUS REQUIRES DETENTION IN
596  KM  THE NON RESIDENTIAL PORTIONS OF THIS AREA. FOR THE PURPOSE OF THIS ANALYSIS
597  KM  FREE DISCHARGE FROM THE BASIN IS ASSUMED. THE RESIDENTIAL PORTION OF THE
598  KM  BASIN LOCATED IN OUTSIDE THE CITY LIMITS IS ASSUMED TO BE FULLY DEVELOPED
599  KM  AS 1 DU PER ACRE RESIDENTIAL.
600  BA  .138
601  LS   0   76.3
602  UD  .353
603  KM  *******************************************************
HEC-1 INPUT

**BEGIN CALCULATIONS FOR THE FOCUS ON THE FAMILY STORM DRAIN WATERSHED**

**SB-F1**
**COMPUTE HYDROGRAPH FOR BASIN F1**

**BA** .119

**LS** 0  78.3

**UD** .208

**F1P**
**DIVERT FLOW IN EXCESS OF THE DOWNSTREAM STORM DRAIN CAPACITY ASSUMING**
**FULL PIPE FLOW IN 36" DIA @3.44% FROM THE SAG POINT IN LEXINGTON DRIVE.**
**FULL FLOW CAPACITY= 123cfs**

**DT** F1S

**DI** 123 150 200 250

**DQ** 0 27 77 127

**RT-F1P**
**ROUTE FLOW IN THE STORM DRAIN 1300 LF WEST FROM THE SAG PT. IN LEXINGTON**
**DRIVE TO SUMMER FIELD POND**

**RD** 1300 .036 .013  CIRC  3

**SB-F2**
**COMPUTE HYDROGRAPH FOR BASIN F2**

**BA** .039

**LS** 0  74

**UD** .171

**F1S**
**RETRIEVE FLOW THAT WILL NOT FIT IN THE STORM DRAIN AT LEXINGTON DRIVE**

**RT-F1S**
**ROUTE THE EXCESS FLOW THAT IS ON THE SURFACE OF LEXINGTON DRIVE AT THE SAG**
**POINT OVERLAND IN A GRASS LINED SWALE TO THE SUMMERFIELD DETENTION BASIN**

**RD** 1300 .037 .040  TRAP  15  6

**AP-DFSF**
**COMBINE ROUTED FLOWS RT-F1S AND RT-F1P WITH FLOW FROM F2 AT THE SUMMER**
**FIELD POND. THIS IS THE TOTAL FLOW TO THE POND**

**HC** 3

**RR-DFSF**
**ROUTE THE FLOW AT AP-DFSF THROUGH THE SUMMER FIELD DETENTION BASIN.**
**THE INFLOW/OUTFLOW S.D. FOR THIS FACILITY IS BURIED BELOW THE POND BOTTOM.**
**THE POND FILLS WHEN THE CAPACITY OF THE DOWNSTREAM REACH OF S.D. IS**
**EXCEEDED. THIS CONFIGURATION PRESENTS A COMPLEX HYDRAULIC PROBLEM. IT IS**
**ASSUMED THAT UNTIL INFLOW >120cfs FLOW WILL PASS THROUGH THE STORM DRAIN.**
**WHEN INFLOW > 120cfs BACKWATER WILL FORM AT THE OUTLET AND THE Lid ON THE**
**UPSTREAM MANHOLE WILL LIKELY BE LIFTED OFF AND SOME FLOW WILL ENTER THE POND**
**FROM THAT POINT. WHEN INFLOW>120cfs IT IS ASSUMED THAT THE HEAD LOSS AT**
**THE OUTLET WILL BE APPROXIMATELY 1*VELOCITY HEAD FOR THE PURPOSE OF**
**CALCULATING THE DISCHARGE CURVE.**

**KO** 3  1

**RS** 1  STOR  0
HEC-1 INPUT

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

651   SV  0  0.57  4.63  6.87  10.32
652   SE  92  94  96  98  100
653   SQ  120  126  131  137  144

654   KK  RT-DFS
655   KM  ROUTE OUTFLOW FROM THE DETENTION BASIN IN A 48" S.D. TO RESEARCH PKWY.
656   RD  800  .018  .013  CIRC  4

657   KK  SB-F3
658   KM  COMPUTE HYDROGRAPH FOR BASIN F3
659   BA  .114
660   LS  0  77.0
661   UD  .215

662   KK  AP22
663   KM  COMBINE ROUTED FLOW RT-DFS TO FLOW FROM BASIN F3 AT THE INTERSECTION OF
664   KM  RESEARCH PARKWAY AND SUMMERSET DRIVE.
665   NC  2

666   KK  AP22P
667   KM  DIVERT FLOW IN EXCESS OF THE DOWNSTREAM STORM DRAIN CAPACITY AT THE
668   KM  INTERSECTION OF RESEARCH PARKWAY AND SUMMERSET DRIVE. CONTROLLING
669   KM  DOWNSTREAM STORM DRAIN IS A 60" DIA RCP @ S=1%, FULL FLOW CAPACITY= 260cfs
670   KM  THE DIVERTED FLOW IS ASSUMED TO RUN DOWN SUMMERSET DR. SOUTH OF RESEARCH
671   KM  PARKWAY AND EVENTUALLY TO COTTONWOOD CREEK.
672   DT  AP22S
673   DI  260  261  280  300  340  360  380
674   DQ  0  1  20  40  60  80  100  120

675   KKRT-AP22P
676   KM  ROUTE THE S.D.FLOW FROM THE BRIARGATE PKWY/ SUMMERSET INTERSECTION TO THE
677   KM  INTERSECTION OF RESEARCH PKWY. AND CHAPEL HILLS DR.
678   RD  2100  .02  .013  CIRC  5

679   KK  SB-F4
680   KM  COMPUTE HYDROGRAPH FOR BASIN F4
681   BA  .038
682   LS  0  83.0
683   UD  .197

684   KK  RR-DF4
685   KM  ROUTE FLOW THRU A POND ROUTING ROUTINE TO REFLECT REDUCTION IN PEAK FLOW
686   KM  RATE OF 1.6 CFS/ACRE FROM THE 11.5 AC THAT WILL BE DEVELOPED AS LI/O
687   KM  DISCHARGE REDUCTION PER ACRE IS DETERMINED PER THE RATE AND AREA INCLUDED
688   KM  IN THE MOD FOR BRIARGATE BUSINESS CAMPUS
689   KM  THE ROUTING ROUTINE ONLY REGULATES THE PEAK DISCHARGE AND DOES NOT LAG
690   KM  THE DISCHARGE, THIS IS APPROPRIATE AS A PORTION OF THE SITE WILL LIKELY
691   KM  FREE DISCHARGE TO THE ADJACENT STREET
692   KM  DISCHARGE REDUCTION = LI/O AREA (acres)11.5 x 1.6 cfs = 18.4 cfs
693   RS  1  STOR  0
694   SV  0  .001  6  10
695   SE  100  102  104  106
696   SQ  0  70.6  70.6  70.6
ID......1......2......3......4......5......6......7......8......9......10

697  KK  AP23
698  KM  COMBINE ROUTED FLOW RT-AP22P TO FLOW FROM BASIN F4 AT THE INTERSECTION OF
699  KM  RESEARCH PARKWAY AND CHAPEL HILLS DR.
700  HC  2

701  KK  AP23P
702  KM  DIVERT FLOW IN EXCESS OF THE DOWNSTREAM STORM DRAIN CAPACITY AT THE
703  KM  FIRST MANHOLE (MH8) DOWNSTREAM OF THE INTERSECTION OF RESEARCH PARKWAY AND
704  KM  CHAPEL HILLS DRIVE. THE MANHOLE IS LOCATED JUST UPSTREAM OF A PIPE SIZE
705  KM  REDUCTION FROM 54" TO 48" DIA.. IT IS ASSUMED THAT THE MH LID WILL BE PUSHED
706  KM  OFF BY THE HIGH HGL ABOVE THE TRANSITION AT THE ESTIMATED 100 YEAR PEAK
707  KM  FLOW RATE. DOWNSTREAM PIPE CAPACITY IS ESTIMATED AT 298 cfs BASED ON
708  KM  FULL PIPE CONVEYANCE CAPACITY OF 48" DIA RCP, SLOPE = 4.3%
709  DT  AP23S
710  DI  298  300  325  350  375  400  425  450  470
711  DQ  0    2    27   52   77  102  127  152  172

712  KKRT-AP23P
713  KM  ROUTE THE FLOW IN THE STORM DRAIN FROM THE RESEARCH PKWY/CHAPEL HILLS DR.
714  KM  TO THE INTERSECTION OF EXPLORER DRIVE AND THE FOCUS ON THE
715  KM  FAMILY S.D.
716  RD  2100 .044 .013 CIRC  4

717  KK  AP23S
718  KM  RETRIEVE THE DIVERTED FLOW AT MH8 JUST DOWNSTREAM OF THE INTERSECTION OF
719  KM  RESEARCH PARKWAY AND CHAPEL HILLS DRIVE. THIS IS SURFACE FLOW.
720  DR  AP23S

721  KKRT-AP23S
722  KM  ROUTE THE SURFACE FLOW AT MH8 ACROSS THE FOCUS SITE TO EXPLORER DRIVE
723  KM  ASSUME FLOW WILL BE SHALLOW AND WIDE THROUGH THE PARKING LOTS
724  RD  1550 .042 .015 TRAP  75 .01

725  KK  SB-F5
726  KM  COMPUTE HYDROGRAPH FOR BASIN F5
727  BA  .064
728  LS  0    95.5
729  UD  .121

730  KK  RR-FF5
731  KM  ROUTE FLOW THRU A POND ROUTING ROUTINE TO REFLECT REDUCTION IN PEAK FLOW
732  KM  RATE BASED ON APPROXIMATELY 35% OF THE DIFFERENCE BETWEEN THE DEVELOPED
733  KM  AND HISTORIC PEAK 100 YR FLOW RATE PER THE ORIGINAL DBPS CRITERIA FOR LI/G
734  KM  LAND USE. HISTORIC 100 YR PEAK ESTIMATED AT 1.5 CFS/AC. FULLY DEVELOPED 100
735  KM  YR PEAK ESTIMATED AT 5.6 CFS/AC. ESTIMATED REQUIRED DETENTION =
736  KM (5.6-1.5)*.35*35AC=50cfs TOTAL Qin=225cfs
737  KM  THE ROUTING ROUTINE ONLY REGULATES THE PEAK DISCHARGE AND DOES NOT LAG
738  KM  THE DISCHARGE. THIS IS APPROPRIATE AS A PORTION OF THE BASIN DISCHARGES
739  KM  DIRECTLY TO THE ADJACENT STREET AND STORM DRAIN
740  RS  1   STOR   0
741  SV  0    .001   6   10
742  SE 100  102  104  106
743  SQ  0   175  175  175
LINE

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

744  KK  AP24
745  KM  COMBINE THE ROUTED FLOW IN THE S.D.(RTAP102) TO FLOW FROM FF1 AND THE SURFACE
746  KM  FLOW THAT WAS DIVERTED THROUGH THE FOCUS SITE FROM MH8(RP102A) AT THE
747  KM  INTERSECTION OF EXPLORER DRIVE AND THE FOCUS ON THE FAMILY STORM DRAIN.
748  HC  3

749  KK  AP24P
750  KM  DIVERT FLOW IN EXCESS OF THE DOWNSTREAM STORM DRAIN CAPACITY AT THE
751  KM  INTERSECTION OF EXPLORER DRIVE AND TELSTAR DRIVE. DOWNSTREAM
752  KM  STORM DRAIN IS A 66" DIA RCP & S=.11%, FULL FLOW CAPACITY = 350cfs
753  KM  ASSUME THIS DIVERTED FLOW WILL GO WEST DOWN TELSTAR DRIVE
754  DT  AP24S
755  DI  350  351  370  390  410  430  450  470  490
756  DQ  0   1   20    40    60    80   100  120  140

757  KKRT-AP24P
758  KM  ROUTE THE FLOW IN THE FOCUS STORM DRAIN FROM AP24 AT THE INTERSECTION OF
759  KM  EXPLORER DRIVE AND THE FOCUS S.D. TO AP25 AT THE INTERSECTION OF EXPLORER
760  KM  DRIVE & BRIARGE PKWY
761  RD  800  .011  .013  CIRC  5.5

762  KK  SB-F6
763  KM  COMPUTE HYDROGRAPH FOR BASIN F6
764  BA  .038
765  LS  0  96.0
766  UD  .106

767  KK  RR-DF6
768  KM  ROUTE FLOW THRU A POND ROUTING ROUTINE TO REFLECT REDUCTION IN PEAK FLOW
769  KM  RATE BASED ON APPROXIMATELY 35% OF THE DIFFERENCE BETWEEN THE DEVELOPED
770  KM  AND HISTORIC PEAK 100 YR FLOW RATE. HISTORIC ESTIMATED AT 1.5 CFS/AC.
771  KM  FULLY DEVELOPED ESTIMATED AT 6.0 CFS/AC. ESTIMATED REQUIRED DETENTION =
772  KM  (6.0-1.5)*.35*21.5=36cfs  TOTAL Qin=138cfs
773  KM  THE ROUTING ROUTINE ONLY REGULATES THE PEAK DISCHARGE AND DOES NOT LAG
774  KM  THE DISCHARGE. THIS IS APPROPRIATE AS A PORTION OF THE BASIN DISCHARGES
775  KM  DIRECTLY TO THE ADJACENT STREET AND STORM DRAIN
776  RS  1  STOR  0
777  SV  0  .001  6  10
778  SE  100  102  104  106
779  SQ  0  104  104  104

780  KK  SB-F7
781  KM  COMPUTE HYDROGRAPH FOR BASIN F7
782  BA  .052
783  LS  0  93.0
784  UD  .137

785  KK  RR-DF7
786  KM  ROUTE FLOW THRU A POND ROUTING ROUTINE TO REFLECT REDUCTION IN PEAK FLOW
787  KM  RATE BASED ON APPROXIMATELY 35% OF THE DIFFERENCE BETWEEN THE DEVELOPED
788  KM  AND HISTORIC PEAK 100 YR FLOW RATE. HISTORIC ESTIMATED AT 1.5 CFS/AC.
789  KM  FULLY DEVELOPED ESTIMATED AT 5.2 CFS/AC. ESTIMATED REQUIRED DETENTION =
790  KM  (5.2-1.5)*.35*29AC=38cfs  TOTAL Qin=170cfs
791  KM  THE ROUTING ROUTINE ONLY REGULATES THE PEAK DISCHARGE AND DOES NOT LAG
<table>
<thead>
<tr>
<th>LINE</th>
<th>ID.......1.......2.......3.......4.......5.......6.......7.......8.......9.......10</th>
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<td>792</td>
<td>KM THE DISCHARGE. THIS IS APPROPRIATE AS A PORTION OF THE BASIN DISCHARGES</td>
</tr>
<tr>
<td>793</td>
<td>KM DIRECTLY TO THE ADJACENT STREET AND STORM DRAIN</td>
</tr>
<tr>
<td>794</td>
<td>RS 1 STOR 0</td>
</tr>
<tr>
<td>795</td>
<td>SV 0 .001 6 10</td>
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<tr>
<td>796</td>
<td>SE 100 102 104 106</td>
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<td>797</td>
<td>SQ 0 132 132 132</td>
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<tr>
<td>798</td>
<td>KK AP25</td>
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<tr>
<td>799</td>
<td>KM COMBINE ROUTED FLOW RT-AP25P TO CONTROLLED FLOW FROM BASINS F6 AND F7</td>
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<td>800</td>
<td>KM AT THE INTERSECTION OF EXPLORER DR AND BRIARGATE PKWY.</td>
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<tr>
<td>801</td>
<td>HC 3</td>
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<tr>
<td>802</td>
<td>KK AP25P</td>
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<tr>
<td>803</td>
<td>KM DIVERT FLOW IN EXCESS OF THE DOWNSTREAM STORM DRAIN CAPACITY AT THE</td>
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<tr>
<td>804</td>
<td>KM INTERSECTION OF EXPLORER DR. AND BRIARGATE PARKWAY. CONTROL APPEARS TO</td>
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<tr>
<td>805</td>
<td>KM BE DOWNSTREAM 54' DIA S.D. @ 5.5% SLOPE, FULL PIPE CAPACITY=461cfs</td>
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<tr>
<td>806</td>
<td>KM DIVERTED FLOW IS ASSUMED TO FLOW DOWN BRIARGATE PARKWAY TO THE SUMP</td>
</tr>
<tr>
<td>807</td>
<td>KM ADJACENT TO FACILITY #1</td>
</tr>
<tr>
<td>808</td>
<td>DT AP25S</td>
</tr>
<tr>
<td>809</td>
<td>DI 461 464 475 500 525 550 575 600 625</td>
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<tr>
<td>810</td>
<td>DQ 0 1 14 39 64 89 114 139 164</td>
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<tr>
<td>811</td>
<td>KKRT-AP25P</td>
</tr>
<tr>
<td>812</td>
<td>KM ROUTE THE FLOW IN THE S.D.FROM THE INTERSECTION OF EXPLORER DR. &amp; BRIARGATE</td>
</tr>
<tr>
<td>813</td>
<td>KM PARKWAY TO DETENTION FACILITY 1 AT BRIARGATE PKWY &amp; HIGHWAY 83</td>
</tr>
<tr>
<td>814</td>
<td>RD 1250 .011 .013 CIRC 5.5</td>
</tr>
<tr>
<td>815</td>
<td>KK SB-PMB</td>
</tr>
<tr>
<td>816</td>
<td>KM COMPUTE HYDROGRAPH FOR BASIN PMB THE PORTION OF BRIARGATE PARKWAY BETWEEN</td>
</tr>
<tr>
<td>817</td>
<td>KM EXPLORER DR. AND HIGHWAY 83</td>
</tr>
<tr>
<td>818</td>
<td>BA .014</td>
</tr>
<tr>
<td>819</td>
<td>LS 0 98</td>
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<tr>
<td>820</td>
<td>UD .100</td>
</tr>
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<td>821</td>
<td>KK AP-DF#1</td>
</tr>
<tr>
<td>822</td>
<td>KM ADD THE FLOW FROM THE FOCUS ON THE FAMILY STORM DRAIN, BASINS PM7 AND PM8,</td>
</tr>
<tr>
<td>823</td>
<td>KM AND FLOW IN PINE CREEK FOR THE TOTAL INFLOW TO DETENTION FACILITY 1</td>
</tr>
<tr>
<td>824</td>
<td>HC 4</td>
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<tr>
<td>825</td>
<td>KK RR-DF#1</td>
</tr>
<tr>
<td>826</td>
<td>KM ROUTE FLOW THRU DETENTION FACILITY NO.1. VOLUME MODIFIED TO REFLECT PROPOSED</td>
</tr>
<tr>
<td>827</td>
<td>KM ENLARGEMENT. PROPOSED ENLARGEMENT IS TO ADD A MINIMUM OF 0.7 ACRES OF SURFACE</td>
</tr>
<tr>
<td>828</td>
<td>KM AREA TO EACH OF THE CONTOURS AT OR ABOVE ELEVATION 58. OUTLET MODELED</td>
</tr>
<tr>
<td>829</td>
<td>KM ASSUMING THE TOP 7.5' OF THE ENTRANCE TO THE 10'X 12' S HIGH BOX CULVERT IS</td>
</tr>
<tr>
<td>830</td>
<td>KM BLOCKED AND A NEW 12' WIDE OPENING IS CREATED W/ INVERT AT 67.2</td>
</tr>
<tr>
<td>831</td>
<td>KM OUTFLOW CURVE CALCULATED WITH A SPREADSHEET TREATING THE LOWER OPENING AS</td>
</tr>
<tr>
<td>832</td>
<td>KM A SUBMERGED ORIFICE WITH C=.60, h=POD DEPTH - NORMAL DEPTH IN THE OUTFALL</td>
</tr>
<tr>
<td>833</td>
<td>KM AND THE UPPER OPENING TO ELEVATION 73.0 TREATED AS A SHARP CRESTED WEIR WITH</td>
</tr>
<tr>
<td>834</td>
<td>KM A FULL LENGTH OF 12.77' (THE SKEW LENGTH) ADJUSTED 0.2h FOR END CONTRACTIONS</td>
</tr>
<tr>
<td>835</td>
<td>KM AND C=3.22+0.40(h/P), WHERE P=14.2, ABOVE ELEVATION 73.0 THE TOP OUTLET</td>
</tr>
<tr>
<td>836</td>
<td>KM STRUCTURE IS ASSUMED TO TERMINATE WITHOUT A TOP AND THIS ADDITIONAL FLOW CAN</td>
</tr>
<tr>
<td>837</td>
<td>KM OVER TOP THE SIDES AND BACK OF THE ASSUMED 3 SIDED STRUCTURE 12.77 x 10</td>
</tr>
<tr>
<td>838</td>
<td>KO 3 1</td>
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<tr>
<td>839</td>
<td>RS 1 STOR 0</td>
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<tr>
<td>840</td>
<td>SA 0 0.18 0.48 4.83 5.23 5.52 5.83 6.13 6.44 6.78</td>
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HEC-1 INPUT

LINE  ID......1......2......3......4......5......6......7......8......9......10
841  SA  7.14  7.34  7.53  7.73  7.93
842  SE  56.0  55.0  56.0  58.0  60.0  62.0  64.0  66.0  68.0  70.0
843  SE  72.0  73.0  74.0  75.0  76.0
844  SQ  0  105  194  275  344  401  451  496  560  747
845  SQ  998  1142  1267  1750  2100
846  KK  AP25S
847  KM  RETRIEVE THE DIVERTED FLOW AT THE INTERSECTION OF BRIARGATE PARKWAY AND
848  KM  EXPLORER DRIVE. THIS IS FLOW IN THE STREET.
849  DR  AP25S
850  KKRT-AP25S
851  KM  ROUTE THE SURFACE FLOW IN BRIARGATE PARKWAY DOWN BRIARGATE PARKWAY TO PINE
852  KM  CREEK. ASSUME THIS FLOW ENTERS THE CHANNEL AT THE OUTLET FROM DETENTION
853  KM  FACILITY #1.
854  RD  1400 .043 .015 TRAP  75 .01
855  KK  AP26
856  KM  COMBINE ROUTED FLOW RT-AP25S TO THE OUTFLOW FROM DF#1 AT THE INTERSECTION OF
857  KM  BRIARGATE PKWY. AND PINE CREEK
858  HC  2
859  KK  RT-AP26
860  KM  ROUTE THE COMBINED FLOW FROM AP26 AT BRIARGATE PARKWAY DOWN PINE CREEK TO
861  KM  THE INTERSECTION OF PINE CREEK AND HIGHWAY 83. USE AVERAGE
862  KM  APPROXIMATE SECTION AND SLOPE FOR ROUTING
863  RD  1450 .019 .045 TRAP  40  2
864  KK  SB-PM9
865  KM  COMPUTE HYDROGRAPH FOR BASIN PM9
866  BA .068
867  LS  0  93
868  UD .120
869  KK  AP27
870  KM  COMBINE THE FLOW FROM BASIN PM9 AND THE ROUTED FLOW IN PINE CREEK (RT-AP26) A
871  KM  AT THE UPSTREAM SIDE OF HIGHWAY 83.
872  HC  2
873  KK  SB-PM10
874  KM  COMPUTE HYDROGRAPH FOR BASIN PM10
875  BA .048
876  LS  0  98
877  UD .092
878  KKRRDFPM10
879  KM  ROUTE FLOW THRU A POND ROUTING ROUTINE TO REFLECT REDUCTION IN PEAK FLOW
880  KM  RATE TO THE APPROXIMATE PEAK FLOW RATE DISCHARGE GOAL FROM THE BASIN
881  KM  AS SHOWN IN THE FINAL DRAINAGE REPORT FOR BRIARGATE BUSINESS CAMPUS
882  KM  FILING 13 AS APPROVED OCT 31, 1996
883  KM  THE ROUTING ROUTINE ONLY REGULATES THE PEAK DISCHARGE AND DOES NOT LAG
884  KM  THE DISCHARGE. THIS IS APPROPRIATE AS A PORTION OF THE BASIN MAY DISCHARGE
885  KM  DIRECTLY TO THE ADJACENT STREET AND STORM DRAIN.
886  KM  DISCHARGE FROM THE BASIN PER THE FINAL DRAINAGE REPORT=140 cfs
887  RS  1 STOR  0
ID......1......2......3......4......5......6......7......8......9......10

888  SV  0   001 .6   1.5
889  SE  100  102  104  106
890  SQ  0   140  140  140

891  KK   RT-PM10
892  KM  ROUTE THE FLOW IN THE S.D.FROM THE LOW POINT IN TELESTAR DR. TO THE EXISTING
893  KM  OUTFALL TO PINE CREEK JUST UPSTREAM OF HIGHWAY 83.
894  RD  1000 .025 .013  CIRC   4.0

895  KK   SB-PM11
896  KM  COMPUTE HYDROGRAPH FOR BASIN PM11
897  BA  .041
898  LS  0   98
899  UD  .096

900  KK   AP24S
901  KM  RETRIEVE THE FLOW THAT WAS IN EXCESS OF THE STORM DRAIN CAPACITY AT THE
902  KM  INTERSECTION OF EXPLORER DRIVE AND TELSTAR DRIVE.(AP24S)
903  DR  AP24S

904  KKRT-AP24S
905  KM  ROUTE THE RETRIEVED FLOW FROM AP24 DOWN TELSTAR DRIVE TO THE SUMP THEN
906  KM  ACROSS BBC FILING 19 TO AP28 IN PINE CREEK.
907  RD  2200 .05 .015  TRAP   40   01

908  KK   AP28
909  KM  COMBINE THE FLOW FROM BASIN PM11 WITH THE ROUTED SURFACE FLOW FROM THE
910  KM  INTERSECTION OF TELSTAR DR. AND EXPLORER DRIVE (RT-AP24S), THE FLOW IN
911  KM  PINE CREEK AT AP27, AND THE ROUTED FLOW FROM BASIN PM10.
912  KM  FLOW IS COMBINED IN PINE CREEK AT THE UPSTREAM SIDE OF THE BOX CULVERT
913  KM  UNDER HIGHWAY 83. THIS REPRESENTS THE TOTAL FLOW TO PINE CREEK FROM THE
914  KM  BRIARGATE AREA
915  KO  3   1
916  WC  4
917  ZZ  

3
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903    .  .  .  .  .  AP24S
900    .  .  .  AP24S  V
    .  .  .  V
904    .  .  .  RT-AP24S
    .  .  .  
    .  .  .  .
908    AP28  .  .  .  .  .

***) RUNOFF ALSO COMPUTED AT THIS LOCATION
PINE CREEK DRAINAGE BASIN - 24HR, FULL DEVELOPED CONDITION (TYPE IIa100 YEAR)
FILE:PCDBPSD.DAT
FULLY DEVELOPED CONDITION MODEL
993 REVISION, LAST MODEL REVISION DATE:8/5/98
CN VALUES HAVE BEEN ADJUSTED TO PRODUCE PEAK 100 YEAR FLOW RATES SIMILAR TO
100 YEAR FLOW RATES PRODUCED BY RATIONAL METHOD.
BEGIN CALCULATIONS IN THE PINE CREEK NORTH FORK WATERSHED

11 10  OUTPUT CONTROL VARIABLES
       IPRINT  5  PRINT CONTROL
       IPLOT  0  PLOT CONTROL
       QSCAL  0  HYDROGRAPH PLOT SCALE

1T  HYDROGRAPH TIME DATA
       NMIN  3  MINUTES IN COMPUTATION INTERVAL
       IDATE  1 0  STARTING DATE
       ITIME  0000  STARTING TIME
       NQ  300  NUMBER OF HYDROGRAPH ORDNATES
       NQDATE  1 0  ENDING DATE
       NQTIME  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

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
### 82 KK
* RR-DFF *
* *
************

### 87 KD
OUTPUT CONTROL VARIABLES
IPRT  3  PRINT CONTROL
IPLLOT  1  PLOT CONTROL
GSCAL  0.  HYDROGRAPH PLOT SCALE

### HYDROGRAPH ROUTING DATA

#### 88 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

#### 89 SV
STORAGE
<table>
<thead>
<tr>
<th></th>
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<th>0.1</th>
<th>2.8</th>
<th>8.0</th>
<th>14.1</th>
<th>20.9</th>
<th>28.4</th>
<th>36.6</th>
<th>45.5</th>
<th>55.1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>65.3</td>
<td>76.3</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 91 SE
ELEVATION
<table>
<thead>
<tr>
<th></th>
<th>59.00</th>
<th>60.00</th>
<th>62.00</th>
<th>64.00</th>
<th>66.00</th>
<th>68.00</th>
<th>70.00</th>
<th>72.00</th>
<th>74.00</th>
<th>76.00</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>78.00</td>
<td>80.00</td>
<td>82.00</td>
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<td></td>
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#### 93 SQ
DISCHARGE
<table>
<thead>
<tr>
<th></th>
<th>0.0</th>
<th>10.0</th>
<th>47.0</th>
<th>93.0</th>
<th>130.0</th>
<th>160.0</th>
<th>180.0</th>
<th>203.0</th>
<th>222.0</th>
<th>240.0</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>262.0</td>
<td>280.0</td>
<td>295.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

***

### HYDROGRAPH AT STATION RR-DFF

#### EAK FLOW
<table>
<thead>
<tr>
<th>TIME (HR)</th>
<th>6-HR</th>
<th>24-HR</th>
<th>72-HR</th>
<th>14.95-HR</th>
</tr>
</thead>
<tbody>
<tr>
<td>250. 6.55</td>
<td>500.</td>
<td>200.</td>
<td>100.</td>
<td>85.</td>
</tr>
</tbody>
</table>

#### DFEK STORAGE
<table>
<thead>
<tr>
<th>TIME (AC-FT)</th>
<th>6-HR</th>
<th>24-HR</th>
<th>72-HR</th>
<th>14.95-HR</th>
</tr>
</thead>
<tbody>
<tr>
<td>60. 6.55</td>
<td>50.</td>
<td>20.</td>
<td>10.</td>
<td>14.</td>
</tr>
</tbody>
</table>

#### EAK STAGE
<table>
<thead>
<tr>
<th>TIME (FEET)</th>
<th>6-HR</th>
<th>24-HR</th>
<th>72-HR</th>
<th>14.95-HR</th>
</tr>
</thead>
<tbody>
<tr>
<td>76.93 6.55</td>
<td>70.70</td>
<td>64.43</td>
<td>64.43</td>
<td>64.43</td>
</tr>
</tbody>
</table>

CUMULATIVE AREA = 0.73 SQ MI

***

************
* * *

### 13 KK
* RR-DFF *
* *
************
OUTPUT CONTROL VARIABLES
IPRINT  3 PRINT CONTROL
IPLAN  1 PLOT CONTROL
QSCAL  0. HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

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

STORAGE  0.0  0.0  0.1  0.7  1.5  4.4  7.8  11.7  16.1  21.0
119   26.4

ELEVATION  90.00  92.00  94.00  96.00  98.00  100.00  102.00  104.00  106.00  108.00
121  110.00

DISCHARGE  0.  22.  70.  112.  143.  170.  190.  210.  230.  250.
123  265.

***  ***  ***  ***  ***

HYDROGRAPH AT STATION  RR-DFF

PEAK FLOW  TIME  MAXIMUM AVERAGE FLOW
(CFS)  (HR)  6-HR  24-HR  72-HR  14.95-HR
239.  8.05  (CFS)  217.  103.  103.  103.  2.187  2.559  2.559  2.559
(INCHES)  (AC-FT)  107.  128.  128.  128.

PEAK STORAGE  TIME  MAXIMUM AVERAGE STORAGE
(AC-FT)  (HR)  6-HR  24-HR  72-HR  14.95-HR
18.  8.05  13.  5.  5.  5.

PEAK STAGE  TIME  MAXIMUM AVERAGE STAGE
(FEET)  (HR)  6-HR  24-HR  72-HR  14.95-HR
106.85  8.05  104.67  96.88  96.88  96.88

CUMULATIVE AREA = 0.92 SQ MI

***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***

***************
*  *
166  KK  *  RR-DFF  *
*  *
***************

OUTPUT CONTROL VARIABLES
IPRINT  3 PRINT CONTROL
IPLAN  1 PLOT CONTROL
QSCAL  0. HYDROGRAPH PLOT SCALE
HYDROGRAPH ROUTING DATA

174 RS
STORAGE ROUTING
NSIPS 1 NUMBER OF SUBREACHES
ITYP STOR TYPE OF INITIAL CONDITION
RSVIRC 0.00 INITIAL CONDITION
X 0.00 WORKING R AND D COEFFICIENT

175 SV
STORAGE 0.0 0.0 1.3 3.9 6.9 10.3 14.1 18.2 22.8 27.9

176 SE
ELEVATION 784.00 786.00 788.00 790.00 792.00 794.00 796.00 798.00 800.00 802.00

177 SQ

***

***

***

***

HYDROGRAPH AT STATION RR-DFE

PEAK FLOW TIME MAXIMUM AVERAGE FLOW
(CFS) (HR) 6-HR 24-HR 72-HR 14.95-HR
263. 8.10 253. 129. 129. 129.

(INCHES) 1.889 2.395 2.395 2.395

(AC-FT) 125. 159. 159. 159.

PEAK STORAGE TIME MAXIMUM AVERAGE STORAGE
(AC-FT) (HR) 6-HR 24-HR 72-HR 14.95-HR
19. 8.10 17. 8. 8. 8.

PEAK STAGE TIME MAXIMUM AVERAGE STAGE
(FEET) (HR) 6-HR 24-HR 72-HR 14.95-HR
798.27 8.10 797.20 790.61 790.61 790.62

CUMULATIVE AREA = 1.25 SQ MI

---

***************
*
*
225 KK
*
*
***************

132 KO
OUTPUT CONTROL VARIABLES
IPRINT 3 PRINT CONTROL
IPLLOT 1 PLOT CONTROL
OSCAL 0. HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

131 RS
STORAGE ROUTING
<table>
<thead>
<tr>
<th>NSTPS</th>
<th>1 NUMBER OF SUBREACHES</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITYP</td>
<td>STOR TYPE OF INITIAL CONDITION</td>
</tr>
<tr>
<td>RSVRIC</td>
<td>0.00 INITIAL CONDITION</td>
</tr>
<tr>
<td>X</td>
<td>0.00 WORKING R AND D COEFFICIENT</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>233 SV</th>
<th>STORAGE</th>
<th>0.0</th>
<th>6.8</th>
<th>14.3</th>
<th>22.4</th>
<th>31.1</th>
<th>40.6</th>
<th>50.8</th>
<th>61.8</th>
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</thead>
<tbody>
<tr>
<td>234 SE</td>
<td>ELEVATION</td>
<td>100.00</td>
<td>102.00</td>
<td>104.00</td>
<td>106.00</td>
<td>108.00</td>
<td>110.00</td>
<td>112.00</td>
<td>114.00</td>
</tr>
<tr>
<td>235 SQ</td>
<td>DISCHARGE</td>
<td>0</td>
<td>18.0</td>
<td>54.0</td>
<td>72.0</td>
<td>87.0</td>
<td>99.0</td>
<td>110.0</td>
<td>120.0</td>
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</table>

*** *** *** *** *** ***

**HYDROGRAPH AT STATION RR-DFO**

<table>
<thead>
<tr>
<th>PEAK FLOW</th>
<th>TIME (HR)</th>
<th>MAXIMUM AVERAGE FLOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>(CFS) 99.0</td>
<td>6-HR 85.0</td>
<td>24-HR 44.0</td>
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<tr>
<td>(INCHES) 1.689</td>
<td>2.201</td>
<td></td>
</tr>
<tr>
<td>(AC-FT) 42.0</td>
<td>55.5</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>PEAK STORAGE</th>
<th>TIME (HR)</th>
<th>MAXIMUM AVERAGE STORAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>(AC-FT) 41.0</td>
<td>6-HR 31.0</td>
<td>24-HR 15.0</td>
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<tr>
<td>(FEET) 109.99</td>
<td>107.83</td>
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</table>

<table>
<thead>
<tr>
<th>PEAK STAGE</th>
<th>TIME (HR)</th>
<th>MAXIMUM AVERAGE STAGE</th>
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<tbody>
<tr>
<td>(FEET) 109.99</td>
<td>6-HR 107.83</td>
<td>24-HR 103.95</td>
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</table>

CUMULATIVE AREA = 0.47 SQ MI

**HYDROGRAPH ROUTING DATA**

**OUTPUT CONTROL VARIABLES**

- IPRINT: 3 PRINT CONTROL
- IPLT: 1 PLOT CONTROL
- QC: 0. HYDROGRAPH PLOT SCALE

**STORAGE ROUTING**

<table>
<thead>
<tr>
<th>NSTPS</th>
<th>1 NUMBER OF SUBREACHES</th>
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</thead>
<tbody>
<tr>
<td>ITYP</td>
<td>STOR TYPE OF INITIAL CONDITION</td>
</tr>
<tr>
<td>RSVRIC</td>
<td>0.00 INITIAL CONDITION</td>
</tr>
<tr>
<td>X</td>
<td>0.00 WORKING R AND D COEFFICIENT</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>307 SV</th>
<th>STORAGE</th>
<th>0.0</th>
<th>2.7</th>
<th>9.7</th>
<th>18.6</th>
<th>28.0</th>
<th>38.2</th>
<th>49.0</th>
<th>60.5</th>
<th>72.8</th>
<th>85.8</th>
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<tr>
<td>99.7</td>
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<td></td>
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</tr>
</tbody>
</table>
HYDROGRAPH AT STATION  RR-DFC

PEAK FLOW

<table>
<thead>
<tr>
<th>TIME</th>
<th>MAXIMUM AVERAGE FLOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>(CFS)</td>
<td>(HR)</td>
</tr>
<tr>
<td>6-HR</td>
<td>113.</td>
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<tr>
<td>24-HR</td>
<td>139.</td>
</tr>
<tr>
<td>72-HR</td>
<td>139.</td>
</tr>
<tr>
<td>14.95-HR</td>
<td>139.</td>
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</tbody>
</table>

STORAGE

<table>
<thead>
<tr>
<th>TIME</th>
<th>MAXIMUM AVERAGE STORAGE</th>
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</thead>
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<tr>
<td>(AC-FT)</td>
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<td>6-HR</td>
<td>56.</td>
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<tr>
<td>24-HR</td>
<td>29.</td>
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<tr>
<td>72-HR</td>
<td>29.</td>
</tr>
<tr>
<td>14.95-HR</td>
<td>29.</td>
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</tbody>
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PEAK STAGE

<table>
<thead>
<tr>
<th>TIME</th>
<th>MAXIMUM AVERAGE STAGE</th>
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</thead>
<tbody>
<tr>
<td>(FEET)</td>
<td>(HR)</td>
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<tr>
<td>6-HR</td>
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<tr>
<td>24-HR</td>
<td>69.08</td>
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<tr>
<td>72-HR</td>
<td>69.08</td>
</tr>
<tr>
<td>14.95-HR</td>
<td>69.08</td>
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</table>

CUMULATIVE AREA = 1.04 SQ MI

**************
*
* 333 KK
* RR-DFB *
* *
**************

340 KO
OUTPUT CONTROL VARIABLES

<table>
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<th>IPRT</th>
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<tr>
<td>IPLT</td>
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<tr>
<td>OSCAL</td>
<td>0. HYDROGRAPH PLOT SCALE</td>
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341 RS
STORAGE ROUTING

<table>
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<th>1 NUMBER OF SUBREACHES</th>
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<tbody>
<tr>
<td>ITYP</td>
<td>STOR TYPE OF INITIAL CONDITION</td>
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<tr>
<td>RSVRIC</td>
<td>0.00 INITIAL CONDITION</td>
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<tr>
<td>X</td>
<td>0.00 WORKING R AND D COEFFICIENT</td>
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342 SV
STORAGE

<table>
<thead>
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</thead>
<tbody>
<tr>
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<tr>
<td>64.00</td>
<td>0.10</td>
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<tr>
<td>70.00</td>
<td>5.80</td>
</tr>
<tr>
<td>72.00</td>
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</tr>
<tr>
<td>74.00</td>
<td>12.10</td>
</tr>
<tr>
<td>76.00</td>
<td>15.90</td>
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344 SE
ELEVATION

<table>
<thead>
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<th>ELEVATION</th>
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<tr>
<td>71.20</td>
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<tr>
<td>72.00</td>
<td>30.00</td>
</tr>
<tr>
<td>74.00</td>
<td>88.00</td>
</tr>
<tr>
<td>76.00</td>
<td>90.00</td>
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<tr>
<td>78.00</td>
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<tr>
<td>80.00</td>
<td>86.00</td>
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<tr>
<td>82.00</td>
<td>87.60</td>
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</table>
346 sq

**

**

**

**

HYDROGRAPH AT STATION RR-DFB

<p>| PEAK FLOW TIME MAXIMUM AVERAGE FLOW |</p>
<table>
<thead>
<tr>
<th>(CFS)</th>
<th>(HR)</th>
<th>6-HR</th>
<th>24-HR</th>
<th>72-HR</th>
<th>14.95-HR</th>
</tr>
</thead>
<tbody>
<tr>
<td>247.</td>
<td>7.25</td>
<td>286.</td>
<td>125.</td>
<td>125.</td>
<td>125.</td>
</tr>
<tr>
<td>(INCHES)</td>
<td>1.685</td>
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<td>2.327</td>
<td>2.327</td>
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<tr>
<td>(AC-Ft)</td>
<td>112.</td>
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<td>155.</td>
<td>155.</td>
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</tbody>
</table>

<p>| PEAK STORAGE TIME MAXIMUM AVERAGE STORAGE |</p>
<table>
<thead>
<tr>
<th>(AC-FT)</th>
<th>(HR)</th>
<th>6-HR</th>
<th>24-HR</th>
<th>72-HR</th>
<th>14.95-HR</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.</td>
<td>7.25</td>
<td>11.</td>
<td>6.</td>
<td>6.</td>
<td></td>
</tr>
</tbody>
</table>

<p>| PEAK STAGE TIME MAXIMUM AVERAGE STAGE |</p>
<table>
<thead>
<tr>
<th>(FEET)</th>
<th>(HR)</th>
<th>6-HR</th>
<th>24-HR</th>
<th>72-HR</th>
<th>14.95-HR</th>
</tr>
</thead>
<tbody>
<tr>
<td>82.91</td>
<td>7.25</td>
<td>81.49</td>
<td>76.71</td>
<td>76.71</td>
<td>76.71</td>
</tr>
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</table>

CUMULATIVE AREA = 1.25 SQ MI

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**************

* * *

512 KK  
* RR-DFB *
* *

**************

517 KO

OUTPUT CONTROL VARIABLES

IPRINT 3 PRINT CONTROL
IPLLOT 1 PLOT CONTROL
QSCALE 0. HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

518 RS

STORAGE ROUTING

NSTPS 1 NUMBER OF SUBREACHES
ITYP STOR TYPE OF INITIAL CONDITION
RSTYPE 0.00 INITIAL CONDITION
RSTYPE 0.00 WORKING R AND D COEFFICIENT

519 SV

STORAGE 0.0 0.0 0.2 1.0 2.0 2.8 4.3 5.3 6.5 11.6
15.4

521 SQ

DISCHARGE 2. 3. 3. 4. 4. 5. 5. 6. 8. 9.
279.

523 SE

ELEVATION 6796.60 6797.00 6798.00 6800.00 6802.00 6803.50 6803.51 6804.00 6804.10 6805.50
6806.50

***
HYDROGRAPH AT STATION RR-DFS

PEAK FLOW

<table>
<thead>
<tr>
<th>TIME</th>
<th>MAXIMUM AVERAGE FLOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>(CFS)</td>
<td>(HR)</td>
</tr>
<tr>
<td>9.</td>
<td>8.20</td>
</tr>
<tr>
<td>(INCHES)</td>
<td>0.573</td>
</tr>
<tr>
<td>(AC-FT)</td>
<td>4.</td>
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</tbody>
</table>

PEAK STORAGE

<table>
<thead>
<tr>
<th>TIME</th>
<th>MAXIMUM AVERAGE STORAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>(AC-FT)</td>
<td>(HR)</td>
</tr>
<tr>
<td>11.</td>
<td>8.30</td>
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</tbody>
</table>

PEAK STAGE

<table>
<thead>
<tr>
<th>TIME</th>
<th>MAXIMUM AVERAGE STAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>(FEET)</td>
<td>(HR)</td>
</tr>
<tr>
<td>6805.44</td>
<td>8.30</td>
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</table>

CUMULATIVE AREA = 0.14 SQ MI

**************
* * *
* 38 KK * RR-DFS *
* * *
**************

49 KO

OUTPUT CONTROL VARIABLES

IPRTNT 3 PRINT CONTROL
IPL07T 1 PLOT CONTROL
GSCAL 0 HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

50 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

51 SV

STORAGE 0.0 0.6 4.6 6.9 10.3

652 SE

ELEVATION 92.00 94.00 96.00 98.00 100.00

63 SQ

DISCHARGE 120. 126. 131. 137. 144.

***

*** *** *** *** ***

HYDROGRAPH AT STATION RR-DFS

PEAK FLOW

<table>
<thead>
<tr>
<th>TIME</th>
<th>MAXIMUM AVERAGE FLOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>(CFS)</td>
<td>(HR)</td>
</tr>
<tr>
<td>9.</td>
<td>8.20</td>
</tr>
</tbody>
</table>
PEAK STORAGE TIME MAXIMUM AVERAGE STORAGE
(AC-FT) (HR) 6-HR 24-HR 72-HR 14.95-HR
4.  6.35  0.  0.  0.  0.  0.

PEAK STAGE TIME MAXIMUM AVERAGE STAGE
(HEIGHT) (HR) 6-HR 24-HR 72-HR 14.95-HR
95.57  6.35  92.18  92.18  92.18  92.18

CUMULATIVE AREA = 0.16 SQ MI

************
*  *
825 XX  *  RR-DF#1  *
*  *
************

838 KO
OUTPUT CONTROL VARIABLES
IPRN = 3 PRINT CONTROL
IPLOT  = 1 PLOT CONTROL
QSCAL  = 0. HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

839 RS
STORAGE ROUTING
NSTIPS  = 1 NUMBER OF SUBREACHES
STOR  = 1 TYPE OF INITIAL CONDITION
RSVRIC  = 0.00 INITIAL CONDITION
R = 0.00 WORKING R AND D COEFFICIENT

840 SA
AREA  = 0.0 0.2 0.5 4.8 5.2 5.5 5.8 6.1 6.4 6.8
       7.1 7.3 7.5 7.7 7.9

842 SE
ELEVATION  = 54.00 55.00 56.00 58.00 60.00 62.00 64.00 66.00 68.00 70.00
           72.00 73.00 74.00 75.00 76.00

844 SQ
DISCHARGE  = 0.  105.  194.  275.  344.  401.  451.  496.  560.  747.
               998. 1142. 1247. 1750. 2100.

COMPUTED STORAGE-ELEVATION DATA

STORAGE  = 0.00 0.06 0.38 4.93 14.99 25.74 37.09 49.05 61.62 74.83
ELEVATION  = 54.00 55.00 56.00 58.00 60.00 62.00 64.00 66.00 68.00 70.00
STORAGE  = 88.75 95.99 103.43 111.06 118.90
ELEVATION  = 72.00 73.00 74.00 75.00 76.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 0.0 TO 105.
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.)

*** *** *** *** *** ***

HYDROGRAPH AT STATION RR-DF#1

<table>
<thead>
<tr>
<th>Peak Flow</th>
<th>Time (HR)</th>
<th>Maximum Average Flow</th>
</tr>
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<tr>
<td>(CFS)</td>
<td>1147.</td>
<td>6-HR 24-HR 72-HR 14.95-HR</td>
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<tr>
<td>(INCHES)</td>
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<td>(AC·FT)</td>
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<table>
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CUMULATIVE AREA = 4.43 SQ MI

***************
*             *
908 KK       * AP28 *
*             *
***************

915 K0

OUTPUT CONTROL VARIABLES
IPRINT 3 PRINT CONTROL
IPLOT 1 PLOT CONTROL
GSCAL 0 HYDROGRAPH PLOT SCALE

16 HC

HYDROGRAPH COMBINATION
ICOMP 4 NUMBER OF HYDROGRAPHS TO COMBINE

*** *** *** *** *** ***

HYDROGRAPH AT STATION AP28

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CUMULATIVE AREA = 4.58 SQ MI
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<th>TIME OF PEAK</th>
<th>AVERAGE FLOW FOR MAXIMUM PERIOD</th>
<th>BASIN AREA</th>
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### SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
*(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)*

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**CONTINUITY SUMMARY (AC-FT)**

- **INFLOW=0.1812E+02**
- **EXCESS=0.0000E+00**
- **OUTFLOW=0.1811E+02**
- **BASIN STORAGE=0.9474E-02**
- **PERCENT ERROR= 0.0**

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- **PERCENT ERROR= 0.0**

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- **EXCESS=0.0000E+00**
- **OUTFLOW=0.5163E+02**
- **BASIN STORAGE=0.1718E-01**
- **PERCENT ERROR= 0.0**

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**CONTINUITY SUMMARY (AC-FT)**

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- **EXCESS=0.0000E+00**
- **OUTFLOW=0.1361E+02**
- **BASIN STORAGE=0.6878E-02**
- **PERCENT ERROR= 0.0**

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- **EXCESS=0.0000E+00**
- **OUTFLOW=0.7676E+02**
- **BASIN STORAGE=0.3147E-01**
- **PERCENT ERROR= 0.0**

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- **OUTFLOW=0.1048E+03**
- **BASIN STORAGE=0.3794E+00**
- **PERCENT ERROR= 0.0**

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**CONTINUITY SUMMARY (AC-FT)**

- **INFLOW=0.1275E+03**
- **EXCESS=0.0000E+00**
- **OUTFLOW=0.1275E+03**
- **BASIN STORAGE=0.1190E+00**
- **PERCENT ERROR= 0.0**

<table>
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<tr>
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<th>ELEMENT</th>
<th>DT (MIN)</th>
<th>PEAK CFS</th>
<th>TIME TO PEAK (IN)</th>
<th>VOLUME</th>
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**CONTINUITY SUMMARY (AC-FT)**

- **INFLOW=0.1349E+03**
- **EXCESS=0.0000E+00**
- **OUTFLOW=0.1349E+03**
- **BASIN STORAGE=0.1055E+00**
- **PERCENT ERROR= 0.0**

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<tr>
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<th>PEAK CFS</th>
<th>TIME TO PEAK (IN)</th>
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**CONTINUITY SUMMARY (AC-FT)**

- **INFLOW=0.1350E+03**
- **EXCESS=0.0000E+00**
- **OUTFLOW=0.1349E+03**
- **BASIN STORAGE=0.1055E+00**
- **PERCENT ERROR= 0.0**

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<th>TIME TO PEAK (IN)</th>
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CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3298E+03 EXCESS=0.0000E+00 OUTFLOW=0.3288E+03 BASIN STORAGE=0.9628E+00 PERCENT ERROR= 0.0

<table>
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<tr>
<th>RT-PM1</th>
<th>MANE</th>
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<th>107.12</th>
<th>366.09</th>
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<th>366.00</th>
<th>2.24</th>
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CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6448E+01 EXCESS=0.0000E+00 OUTFLOW=0.6446E+01 BASIN STORAGE=0.7579E-02 PERCENT ERROR= -0.1

<table>
<thead>
<tr>
<th>RT-AP12</th>
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<th>979.76</th>
<th>371.25</th>
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<th>3.00</th>
<th>974.98</th>
<th>372.00</th>
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CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3527E+03 EXCESS=0.0000E+00 OUTFLOW=0.3516E+03 BASIN STORAGE=0.1159E+01 PERCENT ERROR= 0.0

<table>
<thead>
<tr>
<th>RT-CS1</th>
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CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5244E+01 EXCESS=0.0000E+00 OUTFLOW=0.5233E+01 BASIN STORAGE=0.2491E-01 PERCENT ERROR= -0.3

<table>
<thead>
<tr>
<th>RT-AP14</th>
<th>MANE</th>
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<th>284.03</th>
<th>366.35</th>
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<th>366.00</th>
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CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2089E+02 EXCESS=0.0000E+00 OUTFLOW=0.2089E+02 BASIN STORAGE=0.2081E+01 PERCENT ERROR= -0.1

<table>
<thead>
<tr>
<th>RT-AP15</th>
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<th>406.34</th>
<th>366.25</th>
<th>3.08</th>
<th>3.00</th>
<th>405.99</th>
<th>366.00</th>
<th>3.08</th>
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CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2891E+02 EXCESS=0.0000E+00 OUTFLOW=0.2890E+02 BASIN STORAGE=0.2341E-01 PERCENT ERROR= -0.1

<table>
<thead>
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<th>RT-AP16</th>
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<th>427.19</th>
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<th>3.25</th>
<th>3.00</th>
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<th>366.00</th>
<th>3.25</th>
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CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3973E+02 EXCESS=0.0000E+00 OUTFLOW=0.3973E+02 BASIN STORAGE=0.7924E-02 PERCENT ERROR= 0.0

<table>
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<th>RT-DFA</th>
<th>MANE</th>
<th>1.11</th>
<th>8.98</th>
<th>499.60</th>
<th>1.00</th>
<th>3.00</th>
<th>8.98</th>
<th>498.00</th>
<th>1.00</th>
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CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7739E+01 EXCESS=0.0000E+00 OUTFLOW=0.7729E+01 BASIN STORAGE=0.9996E-02 PERCENT ERROR= 0.0

<table>
<thead>
<tr>
<th>RT-AP17</th>
<th>MANE</th>
<th>0.82</th>
<th>141.10</th>
<th>367.03</th>
<th>1.35</th>
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CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1605E+02 EXCESS=0.0000E+00 OUTFLOW=0.1603E+02 BASIN STORAGE=0.1607E-01 PERCENT ERROR= 0.0

<table>
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<th>RT-AP18</th>
<th>MANE</th>
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<th>1.51</th>
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</table>

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2146E+02 EXCESS=0.0000E+00 OUTFLOW=0.2145E+02 BASIN STORAGE=0.8548E-02 PERCENT ERROR= 0.0

<table>
<thead>
<tr>
<th>RT-AP19</th>
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<th>1748.21</th>
<th>370.93</th>
<th>2.23</th>
<th>3.00</th>
<th>1739.33</th>
<th>369.00</th>
<th>2.24</th>
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</table>
### Continuity Summary (AC-FT)

**Example 1:**
- **Inflow:** 0.4230E+03
- **Excess:** 0.0000E+00
- **Outflow:** 0.4220E+03
- **Basin Storage:** 0.1201E+01
- **Percent Error:** 0.0

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<th></th>
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</thead>
<tbody>
<tr>
<td>RT-F1p Mane</td>
<td>0.92</td>
<td>123.10</td>
<td>355.43</td>
<td>1.86</td>
<td>3.00</td>
<td>123.01</td>
<td>360.00</td>
<td>1.86</td>
</tr>
</tbody>
</table>

**Example 2:**
- **Inflow:** 0.1179E+02
- **Excess:** 0.0000E+00
- **Outflow:** 0.1178E+02
- **Basin Storage:** 0.1000E+01
- **Percent Error:** 0.0

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<th></th>
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<tbody>
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<td>108.57</td>
<td>369.00</td>
<td>-1.00</td>
<td>3.00</td>
<td>108.57</td>
<td>369.00</td>
<td>-1.00</td>
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</tbody>
</table>

**Example 3:**
- **Inflow:** 0.1409E+03
- **Excess:** 0.0000E+00
- **Outflow:** 0.1409E+03
- **Basin Storage:** 0.0000E+00
- **Percent Error:** 0.0

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<td>260.35</td>
<td>359.10</td>
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<td>260.20</td>
<td>360.00</td>
<td>11.05</td>
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**Example 4:**
- **Inflow:** 0.1605E+03
- **Excess:** 0.0000E+00
- **Outflow:** 0.1605E+03
- **Basin Storage:** 0.7076E+02
- **Percent Error:** 0.0

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<td>360.00</td>
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</table>

**Example 5:**
- **Inflow:** 0.1648E+03
- **Excess:** 0.0000E+00
- **Outflow:** 0.1648E+03
- **Basin Storage:** 0.7178E+02
- **Percent Error:** 0.0

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<td>361.50</td>
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<td>3.00</td>
<td>36.44</td>
<td>363.00</td>
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**Example 6:**
- **Inflow:** 0.1740E+03
- **Excess:** 0.0000E+00
- **Outflow:** 0.1740E+03
- **Basin Storage:** 0.7306E+02
- **Percent Error:** 0.0

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<tbody>
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<td>RT-AP25p Mane</td>
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<td>344.51</td>
<td>7.55</td>
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<td>461.12</td>
<td>345.00</td>
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**Example 7:**
- **Inflow:** 0.1870E+03
- **Excess:** 0.0000E+00
- **Outflow:** 0.1870E+03
- **Basin Storage:** 0.1510E+01
- **Percent Error:** 0.0

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<td>351.00</td>
<td>-1.00</td>
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<td>126.10</td>
<td>351.00</td>
<td>-1.00</td>
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**Example 8:**
- **Inflow:** 0.6191E+03
- **Excess:** 0.0000E+00
- **Outflow:** 0.6167E+03
- **Basin Storage:** 0.2701E+01
- **Percent Error:** 0.0

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<tbody>
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<td>3.00</td>
<td>140.10</td>
<td>351.00</td>
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CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1063E+02 EXCESS=0.0000E+00 OUTFLOW=0.1063E+02 BASIN STORAGE=0.4832E+02 PERCENT ERROR= 0.0

| RT-AP24S | NAME  | 0.90 | 158.95 | 365.40 | -1.00 | 3.00 | 158.39 | 366.00 | -1.00 |

*** NORMAL END OF HEC-1 ***
HEC-1 MODEL OUTPUT
INTERIM CONDITION

• 5-YEAR STORM
This program replaces all previous versions of NEC-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 DSN-CARD was changed with revisions dated 28 Sep 81. This is the FORTRAN77 version.

New options: DBBREAK OUTFLOW SUBMERGENCE, SINGLE EVENT DAMAGE CALCULATION, DSS:READ 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

*** FREE ***

*DIAGRAM

IT  3  0  0  300

IO  5

KK SB-IPN1

KM

KK RT-IPN1

KM

READ INPUT DATA

1  1  1  1

READ CHANNEL DATA

1  1  1  1

READ MATRIX DATA

1  1  1  1

READ OUTLET DATA

1  1  1  1

END OF INPUT

DD 2500 0.033 0.045

TRAP 100 15

KK SB-IPN2

KM

COMPUTE HYDROGRAPH FOR BASIN IPN2

BA  .229

LS  0  62.0

UD  .377

KK API11

KM

COMBINE ROUTED FLOW FROM BASIN IPN1 WITH FLOW FROM BASIN IPN2

HC  2
47  KK RT-API1
48  KM ROUTE THE FLOW IN THE NORTH FORK OF PINE CREEK FROM API1 TO API2
49  RD  2600  .034  .045  TRAP 12  2.5

50  KK SB-IPN3
51  KM COMPUTE HYDROGRAPH FOR BASIN IPN3
52  BA  .122
53  LS  0  63.3
54  UD  .268

55  KK API2
56  KM COMBINE THE ROUTED FLOW FROM API1 WITH THE FLOW FROM BASIN IPN3
57  HC  2

58  KK RT-API2
59  KM ROUTE THE FLOW IN THE NORTH FORK OF PINE CREEK FROM API2 TO API3
60  RD  1300  .026  .045  TRAP 30  4

61  KK SB-IPN4
62  KM COMPUTE HYDROGRAPH FOR BASIN IPN4
63  BA  .142
64  LS  0  62.1
65  UD  .198

66  KK API3
67  KM COMBINE THE ROUTED FLOW FROM API2 WITH THE FLOW FROM BASIN IPN4
68  HC  2

69  KK RT-API3
70  KM ROUTE THE FLOW IN THE NORTH FORK OF PINE CREEK FROM API3 TO API4
71  RD  1600  .02  .045  TRAP 20  3

72  KK SB-IPN5
73  KM COMPUTE HYDROGRAPH FOR BASIN IPN5
74  BA  .043
75  LS  0  62
76  UD  .169
77  KM ********************************************************************************************
78  KM **LAND DOWNSTREAM OF THIS POINT ASSUMED TO BE FULLY DEVELOPED ****
79  KM *******************************************************************************************

80  KK SB-PN9
81  KM COMPUTE HYDROGRAPH FOR BASIN PN9
82  BA  .036
83  LS  0  72.8
84  UD  .170

85  KK AP-4
86  KM COMBINE ROUTED FLOW FROM API3 WITH FLOW FROM BASINS IPN5 AND PN9
87  HC  3
88  KK  RT-AP4
89  KM  ROUTE THE FLOW IN PINE CREEK MAIN CHANNEL DOWN THE CHANNEL FROM AP4
90  KM  TO DETENTION FACILITY "E" AT THE COLLECTOR STREET CROSSING
91  RD  1400  .032  .045  TRAP  20  3

92  KK  SB-PN11
93  KM  COMPUTE HYDROGRAPH FOR BASIN PN11
94  BA  0.079
95  LS  0  76.7
96  UD  .189

97  KK  SB-PN12
98  KM  COMPUTE HYDROGRAPH FOR BASIN PN12
99  BA  0.039
100 LS  0  68.2
101 UD  .129

102 KK  SB-PN13
103 KM  COMPUTE HYDROGRAPH FOR BASIN PN13
104 BA  0.127
105 LS  0  74
106 UD  .195

107 KK  APDFE
108 KM  COMBINE ROUTED FLOW RT-AP4 WITH FLOW FROM BASINS PN11, PN12, AND PN13
109 KM  AT REGIONAL DETENTION FACILITY "E"
110 RC  4

111 KK  RR-DFE
112 KM  NOTE: THE INPUT POND VOLUME REFLECTS THE DESIGN POND VOLUME ON 7-23-98
113 KM  ROUTE FLOW THRU A DETENTION FACILITY. ASSUME A 34" DIA OUTLET WITH
114 KM  THE INVERT DEPRESSED 2' BELOW POND INVERT (INV EL=84). OUTLET Q ESTIMATED
115 KM  WITH BUREAU OF PUBLIC ROADS NOMOGRAPH FOR INLET CONTROL OF CULVERTS
116 KM  DISCHARGE ABOVE EL 100.3 INCLUDES FLOW OVER EMERGENCY SPILLWAY
117 KM  SCALE 1
118 KO  3  1
119 RS  1  STOR  0
120 SV  0  0  1.25  3.91  6.93  10.31  14.07  18.24  22.83  27.87
121 SE  784  786  788  790  792  794  796  798  800  802
122 SQ  0  25  80  136  173  210  240  263  280  1431

123 KK  RT-DFE
124 KM  ROUTE THE OUTFLOW FROM DETENTION FACILITY "E" IN A STORM DRAIN TO AP-5
125 RD  1800  .025  .013  CIRC  4.5

126 KK  SB-PN14
127 KM  COMPUTE HYDROGRAPH FOR BASIN PN14
128 BA  .027
129 LS  0  74.3
130 UD  .157
131  KK RT-PN14
132  KM  ROUTE FLOW FROM BASIN PN14 IN A STORM DRAIN TO AP5
133  RD  1400  .055  .013  CIRC  2
134  KK SB-PN15
135  KM  COMPUTE HYDROGRAPH FOR BASIN PN15
136  BA  .074
137  LS  0  72.7
138  UD  .186
139  KK  AP-5
140  KM  COMBINE ROUTED FLOW RT-PN14 TO FLOW FROM BASIN PN15
141  HC  3
142  KK RT-AP5
143  KM  ROUTE THE FLOW AT AP5 TO AP5A AT THE CONFLUENCE OF THE FLOWS FROM THE
144  KM  NORTH AND SOUTH FORKS OF PINE CREEK
145  RD  400  .025  .013  CIRC  5
146  KM  ******************************************
147  KM  *** BEGIN CALCULATIONS FOR THE SOUTH FORK OF PINE CREEK WATERSHED***
148  KM  ******************************************
149  KK SB-IPS1
150  KM  COMPUTE HYDROGRAPH FOR BASIN IPS1
151  BA  .147
152  LS  0  63.1
153  UD  .395
154  KK RT-IPS1
155  KM  ROUTE THE FLOW FROM BASIN IPS1 THROUGH BASIN IPS2 TO AP16
156  RD  2200  .027  .045  TRAP  10  20
157  KK SB-IPS2
158  KM  COMPUTE HYDROGRAPH FOR BASIN IPS2
159  BA  .104
160  LS  0  62.2
161  UD  .368
162  KK SB-IPS3
163  KM  COMPUTE HYDROGRAPH FOR BASIN IPS3
164  BA  .109
165  LS  0  62
166  UD  .250
167  KK RT-IPS3
168  KM  ROUTE THE FLOW FROM BASIN IPS3 THROUGH BASIN IPS4 TO AP14
169  RD  3250  .033  .045  TRAP  10  15
170  KK SB-IPS4
171  KM  COMPUTE HYDROGRAPH FOR BASIN IPS4
172  BA  .166
173  LS  0  62
174  UD  .305
HEC-1 INPUT

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

175   KK  AP14
176   KM  COMBINE THE ROUTED FLOW FROM BASIN IPS3 TO THE FLOW FROM BASIN IPS4
177   HC  2

178   KK  RT-AP14
179   KM  ROUTE THE FLOW FROM API4 THROUGH BASIN IPS5 TO API5
180   RD  3100  .029  .045  TRAP  10  35

181   KK  SB-IPS5
182   KM  COMPUTE HYDROGRAPH FOR BASIN IPS5
183   BA  .134
184   LS  0  62.5
185   UD  .302

186   KK  AP15
187   KM  COMBINE THE ROUTED FLOW FROM API4 TO THE FLOW FROM BASIN IPS5
188   HC  2

189   KK  RT-AP15
190   KM  ROUTE THE FLOW FROM API5 THROUGH IPS2 API6
191   RD  1700  .031  .045  TRAP  50  35

192   KK  AP16
193   KM  COMBINE THE ROUTED FLOW FROM API5 WITH THE ROUTED FLOW FROM BASIN IPS1
194   KM  AND THE FLOW FROM BASIN IPS2 AT API6
195   HC  3

196   KK  SB-PS10
197   KM  COMPUTE HYDROGRAPH FOR BASIN PS10 (FULLY DEVELOPED CONDITION)
198   BA  .058
199   LS  0  72.9
200   UD  .160

201   KK  APDPC
202   KM  COMBINE FLOW AT FLOW FROM API6 WITH FLOW FROM BASIN PS10 IN REGIONAL
203   KM  DETENTION FACILITY "C". THIS IS THE TOTAL INFLOW TO DETENTION FACILITY "C"
204   HC  2

205   KK  RR-DFC
206   KM  ROUTE THE FLOW THROUGH DETENTION FACILITY "C". ASSUME GRADING FOR THE
207   KM  FULLY DEVELOPED CONDITION DETENTION POND IS COMPLETE BUT OUTFALL IS NOT
208   KM  CONSTRUCTED SO POND FUNCTIONS AS A RETENTION POND.
209   KO  3  1  100
210   RS  1  STOR  0
211   SV  0  2.73  9.72  18.56  28.03  38.15  48.95  60.45  72.75  85.05
212   SV  99.66
213   SE  62  64  66  68  70  72  74  76  78  80
214   SE  82
215   SQ  0  0  0  0  0  0  0  0  0  0
216   SQ  0.10
LINE | 10......1......2......3......4......5......6......7......8......9......10

217 | KK SB-IPS6
218 | KM COMPUTE HYDROGRAPH FOR BASIN IPS6
219 | BA .132
220 | LS 0 62
221 | UD .352

222 | KK RT-IPS6
223 | KM ROUTE THE FLOW FROM BASIN IPS6 THROUGH BASIN IPS7 TO API7
224 | RD 4250 .028 .045 TRAP 25 10

225 | KK SB-IPS7
226 | KM COMPUTE HYDROGRAPH FOR BASIN IPS7
227 | BA .209
228 | LS 0 62.6
229 | UD .289

230 | KK API7
231 | KM COMBINE THE ROUTED FLOW FROM BASIN IPS6 WITH THE FLOW FROM BASIN IPS7
232 | HC 2

233 | KK RT-API7
234 | KM ROUTE THE FLOW FROM API7 TO API8
235 | RD 2300 .028 .045 TRAP 20 3

236 | KK SB-IPS8
237 | KM COMPUTE HYDROGRAPH FOR BASIN IPS8
238 | BA .088
239 | LS 0 62.7
240 | UD .265

241 | KK SB-IPS9
242 | KM COMPUTE HYDROGRAPH FOR BASIN IPS9 (ASSUMED 23 ACRES OF SAGEWOOD DEVELOPED)
243 | BA .059
244 | LS 0 73.9
245 | UD .165

246 | KK API8
247 | KM COMBINE THE ROUTED FLOW FROM API7 TO THE FLOW FROM BASINS IPS8 AND IPS9
248 | HC 3

249 | KK RT-API8
250 | KM ROUTE THE FLOW FROM DPI8 TO DPI9
251 | RD 1200 .025 .045 TRAP 20 3

252 | KKS8-IPS10
253 | KM COMPUTE HYDROGRAPH FOR BASIN IPS10 (YMCA SITE AND 16 ACRES OF EXISTING
254 | KM RESIDENTIAL DEVELOPMENT ASSUMED TO BE DEVELOPED)
255 | BA .122
256 | LS 0 71.5
257 | UD .176
HEC-1 INPUT

LINE

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

258  KK  API19
259  KM  COMBINE THE ROUTED FLOW FROM API18 TO THE FLOW FROM BASIN IPS10
260  KM  ALSO ADD THE OUTFLOW HYDROGRAPH FROM DETENTION FACILITY "C" (NO OUTFLOW)
261  KM  TO PROVIDE CONTINUITY IN THE MODEL
262  HC  3

263  KK  RT-AP19
264  KM  ROUTE THE FLOW IN THE SOUTH FORK OF PINE CREEK FROM API19 TO DETENTION
265  KM  FACILITY "B"
266  RD  3400 .027 .045       TRAP  20  3
267  KM  *****************************************************************
268  KM  ***** DOWNSTREAM BASINS ASSUMED TO BE FULLY DEVELOPED ************
269  KM  *****************************************************************

270  KK  SB-PS11
271  KM  COMPUTE HYDROGRAPH FOR BASIN PS11
272  BA  .056
273  LS  0  80.3
274  UD  .172

275  KK  SB-PS12
276  KM  COMPUTE HYDROGRAPH FOR BASIN PS12
277  BA  .153
278  LS  0  69.0
279  UD  .233

280  KK  APDFB
281  KM  COMBINE THE ROUTED FLOW FROM API19 TO THE FLOW FROM BASINS IPS11 AND IPS12
282  KM  AT DETENTION FACILITY "B". THIS IS THE TOTAL INTERIM CONDITION INFLOW TO
283  KM  DETENTION FACILITY "B"
284  HC  3

285  KK  RR-DFB
286  KM  ROUTE FLOW THROUGH REGIONAL DETENTION POND "B"
287  KM  THIS VOLUME REFLECTS THE DESIGN VOLUME PER PRELIMINARY PLANS ON 7-23-98
288  KM  WITH 54" DIA OUTLET SET AT INVERT ELEV. 70.2. OUTLET Q ESTIMATED WITH
289  KM  BUREAU OF PUBLIC ROADS NOMO GRAPH FOR INLET CONTROL OF CONCRETE PIPE
290  KM  DISCHARGE ABOVE 87.6 INCLUDES FLOW OVER 80' LONG EMERGENCY SPILLWAY
291  KM  SCALE 1
292  KD  3  1
293  RS  1  STOR  0
294  SV  0  0.06  1.17  3.30  5.82  8.73  12.07  15.85  20.07  23.60
295  SV  24.76  29.96
296  SE  71.2  72.0  74  76  78  80  82  84  86  87.6
297  SE  88  90
298  SQ  0  22  73  130  169  202  236  260  285  301
299  SQ  371  1222

300  KK  RT-DFB
301  KM  ROUTE FLOW 1000 LF NORTHWEST IN A STORM DRAIN FROM DETENTION FACILITY "B"
302  KM  TO AP-11
303  RD  1000 .021 .013       CIRC  4.5
HEC-1 INPUT

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

304  KK  SB-PS13
305  KM  COMPUTE HYDROGRAPH FOR BASIN PS13
306  BA  .065
307  LS  0  74.1
308  UD  .149

309  KK  AP11
310  KM  COMBINE ROUTED FLOW RT-DF8 TO FLOW FROM BASIN PS13 AT AP11
311  HC  2

312  KK  RT-AP11
313  KM  ROUTE FLOW 600 LF NORTHWEST IN A STORM DRAIN FROM AP11 TO AP5A (THE
314  KM  CONFLUENCE OF FLOWS FROM THE NORTH AND SOUTH FORKS OF PINE CREEK)
315  RD  600  .021  .013  CIRC  5

316  KK  AP5A
317  KM  COMBINE ROUTED FLOW AP5 (FLOW FROM THE NORTH FORK OF PINE CREEK) TO ROUTED
318  KM  FLOW RT-AP11 (FLOW FROM THE SOUTH FORK OF PINE CREEK)
319  HC  2

320  KK  RT-AP5A
321  KM  ROUTE THE FLOW IN PINE CREEK MAIN CHANNEL 1300 FEET DOWN THE CHANNEL FROM
322  KM  AP5A NEAR THE HISTORIC CONFLUENCE OF PINE CREEK TO AP12 AT THE CONFLUENCE
323  KM  OF THE MAIN CHANNEL AND THE LEXINGTON DRIVE STORM DRAIN OUTFALL. USE AN
324  KM  APPROXIMATE AVERAGE CHANNEL SECTION AND SLOPE FOR ROUTING.
325  RD  1300  .023  .045  TRAP  50  2

326  KK  SB-PM1
327  KM  COMPUTE HYDROGRAPH FOR BASIN PM1
328  BA  .054
329  LS  0  78.5
330  UD  .203

331  KK  RT-PM1
332  KM  ROUTE THE FLOW FROM BASIN PM1 1200 LF NORTH IN THE LEXINGTON DR. S.D. TO
333  KM  PINE CREEK MAIN CHANNEL.
334  RD  1200  .08  .013  CIR  3.5

335  KK  SB-PM2
336  KM  COMPUTE HYDROGRAPH FOR BASIN PM2, AN AREA OF THE GOLF COURSE
337  BA  .154
338  LS  0  66.0
339  UD  .310

340  KK  SB-PM3
341  KM  COMPUTE HYDROGRAPH FOR BASIN PK3
342  BA  .067
343  LS  0  73.5
344  UD  .248
LINE   ID......1.......2........3........4........5........6........7........8........9........10

345   KK  AP12
346   KM  COMBINE ROUTED FLOW RT-PM1 WITH THE ROUTED FLOW IN PINE CREEK MAIN CHANNEL
347   KM  AND THE FLOW FROM BASINS PM2 AND PM3
348   HC  4
349   KK  RT-AP12
350   KM  ROUTE THE FLOW IN PINE CREEK MAIN CHANNEL DOWN THE CHANNEL FROM AP12 NEAR THE
351   KM  OUTFALL OF LEXINGTON DRIVE STORM DRAIN TO THE CROSSING AT CHAPEL HILLS DRIVE
352   KM  USE AN APPROXIMATE AVERAGE CHANNEL SECTION AND SLOPE FOR ROUTING.
353   RD  1600  0.018  0.045  TRAP  30   2
354   KK  SB-PM4
355   KM  COMPUTE HYDROGRAPH FOR BASIN PM4
356   BA  0.111
357   LS  0   71.9
358   UD  0.170
359   KK  AP13
360   KM  COMBINE FLOW FROM BASIN PM4 TO THE ROUTED FLOW RT-AP12 IN PINE CREEK MAIN
361   KM  CHANNEL ON THE EAST SIDE OF THE CHAPEL HILLS DRIVE CROSSING
362   HC  2
363   KM  *******************************************************************************************************************************************
364   KM  ****BEGIN SOUTH CHAPEL HILLS DRIVE STORM DRAIN WATERSHED***************************************************************************
365   KM  *******************************************************************************************************************************************
366   KK  SB-CS1
367   KM  COMPUTE HYDROGRAPH FOR BASIN CS1
368   BA  0.053
369   LS  0   73.6
370   UD  0.181
371   KK  RT-CS1
372   KM  ROUTE FLOW 1300 LF WEST IN DYNAMIC DR. ASSUME BULK OF FLOW IS ON THE SURFACE
373   RD  1300  0.021  0.013  TRAP  32   .01
374   KK  SB-CS2
375   KM  COMPUTE HYDROGRAPH FOR BASIN CS1
376   BA  0.070
377   LS  0   98.0
378   UD  0.101
379   KKRR-DFCS2
380   KM  ROUTE FLOW THRU AN ASSUMED DETENTION FACILITY TO REFLECT DETENTION OF 1.6cfs
381   KM  /ACRE FROM THE I/O PROPERTY AS ASSUMED IN THE MDP FOR BRIARGATE BUSINESS
382   KM  CAMPUS. BECAUSE THE DISCHARGE CONFIGURATION IS UNKNOWN AT THIS TIME ASSUME
383   KM  THAT THE PEAK DISCHARGE RATE MAY BE DISCHARGED AS SOON AS IT IS AVAILABLE AT
384   KM  THE POND TO REFLECT POTENTIAL FREE DISCHARGE FROM A PORTION OF THE SUBBASIN
385   KM  DISCHARGE REDUCTION ASSUMED AT 1.6 cfs x 37ac=60 cfs
386   RS  1  STOR   0
387   SV  0    0.001 6   10
388   SE  100  102  104  106
389   SQ  0   194  194  194
LINE
ID....1....2....3....4....5....6....7....8....9....10

390  KK  AP14
391  KM  COMBINE ROUTED FLOW RT-CS1 TO CONTROLLED FLOW FROM BASIN CS2 AT THE
392  KM  INTERSECTION OF CHAPEL HILLS DR. AND DYNAMIC DR.
393  HC  2
394  KK  RT-AP14
395  KM  ROUTE FLOW 1100 LF NORTH IN THE CHAPEL HILLS DR. S.D. TO BRIARGATE PKWY.
396  KM  NOTE: THE CALCULATED 100 YEAR FLOW IS IN EXCESS OF THE FULL PIPE CAPACITY
397  KM  OF THE STORM DRAIN BETWEEN DYNAMIC DRIVE AND BRIARGATE PARKWAY. SOME OF
398  KM  THE FLOW MAY BE ON THE SURFACE IN CHAPEL HILLS DRIVE.
399  RD  1100  .02  .013  CIR  4

400  KK  SB-CS3
401  KM  COMPUTE HYDROGRAPH FOR BASIN CH3
402  BA  .053
403  LS  0  84.8
404  UD  .177

405  KKRR-DFCS3
406  KM  ROUTE FLOW THRU AN ASSUMED DETENTION FACILITY TO REFLECT DETENTION REDUCING
407  KM  THE PEAK 100YR FLOW RATE FROM THE 9 ACRES OF THE BASIN THAT ARE DESIGNATED
408  KM  AS L/R USE AS ASSUMED IN MODD FOR BRIARGATE BUSINESS CAMPUS.
409  KM  BECAUSE THE DISCHARGE CONFIGURATION IS UNKNOWN AT THIS TIME ASSUME
410  KM  THAT THE PEAK DISCHARGE RATE MAY BE DISCHARGED AS SOON AS IT IS AVAILABLE
411  KM  AT THE POND TO REFLECT FREE DISCHARGE FROM A PORTION OF THE SUB BASIN.
412  KM  DISCHARGE REDUCTION ASSUMED AT 1.6 cfs x 9=14 cfs
413  RS  1  STOR  0
414  SV  0  .001  6  10
415  SE  100  102  104  106
416  SQ  0  123  123  123

417  KK  AP15
418  KM  COMBINE ROUTED FLOW RT-AP14 WITH CONTROLLED FLOW FROM BASIN CS3 AT THE
419  KM  INTERSECTION OF CHAPEL HILLS DR. AND BRIARGATE PARKWAY. NOTE A SMALL PORTION
420  KM  OF BASIN CS3 IS LOCATED DOWNSTREAM OF THIS POINT. FOR THIS MODELING PURPOSE
421  KM  THIS IS CONSIDERED INSIGNIFICANT.
422  HC  2

423  KK  RT-AP15
424  KM  ROUTE FLOW 1400 LF NORTH IN THE CHAPEL HILLS DR. S.D.
425  KM  NOTE: THE CALCULATED 100 YEAR FLOW IS IN EXCESS OF THE FULL PIPE CAPACITY
426  KM  OF THE STORM DRAIN BETWEEN BRIARGATE PARKWAY AND PINE CREEK. SOME OF
427  KM  THE FLOW MAY BE ON THE SURFACE IN CHAPEL HILLS DRIVE. A SMALL PORTION OF
428  KM  THE SURFACE FLOW MAY BE DIVERTED DOWN BRIARGATE PARKWAY, BUT FOR THE PURPOSE
429  KM  OF THIS ANALYSIS ALL OF THE FLOW FROM THE CHAPEL HILLS DRIVE/BRIARGATE PKY.
430  KM  INTERSECTION IS ASSUMED TO REACH PINE CREEK AT CHAPEL HILLS DRIVE.
431  RD  1400  .045  .013  CIR  4.5

432  KK  SB-CS4
433  KM  COMPUTE HYDROGRAPH FOR BASIN CS4
434  BA  .053
435  LS  0  95.5
436  UD  .101
437    KK RR-DFVC
438    KM ROUTE FLOW THRU THE PROPOSED VILLAGE CENTER DETENTION FACILITY
439    KM POND GRADING PER THE PRELIMINARY GRADING SHOWN IN THE MDDP FOR VILLAGE
440    KM CENTER. DISCHARGE ASSUMES USE OF THE EXISTING 18" DIAMETER STUB.
441    KM WITH THE INVERT SET AT ELEVATION 73. BUREAU OF PUBLIC ROADS NOMOGRAPH
442    KM USED TO ESTIMATE OUTFLOW RATES ASSUMING INLET CONTROL.
443    RS  1  STOR  0
444    SV  000 .032  1.67  3.23  5.00  7.00
445    SE  73  74  76  78  80  82
446    SQ  0  3  13  17  20  22

447    KK AP16
448    KM COMBINE ROUTED FLOW RT-AP15 WITH THE DISCHARGE FROM THE VILLAGE CENTER POND
449    WC  2

450    KK RT-AP16
451    KM ROUTE THE FLOW IN THE CHAPEL HILLS DRIVE STORM DRAIN FROM AP16 TO AP19 IN
452    KM PINE CREEK MAIN CHANNEL ON THE DOWNSTREAM SIDE OF THE CHAPEL HILLS DRIVE
453    KM CROSSING
454    RD  300 .03 .013  CIR  4.5
455    KM *********************************************
456    KM *********************************************
457    KM *********************************************

458    KK SB-CN1
459    KM COMPUTE RUNOFF FROM BASIN CN1 THE WATERSHED CONTRIBUTING TO THE PARK SITE AT
460    KM CHAPEL HILLS DRIVE POND (REGIONAL DETENTION FACILITY "A").
461    BA  .145
462    LS  0  76.8
463    UD  .190

464    KK RR-DFA
465    KM ROUTE THE FLOW FROM CN1 THROUGH THE PROPOSED DETENTION POND AT THE PARK
466    KM SITE AT CHAPEL HILLS DRIVE. STAGE STORAGE CURVE PER THE 12/22/97 GRADING PLAN
467    KM DISCHARGE CURVE REFLECTS 12" DIAMETER OUTLET PIPE CONTROL FOR NORMAL DISCHARG
468    KM AND A 100' LONG EMERGENCY SPILLWAY SET AT ELEVATION 6805.5
469    KO  3  1  100
470    RS  1  STOR  0
471    SV  0 .01 .22 .99  1.95  2.80  4.25  5.31  6.51  11.64
472    SV  15.36
473    SQ  2.35  2.54  3.00  3.73  4.35  4.75  5.36  5.50  8.39  9.01
474    SQ  279
475    SE  6796.6  6797.0  6798.0  6800.0  6802.0  6803.5  6803.51  6804  6804.1  6805.5
476    SE  6806.5

477    KK RT-DFA
478    KM ROUTE OUTFLOW FROM REGIONAL DETENTION POND "A" DOWN THE CHAPEL HILLS STORM
479    KM DRAIN FROM LEXINGTON DRIVE TO TREELAKE DRIVE
480    RD  930 .04 .013  CIRC  1.5
HEC-1 INPUT

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

481  KK SB-CN2
482  KM COMPUTE RUNOFF FROM BASIN CN2
483  BA 0.078
484  LS 0 75.5
485  UD 0.214

486  KK AP17
487  KM COMBINE ROUTED FLOW RT- DFA AND FLOW FROM BASIN CN2 AT THE INTERSECTION OF
488  KM CHAPEL HILLS DRIVE AND TREELAKE DRIVE
489  RC 2

490  KK RT-AP17
491  KM ROUTE FLOW AT AP17 DOWN THE CHAPEL HILLS DRIVE STORM DRAIN TO MULLIGAN DR.
492  RD 1400 0.05 0.013 CIRC 3.5

493  KK SB-CN3
494  KM COMPUTE RUNOFF FROM BASIN CN3
495  BA 0.043
496  LS 0 80.0
497  UD 0.157

498  KK AP18
499  KM COMBINE ROUTED FLOW RT-AP17 TO FLOW FROM BASIN CN3 AT INTERSECTION OF CHAPEL
500  KM HILLS DR. AND MULLIGAN DR.
501  RC 2

502  KK RT-AP18
503  KM ROUTE FLOW AT AP18 DOWN THE CHAPEL HILLS DRIVE STORM DRAIN TO AP19 IN THE
504  KM PINE CREEK MAIN CHANNEL ON THE DOWNSTREAM SIDE OF THE CHAPEL HILLS DRIVE
505  KM CROSSING. NOTE A SMALL PORTION OF BASIN CHN3 IS LOCATED SOUTH OF AP18. THIS
506  KM IS CONSIDERED INSIGNIFICANT FOR THE PURPOSE OF THIS ANALYSIS.
507  RD 600 0.04 0.013 CIRC 3.5

508  KK AP19
509  KM COMBINE ROUTED FLOW RT-AP18 FROM THE NORTH CHAPEL HILLS DR. STORM DRAIN
510  KM WITH THE ROUTED FLOW RT-AP16 FROM THE SOUTH CHAPEL HILLS DRIVE STORM DRAIN
511  KM AND THE FLOW IN PINE CREEK MAIN CHANNEL (AP13) AT THE WEST SIDE OF THE CHAPEL
512  KM HILLS DRIVE CROSSING. FLOW THAT IS TAKEN INTO THE PINE CREEK CHANNEL FORM THE
513  KM STREET AT THIS POINT HAS BEEN ACCOUNTED FOR IN BASINS CN3 AND CS3. THIS WAS
514  KM DONE TO REDUCE THE COMPLEXITY OF THE MODEL.
515  RC 3

516  KK RT-AP19
517  KM ROUTE THE FLOW IN PINE CREEK MAIN CHANNEL FROM AP19 AT THE CHAPEL HILLS DRIVE
518  KM CROSSING TO AP20 AT REGIONAL DETENTION FACILITY 1 AT BRIARGATE PARKWAY AND
519  KM HIGHWAY 83. USE AVERAGE SLOPES AND APPROXIMATE CROSS SECTIONS FOR ROUTING.
520  RD 750 0.035 .045 TRAP 30 2
521  RD 1000 0.025 0.045 TRAP 120 2
522  RD 1400 0.026 0.045 TRAP 60 2
HEC-1 INPUT

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

523  KK  SB-PM5
524  KM  COMPUTE HYDROGRAPH FOR BASIN PM5
525  BA  .183
526  LS  0  70.0
527  UD  .165

528  KK  AP20
529  KM  COMBINE FLOW FROM BASIN PM6 WITH THE ROUTED FLOW IN PINE CREEK
530  HC  2

531  KK  SB-PM6
532  KM  COMPUTE HYDROGRAPH FOR PM6 THE AREA BETWEEN CHAPEL HILLS DR. AND DETENTION
533  KM  FACILITY 1 BOUNDED BY THE GOLF COURSE AND BRIARGATE PARKWAY. NOTE: THE MDDP
534  KM  FOR BRIARGATE BUSINESS CAMPUS REQUIRES DETENTION IN THIS SUBBASIN. FOR THE
535  KM  PURPOSE OF THIS ANALYSIS NO DETENTION IS ASSUMED TO ALLOW THE DEVELOPER THE
536  KM  OPTION OF CONSTRUCTING LARGER CONVEYANCE FACILITIES TO DETENTION FACILITY
537  KM  NO. 1 AND ALLOWING FREE DISCHARGE FROM THE BASIN.
538  BA  .088
539  LS  0  96
540  UD  .110

541  KK  AP21
542  KM  COMBINE FLOW FROM PM6 WITH THE FLOW IN PINE CREEK AT AP21 FOR THE TOTAL FLOW
543  KM  IN PINE CREEK CHANNEL AS IT ENTERS DETENTION FACILITY No 1
544  HC  2

545  KK  SB-PM7
546  KM  COMPUTE HYDROGRAPH FOR BASIN PM7 THE AREA NORTH OF DETENTION FACILITY 1
547  KM  NOTE: THE MDDP FOR THE BRIARGATE BUSINESS CAMPUS REQUIRES DETENTION IN
548  KM  THE NON RESIDENTIAL PORTIONS OF THIS AREA. FOR THE PURPOSE OF THIS ANALYSIS
549  KM  FREE DISCHARGE FROM THE BASIN IS ASSUMED. THE RESIDENTIAL PORTION OF THE
550  KM  BASIN LOCATED OUTSIDE THE CITY LIMITS IS ASSUMED TO BE FULLY DEVELOPED
551  KM  AS 1 DU PER ACRE RESIDENTIAL.
552  BA  .138
553  LS  0  76.3
554  UD  .353

555  KM  *********************************************************
556  KM  *****************************************************
557  KM  *****************************************************
558  KK  SB-F1
559  KM  COMPUTE HYDROGRAPH FOR BASIN F1
560  BA  .119
561  LS  0  78.3
562  UD  .208

563  KK  RT-F1P
564  KM  ROUTE FLOW IN THE STORM DRAIN 1300 LF WEST FROM THE SAG PT. IN LEXINGTON
565  KM  DRIVE TO SUMMER FIELD POND
566  RD  1300  .036  .013  CIRC  3
HEC-1 INPUT

LINE

10.1.2.3.4.5.6.7.8.9.10

567  KK  SB-F2
568  KM  COMPUTE HYDROGRAPH FOR BASIN F2
569  BA  .039
570  LS  0  74
571  UD  .171

572  KK  AP-DFS
573  KM  COMBINE ROUTED FLOW RT-F1P WITH FLOW FROM F2 AT THE SUMMER
574  KM  FIELD POND. THIS IS THE TOTAL FLOW TO THE POND
575  HC  2

576  KK  RR-DFS
577  KM  ROUTE THE FLOW AT AP-DFSF THROUGH THE SUMMER FIELD DETENTION BASIN.
578  KM  THE INFLOW/OUTFLOU S.D. FOR THIS FACILITY IS BURIED BELOW THE POND BOTTOM.
579  KM  THE POND FILLS WHEN THE CAPACITY OF THE DOWNSTREAM REACH OF S.D. IS
580  KM  EXCEEDED. THIS CONFIGURATION PRESENTS A COMPLEX HYDRAULIC PROBLEM. IT IS
581  KM  ASSUMED THAT UNTIL INFLOW >120cfs FLOW WILL PASS THROUGH THE STORM DRAIN.
582  KM  WHEN INFLOW > 120cfs BACKWATER WILL FORM AT THE OUTLET AND THE LID ON THE
583  KM  UPSTREAM MANHOLE WILL LIKELY BE LIFTED OFF AND SOME FLOW WILL ENTER THE POND
584  KM  FROM THAT POINT. WHEN INFLOW>120cfs IT IS ASSUMED THAT THE HEAD LOSS AT
585  KM  THE OUTLET WILL BE APPROXIMATELY 1*VELOCITY HEAD FOR THE PURPOSE OF
586  KM  CALCULATING THE DISCHARGE CURVE.
587  KM  NOTE: THE OUTFLOW CURVE WAS MODIFIED IN THIS MODEL TO ALLOW THE 5 YEAR
588  KM  STORM TO RUN. AT ELEV. 92 SQ OF 80 WAS SUBSTITUTED FOR 120. THIS CHANGE
589  KM  IS CONSIDERED INSIGNIFICANT AT THE 5 YEAR Q
590  KO  3  1  100
591  RS  1  STOR  0
592  SV  0  0.57  4.63  6.87  10.32
593  SE  92  94  96  98  100
594  SQ  80  126  131  137  144

595  KK  RT-DFS
596  KM  ROUTE OUTFLOW FROM THE DETENTION BASIN IN A 48h S.D. TO RESEARCH PKWY.
597  RD  800  .018  .013  CIRC  4

598  KK  SB-F3
599  KM  COMPUTE HYDROGRAPH FOR BASIN F3
600  BA  .114
601  LS  0  77.0
602  UD  .215

603  KK  AP22
604  KM  COMBINE ROUTED FLOW RT-DFSF TO FLOW FROM BASIN F3 AT THE INTERSECTION OF
605  KM  RESEARCH PARKWAY AND SUMMERSET DRIVE.
606  HC  2

607  KKRT-AP22P
608  KM  ROUTE THE S.D.FLOW FROM THE BRIARGATE PKWY/ SUMMERSET INTERSECTION TO THE
609  KM  INTERSECTION OF RESEARCH PKWY, AND CHAPEL HILLS DR.
610  RD  2100  .02  .013  CIRC  5
LINE

611  KK  SB-F4
612  KM  COMPUTE HYDROGRAPH FOR BASIN F4
613  BA  .038
614  LS  0  83.0
615  UD  .197

616  KK  RR-DFF4
617  KM  ROUTE FLOW THRU A POND ROUTING ROUTINE TO REFLECT REDUCTION IN PEAK FLOW
618  KM  RATE OF 1.6 CFS/ACRE FROM THE 11.5 AC THAT WILL BE DEVELOPED AS LI/O
619  KM  DISCHARGE REDUCTION PER ACRE IS DETERMINED PER THE RATE AND AREA INCLUDED
620  KM  IN THE NDDP FOR BRIARGATE BUSINESS CAMPUS
621  KM  THE ROUTING ROUTINE ONLY REGULATES THE PEAK DISCHARGE AND DOES NOT LAG
622  KM  THE DISCHARGE. THIS IS APPROPRIATE AS A PORTION OF THE SITE WILL LIKELY
623  KM  FREE DISCHARGE TO THE ADJACENT STREET
624  KM  DISCHARGE REDUCTION = LI/O AREA (acres)\(\times 1.6\) cfs = 18.4 cfs
625  RS  1  STOR  0
626  SV  0  .001  6  10
627  SE  100  102  104  106
628  SQ  0  70.6  70.6  70.6

629  KK  AP23
630  KM  COMBINE ROUTED FLOW RT-AP22P TO FLOW FROM BASIN F4 AT THE INTERSECTION OF
631  KM  RESEARCH PARKWAY AND CHAPEL HILLS DR.
632  HC  2

633  KKRT-AP23P
634  KM  ROUTE THE FLOW IN THE STORM DRAIN FROM THE RESEARCH PKWY/CHAPEL HILLS DR.
635  KM  INTERSECTION TO THE INTERSECTION OF EXPLORER DRIVE AND THE FOCUS ON THE
636  KM  FAMILY S.D.
637  RD  2100  .044  .013  CIRC  4

638  KK  SB-F5
639  KM  COMPUTE HYDROGRAPH FOR BASIN F5
640  BA  .064
641  LS  0  95.5
642  UD  .121

643  KK  RR-DFF5
644  KM  ROUTE FLOW THRU A POND ROUTING ROUTINE TO REFLECT REDUCTION IN PEAK FLOW
645  KM  RATE BASED ON APPROXIMATELY 35% OF THE DIFFERENCE BETWEEN THE DEVELOPED
646  KM  AND HISTORIC PEAK 100 YR FLOW RATE PER THE ORIGINAL DBPS CRITERIA FOR LI/O
647  KM  LAND USE. HISTORIC 100 YR PEAK ESTIMATED AT 1.5 CFS/AC. FULLY DEVELOPED 100
648  KM  YR PEAK ESTIMATED AT 5.6 CFS/AC. ESTIMATED REQUIRED DETENTION =
649  KM  \((5.6-1.5)\)*,35*35AC=50cfs  TOTAL Qin=225cfs
650  KM  THE ROUTING ROUTINE ONLY REGULATES THE PEAK DISCHARGE AND DOES NOT LAG
651  KM  THE DISCHARGE. THIS IS APPROPRIATE AS A PORTION OF THE BASIN DISCHARGES
652  KM  DIRECTLY TO THE ADJACENT STREET AND STORM DRAIN
653  RS  1  STOR  0
654  SV  0  .001  6  10
655  SE  100  102  104  106
656  SQ  0  175  175  175
LINE

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

657  KK  AP24
658  KM  COMBINE THE ROUTED FLOW IN THE S.D. (RTAP102) TO FLOW FROM FF1
659  HC  2

660  KKRT-AP24P
661  KM  ROUTE THE FLOW IN THE FOCUS STORM DRAIN FROM AP24 AT THE INTERSECTION OF
662  KM  EXPLORER DRIVE AND THE FOCUS S.D. TO AP25 AT THE INTERSECTION OF EXPLORER
663  KM  DRIVE & BRIARGATE PKWY
664  RD  800 .011 .013  CIRC  5.5

665  KK  SB-F6
666  KM  COMPUTE HYDROGRAPH FOR BASIN F6
667  BA  .038
668  LS  0  98.0
669  UD  .106

670  KK  RR-DF6
671  KM  ROUTE FLOW THRU A POND ROUTING ROUTINE TO REFLECT REDUCTION IN PEAK FLOW
672  KM  RATE BASED ON APPROXIMATELY 35% OF THE DIFFERENCE BETWEEN THE DEVELOPED
673  KM  AND HISTORIC PEAK 100 YR FLOW RATE. HISTORIC ESTIMATED AT 1.5 CFS/AC.
674  KM  FULLY DEVELOPED ESTIMATED AT 5.0 CFS/AC. ESTIMATED REQUIRED DETENTION =
675  KM  (6.0-1.5)*.35*21.5AC=34cfs  TOTAL Qin=138cfs
676  KM  THE ROUTING ROUTINE ONLY REGULATES THE PEAK DISCHARGE AND DOES NOT LAG
677  KM  THE DISCHARGE. THIS IS APPROPRIATE AS A PORTION OF THE BASIN DISCHARGES
678  KM  DIRECTLY TO THE ADJACENT STREET AND STORM DRAIN
679  RS  1  STOR  0
680  SV  0 .001  6  10
681  SE  100  102  104  106
682  SQ  0  104  104  104

683  KK  SB-F7
684  KM  COMPUTE HYDROGRAPH FOR BASIN F7
685  BA  .052
686  LS  0  93.0
687  UD  .137

688  KK  RR-DF7
689  KM  ROUTE FLOW THRU A POND ROUTING ROUTINE TO REFLECT REDUCTION IN PEAK FLOW
690  KM  RATE BASED ON APPROXIMATELY 35% OF THE DIFFERENCE BETWEEN THE DEVELOPED
691  KM  AND HISTORIC PEAK 100 YR FLOW RATE. HISTORIC ESTIMATED AT 1.5 CFS/AC.
692  KM  FULLY DEVELOPED ESTIMATED AT 5.2 CFS/AC. ESTIMATED REQUIRED DETENTION =
693  KM  (5.2-1.5)*.35*29AC=38cfs  TOTAL Qin=170cfs
694  KM  THE ROUTING ROUTINE ONLY REGULATES THE PEAK DISCHARGE AND DOES NOT LAG
695  KM  THE DISCHARGE. THIS IS APPROPRIATE AS A PORTION OF THE BASIN DISCHARGES
696  KM  DIRECTLY TO THE ADJACENT STREET AND STORM DRAIN
697  RS  1  STOR  0
698  SV  0 .001  6  10
699  SE  100  102  104  106
700  SQ  0  132  132  132
HEC-1 INPUT

LINE

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

701  KK      AP25
702  KM      COMBINE ROUTED FLOW RT-AP25P TO CONTROLLED FLOW FROM BASINS F6 AND F7
703  KM      AT THE INTERSECTION OF EXPLORER DR AND BRIARGATE PKWY.
704  HC      3

705  XXRT-AP25P
706  KM      ROUTE THE FLOW IN THE S.D. FROM THE INTERSECTION OF EXPLORER DR. & BRIARGATE
707  KM      PARKWAY TO DETENTION FACILITY 1 AT BRIARGATE PKWY & HIGHWAY 83
708  RD      1250   0.011   0.013   CIRC   5.5

709  XX   S9-PMB
710  KM      COMPUTE HYDROGRAPH FOR BASIN PMB THE PORTION OF BRIARGATE PARKWAY BETWEEN
711  KM      EXPLORER DR. AND HIGHWAY 83
712  BA      0.014
713  LS      0       98
714  UD      0.100

715  XX   AP-DF#1
716  KM      ADD THE FLOW FROM THE FOCUS ON THE FAMILY STORM DRAIN, BASINS P7 AND P8,
717  KM      AND FLOW IN PINE CREEK FOR THE TOTAL INFLOW TO DETENTION FACILITY 1
718  HC      4

719  XX   RR-DF#1
720  KM      ROUTE FLOW THRU DETENTION FACILITY NO.1. VOLUME MODIFIED TO REFLECT PROPOSED
721  KM      ENLARGEMENT. PROPOSED ENLARGEMENT IS TO ADD A MINIMUM OF 0.7 ACRES OF SURFACE
722  KM      AREA TO EACH OF THE CONTOURS AT OR ABOVE ELEVATION 58. OUTLET MODELED
723  KM      ASSUMING THE TOP 7.5' OF THE ENTRANCE TO THE 10'X 12' HIGH BOX CULVERT IS
724  KM      BLOCKED AND A NEW 12' WIDE OPENING IS CREATED W/ INVERT AT 67.2
725  KM      OUTFLOW CURVE CALCULATED WITH A SPREADSHEET TREATING THE LOWER OPENING AS
726  KM      A SUBMERSED ORIFICE WITH C=.60, h=POND DEPTH - NORMAL DEPTH IN THE OUTFALL
727  KM      AND THE UPPER OPENING TO ELEVATION 73.0 TREATED AS A SHARP CRESTED WEIR WITH
728  KM      A FULL LENGTH OF 12.77' (THE SKEW LENGTH) ADJUSTED 0.2h FOR END CONTRACTIONS
729  KM      AND C=3.22+0.40(h/P) WHERE P=14.2. ABOVE ELEVATION 73.0 THE TOP OUTLET
730  KM      STRUCTURE IS ASSUMED TO TERMINATE WITHOUT A TOP AND THUS ADDITIONAL FLOW CAN
731  KM      OVER TOP THE SIDES AND BACK OF THE ASSUMED 3 SIDED STRUCTURE 12.77 X 10
732  KO      3
733  RS      1      STOR     0
734  SA      0      0.18    0.48    4.83    5.23    5.52    5.83    6.13    6.44    6.78
735  SA      7.14   7.34    7.53    7.73    7.95
736  SE      54.0   55.0    56.0    58.0    60.0    62.0    64.0    66.0    68.0    70.0
737  SE      72.0   73.0    74.0    75.0    76.0
738  SQ      0      105     194     275     344     401     451     496     560     747
739  SQ      998    1142    1247    1750    2100

740  XX   RT-AP26
741  KM      ROUTE THE COMBINED FLOW FROM AP26 AT BRIARGATE PARKWAY DOWN PINE CREEK TO
742  KM      THE INTERSECTION OF PINE CREEK AND HIGHWAY 83. USE AVERAGE
743  KM      APPROXIMATE SECTION AND SLOPE FOR ROUTING
744  RD      1450  0.019  0.045  TRAP  40    2
ID...1...2...3...4...5...6...7...8...9...10

745  KK SB-PM9
746  KM COMPUTE HYDROGRAPH FOR BASIN PM9
747  BA  .068
748  LS  0  93
749  UD  .120

750  KK AP27
751  KM COMBINE THE FLOW FROM BASIN PM9 AND THE ROUTED FLOW IN PINE CREEK (RT-AP26) AT
752  KM THE UPSTREAM SIDE OF HIGHWAY 83.
753  HC  2

754  KK SB-PM10
755  KM COMPUTE HYDROGRAPH FOR BASIN PM10
756  BA  .048
757  LS  0  98
758  UD  .092

759  KKRDFPM10
760  KM ROUTE FLOW THRU A POND ROUTING ROUTINE TO REFLECT REDUCTION IN PEAK FLOW
761  KM RATE TO THE APPROXIMATE PEAK FLOW RATE DISCHARGE GOAL FROM THE BASIN
762  KM AS SHOWN IN THE FINAL DRAINAGE REPORT FOR BRIARGATE BUSINESS CAMPUS
763  KM FILING 13 AS APPROVED OCT 31, 1996
764  KM THE ROUTING ROUTINE ONLY REGULATES THE PEAK DISCHARGE AND DOES NOT LAG
765  KM THE DISCHARGE. THIS IS APPROPRIATE AS A PORTION OF THE BASIN MAY DISCHARGE
766  KM DIRECTLY TO THE ADJACENT STREET AND STORM DRAIN.
767  KM DISCHARGE FROM THE BASIN PER THE FINAL DRAINAGE REPORT=140 cfs
768  RS  1  STOR  0
769  SV  0  001  .6  1.5
770  SE  100  102  104  106
771  SQ  0  140  140  140

772  KK RT-PM10
773  KM ROUTE THE FLOW IN THE S.D. FROM THE LOW POINT IN TELESTAR DR. TO THE EXISTING
774  KM OUTFALL TO PINE CREEK JUST UPSTREAM OF HIGHWAY 83.
775  RD  1000 .025 .013  CIRC  4.0

776  KK SB-PM11
777  KM COMPUTE HYDROGRAPH FOR BASIN PM11
778  BA  .041
779  LS  0  98
780  UD  .096

781  KK AP28
782  KM COMBINE THE FLOW FROM BASIN PM11 WITH THE FLOW IN PINE CREEK AT AP27,
783  KM AND THE ROUTED FLOW FROM BASIN PM10. FLOW IS COMBINED IN PINE CREEK AT
784  KM THE UPSTREAM SIDE OF THE BOX CULVERT UNDER HIGHWAY 83. THIS REPRESENTS THE
785  KM TOTAL FLOW TO PINE CREEK FROM THE BRIARGATE AREA
786  KO  3  1
787  HC  3
788  ZZ
### SCHEMATIC DIAGRAM OF STREAM NETWORK

**INPUT LINE**

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<th>NO.</th>
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423  .  .  .  RT-AP15
432  .  .  .  SB-CS4
437  .  .  .  RR-DFVC
447  .  .  .  AP16
450  .  .  .  RT-AP16
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498  .  .  .  AP18
502  .  .  .  RT-AP18
508  .  .  .  AP19
516  .  .  .  RT-AP19
523  .  .  .  SB-PM5
528  .  .  .  AP20
665  
. . .  SB-F6
. . .  V
. . .  V
670  
. . .  RR-DF6
. . .
683  
. . .  SB-F7
. . .  V
. . .  V
688  
. . .  RR-DF7
. . .
701  
. . AP25
. . V
. . V
705  
. . RT-AP25P
. . .
709  
. . SB-PM8
. . .
715  
AP-DF1
V
V
719  
RR-DF1
V
V
740  
RT-AP26
.
745  
. SB-PM9
.
750  
AP27
.
.
754  
. SB-PM10
. V
. V
759  
RRDFPM10
. V
. V
772  
RT-PM10
.
.
776  
. SB-PM11
.
.
781  
AP28
.

(*** RUNOFF ALSO COMPUTED AT THIS LOCATION)
PINE CREEK DRAINAGE BASIN - 24HR, (TYPE IIa5 YEAR STORM)
FILE PCDBPSI5.DAT
INTERIM CONDITION MODEL
MODEL MODIFIED FOR 8-98 REVISION LAST UPDATE: 8/5/98
BASINS PN1 THROUGH PN8, PN10, AND PS1 THROUGH PS9 IN UNDEVELOPED OR
PARTIAL DEVELOPED CONDITION, ALL OTHER BASINS ASSUMED TO BE FULLY DEVELOPED.
DETENTION FACILITY "C" ASSUMED TO BE CONSTRUCTED TO DEVELOPED CONDITION
REQUIRED CAPACITY BUT WITHOUT AN OUTFALL SO IT FUNCTIONS AS A TEMPORARY
RETENTION POND. DETENTION FACILITIES "A", "B", "E", AND "H" ARE ASSUMED TO BE
CONTRACTED TO THE DEVELOPED CONDITION REQUIREMENTS.
NOTE: THE DIVERSION ROUTINES WERE REMOVED FROM THE MODEL FOR THE 5 YEAR STORM
NOTE: THE OUTFLOW CURVE FOR THE SUMMER FIELD DETENTION POND WAS MODIFIED
SLIGHTLY TO ALLOW THE 5 YEAR MODEL TO RUN.

15 IO
OUTPUT CONTROL VARIABLES
 IPRINT 5 PRINT CONTROL
 IPLT 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
 NDATE 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
***************
  *
111 KK  * RR-DFE *
  *
***************

118 KO  OUTPUT CONTROL VARIABLES
        IPRNT  3 PRINT CONTROL
        IPLOT  1 PLOT CONTROL
        GSCAL  0. HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

119 RS  STORAGE ROUTING
        NSTPS  1 NUMBER OF SUBREACHES
        ITYP  STOR TYPE OF INITIAL CONDITION
        RSVR1C  0.00 INITIAL CONDITION
        X  0.00 WORKING R AND D COEFFICIENT

120 SV  STORAGE  0.0  0.0  1.3  3.9  6.9  10.3  14.1  18.2  22.8  27.9

121 SE  ELEVATION  784.00  786.00  788.00  790.00  792.00  794.00  796.00  798.00  800.00  802.00


***

***

HYDROGRAPH AT STATION  RR-DFE

PEAK FLOW  TIME  MAXIMUM AVERAGE FLOW
           (CFS)  (HR)  6-HR  24-HR  72-HR  14.95-HR
         97.  6.35  34.  16.  16.  16.

PEAK STORAGE  TIME  MAXIMUM AVERAGE STORAGE
            (AC-FT)  (HR)  6-HR  24-HR  72-HR  14.95-HR
          2.  6.35  0.  0.  0.  0.

PEAK STAGE  TIME  MAXIMUM AVERAGE STAGE
            (FEET)  (HR)  6-HR  24-HR  72-HR  14.95-HR
        788.60  6.35  785.88  784.87  784.87  784.87

CUMULATIVE AREA = 0.98 SQ MI

***

***************
  *

* RR-DFC *

* * *

***************

OUTPUT CONTROL VARIABLES
IPRTN  3 PRINT CONTROL
IPLOT  1 PLOT CONTROL
QSCAL  100. HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

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

STORAGE
0.0  2.7  9.7  18.6  28.0  38.2  49.0  60.5  72.8  85.3

ELEVATION
62.00 64.00 66.00 68.00 70.00 72.00 74.00 76.00 78.00 80.00

DISCHARGE
0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0

***

***

HYDROGRAPH AT STATION RR-DFC

EAK FLOW TIME MAXIMUM AVERAGE FLOW
(CFS) (HR) 6-HR 24-HR 72-HR 14.95-HR
0.05 0.0 0.0 0.0 0.0

PFAK STORAGE TIME MAXIMUM AVERAGE STORAGE
(AC-FT) (HR) 6-HR 24-HR 72-HR 14.95-HR
10. 14.95 0. 0. 0. 0.

EAK STAGE TIME MAXIMUM AVERAGE STAGE
(FEET) (HR) 6-HR 24-HR 72-HR 14.95-HR
66.07 14.95 65.65 63.90 63.90 63.90

CUMULATIVE AREA = 0.70 SQ MI

***

***************

* * *

85 KK * RR-DFB *

* * *

***************
OUTPUT CONTROL VARIABLES
IPRINT  3  PRINT CONTROL
IPLLOT  1  PLOT CONTROL
QSCAL   100.  HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

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

STORAGE
0.0  0.1  1.2  3.3  5.8  8.7  12.1  15.9  20.1  23.6
24.8  30.0

ELEVATION
71.20  72.00  74.00  76.00  78.00  80.00  82.00  84.00  86.00  87.60
88.00  90.00

DISCHARGE
0.22  73.  130.  169.  202.  236.  260.  285.  301.
371.  1222.

***

HYDROGRAPH AT STATION  RR-DFB

PEAK FLOW
(CFS)  (HR)  6-HR  24-HR  72-HR  14.95-HR

(INCHES)  0.192  0.221  0.221  0.221
(AC-FT)   16.  18.  18.  18.

PEAK STORAGE
(AC-FT)  (HR)  6-HR  24-HR  72-HR  14.95-HR
2.  6.45  0.  0.  0.  0.

PEAK STAGE
(FEET)  (HR)  6-HR  24-HR  72-HR  14.95-HR
75.03  6.45  72.37  71.74  71.74  71.74

CUMULATIVE AREA =  1.52  SQ  MI

***

***************
*
*
464  KK
*  RR-DFB  *
*
***************

OUTPUT CONTROL VARIABLES
IPRINT  3  PRINT CONTROL
IPLLOT  1  PLOT CONTROL
QSCAL   100.  HYDROGRAPH PLOT SCALE
### HYDROGRAPH ROUTING DATA

#### 470 RS  
**STORAGE ROUTING**

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<th>ITPS</th>
<th>RSVRSC</th>
<th>X</th>
<th>NUMBER OF SUBREACHES</th>
<th>TYPE OF INITIAL CONDITION</th>
<th>INITIAL CONDITION</th>
<th>WORKING R AND D COEFFICIENT</th>
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#### 71 SV  
**STORAGE**

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<th>5.3</th>
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<th>11.6</th>
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<td>15.4</td>
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#### 73 SQ  
**DISCHARGE**

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<th>2.0</th>
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<th>3.0</th>
<th>4.0</th>
<th>5.0</th>
<th>5.0</th>
<th>6.0</th>
<th>8.0</th>
<th>9.0</th>
<th>11.0</th>
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#### 75 SE  
**ELEVATION**

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<th>6797.00</th>
<th>6798.00</th>
<th>6800.00</th>
<th>6802.00</th>
<th>6803.50</th>
<th>6803.51</th>
<th>6804.00</th>
<th>6804.10</th>
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<td></td>
<td>6806.50</td>
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****  
****  
****  
****  

### HYDROGRAPH AT STATION  
**RR-DFA**

#### PEAK FLOW  
**TIME**

<table>
<thead>
<tr>
<th>PEAK FLOW (CFS)</th>
<th>TIME (HR)</th>
<th>MAXIMUM AVERAGE FLOW</th>
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</thead>
<tbody>
<tr>
<td>5.0</td>
<td>8.10</td>
<td>6.0</td>
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#### PEAK STORAGE  
**TIME**

<table>
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<tr>
<th>PEAK STORAGE (AC-FT)</th>
<th>TIME (HR)</th>
<th>MAXIMUM AVERAGE STORAGE</th>
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<tr>
<td>4.0</td>
<td>8.15</td>
<td>3.0</td>
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#### PEAK STAGE  
**TIME**

<table>
<thead>
<tr>
<th>PEAK STAGE (FEET)</th>
<th>TIME (HR)</th>
<th>MAXIMUM AVERAGE STAGE</th>
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</thead>
<tbody>
<tr>
<td>6803.51</td>
<td>7.65</td>
<td>6803.48</td>
</tr>
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</table>

CUMULATIVE AREA = 0.14 SQ MI

***  
***  
***  
***  

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*  
*  
*  
*  
**************

#### 576 KK  
*  
*  
*  
*  
**************

#### 90 KO  
**OUTPUT CONTROL VARIABLES**

<table>
<thead>
<tr>
<th>IPRINT</th>
<th>PRINT CONTROL</th>
</tr>
</thead>
<tbody>
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<table>
<thead>
<tr>
<th>IPLOT</th>
<th>PLOT CONTROL</th>
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<table>
<thead>
<tr>
<th>GSCAL</th>
<th>HYDROGRAPH PLOT SCALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

### HYDROGRAPH ROUTING DATA

#### 71 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

592  SV  STORAGE  0.0  0.6  4.6  6.9  10.3
593  SE  ELEVATION  92.00  94.00  96.00  98.00  100.00
594  SQ  DISCHARGE  80.  126.  131.  137.  144.

***  ***  ***  ***  ***

HYDROGRAPH AT STATION RR-DFSF

PEAK FLOW  TIME  MAXIMUM AVERAGE FLOW
  (CFS)  (HR) (CFS)  6-HR  24-HR  72-HR  14.95-HR
  92.  6.20  80.  80.  80.  80.
(INCHES)  4.724  11.746  11.746  11.746

PEAK STORAGE  TIME  MAXIMUM AVERAGE STORAGE
  (AC-FT) (HR) (CFS)  6-HR  24-HR  72-HR  14.95-HR
  0.  6.20  0.  0.  0.  0.

PEAK STAGE  TIME  MAXIMUM AVERAGE STAGE
  (FEET) (HR) (CFS)  6-HR  24-HR  72-HR  14.95-HR
  92.50  6.20  92.01  92.00  92.00  92.00

CUMULATIVE AREA =  0.16  SQ  MI

***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***

*************
*    *
719  KK  *  RR-DFS*  *
*    *
*************

732  KO  OUTPUT CONTROL VARIABLES
  IPRINT  3  PRINT CONTROL
  IPRINT  1  PLOT CONTROL
  QSCAL  0.  HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

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

734  SA  AREA  0.0  0.2  0.5  4.8  5.2  5.5  5.8  6.1  6.4  6.8
        7.1  7.3  7.5  7.7  7.9
736 SE
ELEVATION  54.00  55.00  56.00  58.00  60.00  62.00  64.00  66.00  68.00  70.00  
72.00  73.00  74.00  75.00  76.00

738 SQ
DISCHARGE  0.  105.  194.  275.  344.  401.  451.  496.  560.  747.
998.  1142.  1247.  1750.  2100.

***

COMPUTED STORAGE-ELEVATION DATA

| STORAGE  | 0.00 | 0.06 | 0.38 | 4.93 | 14.99 | 25.74 | 37.09 | 49.05 | 61.62 | 74.83 |
| ELEVATION | 54.00 | 55.00 | 56.00 | 58.00 | 60.00 | 62.00 | 64.00 | 66.00 | 68.00 | 70.00 |

| STORAGE  | 88.75 | 95.99 | 103.43 | 111.06 | 118.90 |
| ELEVATION | 72.00 | 73.00 | 74.00 | 75.00 | 76.00 |

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 0. TO 105.
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.)

***

HYDROGRAPH AT STATION RR-DF#1

| PEAK FLOW | TIME  | MAXIMUM AVERAGE FLOW |
| (CFS)     | (HR)  |                      |
| 452.      | 6.75  | 310.  187.  187.  187. |
| (INCHES)  | 0.061 | 0.976  0.976  0.976 |
| (AC-FT)   | 154.  | 231.  231.  231. |

| PEAK STORAGE | TIME  | MAXIMUM AVERAGE STORAGE |
| (AC-FT)  | (HR)  |                      |
| 37.      | 6.75  | 16.  6.  6.  6. |

| PEAK STAGE | TIME  | MAXIMUM AVERAGE STAGE |
| (FEET)    | (HR)  |                      |
| 64.06     | 6.75  | 59.56  56.84  56.84 |

CUMULATIVE AREA = 4.43 SQ MI

***

***************

*  *

81 KK
*  AP28 *
*  *

***************

86 KO
OUTPUT CONTROL VARIABLES

| IPRNT   | 3 PRINT CONTROL |
| ISTOP   | 1 PLOT CONTROL  |
| OSCAL   | 0. HYDROGRAPH PLOT SCALE |

787 HC
HYDROGRAPH COMBINATION

| ICOMP   | 3 NUMBER OF HYDROGRAPHS TO COMBINE |
HYDROGRAPH AT STATION AP2B

<table>
<thead>
<tr>
<th>PEAK FLOW (CFS)</th>
<th>TIME (HR)</th>
<th>MAXIMUM AVERAGE FLOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>632.0</td>
<td>6.05</td>
<td>343.  201.  201.   201.</td>
</tr>
<tr>
<td>(INCHES)</td>
<td>(AC-FT)</td>
<td>0.695  1.012  1.012  1.012</td>
</tr>
<tr>
<td></td>
<td></td>
<td>170.   248.   248.   248.</td>
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</tbody>
</table>

CUMULATIVE AREA = 4.59 SQ MI
<table>
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<tr>
<th>OPERATION</th>
<th>STATION</th>
<th>PEAK FLOW</th>
<th>TIME OF PEAK</th>
<th>AVERAGE FLOW FOR MAXIMUM PERIOD</th>
<th>BASIN AREA</th>
<th>MAXIMUM STAGE</th>
<th>TIME OF MAX STAGE</th>
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</thead>
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<tr>
<td>HYDROGRAPH AT</td>
<td>SB-1PN1</td>
<td>22.</td>
<td>6.30</td>
<td>4.</td>
<td>2.</td>
<td>2.</td>
<td>0.16</td>
</tr>
<tr>
<td>ROUTED TO</td>
<td>RT-1PN1</td>
<td>25.</td>
<td>6.55</td>
<td>4.</td>
<td>2.</td>
<td>2.</td>
<td>0.16</td>
</tr>
<tr>
<td>HYDROGRAPH AT</td>
<td>SB-1PN2</td>
<td>23.</td>
<td>6.35</td>
<td>5.</td>
<td>2.</td>
<td>2.</td>
<td>0.23</td>
</tr>
<tr>
<td>2 COMBINED AT</td>
<td>API1</td>
<td>43.</td>
<td>6.55</td>
<td>9.</td>
<td>4.</td>
<td>4.</td>
<td>0.39</td>
</tr>
<tr>
<td>ROUTED TO</td>
<td>RT-API1</td>
<td>43.</td>
<td>6.65</td>
<td>9.</td>
<td>4.</td>
<td>4.</td>
<td>0.39</td>
</tr>
<tr>
<td>HYDROGRAPH AT</td>
<td>SB-1PN3</td>
<td>19.</td>
<td>6.20</td>
<td>3.</td>
<td>1.</td>
<td>1.</td>
<td>0.12</td>
</tr>
<tr>
<td>2 COMBINED AT</td>
<td>API2</td>
<td>50.</td>
<td>6.65</td>
<td>12.</td>
<td>6.</td>
<td>6.</td>
<td>0.51</td>
</tr>
<tr>
<td>ROUTED TO</td>
<td>RT-API2</td>
<td>49.</td>
<td>6.75</td>
<td>12.</td>
<td>6.</td>
<td>6.</td>
<td>0.51</td>
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<tr>
<td>HYDROGRAPH AT</td>
<td>SB-1PN4</td>
<td>23.</td>
<td>6.15</td>
<td>3.</td>
<td>2.</td>
<td>2.</td>
<td>0.14</td>
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<tr>
<td>2 COMBINED AT</td>
<td>API3</td>
<td>54.</td>
<td>6.75</td>
<td>16.</td>
<td>7.</td>
<td>7.</td>
<td>0.66</td>
</tr>
<tr>
<td>ROUTED TO</td>
<td>RT-API3</td>
<td>53.</td>
<td>6.85</td>
<td>16.</td>
<td>7.</td>
<td>7.</td>
<td>0.66</td>
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<td>HYDROGRAPH AT</td>
<td>SB-1PN5</td>
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<td>6.10</td>
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<td>HYDROGRAPH AT</td>
<td>SB-PN9</td>
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<td>6.10</td>
<td>2.</td>
<td>1.</td>
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<tr>
<td>3 COMBINED AT</td>
<td>AP-4</td>
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<td>6.85</td>
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<td>ROUTED TO</td>
<td>RT-API4</td>
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<td>6.90</td>
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<td>SB-PN11</td>
<td>55.</td>
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<td>0.04</td>
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<td>HYDROGRAPH AT</td>
<td>SB-PN13</td>
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<td>8.</td>
<td>4.</td>
<td>4.</td>
<td>0.13</td>
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<tr>
<td>4 COMBINED AT</td>
<td>APDNE</td>
<td>165.</td>
<td>6.10</td>
<td>34.</td>
<td>16.</td>
<td>16.</td>
<td>0.98</td>
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<td>38.</td>
<td>6.10</td>
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<td>2.</td>
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<tr>
<td>ROUTED TO</td>
<td>RR-DFF4</td>
<td>38.</td>
<td>6.10</td>
<td>4.</td>
<td>2.</td>
<td>2.</td>
<td>0.04</td>
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<tr>
<td>2 COMBINED AT</td>
<td>AP23</td>
<td>194.</td>
<td>6.15</td>
<td>93.</td>
<td>86.</td>
<td>86.</td>
<td>0.31</td>
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<tr>
<td>ROUTED TO</td>
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<td>193.</td>
<td>6.15</td>
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<tr>
<td>HYDROGRAPH AT</td>
<td>SB-F5</td>
<td>127.</td>
<td>6.00</td>
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<td>ROUTED TO</td>
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<td>127.</td>
<td>6.00</td>
<td>13.</td>
<td>6.</td>
<td>6.</td>
<td>0.06</td>
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<td>Value1</td>
<td>Value2</td>
<td>Value3</td>
<td>Value4</td>
<td>Value5</td>
<td>Value6</td>
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<td>2 Combined at AP24</td>
<td>298.</td>
<td>6.05</td>
<td>107.</td>
<td>92.</td>
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<td>0.37</td>
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<td>Routed To RT-AP24P</td>
<td>295.</td>
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<td>107.</td>
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<td>10.</td>
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<td>10.</td>
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<td>3 Combined at AP25</td>
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<td>125.</td>
<td>100.</td>
<td>100.</td>
<td>0.46</td>
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<td>125.</td>
<td>100.</td>
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<td>0.46</td>
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<td>Hydrograph at SB-PMB</td>
<td>30.</td>
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<td>1.</td>
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<td>310.</td>
<td>187.</td>
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<td>Routed To RR-DFF1</td>
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<td>310.</td>
<td>187.</td>
<td>187.</td>
<td>4.43</td>
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<td>Routed To RT-AP26</td>
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<td>310.</td>
<td>186.</td>
<td>186.</td>
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<td>Hydrograph at SB-PM9</td>
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<td>13.</td>
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<td>0.07</td>
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<td>2 Combined at AP27</td>
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<td>325.</td>
<td>191.</td>
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<td>Hydrograph at SB-PM10</td>
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<td>11.</td>
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<td>Hydrograph at SB-PM11</td>
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<td>10.</td>
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<td>4.</td>
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<td>3 Combined at AP28</td>
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<td>343.</td>
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### SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

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<tr>
<th>ISTAQ</th>
<th>ELEMENT</th>
<th>DT (MIN)</th>
<th>PEAK (CFS)</th>
<th>TIME TO PEAK (MIN)</th>
<th>VOLUME (MIN)</th>
<th>DT (MIN)</th>
<th>PEAK (CFS)</th>
<th>TIME TO PEAK (MIN)</th>
<th>VOLUME (MIN)</th>
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<tr>
<td>RT-1P1N</td>
<td>MANE</td>
<td>1.65</td>
<td>25.94</td>
<td>389.40</td>
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<td>3.00</td>
<td>24.83</td>
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### CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2554E+01 EXCESS=0.0000E+00 OUTFLOW=0.2491E+01 BASIN STORAGE=0.1056E+00 PERCENT ERROR= -1.7

| RT-API | MANE | 2.40 | 43.36 | 398.40 | 0.26 | 3.00 | 42.84 | 399.00 | 0.26 |

### CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5489E+01 EXCESS=0.0000E+00 OUTFLOW=0.5417E+01 BASIN STORAGE=0.9483E+01 PERCENT ERROR= -0.4

| RT-API | MANE | 2.70 | 48.86 | 405.00 | 0.26 | 3.00 | 48.86 | 405.00 | 0.26 |

### CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7261E+01 EXCESS=0.0000E+00 OUTFLOW=0.7200E+01 BASIN STORAGE=0.8563E+01 PERCENT ERROR= -0.3

| RT-API | MANE | 2.65 | 53.01 | 410.40 | 0.26 | 3.00 | 52.50 | 411.00 | 0.26 |

### CONTINUITY SUMMARY (AC-FT) - INFLOW=0.9098E+01 EXCESS=0.0000E+00 OUTFLOW=0.9004E+01 BASIN STORAGE=0.1178E+01 PERCENT ERROR= -0.3

| RT-API | MANE | 3.00 | 54.85 | 414.00 | 0.27 | 3.00 | 54.85 | 414.00 | 0.27 |

### CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1076E+02 EXCESS=0.0000E+00 OUTFLOW=0.1069E+02 BASIN STORAGE=0.9697E+01 PERCENT ERROR= -0.2

| RT-API | MANE | 1.39 | 96.77 | 381.64 | 0.37 | 3.00 | 96.74 | 381.00 | 0.37 |

### CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1945E+02 EXCESS=0.0000E+00 OUTFLOW=0.1949E+02 BASIN STORAGE=0.4016E-01 PERCENT ERROR= 0.0

| RT-API | MANE | 1.30 | 17.18 | 364.89 | 0.67 | 3.00 | 17.04 | 366.00 | 0.67 |

### CONTINUITY SUMMARY (AC-FT) - INFLOW=0.9711E+00 EXCESS=0.0000E+00 OUTFLOW=0.9699E+00 BASIN STORAGE=0.1459E-02 PERCENT ERROR= 0.0

| RT-API | MANE | 0.29 | 135.15 | 369.52 | 0.40 | 3.00 | 134.70 | 369.00 | 0.40 |

### CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2283E+02 EXCESS=0.0000E+00 OUTFLOW=0.2284E+02 BASIN STORAGE=0.8051E-02 PERCENT ERROR= 0.0

<p>| RT-API | MANE | 1.80 | 16.97 | 394.20 | 0.27 | 3.00 | 16.92 | 393.00 | 0.27 |</p>
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<th>Mane</th>
<th>Day</th>
<th>Inf</th>
<th>Excess</th>
<th>Out</th>
<th>Storage</th>
<th>Percent Error</th>
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<td>0.16</td>
<td>3.00</td>
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<td>RT-PM1</td>
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HEC-1 MODEL OUTPUT
INTERIM CONDITION
• 100-YEAR STORM
FLOOD HYDROGRAPH PACKAGE (HEC-1)

MAY 1991
VERSION 4.0.1E

RUN DATE 06/05/1998 TIME 17:41:34

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X X XXXXXX XXXX X
X X X X X X XX
X X X X X X X
XXXXXX XXX X XXXXX X
X X X X X X X
X X X X X X X
X X XXXXXX XXXX XXX

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::: :::: Full Microcomputer Implementation :::: ::::
::: by :::: Haestad Methods, Inc. :::: ::::
::: ::::

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.

HEC-1 INPUT

ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
1 ID PINE CREEK DRAINAGE BASIN - 24HR,(TYPE IIa100 YEAR STORM)
2 ID FILE PCBPSII.DAT
3 ID INTERIM CONDITION MODEL
4 ID MODEL MODIFIED FOR 8-98 REVISION LAST UPDATE:8/5/98
5 ID BASINS PN1 THROUGH PN8, PN10, AND PS1 THROUGH PS9 IN UNDEVELOPED OR
6 ID PARTIAL DEVELOPED CONDITION. ALL OTHER BASINS ASSUMED TO BE FULLY DEVELOPED.
7 ID DETENTION FACILITY "C" ASSUMED TO BE CONSTRUCTED TO DEVELOPED CONDITION
8 ID REQUIRED CAPACITY BUT WITHOUT AN OUTFALL SO IT FUNCTIONS AS A TEMPORARY
9 ID RETENTION POND. DETENTION FACILITIES "A", "B", AND "E" ARE ASSUMED TO
10 ID BE CONSTRUCTED TO THE DEVELOPED CONDITION REQUIREMENTS.

*** FREE ***

*DIAGRAM

IT 3 0 0 300

ID 5

13 KK SB-IPN1
14 KM *****************************************************
15 KM *** BEGIN CALCULATIONS FOR THE NORTH FORK OF PINE CREEK WATERSHED******
16 KM *****************************************************
17 KM COMPUTE HYDROGRAPH FOR BASIN IPN1
18 BA .164
19 IN 15
20 PB 4.4
21 PC 0000 .0005 .0015 .0030 .0045 .0060 .0080 .0100 .0120 .0143
22 PC .0165 .0188 .0210 .0233 .0259 .0278 .0320 .0390 .0460 .0530
23 PC .0600 .0750 .1000 .1400 .1700 .2100 .2500 .2900 .3300 .3700
24 PC .8000 .8100 .8200 .8200 .8300 .8300 .8400 .8400 .8500 .8500
25 PC .8600 .8638 .8675 .8713 .8750 .8788 .8825 .8863 .8900 .8938
26 PC .8975 .9013 .9050 .9083 .9115 .9148 .9180 .9210 .9240 .9270
27 PC .9300 .9325 .9350 .9375 .9400 .9425 .9450 .9475 .9500 .9525
28 PC .9550 .9575 .9600 .9625 .9650 .9675 .9700 .9725 .9750 .9775
29 PC .9800 .9813 .9825 .9838 .9850 .9863 .9875 .9888 .9900 .9913
30 PC .9925 .9938 .9950 .9963 .9975 .9988 1.000
31 LS 0 63.7
32 UD .360

33 KK RT-IPN1
34 KM ROUTE THE FLOW FROM BASIN IPN1 THROUGH BASIN IPN2 TO API1
35 RD 2500 .033 .045 TRAP 100 15

36 KK SB-IPN2
37 KM COMPUTE HYDROGRAPH FOR BASIN IPN2
38 BA .229
39 LS 0 62.0
40 UD .377

41 KK API1
42 KM COMBINE Routed FLOW FROM BASIN IPN1 WITH FLOW FROM BASIN IPN2
43 NC 2
ID......1......2......3......4......5......6......7......8......9......10

44  KK RT-API1
45  KM ROUTE THE FLOW IN THE NORTH FORK OF PINE CREEK FROM API1 TO API2
46  RD  2600  .034  .045    TRAP   12    2.5

47  KK SB-IPN3
48  KM COMPUTE HYDROGRAPH FOR BASIN IPN3
49  BA  .122
50  LS  0   63.3
51  UD  .268

52  KK API2
53  KM COMBINE THE ROUTED FLOW FROM API1 WITH THE FLOW FROM BASIN IPN3
54  HC  2

55  KK RT-API12
56  KM ROUTE THE FLOW IN THE NORTH FORK OF PINE CREEK FROM API2 TO API3
57  RD  1360  .026  .045    TRAP   30    4

58  KK SB-IPN4
59  KM COMPUTE HYDROGRAPH FOR BASIN IPN4
60  BA  .142
61  LS  0   62.1
62  UD  .198

63  KK API3
64  KM COMBINE THE ROUTED FLOW FROM API2 WITH THE FLOW FROM BASIN IPN4
65  HC  2

66  KK RT-API13
67  KM ROUTE THE FLOW IN THE NORTH FORK OF PINE CREEK FROM API3 TO API4
68  RD  1600  .02  .045    TRAP   20    3

69  KK SB-IPN5
70  KM COMPUTE HYDROGRAPH FOR BASIN IPN5
71  BA  .043
72  LS  0   62
73  UD  .169
74  KM ********************************************
75  KM **LAND DOWNSTREAM OF THIS POINT ASSUMED TO BE FULLY DEVELOPED ****
76  KM ********************************************

77  KK SB-PN9
78  KM COMPUTE HYDROGRAPH FOR BASIN PN9
79  BA  .036
80  LS  0   72.8
81  UD  .170

82  KK AP-4
83  KM COMBINE ROUTED FLOW FROM API3 WITH FLOW FROM BASINS IPN5 AND PN9
84  HC  3
LINE
ID........1........2........3........4........5........6........7........8........9........10

85     KK RT-AP4
86     KM ROUTE THE FLOW IN PINE CREEK MAIN CHANNEL DOWN THE CHANNEL FROM AP4
87     KM TO DETENTION FACILITY "E" AT THE COLLECTOR STREET CROSSING
88     RD 1400 .032 .045 TRAP 20 3

89     KK SB-PN11
90     KM COMPUTE HYDROGRAPH FOR BASIN PN11
91     BA  0.079
92     LS  0  76.7
93     UD  .189

94     KK SB-PN12
95     KM COMPUTE HYDROGRAPH FOR BASIN PN12
96     BA  0.039
97     LS  0  68.2
98     UD  .129

99     KK SB-PN13
100    KM COMPUTE HYDROGRAPH FOR BASIN PN13
101    BA  0.127
102    LS  0  74
103    UD  .195

104    KK APOFE
105    KM COMBINE ROUTED FLOW RT-AP4 WITH FLOW FROM BASINS PN11, PN12, AND PN13
106    KM AT REGIONAL DETENTION FACILITY "E"
107    HC  4

108    KK RR-DFE
109    KM NOTE: THE INPUT POND VOLUME REFLECTS THE DESIGN POND VOLUME ON 7-23-98
110    KM ROUTE FLOW THRU A DETENTION FACILITY. ASSUME A 54'' DIA OUTLET WITH
111    KM THE INVERT DEPRESSED 2' BELOW POND INVERT (INV EL=84, OUTLET 0 ESTIMATED
112    KM WITH BUREAU OF PUBLIC ROADS NOMOGRAPH FOR INLET CONTROL OF CULVERTS
113    KM DISCHARGE ABOVE EL 100.3 INCLUDES FLOW OVER EMERGENCY SPILLWAY
114    KM SCALE 1
115    KO  3  1
116    RS  1  STOR  0
117    SV  0  0  1.25  3.91  6.93 10.31 14.07 18.24 22.83 27.87
118    SE  784  786  788  790  792  794  796  798  800  802
119    SQ  0  25  80 136 173 210 240 263 280 1431

120    KK RT-DFE
121    KM ROUTE THE OUTFLOW FROM DETENTION FACILITY "E" IN A STORM DRAIN TO AP-5
122    RD 1800 .025 .013 CIRC 4.5

123    KK SB-PN14
124    KM COMPUTE HYDROGRAPH FOR BASIN PN14
125    BA  .027
126    LS  0  74.3
127    UD  .157
LINE  ID........1........2........3........4........5........6........7........8........9........10

128  KK RT-PN14
129  KM ROUTE FLOW FROM BASIN PN14 IN A STORM DRAIN TO AP5
130  RD  1400  .055  .013  CIRC   2

131  KK SB-PN15
132  KM COMPUTE HYDROGRAPH FOR BASIN PN15
133  BA  .074
134  LS   0   72.7
135  UD  .186

136  KK AP-5
137  KM COMBINE ROUTED FLOW RT-PN14 TO FLOW FROM BASIN PN15
138  HC  3

139  KK RT-AP5
140  KM ROUTE THE FLOW AT AP5 TO AP5A AT THE CONFLUENCE OF THE FLOWS FROM THE
141  KM NORTH AND SOUTH FORKS OF PINE CREEK
142  RD  400  .025  .013  CIRC   5
143  KM *******************************************************************
144  KM *** BEGIN CALCULATIONS FOR THE SOUTH FORK OF PINE CREEK WATERSHED***
145  KM *******************************************************************

146  KK SB-IPS1
147  KM COMPUTE HYDROGRAPH FOR BASIN IPS1
148  BA  .147
149  LS   0   63.1
150  UD  .395

151  KK RT-IPS1
152  KM ROUTE THE FLOW FROM BASIN IPS1 THROUGH BASIN IPS2 TO AP16
153  RD  2200  .027  .045  TRAP  10   20

154  KK SB-IPS2
155  KM COMPUTE HYDROGRAPH FOR BASIN IPS2
156  BA  .104
157  LS   0   62.2
158  UD  .368

159  KK SB-IPS3
160  KM COMPUTE HYDROGRAPH FOR BASIN IPS3
161  BA  .109
162  LS   0   62
163  UD  .250

164  KK RT-IPS3
165  KM ROUTE THE FLOW FROM BASIN IPS3 THROUGH BASIN IPS4 TO AP14
166  RD  3250  .033  .045  TRAP  10   15

167  KK SB-IPS4
168  KM COMPUTE HYDROGRAPH FOR BASIN IPS4
169  BA  .166
170  LS   0   62
171  UD  .305
HEC-1 INPUT

LINE

172  KK  API4
173  KM  COMBINE THE ROUTED FLOW FROM BASIN IPS3 TO THE FLOW FROM BASIN IPS4
174  HC  2
175  KK RT-API4
176  KM  ROUTE THE FLOW FROM API4 THROUGH BASIN IPS5 TO API5
177  RD  3100  .029  .045  TRAP  10  35
178  KK SB-IPS5
179  KM  COMPUTE HYDROGRAPH FOR BASIN IPS5
180  BA  .134
181  LS  0  62.5
182  UD  .382
183  KK  API5
184  KM  COMBINE THE ROUTED FLOW FROM API4 TO THE FLOW FROM BASIN IPS5
185  HC  2
186  KK RT-API5
187  KM  ROUTE THE FLOW FROM API5 THROUGH IPS2 API6
188  RD  1700  .031  .045  TRAP  50  35
189  KK  API6
190  KM  COMBINE THE ROUTED FLOW FROM API5 WITH THE ROUTED FLOW FROM BASIN IPS1
191  KM  AND THE FLOW FROM BASIN IPS2 AT API6
192  HC  3
193  KK SB-PS10
194  KM  COMPUTE HYDROGRAPH FOR BASIN PS10 (FULLY DEVELOPED CONDITION)
195  BA  .038
196  LS  0  72.9
197  UD  .160
198  KK  APOFC
199  KM  COMBINE FLOW AT FLOW FROM API6 WITH FLOW FROM BASIN PS10 IN REGIONAL
200  KM DETENTION FACILITY "C". THIS IS THE TOTAL INFLOW TO DETENTION FACILITY "C"
201  HC  2
202  KK RR-DFC
203  KM ROUTE THE FLOW THROUGH DETENTION FACILITY "C". ASSUME GRADING FOR THE
204  KM FULLY DEVELOPED CONDITION DETENTION POND IS COMPLETE BUT OUTFALL IS NOT
205  KM CONSTRUCTED SO POND FUNCTIONS AS A RETENTION POND.
206  KO  3  1  100
207  RS  1  STOR  0
208  SV  0  2.73  9.72  18.56  28.03  38.15  48.95  60.45  72.75  85.85
209  SV  99.66
210  SE  62  64  66  68  70  72  74  76  78  80
211  SE  82
212  SQ  0  0  0  0  0  0  0  0  0  0
213  SQ  0.10
HEC-1 INPUT

LINE

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

214  KK SB-IPS6
215  KM  COMPUTE HYDROGRAPH FOR BASIN IPS6
216  BA  .132
217  LS  0    62
218  UD  .352

219  KK RT-IPS6
220  KM  ROUTE THE FLOW FROM BASIN IPS6 THROUGH BASIN IPS7 TO API7
221  RD  4250  .028  .045  TRAP  25    10

222  KK SB-IPS7
223  KM  COMPUTE HYDROGRAPH FOR BASIN IPS7
224  BA  .209
225  LS  0   62.6
226  UD  .289

227  KK API7
228  KM  :  COMBINE THE ROUTED FLOW FROM BASIN IPS6 WITH THE FLOW FROM BASIN IPS7
229  HC  2

230  KK RT-API7
231  KM  ROUTE THE FLOW FROM API7 TO API8
232  RD  2300  .028  .045  TRAP  20    3

233  KK SB-IPS8
234  KM  COMPUTE HYDROGRAPH FOR BASIN IPS8
235  BA  .088
236  LS  0   62.7
237  UD  .265

238  KK SB-IPS9
239  KM  COMPUTE HYDROGRAPH FOR BASIN IPS9 (ASSUMED 23 ACRES OF SAGEWOOD DEVELOPED)
240  BA  .059
241  LS  0   73.9
242  UD  .165

243  KK API8
244  KM  :  COMBINE THE ROUTED FLOW FROM API7 TO THE FLOW FROM BASINS IPS8 AND IPS9
245  HC  3

246  KK RT-DPI8
247  KM  ROUTE THE FLOW FROM DPI8 TO DPI9
248  RD  1200  .025  .045  TRAP  20    3

249  KKSB-IPS10
250  KM  COMPUTE HYDROGRAPH FOR BASIN IPS10 (YMCA SITE AND 16 ACRES OF EXISTING
251  KM  RESIDENTIAL DEVELOPMENT ASSUMED TO BE DEVELOPED)
252  BA  .122
253  LS  0   71.5
254  UD  .176
HEC-1 INPUT

LINE

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

255  KK  AP19
256  KM  COMBINE THE ROUTED FLOW FROM AP1B TO THE FLOW FROM BASIN IPS10
257  KM  ALSO ADD THE OUTFLOW HYDROGRAPH FROM DETENTION FACILITY "C" (NO OUTFLOW)
258  KM  TO PROVIDE CONTINUITY IN THE MODEL
259  HC  3

260  KK  RT-AP19
261  KM  ROUTE THE FLOW IN THE SOUTH FORK OF PINE CREEK FROM AP19 TO DETENTION
262  KM  FACILITY "B"
263  RD  3400  .027   .045 TRAP  20  3
264  KM  ************************************************************************************
265  KM  ***** DOWNSTREAM BASINS ASSUMED TO BE FULLY DEVELOPED ********************
266  KM  ****************************************************************************

267  KK  SB-PS11
268  KM  COMPUTE HYDROGRAPH FOR BASIN PS11
269  BA  .056
270  LS  0   80.3
271  UD  .172

272  KK  SB-PS12
273  KM  COMPUTE HYDROGRAPH FOR BASIN PS12
274  BA  .153
275  LS  0   69.0
276  UD  .233

277  KK  AP0FB
278  KM  COMBINE THE ROUTED FLOW FROM AP19 TO THE FLOW FROM BASINS IPS11 AND IPS12
279  KM  AT DETENTION FACILITY "B", THIS IS THE TOTAL INTERIM CONDITION INFLOW TO
280  KM  DETENTION FACILITY "B"
281  HC  3

282  KK  RR-DFB
283  KM  ROUTE FLOW THROUGH REGIONAL DETENTION POND "B"
284  KM  THIS VOLUME REFLECTS THE DESIGN VOLUME PER PRELIMINARY PLANS ON 7-23-98
285  KM  WITH 34" DIA OUTLET SET AT INVERT ELEV. 70.2. OUTLET Q ESTIMATED WITH
286  KM  BUREAU OF PUBLIC ROADS NOMO GRAPH FOR INLET CONTROL OF CONCRETE PIPE
287  KM  DISCHARGE ABOVE 87.6 INCLUDES FLOW OVER 80' LONG EMERGENCY SPILLWAY
288  KM  SCALE 1
289  KD  3   1
290  RS  1    STOR   0
291  SV  0   0.06  1.17  3.30  5.82  8.73  12.07  15.85  20.07  23.60
292  SV  24.76  29.96
293  SE  71.2  72.0  74  76  78  80  82  84  86  90
294  SE  88  90
295  SQ  0    22  73  130  169  202  236  260  285  301
296  SQ  371  1222

297  KK  RT-DFB
298  KM  ROUTE FLOW 1000 LF NORTHWEST IN A STORM DRAIN FROM DETENTION FACILITY "B"
299  KM  TO AP-11
300  RD  1000  .021  .013 CIRC  4.5
HEC-1 INPUT  PAGE 8

LINE

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

301  KK SB-PS13
302  KM  COMPUTE HYDROGRAPH FOR BASIN PS13
303  BA  .065
304  LS  0   74.1
305  UD  .149

306  KK  AP11
307  KM  COMBINE ROUTED FLOW RT-0FB TO FLOW FROM BASIN PS13 AT AP11
308  HC  2

309  KK  RT-AP11
310  KM  ROUTE FLOW 600 LF NORTHWEST IN A STORM DRAIN FROM AP11 TO AP5A (THE
311  KM  CONFLUENCE OF FLOWS FROM THE NORTH AND SOUTH FORKS OF PINE CREEK)
312  RD  600  .021  .013  CIRC  5

313  KK  AP5A
314  KM  COMBINE ROUTED FLOW AP5 (FLOW FROM THE NORTH FORK OF PINE CREEK) TO ROUTED
315  KN  FLOW RT-AP11 (FLOW FROM THE SOUTH FORK OF PINE CREEK)
316  HC  2

317  KK  RT-AP5A
318  KM  ROUTE THE FLOW IN PINE CREEK MAIN CHANNEL 1300 FEET DOWN THE CHANNEL FROM
319  KM  AP5A NEAR THE HISTORIC CONFLUENCE OF PINE CREEK TO AP12 AT THE CONFLUENCE
320  KM  OF THE MAIN CHANNEL AND THE LEXINGTON DRIVE STORM DRAIN OUTFALL. USE AN
321  KM  APPROXIMATE AVERAGE CHANNEL SECTION AND SLOPE FOR ROUTING.
322  RD  1300  .023  .045  TRAP  50  2

323  KK  SB-PM1
324  KM  COMPUTE HYDROGRAPH FOR BASIN PM1
325  BA  .054
326  LS  0   78.5
327  UD  .203

328  KK  RT-PM1
329  KM  ROUTE THE FLOW FROM BASIN PM1 1200 LF NORTH IN THE LEXINGTON DR. S.D. TO
330  KM  PINE CREEK MAIN CHANNEL.
331  RD  1200  .08  .013  CIR  3.5

332  KK  SB-PM2
333  KM  COMPUTE HYDROGRAPH FOR BASIN PM2, AN AREA OF THE GOLF COURSE
334  BA  .154
335  LS  0   66.0
336  UD  .310

337  KK  SB-PM3
338  KM  COMPUTE HYDROGRAPH FOR BASIN PM3
339  BA  .067
340  LS  0   73.5
341  UD  .248
HEC-1 INPUT

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

342  KK  AP12
343  KM  COMBINE ROUTED FLOW RT-PM1 WITH THE ROUTED FLOW IN PINE CREEK MAIN CHANNEL
344  KM  AND THE FLOW FROM BASINS PM2 AND PM3
345  HC  4
346
346  KK  RT-AP12
347  KM  ROUTE THE FLOW IN PINE CREEK MAIN CHANNEL DOWN THE CHANNEL FROM AP12 NEAR THE
348  KM  OUTFALL OF LEXINGTON DRIVE STORM DRAIN TO THE CROSSING AT CHAPEL HILLS DRIVE
349  KM  USE AN APPROXIMATE AVERAGE CHANNEL SECTION AND SLOPE FOR ROUTING.
350  RD  1600 .018 .045 TRAP 30 2

351  KK  SB-PM4
352  KM  COMPUTE HYDROGRAPH FOR BASIN PM4
353  BA  .111
354  LS  0 71.9
355  UD  .170

356  KK  AP13
357  KM  COMBINE FLOW FROM BASIN PM4 TO THE ROUTED FLOW RT-AP12 IN PINE CREEK MAIN
358  KM  CHANNEL ON THE EAST SIDE OF THE CHAPEL HILLS DRIVE CROSSING
359  HC  2
360  KM  ********************************************BEGIN SOUTH CHAPEL HILLS DRIVE STORM DRAIN WATERSHED*************
361  KM  ********************************************

363  KK  SB-CS1
364  KM  COMPUTE HYDROGRAPH FOR BASIN CS1
365  BA  .053
366  LS  0 73.6
367  UD  .181

368  KK  RT-CS1
369  KM  ROUTE FLOW 1300 LF WEST IN DYNAMIC DR. ASSUME BULK OF FLOW IS ON THE SURFACE
370  RD  1300 .021 .013 TRAP 32 .01

371  KK  SB-CS2
372  KM  COMPUTE HYDROGRAPH FOR BASIN CS1
373  BA  .070
374  LS  0 98.0
375  UD  .101

376  KKRR-DPCS2
377  KM  ROUTE FLOW THRU AN ASSUMED DETENTION FACILITY TO REFLECT DETENTION OF 1.6cfs
378  KM  /ACRE FROM THE L1/O PROPERTY AS ASSUMED IN THE XDDP FOR BRIARIDGE BUSINESS
379  KM  /CAMPUS. BECAUSE THE DISCHARGE CONFIGURATION IS UNKNOWN AT THIS TIME ASSUME
380  KM  THAT THE PEAK DISCHARGE RATE MAY BE DISCHARGED AS SOON AS IT IS AVAILABLE AT
381  KM  THE POND TO REFLECT POTENTIAL FREE DISCHARGE FROM A PORTION OF THE SUBBASIN
382  KM  DISCHARGE REDUCTION ASSUMED AT 1.6 cfs X 37ac=66 cfs
383  RS  1 STOR 0
384  SV  0 .001 6 10
385  SE 100 102 104 106
386  SQ  0 194 194 194
HEC-1 INPUT

387  KK  AP14
388  KM  COMBINE ROUTED FLOW RT-CS1 TO CONTROLLED FLOW FROM BASIN CS2 AT THE
389  KM  INTERSECTION OF CHAPEL HILLS DR. AND DYNAMIC DR.
390  HC  2
391  KK RT-AP14
392  KM  ROUTE FLOW 1100 LF NORTH IN THE CHAPEL HILLS DR. S.D. TO BRIARGATE PKWY.
393  KM  NOTE: THE CALCULATED 100 YEAR FLOW IS IN EXCESS OF THE FULL PIPE CAPACITY
394  KM  OF THE STORM DRAIN BETWEEN DYNAMIC DRIVE AND BRIARGATE PARKWAY. SOME OF
395  KM  THE FLOW MAY BE ON THE SURFACE IN CHAPEL HILLS DRIVE.
396  RD  1100  .02  .013  CIR  4
397  KK SB-CS3
398  KM  COMPUTE HYDROGRAPH FOR BASIN CH3
399  BA  .053
400  LS  0  84.8
401  UD  .177
402  KKRR-DPCS3
403  KM  ROUTE FLOW THRU AN ASSUMED DETENTION FACILITY TO REFLECT DETENTION REDUCING
404  KM  THE PEAK 100YR FLOW RATE FROM THE 9 ACRES OF THE BASIN THAT ARE DESIGNATED
405  KM  AS L/O USE AS ASSUMED IN MDDP FOR BRIARGATE BUSINESS CAMPUS.
406  KM  BECAUSE THE DISCHARGE CONFIGURATION IS UNKNOWN AT THIS TIME ASSUME
407  KM  THAT THE PEAK DISCHARGE RATE MAY BE DISCHARGED AS SOON AS IT IS AVAILABLE
408  KM  AT THE POND TO REFLECT FREE DISCHARGE FROM A PORTION OF THE SUB BASIN.
409  KM  DISCHARGE REDUCTION ASSUMED AT 1.6 cfs X 9=14 cfs
410  RS  1  STOR  0
411  SV  0  .001  6  10
412  SE  100  102  104  106
413  SQ  0  123  123  123
414  KK  AP15
415  KM  COMBINE ROUTED FLOW RT-AP14 WITH CONTROLLED FLOW FROM BASIN CS3 AT THE
416  KM  INTERSECTION OF CHAPEL HILLS DR. AND BRIARGATE PARKWAY. NOTE A SMALL PORTION
417  KM  OF BASIN CS3 IS LOCATED DOWNSTREAM OF THIS POINT. FOR THIS MODELING PURPOSE
418  KM  THIS IS CONSIDERED INSIGNIFICANT.
419  HC  2
420  KK RT-AP15
421  KM  ROUTE FLOW 1400 LF NORTH IN THE CHAPEL HILLS DR. S.D.
422  KM  NOTE: THE CALCULATED 100 YEAR FLOW IS IN EXCESS OF THE FULL PIPE CAPACITY
423  KM  OF THE STORM DRAIN BETWEEN BRIARGATE PARKWAY AND PINE CREEK. SOME OF
424  KM  THE FLOW MAY BE ON THE SURFACE IN CHAPEL HILLS DRIVE. A SMALL PORTION OF
425  KM  THE SURFACE FLOW MAY BE DIVERTED DOWN BRIARGATE PARKWAY, BUT FOR THE PURPOSE
426  KM  OF THIS ANALYSIS ALL OF THE FLOW FROM THE CHAPEL HILLS DRIVE/BRIARGATE PKWY.
427  KM  INTERSECTION IS ASSUMED TO REACH PINE CREEK AT CHAPEL HILLS DRIVE.
428  RD  1400  .045  .013  CIR  4.5
429  KK SB-CS4
430  KM  COMPUTE HYDROGRAPH FOR BASIN CS4
431  BA  .053
432  LS  0  95.5
433  UD  .101
LINE
ID........1........2........3........4........5........6........7........8........9........10

434  KK RR-DFVC
435  KM ROUTE FLOW THRU THE PROPOSED VILLAGE CENTER DETENTION FACILITY
436  KM POND GRADING PER THE PRELIMINARY GRADING SHOWN IN THE MDDP FOR VILLAGE
437  KM CENTER. DISCHARGE ASSUMES USE OF THE EXISTING 18" DIAMETER STUB.
438  KM WITH THE INVERT SET AT ELEVATION 73. BUREAU OF PUBLIC ROADS NOMOGRAPH
439  KM USED TO ESTIMATE OUTFLOW RATES ASSUMING INLET CONTROL.
440  RS  1  STOR  0
441  SV  000  .032  1.67  3.23  5.00  7.00
442  SE  73   74   76   78   80   82
443  SQ  0   3   13  17  20  22

444  KK  AP16
445  KM COMBINE ROUTED FLOW RT-AP15 WITH THE DISCHARGE FROM THE VILLAGE CENTER POND
446  HC  2

447  KK RT-AP16
448  KM ROUTE THE FLOW IN THE CHAPEL HILLS DRIVE STORM DRAIN FROM AP16 TO AP19 IN
449  KM PINE CREEK MAIN CHANNEL ON THE DOWNSTREAM SIDE OF THE CHAPEL HILLS DRIVE
450  KM CROSSING
451  RD  300  .03  .013  CIR  4.5
452  KM
453  KM ****************************************
454  KM ****************************************

455  KK  56-CN1
456  KM COMPUTE RUNOFF FROM BASIN CN1 THE WATERSHED CONTRIBUTING TO THE PARK SITE AT
457  KM CHAPEL HILLS DRIVE POND (REGIONAL DETENTION FACILITY "A")
458  BA  .145
459  LS  0   76.8
460  UD  .190

461  KK  RR-DFA
462  KM ROUTE THE FLOW FROM CN1 THROUGH THE PROPOSED DETENTION POND AT THE PARK
463  KM SITE AT CHAPEL HILLS DRIVE. STAGE STORAGE CURVE PER THE 12/22/97 GRADING PLAN
464  KM DISCHARGE CURVE REFLECTS 12" DIAMETER OUTLET PIPE CONTROL FOR NORMAL DISCHARG
465  KM AND A 100' LONG EMERGENCY SPILLWAY SET AT ELEVATION 6805.5
466  KD  3   1  100
467  RS  1  STOR  0
468  SV  0   .01  .22   .99  1.95  2.80  4.25  5.31  6.51  11.64
469  SV  15.36
470  SQ  2.35  2.54  3.00  3.73  4.35  4.75  5.36  5.50  8.39  9.01
471  SQ  279
472  SE  6796.6  6797.0  6798.0  6800.0  6802.0  6803.5  6803.51  6804  6804.1  6805.5
473  SE  6806.5

474  KK RT-DFA
475  KM ROUTE OUTFLOW FROM REGIONAL DETENTION POND "A" DOWN THE CHAPEL HILLS STORM
476  KM DRAIN FROM LEXINGTON DRIVE TO TREELAKE DRIVE
477  RD  930  .04  .013  CIRC  1.5
HEC-1 INPUT

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

478  KK    SB-CN2
479  KM    COMPUTE RUNOFF FROM BASIN CN2
480  BA    .078
481  LS    0    75.5
482  UD    .214

483  KK    AP17
484  KM    COMBINE ROUTED FLOW RT-DFA AND FLOW FROM BASIN CN2 AT THE INTERSECTION OF
485  KM    CHAPEL HILLS DRIVE AND TEE LAKE DRIVE
486  HC    2

487  KK    RT-AP17
488  KM    ROUTE FLOW AT AP17 DOWN THE CHAPEL HILLS DRIVE STORM DRAIN TO MULLIGAN DR.
489  RD    1400  .05   .013  CIRC   3.5

490  KK    SB-CN3
491  KM    COMPUTE RUNOFF FROM BASIN CN3
492  BA    .043
493  LS    0    80.0
494  UD    .157

495  KK    AP18
496  KM    COMBINE ROUTED FLOW RT-AP17 TO FLOW FROM BASIN CN3 AT INTERSECTION OF CHAPEL
497  KM    HILLS DR. AND MULLIGAN DR.
498  HC    2

499  KK    RT-AP18
500  KM    ROUTE FLOW AT AP18 DOWN THE CHAPEL HILLS DRIVE STORM DRAIN TO AP19 IN THE
501  KM    PINE CREEK MAIN CHANNEL ON THE DOWNSTREAM SIDE OF THE CHAPEL HILLS DRIVE
502  KM    CROSSING. NOTE A SMALL PORTION OF BASIN CN3 IS LOCATED SOUTH OF AP18. THIS
503  KM    IS CONSIDERED INSIGNIFICANT FOR THE PURPOSE OF THIS ANALYSIS.
504  RD    600  .04   .013  CIRC   3.5

505  KK    AP19
506  KM    COMBINE ROUTED FLOW RT-AP18 FROM THE NORTH CHAPEL HILLS DR. STORM DRAIN
507  KM    WITH THE ROUTED FLOW RT-AP16 FROM THE SOUTH CHAPEL HILLS DRIVE STORM DRAIN
508  KM    AND THE FLOW IN PINE CREEK MAIN CHANNEL (AP13) AT THE WEST SIDE OF THE CHAPEL
509  KM    HILLS DRIVE CROSSING. FLOW THAT IS TAKEN INTO THE PINE CREEK CHANNEL FORM
510  KM    STREET AT THIS POINT HAS BEEN ACCOUNTED FOR IN BASINS CN3 AND CS3. THIS WAS
511  KM    DONE TO REDUCE THE COMPLEXITY OF THE MODEL.
512  HC    3

513  KK    RT-AP19
514  KM    ROUTE THE FLOW IN PINE CREEK MAIN CHANNEL FROM AP19 AT THE CHAPEL HILLS DRIVE
515  KM    CROSSING TO AP20 AT REGIONAL DETENTION FACILITY 1 AT BRIGADE PARKWAY AND
516  KM    HIGHWAY 83. USE AVERAGE SLOPES AND APPROXIMATE CROSS SECTIONS FOR ROUTING.
517  RD    750  .035   .045  TRAP   30   2
518  RD    1000  .025   .045  TRAP   120   2
519  RD    1400  .026   .045  TRAP   60   2
HEC-1 INPUT

LINE

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

520  KK  SB-P5
521  KM  COMPUTE HYDROGRAPH FOR BASIN PM5
522  BA  .183
523  LS  0    70.0
524  UD  .185

525  KK  AP20
526  KM  COMBINE FLOW FROM BASIN PM5 WITH THE ROUTED FLOW IN PINE CREEK
527  HC  2

528  KK  SB-PM6
529  KM  COMPUTE HYDROGRAPH FOR PM6 THE AREA BETWEEN CHAPEL HILLS DR. AND DETENTION
530  KM  FACILITY 1 BOUNDED BY THE GOLF COURSE AND BRIARGATE PARKWAY. NOTE: THE MDOP
531  KM  FOR BRIARGATE BUSINESS CAMPUS REQUIRES DETENTION IN THIS SUBBASIN. FOR THE
532  KM  PURPOSE OF THIS ANALYSIS NO DETENTION IS ASSUMED TO ALLOW THE DEVELOPER THE
533  KM  OPTION OF CONSTRUCTING LARGER CONVEYANCE FACILITIES TO DETENTION FACILITY
534  KM  NO. 1 AND ALLOWING FREE DISCHARGE FROM THE BASIN.
535  BA  .088
536  LS  0    98
537  UD  .110

538  KK  AP21
539  KM  COMBINE FLOW FROM PM6 WITH THE FLOW IN PINE CREEK AT AP21 FOR THE TOTAL FLOW
540  KM  IN PINE CREEK CHANNEL AS IT ENTERS DETENTION FACILITY NO 1
541  HC  2

542  KK  SB-PM7
543  KM  COMPUTE HYDROGRAPH FOR BASIN PM7 THE AREA NORTH OF DETENTION FACILITY 1
544  KM  NOTE: THE MDOP FOR THE BRIARGATE BUSINESS CAMPUS REQUIRES DETENTION IN
545  KM  THE NON RESIDENTIAL PORTIONS OF THIS AREA. FOR THE PURPOSE OF THIS ANALYSIS
546  KM  FREE DISCHARGE FROM THE BASIN IS ASSUMED. THE RESIDENTIAL PORTION OF THE
547  KM  BASIN LOCATED IN OUTSIDE THE CITY LIMITS IS ASSUMED TO BE FULLY DEVELOPED
548  KM  AS 1 DU PER ACRE RESIDENTIAL.
549  BA  .138
550  LS  0    76.3
551  UD  .353
552  KM  ***********************************************
553  KM  ***BEGIN CALCULATIONS FOR THE FOCUS ON THE FAMILY STORM DRAIN WATERSHED***
554  KM  ***********************************************

555  KK  SB-F1
556  KM  COMPUTE HYDROGRAPH FOR BASIN F1
557  BA  .119
558  LS  0    78.3
559  UD  .208

560  KK  F1P
561  KM  DIVERT FLOW IN EXCESS OF THE DOWNSTREAM STORM DRAIN CAPACITY ASSUMING
562  KM  FULL PIPE FLOW IN 36" DIA 83.44% FROM THE SAG POINT IN LEXINGTON DRIVE.
563  KM  FULL FLOW CAPACITY= 123cfs
564  DT  F1S
565  DI  123  150  200  250
566  DO  0    27  77  127
HEC-1 INPUT

LINE

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

567     KK     RT-F1P
568     KM     ROUTE FLOW IN THE STORM DRAIN 1300 LF WEST FROM THE SAG PT. IN LEXINGTON
569     KM     DRIVE TO SUMMER FIELD POND
570     RD     1300    .036    .013      CIRC  3
571     KK     SB-F2
572     KM     COMPUTE HYDROGRAPH FOR BASIN F2
573     BA     .039
574     LS     0       74
575     UD     .171
576     KK     SB-F1S
577     KM     RETRIEVE FLOW THAT WILL NOT FIT IN THE STORM DRAIN AT LEXINGTON DRIVE
578     DR     F1S
579     KK     RT-F1S
580     KM     ROUTE THE EXCESS FLOW THAT IS ON THE SURFACE OF LEXINGTON DRIVE AT THE SAG
581     KM     POINT OVERLAND IN A GRASS LINED SWALE TO THE SUMMERFIELD DETENTION BASIN
582     RD     1300    .037    .040      TRAP  15  6
583     KK     AP-DFSF
584     KM     COMBINE ROUTED FLOWS RT-F1S AND RT-F1P WITH FLOW FROM F2 AT THE SUMMER
585     KM     FIELD POND. THIS IS THE TOTAL FLOW TO THE POND
586     HC     3
587     KK     RR-DFSF
588     KM     ROUTE THE FLOW AT AP-DFSF THROUGH THE SUMMER FIELD DETENTION BASIN.
589     KM     THE INFLOW/OUTFLOW S.D. FOR THIS FACILITY IS BURIED BELOW THE POND BOTTOM.
590     KM     THE POND FILLS WHEN THE CAPACITY OF THE DOWNSTREAM REACH OF S.D. IS
591     KM     EXCEEDED. THIS CONFIGURATION PRESENTS A COMPLEX HYDRAULIC PROBLEM. IT IS
592     KM     ASSUMED THAT UNTIL INFLOW >120cfs FLOW WILL PASS THROUGH THE STORM DRAIN.
593     KM     WHEN INFLOW > 120cfs BACKWATER WILL FORM AT THE OUTLET AND THE LID ON THE
594     KM     UPSTREAM MANHOLE WILL LIKELY BE LIFTED OFF AND SOME FLOW WILL ENTER THE POND
595     KM     FROM THAT POINT. WHEN INFLOW>120cfs IT IS ASSUMED THAT THE HEAD LOSS AT
596     KM     THE OUTLET WILL BE APPROXIMATELY 1 VELOCITY HEAD FOR THE PURPOSE OF
597     KM     CALCULATING THE DISCHARGE CURVE.
598     KO     3       1      100
599     RS     1       STOR   0
600     SV     0       0.57   4.63   6.87   10.32
601     SE     92      94     96     98     100
602     SQ     120     126    131    137    144
603     KK     RT-DFSF
604     KM     ROUTE OUTFLOW FROM THE DETENTION BASIN IN A 48" S.D. TO RESEARCH PKWY.
605     RD     800    .018    .013      CIRC  4
606     KK     SB-F3
607     KM     COMPUTE HYDROGRAPH FOR BASIN F3
608     BA     .114
609     LS     0       77.0
610     UD     .215
HEC-1 INPUT

LINE

611  KK  AP22
612  KM  COMBINE ROUTED FLOW RT-DTSF TO FLOW FROM BASIN F3 AT THE INTERSECTION OF
613  KM  RESEARCH PARKWAY AND SUMMERSET DRIVE.
614  HC  2

615  KK  AP22P
616  KM  DIVERT FLOW IN EXCESS OF THE DOWNSTREAM STORM DRAIN CAPACITY AT THE
617  KM  INTERSECTION OF RESEARCH PARKWAY AND SUMMERSET DRIVE. CONTROLLING
618  KM  DOWNSTREAM STORM DRAIN IS A 60" DIA RCP @ S=1%, FULL FLOW CAPACITY= 260cfs
619  KM  THE DIVERTED FLOW IS ASSUMED TO RUN DOWN SUMMERSET DR. SOUTH OF RESEARCH
620  KM  PARKWAY AND EVENTUALLY TO COTTONWOOD CREEK.
621  DT  AP22S
622  DI  260  261  280  300  320  340  360  380
623  DQ  0  1  20  40  60  80  100  120

624  KKRT-AP22P
625  KM  ROUTE THE S.D.FLOW FROM THE BRIARGATE PKWY/ SUMMERSET INTERSECTION TO THE
626  KM  INTERSECTION OF RESEARCH PKWY. AND CHAPEL HILLS DR.
627  RD  2100  .02  .013  CIRC  5

628  KK  SB-F4
629  KM  COMPUTE HYDROGRAPH FOR BASIN F4
630  BA  .038
631  LS  0  83.0
632  UD  .197

633  KK  RR-DFF4
634  KM  ROUTE FLOW THRU A POND ROUTING ROUTINE TO REFLECT REDUCTION IN PEAK FLOW
635  KM  RATE OF 1.6 CFS/ACRE FROM THE 11.5 AC THAT WILL BE DEVELOPED AS LI/O
636  KM  DISCHARGE REDUCTION PER ACRE IS DETERMINED PER THE RATE AND AREA INCLUDED
637  KM  IN THE MDP FOR BRIARGATE BUSINESS CAMPUS
638  KM  THE ROUTING ROUTINE ONLY REGULATES THE PEAK DISCHARGE AND DOES NOT LAG
639  KM  THE DISCHARGE. THIS IS APPROPRIATE AS A PORTION OF THE SITE WILL LIKELY
640  KM  FREE DISCHARGE TO THE ADJACENT STREET
641  KM  DISCHARGE REDUCTION = LI/O AREA (acres)11.5 x 1.6 cfs = 18.4 cfs
642  RS  1  STOR  0
643  SV  0  .001  6  10
644  SE  100  102  104  106
645  SQ  0  70.6  70.6  70.6

646  KK  AP23
647  KM  COMBINE ROUTED FLOW RT-AP22P TO FLOW FROM BASIN F4 AT THE INTERSECTION OF
648  KM  RESEARCH PARKWAY AND CHAPEL HILLS DR.
649  HC  2

650  KK  AP23P
651  KM  DIVERT FLOW IN EXCESS OF THE DOWNSTREAM STORM DRAIN CAPACITY AT THE
652  KM  FIRST MANHOLE (MHG) DOWNSTREAM OF THE INTERSECTION OF RESEARCH PARKWAY AND
653  KM  CHAPEL HILLS DRIVE. THE MANHOLE IS LOCATED JUST UPSTREAM OF A PIPE SIZE
654  KM  REDUCTION FROM 54" TO 48" DIA.. IT IS ASSUMED THAT THE MH LID WILL BE PUSHED
655  KM  OFF BY THE HIGH KGL ABOVE THE TRANSITION AT THE ESTIMATED 100 YEAR PEAK
656  KM  FLOW RATE. DOWNSTREAM PIPE CAPACITY IS ESTIMATED AT 298 cfs BASED ON
657  KM  FULL PIPE CONVEYANCE CAPACITY OF 48" DIA RCP, SLOPE = 4.3%
658  DT  AP23S
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<td>RESEARCH PARKWAY AND CHAPEL HILLS DRIVE. THIS IS SURFACE FLOW.</td>
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<td>RATE BASED ON APPROXIMATELY 35% OF THE DIFFERENCE BETWEEN THE DEVELOPED</td>
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<td>AND HISTORIC PEAK 100 YR FLOW RATE PER THE ORIGINAL DBPS CRITERIA FOR LI/0</td>
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<td>(5.6-1.5)*.35=1.85AC=50ft  TOTAL Gln=2325cfs</td>
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<td>KM</td>
<td>THE ROUTING ROUTINE ONLY REGULATES THE PEAK DISCHARGE AND DOES NOT LAG</td>
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<td>KM</td>
<td>COMBINE THE ROUTED FLOW IN THE S.D.(RTAP102) TO FLOW FROM FF1 AND THE SURFACE</td>
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<td>FLOW THAT WAS DIVERTED THROUGH THE FOCUS SITE FROM MH8(AP102A) AT THE</td>
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<td>INTERSECTION OF EXPLORER DRIVE AND THE FOCUS ON THE FAMILY STORM DRAIN.</td>
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<td>DIVERT FLOW IN EXCESS OF THE DOWNSTREAM STORM DRAIN CAPACITY AT THE</td>
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<td>STORM DRAIN IS A 66&quot; DIA RCF @ S=1.1%, FULL FLOW CAPACITY= 350cfs</td>
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706  KKRT-AP24P
707  KM  ROUTE THE FLOW IN THE FOCUS STORM DRAIN FROM AP24 AT THE INTERSECTION OF
708  KM  EXPLORER DRIVE AND THE FOCUS S.O. TO AP25 AT THE INTERSECTION OF EXPLORER
709  KM  DRIVE & BRIARGATE PKWY
710  RD  800  .011  .013  CIRC  5.5

711  KK  SB-F6
712  KM  COMPUTE HYDROGRAPH FOR BASIN F6
713  BA  .038
714  LS  0  98.0
715  UD  .106

716  KK  RR-DDFF6
717  KM  ROUTE FLOW THRU A POND ROUTING ROUTINE TO REFLECT REDUCTION IN PEAK FLOW
718  KM  RATE BASED ON APPROXIMATELY 35% OF THE DIFFERENCE BETWEEN THE DEVELOPED
719  KM  AND HISTORIC PEAK 100 YR FLOW RATE. HISTORIC ESTIMATED AT 1.5 CFS/AC.
720  KM  FULLY DEVELOPED ESTIMATED AT 6.0 CFS/AC. ESTIMATED REQUIRED DETENTION =
721  KM  ((6.0-1.5)*.35*21.5AC=34cfs  TOTAL Qin=138cfs
722  KM  THE ROUTING ROUTINE ONLY REGULATES THE PEAK DISCHARGE AND DOES NOT LAG
723  KM  THE DISCHARGE. THIS IS APPROPRIATE AS A PORTION OF THE BASIN DISCHARGES
724  KM  DIRECTLY TO THE ADJACENT STREET AND STORM DRAIN
725  RS  1  STOR  0
726  SV  0  .001  6  10
727  SE  100  102  104  106
728  SQ  0  104  104  104

729  KK  SB-F7
730  KM  COMPUTE HYDROGRAPH FOR BASIN F7
731  BA  .052
732  LS  0  93.0
733  UD  .137

734  KK  RR-DDFF7
735  KM  ROUTE FLOW THRU A POND ROUTING ROUTINE TO REFLECT REDUCTION IN PEAK FLOW
736  KM  RATE BASED ON APPROXIMATELY 35% OF THE DIFFERENCE BETWEEN THE DEVELOPED
737  KM  AND HISTORIC PEAK 100 YR FLOW RATE. HISTORIC ESTIMATED AT 1.5 CFS/AC.
738  KM  FULLY DEVELOPED ESTIMATED AT 5.2 CFS/AC. ESTIMATED REQUIRED DETENTION =
739  KM  ((5.2-1.5)*.35*29AC=38cfs  TOTAL Qin=170cfs
740  KM  THE ROUTING ROUTINE ONLY REGULATES THE PEAK DISCHARGE AND DOES NOT LAG
741  KM  THE DISCHARGE. THIS IS APPROPRIATE AS A PORTION OF THE BASIN DISCHARGES
742  KM  DIRECTLY TO THE ADJACENT STREET AND STORM DRAIN
743  RS  1  STOR  0
744  SV  0  .001  6  10
745  SE  100  102  104  106
746  SQ  0  132  132  132

747  KK  AP25
748  KM  COMBINE ROUTED FLOW RT-AP25P TO CONTROLLED FLOW FROM BASINS F6 AND F7
749  KM  AT THE INTERSECTION OF EXPLORER DR AND BRIARGATE PKWY.
750  HC  3
HEC-1 INPUT

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

751  KK AP25P
752  KK DIVERT FLOW IN EXCESS OF THE DOWNSTREAM STORM DRAIN CAPACITY AT THE
753  KM INTERSECTION OF EXPLORER DR. AND BRIARGATE PARKWAY. CONTROL APPEARS TO
754  KM BE DOWNSTREAM 5454 DIA S.D. @ 5.5% SLOPE, FULL PIPE CAPACITY=461cfs
755  KM DIVERTED FLOW IS ASSUMED TO FLOW DOWN BRIARGATE PARKWAY TO THE SUMP
756  KM ADJACENT TO FACILITY #1
757  DT AP25S
758  DL 461 464 475 500 525 550 575 600 625
759  DG 0 1 14 39 64 89 114 139 164

760  KKRT-AP25P
761  KM ROUTE THE FLOW IN THE S.D.FROM THE INTERSECTION OF EXPLORER & BRIARGATE
762  KM PARKWAY TO DETENTION FACILITY 1 AT BRIARGATE PKWY & HIGHWAY 83
763  RD 1250 .011 .013 CIRC 5.5

764  KK SB-PMB
765  KM COMPUTE HYDROGRAPH FOR BASIN PMB THE PORTION OF BRIARGATE PARKWAY BETWEEN
766  KM EXPLORER DR. AND HIGHWAY 83
767  BA .014
768  LS 0 98
769  UD .100

770  KK AP-DF#1
771  KM ADD THE FLOW FROM THE FOCUS ON THE FAMILY STORM DRAIN, BASINS PM7 AND PM8,
772  KM AND FLOW IN PINE CREEK FOR THE TOTAL INFLOW TO DETENTION FACILITY 1
773  HC 4

774  KK RR-DF#1
775  KM ROUTE FLOW THRU DETENTION FACILITY NO.1. VOLUME MODIFIED TO REFLECT PROPOSED
776  KM ENLARGEMENT. PROPOSED ENLARGEMENT IS TO ADD A MINIMUM OF 0.65 ACRES OF SURFAC
777  KM ENLARGEMENT. AREA TO EACH OF THE CONTOURS AT OR ABOVE ELEVATION 58. CUTLET MODELED
778  KM ASSUMING THE TOP 7.5' OF THE ENTRANCE TO THE 10'X 12'S HIGH BOX CULVERT IS
779  KM BLOCKED AND A NEW 12' WIDE OPENING IS CREATED W/ INVERT AT 67.2
780  KM OUTFLOW CURVE CALCULATED WITH A SPREADSHEET TREATING THE LOWER OPENING AS
781  KM A SUBMERGED ORIFICE WITH C=60, h=POUND DEPTH - NORMAL DEPTH IN THE OUTFALL
782  KM AND THE UPPER OPENING TO ELEVATION 73.0 TREATED AS A SHARP CRESTED WEIR WITH
783  KM A FULL LENGTH OF 12.77' (THE SkEW LENGTH) ADJUSTED 0.2h FOR END CONTRACTIONS
784  KM AND C=3.22+0.40(h/P) WHERE P=14.2, ABOVE ELEVATION 73.0 THE TOP CULVERT
785  KM STRUCTURE IS ASSUMED TO TERMINATE WITHOUT A TOP AND THUS ADDITIONAL FLOW CAN
786  KM OVER TOP THE SIDES AND BACK OF THE ASSUMED 3 SIDED STRUCTURE 12.77 x 10
787  KD 3 1
788  RS 1 STOR 0
789  SA 0 0.18 0.48 4.83 5.23 5.52 5.83 6.13 6.44 6.78
790  SA 7.14 7.34 7.53 7.73 7.95
791  SE 54.0 55.0 56.0 58.0 60.0 62.0 64.0 66.0 68.0 70.0
792  SE 72.0 73.0 74.0 75.0 76.0
793  SQ 0 105 194 275 344 401 451 496 560 747
794  SQ 998 1142 1247 1750 2100
LINE

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

795      KK  AP25S
796      KN  RETRIEVE THE DIVERTED FLOW AT THE INTERSECTION OF BRIARGATE PARKWAY AND
797      KM  EXPLORER DRIVE. THIS IS FLOW IN THE STREET.
798      DR  AP25S

799      KKRT-AP25S
800      KM  ROUTE THE SURFACE FLOW IN BRIARGATE PARKWAY DOWN BRIARGATE PARKWAY TO PINE
801      KM  CREEK. ASSUME THIS FLOW ENTERS THE CHANNEL AT THE OUTLET FROM DETENTION
802      KM  FACILITY #1.
803      RD  1400 .043 .015 TRAP 75 .01

804      KK  AP26
805      KM  COMBINE ROUTED FLOW RT-AP25S TO THE OUTFLOW FROM DF#1 AT THE INTERSECTION OF
806      KM  BRIARGATE PKWY. AND PINE CREEK
807      HC  2

808      KK RT-AP26
809      KM  ROUTE THE COMBINED FLOW FROM AP26 AT BRIARGATE PARKWAY DOWN PINE CREEK TO
810      KM  THE INTERSECTION OF PINE CREEK AND HIGHWAY 83. USE AVERAGE
811      KM  APPROXIMATE SECTION AND SLOPE FOR ROUTING
812      RD  1450 .019 .045 TRAP 40 2

813      KK  SB-PM9
814      KM  COMPUTE HYDROGRAPH FOR BASIN PM9
815      BA  .060
816      LS  0  93
817      UD  .120

818      KK  AP27
819      KM  COMBINE THE FLOW FROM BASIN PM9 AND THE ROUTED FLOW IN PINE CREEK (RT-AP26) A
820      KM  AT THE UPSTREAM SIDE OF HIGHWAY 83.
821      HC  2

822      KK SB-PM10
823      KM  COMPUTE HYDROGRAPH FOR BASIN PM10
824      BA  .048
825      LS  0  98
826      UD  .092

827      KKRDFPM10
828      KM  ROUTE FLOW THRU A POND ROUTING ROUTINE TO REFLECT REDUCTION IN PEAK FLOW
829      KM  RATE TO THE APPROXIMATE PEAK FLOW RATE DISCHARGE GOAL FROM THE BASIN
830      KM  AS SHOWN IN THE FINAL DRAINAGE REPORT FOR BRIARGATE BUSINESS CAMPUS
831      KM  FILING 13 AS APPROVED OCT 31, 1996
832      KM  THE ROUTING ROUTINE ONLY REGULATES THE PEAK DISCHARGE AND DOES NOT LAG
833      KM  THE DISCHARGE. THIS IS APPROPRIATE AS A PORTION OF THE BASIN MAY DISCHARGE
834      KM  DIRECTLY TO THE ADJACENT STREET AND STORM DRAIN.
835      KM  DISCHARGE FROM THE BASIN PER THE FINAL DRAINAGE REPORT=140 cfs
836      RS  1 STOR 0
837      SV  0  001 .6  1.5
838      SE  100 102 104 106
839      SQ  0  140 140 140
KK RT-PM10
KM ROUTE THE FLOW IN THE S.O. FROM THE LOW POINT IN TELESTAR DR. TO THE EXISTING
KM OUTFALL TO PINE CREEK JUST UPSTREAM OF HIGHWAY 83.
RD 1000 .025 .013 CIRC 4.0

KK SB-PM11
KM COMPUTE HYDROGRAPH FOR BASIN PM11
BA .041
LS 0 98
UD .096

KK AP24S
KM RETRIEVE THE FLOW THAT WAS IN EXCESS OF THE STORM DRAIN CAPACITY AT THE
KM INTERSECTION OF EXPLORER DRIVE AND TELSTAR DRIVE.(AP24S)
DR AP24S

KKRT-AP24S
KM ROUTE THE RETRIEVED FLOW FROM AP24 DOWN TELSTAR DRIVE TO THE SUMP THEN
KM ACROSS BBC FILING 19 TO AP28 IN PINE CREEK.
RD 2200 .05 .015 TRAP 40 01

KK AP28
KM COMBINE THE FLOW FROM BASIN PM11 WITH THE ROUTED SURFACE FLOW FROM THE
KM INTERSECTION OF TELSTAR DR. AND EXPLORER DRIVE (RT-AP24S), THE FLOW IN
KM PINE CREEK AT AP27, AND THE ROUTED FLOW FROM BASIN PM10.
KM FLOW IS COMBINED IN PINE CREEK AT THE UPSTREAM SIDE OF THE BOX CULVERT
KM UNDER HIGHWAY 83. THIS REPRESENTS THE TOTAL FLOW TO PINE CREEK FROM THE
KM BRIARGATE AREA
KD 3 1
HC 4
ZZ
SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

13  SB-IPN1
    V
    V
33  RT-IPN1
    .
36  .  SB-IPN2
    .  
    .  
41  AP11.----------
    V
    V
44  RT-API1
    
47  .  SB-IPN3
    .  
    .  
52  AP12.----------
    V
    V
55  RT-API2
    
58  .  SB-IPN4
    .  
    .  
63  AP13.----------
    V
    V
66  RT-API3
    
69  .  SB-IPN5
    .  
    .  
77  .  .  SB-PN9
    .  .  
82  AP-4.----------
    V
    V
85  RT-API4
    
89  .  SB-PN11
    .  
    .  
94  .  .  SB-PN12
    .  .  
    .  .  
99  .  .  .  SB-PN13
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RR-DFCS3

AP15
V
V
RT-AP15

SB-CS4
V
V
RR-DFVC

AP16
V
V
RT-AP16

SB-CN1
V
V
RR-DFA
V
V
RT-DFA

SB-CN2

AP17
V
V
RT-AP17

SB-CN3

AP18
V
V
RT-AP18

V
V
RT-AP19

SB-PM5

AP20
818  AP27.............
   
822  SB·PM10
   
827  RRDPFM10
   
840  RT·PM10
   
844  SB·PM11
   
852  AP24S

849  AP24S
   
853  RT·AP24S
   
857  AP28........................

***) RUNOFF ALSO COMPUTED AT THIS LOCATION
PINE CREEK DRAINAGE BASIN - 24HR,(TYPE 110 AND 100 YEAR STORM)
FILE PCDBPSI.DAT
INTERIM CONDITION MODEL
MODEL MODIFIED FOR 8-98 REVISION LAST UPDATE: 8/5/98
BASINS PN1 THROUGH PN8, PN10, AND PS1 THROUGH PS9 IN UNDEVELOPED OR
PARTIAL DEVELOPED CONDITION. ALL OTHER BASINS ASSUMED TO BE FULLY DEVELOPED.
DETECTION FACILITY "C" ASSUMED TO BE CONSTRUCTED TO DEVELOPED CONDITION
REQUIRED CAPACITY BUT WITHOUT AN OUTFALL SO IT FUNCTIONS AS A TEMPORARY
RETENTION POND. DETENTION FACILITIES "A", "B", AND "E" ARE ASSUMED TO
BE CONSTRUCTED TO THE DEVELOPED CONDITION REQUIREMENTS.

12 ID OUTPUT CONTROL VARIABLES
   IPRT  5  PRINT CONTROL
   IPLOT 0  PLOT CONTROL
   QSCAL 0  HYDROGRAPH PLOT SCALE

1IT HYDROGRAPH TIME DATA
   NMIN  3  MINUTES IN COMPUTATION INTERVAL
   IDATE 1  0  STARTING DATE
   ITIME 0000  STARTING TIME
   NQ  300  NUMBER OF HYDROGRAPH ORDINATES
   NDATE 1  0  ENDING DATE
   NTIME 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

************
* * *
108 KK * RR-DFE *
* *
************

115 K
OUTPUT CONTROL VARIABLES
IPRNT 3 PRINT CONTROL
IPLT 1 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

116 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

117 SV
STORAGE 0.0 0.0 1.3 3.9 6.9 10.3 14.1 18.2 22.8 27.9

118 SE
ELEVATION 784.00 786.00 788.00 790.00 792.00 794.00 796.00 798.00 800.00 802.00

119 SQ

***
*** *** *** *** ***

HYDROGRAPH AT STATION RR-DFE

PEAK FLOW TIME MAXIMUM AVERAGE FLOW
(CFS) (HR) 6-HR 24-HR 72-HR 14.95-HR
267. 6.80 (CFS) 124. 56. 56. 56.
(INCHES) 1.179 1.317 1.317 1.317
(AC-FT) 62. 69. 69. 69.

SAK STORAGE TIME MAXIMUM AVERAGE STORAGE
(AC-FT) (HR) 6-HR 24-HR 72-HR 14.95-HR
19. 6.80 6. 2. 2. 2.

PEAK STAGE TIME MAXIMUM AVERAGE STAGE
(FEET) (HR) 6-HR 24-HR 72-HR 14.95-HR
798.51 6.80 790.46 787.05 787.05 787.05

CUMULATIVE AREA = 0.98 SQ MI

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
206 KO

OUTPUT CONTROL VARIABLES
IPRNT  3  PRINT CONTROL
IPLT  1  PLOT CONTROL
QSCAL  100.  HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

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

208 SV
STORAGE  0.0  2.7  9.7  18.6  28.0  38.2  49.0  60.5  72.8  85.8
99.7

210 SE
ELEVATION  62.00  64.00  66.00  68.00  70.00  72.00  74.00  76.00  78.00  80.00
82.00

212 SQ
DISCHARGE  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.

***  ***  ***  ***  ***

HYDROGRAPH AT STATION  RR-DFC

PEAK FLOW  TIME  MAXIMUM AVERAGE FLOW
(CFS)  (HR)  6-HR  24-HR  72-HR  14.95-HR
0.  0.05  (CFS)  0.  0.  0.  0.
(INCHES)  0.000  0.000  0.000  0.000
(AC-FT)  0.  0.  0.  0.

PEAK STORAGE  TIME  MAXIMUM AVERAGE STORAGE
(AC-FT)  (HR)  6-HR  24-HR  72-HR  14.95-HR

PEAK STAGE  TIME  MAXIMUM AVERAGE STAGE
(FEET)  (HR)  6-HR  24-HR  72-HR  14.95-HR
72.63  14.95  71.80  67.26  67.26  67.26

CUMULATIVE AREA =  0.70 SQ MI

***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***

***************
*
282 KK  *
*  RR-DFB  *
*
***************

209 KO

OUTPUT CONTROL VARIABLES
IPRNT  3  PRINT CONTROL
IPLT  1  PLOT CONTROL
OSCAL  0. HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

290 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

291 SV  STORAGE
  0.0  0.1  1.2  3.3  5.8  8.7  12.1  15.9  20.1  23.6
  24.8  30.0

293 SE  ELEVATION
  71.20  72.00  74.00  76.00  78.00  80.00  82.00  84.00  86.00  87.60
  88.00  90.00

295 SQ  DISCHARGE
  0.0  22.0  73.0  130.0  169.0  202.0  236.0  260.0  285.0  301.0
  371.0  1222.0

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HYDROGRAPH AT STATION  RR-DFB

PEAK FLOW  TIME  MAXIMUM AVERAGE FLOW
(CFS)  (HR)  6-HR  24-HR  72-HR  14.95-HR
266.  6.70  (CFS)  111.  49.  49.  49.
(INCHES)  0.678  0.754  0.754  0.754
(AC-FT)  55.  61.  61.  61.

PEAK STORAGE  TIME  MAXIMUM AVERAGE STORAGE
(AC-FT)  (HR)  6-HR  24-HR  72-HR  14.95-HR
17.  6.70  5.  2.  2.  2.

PEAK STAGE  TIME  MAXIMUM AVERAGE STAGE
(FEET)  (HR)  6-HR  24-HR  72-HR  14.95-HR
84.45  6.70  76.03  73.32  73.32  73.32

CUMULATIVE AREA =  1.52 SQ MI

**************
*  *
461 KK  *  RR-DFB  *
*  *
**************

466 KO  OUTPUT CONTROL VARIABLES
IPRINT  5  PRINT CONTROL
IPLT  1  PLOT CONTROL
QSCAL  100  HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA
467 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

468 SV

STORAGE 0.0 0.0 0.2 1.0 2.0 2.8 4.3 5.3 6.5 11.6
15.4

470 SQ

DISCHARGE 2. 3. 3. 4. 4. 5. 5. 6. 8. 9.
279.

472 SE

ELEVATION 6796.60 6797.00 6798.00 6800.00 6802.00 6803.50 6803.51 6804.00 6804.10 6805.50
6806.50

***

***

***

***

***

HYDROGRAPH AT STATION RR-DF

PEAK FLOW TIME MAXIMUM AVERAGE FLOW
(CFS) (HR) 6-HR 24-HR 72-HR 14.95-HR
9. 8.20 (CFS) 9. 6. 6. 6.
(INCHES) 0.573 1.001 1.001 1.001
(AC-FT) 4. 8. 8. 8.

PEAK STORAGE TIME MAXIMUM AVERAGE STORAGE
(AC-FT) (HR) 6-HR 24-HR 72-HR 14.95-HR
11. 0.30 11. 6. 6. 6.

PEAK STAGE TIME MAXIMUM AVERAGE STAGE
(FEET) (HR) 6-HR 24-HR 72-HR 14.95-HR
6805.44 8.30 6805.31 6801.83 6801.83 6801.83

CUMULATIVE AREA = 0.14 SQ MI

** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** **

**************
* *
587 KK
* RR-DFSF *
* *
**************

598 KO

OUTPUT CONTROL VARIABLES
IPRINT 3 PRINT CONTROL
IPLOT 1 PLOT CONTROL
QSCAL 100. HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

599 RS

STORAGE ROUTING

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ITYP STOR TYPE OF INITIAL CONDITION
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**HYDROGRAPH AT STATION RR-DFFSF**

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**Cumulative Area = 0.16 SQ MI**

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**OUTPUT CONTROL VARIABLES**

- IPRINT = 3 PRINT CONTROL
- IPRINT = 1 PLOT CONTROL
- OSCALE = 0. HYDROGRAPH PLOT SCALE

**HYDROGRAPH ROUTING DATA**

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COMPUTED STORAGE-ELEVATION DATA

| STORAGE  | 0.00 | 0.06 | 0.38 | 4.93 | 14.99 | 25.74 | 37.09 | 49.05 | 61.62 | 74.83 |
| ELEVATION | 54.00 | 55.00 | 56.00 | 58.00 | 60.00 | 62.00 | 64.00 | 66.00 | 68.00 | 70.00 |

| STORAGE  | 88.75 | 95.99 | 103.43 | 111.06 | 118.90 |
| ELEVATION | 72.00 | 73.00 | 74.00 | 75.00 | 76.00 |

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 0. TO 105.
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.)

HYDROGRAPH AT STATION RR-DF#1

| PEAK FLOW | TIME | MAXIMUM AVERAGE FLOW |
| (CFS)     | (HR) | (CFS)   | 6-HR | 24-HR | 72-HR | 14.95-HR |
| 1130.     | 6.65 | 669.    | 1.404 | 2.021 | 2.021 | 2.021 |

| PEAK STORAGE | TIME | MAXIMUM AVERAGE STORAGE |
| (AC-FT)     | (HR) | (INCHES) | 61. | 27. | 27. | 27. |
| 95.         | 6.65 | 332. |

| PEAK STAGE | TIME | MAXIMUM AVERAGE STAGE |
| (FEET)     | (HR) | (FEET) | 61.09 | 61.09 | 61.09 |
| 72.91      | 6.65 | 67.69 |

CUMULATIVE AREA = 4.43 SQ MI

**************
*        *
857 KK * AP28 *
*        *
**************

864 KO OUTPUT CONTROL VARIABLES
IPRINT 3 PRINT CONTROL
IPLT 1 PLOT CONTROL
QSCAL 0, HYDROGRAPH PLOT SCALE

865 KC HYDROGRAPH COMBINATION
ICONP 4 NUMBER OF HYDROGRAPHS TO COMBINE

***
HYDROGRAPH AT STATION AP28

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CUMULATIVE AREA = 4.59 SQ MI
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Continuity Summary (AC-Ft) - Inflow=0.1024E+02 Excess=0.0000E+00 Outflow=0.1013E+02 Basin Storage=0.2085E+00 Percent Error= -0.9

RT-API2 | MANE   | 2.40     | 245.68     | 386.40           | 1.10        | 3.00     | 243.08     | 387.00           | 1.10   |

Continuity Summary (AC-Ft) - Inflow=0.2316E+02 Excess=0.0000E+00 Outflow=0.2304E+02 Basin Storage=0.1933E+00 Percent Error= -0.3

RT-API3 | MANE   | 2.85     | 336.37     | 387.60           | 1.10        | 3.00     | 334.59     | 387.00           | 1.10   |

Continuity Summary (AC-Ft) - Inflow=0.3051E+02 Excess=0.0000E+00 Outflow=0.3039E+02 Basin Storage=0.1711E+00 Percent Error= -0.2

RT-API4 | MANE   | 2.72     | 351.91     | 388.34           | 1.13        | 3.00     | 351.21     | 390.00           | 1.13   |

Continuity Summary (AC-Ft) - Inflow=0.3857E+02 Excess=0.0000E+00 Outflow=0.3840E+02 Basin Storage=0.2374E+00 Percent Error= -0.2

RT-DFE | MANE   | 1.17     | 267.34     | 409.24           | 1.32        | 3.00     | 267.29     | 411.00           | 1.32   |

Continuity Summary (AC-Ft) - Inflow=0.6896E+02 Excess=0.0000E+00 Outflow=0.6897E+02 Basin Storage=0.4479E-02 Percent Error= 0.0

RT-IPN14 | MANE  | 1.05     | 49.82      | 363.76           | 1.91        | 3.00     | 49.19      | 363.00           | 1.91   |

Continuity Summary (AC-Ft) - Inflow=0.2750E+01 Excess=0.0000E+00 Outflow=0.2748E+01 Basin Storage=0.2765E-02 Percent Error= 0.0

RT-AP5 | MANE   | 0.25     | 340.20     | 369.03           | 1.36        | 3.00     | 340.18     | 369.00           | 1.36   |

Continuity Summary (AC-Ft) - Inflow=0.7874E+02 Excess=0.0000E+00 Outflow=0.7874E+02 Basin Storage=0.4206E-03 Percent Error= 0.0

RT-IPS1 | MANE  | 2.10     | 93.23      | 384.30           | 1.12        | 3.00     | 92.92      | 384.00           | 1.12   |
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<th>Basin Storage</th>
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CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1063E+02 EXCESS=0.0000E+00 OUTFLOW=0.1063E+02 BASIN STORAGE=0.4832E-02 PERCENT ERROR= 0.0

| RT-AP24S | MANE  | 0.90 | 158.95 | 365.40 | -1.00 | 3.00 | 158.39 | 366.00 | -1.00 |

*** NORMAL END OF HEC-1 ***
MAPS (FOLDED IN POCKETS)

- FULLY DEVELOPED CONDITION BASIN MAP AND MASTER PLAN
- INTERIM CONDITION BASIN MAP AND MASTER PLAN
- F.E.M.A. 100-YEAR FLOOD ZONE LIMITS
- SUBDIVISION AND LAND USE IDENTIFICATION MAP
- EXISTING DRAINAGE FACILITY MAP