CONCEPTUAL
MASTER DRAINAGE REPORT
FOR
SERENO CANYON

November 15, 2006

WP# 042054

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Accepted in Concept

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1.0 INTRODUCTION

1.1 Project Description

Sereno Canyon is a planned 330-acre custom lot residential subdivision located in the northeastern portion of Scottsdale, Arizona. The site is located in Section 11, Township 4 North, Range 5 East of the Gila and Salt River Base and Meridian. The site is currently an assemblage of undeveloped parcels bound to the west by the existing Sonoran Crest Development (122nd Street alignment), to the east by the 128th Street alignment, to the north by the Happy Valley Road alignment, and to the south by the McDowell Mountain Sonoran Preserve. Access to the development is planned from the west via the ½-mile section roadway, Alameda Road. Plate 1 provides a vicinity map for the project and surrounding areas.

Sereno Canyon is a proposed custom lot sub-division nestled at the northern base of the McDowell Mountains. Development of the project is planned to occur in four (4) phases. Please refer to Plate 1A for a phasing map of the project. The development includes 122 lots ranging in size from 2 to 3 acres and a clubhouse with amenities such as jacuzzis, pools, water falls, and restaurant facilities. Interpretive trails and scattered pocket parks with water features will also be incorporated into the site plan.

1.2 Type of Report

This report is being prepared as a Conceptual Master Drainage Plan for the proposed Sereno Canyon Project.

1.3 Purpose

This Conceptual Master Drainage Report for the proposed Sereno Canyon project has been prepared to meet the master drainage plan requirements outlined in Chapter 4 of the *City of Scottsdale Design Standards and Policies Manual* (DS&PM) effective September 25, 2006. This report presents description of the hydrological and hydraulic modeling of the proposed drainage systems.

The main purpose of this report is to illustrate the following:

- Compliance with the City of Scottsdale's Drainage Ordinance stormwater storage requirements by providing stormwater storage for 100-year, 2-hour storm event runoff for improved areas computed by Rational Method.
- Reduction of post-development flows to at or below the pre-development flows for 2-year, 10-year and 100-year, 6-hour storm events. Hence, the downstream properties are provided with similar or better flood protection as the pre-development condition.
- Maintenance of the major water courses traversing through the site in their natural location.
- Delineation of the 100-year water surface extents along with determination of the 100-year water surface elevations for the major drainage courses using HEC RAS computer program.

2.0 EXISTING ON-SITE DRAINAGE CONDITIONS AND CHARACTERISTICS

2.1 On-Site Drainage

The proposed project lies in the northern planning section of the City of Scottsdale. The Elevations range from 2,830 feet in the south to 2,675 feet in the northeast. Based on the existing topography of the site, a ridgeline runs through the property from the southern property boundary (approximately at the center) in the northwest direction.

Vegetation is typical Sonoran Desert type with creosote bush, jumping cholla, saguaro cacti, palo verde, ironwood, and mesquite trees. The project site lies within the areas identified as Environmentally Sensitive Lands (ESL) by the City of Scottsdale. The site is further classified as 'Upper Desert' within the ESL areas as shown in Plate 2 – *ESL Classification.*

Plate 3 presents the soils classification (type D) based on the Soil Conservation Service (SCS) Map for the project area. SCS is now referred to as Natural Resource Conservation Service (NRCS). The site photos for the project site are included in Appendix A. The cover type and hydrologic condition were estimated as desert shrub areas with poor hydrologic conditions. From Figure 4-6 of the *City of Scottsdale DS&PM*, a runoff curve number of 88 was used for the corresponding soils group D that occurs within the watershed area.

Currently, the site contains no development and hence an effective impervious area of zero percent was used. The soil characteristics of the site are included in the model in terms of the curve number discussed above. Also, minor rock outcroppings on the site are not considered a factor in computing the percent effective impervious areas as they do not interfere with the drainage pattern and are not hydraulically connected to the sub basin concentration points. This conclusion is made based on the photographs of the site and washes included in Appendix A. Please note that the site will not be mass graded and the outcroppings will be the same in both the existing and proposed conditions and do not impact the pre- and post-development runoff comparison.

There are no washes on the site categorized as a 'Vista Corridor' as the calculated 100-year, 6-hour flow is less than 750 cfs for all washes. The major watercourses traversing the project with a 100-year, 6-hour flow greater than 50 cfs are identified as the site lies within ESL areas. These washes are identified on Plate 9 – *Pre-Development Grading and Drainage Plan.* These washes will be maintained in their natural location and will not be re-aligned.

2.2 Existing On-Site Drainage Network

Existing on-site drainage sub-basin boundaries were identified using aerial mapped 1-foot contours. Please refer to Plate 5 – *Color Topographic Aerial Photograph.* Please refer to Plate 8 – *Pre-Development Drainage Site Plan* for the on-site sub-basins and concentration points.

Runoff generated on-site drains northeasterly or northwesterly from the ridgeline. Washes C1, D1, E1, E2, and F1, with a 100-year, 6-hour flow greater than 50 cfs, traverse the site in the northeast direction and exit at the property boundary. The other minor washes (100-year, 6-hour flow less than 50 cfs) traverse either northeasterly or northwesterly until they exit at the property boundary.

A delineation of water surface extents for washes with 100-year, 6-hour peak flow of 50 cfs or greater has been drawn based on the HEC-RAS analysis. Water surface elevations and top widths for pre-development flows at each cross-section are included on Plate 9 – *Pre-Development Grading and Drainage Plan.* The hydrologic and hydraulic analysis procedures are discussed in Section 5.0. The boundary conditions water surface elevations were determined using normal depth for the given channel slope in HEC RAS.

2.3 Off-Site Watershed

The off-site areas impacting the drainage pattern of the proposed development lie in the northern planning section of the City of Scottsdale. The off-site watershed includes a portion of the 40-acre Sonoran Sky development, an additional 20-acre parcel and mountainous terrain located within the McDowell Sonoran Preserve. Currently, the entire off-site watershed is undeveloped desert land. The aforementioned two properties may be developed in the future. The off-site area impacting the drainage patterns for the proposed

developments are identified on Plate 6 – *Off-Site Watershed Area Map.* Vegetation is typical Sonoran Desert type with creosote bush, jumping cholla, saguaro cacti, palo verde, ironwood, and mesquite trees. The off-site areas lie within the 'Upper Desert' and 'Hillside' (ESL) landform areas.

There are no off-site washes categorized as a 'Vista Corridor' that impact the site, as the calculated 100-year, 6-hour flow is less than 750 cfs. The major watercourses traversing the project with a 100-year, 6-hour flow greater than 50 cfs are identified. These washes will be maintained in their natural location and will not be re-aligned.

Based on the SCS Map, the cover type and hydrologic condition were estimated as desert shrub areas with poor hydrologic conditions. From Figure 4-6 of the *City of Scottsdale's DS&PM*, a runoff curve number of 88 was used for the corresponding soils group D that occurs within the off-site watershed area.

2.4 Existing Off-Site Drainage Network

City of Scottsdale Quarter Section Maps with 2-foot contour interval topography were used to identify the off-site drainage sub-basins impacting the proposed development. Please refer to Plate 6 – *Off-Site Watershed Area Map* for the limits of the drainage sub-basins and concentration points.

Off-site flows enter the site along the southern property boundary along their natural course as overland and concentrated flows. The offsite flows impacting the project traverse the site through washes A1, A2, B1, B2, C, H1, H2, I, J and R. Washes A1, A2, B1, B2, C and R traverse the site in the northeast direction and exit at the east property boundary. Washes H1, H2, I and J traverse the site in the northwest direction until they exit at the west property boundary.

2.5 Existing Drainage Relative to Adjacent Projects

Existing drainage courses exit the site as concentrated flows at various locations on the eastern, western and northern property boundaries. These locations will be maintained with peak flows for the 2-year, 10-year and 100-year, 6-hour storm events at or below pre-developed amounts.

2.6 Flood Insurance Rate Map (FIRM)

The Flood Insurance Rate Maps (FIRM) for Maricopa County, Arizona and incorporated areas, Panel Numbers 04013C1255G and 04013C1260F, effective date September 30, 2005 indicates the site is within Zone "X" (shaded), and Zone "D".

Zone "X" (shaded) is defined by FEMA as follows:

> *Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.*

Zone "D" is defined by FEMA as follows:

> *Areas in which flood hazards are undetermined.*

The location of the parcel relative to the FIRM panels is illustrated on Plate 4 – *Flood Insurance Rate Map (FIRM)* using the FEMA Firmettes.

3.0 PROPOSED MASTER DRAINAGE PLAN

3.1 General Description of Proposed Drainage System

The proposed drainage system will allow existing drainage patterns to be maintained in their natural location and condition where possible. The site is being developed as large custom lots with a minimum lot size of approximately 2 acres. In the event of any future development within the off-site watershed areas, it will be the responsibility of the future developer to attenuate the post-development flows to at or below the pre-development flows.

The off-site runoff impacting the site will traverse the site through natural washes A1, A2, B1, B2, C, H1, H2, I, J and R. Washes A1, A2, B1, B2, C and R traverse though the site in the northeast direction and exit at the east property boundary. Washes H1, H2, I and J traverse the site in the northwest direction until they exit at the west property boundary.

The on-site drainage system will be composed primarily of the existing on-site washes conveying the runoff through the site and exiting at the property boundary at their historic locations. According to the City's Drainage Ordinance, stormwater storage is to be provided for the 100-year, 2-hour storm event for improved areas. Rational Method was used to estimate the required stormwater storage volumes. The procedure is discussed in detail in Section 5.2.4. Detention basins with bleed-off pipes are proposed at strategic locations to provide stormwater storage for the runoff generated during the 100-year, 2-hour storm event. Several existing on-site washes are being utilized as detention basin locations due to the steep slopes encountered within the site. Rock walls will be used to mitigate the need for large constructed slopes to attain ponding areas.

According to the City's Drainage Ordinance, all runoff generated from the developed portion of the site must be managed and the peak discharge from the site reduced to at least pre-development values. With the development being sparse in nature at approximately 0.37 dwelling units per acre and no mass grading being proposed, post-development flows are only slightly higher than pre-development flows. The proposed on-line detention basins along several existing on-site washes will also act to attenuate the post-development peak discharges to at or below the pre-development values. A

detailed description on the design and analysis of these basins is provided in Section 3.5.1.

Roadway runoff will be conveyed along the street up to the capacity of the street within the required stipulations outlined in Figure 4-2 – *Hydraulic Design Criteria* of the *City of Scottsdale DS&PM*. Please refer to Appendix A for a copy of this figure. The additional runoff exceeding the street capacity will be released through curb openings or storm drain system. Curb openings will occur where there is a wash adjacent to the roadway or at culvert crossings.

3.2 Future Conditions

Currently, the off-site areas impacting the site are undeveloped desert lands. The areas proposed to be developed in the future are the 40-acre Sonoran Sky development and the 20-acre parcel at the southern property boundary. Currently no approved drainage reports exist for these two developments. It will be the responsibility of these developments to maintain their post-development flow peaks and volume at or below the pre-development flow peaks and volume when they develop. The proposed drainage systems are designed assuming that there will be no increase in peak flows during the 100-year, 6-hour event upstream of the project site.

The drainage plan for Sereno Canyon proposes to maintain the 2-year, 10-year and 100-year, 6-hour storm event post-development peak discharges at or below the pre-development flows. Also, the drainage courses will be maintained at their historic locations at the property boundary. Thus, no adverse impact is anticipated on the adjacent properties downstream of the project site for the 2-year, 10-year and 100-year, 6-hour storm events.

3.3 Stormwater Storage Requirements

Based on the City of Scottsdale's Drainage Ordinance stormwater storage requirements, on-site stormwater storage is to be provided for runoff generated during the 100-year, 2-hour storm event for improved areas. Rational Method is used to estimate the 100-year, 2-hour stormwater storage volumes. 100-year, 2-hour event stormwater runoff is proposed to be detained on site through detention basins upstream of culvert crossings and at other strategic locations along existing on-site washes. Several of the detention

basins were designed to detain runoff at a depth greater than three feet (3') in order to meet the volume provided requirements within the Environmentally Sensitive Lands Ordinance (ESLO) and Natural Area Open Space (NAOS) constraints. Detention basins were sized at a depth greater than three feet (3'), as grading the detention basins results in large disturbed areas, which are not in accordance with the ESLO intent. Based on the topographical conditions, washes are incised and typically greater than two feet (2') deep. Hence, berms are provided for the detention basins to blend with the natural topography, such that the emergency overflow discharges into the existing wash flow path. During final design when roadway profile and pad elevations have been established, these basins will be reconfigured. The precipitation values for the 100-year, 2-hour storm event were obtained from the NOAA Atlas 2 Volume VIII maps. The equations and the assumptions used to calculate the required and provided stormwater storage volumes are discussed in Section 5.2.4.

Provided below is a summary of the stormwater storage required and provided for each individual drainage basin. Table 3.3, on the following page, indicates that the stormwater storage provided is in excess of the stormwater storage required for the entire site by 2.17 ac-ft. Please refer to Appendix E for detailed stormwater storage calculations.

3.3.1 Dissipation of Stormwater

18-inch bleedoff pipes with removable orifice plates are proposed for the dissipation of the stormwater detained within the stipulated time of 12 to 24 hours per the City of Scottsdale Drainage Ordinance; thus, no dry wells will be required. The orifice plates are preliminarily sized using the orifice equation. A 6-inch diameter orifice plate is proposed to dissipate the detained volume at a rate of not greater than 1.5 cfs. The calculation is included in Appendix F.

Table 3.3
Stormwater Storage

Drainage Boundary	Total Development Area (Acre)	100-yr, 2-hr Required Volume (acre-ft)	100-yr, 2-hr Provided Volume (acre-ft)	Volume Shortage / Excess ± (acre-ft)
A1	3.79	0.53	0.6	0.07
A2	7.17	1.01	1.01	0.00
B	10.94	1.54	1.78	0.24
C	3.65	0.51	0.57	0.06
D	7.73	1.09	1.25	0.16
E1	14.24	2.01	2.01	0.0
E2	13.23	1.87	2.02	0.15
E3	2.19	0.32	0.58	0.26
F1	10.24	1.44	1.99	0.55
F2	3.56	0.5	0.51	0.01
F3	2.93	0.41	0.40	0.0
G	3.7	0.52	0.51	0.0
HI	12.94	1.82	1.98	0.16
H2	8.5	1.2	1.31	0.11
1	4.44	0.63	0.64	0.01
J	4.81	0.68	0.66	0.02
K	2.06	0.29	0.38	0.09
L	1.49	0.21	0.20	0.0
M	1.44	0.2	0.2	0.0
N	2.81	0.4	0.49	0.09
O	0.55	0.08	0.22	0.14
P	1.73	0.24	0.37	0.13
Q	0.52	0.07	0.07	0.00
R	0.18	0.02	0.0	-0.02
Total	**125**	**17.59**	**19.76**	**2.17**

3.4 Pre- and Post- Runoff Characteristics

The U.S. Army Corps of Engineers' HEC-1 computer analysis program was used for hydrologic modeling including routing of flow through storage basins and combining hydrographs. The HEC-1 model was also used to compare the pre- and post-development runoff flows. Based on the site topographic conditions, Kinematic Wave routing technique was used for both the existing and proposed conditions hydrologic modeling. Runoff for each drainage sub-basin was computed and then routed, if required, through downstream drainage sub-basins where the hydrographs were then combined. The parameters were selected per the guidelines provided in the *City of Scottsdale DS&PM*. The parameters selected and the inputs for the HEC-1 models are discussed in Sections 5.1. The parameters changed to model developed conditions are also discussed in Section 5.1.1

Tables 3.4-1, 3.4-2, and 3.4-3 provide the comparative peak flows for the pre- vs. post-developed conditions for 2-year, 10-year, and 100-year, 6-hour events respectively at each concentration point. For the location of these concentration points and corresponding 100-year, 6-hour flow values, please refer to Plates 8 and 9 for existing conditions, and Plates 10 and 11 for developed conditions. The developed conditions HEC-1 model with on-line detention upstream of the culvert road crossings and other strategic locations reduced the post-development flows to below the pre-development flows at each concentration point exiting the site for the 2-year, 10-year, and 100-year, 6-hour storm events.

The HEC-1 input data and output files for the existing and developed conditions are included in Appendices B and C, respectively. The data analysis procedures are discussed in Section 5.0. Hydrographs comparing both pre-development and post-development 100-year, 6-hour event flows at each concentration point exiting the site are included in Appendix D. These hydrographs graphically illustrate that the post-development 100-year, 6-hour flows are at or below the pre-development flows. Further, they also illustrate the time to peak and the duration of the storm event.

Table 3.4-1
2-Year, 6-Hour Flow Summary

Concentration Point	Existing Flow (cfs)	Developed Flow (cfs)	Net Downstream Effect (cfs)
A1	46	39	-7
A2	21	15	-6
COMB B	37	28	-9
C	17	10	-7
D	17	15	-2
COMB E	49	26	-23
E3	6	0	-6
F1	19	13	-6
F2	9	1	-8
F3	8	6	-2
G	7	1	-6
H1	28	7	-21
H2	32	19	-13
I	14	2	-12
J	18	9	-9
K	9	0	-9
L	8	2	-6
M	6	1	-5
N	8	0	-8
O	3	3	0
P	6	6	0
Q	3	3	0
R	94	88	-6

Table 3.4-2
10-Year, 6-Hour Flow Summary

Concentration Point	Existing Flow (cfs)	Developed Flow (cfs)	Net Downstream Effect (cfs)
A1	111	109	-2
A2	52	48	-4
COMB B	93	85	-8
C	43	33	-10
D	43	37	-6
COMB E	126	68	-58
E3	14	4	-10
F1	47	37	-10
F2	21	11	-10
F3	19	18	-1
G	19	9	-10
H1	70	54	-16
H2	79	66	-13
I	35	16	-19
J	43	30	-13
K	19	4	-15
L	17	22	-6
M	14	7	-7
N	18	2	-16
O	6	5	-1
P	13	12	-1
Q	7	5	-2
R	220	209	-11

Table 3.4-3
100-Year, 6-Hour Flow Summary

Concentration Point	Existing Flow (cfs)	Developed Flow (cfs)	Net Downstream Effect (cfs)
A1	235	228	-7
A2	109	108	-1
COMB B	204	198	-6
C	89	80	-9
D	93	79	14
COMB E	275	246	-29
E3	28	16	-12
F1	99	88	-11
F2	43	35	-8
F3	39	38	-1
G	41	31	-10
H1	152	147	-5
H2	172	165	-7
I	73	50	-13
J	83	75	-8
K	35	20	-15
L	32	29	-3
M	28	19	-9
N	35	19	-16
O	11	9	-2
P	24	21	-3
Q	13	10	-3
R	444	411	-33

3.5 Proposed Drainage Structures

3.5.1 On-Site Detention

On-site detention basins are proposed at the upstream end of roadway culvert crossings and at other strategic locations along existing on-site washes to provide stormwater storage as discussed in Section 3.3. Please refer to Appendix E for the 100-year, 2-hour stormwater storage volume calculations for all detention basins.

Stormwater volumes for storm events greater than the 100-year, 2-hour event will overflow over the rock berm. For the 2-year, 10-year, and 100-year, 6-hour storm events, these basins attenuate the post-development flows to at or below the pre-development flows. Peak flows are routed through these basins for the 2-year, 10-year, and 100-year, 6-hour storm events. The peak flow volume during the smaller events (2-year, 6-hour) will not overflow the rock berm and will be drained through the bleed-off pipe. This attenuation is modeled using HEC-1.

Provided in Figure 3.5.1 is a graphical illustration of stormwater routing/storage through a detention basin. Weir walls are proposed at the outlet of the basins. Storage routing curves were developed for the detention basins specific to the outlet structure. Please refer to Appendix F – *Hydraulic Calculations* for weir wall storage routing curves used in the HEC-1 modeling.

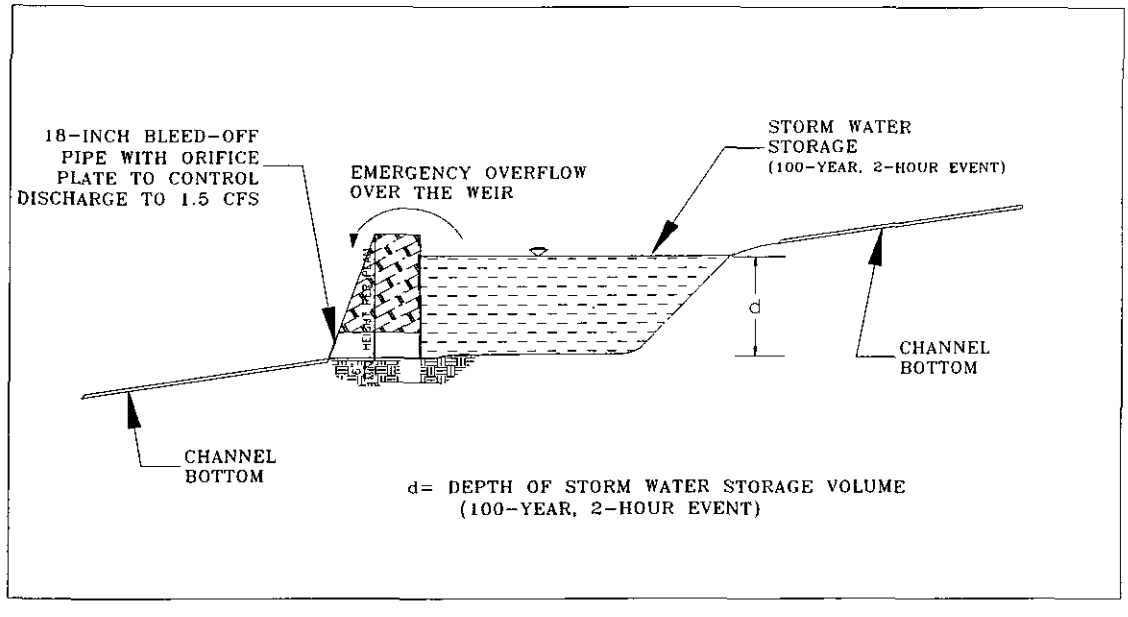

Figure 3.5.1 – Stormwater Routing through a Detention Basin

The bleed-off pipe is sized at 18 inches, based on the minimum pipe size requirements by the City of Scottsdale. As the flows cannot be metered by this bleed-off pipe, an orifice plate is proposed to meter the discharge flows at a rate not greater than 1.5 cfs. The bleed-off pipe with orifice plate drains the water into the natural watercourses downstream of the basin. The proposed orifice plates will be sized such that the detained water is drained at a rate not exceeding 1.5 cfs and the drain time is between 12 to 24 hours.

3.5.2 Roadway Crossing Structures

Culverts will be designed with the final drainage reports, and with the final design of the roadway profiles. The culverts will be designed to convey the 100-year flow downstream of the basin outlet structures, which is less than the existing 100-year flow. Culverts are proposed to be sized such that the headwater behind the culvert does not inundate the building envelopes. Also, the calculated headwater elevation at the culvert is used to define the ponding limits for the 100-year, 6-hour storm event. HY-8 culvert analysis program developed for the Federal Highway Administration will be used for the analysis of the culverts proposed with the improvement plans. The approximate 100-year backwater limits (ponding) will also be incorporated within the proposed floodplain delineations.

Rip rap will be utilized within the channels to dissipate velocities and as erosion protection on the upstream and downstream sides of the proposed culverts. The actual design and rip rap sizing will be based on approved practices and will be completed at the time of improvement plan submittal.

Street runoff conveyance and street capacities will be calculated with the final drainage reports prepared for the improvement plan submittals. Curb openings or storm drain systems will be designed to convey the excess 100-year flow so that street flow depths do not exceed eight inches (8") and the 10-year flow is contained within the curbs. The actual design will be based on approved practices and will be completed at the time of improvement plan submittal.

The drainage system for local residential roadways will be designed consistent with the *City of Scottsdale DS&PM.* The methodology developed by the Federal Highway Administration will be used to calculate, in spreadsheet format, the allowable street cross-section capacities.

3.6 Project Phasing

The project site is proposed to be developed in four phases. For the completion of this project, a drainage report will be prepared for each phase. The drainage structures proposed within each phase will be designed to meet the *City of Scottsdale DS&PM* guidelines. The impact of the phased construction and the required interim condition drainage systems proposed will be discussed in the drainage report for each phase. The development requirements will be met independently for each phase.

4.0 SPECIAL CONDITIONS

4.1 Section 404 Washes

All washes within the project were investigated to identify those that may be deemed jurisdictional. The United States Army Corp of Engineers approved Section 404 Jurisdictional Delineation is presented on Plate 7 – *Section 404 Washes*. This plate provides the approved Section 404 wash locations within the project site. The Section 404 washes are also illustrated on the pre- and post-development grading and drainage plans.

5.0 DATA ANALYSIS METHODS

5.1 Hydrologic Procedures

The U.S. Army Corps of Engineers' HEC-1 hydrologic model is used to compute the 2-year, 10-year and 100-year events, and 6-hour storm events runoff as outlined in Chapter 4 of the *City of Scottsdale DS&PM.* Further, Rational Method is used to compute the 100-year, 2-hour storm event storage volume required. Below is a description of the hydrologic procedures specific to this project.

5.1.1 HEC-1 Procedures

The U.S. Army Corps of Engineers' HEC-1 hydrologic model is used for computing hydrographs, routing the flow through sub-basins, and combining hydrographs. Based on the site topographic conditions the Kinematic Wave routing technique was used for both the existing and proposed conditions hydrologic modeling. The main components for runoff computation are overland flow, collector channel flow and main channel flow. Input data necessary for the computer analysis included definition and measurement of the overland flow characteristics, drainage sub-basins, assignment of soil curve numbers and calculations of the proposed impervious factors. Provided below is a more detailed explanation of the parameter selection and the data inputs for HEC-1 modeling.

5.1.1.1 Rainfall Event

The precipitation amount for the 2-year, 10-year and 100-year events, 6-hour duration period was obtained from NOAA Atlas 2 Volume VIII maps located in the *City of Scottsdale DS&PM.* An illustration of the location of the site on these maps is provided in Appendix A. These values were further analyzed using the Maricopa County Drainage Design Management Systems for Windows (DDMSW) program to determine the precipitation depths for intervals lower than 1 hour, which are input values in the HEC-1 model. The DDMSW report of this analysis is included in Appendix A The total calculated rainfall depths for the 2-year, 10-year, and 100-year, 6-hour storm events are 1.57, 2.29, and 3.37 inches respectively. The drainage sub-basins have also been depicted on the NOAA maps. Based on the size of the drainage area, a

single point rainfall amount without aerial reduction was justified for each storm event analyzed.

5.1.1.2 Soil Curve Numbers

Soil curve numbers are used to account for interception/infiltration losses. Soil curve numbers for the HEC-1 models were calculated based on published guidelines and engineering experience for the type of soils present within the drainage sub-basins. The cover type (less than 30% vegetation cover due to wild fire) and hydrologic condition were estimated as desert shrub areas with poor hydrologic conditions. Plate 3 presents the soils classification (type D) based on the SCS Map for the project area. A runoff curve number of 88 was used for the corresponding soils group D that occurs within the watershed area. Figure 4-6 "Runoff Curve Numbers for Arid and Semi-Arid Rangelands" located in the *City of Scottsdale DS&PM* was used to determine the soil curve number and has been included in Appendix A. Wood/Patel is in agreement with the City's published curve numbers.

5.1.1.3 Impervious Area

Impervious percentages were determined for each sub-basin for the developed conditions HEC-1 model. Currently, the site contains no development and hence a effective impervious area of zero percent was used. The rock outcroppings on the site are not considered a factor in computing the percent impervious as they do not have a pattern that may impact the drainage characteristics and are not hydraulically connected to the basin outlets. Please refer to photographs of the site and washes in Appendix A. For the on-site developed conditions, impervious percentages were calculated utilizing Figure 2.2-16 "Percent of Impervious Area vs. Dwelling Units/Acre", in Chapter 2 of the old *City of Scottsdale DS&PM*. Please refer to Appendix A for a copy of this figure. Based on the lot sizes (Average lot size = 101,500 sq.ft), an impervious percentage of 10 percent was used for the proposed developed areas.

5.1.1.4 Overland Flow Resistance Factor

The resistance factor for overland flow was estimated with guidance from descriptive information and site photographs. Based on the site conditions illustrated by the photographs in Appendix A, the site is considered to most closely resemble the sparse rangeland with Debris-20% cover, as well as the sparse vegetation categories identified in Table 3.5 of the HEC-1 manual. Based on the site photos and field observations, vegetative cover is estimated to be greater than 20%. Thus, a mid-range value from the sparse rangeland with Debris-20% cover category was deemed appropriate. Since a mid-range value from this category corresponded with the upper value of the sparse vegetation category, a value of 0.13 was chosen to best fit both categories with actual site conditions. From Table 3.5 in the HEC-1 manual, a resistance factor for overland flow of 0.13 was chosen. A copy of this table is included in Appendix A.

5.1.1.5 HEC-1 Input Records

This section provides additional description for the input Records used in the HEC-1 modeling for this project. The computation time interval for hydrograph generation used was 2 minutes which is within the range of 1 to 5 minutes specified in the *City of Scottsdale DS & PM.*

BA Record

This record is a direct input for computing runoff. The element of this record is the drainage area in square miles estimated by measuring the area of the drainage boundary.

LS Record

This record is a loss rate data record and computes rainfall losses based on the geological characteristics of the site. The elements on this record are the soil curve numbers and the percent impervious. Both of these data are estimated based on the soil characteristics and site conditions. The derivation of these parameters is discussed in detail in Section 5.1.1.

UK Record

This record defines the characteristics of overland flow. The elements on this record are the overland flow length, slope, resistance factor, and percent of sub-basin area represented. All of the input values are measurements and calculated values except for the resistance factor. The resistance factor for overland flow was estimated based on Table 3.5 in the HEC-1 manual. Based on the site conditions illustrated by the photographs in Appendix A, a resistance factor value of 0.13 was chosen. Further discussion on overland flow resistance factor was provided in Section 5.1.1.4.

RK Record

This record defines the characteristics of the main channel. The elements on this record are the channel length, channel slope, channel roughness, and geometry of the channel. All of the values were measured and calculated values. The channel roughness ('n' value) was chosen based on the site conditions as discussed in Section 5.2. Per the HEC-1 manual, the 'n' value that best represents the channel was chosen. The 'n' value for the channel bottom, 0.032, was chosen to best represent the channel characteristics. Also, this value is conservative as it results in a higher estimate of peak flows. The HEC-1 model was calibrated to the HEC RAS hydraulic model as accurately as possible. However, the HEC-1 model is simplified by using average dimensions of the channel to account for the irregularity in the channel dimensions.

SE Record

This record is used for defining the parameters to facilitate routing of flows through a storage basin. The elements on this record are the elevations corresponding to values in the same field in the SV and SQ Records. These values are obtained from the detention basin elevations and/or head water elevations where storage routing is proposed. Please refer to Appendices F and G for the rating calculations and detention basin calculations respectively. Please note that the elevation values are extrapolated for modeling purposes to determine the headwater elevation over the weir and the limits of inundation.

SV Record

This record is used for defining the storage volumes in the storage routing of flows. These values are obtained from the storage volumes at different elevations of the ponding at the control structures provided as defined by the SE records. These values are calculated and are provided in Appendix G. Please note that the storage volumes are extrapolated to represent the proposed detention volumes.

SQ Record

This record is used to define outflow discharge data for storage routing. Please refer to Appendix F for the rating curves for storage intervals. The elements in this field indicate the discharge at different stages for the proposed structures. Appendix F includes calculations for weir flows.

5.1.2 Parameter Changes for Developed Conditions

The parameter changes depicting the developed conditions are based on the guidelines provided in the *City of Scottsdale DS & PM*. The percent impervious used in the HEC-1 modeling was increased to depict the developed conditions. For the on-site developed conditions, effective impervious percentages were calculated utilizing Figure 2.2-16 "Percent of Impervious Area vs. Dwelling Units/Acre", in Chapter 2 of the old *City of Scottsdale DS&PM*. Please refer to Appendix A for a copy of this figure.

The proposed development includes 122 lots and a clubhouse, which is considered to be an additional lot. The dwelling density is calculated as 0.373 du/acre, for a total of 123 lots and 330 acres. Based on the lot sizes (average lot size = 101,500 sq.ft), and dwelling density of 0.37 du/acre an effective impervious percentage of 10 percent was used for the proposed developed areas in the HEC-1 model. An effective impervious area of 10 percent was used for the developed areas within the project site, while 0 percent was used for the current and proposed undeveloped areas. A weighted percent impervious value was used in HEC-1 model for each drainage basin based on the proposed developed and undeveloped areas.

5.1.3 Rational Method

The Rational Method was used to compute peak discharges for watersheds less than or equal to 160 acres as a comparison with HEC-1 results. Parameters necessary for this procedure are measurement of drainage sub-basin areas, runoff coefficient ("C" values) and calculation of rainfall intensity. Runoff values are calculated using the following 100-year "C" values:

- 0.56 for undeveloped desert land with slopes less than 10% - Hydrologic Soil Group D
- 0.59 for single family residential area R1-130 – Hydrologic Soil Group D

These values are based on Figure 4-5 "Runoff Coefficients for Use with Rational Method" in the *City of Scottsdale DS&PM*. This figure is included in Appendix A. The Maricopa County Flood Control District's Drainage Design Management System (DDMS) software was used to determine the peak discharges by Rational Method.

5.1.4 Stormwater Storage

Based on the City of Scottsdale's Drainage Ordinance stormwater storage requirements, on-site stormwater storage is proposed to be provided for 100-year, 2-hour storm events. The Rational Method is used to estimate the 100-year, 2-hour stormwater storage volumes. The precipitation values for the 100-year, 2-hour storm event were obtained from the NOAA Atlas 2 Volume VIII maps. The equations used to calculate the required and provided stormwater storage volumes are presented below.

5.1.4.1 Required Stormwater Storage Volume

Stormwater storage volume required for the 100-year, 2-hour event is:

$$V_{REQUIRED} = C * \left(\frac{P}{12}\right) * A$$

Where:

- V is the required stormwater storage volume in acre-feet
- C is the weighted "C" coefficient, 0.59 for the proposed developed areas.
- P is the precipitation in inches for the 100-year, 2-hour rainfall, 2.82 inches for the proposed developed areas.
- A is the drainage area in acres

5.1.4.2 Provided Stormwater Storage Volume

Stormwater storage volume provided for the 100-year, 2-hour event is:

$$V_{PROVIDED} = \left[\left(\frac{A_1 + A_2}{2}\right) * (ELEV_2 - ELEV_1)\right]$$

Where:

- V is the provided stormwater storage volume in acre-feet
- A is the contour area in acres
- ELEV is the contour elevation

Section 3.3 of this report describes the stormwater storage provided through proposed detention basins. Assumptions that were made when determining provided volume were maximum side slopes of 4:1. Please refer to Appendix G for 100-year, 2 hour stormwater storage volume calculations.

5.2 Hydraulic Procedures

5.2.1 Hydraulic Analysis of Open Channels

The U.S. Army Corps of Engineers' HEC-RAS computer program was used for the hydraulic analysis of the washes greater than 50 cfs. HEC-RAS was used to determine the 100-year water surface elevations. Cross-sections were placed such that significant variations in the channel cross-sectional geometry are adequately represented. The Manning's 'n' value was estimated using Cowan Method based on the following parameters:

- Channel material
- Degree of irregularity
- Effects of obstruction
- Vegetation
- Variations in channel cross section
- Degree of meandering

The investigation of site photos presented in Appendix A and aerial photos provided on Plate 5, indicated gradual variations in channel cross-sections within the site and a minor degree of meandering. The vegetation on the site was minimal due to the wild fire that occurred recently and is typical of the local desert climate. The channel material was coarse gravel and the degree of irregularity was minor. Based on the above, a 'n' value of 0.032 and 0.045 were

chosen for channel bottom and channel over banks respectively. Site Photos have been included representative of on-site washes that support the "n" value determination. The site photos are included in Appendix A.

Cross-sections were placed such that significant variations in the channel cross-sectional geometry are adequately represented. Due to the steep slopes on the project site, it was not feasible to put enough cross-sections such that the difference in energy grade elevations is less than one foot (1') between cross-sections. The HEC-RAS computer program gives an error message for a difference in energy grade elevation of greater than one foot (1') between cross-sections. Hence, a wash was analyzed at an elevation difference of one foot (1') to demonstrate the impact of additional cross-sections on the HEC-RAS analysis. It was found that increasing the number of cross sections did not impact the flow depths as long as adequate cross-sections representative of the geometry of the channel are included.

5.2.2 Hydraulic Analysis of Culverts

For analysis of culvert roadway crossings the computer program HY-8 will be used during final design. HY-8 is a culvert analysis program that was developed for the Federal Highway Administration. Site characteristics and flow are entered into the program and the resulting flow regime and headwater values are calculated.

6.0 DISCUSSION ON MODELING RESULTS

6.1 Rational Method vs. HEC-1 Flows

100-year, 6-hour peak flows were calculated using both the Rational Method and HEC-1 for the off-site basins for comparison. The rational method results are included in Appendix E - *100-year Rational Method*. Provided below in Table 6.2 is a comparison of the off-site flows using the Rational Method and HEC-1 results for the 100-year 6-hour storm event.

Table 6.2:
Rational Method vs. HEC-1 Flows

Concentration Point	Rational Method Flow (cfs)	HEC-1 Flow (cfs)	Difference Rational – Hec1 (cfs)
A1	238	225	13
A2	112	103	9
B	210	192	18
H2	193	161	32
I	76	70	6
J	86	81	5
R	409	429	-20

The table indicates that for the 100-year 6-hour storm event the flow values determined by Rational Method were similar to flow values determined using the HEC-1 analysis. The flow values determined by Rational Method were higher for smaller basins and the flow values calculated by HEC-1 were higher for larger basins. A HEC-RAS hydraulic analysis was performed to determine the impact of this variation in flow values using the different hydrological methods. The 100-year water surface elevations were determined using these flow values and the results are discussed in the subsequent section.

6.2 100-Year Floodplain Delineation

The U.S. Army Corps of Engineers' HEC-RAS Version 3.1.2 was used to generate the water surface profiles for washes with 100-year flows in excess of 50 cfs. The 100-year floodplain delineation for these washes has been revised to reflect the limits of ponding that occurs because of the proposed detention basins. At this point, the final location of

the roadways has not been finalized and therefore a post-development HEC-RAS model that includes cross sections representative of the culverts has not been prepared. It is anticipated that the 100-year floodplain delineation for post-development conditions will be approximately the same as the pre-development delineation with the exception of some ponding at culvert crossings. Water surface elevations and top widths for each cross section are included on Plate 11 – *Post-Development Grading and Drainage Plan.*

The 100-year water surface elevations were computed using the peak flow values from HEC-1 and Rational Method results. Provided below is a summary of the HEC-1 and Rational Method flows and the corresponding water surface elevations.

Table 6.3:
Variation in WSE for Flows from Rational Method and HEC-1

Concentration Point	100-year flow		Water Surface Elevations		Difference in WSE
	Rational Method Flow (cfs)	HEC-1 Flow (cfs)	Rational Method (ft)	HEC-1 (ft)	Rational Method –HEC-1 (ft)
A1	238	235	2754.31	2754.3	0.03
A2	112	109	2734.62	2734.6	0.04
B	210	204	2747.05	2747.0	0.07
H2	193	172	2731.65	2731.60	0.04
I	76	73	2755.89	2755.89	0.03

The table indicates that the water surface elevations calculated using flows estimated by Rational Method and HEC-1 change by only up to 0.05 feet. Appendix F provides the detailed HEC-RAS results for all the washes.

7.0 DRAINAGE PLAN REQUIREMENTS

7.1 Drainage System Requirements

The existing drainage patterns will be maintained in their natural location and condition where possible. The site is being developed as large custom lots with an average lot size of 101,500 sq.ft. As lots are developed, individual lot engineering will be required to provide drainage documentation to substantiate the development of the lot. In the event of any future development within the off-site watershed areas, it will be the responsibility of the future developer to attenuate the post-development flows and volume to at or below the pre-development values.

7.2 Easement Requirements

Where flows from the 100-year storm event are greater than 50 cfs, drainage easements will be provided. In addition, drainage easements shall be dedicated to the limits of inundation for the 100-year, 2-hour storm event in each detention basin.

7.3 Roadway Crossing Requirements

In all cases the depth of flow over streets will be in accordance with City of Scottsdale Flood Plain and Drainage Ordinance.

7.4 Maintenance

Ongoing maintenance of the designed or recommended drainage systems is required to preserve the design integrity and purpose of the drainage system. Failure to provide maintenance can prevent the drainage system from performing to its intended design purpose and can result in reduced performance. It is the responsibility of private developers, homeowner associations, etc. to maintain facilities on private property, within all drainage easements, private streets, and right-of-ways unless accepted by the City for maintenance. A regular maintenance program is required so that drainage systems perform to the level of protection or service as presented in this report and the project's plans and specifications.

7.5 Scour Protection

The need for scour protection will be identified as part of the final drainage reports for each phase of this project. Because of the relatively small peak flow values and incised nature of the on-site washes, development setbacks will most likely be utilized rather than bank protection schemes if required.

7.6 Annual Sediment Yield

Sediment yield is defined as that portion of eroded material that travels through a drainage system to a downstream measuring or control point (*Bureau of Reclamation 1987*). The units used for this study are acre-feet/square mile/year (ac-ft/sq.mi./yr.). The prediction of sediment yields is not an exact science. Many complex variables influence the erosion process and any sediment yields analysis requires considerable engineering judgment. For this reason, two (2) methods were used to arrive at a conservative estimate of the average annual sediment yield rate. The following sections provided a detailed discussion of each method and its results.

Sediment yield was calculated using the Pacific Southwest Inter-Agency Committee (PSIAC) method. This method was obtained from the following source: Pacific Southwest Inter-Agency Committee, *Report of the Water Management Subcommittee on Factors Affecting Sediment Yield in the Pacific Southwest Area and Selection and Evaluation of Measures for Reduction of Erosion and Sediment Yield*, October, 1968.

Nine (9) factors are evaluated in determining the sediment yield classification. These are geology, soils, climate, runoff, topography, ground cover, land use, upland erosion, and channel erosion and sediment transport. Characteristics of each of the nine factors, which give that factor high-, moderate-, or low-sediment yield, are evaluated and the factor is assigned a numerical value representing its significance in the yield rating. The yield rating is the sum of values for the appropriate characteristics for each of the nine factors. For the purpose of avoiding complexity, the factors are generally described as independently influencing the amount of sediment yield. Table 7.6 provides the sediment yield classification based on sediment yield rating.

Table 7.6
Sediment Yield Classification Table

Classification	Rating	Sediment Yield acre-ft/sq. mile
1	> 100	3.0
2	75 – 100	1.0 – 3.0
3	50 – 75	0.5 – 1.0
4	25 – 50	0.2 – 0.5
5	0 – 25	< 0.2

Application of the nine sediment yield factors to the watershed discussed in this report generated a total numerical rating of 77 to 85, the actual rating being dependant upon the interpretation of the guidelines that are used to assign rating values to each factor. Regardless of the actual number, i.e. 77 or 85, both values fall within Classification 2 (75 – 100), which indicates a sediment yield range of 1.0 to 3.0 ac-ft/sq.mi./yr.

7.6.1 Bureau of Reclamation Sediment Surveys

The 1987 edition of *Design of Small Dams* (BuRec) publishes data on sediment measurements from 28 reservoirs in semi-arid regions of the United States. A regression line through these data points produces the following equation:

$$Q_s = 1.84\, A^{-0.24}$$

Where:

Q_s = annual sediment yield (ac-ft/sq.mi./yr.)
A = drainage area (sq.mi.)

Using a drainage area size of 1.95 sq.mi., this equation predicts an annual sediment yield of 1.57 ac-ft/sq.mi./yr. or 4,920 cubic yards.

7.6.2 Recommended Annual Sediment Yield

In consideration of the complex processes under investigation, the two (2) methods used exhibit fairly good agreement. Based on comparison of sediment yield calculations to actual sediment yield measurements, Renard & Stone (1981) concluded that "the PSIAC method appears to give the best results for the amount of work required to make the estimate." Based on the results of the sediment yield equations, a design value of 1.6 ac-ft/sq.mi./yr. was selected.

7.6.3 Short-/Long-Term Aggradation, Degradation, Local Scour, and Deposition

Sediment transport analyses need to distinguish between short-term and long-term changes. Short-term changes are event specific and occur to some extent during each flood hydrograph. Examples of short-term changes would be local scour, general scour, bend scour, bedform troughs, and to some extent low-flow channel incisement. With the exception of low-flow channel incisement, any visual signs of these processes may be difficult to detect after the flow has subsided. Short-term scour processes can usually be quantified with empirical and/or theoretical relationships.

Vertical incisement of the channel bed can occur in response to the following six (6) processes:

1. Long-term degradation,
2. Local scour,
3. General scour,
4. Bend scour,
5. Low-flow channel incisement, and
6. Antidune troughs.

Precise prediction of long-term channel impacts can be much more elusive than their short-term counterparts because of the time span involved and the numerous variables that impact long-term changes. The major drainage corridors within the project site will be designed as protected channels.

7.7 Protective Devices

Roadway crossing culverts will incorporate rip rap at both the inlet and the outlet to dissipate energy and provide flow line scour protection. Detention basins upstream of the roadways will incorporate a protected overflow area (using native rip rap and filter fabric) in the event of overtopping. The bleed-off pipes will also incorporate rip rap protection.

8.0 CONCLUSIONS

8.1 Overall Project

1. The project site is located within FEMA Zone "X" (shaded), and Zone "D" as shown on Plate 2.

2. The major watercourses traversing through the project will be maintained in their natural location and condition, and will not be re-aligned wherever possible.

3. Drainage corridors have been designated for the identified washes in accordance with the appropriate City of Scottsdale ordinance requirements.

4. It is being proposed that online detention on the upstream side of the road culvert crossings and other strategic locations be provided to reduce post-development flows to at or below pre-development levels, and for 100-year, 2-hour stormwater storage. Some of the detention basins are sized at a depth greater than three feet (3'), due to ESLO and NAOS constraints.

5. The post-development peak flows for the 2-year, 10-year and 100-year, 6-hour storm events are reduced to at or below the pre-development flows.

6. The stormwater detained will be drained within 24 hours through bleed-off pipes with orifice plates.

7. The design of hydraulic structures is to be based on generally accepted engineering practices and in accordance with City of Scottsdale requirements.

8. On-going maintenance is required for all drainage systems in order to assure design performance.

9. All finished floor elevations are to be designed to be above the 100-year water surface elevation.

8.2 Project Phasing

The project site is proposed to be developed in four phases. For the completion of the site, a final drainage report will be prepared for each phase of the project. The development requirements will be met independently for each phase.

9.0 REFERENCES

1. City of Scottsdale, *Design Standards and Policies Manual Chapter 2 Drainage*, December, 1999.
2. City of Scottsdale, *Design Standards and Policies Manual Chapter 4 Drainage*, June, 2005.
3. Flood Control District of Maricopa County, *Drainage Design Manual for Maricopa County, Arizona: Volume I – Hydrology*, revised January 1995.
4. Flood Control District of Maricopa County, *Drainage Design Manual for Maricopa County, Arizona: Volume II – Hydraulics*, January 28, 1996.
5. U.S. Army Corps of Engineers, *HEC-1, Flood Hydrograph Package*, June 1998.
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7. Arizona Department of Water Resources State Standards for Floodplain Management.
8. HEC-1 Manual, Flood Hydrograph Package User's Manual. US Army Corps of Engineers Hydrologic Engineering Center.
9. US Army Corps of Engineers Hydrologic Engineering Center. Introduction and Application of Kinematic Wave Routing Techniques using HEC-1.
10. Flood Control District of Maricopa County, Drainage Design Management System for Windows.
11. Flood Control District of Maricopa County, Drainage Design Management System.
12. Pacific Southwest Inter-Agency Committee, *Report of the Water Management Subcommittee on Factors Affecting Sediment Yield in the Pacific Southwest Area and Selection and Evaluation of Measures for Reduction of Erosion and Sediment Yield*, October 1968.
13. Design of Small Dams, 1987 Edition.

APPENDIX A

Supporting Information for Parameter Selection

- Site Photo Vicinity Map
- Site Photos
- Soil Survey Data
- FCDMC Rainfall Data
- Precipitation Maps
- Runoff Curve Numbers and Percent Impervious Area Chart
- Resistance Factor for Overland Flow
- Runoff Coefficients for use with Rational Method

Photo 1

Photo 2

WOOD/PATEL
042054

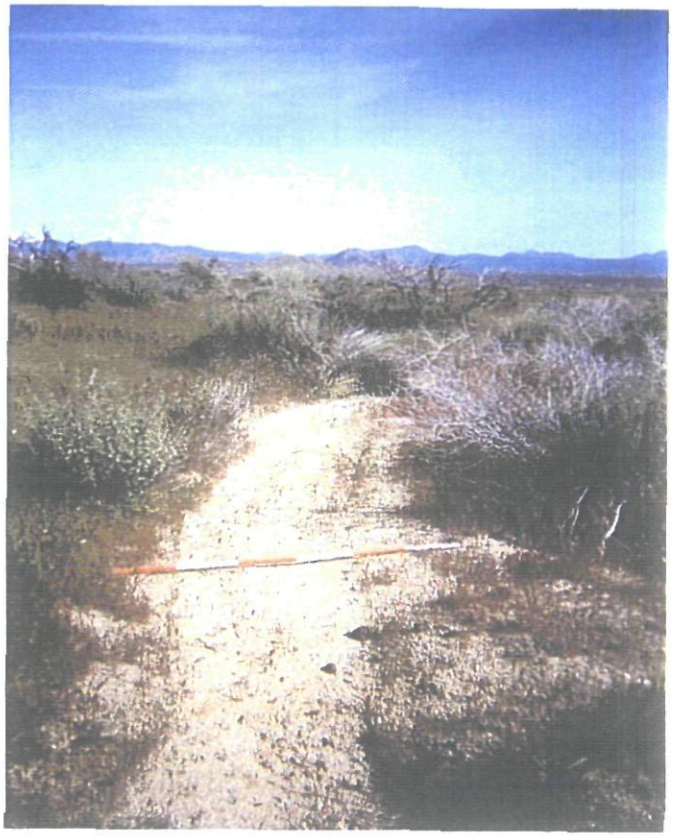

Photo 3

Photo 4

Photo 5

Photo 6

Photo 7

Photo 8

Photo 9

Photo 10

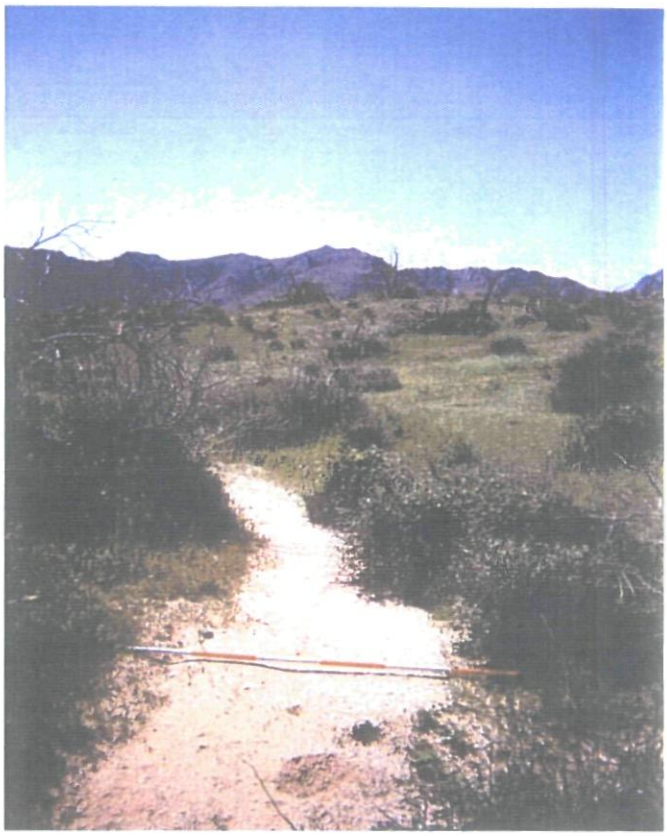

Photo 11

Photo 12

Photo 13

Photo 14

McDOWELL MOUNTAIN BACK BOWL

SITE PHOTO VICINITY MAP

N:\2004\042054\Dwg\Exhibits\2004\ 2054-Photograph Location Elliott.dwg

WOOD/PATEL

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ENGINEER	
DESIGNER	
CAD TECHNICIAN	K. LOPEZ
SCALE (HORIZ)	1" = 200'
SCALE (VERT)	N/A
DATE	02/16/06
JOB NUMBER	042054
SHEET	

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			Bedrock		Cemented pan		Risk of corrosion	
		Frequency	Duration	Months	Depth	Hardness	Depth	Hardness	Uncoated steel	Concrete
					In		In			
8, 59*:										
Dune	B	None	---	---	>60	---	---	---	High	Low.
0*:										
Glenbar Noncalcareous	B	Rare	---	---	>60	---	---	---	High	Low.
Glenbar Calcareous	B	Rare	---	---	>60	---	---	---	High	Low.
1, 62*:										
Gun	D	None	---	---	20-40	Hard	---	---	High	Low.
Wickenburg	D	None	---	---	3-20	Soft	---	---	High	Low.
3, 64*:										
Gun	D	None	---	---	20-40	Hard	---	---	High	Low.
Wickenburg	D	None	---	---	3-20	Soft	---	---	High	Low.
Rock outcrop.										
5*:										
Greyeagle	D	None	---	---	>60	---	4-20	Thick	High	Low.
Continental	C	None	---	---	>60	---	---	---	High	Low.
Nickel	B	None	---	---	>60	---	---	---	High	Low.
5 Greyeagle	D	None	---	---	>60	---	4-20	Thick	High	Low.
Suncity Variant	D	None	---	---	>60	---	5-20	Thick	High	Low.
7 Gist	D	Rare	---	---	>60	---	---	---	High	Low.
8*, 69*:										
Sunsight	B	None	---	---	>60	---	---	---	High	Low.
Criano	D	None	---	---	>60	---	5-20	Thick	High	Low.
0*, 71*:										
Sunsight	B	None	---	---	>60	---	---	---	High	Low.
Pallito	B	None	---	---	>60	---	---	---	High	Low.
2*, 73*:										
Lehmans	D	None	---	---	6-20	Hard	---	---	High	Low.
Rock outcrop.										
4*:										
Luke	C	None	---	---	>60	---	20-40	Thick	High	Low.
Criano	D	None	---	---	>60	---	4-20	Thick	High	Low.
5, 76, 77, 78, 79 Mohall	B	None	---	---	>60	---	---	---	High	Low.
80, 81*:										
Mohall	B	None	---	---	>60	---	---	---	High	Low.

See footnote at end of table.

Rainfall Data

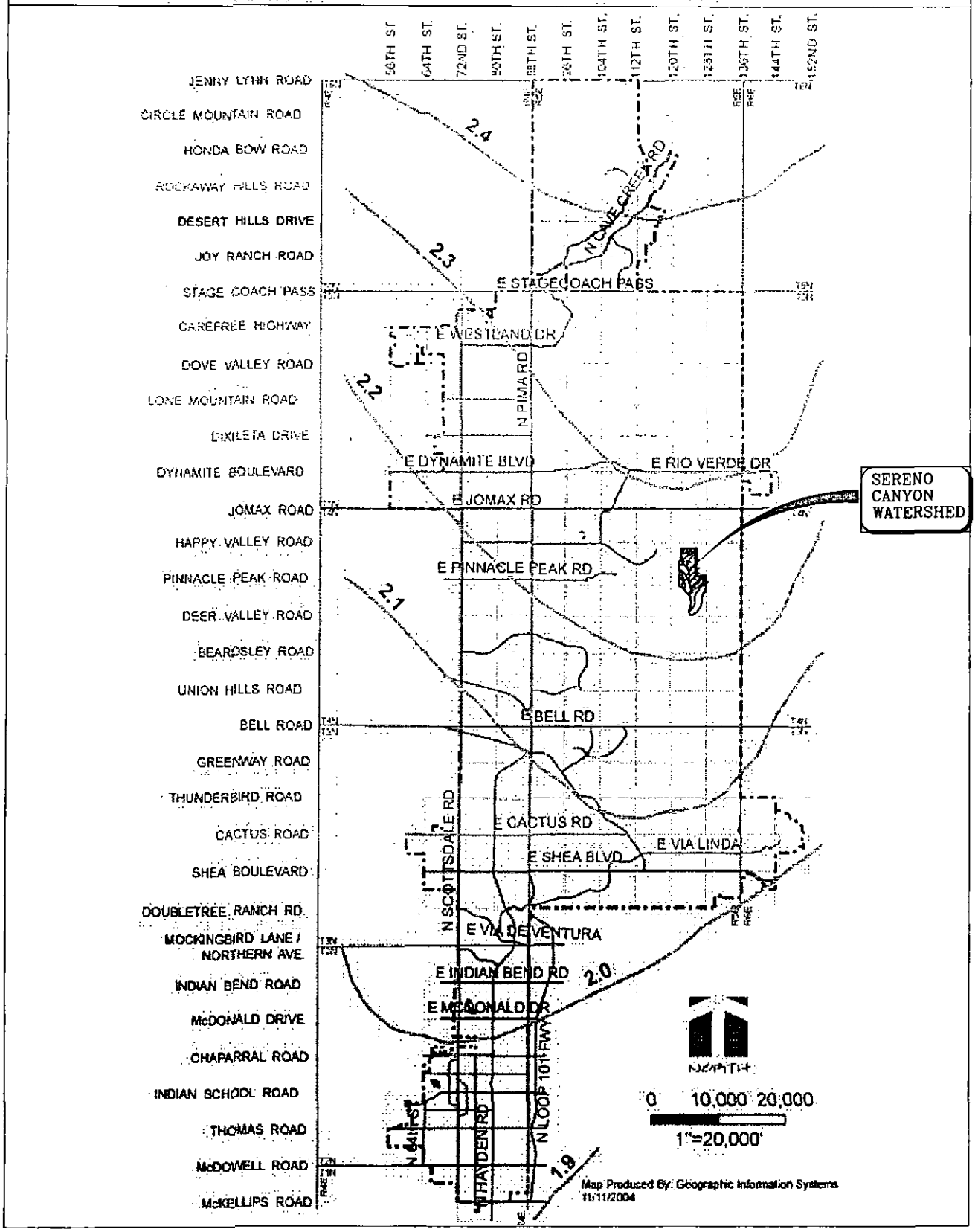
Primary Zone Number: 7 Latitude: 0.0 Elevation: 0

Short Duration Zone Number: 8 Longitude: 0.0

	Point Values (in)					
Duration	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
5 MIN	0.38	0.46	0.52	0.60	0.66	0.73
10 MIN	0.57	0.70	0.78	0.91	1.01	1.11
15 MIN	0.70	0.87	0.99	1.16	1.29	1.43
30 MIN	0.92	1.16	1.33	1.56	1.75	1.94
1 HOUR	1.12	1.43	1.64	1.95	2.19	2.42
2 HOUR	1.27	1.62	1.87	2.21	2.48	2.74
3 HOUR	1.38	1.75	2.01	2.38	2.67	2.96
6 HOUR	1.57	2.00	2.29	2.71	3.04	3.37
12 HOUR	1.81	2.31	2.66	3.15	3.53	3.91
24 HOUR	2.05	2.62	3.02	3.58	4.02	4.45

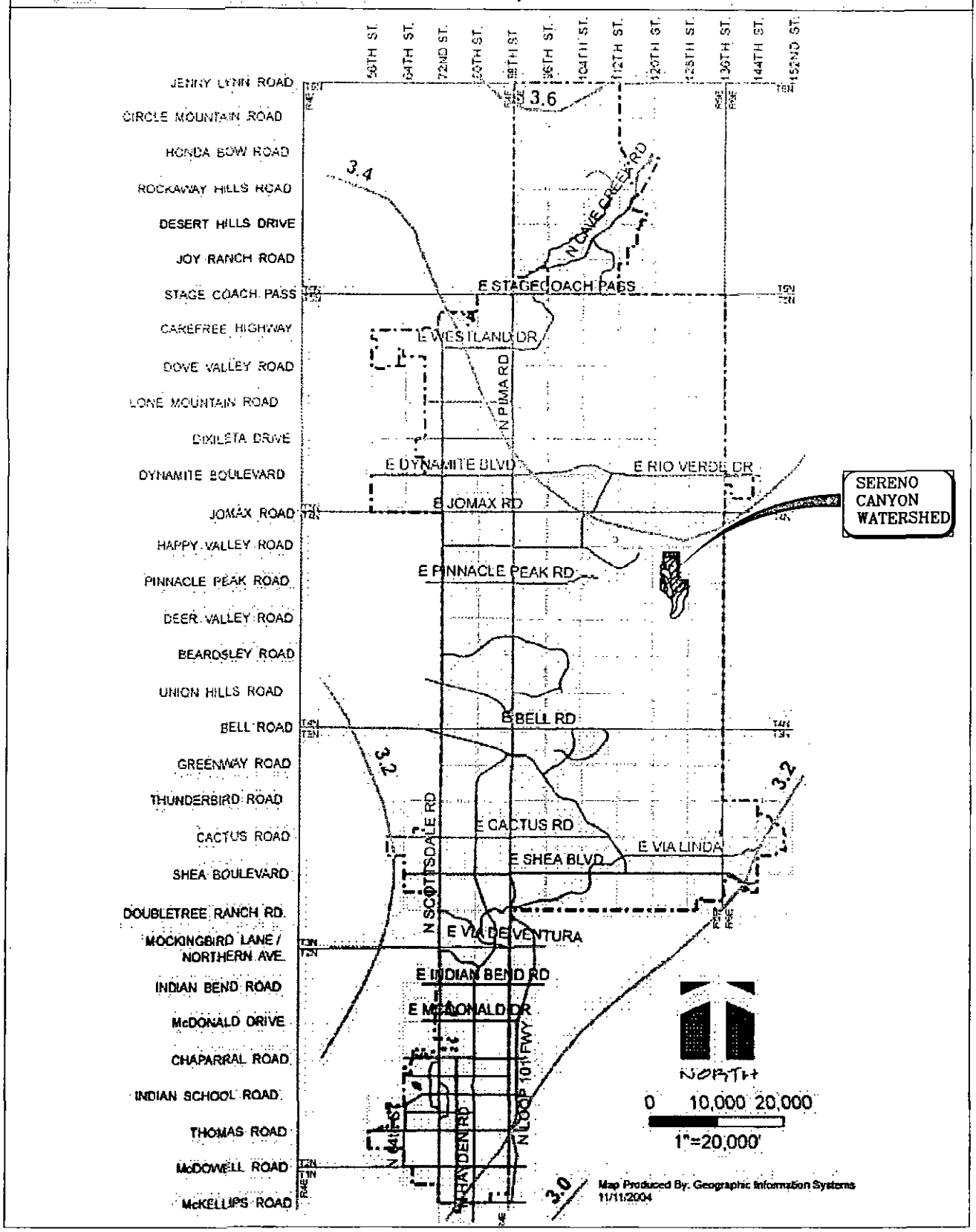
ISOPLUVIALS

10 Year 6 Hour Precipitation in Inches



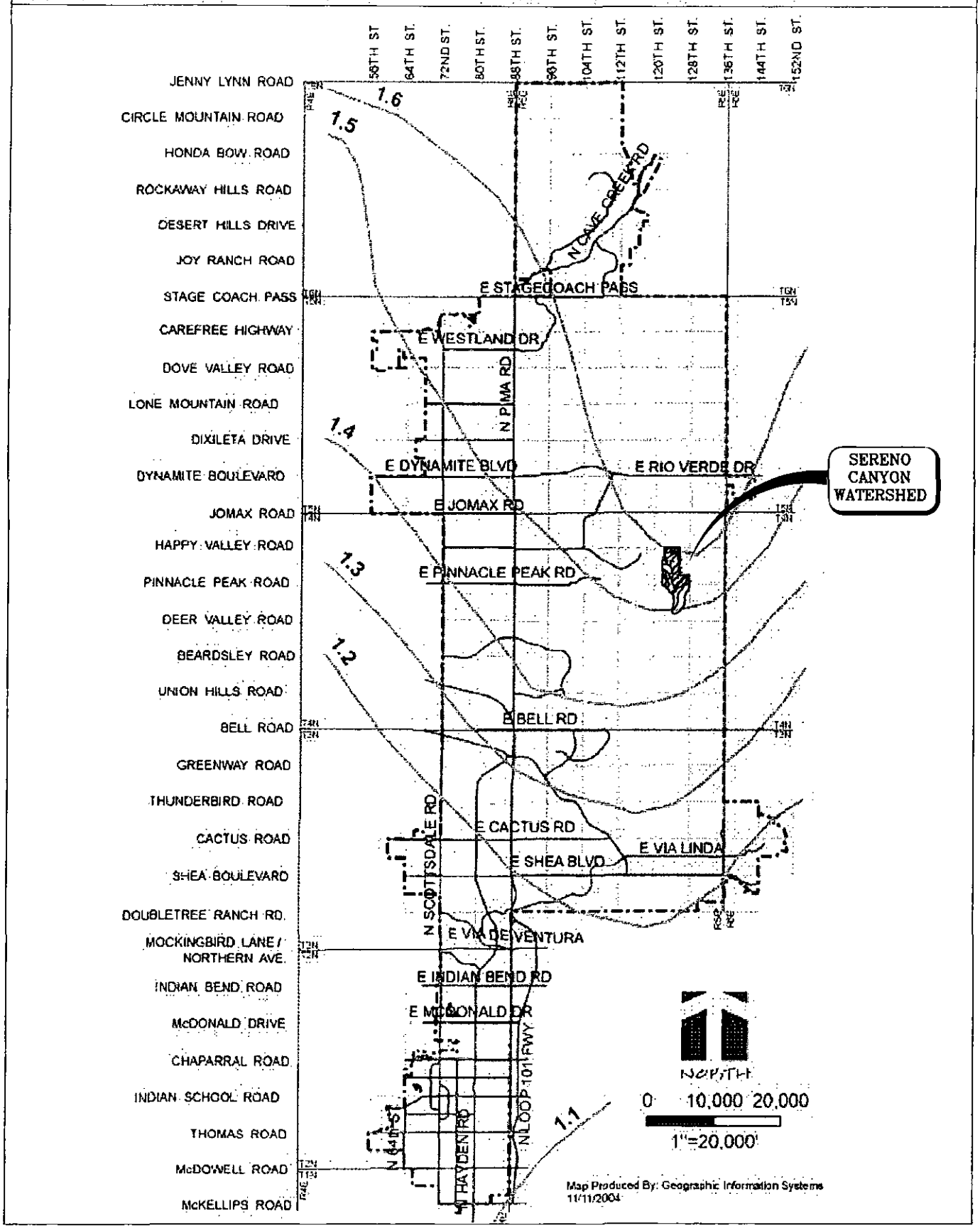
ISOPLUVIALS

100 Year 6 Hour Precipitation in Inches



ISOPLUVIALS

2 Year 6 Hour Precipitation in Inches



2. Infiltration

Infiltration or soil losses will be determined using Green and Ampt (G&A) procedures per FCDMC Hydrology Manual. Use the most recent published SCS soil survey maps of the area to determine the hydrologic soil group or surface soil texture for the G&A procedures. Use USDA Natural Resources Conservation Services (previously the Soil Conservation Services) maps, Soil Survey of Aguila-Carefree Area, Parts of Maricopa and Pinal Counties, or the Soil Survey of Eastern Maricopa and Northern Pinal Counties, Arizona; depending on what part of the city you are located.

3. Runoff Curve Numbers

Where detailed mapping is not available from the SCS or other sources, the use of curve numbers is acceptable. When using runoff curve numbers (ROCN) within Scottsdale:

1. Assume poor hydrologic condition and desert shrub cover type for natural undisturbed desert conditions in Figure 4-6.
2. For lawns, golf courses, and other grassed open space areas, assume good condition in Figure 4-7 to determine the ROCN, then adjust the ROCN to antecedent moisture condition III (use Figure 4-8).
3. For developed conditions, increase the percent impervious on the LS card without changing the ROCN (except in the case of grassed areas, in which the curve number should be adjusted up according to the above). Use the actual or estimated percent impervious; a minimum of 85 percent for commercial and 72 percent industrial.

RUNOFF CURVE NUMBERS FOR ARID & SEMIARID RANGELANDS[1]

Cover Type and Hydrologic Condition	Hydrologic Condition[2]	Curve Numbers for Hydrologic Soil Group			
		A[3]	B	C	D
Herbaceous: mixture of grass, weeds, and low-growing brush, with brush the minor element	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen: mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper: pinyon, juniper, or both; grass understory	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub: major plants include saltbush, greasewood, creosote bush, blackbrush, bursage, Palo Verde, mesquite, and cactus	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

[1] Average Runoff Condition, and $I_a = 0.2S$.

[2] Poor: < 30% ground cover (litter, grass, and brush overstory)
Fair: 30 to 70% ground cover (not applicable in Scottsdale)
Good: >70% ground cover (not applicable in Scottsdale)

[3] Curve Numbers for Group A have been developed only for desert shrub

FIGURE 4-6. RUNOFF CURVE NUMBERS FOR ARID & SEMIARID RANGELANDS

2. Infiltration

Infiltration or soil losses will be determined using Green and Ampt (G&A) procedures per FCDMC Hydrology Manual. Use the most recent published SCS soil survey maps of the area to determine the hydrologic soil group or surface soil texture for the G&A procedures. Use USDA Natural Resources Conservation Services (previously the Soil Conservation Services) maps, Soil Survey of Aguila-Carefree Area, Parts of Maricopa and Pinal Counties, or the Soil Survey of Eastern Maricopa and Northern Pinal Counties, Arizona; depending on what part of the city you are located.

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1. Assume poor hydrologic condition and desert shrub cover type for natural undisturbed desert conditions in Figure 4-6.
2. For lawns, golf courses, and other grassed open space areas, assume good condition in Figure 4-7 to determine the ROCN, then adjust the ROCN to antecedent moisture condition III (use Figure 4-8).
3. For developed conditions, increase the percent impervious on the LS card without changing the ROCN (except in the case of grassed areas, in which the curve number should be adjusted up according to the above). Use the actual or estimated percent impervious; a minimum of 85 percent for commercial and 72 percent industrial.

RUNOFF CURVE NUMBERS FOR ARID & SEMIARID RANGELANDS[1]

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		A[3]	B	C	D
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	Fair		71	81	89
	Good		62	74	85
Oak-aspen: mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper: pinyon, juniper, or both; grass understory	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub: major plants include saltbush, greasewood, creosote bush, blackbrush, bursage, Palo Verde, mesquite, and cactus	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

[1] Average Runoff Condition, and $I_a = 0.2S$.

[2] Poor: < 30% ground cover (litter, grass, and brush overstory)
Fair: 30 to 70% ground cover (not applicable in Scottsdale)
Good: >70% ground cover (not applicable in Scottsdale)

[3] Curve Numbers for Group A have been developed only for desert shrub

FIGURE 4-6. RUNOFF CURVE NUMBERS FOR ARID & SEMIARID RANGELANDS

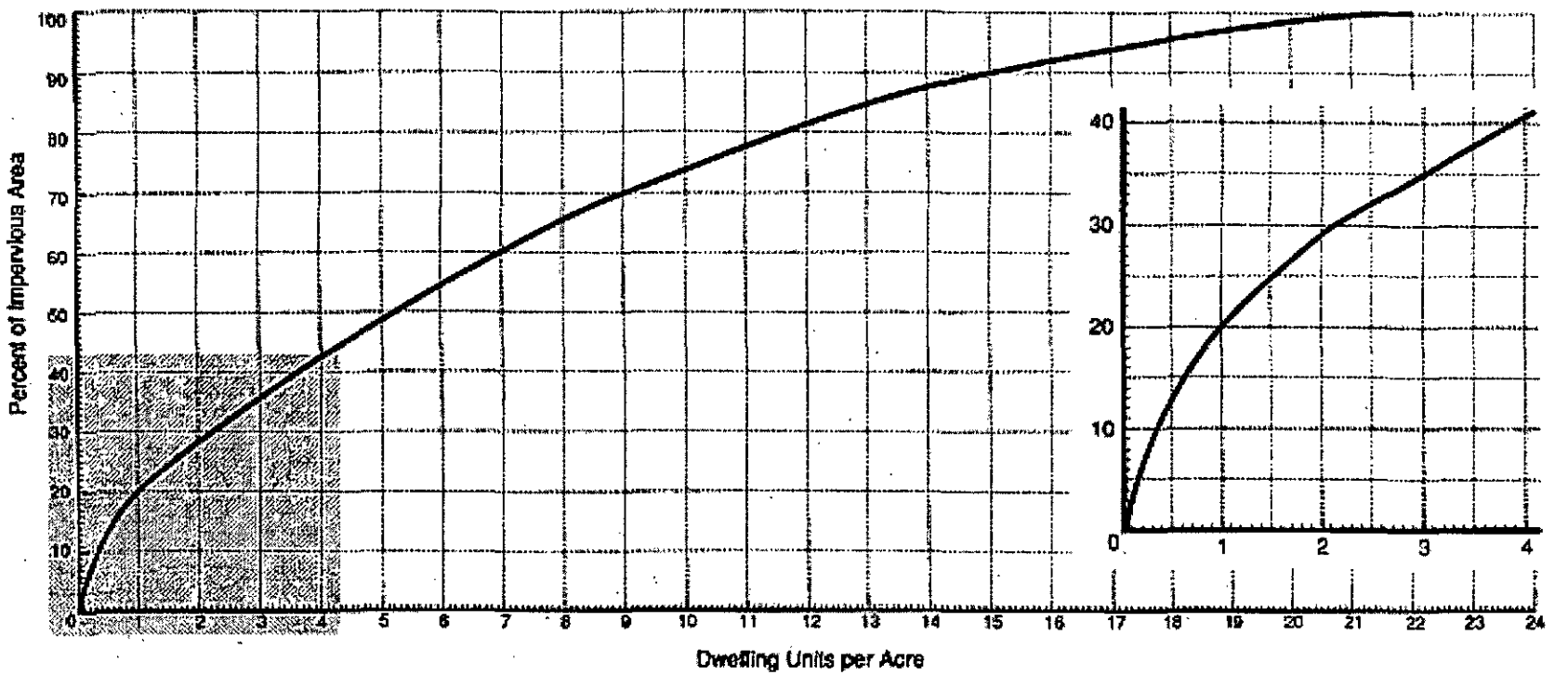

FIGURE 2.2-16

Percent of Impervious Area vs. Dwelling Density

Developed by Water Resources Associates, Inc. from data in Table 2.2a of TR-55, Urban Hydrology For Small Watersheds, and from discussions with Scottsdale city staff.

3.4.4 Element Application

(1) **Overland Flow.** The overland flow element is a wide rectangular channel of unit width; so, referring to Figure 3.6, $\alpha = 1.486S^{\frac{1}{2}}/N$ and $m = 5/3$. Notice that Manning's n has been replaced by an overland flow roughness factor, N. Typical values of N are shown in Table 3.5. When applying Equations (3.43) and (3.46) to an overland flow element, the lateral inflow is rainfall excess (previously computed using methods described in Section 3.2) and the outflow is a flow per unit width.

An overland flow element is described by four parameters: a typical overland flow length, L, slope and roughness factor which are used to compute α, and the percent of the subbasin area represented by this element.

Two overland flow elements may be used for each subbasin. The total discharge, Q, from each element is computed as

$$Q = q * \frac{AREA}{L} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.70)$$

Table 3.5

Resistance Factor for Overland Flow

Surface	N value	Source
Asphalt/Concrete*	0.05 - 0.15	a
Bare Packed Soil Free of Stone	0.10	c
Fallow - No Residue	0.008 - 0.012	b
Convential Tillage - No Residue	0.06 - 0.12	b
Convential Tillage - With Residue	0.16 - 0.22	b
Chisel Plow - No Residue	0.06 - 0.12	b
Chisel Plow - With Residue	0.10 - 0.16	b
Fall Disking - With Residue	0.30 - 0.50	b
No Till - No Residue	0.04 - 0.10	b
No Till (20-40 percent residue cover)	0.07 - 0.17	b
No Till (60-100 percent residue cover)	0.17 - 0.47	b
Sparse Rangeland with Debris:		
0 Percent Cover	0.09 - 0.34	b
20 Percent Cover	0.05 - 0.25	b
Sparse Vegetation	0.053 - 0.13	f
Short Grass Prairie	0.10 - 0.20	f
Poor Grass Cover On Moderately Rough	0.30	c
Bare Surface		
Light Turf	0.20	a
Average Grass Cover	0.4	c
Dense Turf	0.17 - 0.80	a,c,e,f
Dense Grass	0.17 - 0.30	d
Bermuda Grass	0.30 - 0.48	d
Dense Shrubbery and Forest Litter	0.4	a

Legend: a) Harley (1975), b) Engman (1986), c) Hathaway (1945), d) Palmer (1946), e) Ragan and Duru (1972), f) Woolhiser (1975). (See Hjemfelt, 1986)

*Asphalt/Concrete n value for open channel flow 0.01 - 0.016

LAND USE Composite Area-wide Values	Hydrologic Soil Group		
	B	C	D
Commercial & Industrial Areas	0.90		
Residential Areas-Single Family (av. lot size)			
R1-1-1901	0.33	0.50	0.58
R1-130	0.35	0.51	0.59
R1-70	0.37	0.52	0.60
R1-43	0.38	0.55	0.61
R1-35 (35,000 sq. ft./lot)	0.40	0.56	0.62
R1-18 (18,000 sq. ft./lot)	0.43	0.58	0.64
R1-10 (10,000 sq. ft./lot)	0.47	0.62	0.67
R1-7 (7,000 sq. ft./lot)	0.51	0.64	0.70
Townhouses (R-2, R-4)	0.63	0.74	0.78
Apartments & Condominiums (R-3, R-5)	0.76	0.83	0.87
Specific Surface Type Values			
Paved streets, parking lots (concrete or asphalt), roofs, & driveways, etc.	0.95		
Lawns, golf courses, & parks (grassed areas)	0.33	0.56	0.66
Undisturbed natural desert or desert landscaping (no impervious weed barrier)	0.31	0.48	0.56
Desert landscaping (with impervious weed barrier)	0.83	0.83	0.83
Mountain terrain – slopes greater than 10%	0.70	0.70	0.70
Agricultural areas (flood-irrigated fields)	0.20	0.20	0.20

FIGURE 4-5. RUNOFF COEFFICIENTS FOR USE WITH RATIONAL METHOD

D. The Army Corps of Engineer's HEC-1 Computer Model

HEC-1 procedures are applicable for any watershed area over 160 acres and up to 100 square miles in size. HEC-1 is required for analyzing drainage areas over 160 acres in size. **HEC-HMS is not an acceptable substitute for HEC-1**. Minimum required submittals when using HEC-1 are:

- A printout of the input data
- A schematic (routing) diagram of the stream network
- The runoff summary output table
- Electronic input file(s), on CD or floppy
- Supporting Documentation and Source Material for parameter selection

1. Precipitation

Precipitation values for HEC-1 modeling shall be determined using the Flood Control Manual, specifically PD and JD records for point rainfall and area reduction factors. Capital Projects shall use the ADOT manual and methodology when specified. Precipitation values are to be obtained from the Isopluvial maps for the specific frequency desired (see Appendix 4-D).

APPENDIX B

Existing Condition Hydrologic Calculations

- 2-year HEC-1 Model
- 10-year HEC-1 Model
- 100-year HEC-1 Model

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            JUN   1998                *
*          VERSION 4.1                 *
*                                      *
*  RUN DATE   07NOV06  TIME  09:27:06  *
*                                      *
****************************************
```

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

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
```

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

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

```
1                                          HEC-1 INPUT                                                    PAGE  1

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

        1           ID        HEC-1 MODEL FOR SERENO CANYON
        2           ID        2-YEAR, 6-HOUR STORM
        3           ID        RAINFALL FROM NOAA ATLAS
        4           ID        SCS CURVE NUMBER SOIL LOSS PARAMETERS
        5           ID        KINEMATIC WAVE HYDROGRAPH ROUTING
        6           ID        EXISTING CONDITIONS
        7           ID
        8           ID        PREPARED BY WOOD/PATEL, 8.4.2004
        9           ID        FILE NAME:  EX-100.DAT
       10           ID
                    *DIAGRAM
       11           IT       2                    900
       12           IO       5
       13           JD             .01
       14           PH                   .38     0.7    1.12    1.27    1.38    1.57

       15           KK      A1
       16           KM       RUNOFF FROM SUB-BASIN A1
       17           BA    .084
       18           LS             88
       19           UK     260    .025    0.13     100
       20           RK    3520    .023    .032            TRAP      12       5
       21           KO                                      22

       22           KK      A2
       23           KM  RUNOFF FROM SUB-BASIN A2
       24           BA    .036
       25           LS             88
       26           UK     235    .025    0.13     100
       27           RK    2000     .02    .032            TRAP       8       5
       28           KO                                      22

       29           KK      B1
       30           KM  RUNOFF FROM SUB-BASIN B1
       31           BA    .027
       32           LS             88
       33           UK     200    .025    0.13     100
       34           RK    2500    .028    .032            TRAP       8       5
       35           KO                                      22

       36           KK      B2
       37           KM  RUNOFF FROM SUB-BASIN B2
       38           BA    .050
       39           LS             88
       40           UK     400    .025    0.13     100
       41           RK    2340    .024    .032            TRAP       8       5

       42           KK   COMBB
       43           KM  COMBINE SECTIONS B1 AND B2
       44           HC       2
       45           KO                                      22
1                                          HEC-1 INPUT                                                    PAGE  2

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

       46           KK       C
       47           KM  RUNOFF FROM SUB-BASIN C
       48           BA     .03
       49           LS             88
       50           UK     250    .023    0.13     100
       51           RK    1570    .017    .032            TRAP       5       5
       52           KO                                      22

       53           KK       D
       54           KM  RUNOFF FROM SUB-BASIN D
       55           BA    .034
       56           LS             88
```

```
 57          UK     300     .02    0.13     100
 58          RK    1425    .014    .032            TRAP       6       5
 59          KO                                      22

 60          KK      E1
 61          KM  RUNOFF FROM SUB-BASIN E1
 62          BA    .061
 63          LS              88
 64          UK     400     .02    0.13     100
 65          RK    2050    .013    .032            TRAP       7       5
 66          KO                                      22

 67          KK      E2
 68          KM  RUNOFF FROM SUB-BASIN E2
 69          BA    .046
 70          LS              88
 71          UK     200     .02    0.13     100
 72          RK    2370    .013    .032            TRAP      10       5
 73          KO                                      22

 74          KK   COMBE
 75          KM  COMBINE SECTIONS E1 AND E2
 76          HC       2
 77          KO                                      22

 78          KK   CLEAR
 79          KM  CLEAR HYDROGRAPH STACK
 80          HC       6
             *

 81          KK      E3
 82          KM  RUNOFF FROM SUB-BASIN E3
 83          BA    .008
 84          LS              88
 85          UK     175    .025    0.13     100
 86          RK     750    .032    .032            TRAP       6       5
 87          KO                                      22
```



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

 88          KK      F1
 89          KM  RUNOFF FROM SUB-BASIN F1
 90          BA    .036
 91          LS              88
 92          UK     225    .018    0.13     100
 93          RK    2500    .012    .032            TRAP       7       5
 94          KO                                      22

 95          KK      F2
 96          KM  RUNOFF FROM SUB-BASIN F2
 97          BA    .014
 98          LS              88
 99          UK     200    .018    0.13     100
100          RK    1440    .028    .032            TRAP       6       5
101          KO                                      22

102          KK      F3
103          KM  RUNOFF FROM SUB-BASIN F3
104          BA    .013
105          LS              88
106          UK     225    .018    0.13     100
107          RK     850    .026    .032            TRAP       6       5
108          KO                                      22

109          KK       G
110          KM  RUNOFF FROM SUB-BASIN G
111          BA   0.016
112          LS              88
113          UK     400    .025    0.13     100
114          RK     720    .022    .032            TRAP       4       5
115          KO                                      22

116          KK      H1
117          KM  RUNOFF FROM SUB-BASIN H1
118          BA    .059
119          LS              88
120          UK     375    .025    0.13     100
121          RK    2210    .019    .032            TRAP       8       5
122          KO                                      22

123          KK      H2
124          KM  RUNOFF FROM SUB-BASIN H2
125          BA    .072
126          LS              88
127          UK     400    .025    0.13     100
128          RK    3480    .019    .032            TRAP      12       5
129          KO                                      22

130          KK       I
131          KM  RUNOFF FROM SUB-BASIN I
132          BA    .025
133          LS              88
134          UK     225     .02    0.13     100
135          RK    2100    .026    .032            TRAP      10       5
```



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

136          KO                                      22

137          KK   CLEAR
138          KM  CLEAR HYDROGRAPH STACK
139          HC       8
```

```
 140          KK        J
 141          KM  RUNOFF FROM SUB-BASIN J
 142          BA    .024
 143          LS                88       0
 144          UK     145      .02    0.13     100
 145          RK     965     .026    .032            TRAP       5       5
 146          KO                                       22

 147          KK        K
 148          KM  RUNOFF FROM SUB-BASIN K
 149          BA    .009
 150          LS                88       0
 151          UK      81     .025    0.13     100
 152          RK     715     .022    .032            TRAP       5       5
 153          KO                                       22

 154          KK        L
 155          KM  RUNOFF FROM SUB-BASIN L
 156          BA    .009
 157          LS                88       0
 158          UK     113     .018    0.13     100
 159          RK     450     .012    .032            TRAP       5       5
 160          KO                                       22

 161          KK        M
 162          KM  RUNOFF FROM SUB-BASIN M
 163          BA    .008
 164          LS                88       0
 165          UK     137     .018    0.13     100
 166          RK     750     .012    .032            TRAP       4       5
 167          KO                                       22

 168          KK        N
 169          KM  RUNOFF FROM SUB-BASIN N
 170          BA     .01
 171          LS                88       0
 172          UK     117     .018    0.13     100
 173          RK    1036     .012    .032            TRAP       5       5
 174          KO                                       22

 175          KK        O
 176          KM  RUNOFF FROM SUB-BASIN O
 177          BA   .0029
 178          LS                88       0
 179          UK     108      .02    0.13     100
 180          RK     174     .014    .032            TRAP       4       5
 181          KO                                       22
```



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

 182          KK        P
 183          KM  RUNOFF FROM SUB-BASIN P
 184          BA   .0069
 185          LS                88       0
 186          UK     135      .02    0.13     100
 187          RK     354     .014    .032            TRAP       5       5
 188          KO                                       22

 189          KK    CLEAR
 190          KM  CLEAR HYDROGRAPH STACK
 191          HC        8

 192          KK        Q
 193          KM  RUNOFF FROM SUB-BASIN Q
 194          BA   .0032
 195          LS                88       0
 196          UK      86      .02    0.13     100
 197          RK     160     .014    .032            TRAP       4       5
 198          KO                                       22

 199          KK        R
 200          KM  RUNOFF FROM SUB-BASIN R
 201          BA     .15
 202          LS                88
 203          UK     180     .025    0.13     100
 204          RK    4300     .023    .032            TRAP      15       5
 205          KO                                       22
 206          ZZ
```

1

```
          SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE    (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

   15        A1
              .
   22         .          A2
              .           .
   29         .           .         B1
              .           .          .
   36         .           .          .          B2
              .           .          .           .
   42         .           .       COMBB...........
              .           .          .
   46         .           .          .           C
              .           .          .           .
   53         .           .          .           .          D
```

```
                                                  EX-2.OH1
                 .         .         .         .         .
  60             .         .         .         .         .         E1
                 .         .         .         .         .         .
  67             .         .         .         .         .         .         E2
                 .         .         .         .         .         .         .
  74             .         .         .         .         .       COMBE.......
                 .         .         .         .         .         .
  78       CLEAR.......................................................
                 .
  81             .         E3
                 .         .
  88             .         .         F1
                 .         .         .
  95             .         .         .         F2
                 .         .         .         .
 102             .         .         .         .         F3
                 .         .         .         .         .
 109             .         .         .         .         .         G
                 .         .         .         .         .         .
 116             .         .         .         .         .         .         H1
                 .         .         .         .         .         .         .
 123             .         .         .         .         .         .         .         H2
                 .         .         .         .         .         .         .         .
 130             .         .         .         .         .         .         .         .         I
                 .         .         .         .         .         .         .         .         .
 137             .       CLEAR.......................................................................
                 .         .
 140             .         .         J
                 .         .         .
 147             .         .         .         K
                 .         .         .         .
 154             .         .         .         .         L
                 .         .         .         .         .
 161             .         .         .         .         .         M
                 .         .         .         .         .         .
 168             .         .         .         .         .         .         N
                 .         .         .         .         .         .         .
 175             .         .         .         .         .         .         .         O
                 .         .         .         .         .         .         .         .
 182             .         .         .         .         .         .         .         .         P
                 .         .         .         .         .         .         .         .         .
 189             .       CLEAR.......................................................................
                 .         .
 192             .         .         Q
                 .         .         .
 199             .         .         .         R
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              JUN   1998              *
*            VERSION 4.1               *
*                                      *
*  RUN DATE   07NOV06  TIME  09:27:06  *
*                                      *
****************************************
```

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

HEC-1 MODEL FOR SERENO CANYON
2-YEAR, 6-HOUR STORM
RAINFALL FROM NOAA ATLAS
SCS CURVE NUMBER SOIL LOSS PARAMETERS
KINEMATIC WAVE HYDROGRAPH ROUTING
EXISTING CONDITIONS

PREPARED BY WOOD/PATEL, 8.4.2004
FILE NAME: EX-100.DAT

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

    IT        HYDROGRAPH TIME DATA
                     NMIN          2  MINUTES IN COMPUTATION INTERVAL
                    IDATE      1   0  STARTING DATE
                    ITIME       0000  STARTING TIME
                       NQ        900  NUMBER OF HYDROGRAPH ORDINATES
```

```
                NDDATE      2    0  ENDING DATE
                NDTIME        0558  ENDING TIME
                ICENT           19  CENTURY MARK

            COMPUTATION INTERVAL     .03 HOURS
                TOTAL TIME BASE   29.97 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

 13 JD        INDEX STORM NO. 1
                 STRM        1.57  PRECIPITATION DEPTH
                 TRDA         .01  TRANSPOSITION DRAINAGE AREA

 14 PI          PRECIPITATION PATTERN
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .01
                  .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                  .02      .02      .02      .02      .03      .03      .04      .06      .08      .15
                  .15      .12      .07      .05      .03      .03      .03      .02      .02      .02
                  .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                  .01      .01      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                  .00      .00      .00      .00      .00      .00      .00      .00      .00      .00

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

            **************
            *            *
 15 KK      *        A1  *
            *            *
            **************

 21 KO        OUTPUT CONTROL VARIABLES
                IPRNT           5  PRINT CONTROL
                IPLOT           0  PLOT CONTROL
                QSCAL          0.  HYDROGRAPH PLOT SCALE
                IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                 IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
               TIMINT        .033  TIME INTERVAL IN HOURS

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

            **************
            *            *
 22 KK      *        A2  *
            *            *
            **************

 28 KO        OUTPUT CONTROL VARIABLES
                IPRNT           5  PRINT CONTROL
                IPLOT           0  PLOT CONTROL
                QSCAL          0.  HYDROGRAPH PLOT SCALE
                IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                 IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
               TIMINT        .033  TIME INTERVAL IN HOURS

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

            **************
            *            *
 29 KK      *        B1  *
            *            *
            **************

 35 KO        OUTPUT CONTROL VARIABLES
                IPRNT           5  PRINT CONTROL
                IPLOT           0  PLOT CONTROL
                QSCAL          0.  HYDROGRAPH PLOT SCALE
                IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                 IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
               TIMINT        .033  TIME INTERVAL IN HOURS
```

```
*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
 42 KK      *     COMBB  *
            *            *
            **************

 45 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS


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

            **************
            *            *
 46 KK      *          C *
            *            *
            **************

 52 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS


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

            **************
            *            *
 53 KK      *          D *
            *            *
            **************

 59 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS


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

            **************
            *            *
 60 KK      *         E1 *
            *            *
            **************

 66 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS


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

            **************
            *            *
 67 KK      *         E2 *
            *            *
            **************

 73 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
```

```
                    ISAV2          900  LAST ORDINATE PUNCHED OR SAVED
                   TIMINT         .033  TIME INTERVAL IN HOURS


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

            **************
            *            *
  74 KK     *     COMBE  *
            *            *
            **************

  77 KO          OUTPUT CONTROL VARIABLES
                      IPRNT            5  PRINT CONTROL
                      IPLOT            0  PLOT CONTROL
                      QSCAL           0.  HYDROGRAPH PLOT SCALE
                      IPNCH            0  PUNCH COMPUTED HYDROGRAPH
                       IOUT           22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1            1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2          900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT         .033  TIME INTERVAL IN HOURS


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

            **************
            *            *
  81 KK     *        E3  *
            *            *
            **************

  87 KO          OUTPUT CONTROL VARIABLES
                      IPRNT            5  PRINT CONTROL
                      IPLOT            0  PLOT CONTROL
                      QSCAL           0.  HYDROGRAPH PLOT SCALE
                      IPNCH            0  PUNCH COMPUTED HYDROGRAPH
                       IOUT           22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1            1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2          900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT         .033  TIME INTERVAL IN HOURS


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

            **************
            *            *
  88 KK     *        F1  *
            *            *
            **************

  94 KO          OUTPUT CONTROL VARIABLES
                      IPRNT            5  PRINT CONTROL
                      IPLOT            0  PLOT CONTROL
                      QSCAL           0.  HYDROGRAPH PLOT SCALE
                      IPNCH            0  PUNCH COMPUTED HYDROGRAPH
                       IOUT           22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1            1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2          900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT         .033  TIME INTERVAL IN HOURS

        *** FDKRUT - NEWTON RAPHSON FAILEDFIXED POINT ITERATION USED - ITERATION=  1


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

            **************
            *            *
  95 KK     *        F2  *
            *            *
            **************

 101 KO          OUTPUT CONTROL VARIABLES
                      IPRNT            5  PRINT CONTROL
                      IPLOT            0  PLOT CONTROL
                      QSCAL           0.  HYDROGRAPH PLOT SCALE
                      IPNCH            0  PUNCH COMPUTED HYDROGRAPH
                       IOUT           22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1            1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2          900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT         .033  TIME INTERVAL IN HOURS


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

            **************
            *            *
 102 KK     *        F3  *
            *            *
```

```
                **************
 108 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS

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

                **************
                *            *
 109 KK         *         G  *
                *            *
                **************

 115 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS

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

                **************
                *            *
 116 KK         *        H1  *
                *            *
                **************

 122 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS

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

                **************
                *            *
 123 KK         *        H2  *
                *            *
                **************

 129 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS

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

                **************
                *            *
 130 KK         *         I  *
                *            *
                **************

 136 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
```

```
            ***************
            *             *
 140 KK     *          J  *
            *             *
            ***************

 146 KO          OUTPUT CONTROL VARIABLES
                       IPRNT           5  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE
                       IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                        IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT        .033  TIME INTERVAL IN HOURS


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

            ***************
            *             *
 147 KK     *          K  *
            *             *
            ***************

 153 KO          OUTPUT CONTROL VARIABLES
                       IPRNT           5  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE
                       IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                        IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT        .033  TIME INTERVAL IN HOURS


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

            ***************
            *             *
 154 KK     *          L  *
            *             *
            ***************

 160 KO          OUTPUT CONTROL VARIABLES
                       IPRNT           5  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE
                       IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                        IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT        .033  TIME INTERVAL IN HOURS


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

            ***************
            *             *
 161 KK     *          M  *
            *             *
            ***************

 167 KO          OUTPUT CONTROL VARIABLES
                       IPRNT           5  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE
                       IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                        IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT        .033  TIME INTERVAL IN HOURS


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

            ***************
            *             *
 168 KK     *          N  *
            *             *
            ***************

 174 KO          OUTPUT CONTROL VARIABLES
                       IPRNT           5  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE
                       IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                        IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT        .033  TIME INTERVAL IN HOURS
```

```
*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
 175 KK     *         O  *
            *            *
            **************

 181 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE
                      IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                       IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT       .033  TIME INTERVAL IN HOURS


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

            **************
            *            *
 182 KK     *         P  *
            *            *
            **************

 188 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE
                      IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                       IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT       .033  TIME INTERVAL IN HOURS


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

            **************
            *            *
 192 KK     *         Q  *
            *            *
            **************

 198 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE
                      IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                       IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT       .033  TIME INTERVAL IN HOURS


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

            **************
            *            *
 199 KK     *         R  *
            *            *
            **************

 205 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE
                      IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                       IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT       .033  TIME INTERVAL IN HOURS
```

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	A1	46.	3.30	6.	1.	1.	.08		
+	HYDROGRAPH AT	A2	21.	3.27	2.	1.	0.	.04		
+	HYDROGRAPH AT	B1	17.	3.27	2.	0.	0.	.03		
+	HYDROGRAPH AT	B2	23.	3.40	3.	1.	1.	.05		

```
+          2 COMBINED AT
                          COMBB      37.   3.30        5.        1.        1.      .08
+          HYDROGRAPH AT
                            C        17.   3.27        2.        1.        0.      .03
+          HYDROGRAPH AT
                            D        17.   3.33        2.        1.        0.      .03
+          HYDROGRAPH AT
                           E1        26.   3.43        4.        1.        1.      .06
+          HYDROGRAPH AT
                           E2        27.   3.30        3.        1.        1.      .05
+          2 COMBINED AT
                          COMBE      49.   3.33        7.        2.        1.      .11
+          6 COMBINED AT
                          CLEAR     186.   3.30       25.        6.        5.      .37
+          HYDROGRAPH AT
                           E3         6.   3.20        1.        0.        0.      .01
+          HYDROGRAPH AT
                           F1        19.   3.33        2.        1.        0.      .04
+          HYDROGRAPH AT
                           F2         9.   3.27        1.        0.        0.      .01
+          HYDROGRAPH AT
                           F3         8.   3.27        1.        0.        0.      .01
+          HYDROGRAPH AT
                            G         7.   3.37        1.        0.        0.      .02
+          HYDROGRAPH AT
                           H1        28.   3.37        4.        1.        1.      .06
+          HYDROGRAPH AT
                           H2        32.   3.43        5.        1.        1.      .07
+          HYDROGRAPH AT
                            I        14.   3.30        2.        0.        0.      .03
+          8 COMBINED AT
                          CLEAR     113.   3.33       16.        4.        3.      .24
+          HYDROGRAPH AT
                            J        18.   3.17        2.        0.        0.      .02
+          HYDROGRAPH AT
                            K         9.   3.13        1.        0.        0.      .01
+          HYDROGRAPH AT
                            L         8.   3.17        1.        0.        0.      .01
+          HYDROGRAPH AT
                            M         6.   3.20        1.        0.        0.      .01
+          HYDROGRAPH AT
                            N         8.   3.20        1.        0.        0.      .01
+          HYDROGRAPH AT
                            O         3.   3.13        0.        0.        0.      .00
+          HYDROGRAPH AT
                            P         6.   3.17        0.        0.        0.      .01
+          8 COMBINED AT
                          CLEAR     144.   3.30       21.        5.        4.      .31
+          HYDROGRAPH AT
                            Q         3.   3.10        0.        0.        0.      .00
+          HYDROGRAPH AT
                            R        94.   3.27       10.        3.        2.      .15
1
                        SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
                            (FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)
                                                                  INTERPOLATED TO
                                                                COMPUTATION INTERVAL
   ISTAQ    ELEMENT      DT        PEAK     TIME TO     VOLUME      DT       PEAK     TIME TO     VOLUME
                                              PEAK                                      PEAK
                        (MIN)      (CFS)     (MIN)      (IN)     (MIN)     (CFS)     (MIN)       (IN)
   FOR STORM = 1  STORM AREA (SQ MI) =        .01
         A1  MANE        2.00     45.60    197.96       .63      2.00     45.59    198.00        .63

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .2833E+01 OUTFLOW= .2811E+01 BASIN STORAGE= .1146E-02 PERCENT ERROR=    .7

   FOR STORM = 1  STORM AREA (SQ MI) =        .01
         A2  MANE        2.00     21.65    196.72       .63      2.00     21.49    196.00        .63

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1214E+01 OUTFLOW= .1203E+01 BASIN STORAGE= .4066E-03 PERCENT ERROR=    .9

   FOR STORM = 1  STORM AREA (SQ MI) =        .01
         B1  MANE        1.82     17.27    195.49       .63      2.00     17.14    196.00        .63
```

```
CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .9106E+00 OUTFLOW= .9045E+00 BASIN STORAGE= .2559E-03 PERCENT ERROR=    .6

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
             B2  MANE          2.00     22.90    203.78       .63      2.00     22.84    204.00         .63

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1686E+01 OUTFLOW= .1674E+01 BASIN STORAGE= .1114E-02 PERCENT ERROR=    .7

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
              C  MANE          1.85     17.26    197.14       .63      2.00     17.16    196.00         .63

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1012E+01 OUTFLOW= .1005E+01 BASIN STORAGE= .3633E-03 PERCENT ERROR=    .6

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
              D  MANE          1.82     17.39    199.15       .63      2.00     17.32    200.00         .63

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1147E+01 OUTFLOW= .1139E+01 BASIN STORAGE= .5591E-03 PERCENT ERROR=    .6

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
             E1  MANE          1.85     25.97    206.70       .63      2.00     25.95    206.00         .63

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .2057E+01 OUTFLOW= .2042E+01 BASIN STORAGE= .1681E-02 PERCENT ERROR=    .7

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
             E2  MANE          2.00     27.30    196.30       .63      2.00     27.05    198.00         .63

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1551E+01 OUTFLOW= .1541E+01 BASIN STORAGE= .5151E-03 PERCENT ERROR=    .7

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
             E3  MANE          1.00      5.96    191.22       .63      2.00      5.94    192.00         .63

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .2698E+00 OUTFLOW= .2685E+00 BASIN STORAGE= .5610E-04 PERCENT ERROR=    .5

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
             F1  MANE          1.98     19.30    199.10       .63      2.00     19.19    200.00         .63

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1214E+01 OUTFLOW= .1204E+01 BASIN STORAGE= .5067E-03 PERCENT ERROR=    .8

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
             F2  MANE          1.71      8.55    195.83       .63      2.00      8.53    196.00         .63

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .4722E+00 OUTFLOW= .4686E+00 BASIN STORAGE= .1519E-03 PERCENT ERROR=    .7

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
             F3  MANE          1.06      7.64    196.27       .63      2.00      7.63    196.00         .63

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .4385E+00 OUTFLOW= .4352E+00 BASIN STORAGE= .1636E-03 PERCENT ERROR=    .7

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
              G  MANE          1.01      7.50    201.08       .63      2.00      7.49    202.00         .63

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .5396E+00 OUTFLOW= .5361E+00 BASIN STORAGE= .3341E-03 PERCENT ERROR=    .6

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
             H1  MANE          2.00     27.81    202.87       .63      2.00     27.65    202.00         .63

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1990E+01 OUTFLOW= .1974E+01 BASIN STORAGE= .1180E-02 PERCENT ERROR=    .7

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
             H2  MANE          2.00     31.67    205.47       .63      2.00     31.56    206.00         .63

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .2428E+01 OUTFLOW= .2411E+01 BASIN STORAGE= .1729E-02 PERCENT ERROR=    .7

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
              I  MANE          1.74     14.44    197.94       .63      2.00     14.42    198.00         .63

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .8432E+00 OUTFLOW= .8362E+00 BASIN STORAGE= .3168E-03 PERCENT ERROR=    .8

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
              J  MANE           .89     18.64    191.55       .63      2.00     18.28    190.00         .63

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .8095E+00 OUTFLOW= .8050E+00 BASIN STORAGE= .1481E-03 PERCENT ERROR=    .5

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
              K  MANE           .94      9.41    187.34       .63      2.00      9.14    188.00         .63

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .3035E+00 OUTFLOW= .3025E+00 BASIN STORAGE= .1753E-04 PERCENT ERROR=    .3
```

```
FOR STORM = 1  STORM AREA (SQ MI) =        .01
      L  MANE          .75      7.78    189.63       .63      2.00      7.66    190.00        .63

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .3035E+00 OUTFLOW= .3020E+00 BASIN STORAGE= .3530E-04 PERCENT ERROR=    .5

FOR STORM = 1  STORM AREA (SQ MI) =        .01
      M  MANE         1.26      6.15    191.67       .63      2.00      6.09    192.00        .63

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .2698E+00 OUTFLOW= .2683E+00 BASIN STORAGE= .5108E-04 PERCENT ERROR=    .6

FOR STORM = 1  STORM AREA (SQ MI) =        .01
      N  MANE         1.73      7.98    191.88       .63      2.00      7.94    192.00        .63

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .3373E+00 OUTFLOW= .3355E+00 BASIN STORAGE= .5160E-04 PERCENT ERROR=    .5

FOR STORM = 1  STORM AREA (SQ MI) =        .01
      O  MANE          .47      2.67    188.19       .63      2.00      2.65    188.00        .63

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .9781E-01 OUTFLOW= .9736E-01 BASIN STORAGE= .1145E-04 PERCENT ERROR=    .4

FOR STORM = 1  STORM AREA (SQ MI) =        .01
      P  MANE          .68      5.61    189.50       .63      2.00      5.60    190.00        .63

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .2327E+00 OUTFLOW= .2314E+00 BASIN STORAGE= .3947E-04 PERCENT ERROR=    .5

FOR STORM = 1  STORM AREA (SQ MI) =        .01
      Q  MANE          .37      3.22    187.49       .63      2.00      3.19    186.00        .63

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1079E+00 OUTFLOW= .1075E+00 BASIN STORAGE= .8190E-05 PERCENT ERROR=    .4

FOR STORM = 1  STORM AREA (SQ MI) =        .01
      R  MANE         2.00     94.22    195.52       .63      2.00     93.94    196.00        .63

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .5059E+01 OUTFLOW= .5020E+01 BASIN STORAGE= .1201E-02 PERCENT ERROR=    .7


*** NORMAL END OF HEC-1 ***
```

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            JUN   1998                *
*          VERSION 4.1                 *
*                                      *
*  RUN DATE   07NOV06  TIME  09:46:54  *
*                                      *
****************************************
```

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

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
```

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

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

```
1                                          HEC-1 INPUT                                                    PAGE  1

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

    1           ID        HEC-1 MODEL FOR SERENO CANYON
    2           ID        10-YEAR, 6-HOUR STORM
    3           ID        RAINFALL FROM NOAA ATLAS
    4           ID        SCS CURVE NUMBER SOIL LOSS PARAMETERS
    5           ID        KINEMATIC WAVE HYDROGRAPH ROUTING
    6           ID        EXISTING CONDITIONS
    7           ID
    8           ID        PREPARED BY WOOD/PATEL, 8.4.2004
    9           ID        FILE NAME:  EX-10.DAT
   10           ID
                *DIAGRAM
   11           IT       2                    900
   12           IO       5
   13           JD             .01
   14           PH                   0.52    0.99    1.64    1.87    2.01    2.29

   15           KK      A1
   16           KM       RUNOFF FROM SUB-BASIN A1
   17           BA    .084
   18           LS              88
   19           UK     260    .025    0.13     100
   20           RK    3520    .023    .032            TRAP      12       5
   21           KO                                      22

   22           KK      A2
   23           KM  RUNOFF FROM SUB-BASIN A2
   24           BA    .036
   25           LS              88
   26           UK     235    .025    0.13     100
   27           RK    2000     .02    .032            TRAP       8       5
   28           KO                                      22

   29           KK      B1
   30           KM  RUNOFF FROM SUB-BASIN B1
   31           BA    .027
   32           LS              88
   33           UK     200    .025    0.13     100
   34           RK    2500    .028    .032            TRAP       8       5
   35           KO                                      22

   36           KK      B2
   37           KM  RUNOFF FROM SUB-BASIN B2
   38           BA    .050
   39           LS              88
   40           UK     400    .025    0.13     100
   41           RK    2340    .024    .032            TRAP       8       5

   42           KK   COMBB
   43           KM  COMBINE SECTIONS B1 AND B2
   44           HC       2
   45           KO                                      22
1                                          HEC-1 INPUT                                                    PAGE  2

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

   46           KK       C
   47           KM  RUNOFF FROM SUB-BASIN C
   48           BA     .03
   49           LS              88
   50           UK     250    .023    0.13     100
   51           RK    1570    .017    .032            TRAP       5       5
   52           KO                                      22

   53           KK       D
   54           KM  RUNOFF FROM SUB-BASIN D
   55           BA    .034
   56           LS              88
```

```
 57          UK     300     .02    0.13     100
 58          RK    1425    .014    .032            TRAP       6       5
 59          KO                                      22

 60          KK      E1
 61          KM  RUNOFF FROM SUB-BASIN E1
 62          BA    .061
 63          LS              88
 64          UK     400     .02    0.13     100
 65          RK    2050    .013    .032            TRAP       7       5
 66          KO                                      22

 67          KK      E2
 68          KM  RUNOFF FROM SUB-BASIN E2
 69          BA    .046
 70          LS              88
 71          UK     200     .02    0.13     100
 72          RK    2370    .013    .032            TRAP      10       5
 73          KO                                      22

 74          KK   COMBE
 75          KM  COMBINE SECTIONS E1 AND E2
 76          HC       2
 77          KO                                      22

 78          KK   CLEAR
 79          KM  CLEAR HYDROGRAPH STACK
 80          HC       6
             *

 81          KK      E3
 82          KM  RUNOFF FROM SUB-BASIN E3
 83          BA    .008
 84          LS              88
 85          UK     175    .025    0.13     100
 86          RK     750    .032    .032            TRAP       6       5
 87          KO                                      22
```



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

 88          KK      F1
 89          KM  RUNOFF FROM SUB-BASIN F1
 90          BA    .036
 91          LS              88
 92          UK     225    .018    0.13     100
 93          RK    2500    .012    .032            TRAP       7       5
 94          KO                                      22

 95          KK      F2
 96          KM  RUNOFF FROM SUB-BASIN F2
 97          BA    .014
 98          LS              88
 99          UK     200    .018    0.13     100
100          RK    1440    .028    .032            TRAP       6       5
101          KO                                      22

102          KK      F3
103          KM  RUNOFF FROM SUB-BASIN F3
104          BA    .013
105          LS              88
106          UK     225    .018    0.13     100
107          RK     850    .026    .032            TRAP       6       5
108          KO                                      22

109          KK       G
110          KM  RUNOFF FROM SUB-BASIN G
111          BA   0.016
112          LS              88
113          UK     400    .025    0.13     100
114          RK     720    .022    .032            TRAP       4       5
115          KO                                      22

116          KK      H1
117          KM  RUNOFF FROM SUB-BASIN H1
118          BA    .059
119          LS              88
120          UK     375    .025    0.13     100
121          RK    2210    .019    .032            TRAP       8       5
122          KO                                      22

123          KK      H2
124          KM  RUNOFF FROM SUB-BASIN H2
125          BA    .072
126          LS              88
127          UK     400    .025    0.13     100
128          RK    3480    .019    .032            TRAP      12       5
129          KO                                      22

130          KK       I
131          KM  RUNOFF FROM SUB-BASIN I
132          BA    .025
133          LS              88
134          UK     225     .02    0.13     100
135          RK    2100    .026    .032            TRAP      10       5
```



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

136          KO                                      22

137          KK   CLEAR
138          KM  CLEAR HYDROGRAPH STACK
139          HC       8
```

```
140          KK        J
141          KM   RUNOFF FROM SUB-BASIN J
142          BA     .024
143          LS                88        0
144          UK      145      .02     0.13      100
145          RK      965     .026     .032             TRAP        5        5
146          KO                                         22

147          KK        K
148          KM   RUNOFF FROM SUB-BASIN K
149          BA     .009
150          LS                88        0
151          UK       81     .025     0.13      100
152          RK      715     .022     .032             TRAP        5        5
153          KO                                         22

154          KK        L
155          KM   RUNOFF FROM SUB-BASIN L
156          BA     .009
157          LS                88        0
158          UK      113     .018     0.13      100
159          RK      450     .012     .032             TRAP        5        5
160          KO                                         22

161          KK        M
162          KM   RUNOFF FROM SUB-BASIN M
163          BA     .008
164          LS                88        0
165          UK      137     .018     0.13      100
166          RK      750     .012     .032             TRAP        4        5
167          KO                                         22

168          KK        N
169          KM   RUNOFF FROM SUB-BASIN N
170          BA      .01
171          LS                88        0
172          UK      117     .018     0.13      100
173          RK     1036     .012     .032             TRAP        5        5
174          KO                                         22

175          KK        O
176          KM   RUNOFF FROM SUB-BASIN O
177          BA    .0029
178          LS                88        0
179          UK      108      .02     0.13      100
180          RK      174     .014     .032             TRAP        4        5
181          KO                                         22
```



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

182          KK        P
183          KM   RUNOFF FROM SUB-BASIN P
184          BA    .0069
185          LS                88        0
186          UK      135      .02     0.13      100
187          RK      354     .014     .032             TRAP        5        5
188          KO                                         22

189          KK    CLEAR
190          KM   CLEAR HYDROGRAPH STACK
191          HC        8

192          KK        Q
193          KM   RUNOFF FROM SUB-BASIN Q
194          BA    .0032
195          LS                88        0
196          UK       86      .02     0.13      100
197          RK      160     .014     .032             TRAP        4        5
198          KO                                         22

199          KK        R
200          KM   RUNOFF FROM SUB-BASIN R
201          BA      .15
202          LS                88
203          UK      180     .025     0.13      100
204          RK     4300     .023     .032             TRAP       15        5
205          KO                                         22
206          ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

   15        A1
              .
              .
   22         .          A2
              .           .
              .           .
   29         .           .          B1
              .           .           .
              .           .           .
   36         .           .           .          B2
              .           .           .           .
              .           .           .           .
   42         .           .       COMBB............
              .           .           .
              .           .           .
   46         .           .           .           C
              .           .           .           .
              .           .           .           .
   53         .           .           .           .          D
```

```
                                                  EX-10.OH1
                 :         :         :         :         :
  60             :         :         :         :         :         E1
                 :         :         :         :         :         :
  67             :         :         :         :         :         :         E2
                 :         :         :         :         :         :         :
  74             :         :         :         :         :      COMBE.........
                 :         :         :         :         :         :
  78       CLEAR.........................................................
                 :
  81             :         E3
                 :         :
  88             :         :         F1
                 :         :         :
  95             :         :         :         F2
                 :         :         :         :
 102             :         :         :         :         F3
                 :         :         :         :         :
 109             :         :         :         :         :         G
                 :         :         :         :         :         :
 116             :         :         :         :         :         :         H1
                 :         :         :         :         :         :         :
 123             :         :         :         :         :         :         :         H2
                 :         :         :         :         :         :         :         :
 130             :         :         :         :         :         :         :         :         I
                 :         :         :         :         :         :         :         :         :
 137             :       CLEAR.......................................................................
                 :         :
 140             :         :         J
                 :         :         :
 147             :         :         :         K
                 :         :         :         :
 154             :         :         :         :         L
                 :         :         :         :         :
 161             :         :         :         :         :         M
                 :         :         :         :         :         :
 168             :         :         :         :         :         :         N
                 :         :         :         :         :         :         :
 175             :         :         :         :         :         :         :         O
                 :         :         :         :         :         :         :         :
 182             :         :         :         :         :         :         :         :         P
                 :         :         :         :         :         :         :         :         :
 189             :       CLEAR.......................................................................
                 :         :
 192             :         :         Q
                 :         :         :
 199             :         :         :         R
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              JUN   1998              *
*            VERSION 4.1               *
*                                      *
*  RUN DATE   07NOV06  TIME  09:46:54  *
*                                      *
****************************************
```

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

```
                    HEC-1 MODEL FOR SERENO CANYON
                    10-YEAR, 6-HOUR STORM
                    RAINFALL FROM NOAA ATLAS
                    SCS CURVE NUMBER SOIL LOSS PARAMETERS
                    KINEMATIC WAVE HYDROGRAPH ROUTING
                    EXISTING CONDITIONS

                    PREPARED BY WOOD/PATEL, 8.4.2004
                    FILE NAME:  EX-10.DAT

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

    IT        HYDROGRAPH TIME DATA
                     NMIN          2  MINUTES IN COMPUTATION INTERVAL
                    IDATE      1   0  STARTING DATE
                    ITIME       0000  STARTING TIME
                       NQ        900  NUMBER OF HYDROGRAPH ORDINATES
```

```
                NDDATE      2    0  ENDING DATE
                NDTIME        0558  ENDING TIME
                ICENT           19  CENTURY MARK

            COMPUTATION INTERVAL     .03 HOURS
                TOTAL TIME BASE   29.97 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

 13 JD        INDEX STORM NO. 1
                  STRM        2.29  PRECIPITATION DEPTH
                  TRDA         .01  TRANSPOSITION DRAINAGE AREA

 14 PI          PRECIPITATION PATTERN
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .01       .01       .01       .01
                   .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                   .01       .01       .01       .01       .01       .02       .02       .02       .02       .02
                   .02       .03       .03       .04       .04       .05       .06       .08       .11       .21
                   .21       .17       .10       .08       .05       .04       .04       .04       .03       .02
                   .02       .02       .02       .02       .02       .01       .01       .01       .01       .01
                   .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                   .01       .01       .01       .01       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00

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

          ***************
          *             *
 15 KK    *        A1   *
          *             *
          ***************

 21 KO        OUTPUT CONTROL VARIABLES
                IPRNT           5  PRINT CONTROL
                IPLOT           0  PLOT CONTROL
                QSCAL          0.  HYDROGRAPH PLOT SCALE
                IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                 IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
               TIMINT        .033  TIME INTERVAL IN HOURS

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

          ***************
          *             *
 22 KK    *        A2   *
          *             *
          ***************

 28 KO        OUTPUT CONTROL VARIABLES
                IPRNT           5  PRINT CONTROL
                IPLOT           0  PLOT CONTROL
                QSCAL          0.  HYDROGRAPH PLOT SCALE
                IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                 IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
               TIMINT        .033  TIME INTERVAL IN HOURS

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

          ***************
          *             *
 29 KK    *        B1   *
          *             *
          ***************

 35 KO        OUTPUT CONTROL VARIABLES
                IPRNT           5  PRINT CONTROL
                IPLOT           0  PLOT CONTROL
                QSCAL          0.  HYDROGRAPH PLOT SCALE
                IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                 IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
               TIMINT        .033  TIME INTERVAL IN HOURS
```

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

          **************
          *            *
  42 KK   *     COMBB  *
          *            *
          **************

  45 KO          OUTPUT CONTROL VARIABLES
                       IPRNT          5  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE
                       IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                        IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT       .033  TIME INTERVAL IN HOURS


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

          **************
          *            *
  46 KK   *          C *
          *            *
          **************

  52 KO          OUTPUT CONTROL VARIABLES
                       IPRNT          5  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE
                       IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                        IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT       .033  TIME INTERVAL IN HOURS


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

          **************
          *            *
  53 KK   *          D *
          *            *
          **************

  59 KO          OUTPUT CONTROL VARIABLES
                       IPRNT          5  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE
                       IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                        IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT       .033  TIME INTERVAL IN HOURS


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

          **************
          *            *
  60 KK   *         E1 *
          *            *
          **************

  66 KO          OUTPUT CONTROL VARIABLES
                       IPRNT          5  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE
                       IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                        IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT       .033  TIME INTERVAL IN HOURS


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

          **************
          *            *
  67 KK   *         E2 *
          *            *
          **************

  73 KO          OUTPUT CONTROL VARIABLES
                       IPRNT          5  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE
                       IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                        IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
```

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                ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
               TIMINT       .033  TIME INTERVAL IN HOURS


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

          **************
          *            *
  74 KK   *     COMBE  *
          *            *
          **************

  77 KO         OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE
                     IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                      IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                     ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                     ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
                    TIMINT       .033  TIME INTERVAL IN HOURS


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

          **************
          *            *
  81 KK   *        E3  *
          *            *
          **************

  87 KO         OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE
                     IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                      IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                     ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                     ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
                    TIMINT       .033  TIME INTERVAL IN HOURS


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

          **************
          *            *
  88 KK   *        F1  *
          *            *
          **************

  94 KO         OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE
                     IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                      IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                     ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                     ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
                    TIMINT       .033  TIME INTERVAL IN HOURS


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

          **************
          *            *
  95 KK   *        F2  *
          *            *
          **************

 101 KO         OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE
                     IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                      IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                     ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                     ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
                    TIMINT       .033  TIME INTERVAL IN HOURS


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

          **************
          *            *
 102 KK   *        F3  *
          *            *
          **************

 108 KO         OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
```

```
                    QSCAL          0.  HYDROGRAPH PLOT SCALE
                    IPNCH          0   PUNCH COMPUTED HYDROGRAPH
                     IOUT         22   SAVE HYDROGRAPH ON THIS UNIT
                    ISAV1          1   FIRST ORDINATE PUNCHED OR SAVED
                    ISAV2        900   LAST ORDINATE PUNCHED OR SAVED
                   TIMINT       .033   TIME INTERVAL IN HOURS

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

          **************
          *            *
 109 KK   *         G  *
          *            *
          **************

 115 KO          OUTPUT CONTROL VARIABLES
                    IPRNT          5   PRINT CONTROL
                    IPLOT          0   PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE
                    IPNCH          0   PUNCH COMPUTED HYDROGRAPH
                     IOUT         22   SAVE HYDROGRAPH ON THIS UNIT
                    ISAV1          1   FIRST ORDINATE PUNCHED OR SAVED
                    ISAV2        900   LAST ORDINATE PUNCHED OR SAVED
                   TIMINT       .033   TIME INTERVAL IN HOURS

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

          **************
          *            *
 116 KK   *        H1  *
          *            *
          **************

 122 KO          OUTPUT CONTROL VARIABLES
                    IPRNT          5   PRINT CONTROL
                    IPLOT          0   PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE
                    IPNCH          0   PUNCH COMPUTED HYDROGRAPH
                     IOUT         22   SAVE HYDROGRAPH ON THIS UNIT
                    ISAV1          1   FIRST ORDINATE PUNCHED OR SAVED
                    ISAV2        900   LAST ORDINATE PUNCHED OR SAVED
                   TIMINT       .033   TIME INTERVAL IN HOURS

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

          **************
          *            *
 123 KK   *        H2  *
          *            *
          **************

 129 KO          OUTPUT CONTROL VARIABLES
                    IPRNT          5   PRINT CONTROL
                    IPLOT          0   PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE
                    IPNCH          0   PUNCH COMPUTED HYDROGRAPH
                     IOUT         22   SAVE HYDROGRAPH ON THIS UNIT
                    ISAV1          1   FIRST ORDINATE PUNCHED OR SAVED
                    ISAV2        900   LAST ORDINATE PUNCHED OR SAVED
                   TIMINT       .033   TIME INTERVAL IN HOURS

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

          **************
          *            *
 130 KK   *         I  *
          *            *
          **************

 136 KO          OUTPUT CONTROL VARIABLES
                    IPRNT          5   PRINT CONTROL
                    IPLOT          0   PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE
                    IPNCH          0   PUNCH COMPUTED HYDROGRAPH
                     IOUT         22   SAVE HYDROGRAPH ON THIS UNIT
                    ISAV1          1   FIRST ORDINATE PUNCHED OR SAVED
                    ISAV2        900   LAST ORDINATE PUNCHED OR SAVED
                   TIMINT       .033   TIME INTERVAL IN HOURS

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

          **************
          *            *
 140 KK   *         J  *
          *            *
          **************
```

```
146 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS


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

          **************
          *            *
147 KK    *         K  *
          *            *
          **************

153 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS


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

          **************
          *            *
154 KK    *         L  *
          *            *
          **************

160 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS


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

          **************
          *            *
161 KK    *         M  *
          *            *
          **************

167 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS


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

          **************
          *            *
168 KK    *         N  *
          *            *
          **************

174 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS


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

          **************
```

```
                *            *
175 KK          *         O  *
                *            *
                **************

181 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS


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

                **************
                *            *
182 KK          *         P  *
                *            *
                **************

188 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS


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

                **************
                *            *
192 KK          *         Q  *
                *            *
                **************

198 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS


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

                **************
                *            *
199 KK          *         R  *
                *            *
                **************

205 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS
```

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	A1	111.	3.23	11.	3.	2.	.08		
+	HYDROGRAPH AT	A2	52.	3.20	5.	1.	1.	.04		
+	HYDROGRAPH AT	B1	40.	3.17	3.	1.	1.	.03		
+	HYDROGRAPH AT	B2	57.	3.27	6.	2.	1.	.05		
+	2 COMBINED AT	COMBB	93.	3.23	10.	2.	2.	.08		
	HYDROGRAPH AT									

```
+                                C        43.   3.20        4.        1.        1.      .03
          HYDROGRAPH AT
+                                D        43.   3.20        4.        1.        1.      .03
          HYDROGRAPH AT
+                               E1        67.   3.27        8.        2.        2.      .06
          HYDROGRAPH AT
+                               E2        65.   3.20        6.        1.        1.      .05
          2 COMBINED AT
+                            COMBE       126.   3.23       14.        3.        3.      .11
          6 COMBINED AT
+                            CLEAR       463.   3.20       47.       12.        9.      .37
          HYDROGRAPH AT
+                               E3        14.   3.13        1.        0.        0.      .01
          HYDROGRAPH AT
+                               F1        47.   3.23        5.        1.        1.      .04
          HYDROGRAPH AT
+                               F2        21.   3.17        2.        0.        0.      .01
          HYDROGRAPH AT
+                               F3        19.   3.17        2.        0.        0.      .01
          HYDROGRAPH AT
+                                G        19.   3.23        2.        1.        0.      .02
          HYDROGRAPH AT
+                               H1        70.   3.23        8.        2.        2.      .06
          HYDROGRAPH AT
+                               H2        79.   3.30        9.        2.        2.      .07
          HYDROGRAPH AT
+                                I        35.   3.20        3.        1.        1.      .03
          8 COMBINED AT
+                            CLEAR       285.   3.23       31.        8.        6.      .24
          HYDROGRAPH AT
+                                J        43.   3.13        3.        1.        1.      .02
          HYDROGRAPH AT
+                                K        19.   3.10        1.        0.        0.      .01
          HYDROGRAPH AT
+                                L        17.   3.10        1.        0.        0.      .01
          HYDROGRAPH AT
+                                M        14.   3.13        1.        0.        0.      .01
          HYDROGRAPH AT
+                                N        18.   3.13        1.        0.        0.      .01
          HYDROGRAPH AT
+                                O         6.   3.10        0.        0.        0.      .00
          HYDROGRAPH AT
+                                P        13.   3.10        1.        0.        0.      .01
          8 COMBINED AT
+                            CLEAR       364.   3.20       40.       10.        8.      .31
          HYDROGRAPH AT
+                                Q         7.   3.07        0.        0.        0.      .00
          HYDROGRAPH AT
+                                R       220.   3.20       19.        5.        4.      .15
1
                        SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
                            (FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)
                                                                   INTERPOLATED TO
                                                                COMPUTATION INTERVAL
        ISTAQ    ELEMENT      DT       PEAK    TIME TO     VOLUME      DT      PEAK    TIME TO     VOLUME
                                                  PEAK                                  PEAK
                             (MIN)     (CFS)    (MIN)      (IN)     (MIN)    (CFS)     (MIN)       (IN)
        FOR STORM = 1  STORM AREA (SQ MI) =        .01
             A1  MANE         2.00    113.23   193.02      1.20      2.00   110.67    194.00       1.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .5392E+01 OUTFLOW= .5360E+01 BASIN STORAGE= .1203E-02 PERCENT ERROR=    .6

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
             A2  MANE         1.72     53.31   191.26      1.20      2.00    52.34    192.00       1.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .2311E+01 OUTFLOW= .2300E+01 BASIN STORAGE= .4152E-03 PERCENT ERROR=    .4

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
             B1  MANE         1.97     41.51   190.99      1.20      2.00    40.35    190.00       1.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1733E+01 OUTFLOW= .1725E+01 BASIN STORAGE= .2299E-03 PERCENT ERROR=    .5

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
             B2  MANE         1.73     57.59   194.86      1.20      2.00    57.02    196.00       1.20
```

```
CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .3209E+01 OUTFLOW= .3188E+01 BASIN STORAGE= .1093E-02 PERCENT ERROR=    .6

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
              C  MANE          1.39     43.38    190.70      1.20      2.00     42.69    192.00        1.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1926E+01 OUTFLOW= .1917E+01 BASIN STORAGE= .3510E-03 PERCENT ERROR=    .4

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
              D  MANE          1.49     43.45    192.11      1.20      2.00     43.28    192.00        1.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .2182E+01 OUTFLOW= .2168E+01 BASIN STORAGE= .6112E-03 PERCENT ERROR=    .6

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
             E1  MANE          1.86     66.55    195.99      1.20      2.00     66.55    196.00        1.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .3915E+01 OUTFLOW= .3895E+01 BASIN STORAGE= .1651E-02 PERCENT ERROR=    .5

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
             E2  MANE          2.00     65.93    191.46      1.20      2.00     65.44    192.00        1.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .2953E+01 OUTFLOW= .2937E+01 BASIN STORAGE= .5186E-03 PERCENT ERROR=    .5

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
             E3  MANE           .77     14.06    187.27      1.20      2.00     13.99    188.00        1.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .5135E+00 OUTFLOW= .5118E+00 BASIN STORAGE= .4884E-04 PERCENT ERROR=    .3

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
             F1  MANE          1.88     47.77    193.48      1.20      2.00     47.39    194.00        1.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .2311E+01 OUTFLOW= .2297E+01 BASIN STORAGE= .5291E-03 PERCENT ERROR=    .6

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
             F2  MANE          1.37     21.16    190.57      1.20      2.00     21.06    190.00        1.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .8986E+00 OUTFLOW= .8950E+00 BASIN STORAGE= .1544E-03 PERCENT ERROR=    .4

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
             F3  MANE           .85     19.08    190.44      1.20      2.00     19.04    190.00        1.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .8344E+00 OUTFLOW= .8306E+00 BASIN STORAGE= .1711E-03 PERCENT ERROR=    .4

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
              G  MANE           .84     18.87    194.76      1.20      2.00     18.84    194.00        1.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1027E+01 OUTFLOW= .1020E+01 BASIN STORAGE= .3250E-03 PERCENT ERROR=    .6

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
             H1  MANE          1.68     70.36    194.24      1.20      2.00     69.96    194.00        1.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .3787E+01 OUTFLOW= .3764E+01 BASIN STORAGE= .1280E-02 PERCENT ERROR=    .6

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
             H2  MANE          2.00     79.06    198.18      1.19      2.00     79.00    198.00        1.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .4621E+01 OUTFLOW= .4588E+01 BASIN STORAGE= .1717E-02 PERCENT ERROR=    .7

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
              I  MANE          1.73     35.72    191.54      1.20      2.00     35.41    192.00        1.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1605E+01 OUTFLOW= .1596E+01 BASIN STORAGE= .2887E-03 PERCENT ERROR=    .5

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
              J  MANE           .82     43.52    187.61      1.20      2.00     42.95    188.00        1.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1540E+01 OUTFLOW= .1535E+01 BASIN STORAGE= .1366E-03 PERCENT ERROR=    .3

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
              K  MANE           .84     19.33    185.62      1.20      2.00     18.99    186.00        1.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .5777E+00 OUTFLOW= .5771E+00 BASIN STORAGE= .1799E-04 PERCENT ERROR=    .1

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
              L  MANE           .61     17.53    186.45      1.20      2.00     17.46    186.00        1.20
```

```
CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .5777E+00 OUTFLOW= .5764E+00 BASIN STORAGE= .4197E-04 PERCENT ERROR=    .2

          FOR STORM = 1  STORM AREA (SQ MI) =        .01
                M  MANE         1.10     14.36    187.63      1.20      2.00     14.28    188.00        1.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .5135E+00 OUTFLOW= .5119E+00 BASIN STORAGE= .4761E-04 PERCENT ERROR=    .3

          FOR STORM = 1  STORM AREA (SQ MI) =        .01
                N  MANE         1.44     18.20    187.71      1.20      2.00     18.08    188.00        1.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .6419E+00 OUTFLOW= .6400E+00 BASIN STORAGE= .5152E-04 PERCENT ERROR=    .3

          FOR STORM = 1  STORM AREA (SQ MI) =        .01
                O  MANE          .35      5.86    185.68      1.20      2.00      5.79    186.00        1.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1861E+00 OUTFLOW= .1856E+00 BASIN STORAGE= .1133E-04 PERCENT ERROR=    .3

          FOR STORM = 1  STORM AREA (SQ MI) =        .01
                P  MANE          .48     12.94    186.82      1.20      2.00     12.84    186.00        1.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .4429E+00 OUTFLOW= .4414E+00 BASIN STORAGE= .3229E-04 PERCENT ERROR=    .3

          FOR STORM = 1  STORM AREA (SQ MI) =        .01
                Q  MANE          .35      6.82    184.66      1.20      2.00      6.64    184.00        1.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .2054E+00 OUTFLOW= .2051E+00 BASIN STORAGE= .8253E-05 PERCENT ERROR=    .1

          FOR STORM = 1  STORM AREA (SQ MI) =        .01
                R  MANE         2.00    224.79    190.71      1.20      2.00    220.38    192.00        1.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .9628E+01 OUTFLOW= .9574E+01 BASIN STORAGE= .1305E-02 PERCENT ERROR=    .5


*** NORMAL END OF HEC-1 ***
```

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*             JUN   1998               *
*           VERSION 4.1                *
*                                      *
*  RUN DATE   31OCT06  TIME  11:12:07  *
*                                      *
****************************************
```

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

```
X     X  XXXXXXX   XXXXX          X
X     X  X       X     X        XX
X     X  X       X              X
XXXXXXX  XXXX    X        XXXXX  X
X     X  X       X              X
X     X  X       X     X        X
X     X  XXXXXXX   XXXXX        XXX
```

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

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

```
1                                    HEC-1 INPUT                                    PAGE  1

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

        1           ID        HEC-1 MODEL FOR SERENO CANYON
        2           ID        100-YEAR, 6-HOUR STORM
        3           ID        RAINFALL FROM NOAA ATLAS
        4           ID        SCS CURVE NUMBER SOIL LOSS PARAMETERS
        5           ID        KINEMATIC WAVE HYDROGRAPH ROUTING
        6           ID        EXISTING CONDITIONS
        7           ID
        8           ID        PREPARED BY WOOD/PATEL, 8.4.2004
        9           ID        FILE NAME:  EX-100.DAT
       10           ID
                    *DIAGRAM
       11           IT       2                    900
       12           IO       5
       13           JD             .01
       14           PH                    .73    1.43    2.42    2.74    2.96    3.37

       15           KK      A1
       16           KM       RUNOFF FROM SUB-BASIN A1
       17           BA    .084
       18           LS             88
       19           UK     260    .025    0.13     100
       20           RK    3520    .023    .032            TRAP      12       5
       21           KO                                      22

       22           KK      A2
       23           KM  RUNOFF FROM SUB-BASIN A2
       24           BA    .036
       25           LS             88
       26           UK     235    .025    0.13     100
       27           RK    2000     .02    .032            TRAP       8       5
       28           KO                                      22

       29           KK      B1
       30           KM  RUNOFF FROM SUB-BASIN B1
       31           BA    .027
       32           LS             88
       33           UK     200    .025    0.13     100
       34           RK    2500    .028    .032            TRAP       8       5
       35           KO                                      22

       36           KK      B2
       37           KM  RUNOFF FROM SUB-BASIN B2
       38           BA    .050
       39           LS             88
       40           UK     400    .025    0.13     100
       41           RK    2340    .024    .032            TRAP       8       5

       42           KK   COMBB
       43           KM  COMBINE SECTIONS B1 AND B2
       44           HC       2
       45           KO                                      22
1                                    HEC-1 INPUT                                    PAGE  2

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

       46           KK       C
       47           KM  RUNOFF FROM SUB-BASIN C
       48           BA     .03
       49           LS             88
       50           UK     250    .023    0.13     100
       51           RK    1570    .017    .032            TRAP       5       5
       52           KO                                      22

       53           KK       D
       54           KM  RUNOFF FROM SUB-BASIN D
       55           BA    .034
       56           LS             88
```

```
 57          UK     300     .02    0.13     100
 58          RK    1425    .014    .032            TRAP       6       5
 59          KO                                      22

 60          KK      E1
 61          KM  RUNOFF FROM SUB-BASIN E1
 62          BA    .061
 63          LS              88
 64          UK     400     .02    0.13     100
 65          RK    2050    .013    .032            TRAP       7       5
 66          KO                                      22

 67          KK      E2
 68          KM  RUNOFF FROM SUB-BASIN E2
 69          BA    .046
 70          LS              88
 71          UK     200     .02    0.13     100
 72          RK    2370    .013    .032            TRAP      10       5
 73          KO                                      22

 74          KK   COMBE
 75          KM  COMBINE SECTIONS E1 AND E2
 76          HC       2
 77          KO                                      22

 78          KK   CLEAR
 79          KM  CLEAR HYDROGRAPH STACK
 80          HC       6
             *

 81          KK      E3
 82          KM  RUNOFF FROM SUB-BASIN E3
 83          BA    .008
 84          LS              88
 85          UK     175    .025    0.13     100
 86          RK     750    .032    .032            TRAP       6       5
 87          KO                                      22
1                                        HEC-1 INPUT                                                    PAGE  3

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

 88          KK      F1
 89          KM  RUNOFF FROM SUB-BASIN F1
 90          BA    .036
 91          LS              88
 92          UK     225    .018    0.13     100
 93          RK    2500    .012    .032            TRAP       7       5
 94          KO                                      22

 95          KK      F2
 96          KM  RUNOFF FROM SUB-BASIN F2
 97          BA    .014
 98          LS              88
 99          UK     200    .018    0.13     100
100          RK    1440    .028    .032            TRAP       6       5
101          KO                                      22

102          KK      F3
103          KM  RUNOFF FROM SUB-BASIN F3
104          BA    .013
105          LS              88
106          UK     225    .018    0.13     100
107          RK     850    .026    .032            TRAP       6       5
108          KO                                      22

109          KK       G
110          KM  RUNOFF FROM SUB-BASIN G
111          BA   0.016
112          LS              88
113          UK     400    .025    0.13     100
114          RK     720    .022    .032            TRAP       4       5
115          KO                                      22

116          KK      H1
117          KM  RUNOFF FROM SUB-BASIN H1
118          BA    .059
119          LS              88
120          UK     375    .025    0.13     100
121          RK    2210    .019    .032            TRAP       8       5
122          KO                                      22

123          KK      H2
124          KM  RUNOFF FROM SUB-BASIN H2
125          BA    .072
126          LS              88
127          UK     400    .025    0.13     100
128          RK    3480    .019    .032            TRAP      12       5
129          KO                                      22

130          KK       I
131          KM  RUNOFF FROM SUB-BASIN I
132          BA    .025
133          LS              88
134          UK     225     .02    0.13     100
135          RK    2100    .026    .032            TRAP      10       5
1                                        HEC-1 INPUT                                                    PAGE  4

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

136          KO                                      22

137          KK   CLEAR
138          KM  CLEAR HYDROGRAPH STACK
139          HC       8
```

```
140          KK        J
141          KM  RUNOFF FROM SUB-BASIN J
142          BA     .024
143          LS                88       0
144          UK      145      .02    0.13     100
145          RK      965     .026    .032            TRAP       5       5
146          KO                                        22

147          KK        K
148          KM  RUNOFF FROM SUB-BASIN K
149          BA     .009
150          LS                88       0
151          UK       81     .025    0.13     100
152          RK      715     .022    .032            TRAP       5       5
153          KO                                        22

154          KK        L
155          KM  RUNOFF FROM SUB-BASIN L
156          BA     .009
157          LS                88       0
158          UK      113     .018    0.13     100
159          RK      450     .012    .032            TRAP       5       5
160          KO                                        22

161          KK        M
162          KM  RUNOFF FROM SUB-BASIN M
163          BA     .008
164          LS                88       0
165          UK      137     .018    0.13     100
166          RK      750     .012    .032            TRAP       4       5
167          KO                                        22

168          KK        N
169          KM  RUNOFF FROM SUB-BASIN N
170          BA      .01
171          LS                88       0
172          UK      117     .018    0.13     100
173          RK     1036     .012    .032            TRAP       5       5
174          KO                                        22

175          KK        O
176          KM  RUNOFF FROM SUB-BASIN O
177          BA   .0029
178          LS                88       0
179          UK      108      .02    0.13     100
180          RK      174     .014    .032            TRAP       4       5
181          KO                                        22
```



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

182          KK        P
183          KM  RUNOFF FROM SUB-BASIN P
184          BA   .0069
185          LS                88       0
186          UK      135      .02    0.13     100
187          RK      354     .014    .032            TRAP       5       5
188          KO                                        22

189          KK    CLEAR
190          KM  CLEAR HYDROGRAPH STACK
191          HC        8

192          KK        Q
193          KM  RUNOFF FROM SUB-BASIN Q
194          BA   .0032
195          LS                88       0
196          UK       86      .02    0.13     100
197          RK      160     .014    .032            TRAP       4       5
198          KO                                        22

199          KK        R
200          KM  RUNOFF FROM SUB-BASIN R
201          BA      .15
202          LS                88
203          UK      180     .025    0.13     100
204          RK     4300     .023    .032            TRAP      15       5
205          KO                                        22
206          ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

   15          A1
               .
               .
   22          .          A2
               .           .
               .           .
   29          .           .          B1
               .           .           .
               .           .           .
   36          .           .           .          B2
               .           .           .           .
               .           .           .           .
   42          .           .       COMBB...........
               .           .           .
               .           .           .
   46          .           .           .           C
               .           .           .           .
               .           .           .           .
   53          .           .           .           .          D
```

```
                NDDATE        2    0  ENDING DATE
                NDTIME          0558  ENDING TIME
                ICENT             19  CENTURY MARK

              COMPUTATION INTERVAL      .03 HOURS
                  TOTAL TIME BASE    29.97 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

 13 JD        INDEX STORM NO. 1
                    STRM        3.37  PRECIPITATION DEPTH
                    TRDA         .01  TRANSPOSITION DRAINAGE AREA

 14 PI          PRECIPITATION PATTERN
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .01       .01       .01       .01       .01       .01       .01       .01
                   .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                   .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                   .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                   .01       .01       .01       .01       .01       .03       .03       .03       .03       .03
                   .04       .04       .04       .06       .06       .07       .09       .12       .17       .29
                   .29       .24       .15       .11       .07       .07       .06       .05       .04       .04
                   .04       .03       .03       .03       .03       .01       .01       .01       .01       .01
                   .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                   .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                   .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                   .01       .01       .01       .01       .01       .01       .01       .01       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00

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

            **************
            *            *
 15 KK      *        A1  *
            *            *
            **************

 21 KO          OUTPUT CONTROL VARIABLES
                     IPRNT           5  PRINT CONTROL
                     IPLOT           0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE
                     IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                      IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                     ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                     ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                    TIMINT        .033  TIME INTERVAL IN HOURS

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

            **************
            *            *
 22 KK      *        A2  *
            *            *
            **************

 28 KO          OUTPUT CONTROL VARIABLES
                     IPRNT           5  PRINT CONTROL
                     IPLOT           0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE
                     IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                      IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                     ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                     ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                    TIMINT        .033  TIME INTERVAL IN HOURS

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

            **************
            *            *
 29 KK      *        B1  *
            *            *
            **************

 35 KO          OUTPUT CONTROL VARIABLES
                     IPRNT           5  PRINT CONTROL
                     IPLOT           0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE
                     IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                      IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                     ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                     ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                    TIMINT        .033  TIME INTERVAL IN HOURS
```

```
*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

          **************
          *            *
 42 KK    *    COMBB   *
          *            *
          **************

 45 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE
                      IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                       IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT       .033  TIME INTERVAL IN HOURS


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

          **************
          *            *
 46 KK    *        C   *
          *            *
          **************

 52 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE
                      IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                       IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT       .033  TIME INTERVAL IN HOURS


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

          **************
          *            *
 53 KK    *        D   *
          *            *
          **************

 59 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE
                      IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                       IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT       .033  TIME INTERVAL IN HOURS


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

          **************
          *            *
 60 KK    *       E1   *
          *            *
          **************

 66 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE
                      IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                       IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT       .033  TIME INTERVAL IN HOURS


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

          **************
          *            *
 67 KK    *       E2   *
          *            *
          **************

 73 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE
                      IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                       IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
```

```
                ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
               TIMINT       .033  TIME INTERVAL IN HOURS


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

          **************
          *            *
   74 KK  *     COMBE  *
          *            *
          **************

   77 KO        OUTPUT CONTROL VARIABLES
                     IPRNT           5  PRINT CONTROL
                     IPLOT           0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE
                     IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                      IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                     ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                     ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                    TIMINT        .033  TIME INTERVAL IN HOURS


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

          **************
          *            *
   81 KK  *        E3  *
          *            *
          **************

   87 KO        OUTPUT CONTROL VARIABLES
                     IPRNT           5  PRINT CONTROL
                     IPLOT           0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE
                     IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                      IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                     ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                     ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                    TIMINT        .033  TIME INTERVAL IN HOURS


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

          **************
          *            *
   88 KK  *        F1  *
          *            *
          **************

   94 KO        OUTPUT CONTROL VARIABLES
                     IPRNT           5  PRINT CONTROL
                     IPLOT           0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE
                     IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                      IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                     ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                     ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                    TIMINT        .033  TIME INTERVAL IN HOURS


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

          **************
          *            *
   95 KK  *        F2  *
          *            *
          **************

  101 KO        OUTPUT CONTROL VARIABLES
                     IPRNT           5  PRINT CONTROL
                     IPLOT           0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE
                     IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                      IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                     ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                     ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                    TIMINT        .033  TIME INTERVAL IN HOURS


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

          **************
          *            *
  102 KK  *        F3  *
          *            *
          **************

  108 KO        OUTPUT CONTROL VARIABLES
                     IPRNT           5  PRINT CONTROL
                     IPLOT           0  PLOT CONTROL
```

```
                    QSCAL           0.  HYDROGRAPH PLOT SCALE
                    IPNCH            0  PUNCH COMPUTED HYDROGRAPH
                     IOUT           22  SAVE HYDROGRAPH ON THIS UNIT
                    ISAV1            1  FIRST ORDINATE PUNCHED OR SAVED
                    ISAV2          900  LAST ORDINATE PUNCHED OR SAVED
                   TIMINT         .033  TIME INTERVAL IN HOURS


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

              **************
              *            *
109 KK        *        G   *
              *            *
              **************

115 KO             OUTPUT CONTROL VARIABLES
                    IPRNT            5  PRINT CONTROL
                    IPLOT            0  PLOT CONTROL
                    QSCAL           0.  HYDROGRAPH PLOT SCALE
                    IPNCH            0  PUNCH COMPUTED HYDROGRAPH
                     IOUT           22  SAVE HYDROGRAPH ON THIS UNIT
                    ISAV1            1  FIRST ORDINATE PUNCHED OR SAVED
                    ISAV2          900  LAST ORDINATE PUNCHED OR SAVED
                   TIMINT         .033  TIME INTERVAL IN HOURS


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

              **************
              *            *
116 KK        *       H1   *
              *            *
              **************

122 KO             OUTPUT CONTROL VARIABLES
                    IPRNT            5  PRINT CONTROL
                    IPLOT            0  PLOT CONTROL
                    QSCAL           0.  HYDROGRAPH PLOT SCALE
                    IPNCH            0  PUNCH COMPUTED HYDROGRAPH
                     IOUT           22  SAVE HYDROGRAPH ON THIS UNIT
                    ISAV1            1  FIRST ORDINATE PUNCHED OR SAVED
                    ISAV2          900  LAST ORDINATE PUNCHED OR SAVED
                   TIMINT         .033  TIME INTERVAL IN HOURS


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

              **************
              *            *
123 KK        *       H2   *
              *            *
              **************

129 KO             OUTPUT CONTROL VARIABLES
                    IPRNT            5  PRINT CONTROL
                    IPLOT            0  PLOT CONTROL
                    QSCAL           0.  HYDROGRAPH PLOT SCALE
                    IPNCH            0  PUNCH COMPUTED HYDROGRAPH
                     IOUT           22  SAVE HYDROGRAPH ON THIS UNIT
                    ISAV1            1  FIRST ORDINATE PUNCHED OR SAVED
                    ISAV2          900  LAST ORDINATE PUNCHED OR SAVED
                   TIMINT         .033  TIME INTERVAL IN HOURS


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

              **************
              *            *
130 KK        *        I   *
              *            *
              **************

136 KO             OUTPUT CONTROL VARIABLES
                    IPRNT            5  PRINT CONTROL
                    IPLOT            0  PLOT CONTROL
                    QSCAL           0.  HYDROGRAPH PLOT SCALE
                    IPNCH            0  PUNCH COMPUTED HYDROGRAPH
                     IOUT           22  SAVE HYDROGRAPH ON THIS UNIT
                    ISAV1            1  FIRST ORDINATE PUNCHED OR SAVED
                    ISAV2          900  LAST ORDINATE PUNCHED OR SAVED
                   TIMINT         .033  TIME INTERVAL IN HOURS


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

              **************
              *            *
140 KK        *        J   *
              *            *
              **************
```

```
146 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS


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

            **************
            *            *
147 KK      *          K *
            *            *
            **************

153 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS


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

            **************
            *            *
154 KK      *          L *
            *            *
            **************

160 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS


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

            **************
            *            *
161 KK      *          M *
            *            *
            **************

167 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS


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

            **************
            *            *
168 KK      *          N *
            *            *
            **************

174 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS


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

            **************
```

```
+                          C      89.   3.13      7.      2.      1.     .03
        HYDROGRAPH AT
+                          D      93.   3.17      8.      2.      2.     .03
        HYDROGRAPH AT
+                          E1    146.   3.20     14.      4.      3.     .06
        HYDROGRAPH AT
+                          E2    131.   3.13     11.      3.      2.     .05
        2 COMBINED AT
+                       COMBE    275.   3.17     25.      6.      5.     .11
        6 COMBINED AT
+                       CLEAR    994.   3.17     84.     21.     17.     .37
        HYDROGRAPH AT
+                          E3     28.   3.10      2.      0.      0.     .01
        HYDROGRAPH AT
+                          F1     99.   3.17      8.      2.      2.     .04
        HYDROGRAPH AT
+                          F2     43.   3.13      3.      1.      1.     .01
        HYDROGRAPH AT
+                          F3     39.   3.13      3.      1.      1.     .01
        HYDROGRAPH AT
+                           G     41.   3.17      4.      1.      1.     .02
        HYDROGRAPH AT
+                          H1    152.   3.17     14.      3.      3.     .06
        HYDROGRAPH AT
+                          H2    172.   3.20     16.      4.      3.     .07
        HYDROGRAPH AT
+                           I     73.   3.13      6.      1.      1.     .03
        8 COMBINED AT
+                       CLEAR    619.   3.17     56.     14.     11.     .24
        HYDROGRAPH AT
+                           J     83.   3.10      6.      1.      1.     .02
        HYDROGRAPH AT
+                           K     35.   3.07      2.      1.      0.     .01
        HYDROGRAPH AT
+                           L     32.   3.10      2.      1.      0.     .01
        HYDROGRAPH AT
+                           M     28.   3.10      2.      0.      0.     .01
        HYDROGRAPH AT
+                           N     35.   3.10      2.      1.      0.     .01
        HYDROGRAPH AT
+                           O     11.   3.07      1.      0.      0.     .00
        HYDROGRAPH AT
+                           P     24.   3.07      2.      0.      0.     .01
        8 COMBINED AT
+                       CLEAR    801.   3.13     72.     18.     14.     .31
        HYDROGRAPH AT
+                           Q     13.   3.07      1.      0.      0.     .00
        HYDROGRAPH AT
+                           R    444.   3.13     34.      9.      7.     .15
1
                    SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
                        (FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)
                                                          INTERPOLATED TO
                                                        COMPUTATION INTERVAL
      ISTAQ    ELEMENT      DT       PEAK    TIME TO     VOLUME      DT      PEAK    TIME TO     VOLUME
                                             PEAK                                            PEAK
                          (MIN)     (CFS)    (MIN)      (IN)     (MIN)    (CFS)    (MIN)       (IN)
      FOR STORM = 1  STORM AREA (SQ MI) =       .01
            A1  MANE        1.93    236.19   188.91      2.14      2.00   234.69   190.00       2.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .9633E+01 OUTFLOW= .9599E+01 BASIN STORAGE= .1058E-02 PERCENT ERROR=    .3

      FOR STORM = 1  STORM AREA (SQ MI) =       .01
            A2  MANE        1.40    109.51   187.98      2.15      2.00   109.47   188.00       2.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .4129E+01 OUTFLOW= .4119E+01 BASIN STORAGE= .3972E-03 PERCENT ERROR=    .2

      FOR STORM = 1  STORM AREA (SQ MI) =       .01
            B1  MANE        1.65     83.67   187.47      2.15      2.00    83.24   188.00       2.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .3096E+01 OUTFLOW= .3090E+01 BASIN STORAGE= .2639E-03 PERCENT ERROR=    .2

      FOR STORM = 1  STORM AREA (SQ MI) =       .01
            B2  MANE        1.47    126.47   191.43      2.14      2.00   125.94   190.00       2.14
```

```
CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .5734E+01 OUTFLOW= .5714E+01 BASIN STORAGE= .1075E-02 PERCENT ERROR=    .3

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
              C  MANE          1.21     89.27    188.60      2.14      2.00     89.14    188.00        2.15

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .3440E+01 OUTFLOW= .3431E+01 BASIN STORAGE= .3398E-03 PERCENT ERROR=    .3

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
              D  MANE          1.09     93.69    189.80      2.14      2.00     93.00    190.00        2.15

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .3899E+01 OUTFLOW= .3887E+01 BASIN STORAGE= .5549E-03 PERCENT ERROR=    .3

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
             E1  MANE          1.50    146.93    191.32      2.14      2.00    145.90    192.00        2.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .6996E+01 OUTFLOW= .6964E+01 BASIN STORAGE= .1588E-02 PERCENT ERROR=    .4

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
             E2  MANE          1.80    135.47    188.91      2.14      2.00    131.38    188.00        2.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .5275E+01 OUTFLOW= .5261E+01 BASIN STORAGE= .4665E-03 PERCENT ERROR=    .3

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
             E3  MANE           .59     27.61    185.93      2.15      2.00     27.58    186.00        2.15

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .9174E+00 OUTFLOW= .9163E+00 BASIN STORAGE= .5292E-04 PERCENT ERROR=    .1

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
             F1  MANE          2.00     99.30    190.12      2.14      2.00     98.91    190.00        2.15

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .4129E+01 OUTFLOW= .4114E+01 BASIN STORAGE= .4961E-03 PERCENT ERROR=    .3

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
             F2  MANE          1.05     42.99    186.95      2.15      2.00     42.74    188.00        2.15

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1606E+01 OUTFLOW= .1603E+01 BASIN STORAGE= .1464E-03 PERCENT ERROR=    .2

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
             F3  MANE           .79     39.63    187.38      2.15      2.00     39.33    188.00        2.15

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1491E+01 OUTFLOW= .1487E+01 BASIN STORAGE= .1603E-03 PERCENT ERROR=    .2

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
              G  MANE           .64     41.98    189.23      2.14      2.00     41.19    190.00        2.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1835E+01 OUTFLOW= .1829E+01 BASIN STORAGE= .3183E-03 PERCENT ERROR=    .3

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
             H1  MANE          1.38    152.54    190.65      2.14      2.00    152.20    190.00        2.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .6766E+01 OUTFLOW= .6742E+01 BASIN STORAGE= .1371E-02 PERCENT ERROR=    .3

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
             H2  MANE          2.00    172.46    193.00      2.14      2.00    171.53    192.00        2.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .8257E+01 OUTFLOW= .8222E+01 BASIN STORAGE= .1669E-02 PERCENT ERROR=    .4

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
              I  MANE          1.43     73.88    189.00      2.14      2.00     72.74    188.00        2.15

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .2867E+01 OUTFLOW= .2860E+01 BASIN STORAGE= .3037E-03 PERCENT ERROR=    .2

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
              J  MANE           .72     84.27    185.42      2.15      2.00     83.48    186.00        2.15

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .2752E+01 OUTFLOW= .2749E+01 BASIN STORAGE= .1338E-03 PERCENT ERROR=    .1

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
              K  MANE           .72     35.23    184.51      2.15      2.00     35.04    184.00        2.15

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1032E+01 OUTFLOW= .1032E+01 BASIN STORAGE= .1840E-04 PERCENT ERROR=    .0

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
              L  MANE           .48     33.06    185.01      2.15      2.00     31.77    186.00        2.15
```

```
CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1032E+01 OUTFLOW= .1031E+01 BASIN STORAGE= .3573E-04 PERCENT ERROR=    .2

          FOR STORM = 1  STORM AREA (SQ MI) =        .01
                M  MANE          .83     27.65    185.81      2.15      2.00     27.57    186.00        2.15

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .9174E+00 OUTFLOW= .9164E+00 BASIN STORAGE= .4951E-04 PERCENT ERROR=    .1

          FOR STORM = 1  STORM AREA (SQ MI) =        .01
                N  MANE         1.23     35.08    186.42      2.15      2.00     34.66    186.00        2.15

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1147E+01 OUTFLOW= .1146E+01 BASIN STORAGE= .4527E-04 PERCENT ERROR=    .1

          FOR STORM = 1  STORM AREA (SQ MI) =        .01
                O  MANE          .37     10.92    184.32      2.15      2.00     10.86    184.00        2.15

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .3326E+00 OUTFLOW= .3323E+00 BASIN STORAGE= .1057E-04 PERCENT ERROR=    .1

          FOR STORM = 1  STORM AREA (SQ MI) =        .01
                P  MANE          .42     24.72    185.07      2.15      2.00     24.05    184.00        2.15

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .7913E+00 OUTFLOW= .7899E+00 BASIN STORAGE= .3787E-04 PERCENT ERROR=    .2

          FOR STORM = 1  STORM AREA (SQ MI) =        .01
                Q  MANE          .28     12.54    183.97      2.15      2.00     12.53    184.00        2.15

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .3670E+00 OUTFLOW= .3666E+00 BASIN STORAGE= .8886E-05 PERCENT ERROR=    .1

          FOR STORM = 1  STORM AREA (SQ MI) =        .01
                R  MANE         1.93    455.07    188.88      2.14      2.00    443.55    188.00        2.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1720E+02 OUTFLOW= .1715E+02 BASIN STORAGE= .1227E-02 PERCENT ERROR=    .3


*** NORMAL END OF HEC-1 ***
```

APPENDIX C

Proposed Condition Hydrologic Calculations

- 2-year HEC-1 Model
- 10-year HEC-1 Model
- 100-year HEC-1 Model

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*             JUN   1998               *
*           VERSION 4.1                *
*                                      *
*  RUN DATE   14NOV06  TIME  17:51:49  *
*                                      *
****************************************
```

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

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X    X         XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
X     X  X        X    X         X
X     X  XXXXXXX   XXXXX         XXX
```

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

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

```
1                                          HEC-1 INPUT                                                    PAGE  1

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

    1           ID        HEC-1 MODEL FOR SERENO CANYON
    2           ID        2-YEAR, 6-HOUR STORM
    3           ID        RAINFALL FROM NOAA ATLAS
    4           ID        SCS CURVE NUMBER SOIL LOSS PARAMETERS
    5           ID        KINEMATIC WAVE HYDROGRAPH ROUTING
    6           ID        DEVELOPED CONDITIONS
    7           ID        10% IMPERVIOUS AREA USED FOR SITE
    8           ID
    9           ID        PREPARED BY WOOD/PATEL, 1.10.2005
   10           ID        FILE NAME:  DEV-2.DAT
   11           ID
                *DIAGRAM
   12           IT       2                    900
   13           IO       5
   14           JD             .01
   15           PH                   0.38     0.7    1.12    1.27    1.38    1.57

   16           KK      A1
   17           KM       RUNOFF FROM SUB-BASIN A1
   18           BA   0.084
   19           LS              88     1.1
   20           UK     260    .025    0.13     100
   21           RK    3520    .023    .032            TRAP      12       5
                *

   22           KK   BASA1
   23           KM  29' WIER  AT HEADWALL
   24           RS       1    STOR       0
   25           SV       0   0.108   0.242   0.404     0.6   0.841   1.081
   26           SE    2756    2757    2758    2759    2760    2761    2762
   27           SQ       0       0       0       0       0      81     230
   28           KO                                      22

   29           KK      A2
   30           KM  RUNOFF FROM SUB-BASIN A2
   31           BA    .036
   32           LS              88     7.4
   33           UK     235    .025    0.13     100
   34           RK    2000     .02    .032            TRAP       8       5

   35           KK  BAS A2      -3
   36           KM  14' WEIR AT OUTLET
   37           RS       1    STOR       0
   38           SV       0   0.059   0.135   0.228    0.34   0.474   0.608   0.742
   39           SE    2733    2734    2735    2736    2737    2738    2739    2740
   40           SQ       0       0       0       0       0       0      39     111
   41           KO                                      22
                *

   42           KK      B1
   43           KM  RUNOFF FROM SUB-BASIN B1
   44           BA    .027
   45           LS              88     3.7
   46           UK     200    .025    0.13     100
   47           RK    2500    .028    .032            TRAP       8       5
1                                          HEC-1 INPUT                                                    PAGE  2

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

   48           KK  BASB-3
   49           KM  11' WEIR AT HEADWALL
   50           RS       1    STOR       0
   51           SV       0    .089     0.2    .338    0.49   0.643
   52           SE    2781    2782    2783    2784    2785    2786
   53           SQ       0       0       0       0      31      87
   54           KO                                      22
                *
```

```
 55          KK      B2
 56          KM  RUNOFF FROM SUB-BASIN B2
 57          BA    .050
 58          LS              88     6.7
 59          UK     400    .025    0.13     100
 60          RK    2340    .024    .032            TRAP       8       5
             *

 61          KK   COMBB
 62          KM  COMBINE SECTIONS B1 AND B2
 63          HC       2
             *

 64          KK  BASB-5
 65          KM  25' WEIR
 66          RS       1    STOR       0
 67          SV       0   0.146   0.333   0.565   0.843   1.121
 68          SE    2742    2743    2744    2745    2746    2747
 69          SQ       0       0       0       0      70     198
 70          KO                                      22
             *

 71          KK       C
 72          KM  RUNOFF FROM SUB-BASIN C
 73          BA     .03
 74          LS              88     5.9
 75          UK     250    .023    0.13     100
 76          RK    1570    .017    .032            TRAP       5       5
             *

 77          KK  BASC-1
 78          KM  11' WEIR
 79          RS       1    STOR       0
 80          SV       0    .107    .236    .388   0.566   0.745
 81          SE    2779    2780    2781    2782    2783    2784
 82          SQ       0       0       0       0      31      87
 83          KO                                      22
             *

 84          KK       D
 85          KM  RUNOFF FROM SUB-BASIN D
 86          BA    .034
 87          LS              88      10
 88          UK     300     .02    0.13     100
 89          RK    1425    .014    .032            TRAP       6       5
             *
```



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

 90          KK  BASD-2
 91          KM  11' WEIR AT HEAD WALL
 92          RS       1    STOR       0
 93          SV       0   0.039    0.13    0.29   0.541   0.898
 94          SE    2719    2720    2721    2722    2723    2724
 95          SQ       0       0       0       0      31      87
 96          KO                                      22
             *

 97          KK      E1
 98          KM  RUNOFF FROM SUB-BASIN E1
 99          BA    .061
100          LS              88      10
101          UK     400     .02    0.13     100
102          RK    2050    .013    .032            TRAP       7       5

103          KK  BASE1-       2
104          KM  19' WEIR AT HEAD WALL
105          RS       1    STOR       0
106          SV       0   0.147   0.334    0.56   0.826   1.135
107          SE    2695    2696    2697    2698    2699    2700
108          SQ       0       0       0       0      53     150
109          KO                                      22
             *

110          KK      E2
111          KM  RUNOFF FROM SUB-BASIN E2
112          BA    .046
113          LS              88      10
114          UK     200     .02    0.13     100
115          RK    2370    .013    .032            TRAP      10       5
             *

116          KK   BASE2
117          KM  FLOW ROUTED THROUGH DETENTION BASIN E2-1
118          KM  2-42" PIPE CULVERT
119          RS       1    STOR       0
120          SV       0   0.094   0.211   0.379   0.641   1.026   1.546   1.861    2.22
121          SE    2696    2697    2698    2699    2700    2701    2702  2702.5    2703
122          SQ       0       0       0       0       0       0       0       0     180
123          KO                                      22
             *

124          KK   COMBE
125          KM  COMBINE SECTIONS E1 AND E2
126          HC       2
127          KO                                      22
             *
```



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

128          KK   CLEAR
```

```
129          KM  CLEAR HYDROGRAPH STACK
130          HC       6
             *

131          KK      E3
132          KM  RUNOFF FROM SUB-BASIN E3
133          BA    .008
134          LS              88      10
135          UK     175    .025    0.13     100
136          RK     750    .032    .032            TRAP       6       5
             *

137          KK   BASE3      -1
138          KM  10' WEIR AT HEAD WALL
139          RS       1    STOR       0
140          SV       0    .082    .188    .322   0.456
141          SE    2711    2712    2713    2714    2715
142          SQ       0       0       0       0      28
143          KO                                      22
             *

144          KK      F1
145          KM  RUNOFF FROM SUB-BASIN F1
146          BA    .036
147          LS              88      10
148          UK     225    .018    0.13     100
149          RK    2500    .012    .032            TRAP       7       5
             *

150          KK   BASF1      -3
151          KM  12' WEIR AT HEAD WALL
152          RS       1    STOR       0
153          SV       0    0.21   0.443   0.701   0.958
154          SE    2696    2697    2698    2699    2700
155          SQ       0       0       0      34      95
156          KO                                      22
             *

157          KK      F2
158          KM  RUNOFF FROM SUB-BASIN F2
159          BA    .014
160          LS              88      10
161          UK     200    .018    0.13     100
162          RK    1440    .028    .032            TRAP       6       5
             *

163          KK   BASF2      -2
164          KM  16' WEIR AT HEAD WALL
165          RS       1    STOR       0
166          SV       0   0.112   0.243   0.396   0.549
167          SE    2701    2702    2703    2704    2705
168          SQ       0       0       0       0      45
169          KO                                      22
             *
```



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

170          KK      F3
171          KM  RUNOFF FROM SUB-BASIN F3
172          BA    .013
173          LS              88      10
174          UK     225    .018    0.13     100
175          RK     850    .026    .032            TRAP       6       5
             *

176          KK   BASF3      -1
177          KM  14' WEIR AT HEAD WALL
178          RS       1    STOR       0
179          SV       0   0.038   0.095   0.172   0.274
180          SE    2704    2705    2706    2707    2708
181          SQ       0       0       0       0      39
182          KO                                      22
             *

183          KK       G
184          KM  RUNOFF FROM SUB-BASIN G
185          BA   0.016
186          LS              88      10
187          UK     400    .025    0.13     100
188          RK     720    .022    .032            TRAP       4       5
             *

189          KK    BASG      -1
190          KM  15' WEIR
191          RS       1    STOR       0
192          SV       0   0.094   0.209   0.347   0.512    0.71
193          SE    2722    2723    2724    2725    2726    2727
194          SQ       0       0       0       0       0      42
195          KO                                      22
             *

196          KK      H1
197          KM  RUNOFF FROM SUB-BASIN H1
198          BA    .059
199          LS              88     9.4
200          UK     375    .025    0.13     100
201          RK    2210    .019    .032            TRAP       8       5

202          KK   BASH1      -1
203          KM  FLOW ROUTED THROUGH DETENTION BASIN H1-1
204          KM  2-36" PIPE CULVERT
205          RS       1    STOR       0
206          SV       0   0.009   0.046   0.132   0.284    0.51   0.822    1.24   1.497   1.809
207          SE    2738    2739    2740    2741    2742    2743    2744    2745  2745.5    2746
```

```
 208          SQ       0       0       0       0       0       0       0       0       0     170
 209          KO                                      22
              *
1                                          HEC-1 INPUT                                                PAGE  6

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

 210          KK      H2
 211          KM  RUNOFF FROM SUB-BASIN H2
 212          BA    .072
 213          LS              88    4.78
 214          UK     400    .025    0.13     100
 215          RK    3480    .019    .032            TRAP      12       5

 216          KK  BASH2-       1
 217          KM  22' WEIR AT HEADWALL
 218          RS       1    STOR       0
 219          SV       0    0.15   0.318   0.507   0.718   0.929
 220          SE       0    2772    2773    2774    2775    2776
 221          SQ       0       0       0       0      62     174

 222          KK  BASH2-       2
 223          KM  21' WEIR AT HEADWALL
 224          RS       1    STOR       0
 225          SV       0    .165    .361    .590    .820   1.049
 226          SE       0    2785    2786    2787    2788    2789
 227          SQ       0       0       0       0      59     166
 228          KO                                      22
              *

 229          KK       I
 230          KM  RUNOFF FROM SUB-BASIN I
 231          BA    .025
 232          LS              88     7.4
 233          UK     225     .02    0.13     100
 234          RK    2100    .026    .032            TRAP      10       5
              *

 235          KK    BASI
 236          KM  10' WEIR
 237          RS       1    STOR       0
 238          SV       0    .186    .399    .640   0.881   1.122
 239          SE    2755    2756    2757    2758    2759    2760
 240          SQ       0       0       0       0      28      79
 241          KO                                      22
              *

 242          KK   CLEAR
 243          KM  CLEAR HYDROGRAPH STACK
 244          HC       8
              *

 245          KK       J
 246          KM  RUNOFF FROM SUB-BASIN J
 247          BA    .024
 248          LS              88     7.9
 249          UK     145     .02    0.13     100
 250          RK     965    .026    .032            TRAP       5       5
              *
1                                          HEC-1 INPUT                                                PAGE  7

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

 251          KK    BASJ
 252          KM  11' WEIR
 253          RS       1    STOR       0
 254          SV       0    .098    .217    .359    .528   0.698
 255          SE    2769    2770    2771    2772    2773    2774
 256          SQ       0       0       0       0      31      87
 257          KO                                      22
              *

 258          KK       K
 259          KM  RUNOFF FROM SUB-BASIN K
 260          BA    .009
 261          LS              88      10
 262          UK      81    .025    0.13     100
 263          RK     715    .022    .032            TRAP       5       5
              *

 264          KK    BASK
 265          KM  13' WEIR
 266          RS       1    STOR       0
 267          SV       0    .106    .232    .378   0.525
 268          SE    2737    2738    2739    2740    2741
 269          SQ       0       0       0       0      36
 270          KO                                      22
              *

 271          KK       L
 272          KM  RUNOFF FROM SUB-BASIN L
 273          BA    .009
 274          LS              88      10
 275          UK     113    .018    0.13     100
 276          RK     450    .012    .032            TRAP       5       5
              *

 277          KK    BASL
 278          KM  13' WEIR
 279          RS       1    STOR       0
 280          SV       0   0.041   0.106     0.2   0.326
 281          SE    2722    2723    2724    2725    2726
 282          SQ       0       0       0       0      36
 283          KO                                      22
```

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                    *

 284                KK       M
 285                KM  RUNOFF FROM SUB-BASIN M
 286                BA    .008
 287                LS              88      10
 288                UK     137    .018    0.13     100
 289                RK     750    .012    .032            TRAP       4       5
                    *
1                                          HEC-1 INPUT                                                    PAGE  8

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

 290                KK    BASM
 291                KM  7' WEIR
 292                RS       1    STOR       0
 293                SV       0   0.056   0.124   0.205   0.301   0.413
 294                SE    2713    2714    2715    2716    2717    2718
 295                SQ       0       0       0       0      20      55
 296                KO                                      22
                    *

 297                KK       N
 298                KM  RUNOFF FROM SUB-BASIN N
 299                BA     .01
 300                LS              88      10
 301                UK     117    .018    0.13     100
 302                RK    1036    .012    .032            TRAP       5       5
                    *

 303                KK    BASN
 304                KM  13' WEIR
 305                RS       1    STOR       0
 306                SV       0   0.083   0.191   0.326    0.49   0.686
 307                SE    2688    2689    2690    2691    2692    2693
 308                SQ       0       0       0       0       0      36
 309                KO                                      22
                    *

 310                KK       O
 311                KM  RUNOFF FROM SUB-BASIN O
 312                KM  Area of Basin subtrating the area to be retained for 100 year event
 313                BA  0.0024       9
 314                LS              88      10
 315                UK     108     .02    0.13     100
 316                RK     174    .014    .032            TRAP       4       5
 317                KO                                      22

 318                KK       P
 319                KM  RUNOFF FROM SUB-BASIN P
 320                KM  Area of Basin subtrating the area to be retained for 100 year event
 321                BA   .0058
 322                LS              88      10
 323                UK     135     .02    0.13     100
 324                RK     354    .014    .032            TRAP       5       5
 325                KO                                      22

 326                KK   CLEAR
 327                KM  CLEAR HYDROGRAPH STACK
 328                HC       8

 329                KK       Q
 330                KM  RUNOFF FROM SUB-BASIN Q
 331                KM  Area of Basin subtrating the area to be retained for 100 year event
 332                BA   .0024
 333                LS              88      10
 334                UK      86     .02    0.13     100
1                                          HEC-1 INPUT                                                    PAGE  9

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

 335                RK     160    .014    .032            TRAP       4       5
 336                KO                                      22

 337                KK       R
 338                KM  RUNOFF FROM SUB-BASIN R
 339                KM  Area of Basin subtrating the area to be retained for 100 year event
 340                BA    .14       8
 341                LS              88     .14
 342                UK     180    .025    0.13     100
 343                RK    4300    .023    .032            TRAP      15       5
 344                KO                                      22
 345                ZZ
1
          SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

   16          A1
                V
                V
   22        BASA1
                .
                .
   29           .          A2
                .           V
                .           V
   35           .       BAS A2
                .           .
                .           .
   42           .           .          B1
                .           .           V
                .           .           V
```

```
48                  BASB-3
55                          B2
61                  COMBB............
                       V
                       V
64                  BASB-5
71                          C
                            V
                            V
77                      BASC-1
84                                  D
                                    V
                                    V
90                              BASD-2
97                                          E1
                                             V
                                             V
103                                     BASE1-
110                                                     E2
                                                         V
                                                         V
116                                                  BASE2
124                                     COMBE............
128 CLEAR...........................................
131             E3
                 V
                 V
137         BASE3
144                 F1
                     V
                     V
150             BASF1
157                         F2
                             V
                             V
163                     BASF2
170                                 F3
                                     V
                                     V
176                             BASF3
183                                         G
                                             V
                                             V
189                                     BASG
196                                                     H1
                                                         V
                                                         V
202                                                  BASH1
210                                                                 H2
                                                                     V
                                                                     V
216                                                             BASH2-
                                                                     V
                                                                     V
222                                                             BASH2-
229                                                                         I
                                                                            V
                                                                            V
235                                                                     BASI
242         CLEAR...............................................................
245                 J
                     V
                     V
251             BASJ
258                         K
                             V
                             V
264                     BASK
```

```
                                                                  DEV-2.OH1
                 .         .         .         .
  271            .         .         .         .         L
                 .         .         .         .         V
  277            .         .         .         .         V
                 .         .         .         .       BASL
  284            .         .         .         .         .
                 .         .         .         .         .         M
                 .         .         .         .         .         V
  290            .         .         .         .         .         V
                 .         .         .         .         .       BASM
  297            .         .         .         .         .         .         N
                 .         .         .         .         .         .         V
  303            .         .         .         .         .         .         V
                 .         .         .         .         .         .       BASN
  310            .         .         .         .         .         .         .         O
                 .         .         .         .         .         .         .         .
  318            .         .         .         .         .         .         .         .         P
                 .         .         .         .         .         .         .         .         .
  326            .       CLEAR.......................................................................
                 .         .
  329            .         .         Q
                 .         .         .
  337            .         .         .         R
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*             JUN   1998               *
*           VERSION 4.1                *
*                                      *
*  RUN DATE   14NOV06  TIME  17:51:49  *
*                                      *
****************************************
```

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

```
                    HEC-1 MODEL FOR SERENO CANYON
                    2-YEAR, 6-HOUR STORM
                    RAINFALL FROM NOAA ATLAS
                    SCS CURVE NUMBER SOIL LOSS PARAMETERS
                    KINEMATIC WAVE HYDROGRAPH ROUTING
                    DEVELOPED CONDITIONS
                    10% IMPERVIOUS AREA USED FOR SITE

                    PREPARED BY WOOD/PATEL, 1.10.2005
                    FILE NAME:  DEV-2.DAT

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

    IT        HYDROGRAPH TIME DATA
                     NMIN          2  MINUTES IN COMPUTATION INTERVAL
                    IDATE      1   0  STARTING DATE
                    ITIME       0000  STARTING TIME
                       NQ        900  NUMBER OF HYDROGRAPH ORDINATES
                   NDDATE      2   0  ENDING DATE
                   NDTIME       0558  ENDING TIME
                    ICENT         19  CENTURY MARK

              COMPUTATION INTERVAL     .03 HOURS
                   TOTAL TIME BASE   29.97 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

 14 JD        INDEX STORM NO. 1
                    STRM        1.57  PRECIPITATION DEPTH
                    TRDA         .01  TRANSPOSITION DRAINAGE AREA

 15 PI          PRECIPITATION PATTERN
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .01
                     .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                     .02       .02       .02       .02       .03       .03       .04       .06       .08       .15
                     .15       .12       .07       .05       .03       .03       .03       .02       .02       .02
                     .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                     .01       .01       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
```

```
                .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00

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

          **************
          *            *
 22 KK    *    BASA1   *
          *            *
          **************

 28 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS

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

          **************
          *            *
 35 KK    *    BAS A2  *          -3
          *            *
          **************

 41 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS

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

          **************
          *            *
 48 KK    *    BASB-3  *
          *            *
          **************

 54 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS

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

          **************
          *            *
 64 KK    *    BASB-5  *
          *            *
          **************

 70 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS

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

          **************
          *            *
 77 KK    *    BASC-1  *
          *            *
          **************

 83 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
```

```
                IPLOT          0  PLOT CONTROL
                QSCAL         0.  HYDROGRAPH PLOT SCALE
                IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                 IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
               TIMINT       .033  TIME INTERVAL IN HOURS


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

          **************
          *            *
 90 KK    *    BASD-2  *
          *            *
          **************

 96 KO          OUTPUT CONTROL VARIABLES
                IPRNT          5  PRINT CONTROL
                IPLOT          0  PLOT CONTROL
                QSCAL         0.  HYDROGRAPH PLOT SCALE
                IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                 IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
               TIMINT       .033  TIME INTERVAL IN HOURS


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

          **************
          *            *
103 KK    *    BASE1-  *          2
          *            *
          **************

109 KO          OUTPUT CONTROL VARIABLES
                IPRNT          5  PRINT CONTROL
                IPLOT          0  PLOT CONTROL
                QSCAL         0.  HYDROGRAPH PLOT SCALE
                IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                 IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
               TIMINT       .033  TIME INTERVAL IN HOURS


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

          **************
          *            *
116 KK    *     BASE2  *
          *            *
          **************

123 KO          OUTPUT CONTROL VARIABLES
                IPRNT          5  PRINT CONTROL
                IPLOT          0  PLOT CONTROL
                QSCAL         0.  HYDROGRAPH PLOT SCALE
                IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                 IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
               TIMINT       .033  TIME INTERVAL IN HOURS


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

          **************
          *            *
124 KK    *     COMBE  *
          *            *
          **************

127 KO          OUTPUT CONTROL VARIABLES
                IPRNT          5  PRINT CONTROL
                IPLOT          0  PLOT CONTROL
                QSCAL         0.  HYDROGRAPH PLOT SCALE
                IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                 IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
               TIMINT       .033  TIME INTERVAL IN HOURS


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

          **************
          *            *
137 KK    *     BASE3  *          -1
          *            *
```

```
                **************
143 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS


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


                **************
                *            *
150 KK          *     BASF1  *          -3
                *            *
                **************

156 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS


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


                **************
                *            *
163 KK          *     BASF2  *          -2
                *            *
                **************

169 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS


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


                **************
                *            *
176 KK          *     BASF3  *          -1
                *            *
                **************

182 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS


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


                **************
                *            *
189 KK          *      BASG  *          -1
                *            *
                **************

195 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
```

```
              **************
              *            *
 202 KK       *     BASH1  *          -1
              *            *
              **************

 209 KO          OUTPUT CONTROL VARIABLES
                       IPRNT          5  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE
                       IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                        IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT       .033  TIME INTERVAL IN HOURS


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

              **************
              *            *
 222 KK       *    BASH2-  *          2
              *            *
              **************

 228 KO          OUTPUT CONTROL VARIABLES
                       IPRNT          5  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE
                       IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                        IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT       .033  TIME INTERVAL IN HOURS


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

              **************
              *            *
 235 KK       *      BASI  *
              *            *
              **************

 241 KO          OUTPUT CONTROL VARIABLES
                       IPRNT          5  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE
                       IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                        IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT       .033  TIME INTERVAL IN HOURS


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

              **************
              *            *
 251 KK       *      BASJ  *
              *            *
              **************

 257 KO          OUTPUT CONTROL VARIABLES
                       IPRNT          5  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE
                       IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                        IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT       .033  TIME INTERVAL IN HOURS


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

              **************
              *            *
 264 KK       *      BASK  *
              *            *
              **************

 270 KO          OUTPUT CONTROL VARIABLES
                       IPRNT          5  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE
                       IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                        IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT       .033  TIME INTERVAL IN HOURS
```

```
*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

          **************
          *            *
277 KK    *      BASL  *
          *            *
          **************

283 KO          OUTPUT CONTROL VARIABLES
                     IPRNT           5  PRINT CONTROL
                     IPLOT           0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE
                     IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                      IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                     ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                     ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                    TIMINT        .033  TIME INTERVAL IN HOURS

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

          **************
          *            *
290 KK    *      BASM  *
          *            *
          **************

296 KO          OUTPUT CONTROL VARIABLES
                     IPRNT           5  PRINT CONTROL
                     IPLOT           0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE
                     IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                      IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                     ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                     ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                    TIMINT        .033  TIME INTERVAL IN HOURS

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

          **************
          *            *
303 KK    *      BASN  *
          *            *
          **************

309 KO          OUTPUT CONTROL VARIABLES
                     IPRNT           5  PRINT CONTROL
                     IPLOT           0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE
                     IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                      IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                     ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                     ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                    TIMINT        .033  TIME INTERVAL IN HOURS

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

          **************
          *            *
310 KK    *         O  *
          *            *
          **************

317 KO          OUTPUT CONTROL VARIABLES
                     IPRNT           5  PRINT CONTROL
                     IPLOT           0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE
                     IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                      IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                     ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                     ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                    TIMINT        .033  TIME INTERVAL IN HOURS

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

          **************
          *            *
318 KK    *         P  *
          *            *
          **************

325 KO          OUTPUT CONTROL VARIABLES
                     IPRNT           5  PRINT CONTROL
                     IPLOT           0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE
                     IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                      IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                     ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                     ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
```

```
                TIMINT        .033  TIME INTERVAL IN HOURS

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

          **************
          *            *
329 KK    *         Q  *
          *            *
          **************

336 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE
                     IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                      IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                     ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                     ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
                    TIMINT       .033  TIME INTERVAL IN HOURS

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

          **************
          *            *
337 KK    *         R  *
          *            *
          **************

344 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE
                     IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                      IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                     ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                     ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
                    TIMINT       .033  TIME INTERVAL IN HOURS
1
```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	A1	47.	3.30	6.	1.	1.	.08		
+	ROUTED TO	BASA1	39.	3.43	5.	1.	1.	.08	2760.48	3.40
+	HYDROGRAPH AT	A2	25.	3.23	3.	1.	1.	.04		
+	ROUTED TO	BAS A2	15.	3.43	2.	0.	0.	.04	2738.38	3.43
+	HYDROGRAPH AT	B1	18.	3.23	2.	0.	0.	.03		
+	ROUTED TO	BASB-3	10.	3.47	1.	0.	0.	.03	2784.31	3.47
+	HYDROGRAPH AT	B2	26.	3.37	4.	1.	1.	.05		
+	2 COMBINED AT	COMBB	33.	3.43	5.	1.	1.	.08		
+	ROUTED TO	BASB-5	28.	3.53	4.	1.	1.	.08	2745.40	3.53
+	HYDROGRAPH AT	C	20.	3.27	2.	1.	0.	.03		
+	ROUTED TO	BASC-1	10.	3.50	1.	0.	0.	.03	2782.34	3.50
+	HYDROGRAPH AT	D	21.	3.30	3.	1.	1.	.03		
+	ROUTED TO	BASD-2	15.	3.43	2.	1.	0.	.03	2722.48	3.43
+	HYDROGRAPH AT	E1	32.	3.37	5.	1.	1.	.06		
+	ROUTED TO	BASE1-	26.	3.50	4.	1.	1.	.06	2698.50	3.50

+	HYDROGRAPH AT	E2	33.	3.27	4.	1.	1.	.05	
+	ROUTED TO	BASE2	0.	.00	0.	0.	0.	.05	2702.36 26.43
+	2 COMBINED AT	COMBE	26.	3.50	4.	1.	1.	.11	
+	6 COMBINED AT	CLEAR	127.	3.47	17.	4.	3.	.37	
+	HYDROGRAPH AT	E3	7.	3.17	1.	0.	0.	.01	
+	ROUTED TO	BASE3	0.	.00	0.	0.	0.	.01	2713.90 24.67
+	HYDROGRAPH AT	F1	23.	3.30	3.	1.	1.	.04	
+	ROUTED TO	BASF1	13.	3.53	2.	0.	0.	.04	2698.39 3.53
+	HYDROGRAPH AT	F2	10.	3.23	1.	0.	0.	.01	
+	ROUTED TO	BASF2	1.	4.13	0.	0.	0.	.01	2704.03 4.13
+	HYDROGRAPH AT	F3	9.	3.23	1.	0.	0.	.01	
+	ROUTED TO	BASF3	6.	3.37	1.	0.	0.	.01	2707.16 3.37
+	HYDROGRAPH AT	G	9.	3.30	1.	0.	0.	.02	
+	ROUTED TO	BASG	1.	5.00	0.	0.	0.	.02	2726.02 5.00
+	HYDROGRAPH AT	H1	34.	3.33	4.	1.	1.	.06	
+	ROUTED TO	BASH1	7.	4.03	1.	0.	0.	.06	2745.52 4.03
+	HYDROGRAPH AT	H2	35.	3.40	5.	1.	1.	.07	
+	ROUTED TO	BASH2-	32.	3.50	4.	1.	1.	.07	2774.51 3.50
+	ROUTED TO	BASH2-	19.	3.77	3.	1.	1.	.07	2787.32 3.77
+	HYDROGRAPH AT	I	16.	3.27	2.	0.	0.	.03	
+	ROUTED TO	BASI	2.	4.17	1.	0.	0.	.03	2758.08 4.17
+	8 COMBINED AT	CLEAR	30.	3.73	8.	2.	2.	.24	
+	HYDROGRAPH AT	J	21.	3.17	2.	0.	0.	.02	
+	ROUTED TO	BASJ	9.	3.40	1.	0.	0.	.02	2772.29 3.40
+	HYDROGRAPH AT	K	11.	3.10	1.	0.	0.	.01	
+	ROUTED TO	BASK	0.	.00	0.	0.	0.	.01	2739.79 27.97
+	HYDROGRAPH AT	L	9.	3.13	1.	0.	0.	.01	
+	ROUTED TO	BASL	2.	3.50	0.	0.	0.	.01	2725.06 3.50
+	HYDROGRAPH AT	M	7.	3.17	1.	0.	0.	.01	
+	ROUTED TO	BASM	1.	3.77	0.	0.	0.	.01	2716.05 3.77
	HYDROGRAPH AT								

```
+                          N        9.    3.17          1.          0.          0.        .01
        ROUTED TO
+                       BASN        0.     .00          0.          0.          0.        .01
+                                                                                          2691.37       26.53
        HYDROGRAPH AT
+                          O        3.    3.13          0.          0.          0.        .00
        HYDROGRAPH AT
+                          P        6.    3.13          0.          0.          0.        .01
        8 COMBINED AT
+                      CLEAR       37.    3.73         10.          3.          2.        .31
        HYDROGRAPH AT
+                          Q        3.    3.10          0.          0.          0.        .00
        HYDROGRAPH AT
+                          R       88.    3.27          9.          2.          2.        .14
1
```

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	INTERPOLATED TO COMPUTATION INTERVAL DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)
FOR STORM = 1	STORM AREA (SQ MI) =			.01					
A1	MANE	2.00	47.04	198.45	.64	2.00	46.72	198.00	.64

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .2879E+01 OUTFLOW= .2857E+01 BASIN STORAGE= .1235E-02 PERCENT ERROR= .7

FOR STORM = 1	STORM AREA (SQ MI) =			.01					
A2	MANE	2.04	25.25	194.06	.70	2.00	25.20	194.00	.70

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1347E+01 OUTFLOW= .1341E+01 BASIN STORAGE= .3797E-03 PERCENT ERROR= .5

FOR STORM = 1	STORM AREA (SQ MI) =			.01					
B1	MANE	1.92	18.63	195.16	.66	2.00	18.43	194.00	.66

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .9606E+00 OUTFLOW= .9551E+00 BASIN STORAGE= .2359E-03 PERCENT ERROR= .5

FOR STORM = 1	STORM AREA (SQ MI) =			.01					
B2	MANE	2.00	26.14	201.02	.69	2.00	26.01	202.00	.69

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1854E+01 OUTFLOW= .1842E+01 BASIN STORAGE= .1126E-02 PERCENT ERROR= .6

FOR STORM = 1	STORM AREA (SQ MI) =			.01					
C	MANE	1.75	19.66	195.10	.68	2.00	19.65	196.00	.68

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1100E+01 OUTFLOW= .1093E+01 BASIN STORAGE= .3456E-03 PERCENT ERROR= .6

FOR STORM = 1	STORM AREA (SQ MI) =			.01					
D	MANE	1.62	21.12	196.56	.72	2.00	21.07	198.00	.72

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1317E+01 OUTFLOW= .1311E+01 BASIN STORAGE= .6177E-03 PERCENT ERROR= .4

FOR STORM = 1	STORM AREA (SQ MI) =			.01					
E1	MANE	2.27	31.91	202.20	.72	2.00	31.86	202.00	.72

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .2362E+01 OUTFLOW= .2349E+01 BASIN STORAGE= .1516E-02 PERCENT ERROR= .5

FOR STORM = 1	STORM AREA (SQ MI) =			.01					
E2	MANE	2.00	33.11	195.30	.72	2.00	32.69	196.00	.72

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1781E+01 OUTFLOW= .1774E+01 BASIN STORAGE= .4574E-03 PERCENT ERROR= .4

FOR STORM = 1	STORM AREA (SQ MI) =			.01					
E3	MANE	.86	7.09	190.52	.72	2.00	7.08	190.00	.72

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .3098E+00 OUTFLOW= .3086E+00 BASIN STORAGE= .4967E-04 PERCENT ERROR= .4

FOR STORM = 1	STORM AREA (SQ MI) =			.01					
F1	MANE	1.89	23.39	198.26	.72	2.00	23.38	198.00	.72

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1394E+01 OUTFLOW= .1388E+01 BASIN STORAGE= .5221E-03 PERCENT ERROR= .4

FOR STORM = 1	STORM AREA (SQ MI) =			.01					
F2	MANE	1.59	10.47	193.53	.72	2.00	10.40	194.00	.72

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .5422E+00 OUTFLOW= .5395E+00 BASIN STORAGE= .1396E-03 PERCENT ERROR= .5

```
FOR STORM = 1  STORM AREA (SQ MI) =        .01
      F3  MANE          1.03      9.22    193.01       .72      2.00      9.21    194.00         .72

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .5035E+00 OUTFLOW= .5017E+00 BASIN STORAGE= .1687E-03 PERCENT ERROR=    .3

FOR STORM = 1  STORM AREA (SQ MI) =        .01
      G  MANE           .86      9.19    198.87       .72      2.00      9.13    198.00         .72

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .6196E+00 OUTFLOW= .6177E+00 BASIN STORAGE= .3650E-03 PERCENT ERROR=    .3

FOR STORM = 1  STORM AREA (SQ MI) =        .01
      H1  MANE          2.00     33.69    199.70       .72      2.00     33.56    200.00         .72

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .2267E+01 OUTFLOW= .2254E+01 BASIN STORAGE= .1203E-02 PERCENT ERROR=    .5

FOR STORM = 1  STORM AREA (SQ MI) =        .01
      H2  MANE          2.16     35.31    204.39       .67      2.00     35.24    204.00         .67

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .2600E+01 OUTFLOW= .2584E+01 BASIN STORAGE= .1757E-02 PERCENT ERROR=    .6

FOR STORM = 1  STORM AREA (SQ MI) =        .01
       I  MANE          2.00     16.55    195.48       .70      2.00     16.48    196.00         .70

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .9357E+00 OUTFLOW= .9298E+00 BASIN STORAGE= .2830E-03 PERCENT ERROR=    .6

FOR STORM = 1  STORM AREA (SQ MI) =        .01
       J  MANE           .97     21.46    190.09       .70      2.00     21.44    190.00         .71

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .9043E+00 OUTFLOW= .9018E+00 BASIN STORAGE= .1448E-03 PERCENT ERROR=    .3

FOR STORM = 1  STORM AREA (SQ MI) =        .01
       K  MANE           .92     10.75    186.30       .72      2.00     10.58    186.00         .72

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .3485E+00 OUTFLOW= .3479E+00 BASIN STORAGE= .1758E-04 PERCENT ERROR=    .2

FOR STORM = 1  STORM AREA (SQ MI) =        .01
       L  MANE           .70      9.15    188.53       .72      2.00      9.13    188.00         .72

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .3485E+00 OUTFLOW= .3477E+00 BASIN STORAGE= .4296E-04 PERCENT ERROR=    .2

FOR STORM = 1  STORM AREA (SQ MI) =        .01
       M  MANE          1.28      7.32    189.98       .72      2.00      7.32    190.00         .72

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .3098E+00 OUTFLOW= .3087E+00 BASIN STORAGE= .5202E-04 PERCENT ERROR=    .3

FOR STORM = 1  STORM AREA (SQ MI) =        .01
       N  MANE          1.55      9.31    190.77       .72      2.00      9.23    190.00         .72

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .3873E+00 OUTFLOW= .3863E+00 BASIN STORAGE= .4529E-04 PERCENT ERROR=    .2

FOR STORM = 1  STORM AREA (SQ MI) =        .01
       O  MANE           .46      2.56    187.54       .72      2.00      2.53    188.00         .72

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .9295E-01 OUTFLOW= .9274E-01 BASIN STORAGE= .9717E-05 PERCENT ERROR=    .2

FOR STORM = 1  STORM AREA (SQ MI) =        .01
       P  MANE           .65      5.59    188.96       .72      2.00      5.52    188.00         .72

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .2246E+00 OUTFLOW= .2239E+00 BASIN STORAGE= .3152E-04 PERCENT ERROR=    .3

FOR STORM = 1  STORM AREA (SQ MI) =        .01
       Q  MANE           .37      2.78    186.06       .72      2.00      2.78    186.00         .72

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .9295E-01 OUTFLOW= .9268E-01 BASIN STORAGE= .6752E-05 PERCENT ERROR=    .3

FOR STORM = 1  STORM AREA (SQ MI) =        .01
       R  MANE          1.97     88.00    197.39       .63      2.00     87.79    196.00         .63

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .4732E+01 OUTFLOW= .4696E+01 BASIN STORAGE= .1127E-02 PERCENT ERROR=    .7


*** NORMAL END OF HEC-1 ***
```

```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *              JUN   1998               *
 *            VERSION 4.1                *
 *                                       *
 *  RUN DATE   14NOV06  TIME  17:51:27   *
 *                                       *
 *****************************************
```

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

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX          XXX
```

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

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

```
1                                          HEC-1 INPUT                                                    PAGE  1

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

    1           ID        HEC-1 MODEL FOR SERENO CANYON
    2           ID        10-YEAR, 6-HOUR STORM
    3           ID        RAINFALL FROM NOAA ATLAS
    4           ID        SCS CURVE NUMBER SOIL LOSS PARAMETERS
    5           ID        KINEMATIC WAVE HYDROGRAPH ROUTING
    6           ID        DEVELOPED CONDITIONS
    7           ID        10% IMPERVIOUS AREA USED FOR SITE
    8           ID
    9           ID        PREPARED BY WOOD/PATEL, 1.10.2005
   10           ID        FILE NAME:  DEV-10.DAT
   11           ID
                *DIAGRAM
   12           IT       2                    900
   13           IO       5
   14           JD             .01
   15           PH                    0.52    0.99    1.64    1.87    2.01    2.29

   16           KK      A1
   17           KM       RUNOFF FROM SUB-BASIN A1
   18           BA   0.084
   19           LS             88     1.1
   20           UK     260    .025    0.13     100
   21           RK    3520    .023    .032            TRAP      12       5
                *

   22           KK   BASA1
   23           KM  29' WIER  AT HEADWALL
   24           RS       1    STOR       0
   25           SV       0   0.108   0.242   0.404     0.6   0.841   1.081
   26           SE    2756    2757    2758    2759    2760    2761    2762
   27           SQ       0       0       0       0       0      81     230
   28           KO                                     22

   29           KK      A2
   30           KM  RUNOFF FROM SUB-BASIN A2
   31           BA    .036
   32           LS             88     7.4
   33           UK     235    .025    0.13     100
   34           RK    2000     .02    .032            TRAP       8       5

   35           KK  BAS A2      -3
   36           KM  14' WEIR AT OUTLET
   37           RS       1    STOR       0
   38           SV       0   0.059   0.135   0.228    0.34   0.474   0.608   0.742
   39           SE    2733    2734    2735    2736    2737    2738    2739    2740
   40           SQ       0       0       0       0       0       0      39     111
   41           KO                                     22
                *

   42           KK      B1
   43           KM  RUNOFF FROM SUB-BASIN B1
   44           BA    .027
   45           LS             88     3.7
   46           UK     200    .025    0.13     100
   47           RK    2500    .028    .032            TRAP       8       5
1                                          HEC-1 INPUT                                                    PAGE  2

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

   48           KK  BASB-3
   49           KM  11' WEIR AT HEADWALL
   50           RS       1    STOR       0
   51           SV       0    .089     0.2    .338    0.49   0.643
   52           SE    2781    2782    2783    2784    2785    2786
   53           SQ       0       0       0       0      31      87
   54           KO                                     22
                *
```

```
 55          KK      B2
 56          KM  RUNOFF FROM SUB-BASIN B2
 57          BA    .050
 58          LS              88     6.7
 59          UK     400    .025    0.13     100
 60          RK    2340    .024    .032            TRAP       8       5
             *

 61          KK   COMBB
 62          KM  COMBINE SECTIONS B1 AND B2
 63          HC       2
             *

 64          KK  BASB-5
 65          KM  25' WEIR
 66          RS       1    STOR       0
 67          SV       0   0.146   0.333   0.565   0.843   1.121
 68          SE    2742    2743    2744    2745    2746    2747
 69          SQ       0       0       0       0      70     198
 70          KO                                      22
             *

 71          KK       C
 72          KM  RUNOFF FROM SUB-BASIN C
 73          BA     .03
 74          LS              88     5.9
 75          UK     250    .023    0.13     100
 76          RK    1570    .017    .032            TRAP       5       5
             *

 77          KK  BASC-1
 78          KM  11' WEIR
 79          RS       1    STOR       0
 80          SV       0    .107    .236    .388   0.566   0.745
 81          SE    2779    2780    2781    2782    2783    2784
 82          SQ       0       0       0       0      31      87
 83          KO                                      22
             *

 84          KK       D
 85          KM  RUNOFF FROM SUB-BASIN D
 86          BA    .034
 87          LS              88      10
 88          UK     300     .02    0.13     100
 89          RK    1425    .014    .032            TRAP       6       5
             *
```

1 HEC-1 INPUT PAGE 3

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

 90          KK  BASD-2
 91          KM  11' WEIR AT HEAD WALL
 92          RS       1    STOR       0
 93          SV       0   0.039    0.13    0.29   0.541   0.898
 94          SE    2719    2720    2721    2722    2723    2724
 95          SQ       0       0       0       0      31      87
 96          KO                                      22
             *

 97          KK      E1
 98          KM  RUNOFF FROM SUB-BASIN E1
 99          BA    .061
100          LS              88      10
101          UK     400     .02    0.13     100
102          RK    2050    .013    .032            TRAP       7       5

103          KK  BASE1-       2
104          KM  19' WEIR AT HEAD WALL
105          RS       1    STOR       0
106          SV       0   0.147   0.334    0.56   0.826   1.135
107          SE    2695    2696    2697    2698    2699    2700
108          SQ       0       0       0       0      53     150
109          KO                                      22
             *

110          KK      E2
111          KM  RUNOFF FROM SUB-BASIN E2
112          BA    .046
113          LS              88      10
114          UK     200     .02    0.13     100
115          RK    2370    .013    .032            TRAP      10       5
             *

116          KK   BASE2
117          KM  FLOW ROUTED THROUGH DETENTION BASIN E2-1
118          KM  2-42" PIPE CULVERT
119          RS       1    STOR       0
120          SV       0   0.094   0.211   0.379   0.641   1.026   1.546   1.861    2.22
121          SE    2696    2697    2698    2699    2700    2701    2702  2702.5    2703
122          SQ       0       0       0       0       0       0       0       0     180
123          KO                                      22
             *

124          KK   COMBE
125          KM  COMBINE SECTIONS E1 AND E2
126          HC       2
127          KO                                      22
             *
```

1 HEC-1 INPUT PAGE 4

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

128          KK   CLEAR
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```
129          KM  CLEAR HYDROGRAPH STACK
130          HC       6
             *

131          KK      E3
132          KM  RUNOFF FROM SUB-BASIN E3
133          BA    .008
134          LS              88      10
135          UK     175    .025    0.13     100
136          RK     750    .032    .032            TRAP       6       5
             *

137          KK   BASE3      -1
138          KM  10' WEIR AT HEAD WALL
139          RS       1    STOR       0
140          SV       0    .082    .188    .322   0.456
141          SE    2711    2712    2713    2714    2715
142          SQ       0       0       0       0      28
143          KO                                      22
             *

144          KK      F1
145          KM  RUNOFF FROM SUB-BASIN F1
146          BA    .036
147          LS              88      10
148          UK     225    .018    0.13     100
149          RK    2500    .012    .032            TRAP       7       5
             *

150          KK   BASF1      -3
151          KM  12' WEIR AT HEAD WALL
152          RS       1    STOR       0
153          SV       0    0.21   0.443   0.701   0.958
154          SE    2696    2697    2698    2699    2700
155          SQ       0       0       0      34      95
156          KO                                      22
             *

157          KK      F2
158          KM  RUNOFF FROM SUB-BASIN F2
159          BA    .014
160          LS              88      10
161          UK     200    .018    0.13     100
162          RK    1440    .028    .032            TRAP       6       5
             *

163          KK   BASF2      -2
164          KM  16' WEIR AT HEAD WALL
165          RS       1    STOR       0
166          SV       0   0.112   0.243   0.396   0.549
167          SE    2701    2702    2703    2704    2705
168          SQ       0       0       0       0      45
169          KO                                      22
             *
```



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

170          KK      F3
171          KM  RUNOFF FROM SUB-BASIN F3
172          BA    .013
173          LS              88      10
174          UK     225    .018    0.13     100
175          RK     850    .026    .032            TRAP       6       5
             *

176          KK   BASF3      -1
177          KM  14' WEIR AT HEAD WALL
178          RS       1    STOR       0
179          SV       0   0.038   0.095   0.172   0.274
180          SE    2704    2705    2706    2707    2708
181          SQ       0       0       0       0      39
182          KO                                      22
             *

183          KK       G
184          KM  RUNOFF FROM SUB-BASIN G
185          BA   0.016
186          LS              88      10
187          UK     400    .025    0.13     100
188          RK     720    .022    .032            TRAP       4       5
             *

189          KK    BASG      -1
190          KM  15' WEIR
191          RS       1    STOR       0
192          SV       0   0.094   0.209   0.347   0.512    0.71
193          SE    2722    2723    2724    2725    2726    2727
194          SQ       0       0       0       0       0      42
195          KO                                      22
             *

196          KK      H1
197          KM  RUNOFF FROM SUB-BASIN H1
198          BA    .059
199          LS              88     9.4
200          UK     375    .025    0.13     100
201          RK    2210    .019    .032            TRAP       8       5

202          KK   BASH1      -1
203          KM  FLOW ROUTED THROUGH DETENTION BASIN H1-1
204          KM  2-36" PIPE CULVERT
205          RS       1    STOR       0
206          SV       0   0.009   0.046   0.132   0.284    0.51   0.822    1.24   1.497   1.809
207          SE    2738    2739    2740    2741    2742    2743    2744    2745  2745.5    2746
```

```
 208        SQ      0       0       0       0       0       0       0       0       0     170
 209        KO                                     22
            *
1                                        HEC-1 INPUT                                          PAGE  6

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

 210        KK      H2
 211        KM  RUNOFF FROM SUB-BASIN H2
 212        BA    .072
 213        LS              88    4.78
 214        UK     400    .025    0.13     100
 215        RK    3480    .019    .032            TRAP      12       5

 216        KK  BASH2-       1
 217        KM  22' WEIR AT HEADWALL
 218        RS       1    STOR       0
 219        SV       0    0.15   0.318   0.507   0.718   0.929
 220        SE       0    2772    2773    2774    2775    2776
 221        SQ       0       0       0       0      62     174

 222        KK  BASH2-       2
 223        KM  21' WEIR AT HEADWALL
 224        RS       1    STOR       0
 225        SV       0    .165    .361    .590    .820   1.049
 226        SE       0    2785    2786    2787    2788    2789
 227        SQ       0       0       0       0      59     166
 228        KO                                     22
            *

 229        KK       I
 230        KM  RUNOFF FROM SUB-BASIN I
 231        BA    .025
 232        LS              88     7.4
 233        UK     225     .02    0.13     100
 234        RK    2100    .026    .032            TRAP      10       5
            *

 235        KK    BASI
 236        KM  10' WEIR
 237        RS       1    STOR       0
 238        SV       0    .186    .399    .640   0.881   1.122
 239        SE    2755    2756    2757    2758    2759    2760
 240        SQ       0       0       0       0      28      79
 241        KO                                     22
            *

 242        KK   CLEAR
 243        KM  CLEAR HYDROGRAPH STACK
 244        HC       8
            *

 245        KK       J
 246        KM  RUNOFF FROM SUB-BASIN J
 247        BA    .024
 248        LS              88     7.9
 249        UK     145     .02    0.13     100
 250        RK     965    .026    .032            TRAP       5       5
            *
1                                        HEC-1 INPUT                                          PAGE  7

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

 251        KK    BASJ
 252        KM  11' WEIR
 253        RS       1    STOR       0
 254        SV       0    .098    .217    .359    .528   0.698
 255        SE    2769    2770    2771    2772    2773    2774
 256        SQ       0       0       0       0      31      87
 257        KO                                     22
            *

 258        KK       K
 259        KM  RUNOFF FROM SUB-BASIN K
 260        BA    .009
 261        LS              88      10
 262        UK      81    .025    0.13     100
 263        RK     715    .022    .032            TRAP       5       5
            *

 264        KK    BASK
 265        KM  13' WEIR
 266        RS       1    STOR       0
 267        SV       0    .106    .232    .378   0.525
 268        SE    2737    2738    2739    2740    2741
 269        SQ       0       0       0       0      36
 270        KO                                     22
            *

 271        KK       L
 272        KM  RUNOFF FROM SUB-BASIN L
 273        BA    .009
 274        LS              88      10
 275        UK     113    .018    0.13     100
 276        RK     450    .012    .032            TRAP       5       5
            *

 277        KK    BASL
 278        KM  13' WEIR
 279        RS       1    STOR       0
 280        SV       0   0.041   0.106     0.2   0.326
 281        SE    2722    2723    2724    2725    2726
 282        SQ       0       0       0       0      36
 283        KO                                     22
```

```
                    *

 284                KK        M
 285                KM  RUNOFF FROM SUB-BASIN M
 286                BA     .008
 287                LS                88      10
 288                UK      137     .018    0.13     100
 289                RK      750     .012    .032            TRAP       4       5
                    *
1                                          HEC-1 INPUT                                                    PAGE  8

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

 290                KK     BASM
 291                KM  7' WEIR
 292                RS        1    STOR       0
 293                SV        0   0.056   0.124   0.205   0.301   0.413
 294                SE     2713    2714    2715    2716    2717    2718
 295                SQ        0       0       0       0      20      55
 296                KO                                        22
                    *

 297                KK        N
 298                KM  RUNOFF FROM SUB-BASIN N
 299                BA      .01
 300                LS                88      10
 301                UK      117     .018    0.13     100
 302                RK     1036     .012    .032            TRAP       5       5
                    *

 303                KK     BASM
 304                KM  13' WEIR
 305                RS        1    STOR       0
 306                SV        0   0.083   0.191   0.326    0.49   0.686
 307                SE     2688    2689    2690    2691    2692    2693
 308                SQ        0       0       0       0       0      36
 309                KO                                        22
                    *

 310                KK        O
 311                KM  RUNOFF FROM SUB-BASIN O
 312                KM  Area of Basin subtrating the area to be retained for 100 year event
 313                BA  0.0024        9
 314                LS                88      10
 315                UK      108      .02    0.13     100
 316                RK      174     .014    .032            TRAP       4       5
 317                KO                                        22

 318                KK        P
 319                KM  RUNOFF FROM SUB-BASIN P
 320                KM  Area of Basin subtrating the area to be retained for 100 year event
 321                BA   .0058
 322                LS                88      10
 323                UK      135      .02    0.13     100
 324                RK      354     .014    .032            TRAP       5       5
 325                KO                                        22

 326                KK    CLEAR
 327                KM  CLEAR HYDROGRAPH STACK
 328                HC        8

 329                KK        Q
 330                KM  RUNOFF FROM SUB-BASIN Q
 331                KM  Area of Basin subtrating the area to be retained for 100 year event
 332                BA   .0024
 333                LS                88      10
 334                UK       86      .02    0.13     100
1                                          HEC-1 INPUT                                                    PAGE  9

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

 335                RK      160     .014    .032            TRAP       4       5
 336                KO                                        22

 337                KK        R
 338                KM  RUNOFF FROM SUB-BASIN R
 339                KM  Area of Basin subtrating the area to be retained for 100 year event
 340                BA      .14        8
 341                LS                88     .14
 342                UK      180     .025    0.13     100
 343                RK     4300     .023    .032            TRAP      15       5
 344                KO                                        22
 345                ZZ
1
        SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
 LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

  16         A1
              V
              V
  22       BASA1
              .
              .
  29          .          A2
              .           V
              .           V
  35          .       BAS A2
              .           .
              .           .
  42          .           .          B1
              .           .           V
              .           .           V
```

```
 48          BASB-3
 55                  B2
 61          COMBB............
                     V
                     V
 64          BASB-5
 71                  C
                     V
                     V
 77                BASC-1
 84                        D
                           V
                           V
 90                      BASD-2
 97                                E1
                                    V
                                    V
103                             BASE1-
110                                          E2
                                              V
                                              V
116                                        BASE2
124                             COMBE............
128 CLEAR...........................................
131         E3
             V
             V
137       BASE3
144            F1
                V
                V
150          BASF1
157                  F2
                      V
                      V
163                BASF2
170                        F3
                            V
                            V
176                      BASF3
183                                G
                                    V
                                    V
189                             BASG
196                                          H1
                                              V
                                              V
202                                        BASH1
210                                                   H2
                                                       V
                                                       V
216                                                 BASH2-
                                                       V
                                                       V
222                                                 BASH2-
229                                                              I
                                                                 V
                                                                 V
235                                                           BASI
242       CLEAR.....................................................
245            J
                V
                V
251          BASJ
258                  K
                      V
                      V
264                BASK
```

```
                                                                  L
271                                                               V
                                                                  V
277                                                             BASL
                                                                  .
284                                                               .          M
                                                                  .          V
                                                                  .          V
290                                                               .       BASM
                                                                  .          .
297                                                               .          .          N
                                                                  .          .          V
                                                                  .          .          V
303                                                               .          .       BASN
                                                                  .          .          .
310                                                               .          .          .          O
                                                                  .          .          .          .
318                                                               .          .          .          .          P
                                                                  .          .          .          .          .
326                                  CLEAR.......................................................................
                                                                                                              .
329                                                   Q
                                                                                                              .
337                                                                R
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                         *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)     *
*              JUN   1998                 *
*            VERSION 4.1                  *
*                                         *
*  RUN DATE   14NOV06  TIME  17:51:27     *
*                                         *
*****************************************
```

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

```
                    HEC-1 MODEL FOR SERENO CANYON
                    10-YEAR, 6-HOUR STORM
                    RAINFALL FROM NOAA ATLAS
                    SCS CURVE NUMBER SOIL LOSS PARAMETERS
                    KINEMATIC WAVE HYDROGRAPH ROUTING
                    DEVELOPED CONDITIONS
                    10% IMPERVIOUS AREA USED FOR SITE

                    PREPARED BY WOOD/PATEL, 1.10.2005
                    FILE NAME:  DEV-10.DAT

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

   IT        HYDROGRAPH TIME DATA
                  NMIN          2  MINUTES IN COMPUTATION INTERVAL
                 IDATE      1   0  STARTING DATE
                 ITIME       0000  STARTING TIME
                    NQ        900  NUMBER OF HYDROGRAPH ORDINATES
                NDDATE      2   0  ENDING DATE
                NDTIME       0558  ENDING TIME
                 ICENT         19  CENTURY MARK

             COMPUTATION INTERVAL     .03 HOURS
                  TOTAL TIME BASE   29.97 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

14 JD        INDEX STORM NO. 1
                 STRM        2.29  PRECIPITATION DEPTH
                 TRDA         .01  TRANSPOSITION DRAINAGE AREA

15 PI          PRECIPITATION PATTERN
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .01       .01       .01       .01
                 .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                 .01       .01       .01       .01       .01       .02       .02       .02       .02       .02
                 .02       .03       .03       .04       .04       .05       .06       .08       .11       .21
                 .21       .17       .10       .08       .05       .04       .04       .04       .03       .02
                 .02       .02       .02       .02       .02       .01       .01       .01       .01       .01
                 .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                 .01       .01       .01       .01       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
```

```
      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00

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

          **************
          *            *
 22 KK    *    BASA1   *
          *            *
          **************

 28 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS

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

          **************
          *            *
 35 KK    *    BAS A2  *          -3
          *            *
          **************

 41 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS

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

          **************
          *            *
 48 KK    *    BASB-3  *
          *            *
          **************

 54 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS

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

          **************
          *            *
 64 KK    *    BASB-5  *
          *            *
          **************

 70 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS

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

          **************
          *            *
 77 KK    *    BASC-1  *
          *            *
          **************

 83 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
```

```
                IPLOT          0  PLOT CONTROL
                QSCAL         0.  HYDROGRAPH PLOT SCALE
                IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                 IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
               TIMINT       .033  TIME INTERVAL IN HOURS


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

          ***************
          *             *
 90 KK    *    BASD-2   *
          *             *
          ***************

 96 KO          OUTPUT CONTROL VARIABLES
                IPRNT          5  PRINT CONTROL
                IPLOT          0  PLOT CONTROL
                QSCAL         0.  HYDROGRAPH PLOT SCALE
                IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                 IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
               TIMINT       .033  TIME INTERVAL IN HOURS


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

          ***************
          *             *
103 KK    *    BASE1-   *          2
          *             *
          ***************

109 KO          OUTPUT CONTROL VARIABLES
                IPRNT          5  PRINT CONTROL
                IPLOT          0  PLOT CONTROL
                QSCAL         0.  HYDROGRAPH PLOT SCALE
                IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                 IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
               TIMINT       .033  TIME INTERVAL IN HOURS


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

          ***************
          *             *
116 KK    *     BASE2   *
          *             *
          ***************

123 KO          OUTPUT CONTROL VARIABLES
                IPRNT          5  PRINT CONTROL
                IPLOT          0  PLOT CONTROL
                QSCAL         0.  HYDROGRAPH PLOT SCALE
                IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                 IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
               TIMINT       .033  TIME INTERVAL IN HOURS


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

          ***************
          *             *
124 KK    *     COMBE   *
          *             *
          ***************

127 KO          OUTPUT CONTROL VARIABLES
                IPRNT          5  PRINT CONTROL
                IPLOT          0  PLOT CONTROL
                QSCAL         0.  HYDROGRAPH PLOT SCALE
                IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                 IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
               TIMINT       .033  TIME INTERVAL IN HOURS


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

          ***************
          *             *
137 KK    *     BASE3   *          -1
          *             *
```

```
              **************
143 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS

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

              **************
              *            *
150 KK        *     BASF1  *          -3
              *            *
              **************

156 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS

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

              **************
              *            *
163 KK        *     BASF2  *          -2
              *            *
              **************

169 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS

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

              **************
              *            *
176 KK        *     BASF3  *          -1
              *            *
              **************

182 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS

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

              **************
              *            *
189 KK        *      BASG  *          -1
              *            *
              **************

195 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
```

```
              **************
              *            *
 202 KK       *     BASH1  *          -1
              *            *
              **************

 209 KO            OUTPUT CONTROL VARIABLES
                        IPRNT           5  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                        IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                         IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT        .033  TIME INTERVAL IN HOURS


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

              **************
              *            *
 222 KK       *    BASH2-  *           2
              *            *
              **************

 228 KO            OUTPUT CONTROL VARIABLES
                        IPRNT           5  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                        IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                         IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT        .033  TIME INTERVAL IN HOURS


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

              **************
              *            *
 235 KK       *      BASI  *
              *            *
              **************

 241 KO            OUTPUT CONTROL VARIABLES
                        IPRNT           5  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                        IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                         IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT        .033  TIME INTERVAL IN HOURS


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

              **************
              *            *
 251 KK       *      BASJ  *
              *            *
              **************

 257 KO            OUTPUT CONTROL VARIABLES
                        IPRNT           5  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                        IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                         IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT        .033  TIME INTERVAL IN HOURS


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

              **************
              *            *
 264 KK       *      BASK  *
              *            *
              **************

 270 KO            OUTPUT CONTROL VARIABLES
                        IPRNT           5  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                        IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                         IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT        .033  TIME INTERVAL IN HOURS
```

```
*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
 277 KK     *      BASL  *
            *            *
            **************

 283 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS


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

            **************
            *            *
 290 KK     *      BASM  *
            *            *
            **************

 296 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS


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

            **************
            *            *
 303 KK     *      BASN  *
            *            *
            **************

 309 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS


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

            **************
            *            *
 310 KK     *         O  *
            *            *
            **************

 317 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS


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

            **************
            *            *
 318 KK     *         P  *
            *            *
            **************

 325 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
```

```
                    TIMINT        .033  TIME INTERVAL IN HOURS

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

            **************
            *            *
 329 KK     *         Q  *
            *            *
            **************

 336 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS

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

            **************
            *            *
 337 KK     *         R  *
            *            *
            **************

 344 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS
```

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	A1	113.	3.23	11.	3.	2.	.08		
+	ROUTED TO	BASA1	109.	3.27	10.	2.	2.	.08		
+									2761.19	3.27
+	HYDROGRAPH AT	A2	57.	3.17	5.	1.	1.	.04		
+	ROUTED TO	BAS A2	48.	3.23	4.	1.	1.	.04		
+									2739.13	3.23
+	HYDROGRAPH AT	B1	42.	3.17	4.	1.	1.	.03		
+	ROUTED TO	BASB-3	31.	3.27	3.	1.	1.	.03		
+									2784.99	3.27
+	HYDROGRAPH AT	B2	62.	3.23	7.	2.	1.	.05		
+	2 COMBINED AT	COMBB	92.	3.27	10.	2.	2.	.08		
+	ROUTED TO	BASB-5	85.	3.30	9.	2.	2.	.08		
+									2746.12	3.30
+	HYDROGRAPH AT	C	46.	3.17	4.	1.	1.	.03		
+	ROUTED TO	BASC-1	33.	3.30	3.	1.	1.	.03		
+									2783.04	3.30
+	HYDROGRAPH AT	D	48.	3.20	5.	1.	1.	.03		
+	ROUTED TO	BASD-2	37.	3.30	4.	1.	1.	.03		
+									2723.11	3.30
+	HYDROGRAPH AT	E1	74.	3.27	8.	2.	2.	.06		
+	ROUTED TO	BASE1-	68.	3.33	7.	2.	1.	.06		
+									2699.15	3.33

+	HYDROGRAPH AT	E2	71.	3.20	6.	2.	1.	.05		
+	ROUTED TO	BASE2	21.	3.57	3.	1.	1.	.05		
+									2702.56	3.57
+	2 COMBINED AT	COMBE	68.	3.33	10.	3.	2.	.11		
+	6 COMBINED AT	CLEAR	364.	3.30	40.	10.	8.	.37		
+	HYDROGRAPH AT	E3	15.	3.13	1.	0.	0.	.01		
+	ROUTED TO	BASE3	4.	3.47	0.	0.	0.	.01		
+									2714.13	3.47
+	HYDROGRAPH AT	F1	52.	3.20	5.	1.	1.	.04		
+	ROUTED TO	BASF1	37.	3.33	4.	1.	1.	.04		
+									2699.05	3.33
+	HYDROGRAPH AT	F2	23.	3.17	2.	0.	0.	.01		
+	ROUTED TO	BASF2	11.	3.33	1.	0.	0.	.01		
+									2704.25	3.33
+	HYDROGRAPH AT	F3	21.	3.17	2.	0.	0.	.01		
+	ROUTED TO	BASF3	18.	3.20	1.	0.	0.	.01		
+									2707.47	3.20
+	HYDROGRAPH AT	G	21.	3.20	2.	1.	0.	.02		
+	ROUTED TO	BASG	9.	3.47	1.	0.	0.	.02		
+									2726.22	3.47
+	HYDROGRAPH AT	H1	78.	3.23	8.	2.	2.	.06		
+	ROUTED TO	BASH1	54.	3.37	5.	1.	1.	.06		
+									2745.66	3.37
+	HYDROGRAPH AT	H2	84.	3.27	10.	2.	2.	.07		
+	ROUTED TO	BASH2-	81.	3.30	9.	2.	2.	.07		
+									2775.17	3.30
+	ROUTED TO	BASH2-	66.	3.43	7.	2.	1.	.07		
+									2788.06	3.43
+	HYDROGRAPH AT	I	38.	3.20	3.	1.	1.	.03		
+	ROUTED TO	BASI	16.	3.43	2.	1.	0.	.03		
+									2758.57	3.43
+	8 COMBINED AT	CLEAR	193.	3.40	23.	6.	5.	.24		
+	HYDROGRAPH AT	J	45.	3.13	3.	1.	1.	.02		
+	ROUTED TO	BASJ	30.	3.20	3.	1.	1.	.02		
+									2772.96	3.20
+	HYDROGRAPH AT	K	20.	3.10	1.	0.	0.	.01		
+	ROUTED TO	BASK	4.	3.40	1.	0.	0.	.01		
+									2740.11	3.40
+	HYDROGRAPH AT	L	19.	3.10	1.	0.	0.	.01		
+	ROUTED TO	BASL	11.	3.20	1.	0.	0.	.01		
+									2725.31	3.20
+	HYDROGRAPH AT	M	15.	3.13	1.	0.	0.	.01		
+	ROUTED TO	BASM	7.	3.30	1.	0.	0.	.01		
+									2716.36	3.30
+	HYDROGRAPH AT									

```
+                          N       19.    3.13          1.          0.          0.        .01
        ROUTED TO
+                       BASN        2.    3.70          0.          0.          0.        .01
+                                                                                        2692.06        3.70
        HYDROGRAPH AT
+                          O        5.    3.10          0.          0.          0.        .00
        HYDROGRAPH AT
+                          P       12.    3.10          1.          0.          0.        .01
        8 COMBINED AT
+                      CLEAR      229.    3.40         29.          7.          6.        .31
        HYDROGRAPH AT
+                          Q        5.    3.07          0.          0.          0.        .00
        HYDROGRAPH AT
+                          R      209.    3.20         18.          5.          4.        .14
1
                                   SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
                                      (FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)
                                                                          INTERPOLATED TO
                                                                       COMPUTATION INTERVAL
        ISTAQ    ELEMENT      DT       PEAK    TIME TO      VOLUME      DT      PEAK    TIME TO      VOLUME
                                                  PEAK                                    PEAK

                             (MIN)     (CFS)     (MIN)      (IN)     (MIN)     (CFS)     (MIN)       (IN)

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
              A1  MANE        2.00    115.18    193.37      1.21      2.00    113.02    194.00       1.21

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .5445E+01 OUTFLOW= .5413E+01 BASIN STORAGE= .1061E-02 PERCENT ERROR=    .6

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
              A2  MANE        1.68     57.43    190.51      1.28      2.00     56.73    190.00       1.28

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .2465E+01 OUTFLOW= .2458E+01 BASIN STORAGE= .3728E-03 PERCENT ERROR=    .3

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
              B1  MANE        1.87     42.57    190.13      1.24      2.00     42.28    190.00       1.24

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1791E+01 OUTFLOW= .1781E+01 BASIN STORAGE= .2570E-03 PERCENT ERROR=    .6

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
              B2  MANE        1.70     62.30    195.09      1.27      2.00     62.22    194.00       1.27

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .3403E+01 OUTFLOW= .3386E+01 BASIN STORAGE= .1074E-02 PERCENT ERROR=    .5

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
               C  MANE        1.43     45.89    190.10      1.26      2.00     45.76    190.00       1.26

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .2028E+01 OUTFLOW= .2021E+01 BASIN STORAGE= .3612E-03 PERCENT ERROR=    .4

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
               D  MANE        1.39     48.14    191.54      1.31      2.00     48.10    192.00       1.31

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .2379E+01 OUTFLOW= .2369E+01 BASIN STORAGE= .6044E-03 PERCENT ERROR=    .4

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
              E1  MANE        1.75     74.37    195.04      1.31      2.00     73.87    196.00       1.31

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .4269E+01 OUTFLOW= .4253E+01 BASIN STORAGE= .1659E-02 PERCENT ERROR=    .3

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
              E2  MANE        2.00     72.17    190.70      1.30      2.00     70.61    192.00       1.30

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .3219E+01 OUTFLOW= .3199E+01 BASIN STORAGE= .5220E-03 PERCENT ERROR=    .6

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
              E3  MANE         .72     15.34    187.59      1.31      2.00     15.08    188.00       1.31

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .5598E+00 OUTFLOW= .5589E+00 BASIN STORAGE= .5716E-04 PERCENT ERROR=    .2

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
              F1  MANE        1.91     52.45    192.51      1.30      2.00     51.64    192.00       1.30

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .2519E+01 OUTFLOW= .2500E+01 BASIN STORAGE= .5312E-03 PERCENT ERROR=    .8

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
              F2  MANE        1.30     23.06    189.57      1.31      2.00     22.91    190.00       1.31

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .9797E+00 OUTFLOW= .9755E+00 BASIN STORAGE= .1414E-03 PERCENT ERROR=    .4
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FOR STORM = 1  STORM AREA (SQ MI) =        .01
      F3  MANE          .78     20.87    189.80      1.30      2.00     20.72    190.00        1.30

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .9098E+00 OUTFLOW= .9034E+00 BASIN STORAGE= .1756E-03 PERCENT ERROR=    .7

FOR STORM = 1  STORM AREA (SQ MI) =        .01
      G  MANE          .84     20.91    191.73      1.30      2.00     20.91    192.00        1.30

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1120E+01 OUTFLOW= .1113E+01 BASIN STORAGE= .3816E-03 PERCENT ERROR=    .5

FOR STORM = 1  STORM AREA (SQ MI) =        .01
      H1  MANE         1.73     77.78    193.87      1.30      2.00     77.56    194.00        1.30

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .4108E+01 OUTFLOW= .4096E+01 BASIN STORAGE= .1136E-02 PERCENT ERROR=    .3

FOR STORM = 1  STORM AREA (SQ MI) =        .01
      H2  MANE         2.01     84.00    195.55      1.25      2.00     83.97    196.00        1.25

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .4821E+01 OUTFLOW= .4796E+01 BASIN STORAGE= .1696E-02 PERCENT ERROR=    .5

FOR STORM = 1  STORM AREA (SQ MI) =        .01
       I  MANE         1.85     38.26    191.32      1.28      2.00     37.58    192.00        1.28

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1712E+01 OUTFLOW= .1705E+01 BASIN STORAGE= .3085E-03 PERCENT ERROR=    .4

FOR STORM = 1  STORM AREA (SQ MI) =        .01
       J  MANE          .84     45.84    186.87      1.29      2.00     45.03    188.00        1.29

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1650E+01 OUTFLOW= .1648E+01 BASIN STORAGE= .1536E-03 PERCENT ERROR=    .1

FOR STORM = 1  STORM AREA (SQ MI) =        .01
       K  MANE          .81     20.79    184.71      1.31      2.00     20.13    186.00        1.31

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .6298E+00 OUTFLOW= .6293E+00 BASIN STORAGE= .1887E-04 PERCENT ERROR=    .1

FOR STORM = 1  STORM AREA (SQ MI) =        .01
       L  MANE          .69     18.68    185.87      1.31      2.00     18.66    186.00        1.31

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .6298E+00 OUTFLOW= .6292E+00 BASIN STORAGE= .4243E-04 PERCENT ERROR=    .1

FOR STORM = 1  STORM AREA (SQ MI) =        .01
       M  MANE          .98     15.38    187.16      1.31      2.00     15.23    188.00        1.31

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .5598E+00 OUTFLOW= .5583E+00 BASIN STORAGE= .4692E-04 PERCENT ERROR=    .3

FOR STORM = 1  STORM AREA (SQ MI) =        .01
       N  MANE         1.38     19.77    187.36      1.31      2.00     19.48    188.00        1.31

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .6998E+00 OUTFLOW= .6992E+00 BASIN STORAGE= .5151E-04 PERCENT ERROR=    .1

FOR STORM = 1  STORM AREA (SQ MI) =        .01
       O  MANE          .39      5.21    185.54      1.31      2.00      5.10    186.00        1.31

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1680E+00 OUTFLOW= .1676E+00 BASIN STORAGE= .8995E-05 PERCENT ERROR=    .2

FOR STORM = 1  STORM AREA (SQ MI) =        .01
       P  MANE          .58     11.76    186.23      1.31      2.00     11.73    186.00        1.31

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .4059E+00 OUTFLOW= .4052E+00 BASIN STORAGE= .3030E-04 PERCENT ERROR=    .2

FOR STORM = 1  STORM AREA (SQ MI) =        .01
       Q  MANE          .25      5.51    184.71      1.31      2.00      5.42    184.00        1.31

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1680E+00 OUTFLOW= .1676E+00 BASIN STORAGE= .6537E-05 PERCENT ERROR=    .2

FOR STORM = 1  STORM AREA (SQ MI) =        .01
       R  MANE         1.84    210.47    191.74      1.20      2.00    208.88    192.00        1.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .8998E+01 OUTFLOW= .8958E+01 BASIN STORAGE= .1237E-02 PERCENT ERROR=    .4


*** NORMAL END OF HEC-1 ***
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1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*             JUN   1998               *
*           VERSION 4.1                *
*                                      *
*  RUN DATE   14NOV06  TIME  17:50:45  *
*                                      *
****************************************
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```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
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X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

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

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1                                          HEC-1 INPUT                                                    PAGE  1

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

    1           ID        HEC-1 MODEL FOR SERENO CANYON
    2           ID        100-YEAR, 6-HOUR STORM
    3           ID        RAINFALL FROM NOAA ATLAS
    4           ID        SCS CURVE NUMBER SOIL LOSS PARAMETERS
    5           ID        KINEMATIC WAVE HYDROGRAPH ROUTING
    6           ID        DEVELOPED CONDITIONS
    7           ID        10% IMPERVIOUS AREA USED FOR SITE
    8           ID
    9           ID        PREPARED BY WOOD/PATEL, 1.10.2005
   10           ID        FILE NAME:  DEV-100.DAT
   11           ID
                *DIAGRAM
   12           IT       2                    900
   13           IO       5
   14           JD             .01
   15           PH                    .73    1.43    2.42    2.74    2.96    3.37

   16           KK      A1
   17           KM       RUNOFF FROM SUB-BASIN A1
   18           BA   0.084
   19           LS              88     1.1
   20           UK     260    .025    0.13     100
   21           RK    3520    .023    .032            TRAP      12       5
                *

   22           KK   BASA1
   23           KM  29' WIER  AT HEADWALL
   24           RS       1    STOR       0
   25           SV       0   0.108   0.242   0.404     0.6   0.841   1.081
   26           SE    2756    2757    2758    2759    2760    2761    2762
   27           SQ       0       0       0       0       0      81     230
   28           KO                                      22

   29           KK      A2
   30           KM  RUNOFF FROM SUB-BASIN A2
   31           BA    .036
   32           LS              88     7.4
   33           UK     235    .025    0.13     100
   34           RK    2000     .02    .032            TRAP       8       5

   35           KK  BAS A2      -3
   36           KM  14' WEIR AT OUTLET
   37           RS       1    STOR       0
   38           SV       0   0.059   0.135   0.228    0.34   0.474   0.608   0.742
   39           SE    2733    2734    2735    2736    2737    2738    2739    2740
   40           SQ       0       0       0       0       0       0      39     111
   41           KO                                      22
                *

   42           KK      B1
   43           KM  RUNOFF FROM SUB-BASIN B1
   44           BA    .027
   45           LS              88     3.7
   46           UK     200    .025    0.13     100
   47           RK    2500    .028    .032            TRAP       8       5
1                                          HEC-1 INPUT                                                    PAGE  2

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

   48           KK  BASB-3
   49           KM  11' WEIR AT HEADWALL
   50           RS       1    STOR       0
   51           SV       0    .089     0.2    .338    0.49   0.643
   52           SE    2781    2782    2783    2784    2785    2786
   53           SQ       0       0       0       0      31      87
   54           KO                                      22
                *
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 55          KK      B2
 56          KM  RUNOFF FROM SUB-BASIN B2
 57          BA    .050
 58          LS              88     6.7
 59          UK     400    .025    0.13     100
 60          RK    2340    .024    .032            TRAP       8       5
             *

 61          KK   COMBB
 62          KM  COMBINE SECTIONS B1 AND B2
 63          HC       2
             *

 64          KK  BASB-5
 65          KM  25' WEIR
 66          RS       1    STOR       0
 67          SV       0   0.146   0.333   0.565   0.843   1.121
 68          SE    2742    2743    2744    2745    2746    2747
 69          SQ       0       0       0       0      70     198
 70          KO                                      22
             *

 71          KK       C
 72          KM  RUNOFF FROM SUB-BASIN C
 73          BA     .03
 74          LS              88     5.9
 75          UK     250    .023    0.13     100
 76          RK    1570    .017    .032            TRAP       5       5
             *

 77          KK  BASC-1
 78          KM  11' WEIR
 79          RS       1    STOR       0
 80          SV       0    .107    .236    .388   0.566   0.745
 81          SE    2779    2780    2781    2782    2783    2784
 82          SQ       0       0       0       0      31      87
 83          KO                                      22
             *

 84          KK       D
 85          KM  RUNOFF FROM SUB-BASIN D
 86          BA    .034
 87          LS              88      10
 88          UK     300     .02    0.13     100
 89          RK    1425    .014    .032            TRAP       6       5
             *
```



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

 90          KK  BASD-2
 91          KM  11' WEIR AT HEAD WALL
 92          RS       1    STOR       0
 93          SV       0   0.039    0.13    0.29   0.541   0.898
 94          SE    2719    2720    2721    2722    2723    2724
 95          SQ       0       0       0       0      31      87
 96          KO                                      22
             *

 97          KK      E1
 98          KM  RUNOFF FROM SUB-BASIN E1
 99          BA    .061
100          LS              88      10
101          UK     400     .02    0.13     100
102          RK    2050    .013    .032            TRAP       7       5

103          KK  BASE1-       2
104          KM  19' WEIR AT HEAD WALL
105          RS       1    STOR       0
106          SV       0   0.147   0.334    0.56   0.826   1.135
107          SE    2695    2696    2697    2698    2699    2700
108          SQ       0       0       0       0      53     150
109          KO                                      22
             *

110          KK      E2
111          KM  RUNOFF FROM SUB-BASIN E2
112          BA    .046
113          LS              88      10
114          UK     200     .02    0.13     100
115          RK    2370    .013    .032            TRAP      10       5
             *

116          KK   BASE2
117          KM  FLOW ROUTED THROUGH DETENTION BASIN E2-1
118          KM  2-42" PIPE CULVERT
119          RS       1    STOR       0
120          SV       0   0.094   0.211   0.379   0.641   1.026   1.546   1.861    2.22
121          SE    2696    2697    2698    2699    2700    2701    2702  2702.5    2703
122          SQ       0       0       0       0       0       0       0       0     180
123          KO                                      22
             *

124          KK   COMBE
125          KM  COMBINE SECTIONS E1 AND E2
126          HC       2
127          KO                                      22
             *
```



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

128          KK   CLEAR
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 129          KM  CLEAR HYDROGRAPH STACK
 130          HC       6
              *

 131          KK      E3
 132          KM  RUNOFF FROM SUB-BASIN E3
 133          BA    .008
 134          LS              88      10
 135          UK     175    .025    0.13     100
 136          RK     750    .032    .032            TRAP       6       5
              *

 137          KK   BASE3      -1
 138          KM  10' WEIR AT HEAD WALL
 139          RS       1    STOR       0
 140          SV       0    .082    .188    .322   0.456
 141          SE    2711    2712    2713    2714    2715
 142          SQ       0       0       0       0      28
 143          KO                                      22
              *

 144          KK      F1
 145          KM  RUNOFF FROM SUB-BASIN F1
 146          BA    .036
 147          LS              88      10
 148          UK     225    .018    0.13     100
 149          RK    2500    .012    .032            TRAP       7       5
              *

 150          KK   BASF1      -3
 151          KM  12' WEIR AT HEAD WALL
 152          RS       1    STOR       0
 153          SV       0    0.21   0.443   0.701   0.958
 154          SE    2696    2697    2698    2699    2700
 155          SQ       0       0       0      34      95
 156          KO                                      22
              *

 157          KK      F2
 158          KM  RUNOFF FROM SUB-BASIN F2
 159          BA    .014
 160          LS              88      10
 161          UK     200    .018    0.13     100
 162          RK    1440    .028    .032            TRAP       6       5
              *

 163          KK   BASF2      -2
 164          KM  16' WEIR AT HEAD WALL
 165          RS       1    STOR       0
 166          SV       0   0.112   0.243   0.396   0.549
 167          SE    2701    2702    2703    2704    2705
 168          SQ       0       0       0       0      45
 169          KO                                      22
              *
```



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

 170          KK      F3
 171          KM  RUNOFF FROM SUB-BASIN F3
 172          BA    .013
 173          LS              88      10
 174          UK     225    .018    0.13     100
 175          RK     850    .026    .032            TRAP       6       5
              *

 176          KK   BASF3      -1
 177          KM  14' WEIR AT HEAD WALL
 178          RS       1    STOR       0
 179          SV       0   0.038   0.095   0.172   0.274
 180          SE    2704    2705    2706    2707    2708
 181          SQ       0       0       0       0      39
 182          KO                                      22
              *

 183          KK       G
 184          KM  RUNOFF FROM SUB-BASIN G
 185          BA   0.016
 186          LS              88      10
 187          UK     400    .025    0.13     100
 188          RK     720    .022    .032            TRAP       4       5
              *

 189          KK    BASG      -1
 190          KM  15' WEIR
 191          RS       1    STOR       0
 192          SV       0   0.094   0.209   0.347   0.512    0.71
 193          SE    2722    2723    2724    2725    2726    2727
 194          SQ       0       0       0       0       0      42
 195          KO                                      22
              *

 196          KK      H1
 197          KM  RUNOFF FROM SUB-BASIN H1
 198          BA    .059
 199          LS              88     9.4
 200          UK     375    .025    0.13     100
 201          RK    2210    .019    .032            TRAP       8       5

 202          KK   BASH1      -1
 203          KM  FLOW ROUTED THROUGH DETENTION BASIN H1-1
 204          KM  2-36" PIPE CULVERT
 205          RS       1    STOR       0
 206          SV       0   0.009   0.046   0.132   0.284    0.51   0.822    1.24   1.497   1.809
 207          SE    2738    2739    2740    2741    2742    2743    2744    2745  2745.5    2746
```

```
 208          SQ      0       0       0       0       0       0       0       0       0     170
 209          KO                                      22
              *
1                                          HEC-1 INPUT                                          PAGE  6

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

 210          KK      H2
 211          KM  RUNOFF FROM SUB-BASIN H2
 212          BA    .072
 213          LS                  88    4.78
 214          UK     400    .025    0.13     100
 215          RK    3480    .019    .032             TRAP      12       5

 216          KK  BASH2-       1
 217          KM  22' WEIR AT HEADWALL
 218          RS       1    STOR       0
 219          SV       0    0.15   0.318   0.507   0.718   0.929
 220          SE       0    2772    2773    2774    2775    2776
 221          SQ       0       0       0       0      62     174

 222          KK  BASH2-       2
 223          KM  21' WEIR AT HEADWALL
 224          RS       1    STOR       0
 225          SV       0    .165    .361    .590    .820   1.049
 226          SE       0    2785    2786    2787    2788    2789
 227          SQ       0       0       0       0      59     166
 228          KO                                      22
              *

 229          KK       I
 230          KM  RUNOFF FROM SUB-BASIN I
 231          BA    .025
 232          LS                  88     7.4
 233          UK     225     .02    0.13     100
 234          RK    2100    .026    .032             TRAP      10       5
              *

 235          KK    BASI
 236          KM  10' WEIR
 237          RS       1    STOR       0
 238          SV       0    .186    .399    .640   0.881   1.122
 239          SE    2755    2756    2757    2758    2759    2760
 240          SQ       0       0       0       0      28      79
 241          KO                                      22
              *

 242          KK   CLEAR
 243          KM  CLEAR HYDROGRAPH STACK
 244          HC       8
              *

 245          KK       J
 246          KM  RUNOFF FROM SUB-BASIN J
 247          BA    .024
 248          LS                  88     7.9
 249          UK     145     .02    0.13     100
 250          RK     965    .026    .032             TRAP       5       5
              *
1                                          HEC-1 INPUT                                          PAGE  7

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

 251          KK    BASJ
 252          KM  11' WEIR
 253          RS       1    STOR       0
 254          SV       0    .098    .217    .359    .528   0.698
 255          SE    2769    2770    2771    2772    2773    2774
 256          SQ       0       0       0       0      31      87
 257          KO                                      22
              *

 258          KK       K
 259          KM  RUNOFF FROM SUB-BASIN K
 260          BA    .009
 261          LS                  88      10
 262          UK      81    .025    0.13     100
 263          RK     715    .022    .032             TRAP       5       5
              *

 264          KK    BASK
 265          KM  13' WEIR
 266          RS       1    STOR       0
 267          SV       0    .106    .232    .378   0.525
 268          SE    2737    2738    2739    2740    2741
 269          SQ       0       0       0       0      36
 270          KO                                      22
              *

 271          KK       L
 272          KM  RUNOFF FROM SUB-BASIN L
 273          BA    .009
 274          LS                  88      10
 275          UK     113    .018    0.13     100
 276          RK     450    .012    .032             TRAP       5       5
              *

 277          KK    BASL
 278          KM  13' WEIR
 279          RS       1    STOR       0
 280          SV       0   0.041   0.106     0.2   0.326
 281          SE    2722    2723    2724    2725    2726
 282          SQ       0       0       0       0      36
 283          KO                                      22
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                    *

 284                KK       M
 285                KM  RUNOFF FROM SUB-BASIN M
 286                BA    .008
 287                LS              88      10
 288                UK     137    .018    0.13     100
 289                RK     750    .012    .032            TRAP       4       5
                    *
1                                          HEC-1 INPUT                                                    PAGE  8

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

 290                KK    BASM
 291                KM  7' WEIR
 292                RS       1    STOR       0
 293                SV       0   0.056   0.124   0.205   0.301   0.413
 294                SE    2713    2714    2715    2716    2717    2718
 295                SQ       0       0       0       0      20      55
 296                KO                                      22
                    *

 297                KK       N
 298                KM  RUNOFF FROM SUB-BASIN N
 299                BA     .01
 300                LS              88      10
 301                UK     117    .018    0.13     100
 302                RK    1036    .012    .032            TRAP       5       5
                    *

 303                KK    BASN
 304                KM  13' WEIR
 305                RS       1    STOR       0
 306                SV       0   0.083   0.191   0.326    0.49   0.686
 307                SE    2688    2689    2690    2691    2692    2693
 308                SQ       0       0       0       0       0      36
 309                KO                                      22
                    *

 310                KK       O
 311                KM  RUNOFF FROM SUB-BASIN O
 312                KM  Area of Basin subtrating the area to be retained for 100 year event
 313                BA  0.0024       9
 314                LS              88      10
 315                UK     108     .02    0.13     100
 316                RK     174    .014    .032            TRAP       4       5
 317                KO                                      22

 318                KK       P
 319                KM  RUNOFF FROM SUB-BASIN P
 320                KM  Area of Basin subtrating the area to be retained for 100 year event
 321                BA   .0058
 322                LS              88      10
 323                UK     135     .02    0.13     100
 324                RK     354    .014    .032            TRAP       5       5
 325                KO                                      22

 326                KK   CLEAR
 327                KM  CLEAR HYDROGRAPH STACK
 328                HC       8

 329                KK       Q
 330                KM  RUNOFF FROM SUB-BASIN Q
 331                KM  Area of Basin subtrating the area to be retained for 100 year event
 332                BA   .0024
 333                LS              88      10
 334                UK      86     .02    0.13     100
1                                          HEC-1 INPUT                                                    PAGE  9

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

 335                RK     160    .014    .032            TRAP       4       5
 336                KO                                      22

 337                KK       R
 338                KM  RUNOFF FROM SUB-BASIN R
 339                KM  Area of Basin subtrating the area to be retained for 100 year event
 340                BA     .14       8
 341                LS              88     .14
 342                UK     180    .025    0.13     100
 343                RK    4300    .023    .032            TRAP      15       5
 344                KO                                      22
 345                ZZ
1
          SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

   16          A1
                V
                V
   22        BASA1
                .
                .
   29           .          A2
                .           V
                .           V
   35           .       BAS A2
                .           .
                .           .
   42           .           .          B1
                .           .           V
                .           .           V
```

```
48                  BASB-3
55                                B2
61                  COMBB............
                       V
                       V
64                  BASB-5
71                                C
                                  V
                                  V
77                            BASC-1
84                                        D
                                          V
                                          V
90                                    BASD-2
97                                                E1
                                                   V
                                                   V
103                                           BASE1-
110                                                          E2
                                                              V
                                                              V
116                                                       BASE2
124                                           COMBE............
128 CLEAR...........................................................
131             E3
                 V
                 V
137          BASE3
144                 F1
                     V
                     V
150                 BASF1
157                               F2
                                   V
                                   V
163                           BASF2
170                                       F3
                                           V
                                           V
176                                   BASF3
183                                                G
                                                   V
                                                   V
189                                           BASG
196                                                          H1
                                                              V
                                                              V
202                                                       BASH1
210                                                                   H2
                                                                       V
                                                                       V
216                                                                BASH2-
                                                                       V
                                                                       V
222                                                                BASH2-
229                                                                                I
                                                                                   V
                                                                                   V
235                                                                             BASI
242          CLEAR...............................................................
245                 J
                     V
                     V
251                 BASJ
258                               K
                                   V
                                   V
264                           BASK
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  326                                                             .
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  329                                                             .
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                                                                  .
  337                                                             .
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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1****************************************                    ****************************************
*                                      *                    *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *   U.S. ARMY CORPS OF ENGINEERS       *
*              JUN   1998              *                    *   HYDROLOGIC ENGINEERING CENTER      *
*           VERSION 4.1                *                    *         609 SECOND STREET            *
*                                      *                    *      DAVIS, CALIFORNIA 95616         *
*  RUN DATE   14NOV06  TIME  17:50:45  *                    *          (916) 756-1104              *
*                                      *                    *                                      *
****************************************                    ****************************************
```

```
                    HEC-1 MODEL FOR SERENO CANYON
                    100-YEAR, 6-HOUR STORM
                    RAINFALL FROM NOAA ATLAS
                    SCS CURVE NUMBER SOIL LOSS PARAMETERS
                    KINEMATIC WAVE HYDROGRAPH ROUTING
                    DEVELOPED CONDITIONS
                    10% IMPERVIOUS AREA USED FOR SITE

                    PREPARED BY WOOD/PATEL, 1.10.2005
                    FILE NAME:  DEV-100.DAT

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

    IT        HYDROGRAPH TIME DATA
                     NMIN          2  MINUTES IN COMPUTATION INTERVAL
                    IDATE      1   0  STARTING DATE
                    ITIME       0000  STARTING TIME
                       NQ        900  NUMBER OF HYDROGRAPH ORDINATES
                   NDDATE      2   0  ENDING DATE
                   NDTIME       0558  ENDING TIME
                    ICENT         19  CENTURY MARK

                COMPUTATION INTERVAL     .03 HOURS
                     TOTAL TIME BASE   29.97 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

 14 JD        INDEX STORM NO. 1
                     STRM        3.37  PRECIPITATION DEPTH
                     TRDA         .01  TRANSPOSITION DRAINAGE AREA

 15 PI          PRECIPITATION PATTERN
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                   .00       .00       .01       .01       .01       .01       .01       .01       .01       .01
                   .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                   .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                   .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                   .01       .01       .01       .01       .01       .03       .03       .03       .03       .03
                   .04       .04       .04       .06       .06       .07       .09       .12       .17       .29
                   .29       .24       .15       .11       .07       .07       .06       .05       .04       .04
                   .04       .03       .03       .03       .03       .01       .01       .01       .01       .01
                   .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                   .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                   .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
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```
.01     .01     .01     .01     .01     .01     .01     .01     .00     .00
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.00     .00     .00     .00     .00     .00     .00     .00     .00     .00
.00     .00     .00     .00     .00     .00     .00     .00     .00     .00

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

          **************
          *            *
 22 KK    *    BASA1   *
          *            *
          **************

 28 KO        OUTPUT CONTROL VARIABLES
                IPRNT          5  PRINT CONTROL
                IPLOT          0  PLOT CONTROL
                QSCAL         0.  HYDROGRAPH PLOT SCALE
                IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                 IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
               TIMINT       .033  TIME INTERVAL IN HOURS

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

          **************
          *            *
 35 KK    *   BAS A2   *          -3
          *            *
          **************

 41 KO        OUTPUT CONTROL VARIABLES
                IPRNT          5  PRINT CONTROL
                IPLOT          0  PLOT CONTROL
                QSCAL         0.  HYDROGRAPH PLOT SCALE
                IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                 IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
               TIMINT       .033  TIME INTERVAL IN HOURS

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

          **************
          *            *
 48 KK    *   BASB-3   *
          *            *
          **************

 54 KO        OUTPUT CONTROL VARIABLES
                IPRNT          5  PRINT CONTROL
                IPLOT          0  PLOT CONTROL
                QSCAL         0.  HYDROGRAPH PLOT SCALE
                IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                 IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
               TIMINT       .033  TIME INTERVAL IN HOURS

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

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          *            *
 64 KK    *   BASB-5   *
          *            *
          **************

 70 KO        OUTPUT CONTROL VARIABLES
                IPRNT          5  PRINT CONTROL
                IPLOT          0  PLOT CONTROL
                QSCAL         0.  HYDROGRAPH PLOT SCALE
                IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                 IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
               TIMINT       .033  TIME INTERVAL IN HOURS

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

          **************
          *            *
 77 KK    *   BASC-1   *
          *            *
          **************

 83 KO        OUTPUT CONTROL VARIABLES
                IPRNT          5  PRINT CONTROL
```

```
                IPLOT          0  PLOT CONTROL
                QSCAL         0.  HYDROGRAPH PLOT SCALE
                IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                 IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
               TIMINT       .033  TIME INTERVAL IN HOURS


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


          **************
          *            *
 90 KK    *    BASD-2  *
          *            *
          **************

 96 KO          OUTPUT CONTROL VARIABLES
                IPRNT          5  PRINT CONTROL
                IPLOT          0  PLOT CONTROL
                QSCAL         0.  HYDROGRAPH PLOT SCALE
                IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                 IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
               TIMINT       .033  TIME INTERVAL IN HOURS


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


          **************
          *            *
103 KK    *    BASE1-  *          2
          *            *
          **************

109 KO          OUTPUT CONTROL VARIABLES
                IPRNT          5  PRINT CONTROL
                IPLOT          0  PLOT CONTROL
                QSCAL         0.  HYDROGRAPH PLOT SCALE
                IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                 IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
               TIMINT       .033  TIME INTERVAL IN HOURS


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


          **************
          *            *
116 KK    *     BASE2  *
          *            *
          **************

123 KO          OUTPUT CONTROL VARIABLES
                IPRNT          5  PRINT CONTROL
                IPLOT          0  PLOT CONTROL
                QSCAL         0.  HYDROGRAPH PLOT SCALE
                IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                 IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
               TIMINT       .033  TIME INTERVAL IN HOURS


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


          **************
          *            *
124 KK    *     COMBE  *
          *            *
          **************

127 KO          OUTPUT CONTROL VARIABLES
                IPRNT          5  PRINT CONTROL
                IPLOT          0  PLOT CONTROL
                QSCAL         0.  HYDROGRAPH PLOT SCALE
                IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                 IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
               TIMINT       .033  TIME INTERVAL IN HOURS


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


          **************
          *            *
137 KK    *     BASE3  *         -1
          *            *
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              **************
143 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE
                      IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                       IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT       .033  TIME INTERVAL IN HOURS

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

              **************
              *            *
150 KK        *     BASF1  *          -3
              *            *
              **************

156 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE
                      IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                       IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT       .033  TIME INTERVAL IN HOURS

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

              **************
              *            *
163 KK        *     BASF2  *          -2
              *            *
              **************

169 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE
                      IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                       IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT       .033  TIME INTERVAL IN HOURS

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

              **************
              *            *
176 KK        *     BASF3  *          -1
              *            *
              **************

182 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE
                      IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                       IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT       .033  TIME INTERVAL IN HOURS

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

              **************
              *            *
189 KK        *      BASG  *          -1
              *            *
              **************

195 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE
                      IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                       IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2        900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT       .033  TIME INTERVAL IN HOURS

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
```

```
              **************
              *            *
 202 KK       *     BASH1  *          -1
              *            *
              **************

 209 KO            OUTPUT CONTROL VARIABLES
                        IPRNT           5  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                        IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                         IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT        .033  TIME INTERVAL IN HOURS


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

              **************
              *            *
 222 KK       *    BASH2-  *          2
              *            *
              **************

 228 KO            OUTPUT CONTROL VARIABLES
                        IPRNT           5  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                        IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                         IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT        .033  TIME INTERVAL IN HOURS


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

              **************
              *            *
 235 KK       *      BASI  *
              *            *
              **************

 241 KO            OUTPUT CONTROL VARIABLES
                        IPRNT           5  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                        IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                         IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT        .033  TIME INTERVAL IN HOURS


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

              **************
              *            *
 251 KK       *      BASJ  *
              *            *
              **************

 257 KO            OUTPUT CONTROL VARIABLES
                        IPRNT           5  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                        IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                         IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT        .033  TIME INTERVAL IN HOURS


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

              **************
              *            *
 264 KK       *      BASK  *
              *            *
              **************

 270 KO            OUTPUT CONTROL VARIABLES
                        IPRNT           5  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                        IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                         IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT        .033  TIME INTERVAL IN HOURS
```

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

            **************
            *            *
 277 KK     *      BASL  *
            *            *
            **************

 283 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS


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

            **************
            *            *
 290 KK     *      BASM  *
            *            *
            **************

 296 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS


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

            **************
            *            *
 303 KK     *      BASN  *
            *            *
            **************

 309 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS


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

            **************
            *            *
 310 KK     *         O  *
            *            *
            **************

 317 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS


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

            **************
            *            *
 318 KK     *         P  *
            *            *
            **************

 325 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
```

```
                    TIMINT        .033  TIME INTERVAL IN HOURS


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

            **************
            *            *
 329 KK     *          Q *
            *            *
            **************

 336 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS


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

            **************
            *            *
 337 KK     *          R *
            *            *
            **************

 344 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2         900  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .033  TIME INTERVAL IN HOURS
1
                                                RUNOFF SUMMARY
                                        FLOW IN CUBIC FEET PER SECOND
                                     TIME IN HOURS,  AREA IN SQUARE MILES

                                     PEAK   TIME OF    AVERAGE FLOW FOR MAXIMUM PERIOD      BASIN    MAXIMUM    TIME OF
          OPERATION        STATION   FLOW    PEAK                                          AREA     STAGE    MAX STAGE
+                                                        6-HOUR     24-HOUR     72-HOUR
          HYDROGRAPH AT
+                              A1    236.    3.17         19.         5.          4.       .08
          ROUTED TO
+                           BASA1    228.    3.17         18.         5.          4.       .08
+                                                                                          2761.99      3.17
          HYDROGRAPH AT
+                              A2    112.    3.13          9.         2.          2.       .04
          ROUTED TO
+                          BAS A2    108.    3.17          8.         2.          2.       .04
+                                                                                          2739.95      3.17
          HYDROGRAPH AT
+                              B1     84.    3.13          6.         2.          1.       .03
          ROUTED TO
+                          BASB-3     76.    3.17          6.         1.          1.       .03
+                                                                                          2785.80      3.17
          HYDROGRAPH AT
+                              B2    131.    3.17         12.         3.          2.       .05
          2 COMBINED AT
+                           COMBB    207.    3.17         18.         4.          4.       .08
          ROUTED TO
+                          BASB-5    198.    3.20         16.         4.          3.       .08
+                                                                                          2747.00      3.20
          HYDROGRAPH AT
+                               C     92.    3.13          7.         2.          1.       .03
          ROUTED TO
+                          BASC-1     80.    3.20          6.         2.          1.       .03
+                                                                                          2783.88      3.20
          HYDROGRAPH AT
+                               D     98.    3.13          8.         2.          2.       .03
          ROUTED TO
+                          BASD-2     79.    3.23          8.         2.          2.       .03
+                                                                                          2723.85      3.23
          HYDROGRAPH AT
+                              E1    154.    3.17         15.         4.          3.       .06
          ROUTED TO
+                          BASE1-    145.    3.23         14.         3.          3.       .06
+                                                                                          2699.95      3.23
```

+	HYDROGRAPH AT	E2	138.	3.13	11.	3.	2.	.05	
+	ROUTED TO	BASE2	101.	3.23	7.	2.	1.	.05	
+									2702.78 3.23
+	2 COMBINED AT	COMBE	246.	3.23	21.	5.	4.	.11	
+	6 COMBINED AT	CLEAR	885.	3.23	78.	19.	16.	.37	
+	HYDROGRAPH AT	E3	29.	3.10	2.	0.	0.	.01	
+	ROUTED TO	BASE3	16.	3.20	1.	0.	0.	.01	
+									2714.56 3.20
+	HYDROGRAPH AT	F1	102.	3.17	9.	2.	2.	.04	
+	ROUTED TO	BASF1	88.	3.23	8.	2.	2.	.04	
+									2699.89 3.23
+	HYDROGRAPH AT	F2	45.	3.13	3.	1.	1.	.01	
+	ROUTED TO	BASF2	35.	3.20	3.	1.	1.	.01	
+									2704.78 3.20
+	HYDROGRAPH AT	F3	41.	3.13	3.	1.	1.	.01	
+	ROUTED TO	BASF3	38.	3.17	3.	1.	1.	.01	
+									2707.98 3.17
+	HYDROGRAPH AT	G	43.	3.13	4.	1.	1.	.02	
+	ROUTED TO	BASG	31.	3.27	3.	1.	1.	.02	
+									2726.74 3.27
+	HYDROGRAPH AT	H1	160.	3.17	14.	4.	3.	.06	
+	ROUTED TO	BASH1	147.	3.20	11.	3.	2.	.06	
+									2745.93 3.20
+	HYDROGRAPH AT	H2	176.	3.20	17.	4.	3.	.07	
+	ROUTED TO	BASH2-	172.	3.23	16.	4.	3.	.07	
+									2775.99 3.23
+	ROUTED TO	BASH2-	165.	3.27	15.	4.	3.	.07	
+									2788.99 3.27
+	HYDROGRAPH AT	I	76.	3.13	6.	2.	1.	.03	
+	ROUTED TO	BASI	50.	3.23	5.	1.	1.	.03	
+									2759.43 3.23
+	8 COMBINED AT	CLEAR	543.	3.23	48.	12.	10.	.24	
+	HYDROGRAPH AT	J	86.	3.10	6.	1.	1.	.02	
+	ROUTED TO	BASJ	75.	3.13	5.	1.	1.	.02	
+									2773.79 3.13
+	HYDROGRAPH AT	K	36.	3.07	2.	1.	0.	.01	
+	ROUTED TO	BASK	20.	3.17	1.	0.	0.	.01	
+									2740.57 3.17
+	HYDROGRAPH AT	L	34.	3.07	2.	1.	0.	.01	
+	ROUTED TO	BASL	28.	3.13	2.	0.	0.	.01	
+									2725.78 3.13
+	HYDROGRAPH AT	M	29.	3.10	2.	0.	0.	.01	
+	ROUTED TO	BASM	21.	3.17	2.	0.	0.	.01	
+									2717.03 3.17
	HYDROGRAPH AT								

```
+                          N       36.    3.10          2.          1.          0.        .01
        ROUTED TO
+                       BASN       16.    3.27          1.          0.          0.        .01
+                                                                                        2692.43        3.27
        HYDROGRAPH AT
+                          O        9.    3.07          1.          0.          0.        .00
        HYDROGRAPH AT
+                          P       21.    3.07          1.          0.          0.        .01
        8 COMBINED AT
+                      CLEAR      673.    3.23         61.         15.         12.        .31
        HYDROGRAPH AT
+                          Q       10.    3.07          1.          0.          0.        .00
        HYDROGRAPH AT
+                          R      411.    3.13         32.          8.          6.        .14
1
                                   SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
                                       (FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)
                                                                          INTERPOLATED TO
                                                                       COMPUTATION INTERVAL
         ISTAQ    ELEMENT      DT       PEAK    TIME TO      VOLUME      DT       PEAK    TIME TO      VOLUME
                                                   PEAK                                     PEAK

                              (MIN)     (CFS)     (MIN)      (IN)     (MIN)     (CFS)     (MIN)       (IN)

         FOR STORM = 1  STORM AREA (SQ MI) =        .01
               A1  MANE        1.88    239.78    189.45      2.16      2.00    236.42    190.00       2.16

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .9693E+01 OUTFLOW= .9674E+01 BASIN STORAGE= .1217E-02 PERCENT ERROR=    .2

         FOR STORM = 1  STORM AREA (SQ MI) =        .01
               A2  MANE        1.44    112.74    188.42      2.24      2.00    112.13    188.00       2.24

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .4302E+01 OUTFLOW= .4291E+01 BASIN STORAGE= .3724E-03 PERCENT ERROR=    .2

         FOR STORM = 1  STORM AREA (SQ MI) =        .01
               B1  MANE        1.70     84.46    188.49      2.19      2.00     83.67    188.00       2.19

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .3161E+01 OUTFLOW= .3155E+01 BASIN STORAGE= .2478E-03 PERCENT ERROR=    .2

         FOR STORM = 1  STORM AREA (SQ MI) =        .01
               B2  MANE        1.43    130.88    189.97      2.22      2.00    130.85    190.00       2.22

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .5952E+01 OUTFLOW= .5933E+01 BASIN STORAGE= .1117E-02 PERCENT ERROR=    .3

         FOR STORM = 1  STORM AREA (SQ MI) =        .01
                C  MANE        1.13     92.24    188.19      2.22      2.00     91.80    188.00       2.22

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .3556E+01 OUTFLOW= .3549E+01 BASIN STORAGE= .4105E-03 PERCENT ERROR=    .2

         FOR STORM = 1  STORM AREA (SQ MI) =        .01
                D  MANE        1.07     98.44    188.54      2.27      2.00     97.55    188.00       2.27

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .4120E+01 OUTFLOW= .4113E+01 BASIN STORAGE= .6457E-03 PERCENT ERROR=    .2

         FOR STORM = 1  STORM AREA (SQ MI) =        .01
               E1  MANE        1.46    154.45    191.31      2.27      2.00    153.59    190.00       2.27

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .7392E+01 OUTFLOW= .7370E+01 BASIN STORAGE= .1786E-02 PERCENT ERROR=    .3

         FOR STORM = 1  STORM AREA (SQ MI) =        .01
               E2  MANE        1.74    141.10    188.83      2.27      2.00    137.93    188.00       2.27

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .5574E+01 OUTFLOW= .5564E+01 BASIN STORAGE= .4962E-03 PERCENT ERROR=    .2

         FOR STORM = 1  STORM AREA (SQ MI) =        .01
               E3  MANE         .61     28.67    185.81      2.27      2.00     28.52    186.00       2.27

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .9695E+00 OUTFLOW= .9686E+00 BASIN STORAGE= .5751E-04 PERCENT ERROR=    .1

         FOR STORM = 1  STORM AREA (SQ MI) =        .01
               F1  MANE        2.00    102.90    190.64      2.27      2.00    102.36    190.00       2.27

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .4363E+01 OUTFLOW= .4352E+01 BASIN STORAGE= .5158E-03 PERCENT ERROR=    .2

         FOR STORM = 1  STORM AREA (SQ MI) =        .01
               F2  MANE        1.19     44.77    187.96      2.27      2.00     44.71    188.00       2.27

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1697E+01 OUTFLOW= .1695E+01 BASIN STORAGE= .1539E-03 PERCENT ERROR=    .1
```

```
FOR STORM = 1  STORM AREA (SQ MI) =        .01
      F3  MANE          .68     41.31    186.98      2.27      2.00     40.52    188.00        2.27

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1575E+01 OUTFLOW= .1573E+01 BASIN STORAGE= .1671E-03 PERCENT ERROR=    .1

FOR STORM = 1  STORM AREA (SQ MI) =        .01
      G  MANE          .69     43.96    189.19      2.27      2.00     43.37    188.00        2.27

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1939E+01 OUTFLOW= .1934E+01 BASIN STORAGE= .3297E-03 PERCENT ERROR=    .3

FOR STORM = 1  STORM AREA (SQ MI) =        .01
      H1  MANE         1.32    160.19    190.42      2.26      2.00    159.95    190.00        2.26

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .7127E+01 OUTFLOW= .7113E+01 BASIN STORAGE= .1335E-02 PERCENT ERROR=    .2

FOR STORM = 1  STORM AREA (SQ MI) =        .01
      H2  MANE         2.00    176.79    191.31      2.20      2.00    175.93    192.00        2.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .8481E+01 OUTFLOW= .8448E+01 BASIN STORAGE= .1838E-02 PERCENT ERROR=    .4

FOR STORM = 1  STORM AREA (SQ MI) =        .01
      I  MANE         1.43     76.57    188.46      2.24      2.00     75.65    188.00        2.24

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .2987E+01 OUTFLOW= .2981E+01 BASIN STORAGE= .2899E-03 PERCENT ERROR=    .2

FOR STORM = 1  STORM AREA (SQ MI) =        .01
      J  MANE          .67     86.10    185.83      2.24      2.00     85.63    186.00        2.25

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .2876E+01 OUTFLOW= .2873E+01 BASIN STORAGE= .1339E-03 PERCENT ERROR=    .1

FOR STORM = 1  STORM AREA (SQ MI) =        .01
      K  MANE          .67     36.44    184.23      2.27      2.00     36.31    184.00        2.27

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1091E+01 OUTFLOW= .1091E+01 BASIN STORAGE= .1964E-04 PERCENT ERROR=    .0

FOR STORM = 1  STORM AREA (SQ MI) =        .01
      L  MANE          .50     34.08    184.38      2.27      2.00     33.57    184.00        2.27

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1091E+01 OUTFLOW= .1089E+01 BASIN STORAGE= .4161E-04 PERCENT ERROR=    .1

FOR STORM = 1  STORM AREA (SQ MI) =        .01
      M  MANE          .92     28.71    186.11      2.27      2.00     28.71    186.00        2.27

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .9695E+00 OUTFLOW= .9685E+00 BASIN STORAGE= .4774E-04 PERCENT ERROR=    .1

FOR STORM = 1  STORM AREA (SQ MI) =        .01
      N  MANE         1.07     36.42    185.94      2.27      2.00     36.37    186.00        2.27

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1212E+01 OUTFLOW= .1212E+01 BASIN STORAGE= .4858E-04 PERCENT ERROR=    .0

FOR STORM = 1  STORM AREA (SQ MI) =        .01
      O  MANE          .34      9.35    184.29      2.27      2.00      9.30    184.00        2.27

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .2908E+00 OUTFLOW= .2905E+00 BASIN STORAGE= .8448E-05 PERCENT ERROR=    .1

FOR STORM = 1  STORM AREA (SQ MI) =        .01
      P  MANE          .46     21.58    184.91      2.27      2.00     21.09    184.00        2.27

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .7029E+00 OUTFLOW= .7020E+00 BASIN STORAGE= .2793E-04 PERCENT ERROR=    .1

FOR STORM = 1  STORM AREA (SQ MI) =        .01
      Q  MANE          .32      9.68    183.90      2.27      2.00      9.65    184.00        2.27

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .2908E+00 OUTFLOW= .2907E+00 BASIN STORAGE= .5883E-05 PERCENT ERROR=    .1

FOR STORM = 1  STORM AREA (SQ MI) =        .01
      R  MANE         1.96    420.39    189.24      2.15      2.00    411.28    188.00        2.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1607E+02 OUTFLOW= .1602E+02 BASIN STORAGE= .1145E-02 PERCENT ERROR=    .3


*** NORMAL END OF HEC-1 ***
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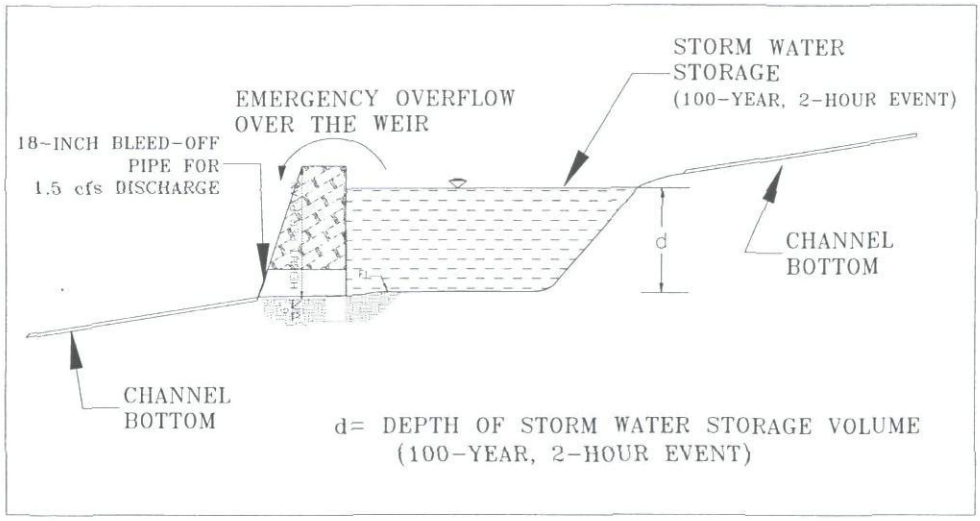
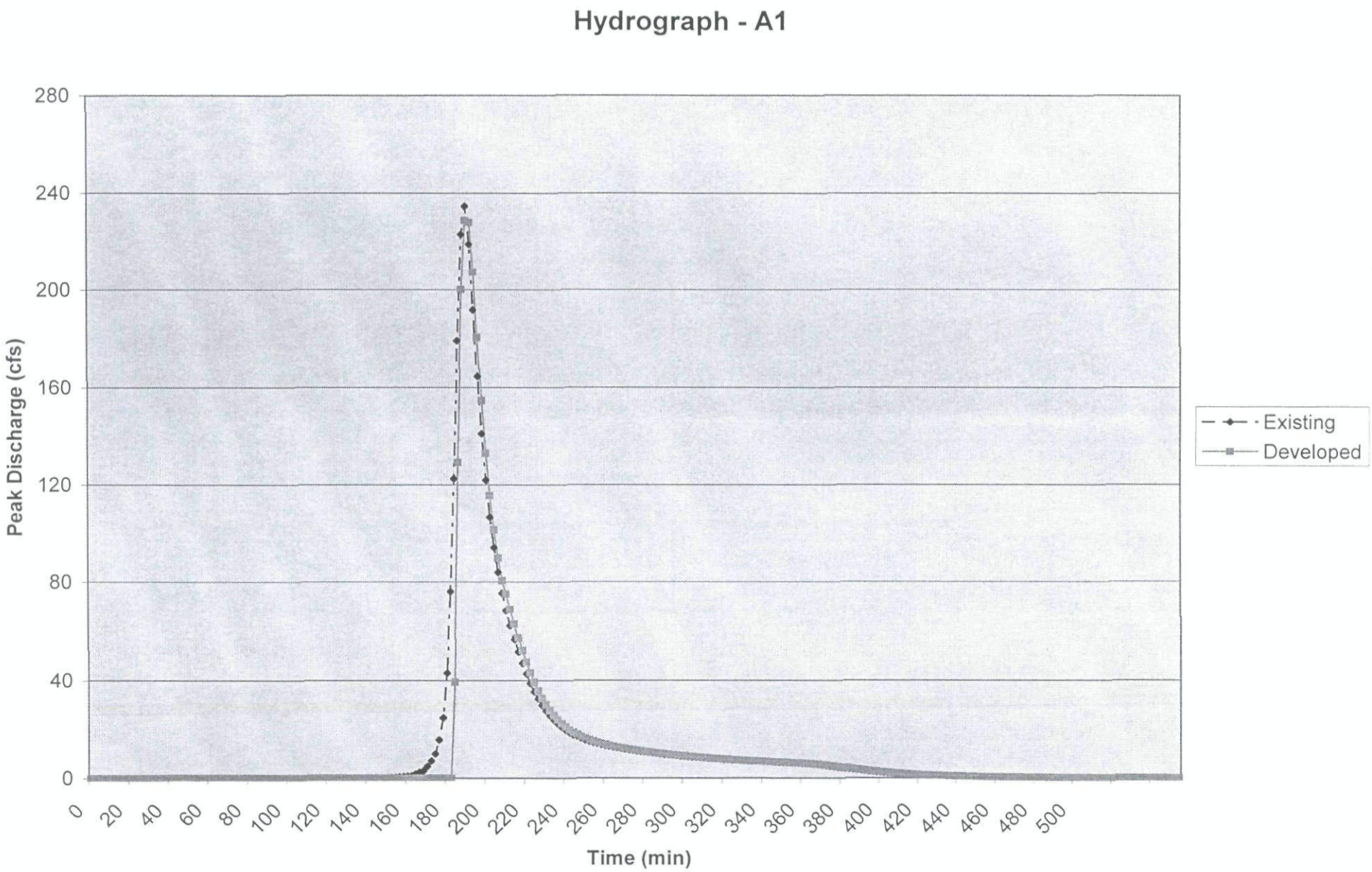
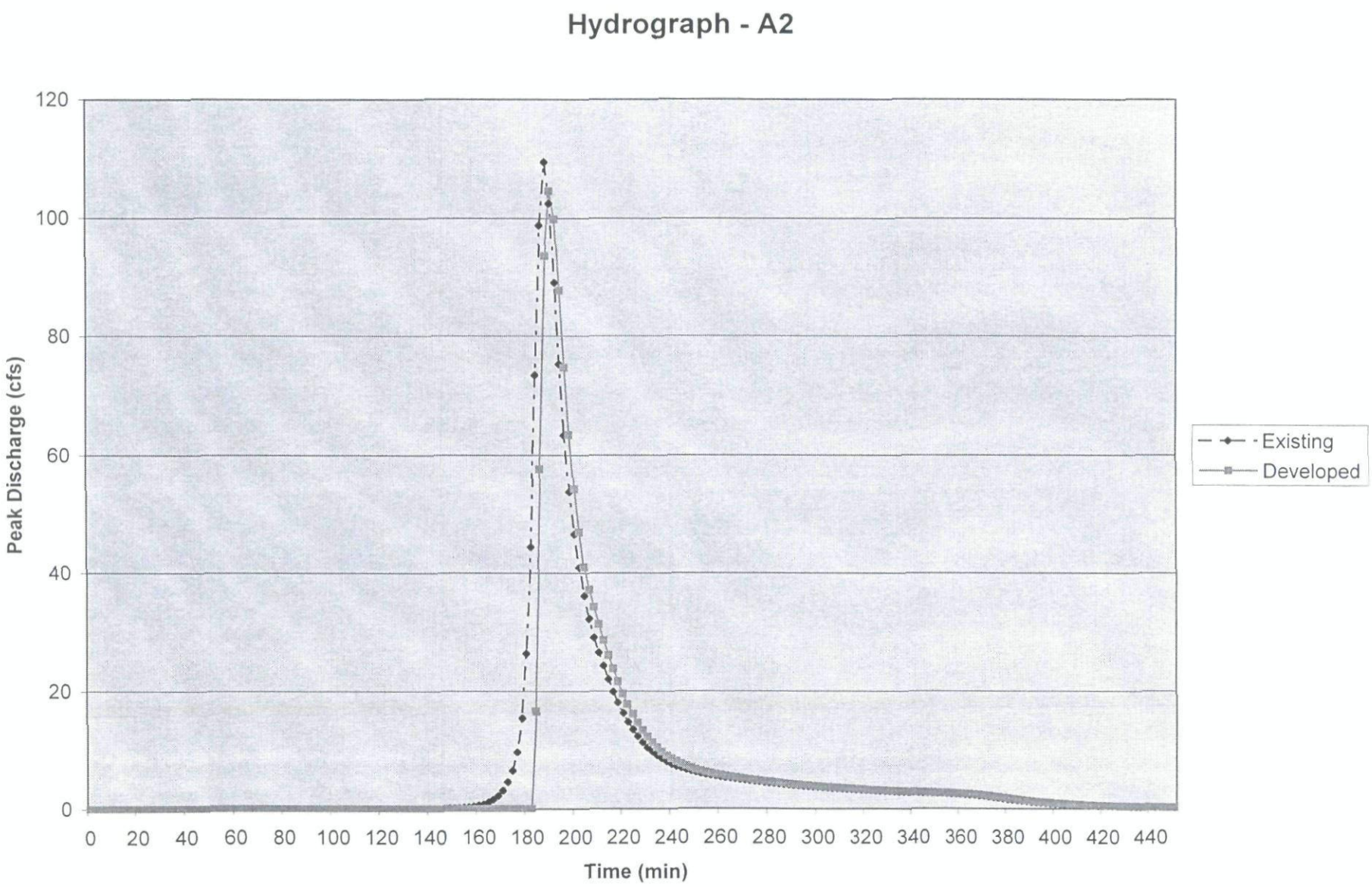

STORM WATER
STORAGE
(100-YEAR, 2-HOUR EVENT)
EMERGENCY OVERFLOW
OVER THE WEIR
18-INCH BLEED-OFF
PIPE FOR
1.5 cfs DISCHARGE
d
CHANNEL
BOTTOM
CHANNEL
BOTTOM
d= DEPTH OF STORM WATER STORAGE VOLUME
(100-YEAR, 2-HOUR EVENT)

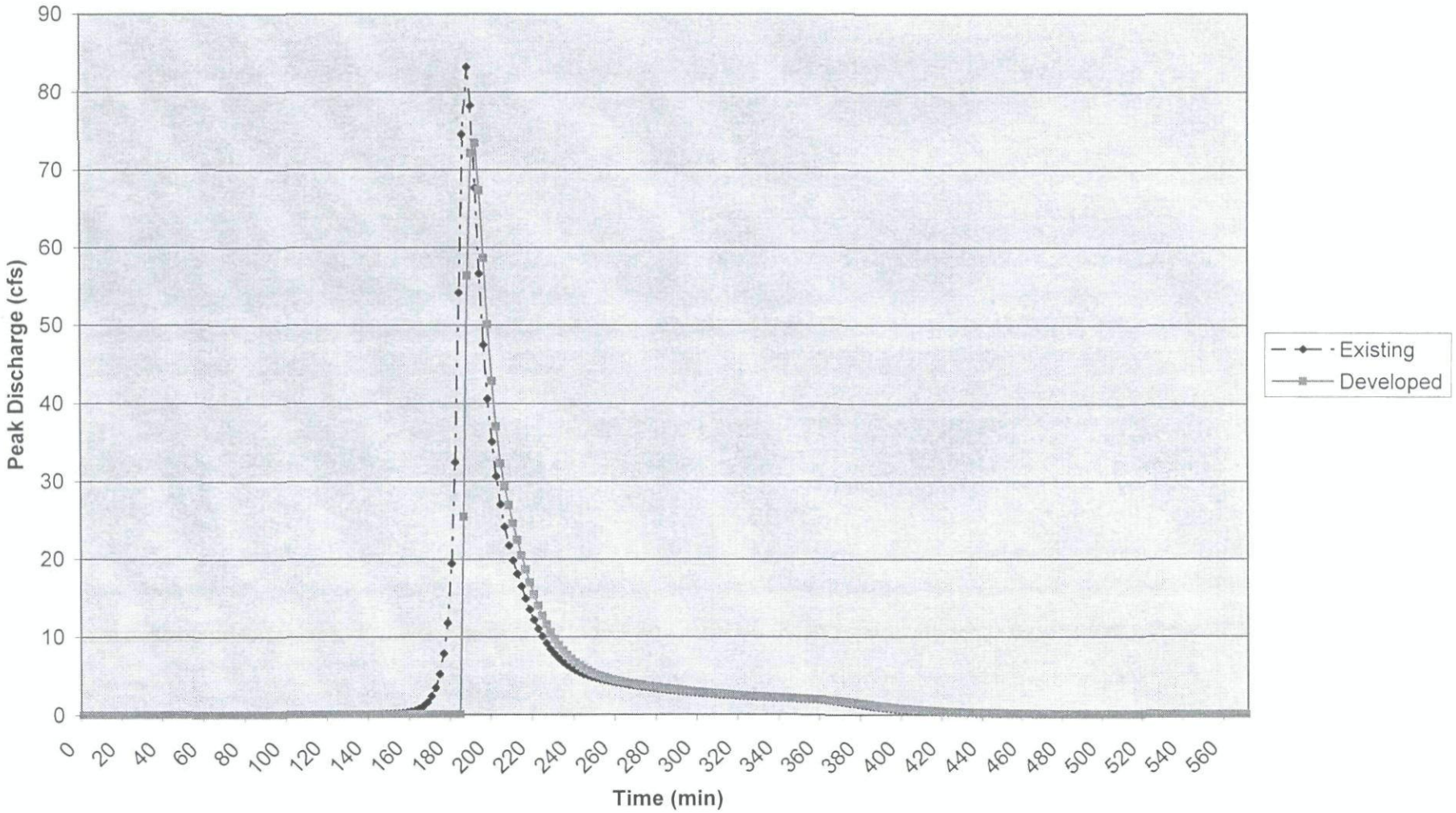
APPENDIX D

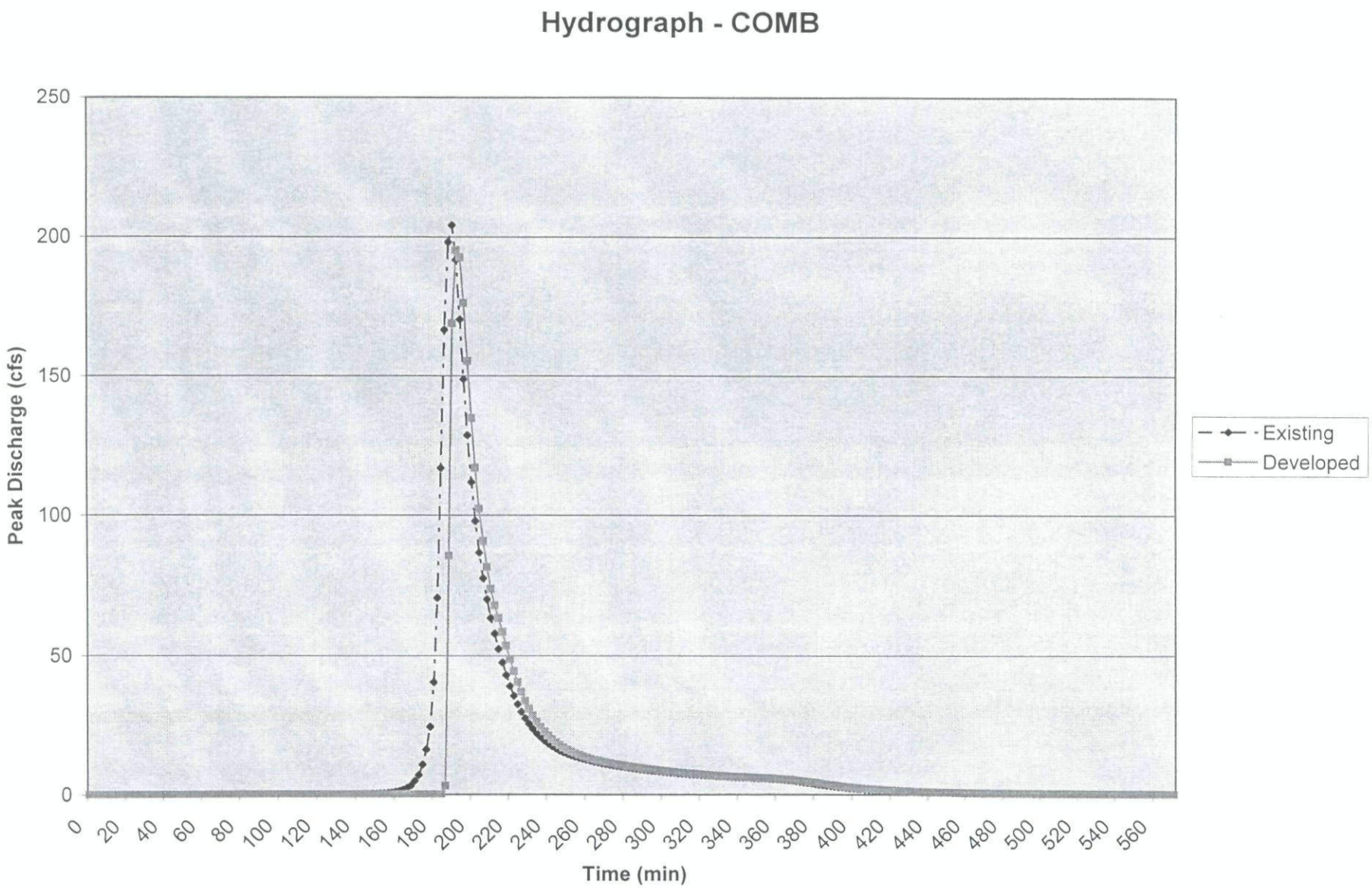
Hydrographs

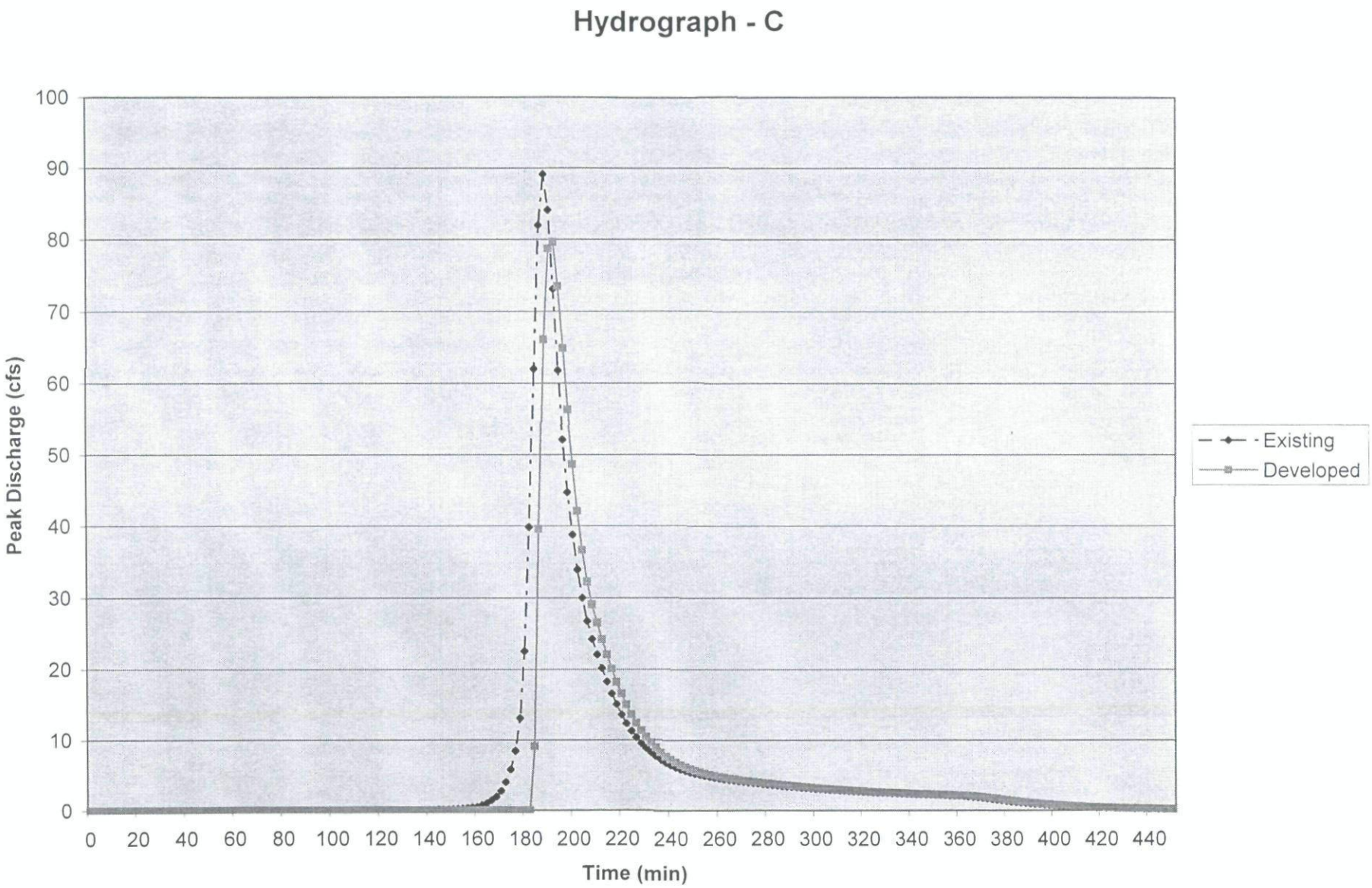

Hydrograph - A1
Peak Discharge (cfs)
280
240
200
160
120
80
40
0
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
360
380
400
420
440
460
480
500
Time (min)
Existing
Developed

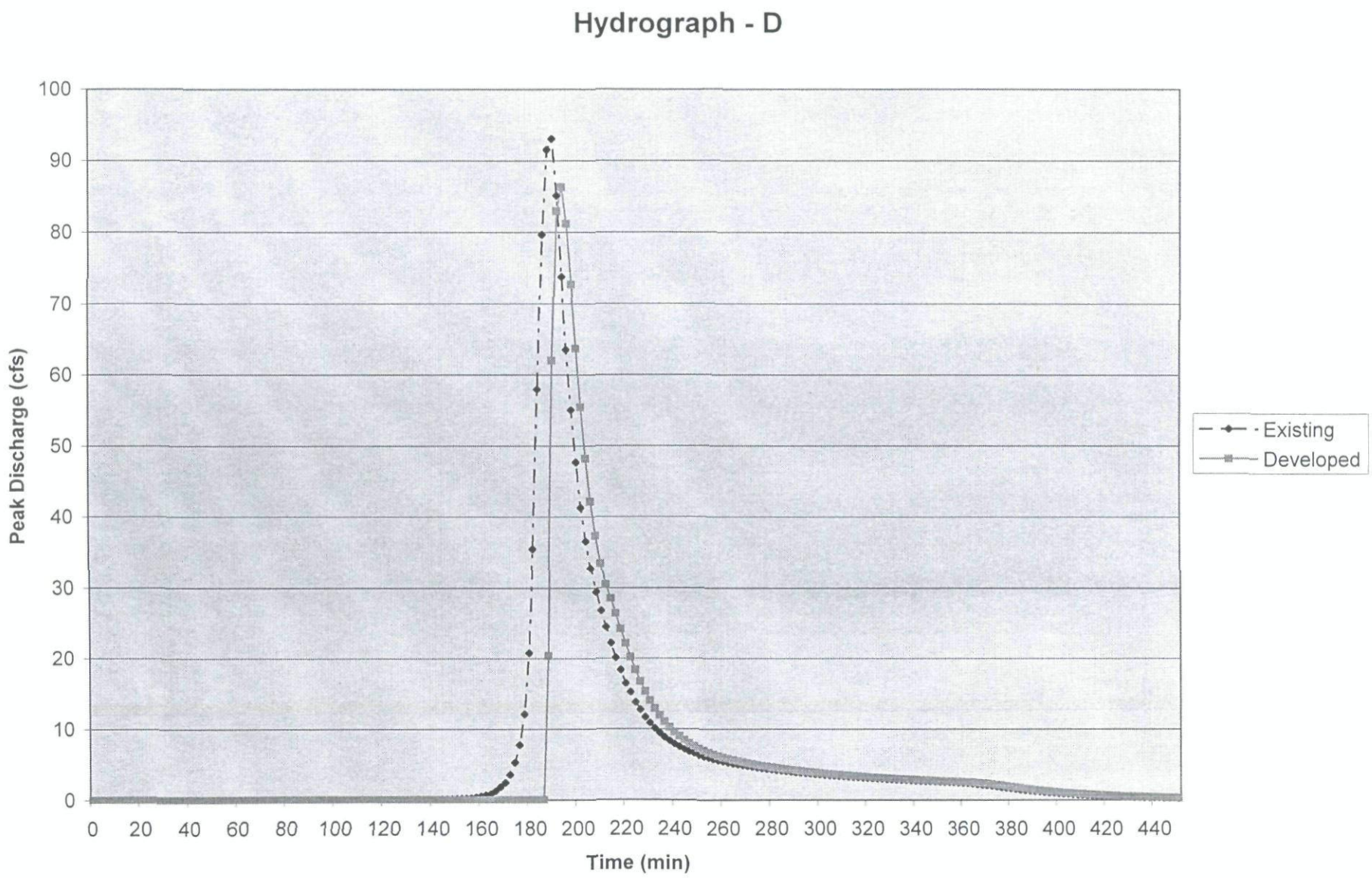

Hydrograph - A2
Peak Discharge (cfs)
120
100
80
60
40
20
0
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440
Time (min)
Existing
Developed

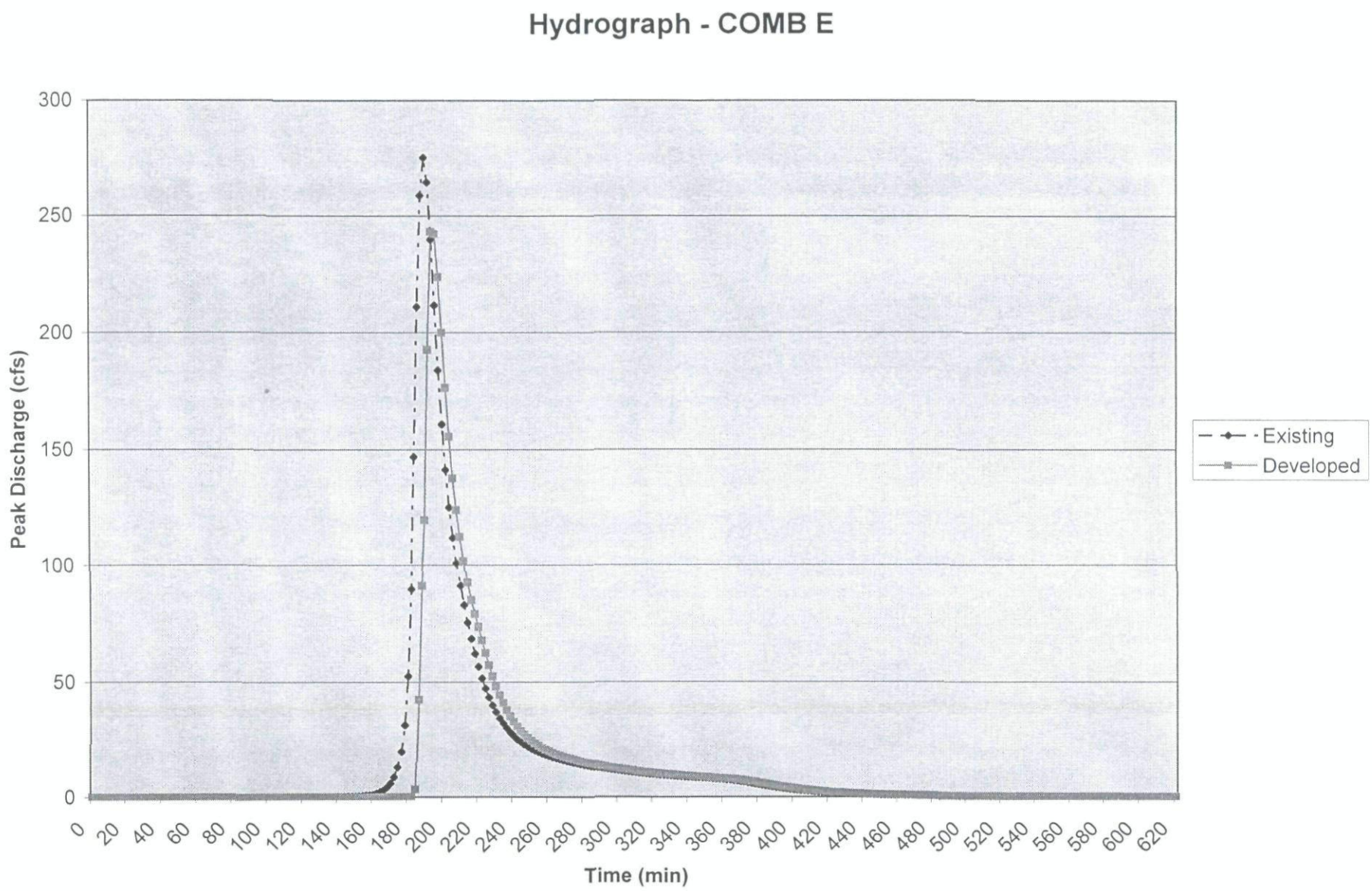
Hydrograph - B1

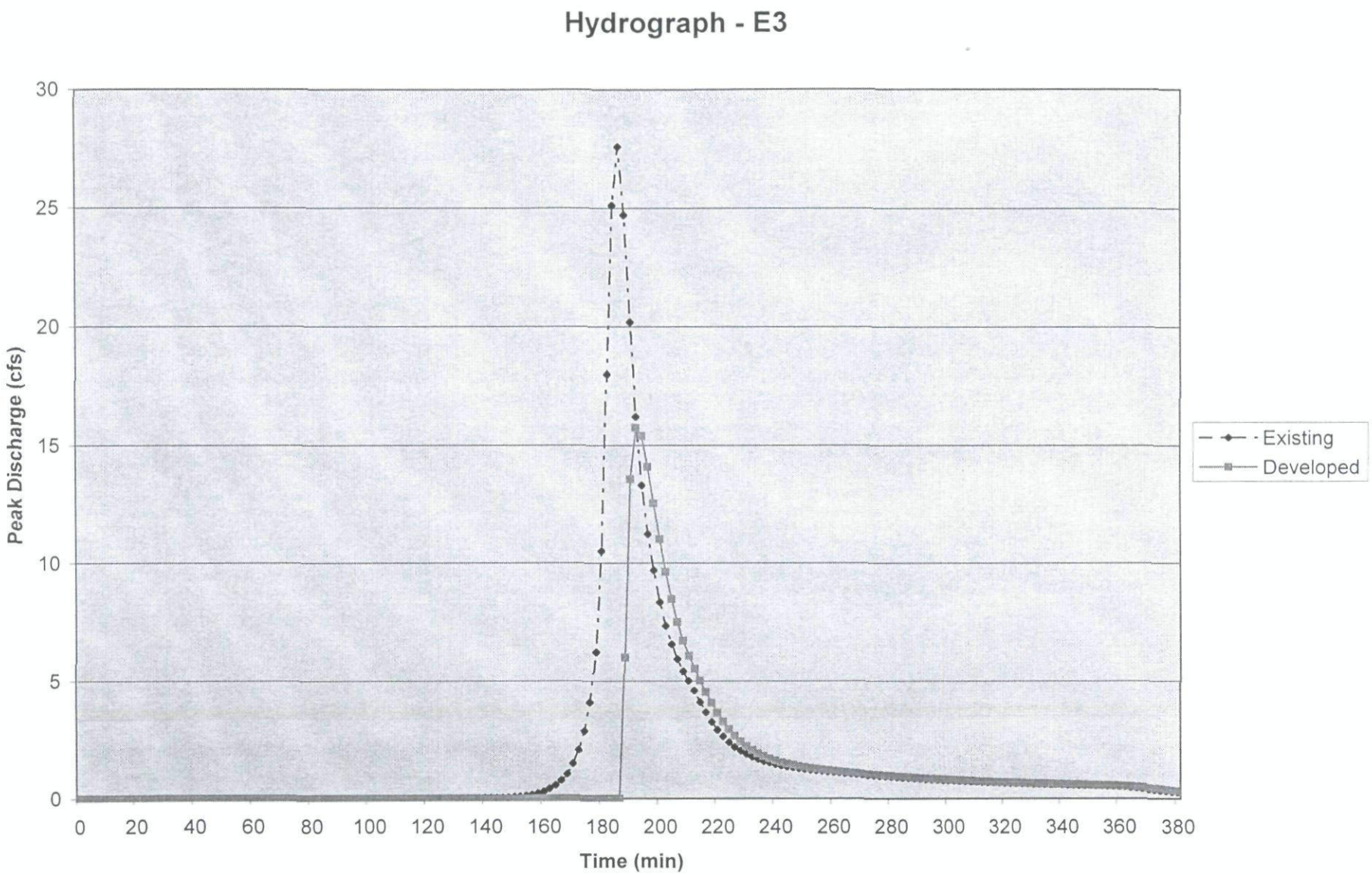


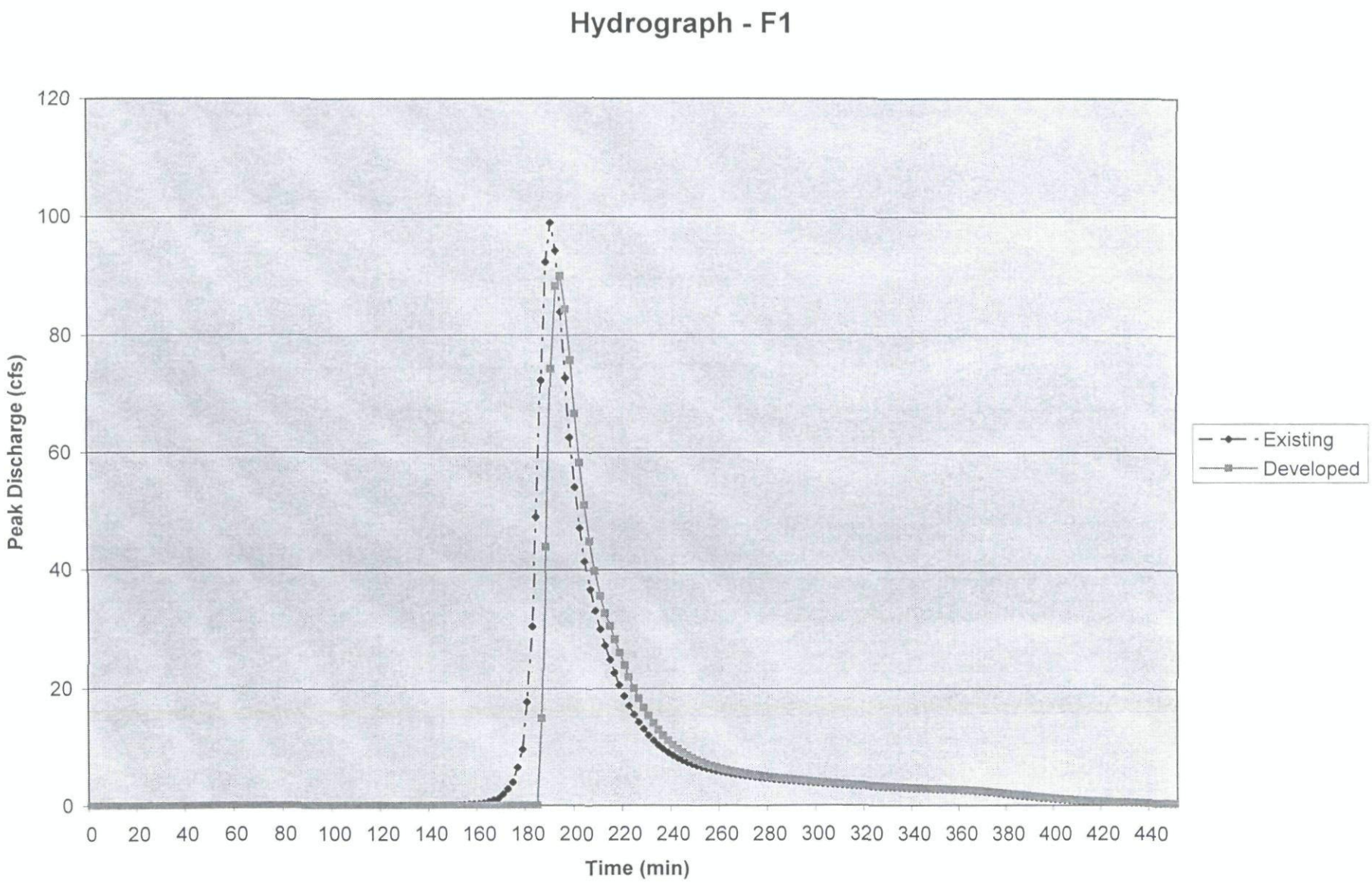

Hydrograph - COMB
Peak Discharge (cfs)
250
200
150
100
50
0
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
360
380
400
420
440
460
480
500
520
540
560
Time (min)
Existing
Developed

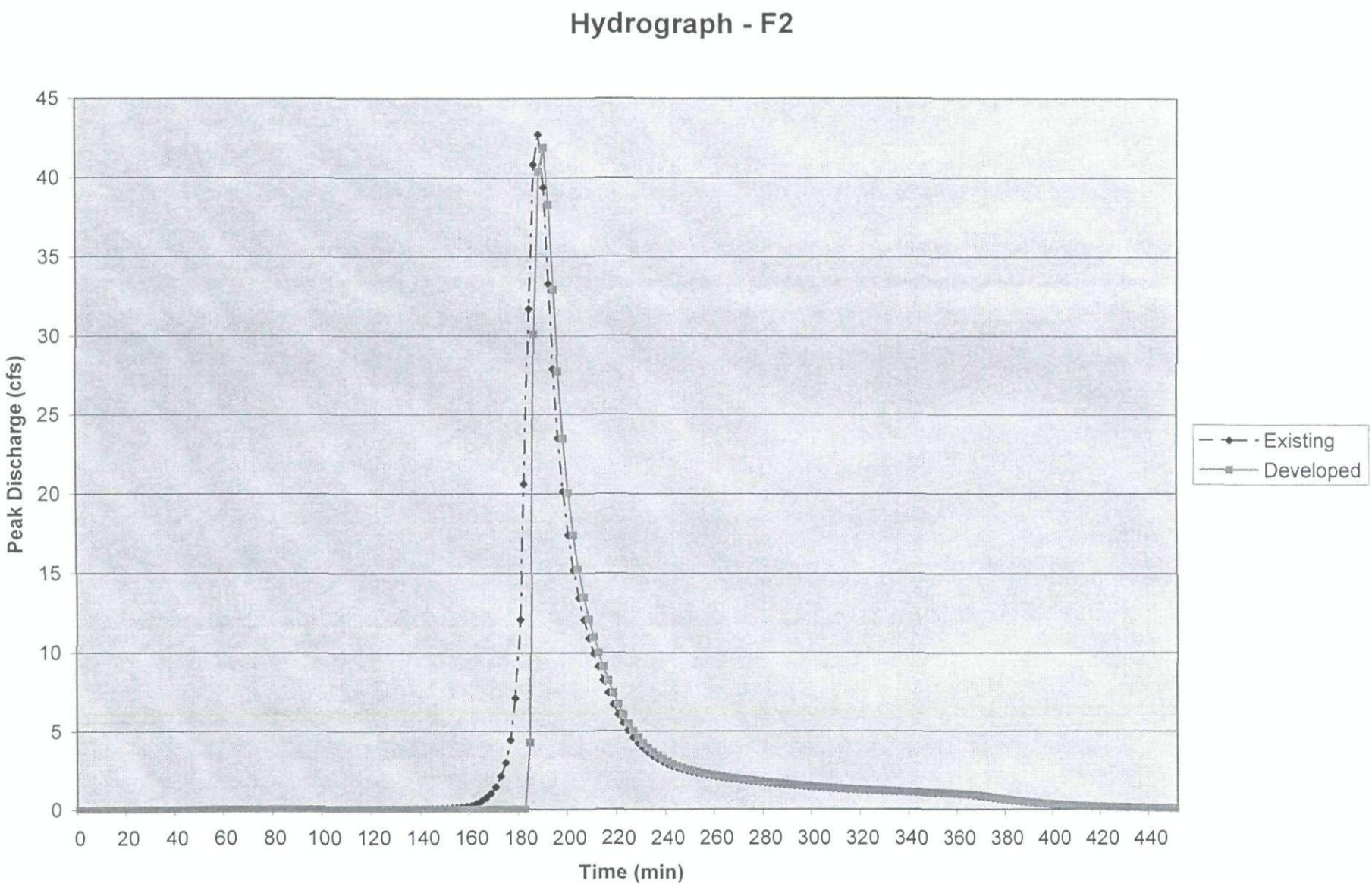

Hydrograph - C
Peak Discharge (cfs)
100
90
80
70
60
50
40
30
20
10
0
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440
Time (min)
Existing
Developed

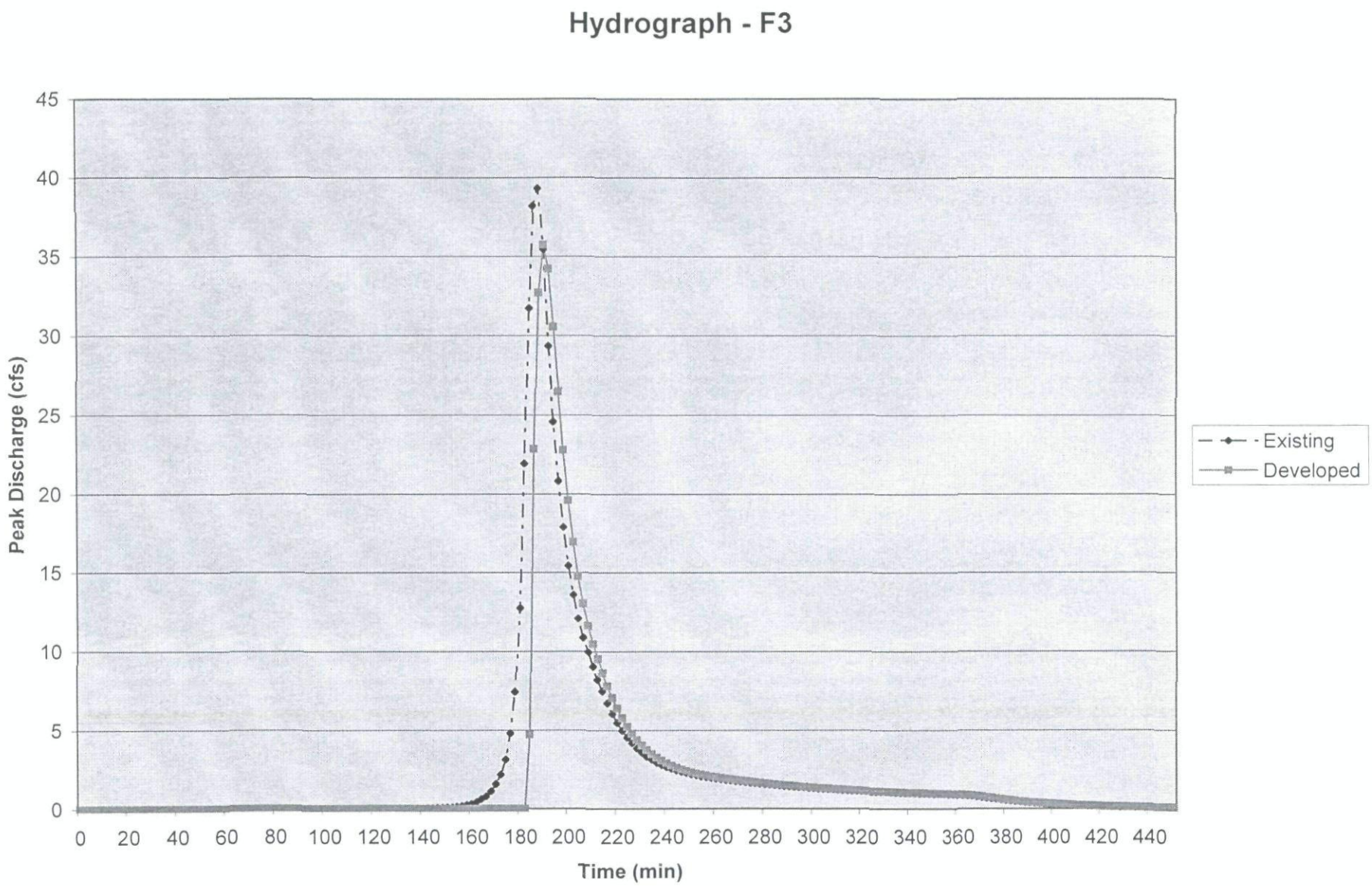

Hydrograph - D
Peak Discharge (cfs)
100
90
80
70
60
50
40
30
20
10
0
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440
Time (min)
Existing
Developed

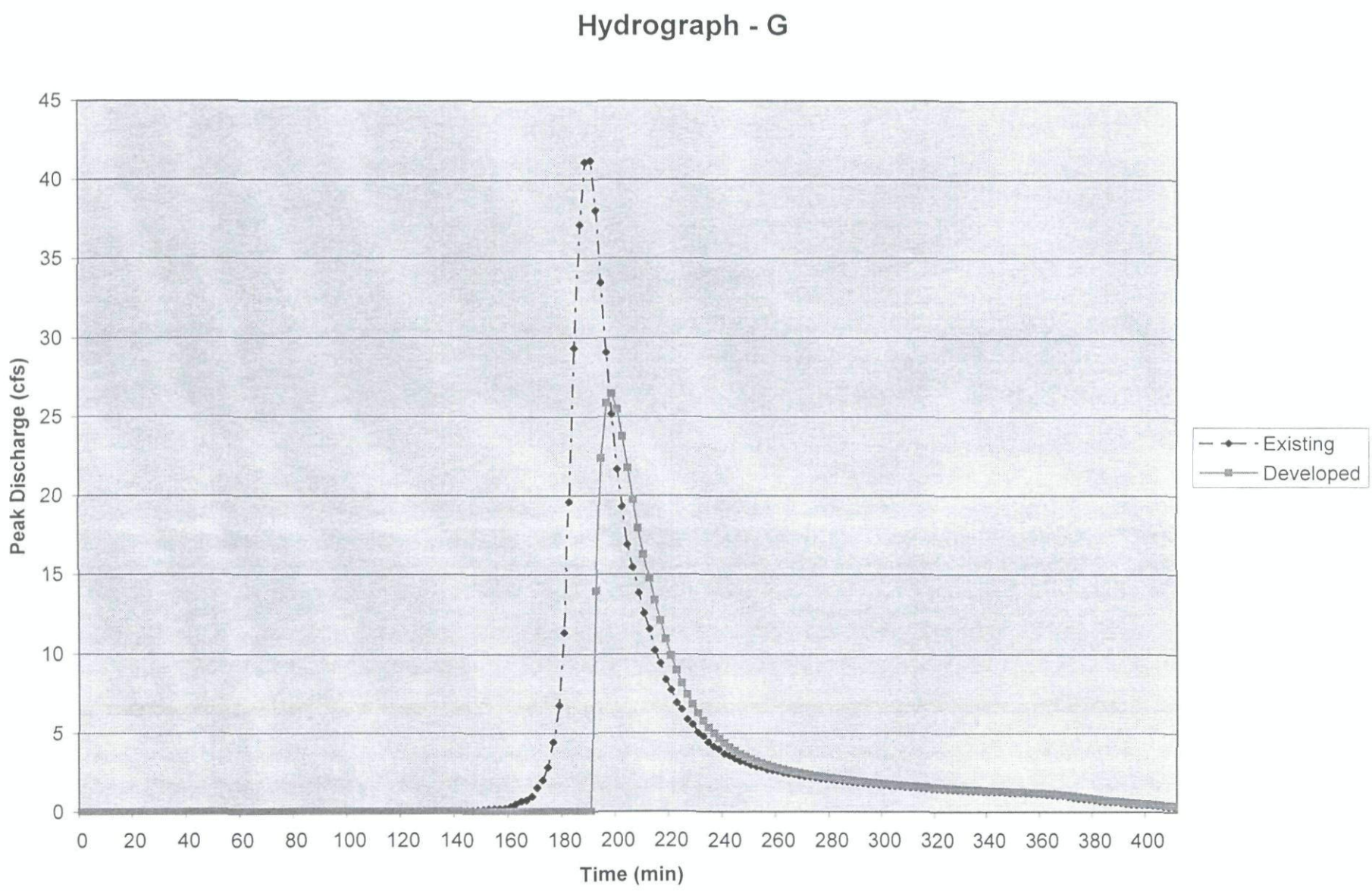

Hydrograph - COMB E
Peak Discharge (cfs)
300
250
200
150
100
50
0
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440 460 480 500 520 540 560 580 600 620
Time (min)
Existing
Developed

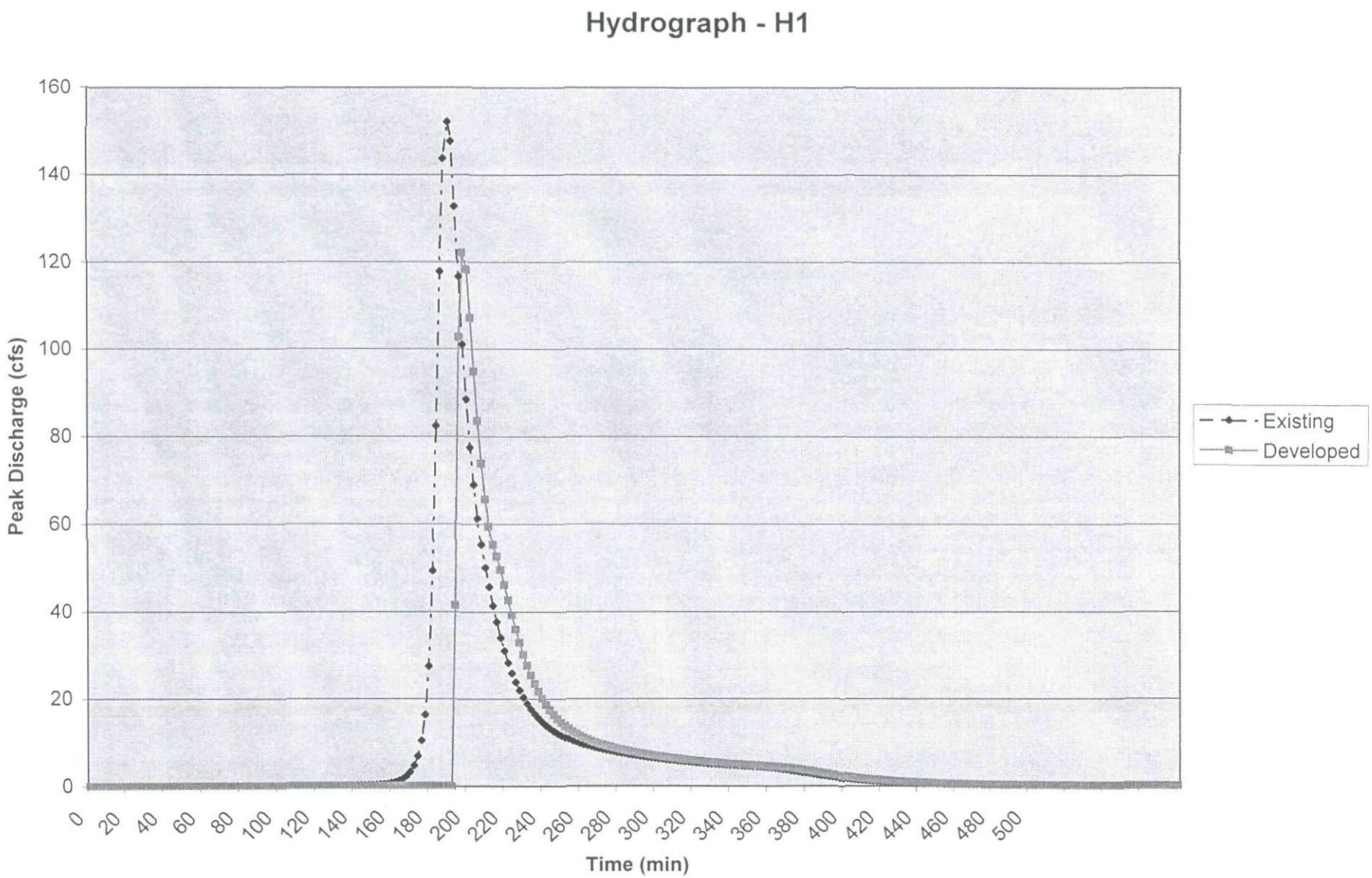

Hydrograph - E3
Peak Discharge (cfs)
30
25
20
15
10
5
0
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
360
380
Time (min)
Existing
Developed

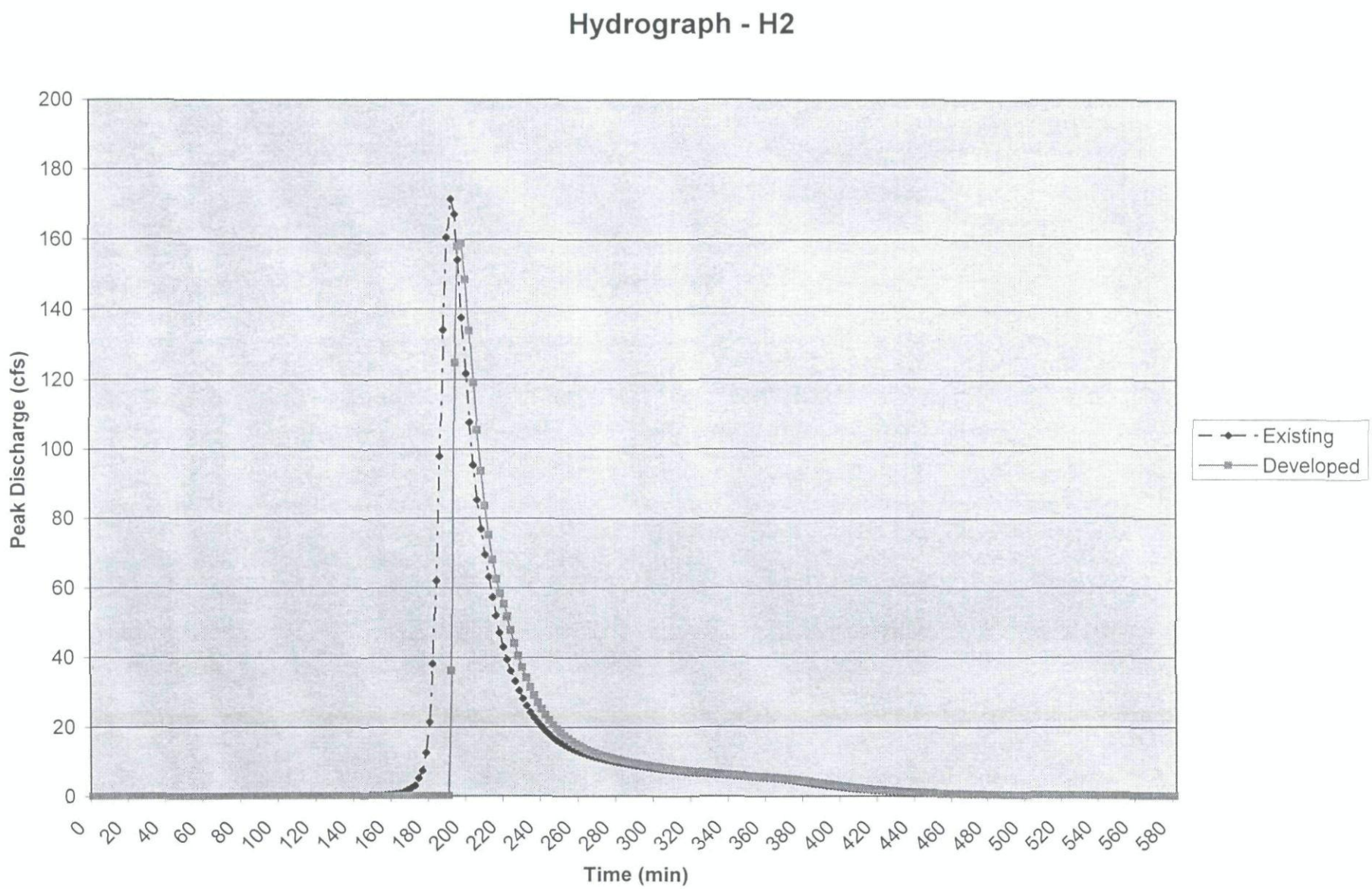

Hydrograph - F1
Peak Discharge (cfs)
120
100
80
60
40
20
0
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440
Time (min)
Existing
Developed

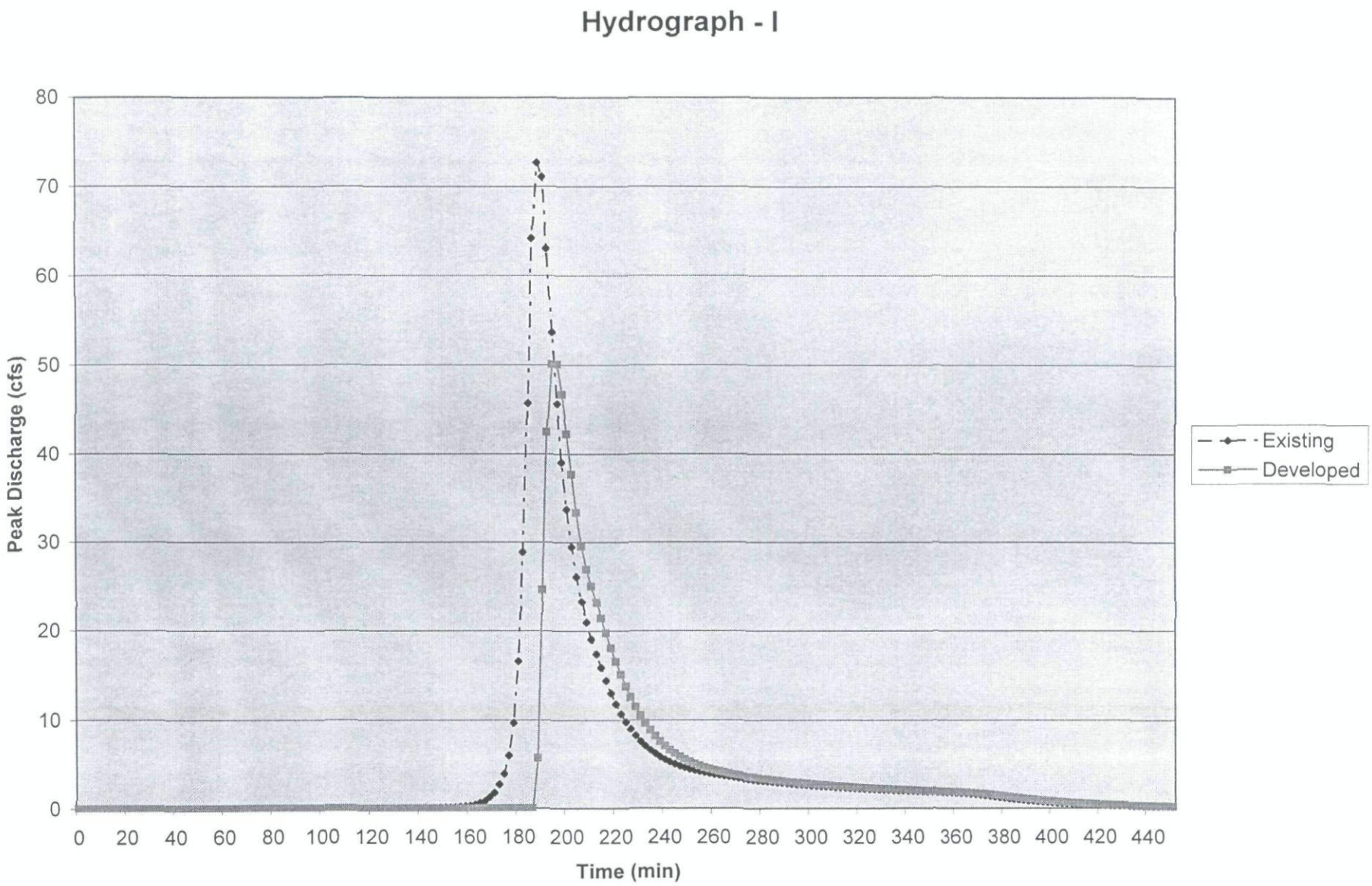

Hydrograph - F2
Peak Discharge (cfs)
45
40
35
30
25
20
15
10
5
0
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440
Time (min)
Existing
Developed

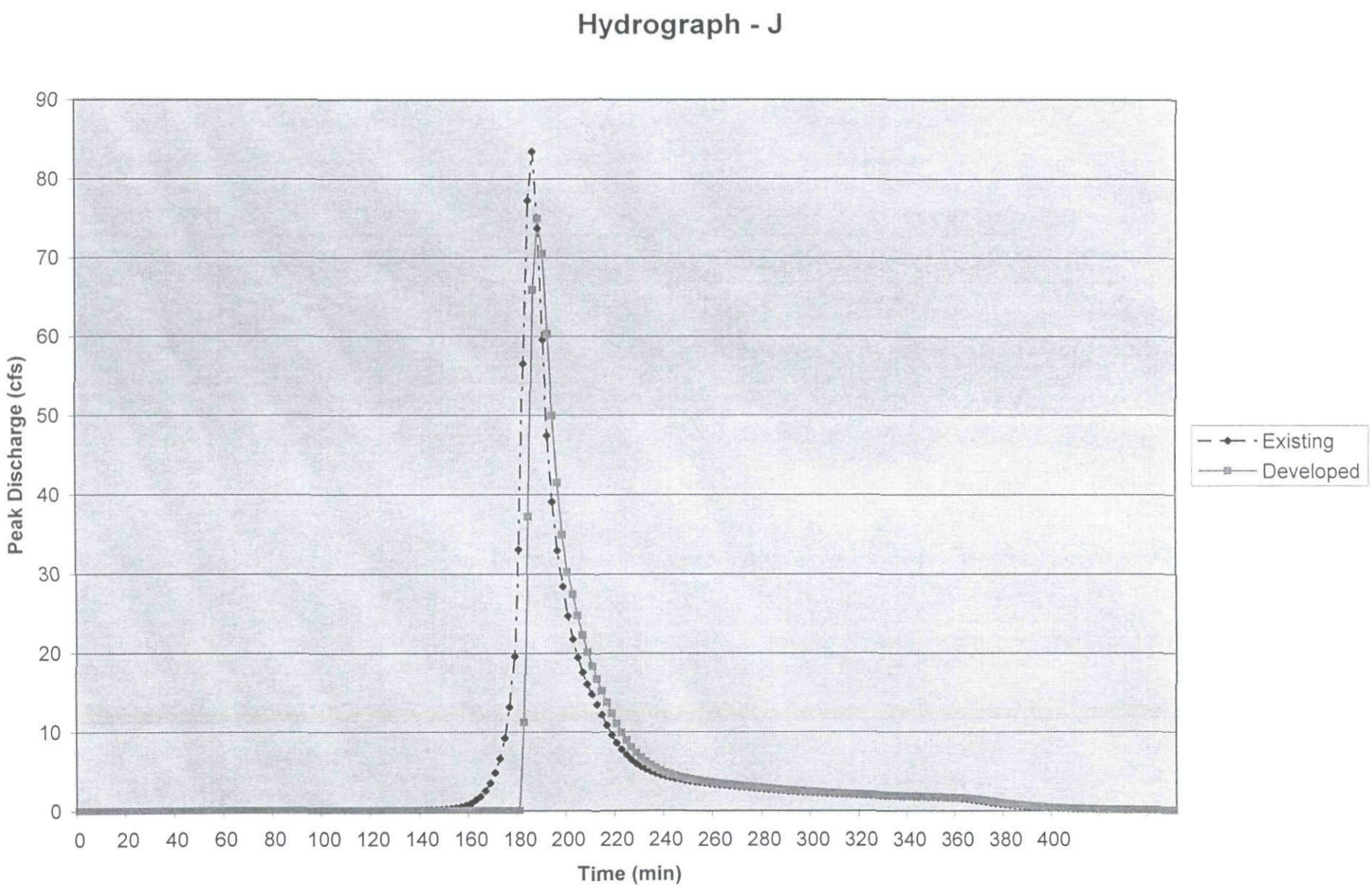

Hydrograph - F3
Peak Discharge (cfs)
45
40
35
30
25
20
15
10
5
0
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440
Time (min)
Existing
Developed

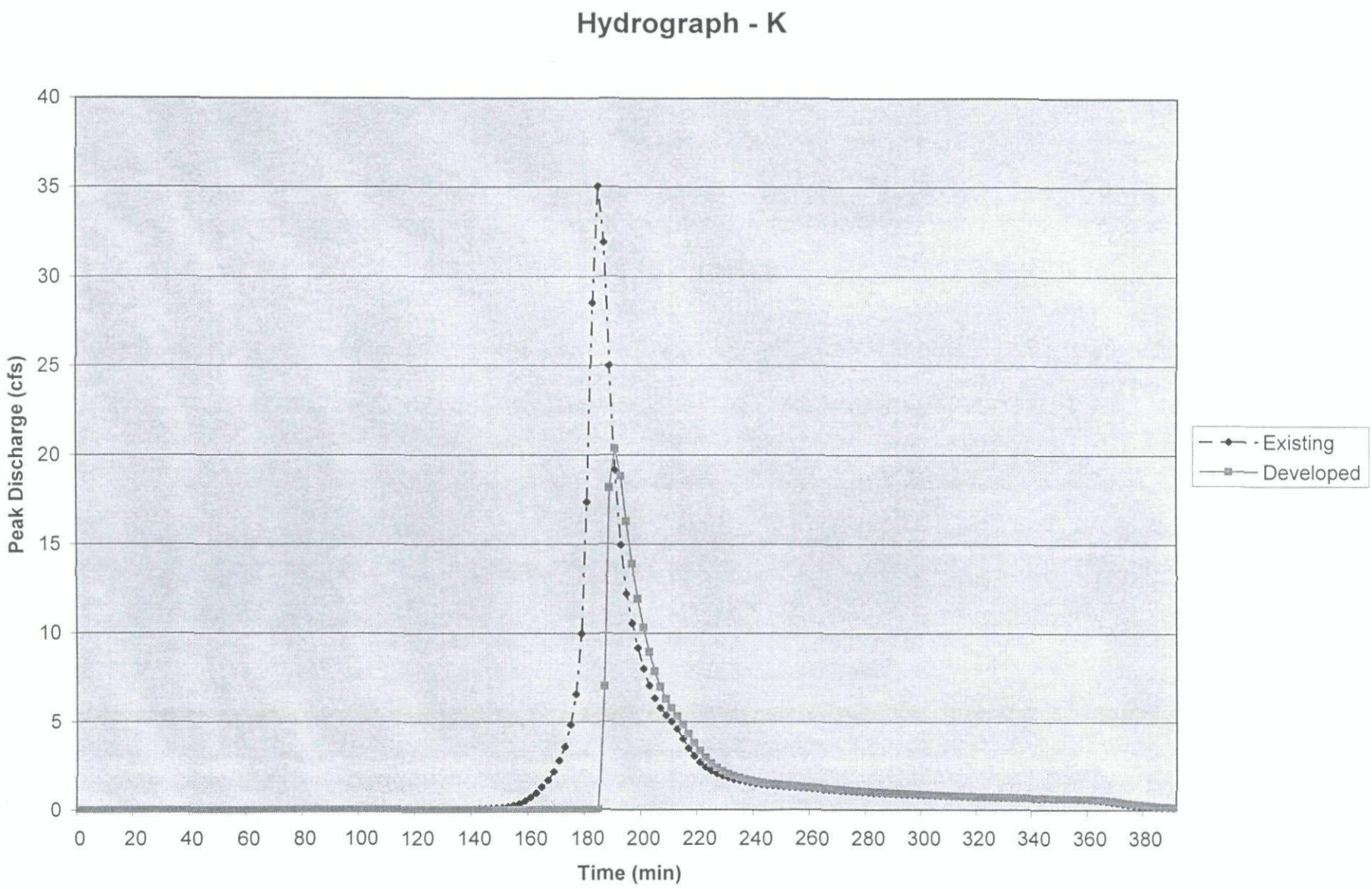

Hydrograph - G
Peak Discharge (cfs)
45
40
35
30
25
20
15
10
5
0
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
360
380
400
Time (min)
Existing
Developed

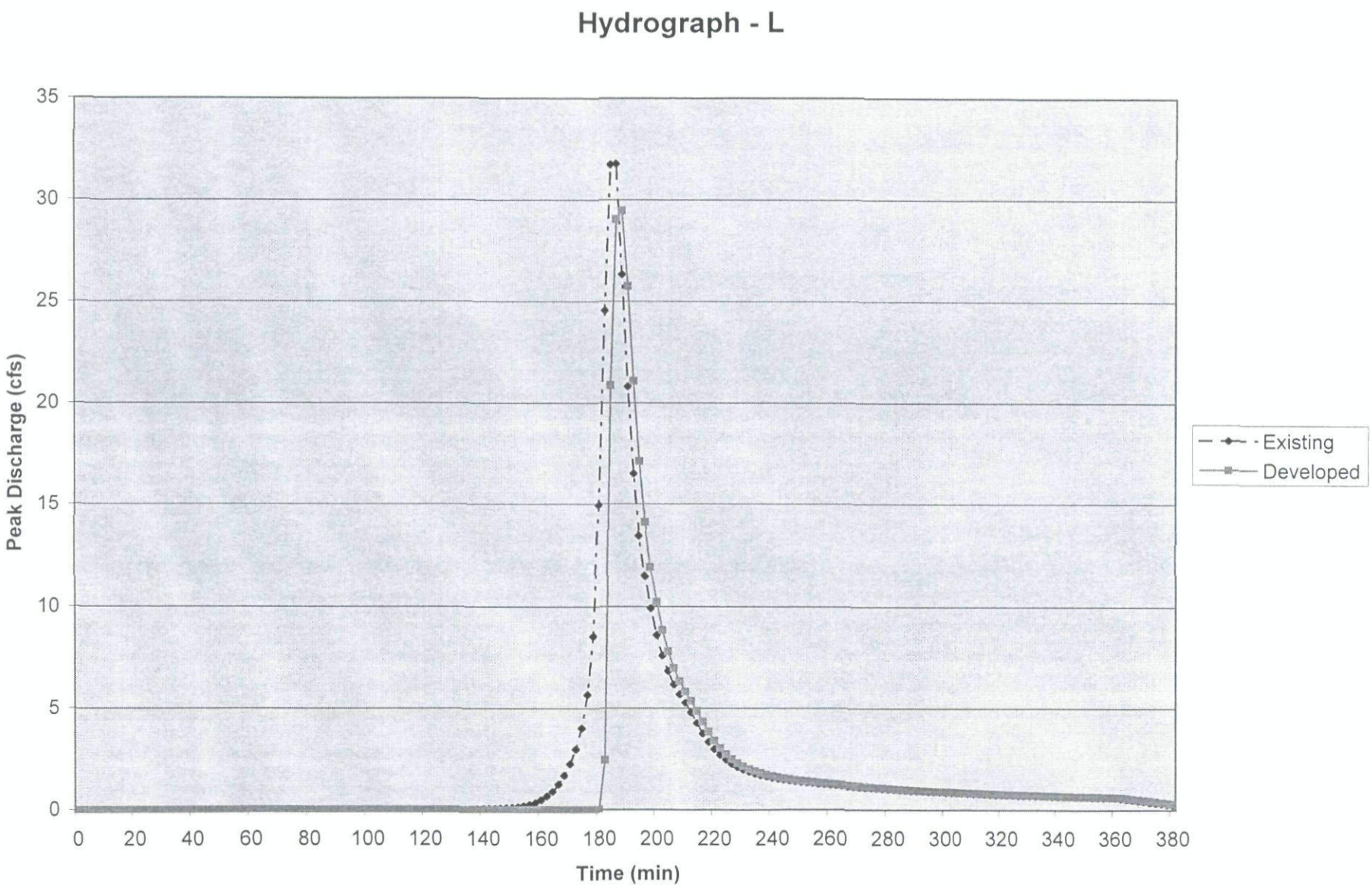

Hydrograph - H1
Peak Discharge (cfs)
160
140
120
100
80
60
40
20
0
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
360
380
400
420
440
460
480
500
Time (min)
Existing
Developed

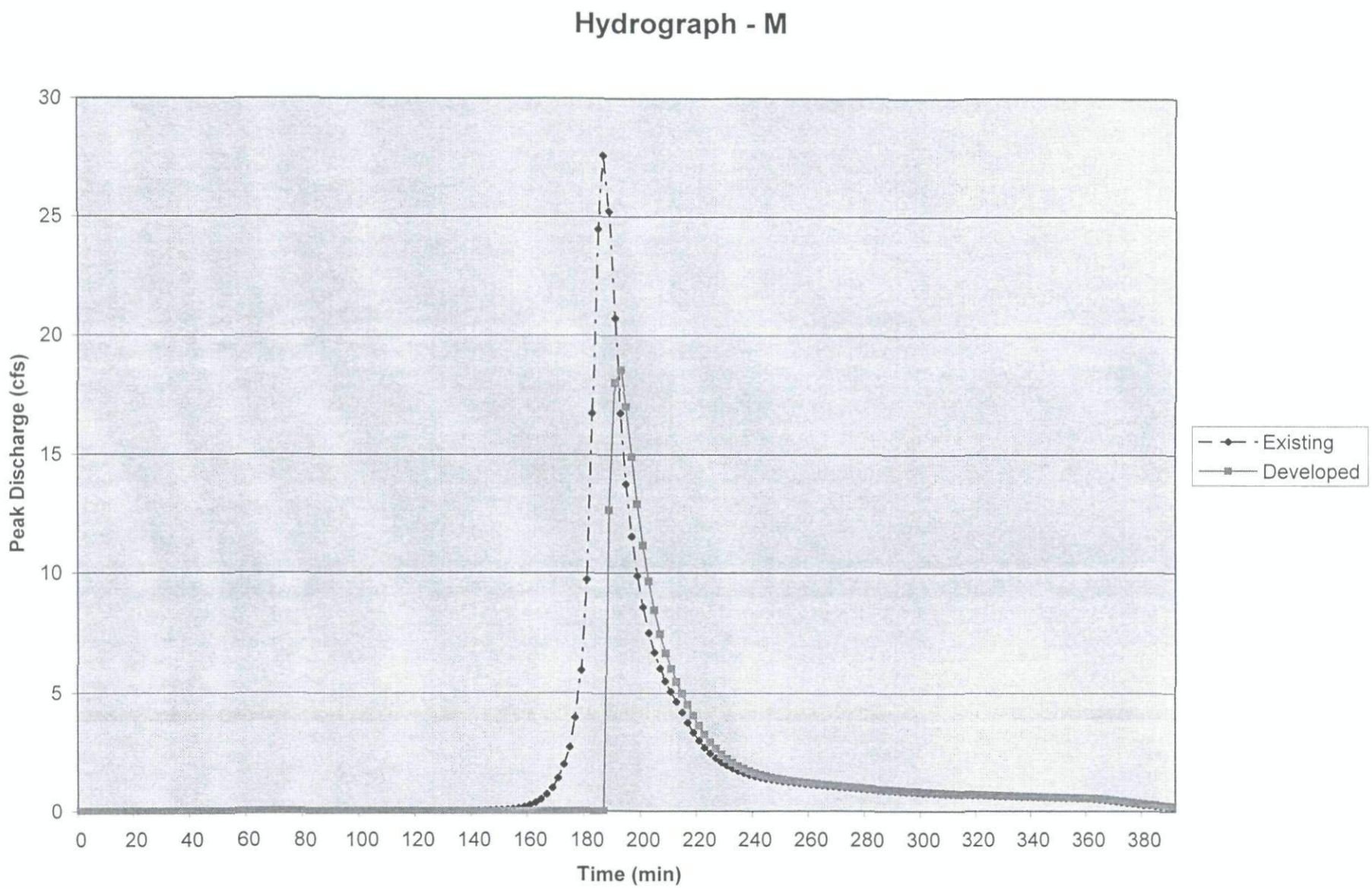

Hydrograph - H2
Peak Discharge (cfs)
200
180
160
140
120
100
80
60
40
20
0
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440 460 480 500 520 540 560 580
Time (min)
Existing
Developed

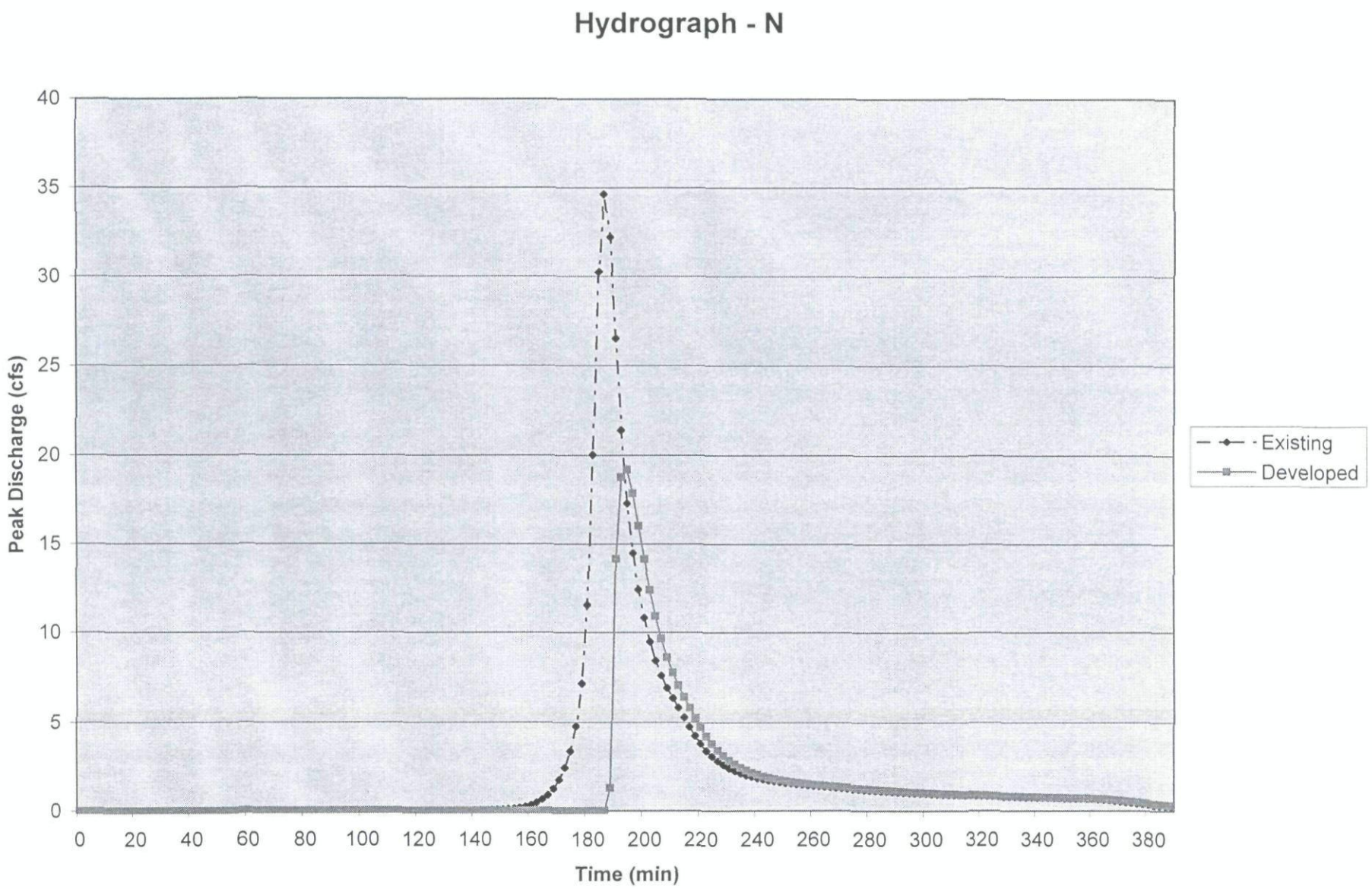

Hydrograph - I
Peak Discharge (cfs)
80
70
60
50
40
30
20
10
0
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440
Time (min)
Existing
Developed

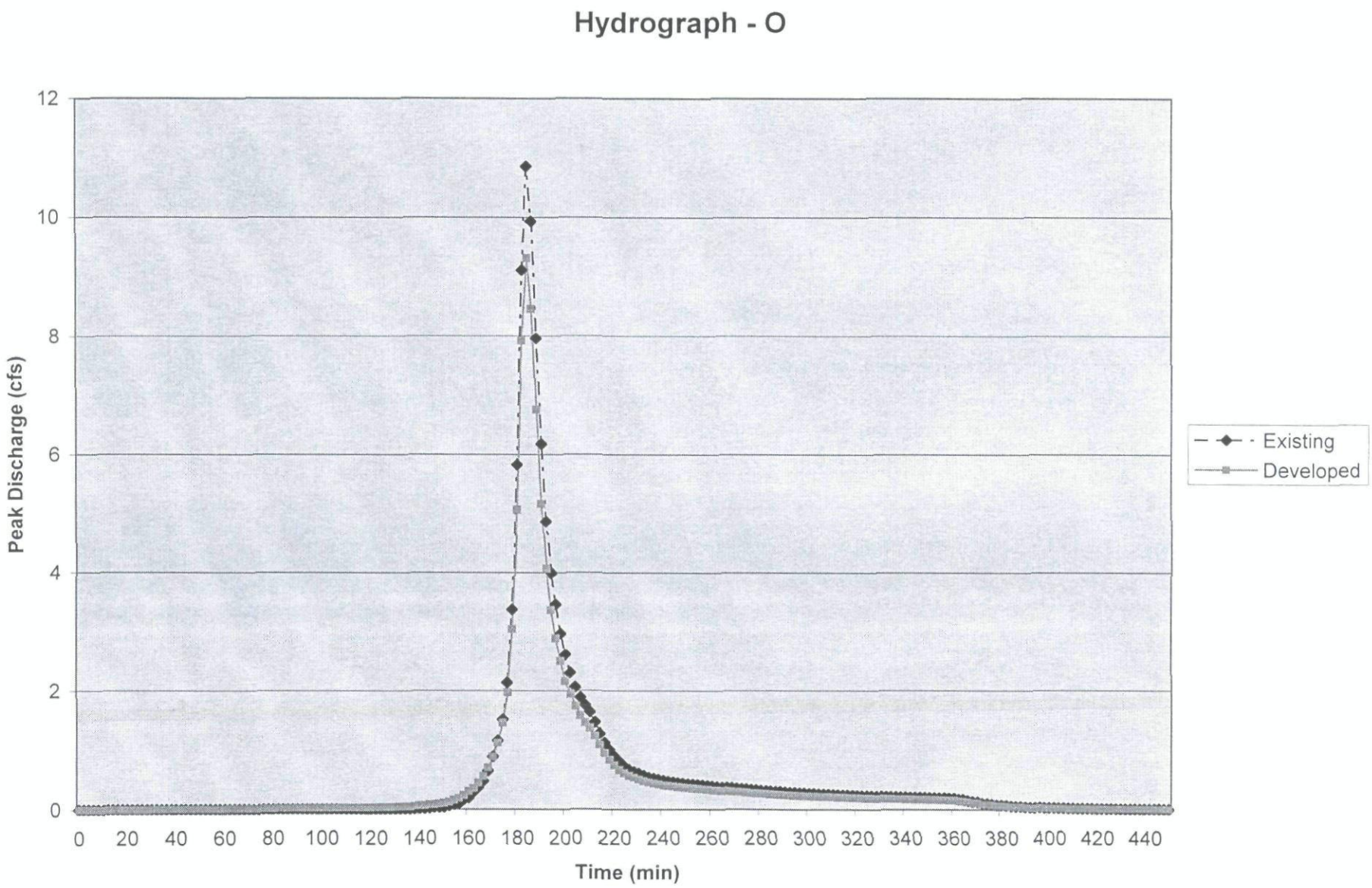

Hydrograph - J
Peak Discharge (cfs)
90
80
70
60
50
40
30
20
10
0
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400
Time (min)
Existing
Developed

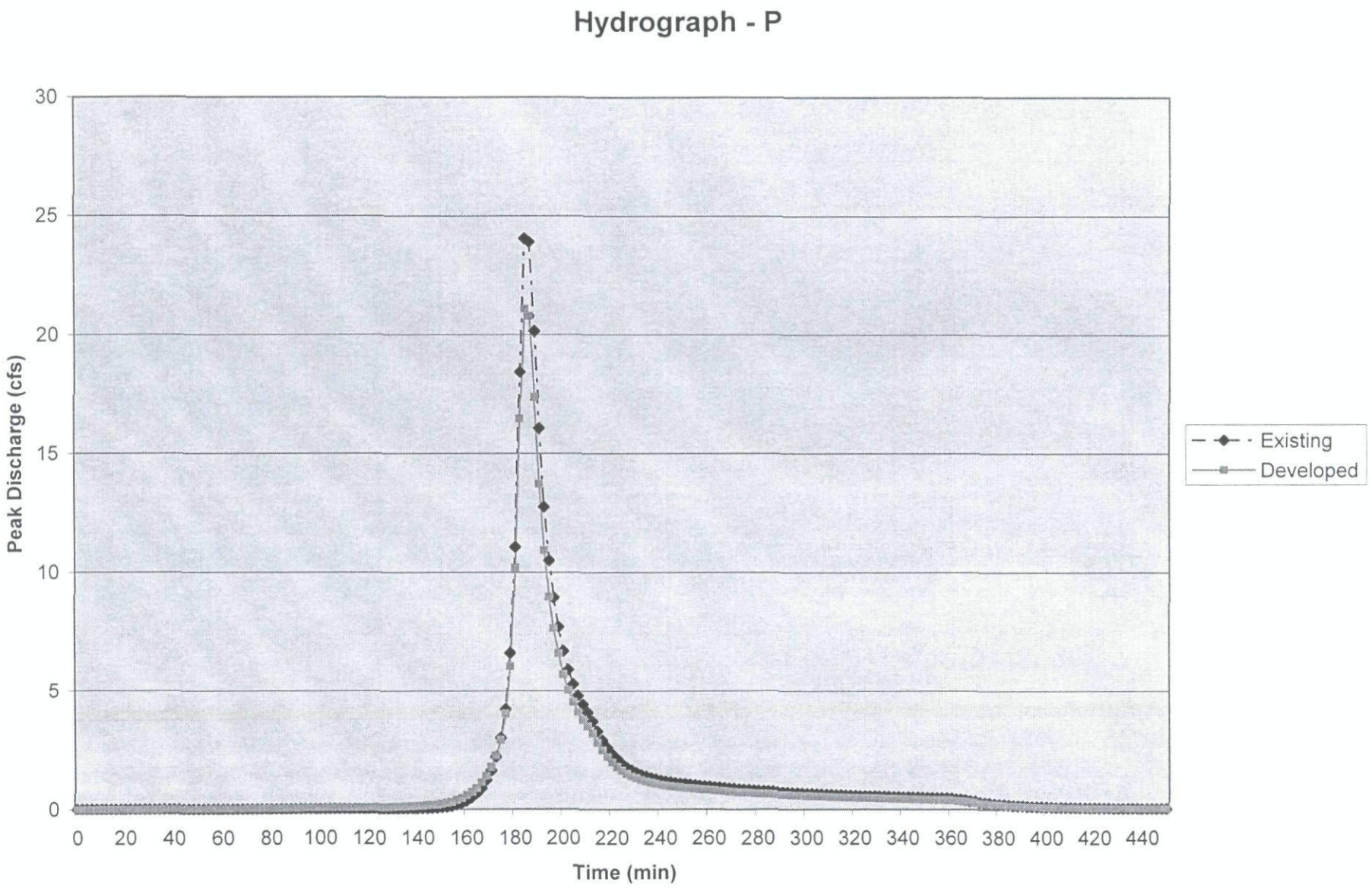

Hydrograph - K
Peak Discharge (cfs)
40
35
30
25
20
15
10
5
0
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
360
380
Time (min)
Existing
Developed

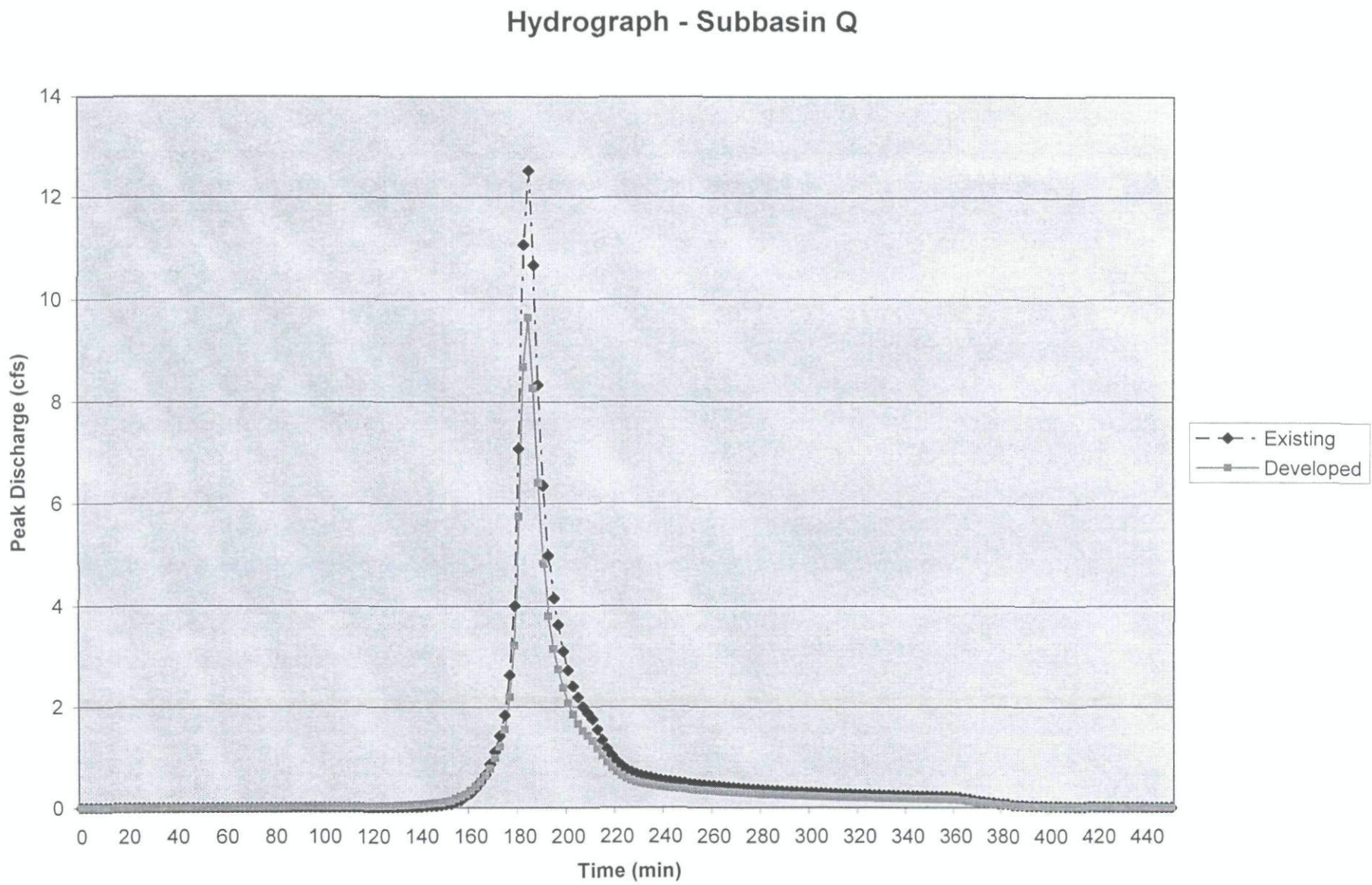

Hydrograph - L
Peak Discharge (cfs)
35
30
25
20
15
10
5
0
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
360
380
Time (min)
Existing
Developed

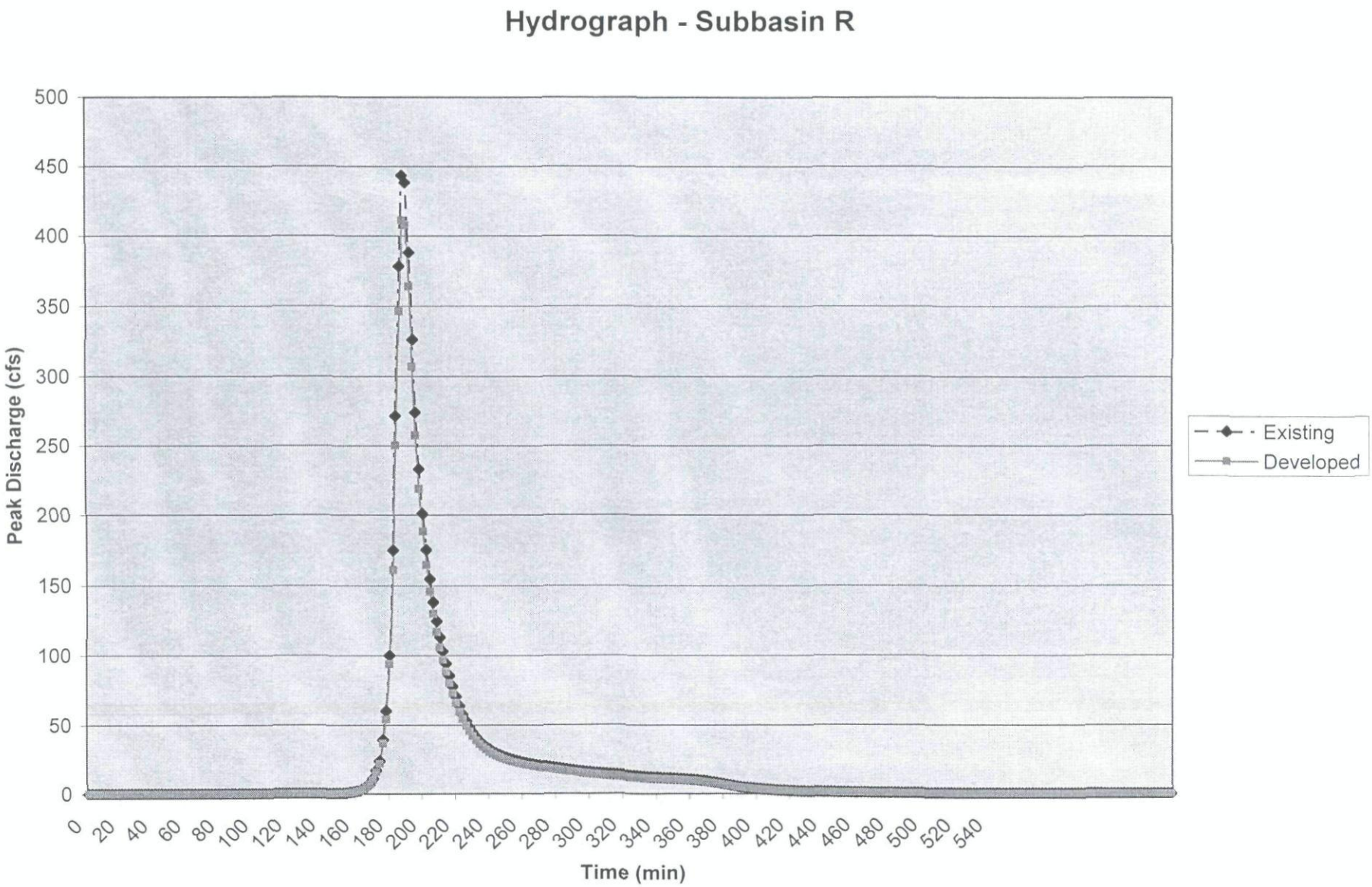

Hydrograph - M
Peak Discharge (cfs)
30
25
20
15
10
5
0
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
360
380
Time (min)
Existing
Developed


Hydrograph - N
Peak Discharge (cfs)
40
35
30
25
20
15
10
5
0
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
360
380
Time (min)
Existing
Developed


Hydrograph - O
Peak Discharge (cfs)
0
2
4
6
8
10
12
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440
Time (min)
Existing
Developed


Hydrograph - P
Peak Discharge (cfs)
30
25
20
15
10
5
0
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440
Time (min)
Existing
Developed


Hydrograph - Subbasin Q
Peak Discharge (cfs)
0
2
4
6
8
10
12
14
Time (min)
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440
Existing
Developed


Hydrograph - Subbasin R
Peak Discharge (cfs)
500
450
400
350
300
250
200
150
100
50
0
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440 460 480 500 520 540
Time (min)
Existing
Developed

APPENDIX E

100-year Rational Method

Project: *SERENO CANYON*
Location: *City of Scottsdale*
Date: *09-May-06*
References: *Drainage Design Manual for Maricopa County, Volume I-Hydrology*
City of Scottsdale Engineering & Design Standards

Project Number: *042054*
Project Engineer: *Gordon W. Wark, P.E.*

RATIONAL METHOD CALCULATIONS: OFF-SITE FLOW

* Summary of Rational Method values using Flood Control District of Maricopa County DDMSW Software

Concentration Point	Area		"C" Value	Length of Area	2 - Year			10-Year			100-Year		
	(sq ft)	(ac)		(ft)	T_c (min)	Intensity (in/hr)	Q (cfs)	T_c (min)	Intensity (in/hr)	Q (cfs)	T_c (min)	Intensity (in/hr)	Q (cfs)
A1	2,502,397	57.4	0.56	4,754	16	2.5	65	13	4.5	116	11	7.4	238
A2	989,311	22.7	0.56	2,100	10	3.2	33	8	5.4	55	7	88.0	112
B	2,153,597	49.4	0.56	3,200	15	2.6	58	12	4.6	102	10	7.6	210
H2	1,998,065	45.9	0.56	3,350	15	2.6	54	12	4.6	95	10	7.5	193
I	700,376	16.1	0.56	2,012	11	3.0	22	9	5.1	37	8	8.4	76
J	678,947	15.6	0.56	920	6	3.8	27	5	6.3	44	5	9.9	86
R	4,238,208	97.3	0.56	4,300	16	2.5	109	13	4.5	197	10	7.5	409

Notes:

"C" value is based on hydrologic soil group D from Figure 4-5 in the City of Scottsdale DSPM, according to the SCS Classification of Soil #61, Gran Wickenburg.

Flood Control District of Maricopa County
042054 - Sereno Canyon

Sub Basin Data - Rational Method

5/11/2006

Sub Basin	Sub Basin Parameters					Return Period (Years)					
	Area (acres)	Length (ft)	Slope (ft/ft)	Kb		2	5	10	25	50	100
A1	57.40	4,754	0.0747	0.056	**Q (cfs)**	65	96	116	164	205	238
A2	22.70	2,100	0.0833	0.061	**Q (cfs)**	33	46	55	77	97	112
B	49.40	3,200	0.0469	0.057	**Q (cfs)**	58	84	102	143	179	210
H2	45.90	3,350	0.0493	0.057	**Q (cfs)**	54	76	95	133	166	193
I	16.10	2,012	0.0572	0.063	**Q (cfs)**	22	30	37	52	65	76
J	15.60	920	0.0761	0.064	**Q (cfs)**	27	37	44	61	75	86
R	97.30	4,300	0.0605	0.053	**Q (cfs)**	109	162	197	277	347	409

* Non default value

APPENDIX F

Hydraulic Calculations

- Storage Rating Curves
- HEC-RAS Output Files
- Orifice Plate Calculation

Culvert Rating Curves for Stage-Storage Intervals

Project: *Sereno Canyon*
Location: *City of Scottsdale*
Reference: *Rectangular Weir Equation*

W/P#: *042054*
Date: *5/11/2006*

$$Q = CLH^{3/2}$$

Where:

C = Weir Coefficient =	2.80	
L = Length of Weir =	10.00	ft
H = Head above Weir =	1.50	ft
Q = Weir Flow =	51.44	cfs

* The above equation is used to determine the rating curves for weir flow

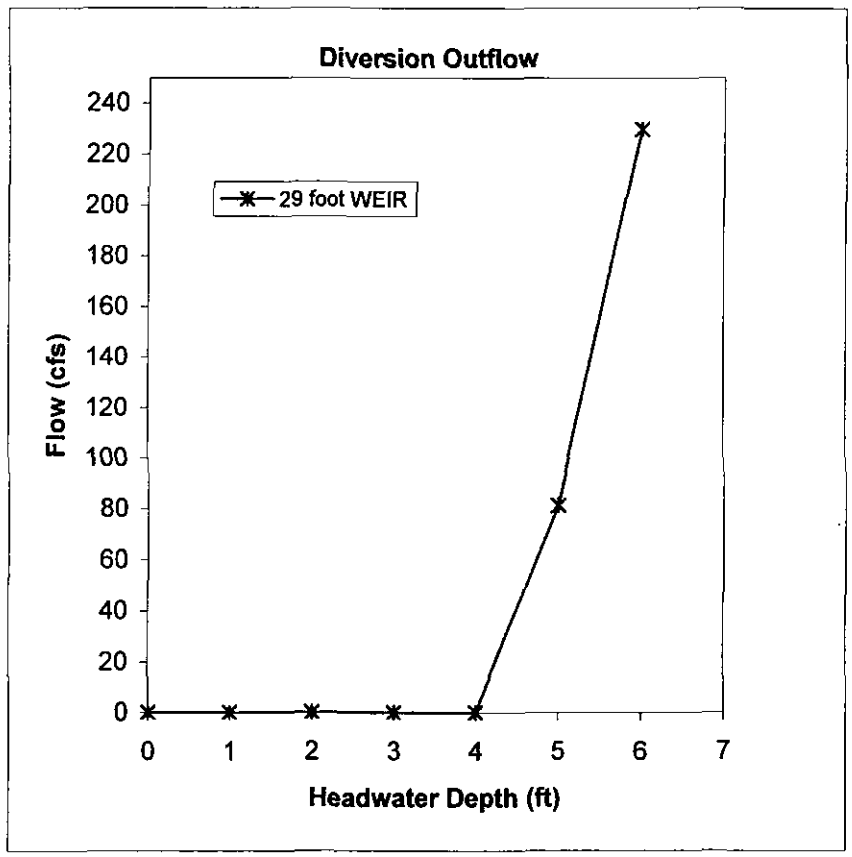
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *11/15/2006*

Rating Curve for Diversion BASA1

29	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	0
5	81
6	230

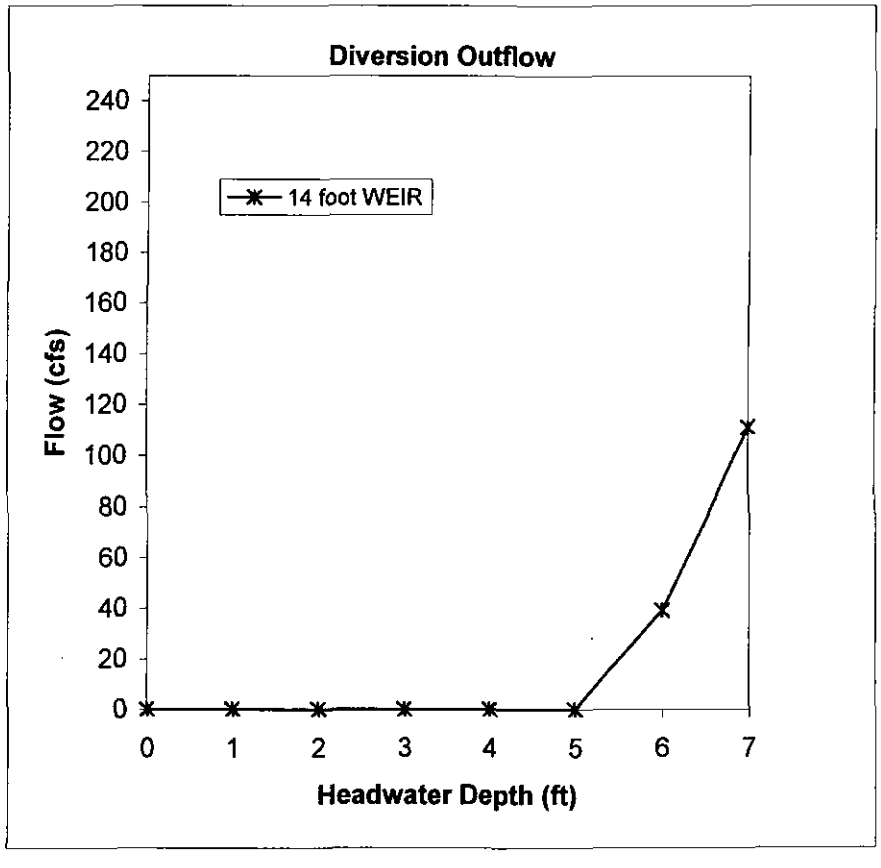


Project: *Sereno Canyon* **W/P#:** *042054*

Location: *City of Scottsdale* **Date:** *11/15/2006*

Rating Curve for Diversion BAS A2-3

14	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	0
5	0
6	39
7	111



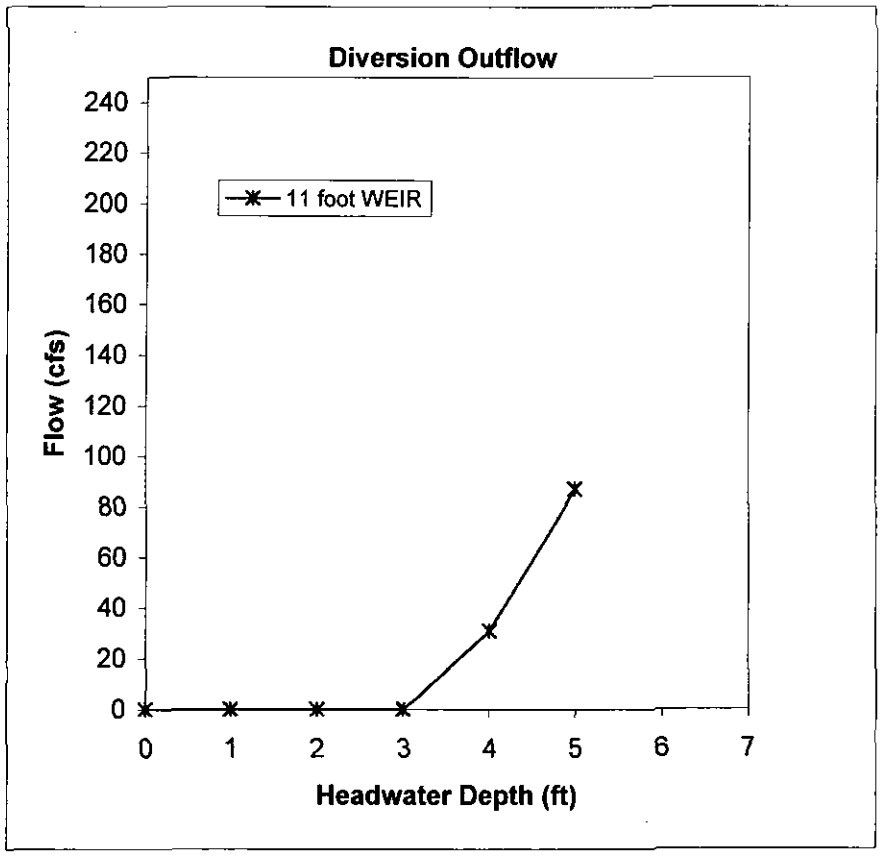
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *11/15/2006*

Rating Curve for Diversion BAS B-3

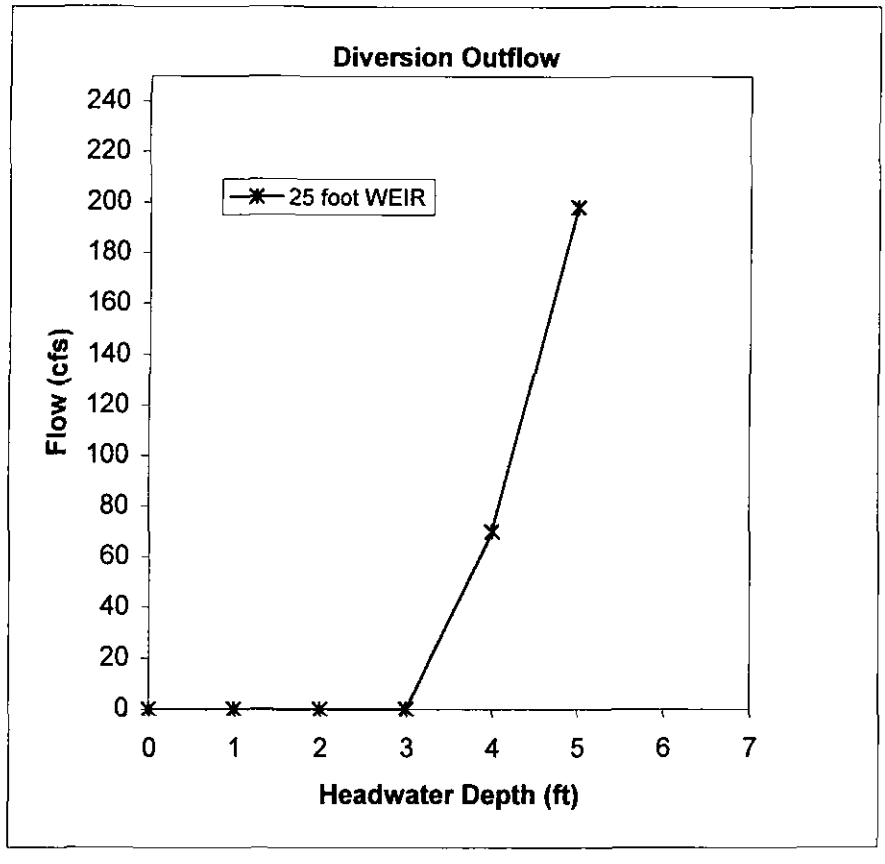
11	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	31
5	87



Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *11/15/2006*

Rating Curve for Diversion BAS B-4

25	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	70
5	198



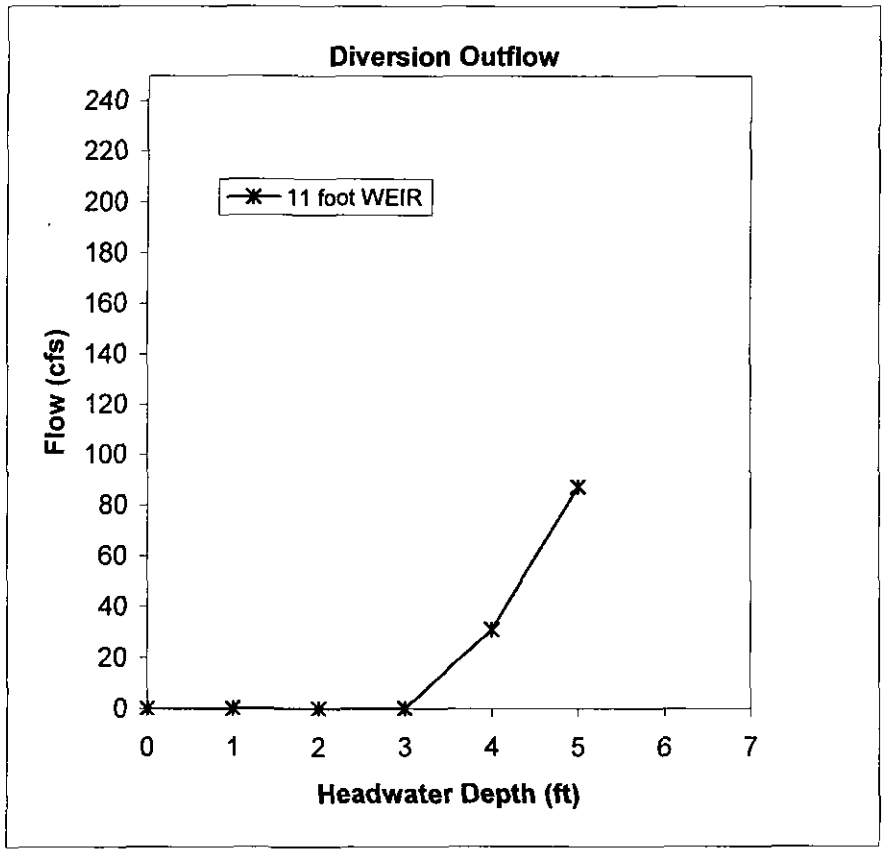
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *11/15/2006*

Rating Curve for Diversion BAS C-1

11	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	31
5	87



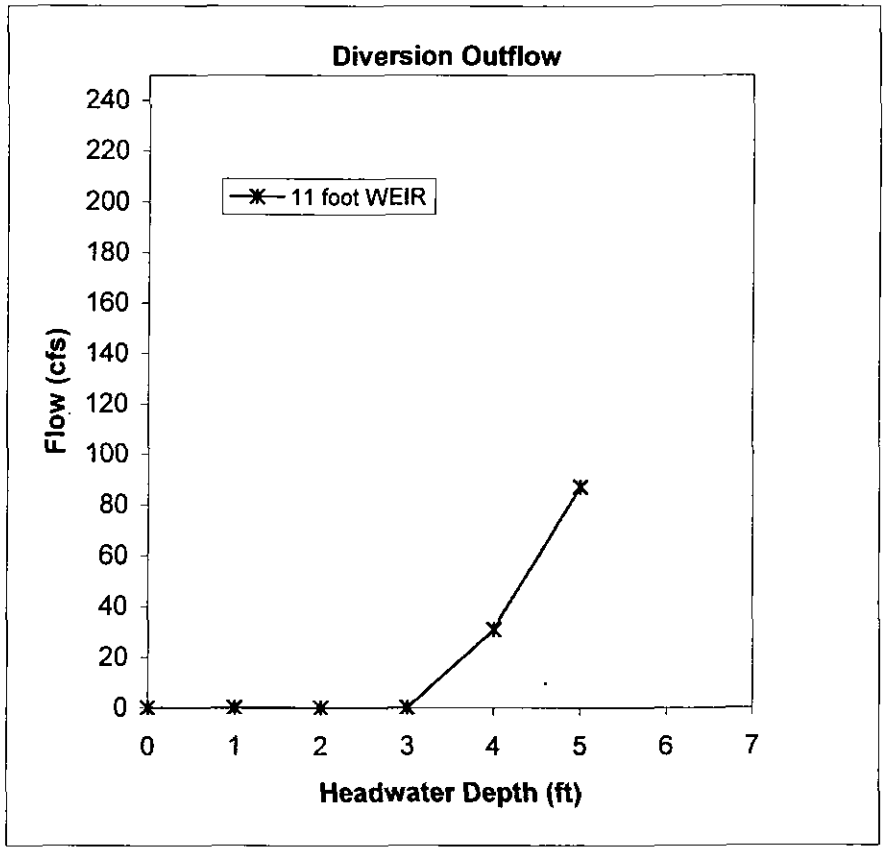
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *11/15/2006*

Rating Curve for Diversion BAS D-1

11	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	31
5	87



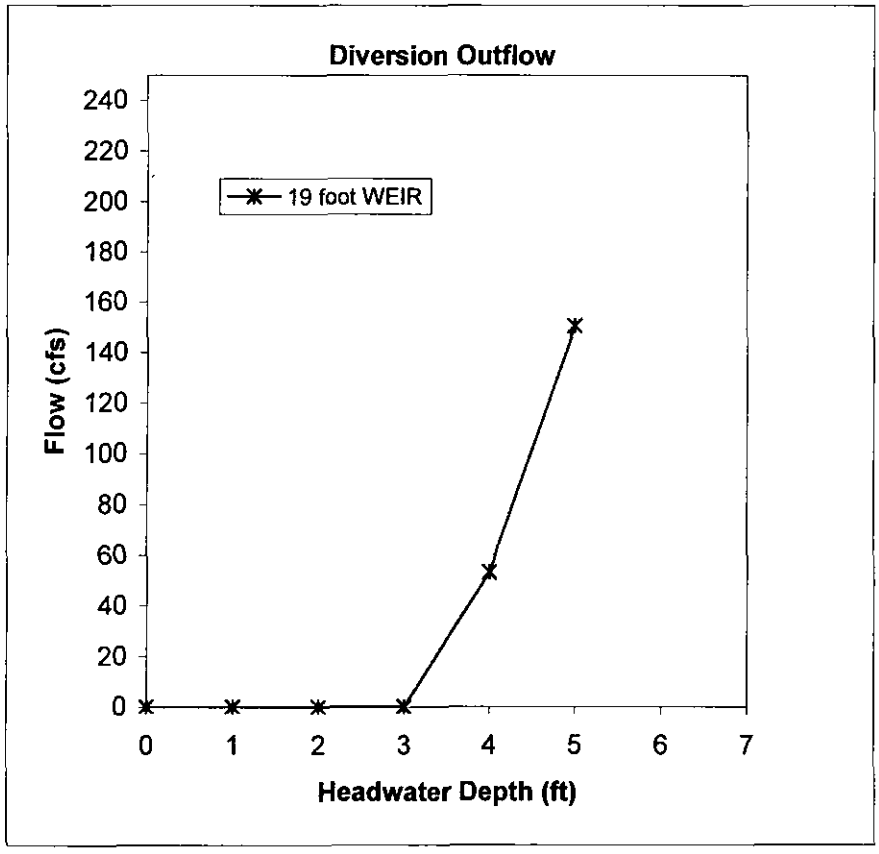
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *11/15/2006*

Rating Curve for Diversion BAS E1-2

19	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	53
5	150



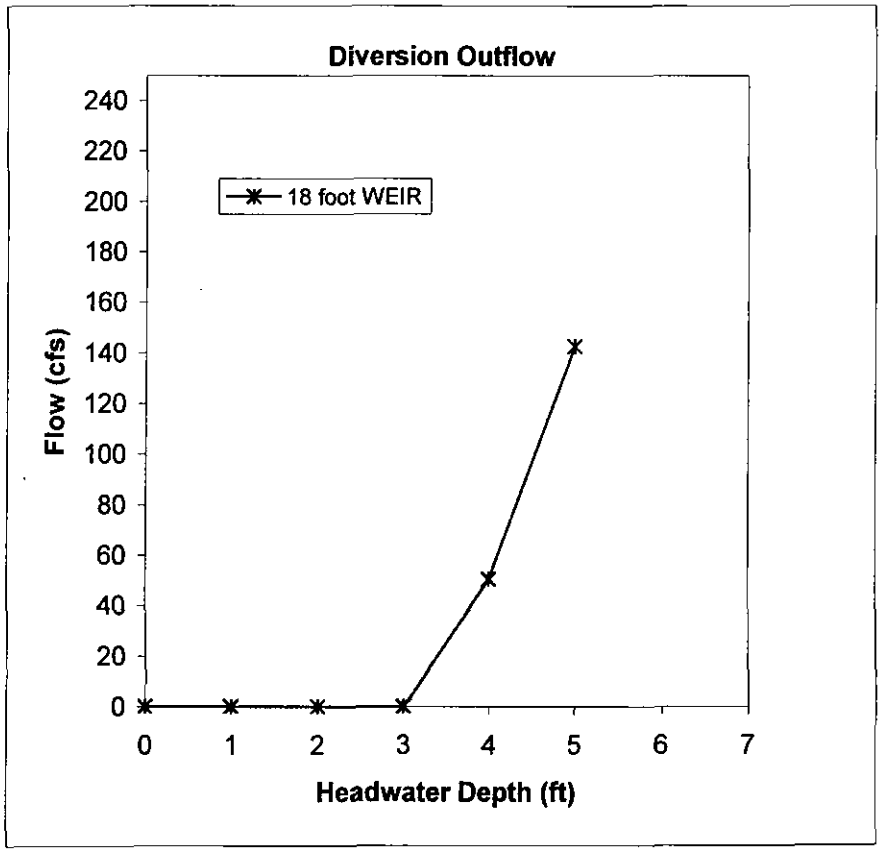
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *11/15/2006*

Rating Curve for Diversion BAS E2-1

18	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	50
5	143



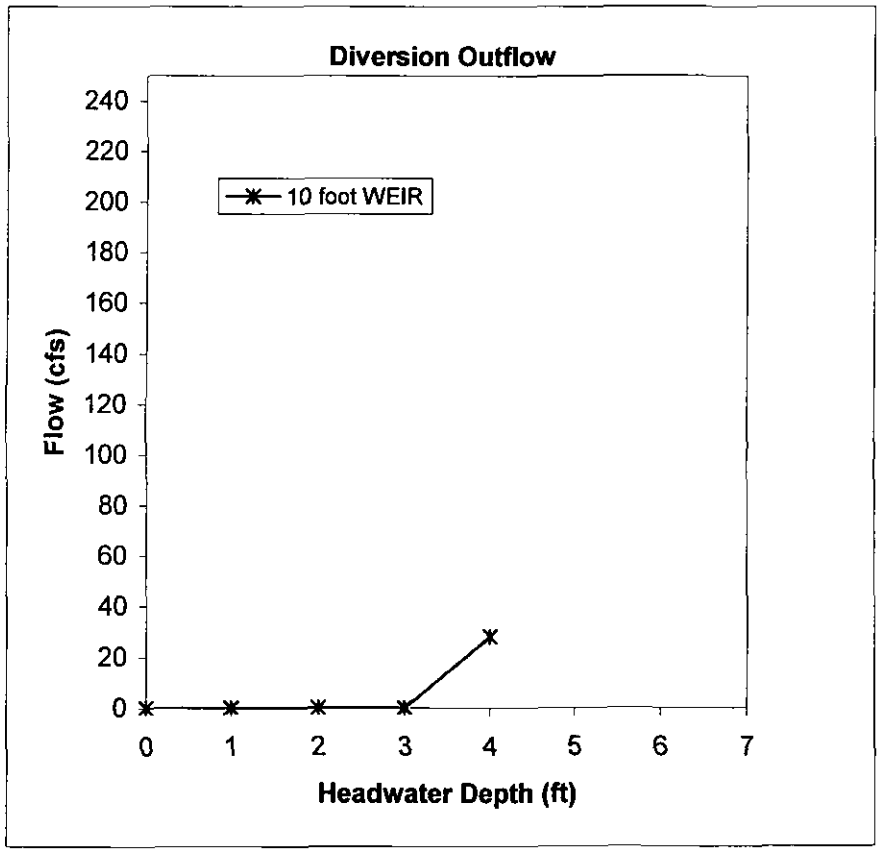
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *11/15/2006*

Rating Curve for Diversion BAS E3-1

10	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	28



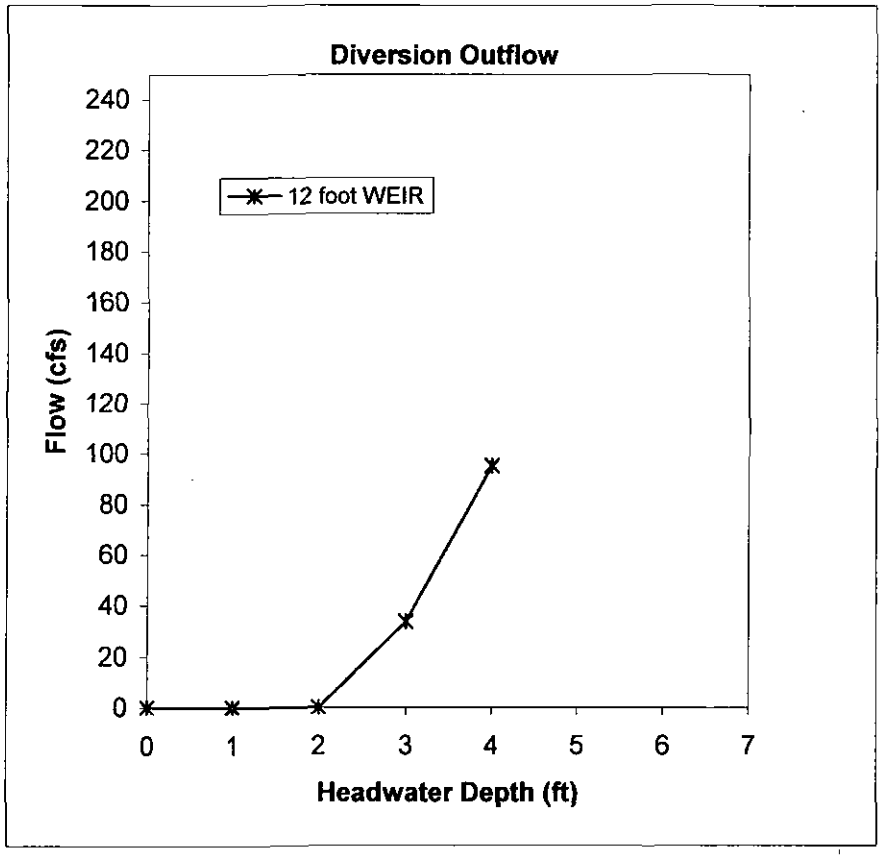
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *11/15/2006*

Rating Curve for Diversion BAS F1-3

12	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	34
4	95



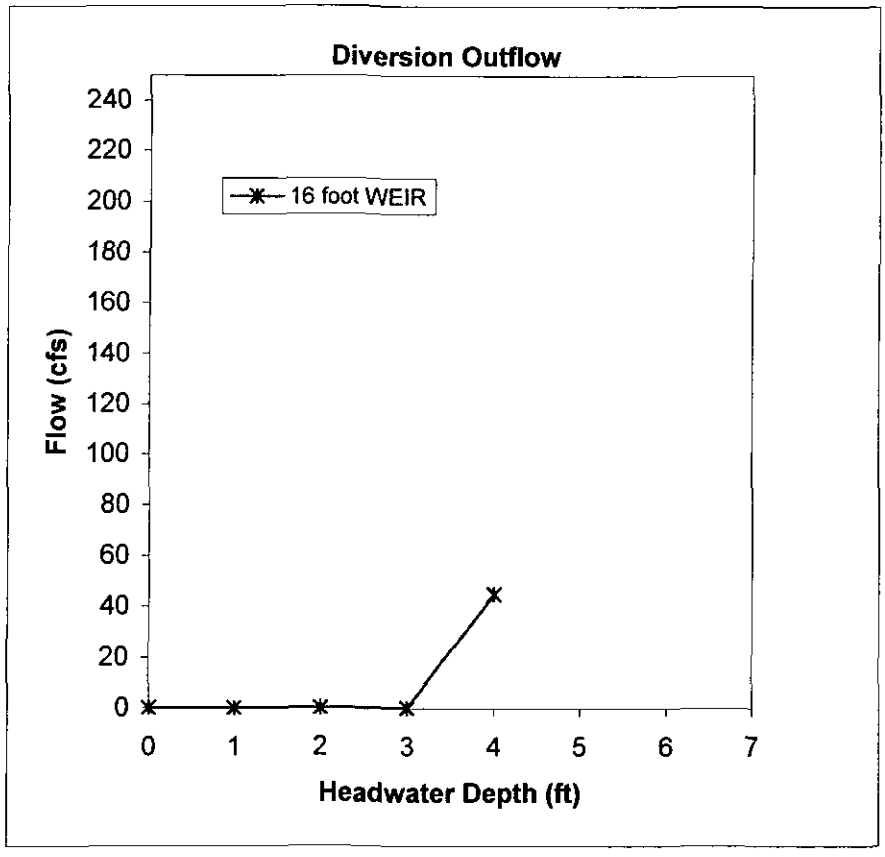
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *11/15/2006*

Rating Curve for Diversion BAS F2-2

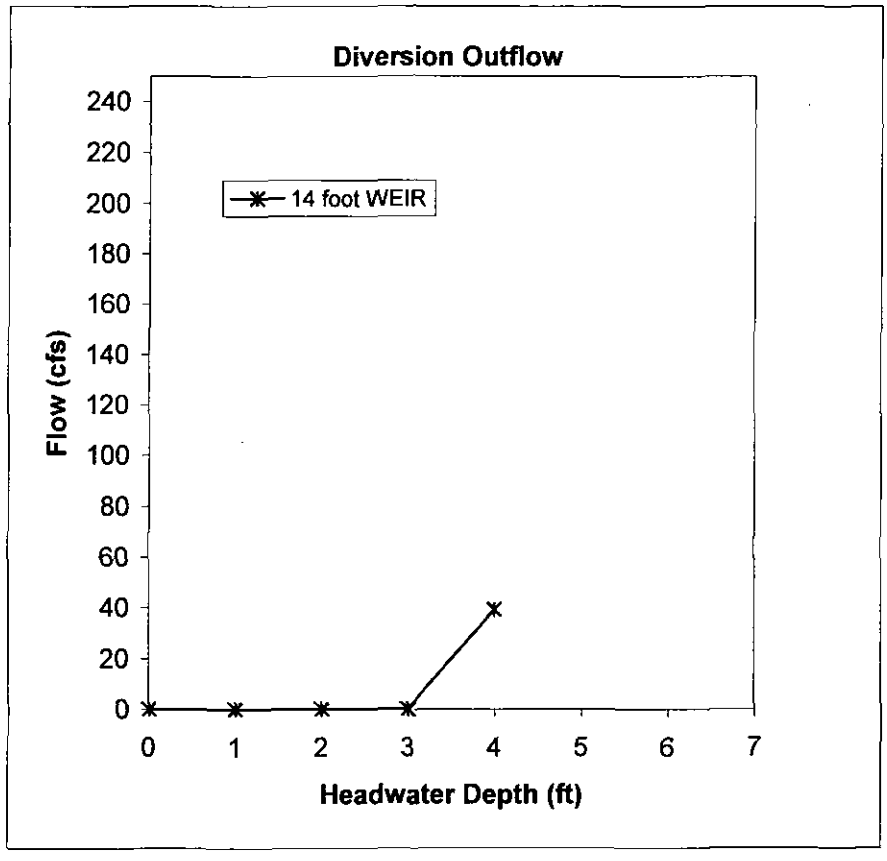
16	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	45



Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *11/15/2006*

Rating Curve for Diversion BAS F3-1

14	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	39



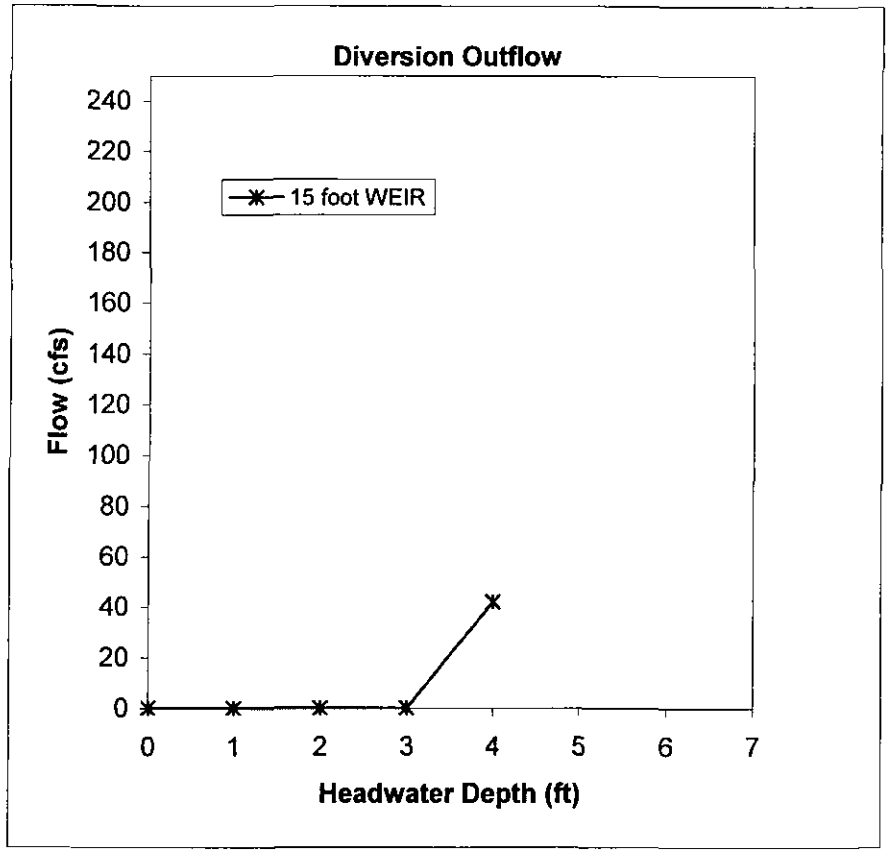
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *11/15/2006*

Rating Curve for Diversion BAS G

15	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	42

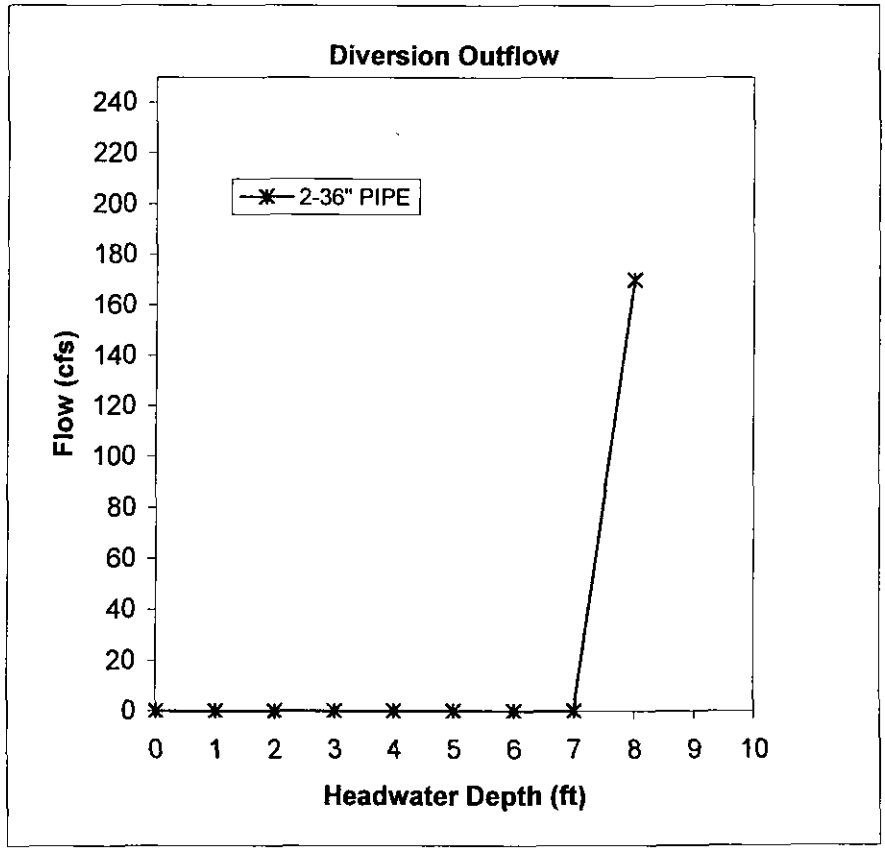


Project: *Sereno Canyon* **W/P#:** *042054*

Location: *City of Scottsdale* **Date:** *11/15/2006*

Rating Curve for Diversion BAS H1-1

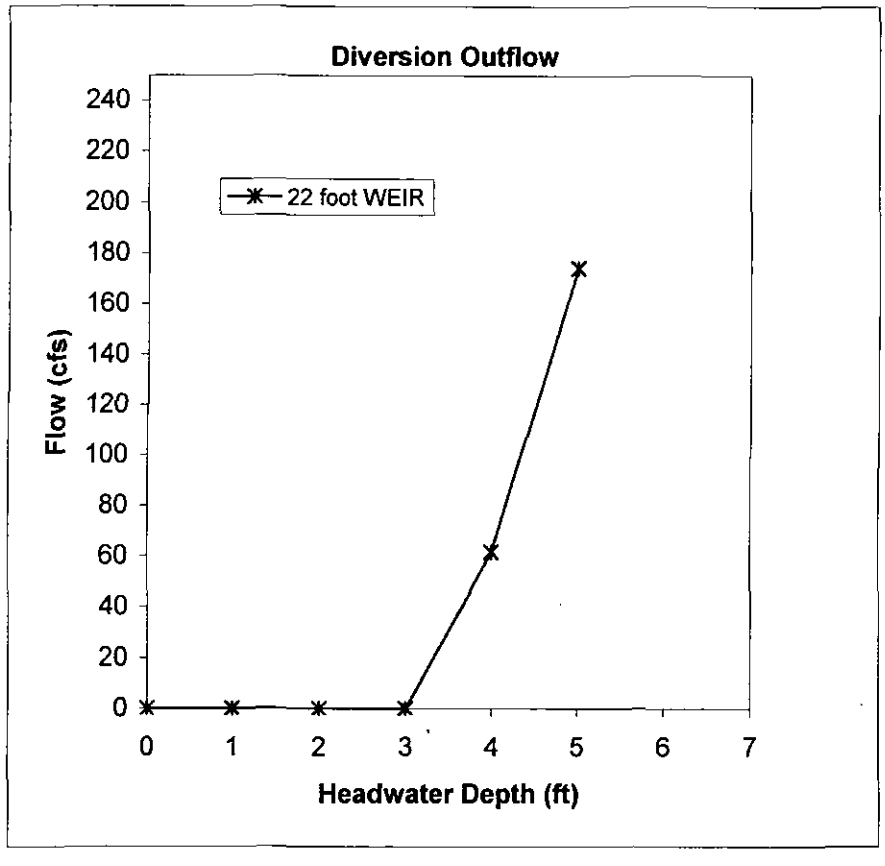
2-36" PIPE	
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	170



Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *11/15/2006*

Rating Curve for Diversion BAS H2-1

22	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	62
5	174



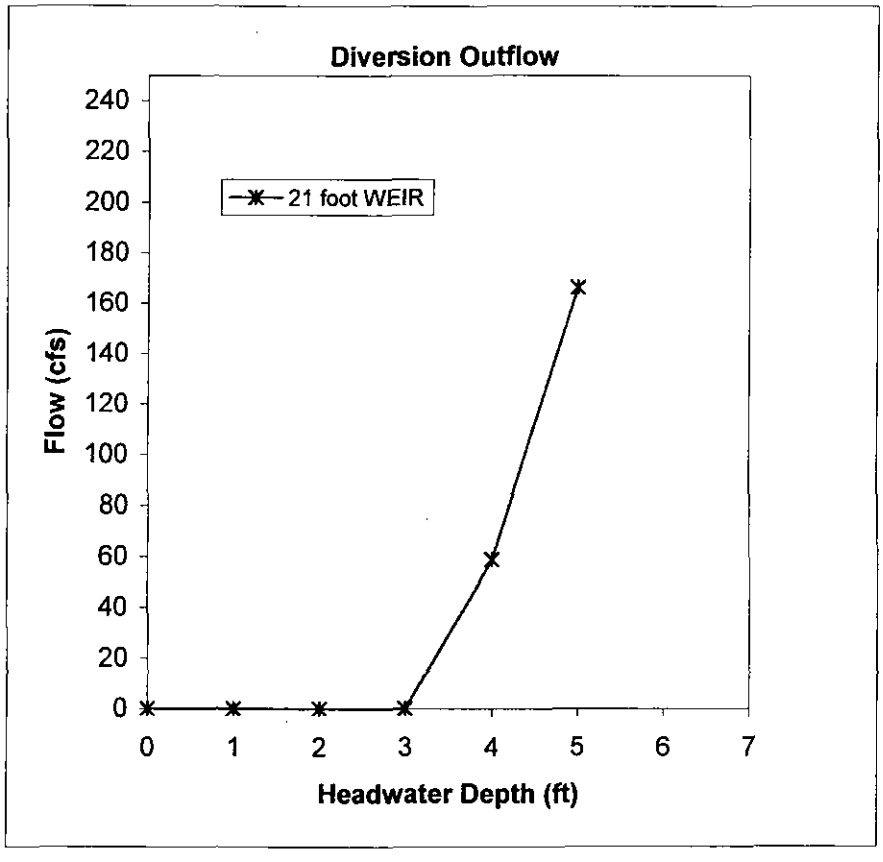
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *11/15/2006*

Rating Curve for Diversion BAS H2-2

21	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	59
5	166



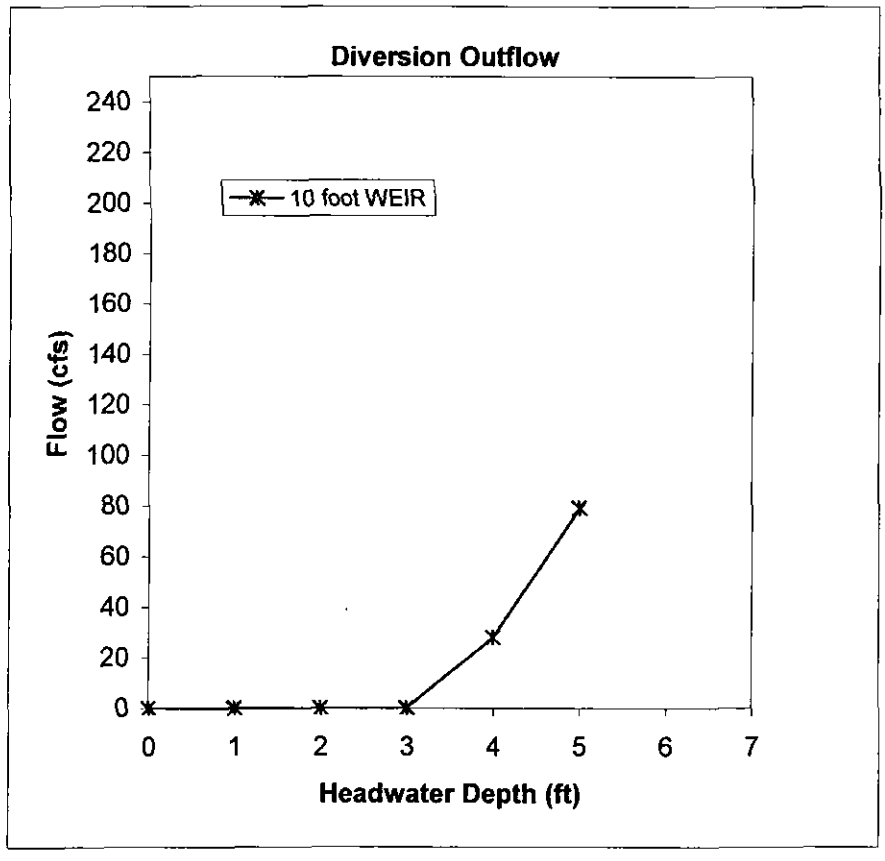
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *11/15/2006*

Rating Curve for Diversion BAS I

10	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	28
5	79



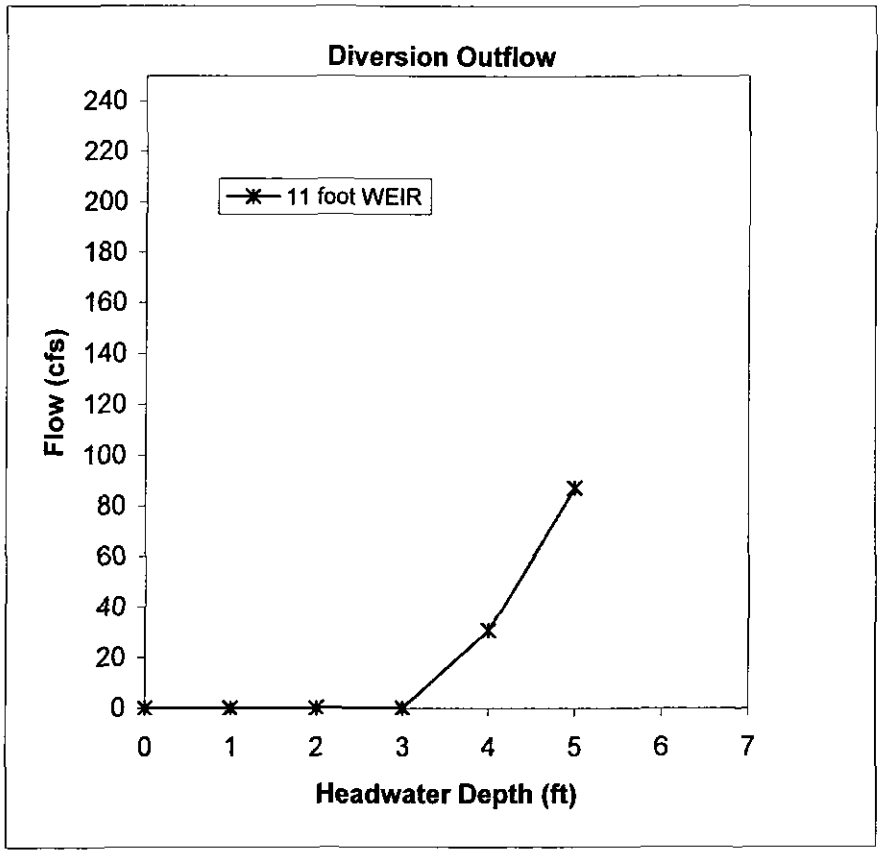
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *11/15/2006*

Rating Curve for Diversion BAS J

11	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	31
5	87



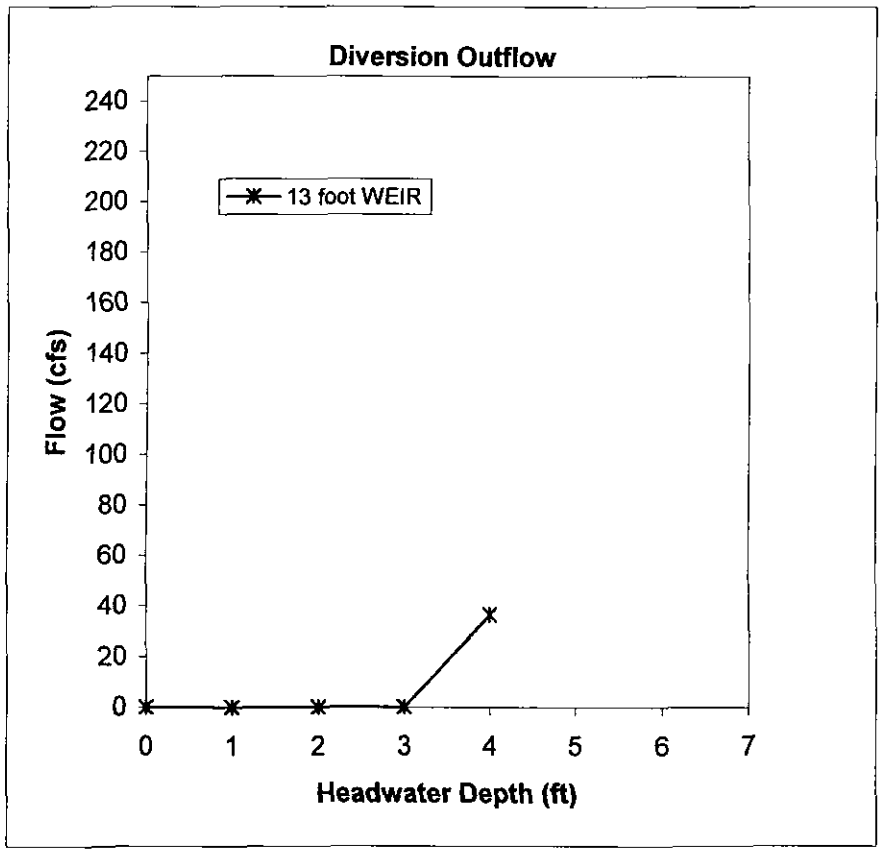
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *11/15/2006*

Rating Curve for Diversion BAS K

13	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	36



WOOD/PATEL

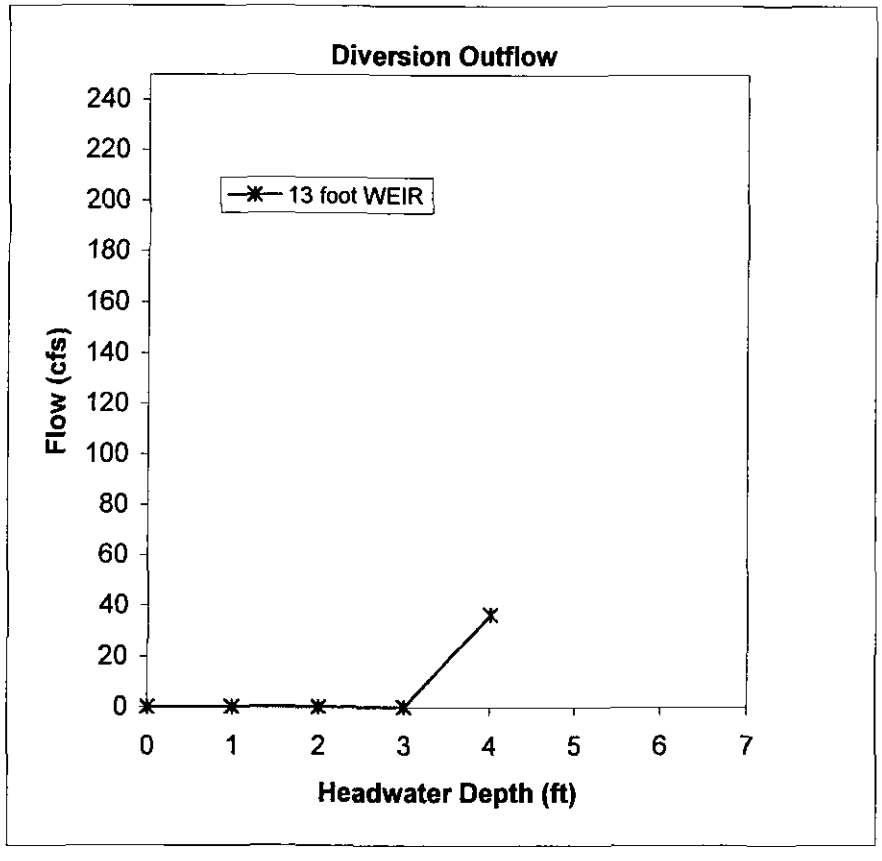
CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon*
Location: *City of Scottsdale*

W/P#: *042054*
Date: *11/15/2006*

Rating Curve for Diversion BAS L

13	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	36



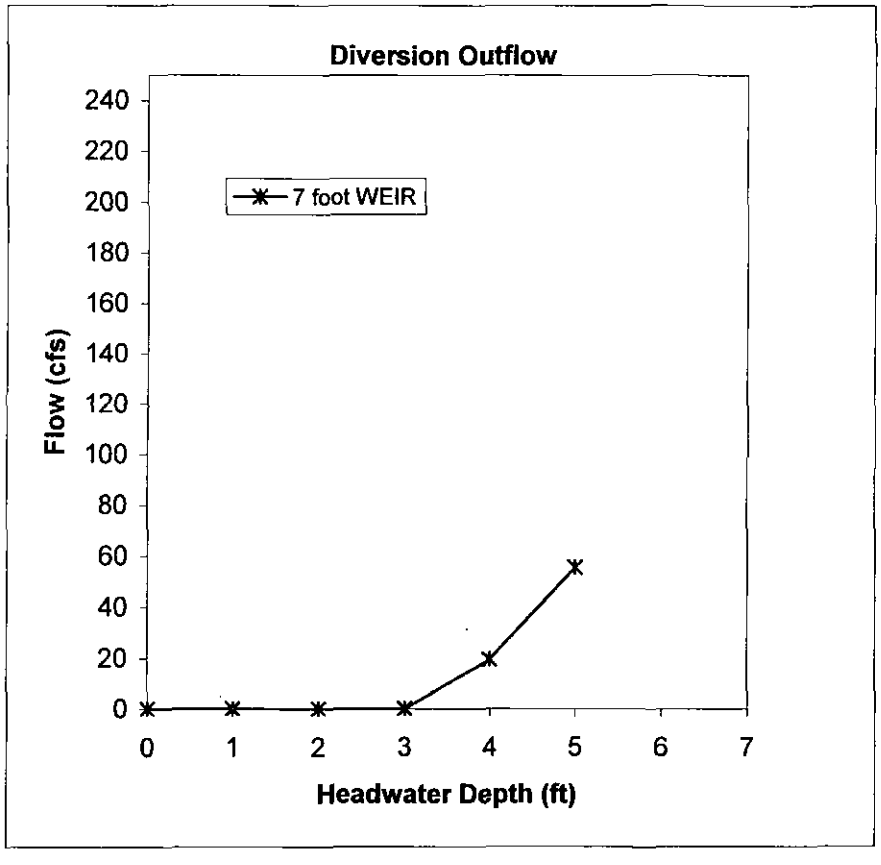
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *11/15/2006*

Rating Curve for Diversion BAS M

7	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	20
5	55



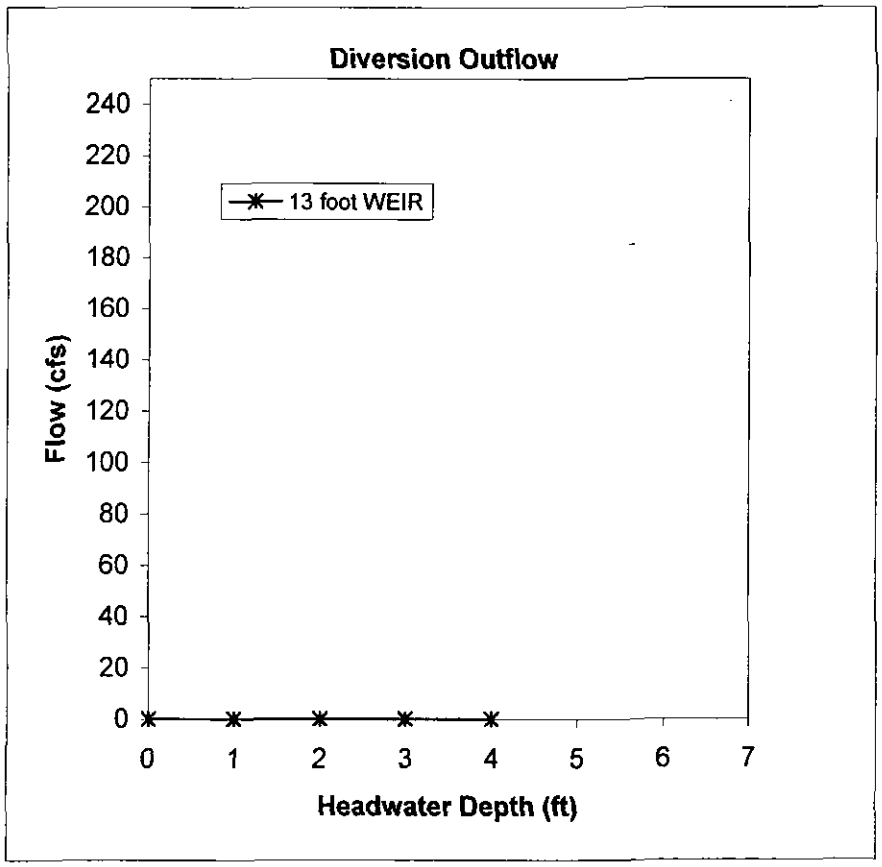
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *11/15/2006*

Rating Curve for Diversion BAS N

13	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	0
5	36

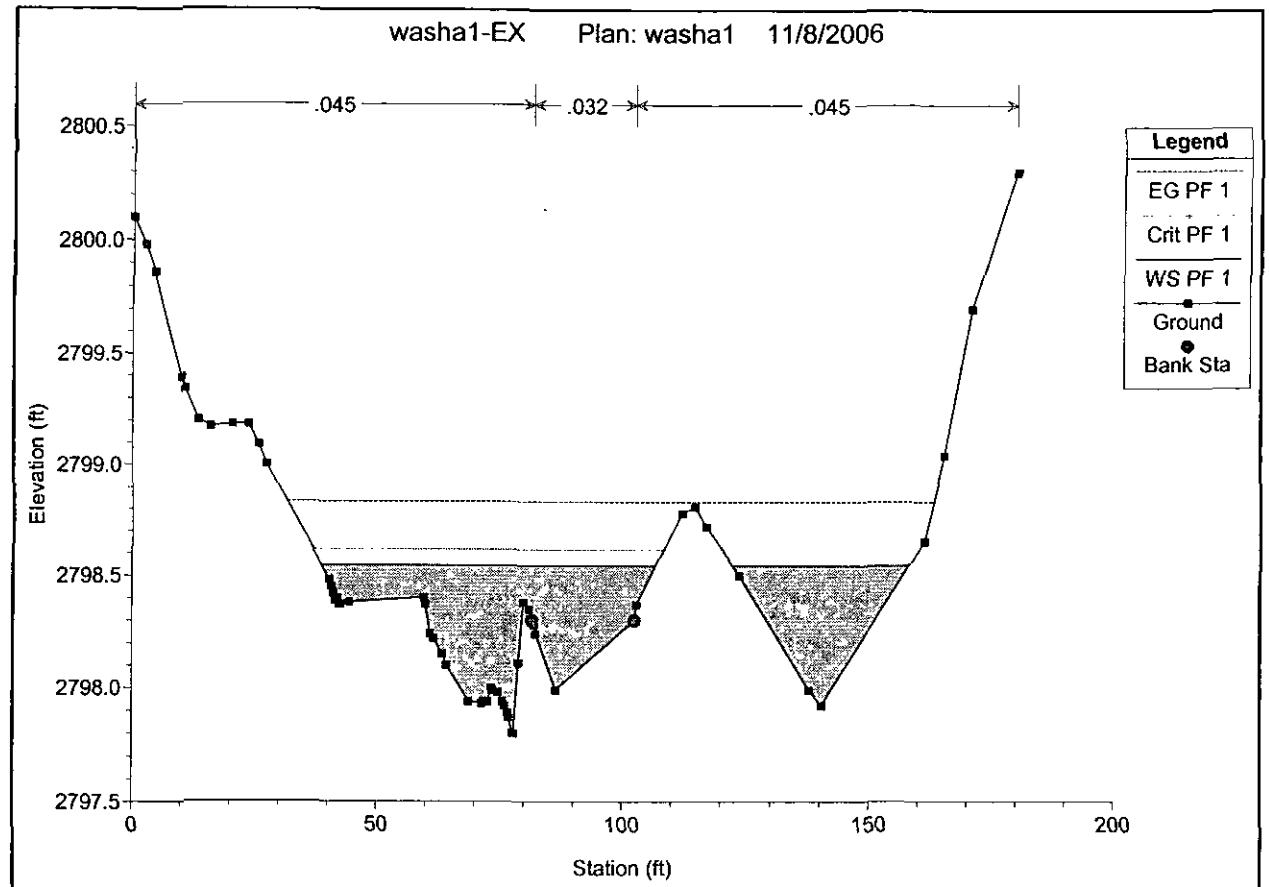


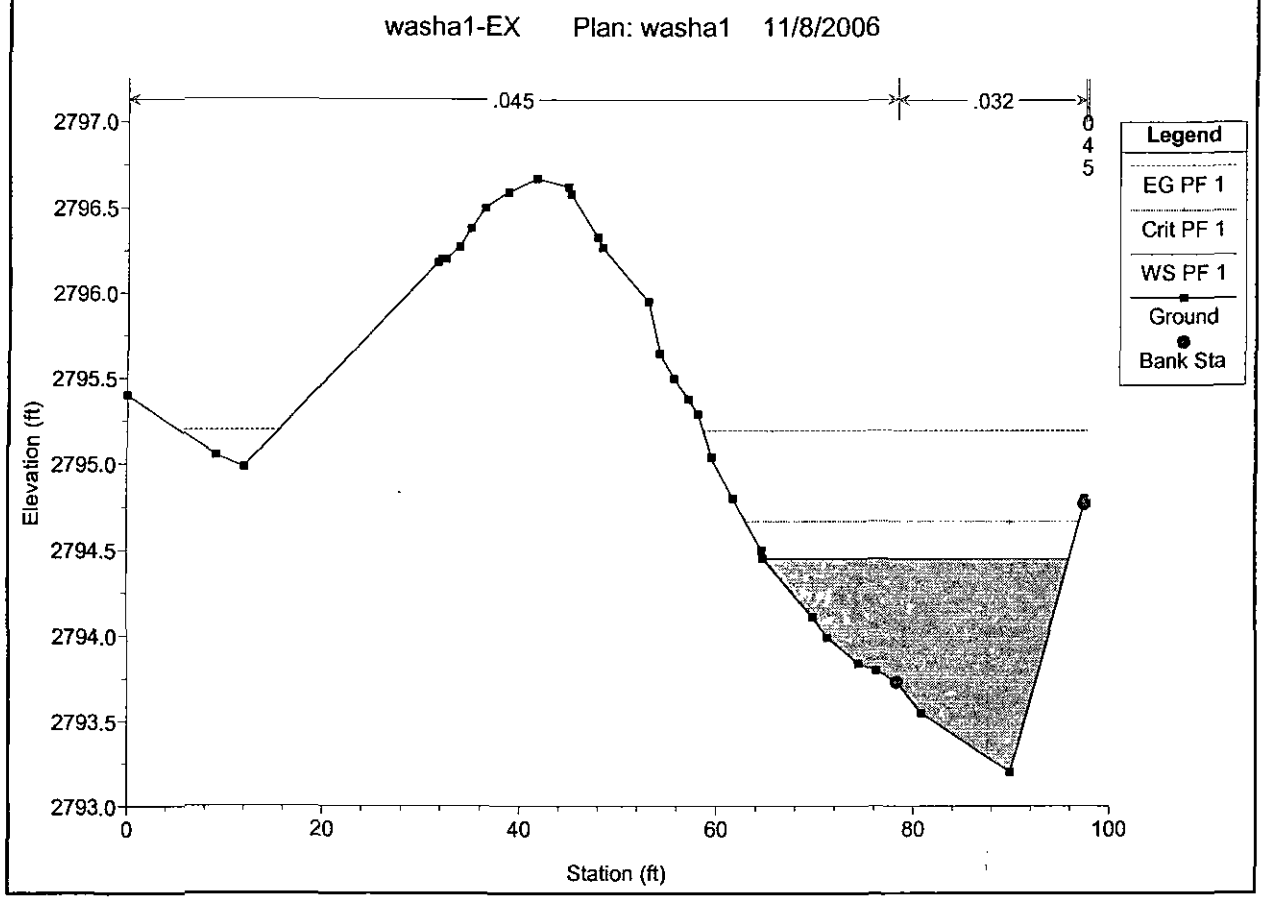
HEC-RAS Output Files

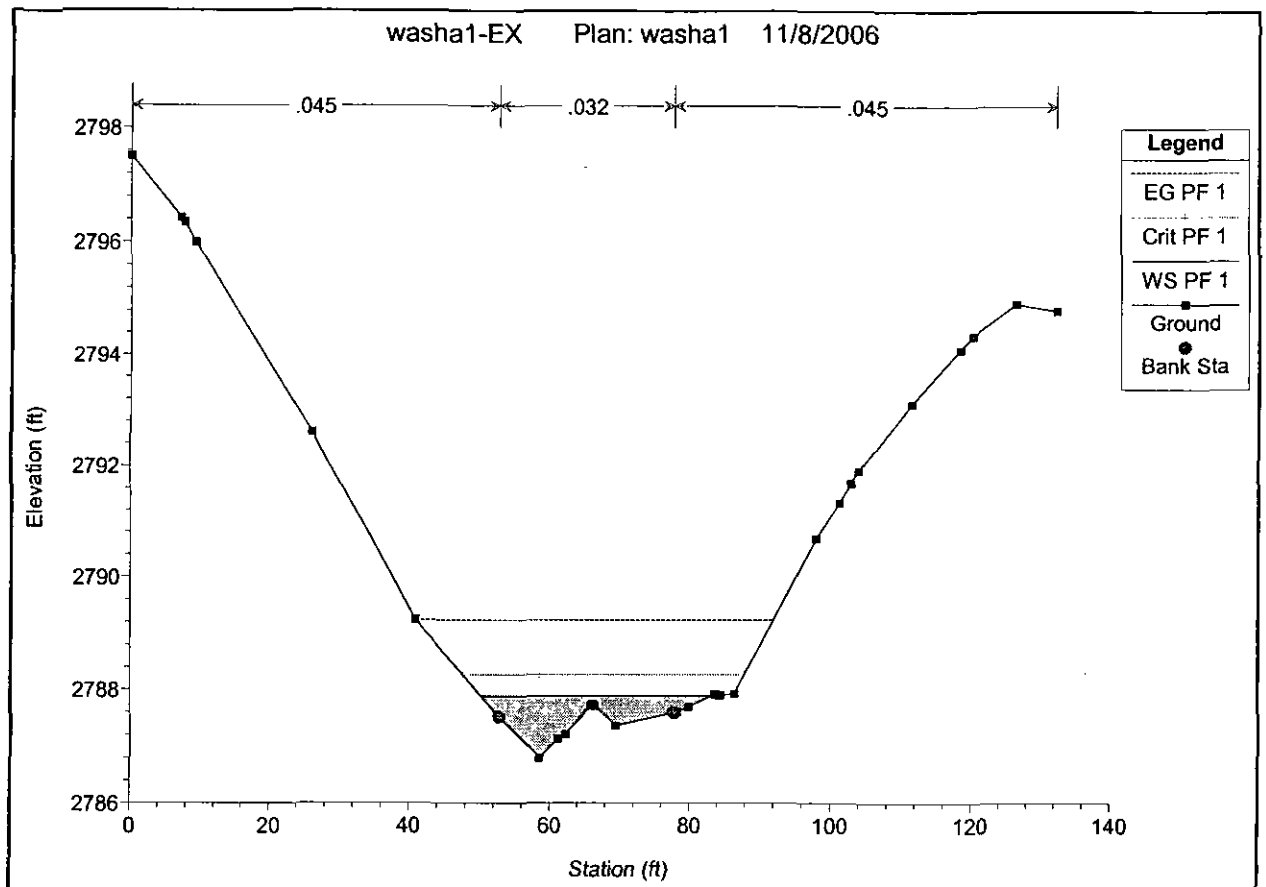
WASH A1

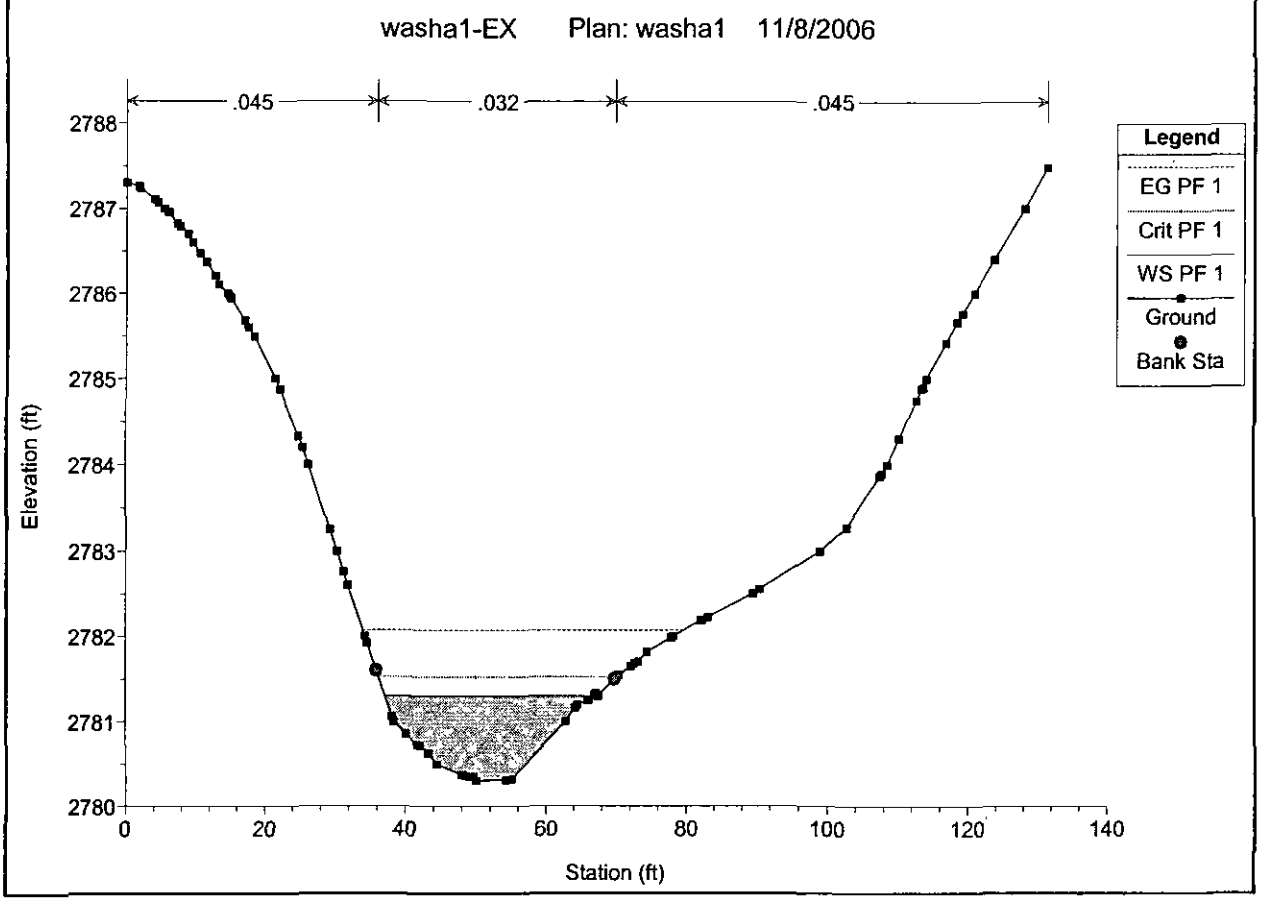
HEC-RAS Plan: wasa1 River: RIVER-1 Reach: Reach-1 Profile: PF 1

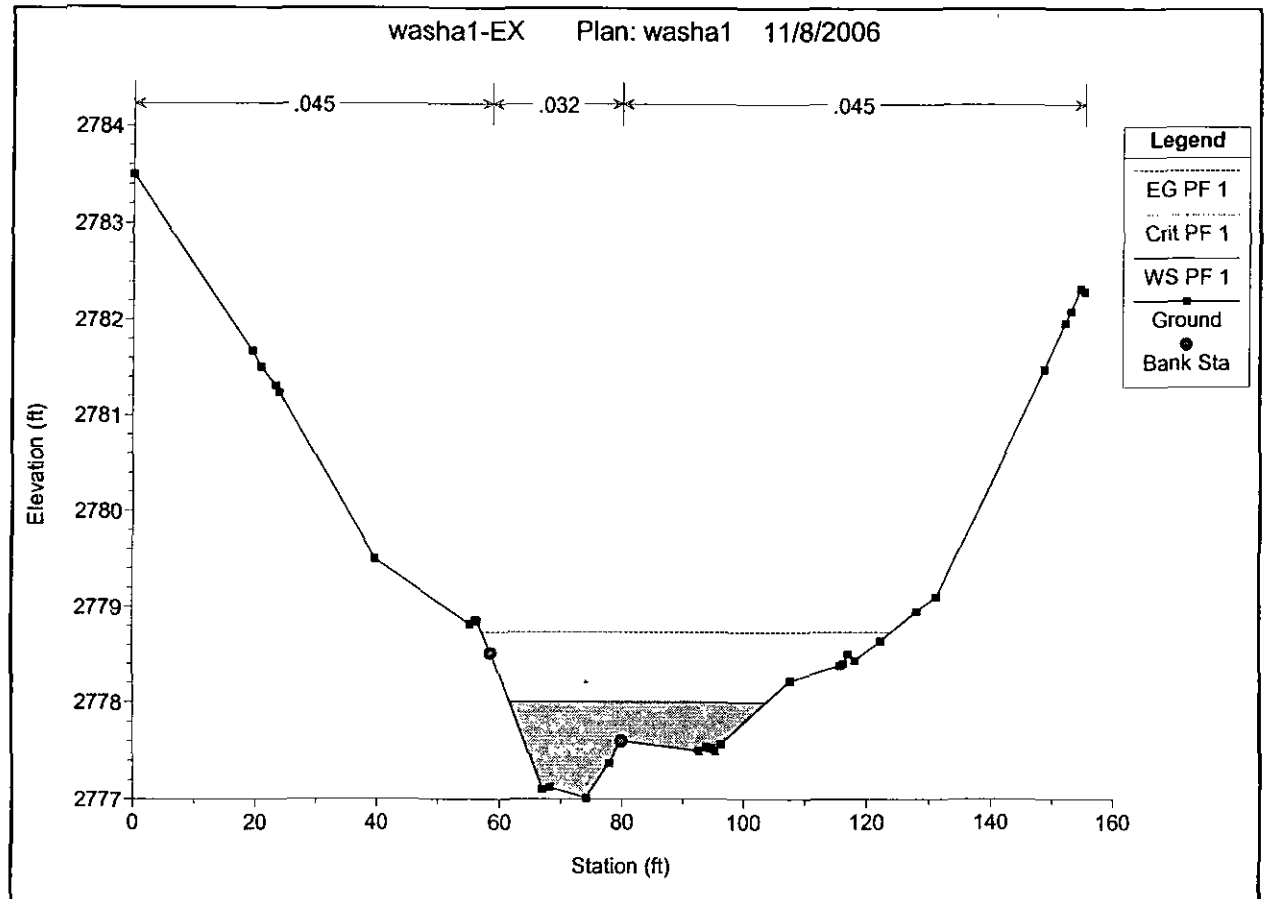
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	6	PF 1	133.00	2797.99	2798.54	2798.61	2798.83	0.050016	5.63	33.66	103.73	1.57
Reach-1	5	PF 1	133.00	2793.20	2794.45	2794.67	2795.20	0.029978	7.35	21.29	31.22	1.38
Reach-1	4	PF 1	133.00	2786.79	2787.89	2788.26	2789.23	0.093236	9.42	15.00	33.03	2.25
Reach-1	3.5	PF 1	133.00	2780.30	2781.30	2781.53	2782.07	0.042079	7.04	18.89	29.62	1.55
Reach-1	3	PF 1	133.00	2777.01	2778.00	2778.20	2778.73	0.041792	7.60	22.37	42.27	1.58
Reach-1	2.5	PF 1	133.00	2772.00	2772.83	2773.19	2773.87	0.067610	8.23	16.36	31.78	1.93
Reach-1	2	PF 1	235.00	2761.68	2763.52	2764.13	2765.42	0.052499	12.11	25.99	37.79	1.92
Reach-1	1.5	PF 1	235.00	2759.00	2760.14	2760.27	2760.65	0.033817	5.69	41.27	75.65	1.36
Reach-1	1	PF 1	235.00	2753.00	2754.30	2754.63	2755.50	0.047422	9.68	33.13	58.31	1.77

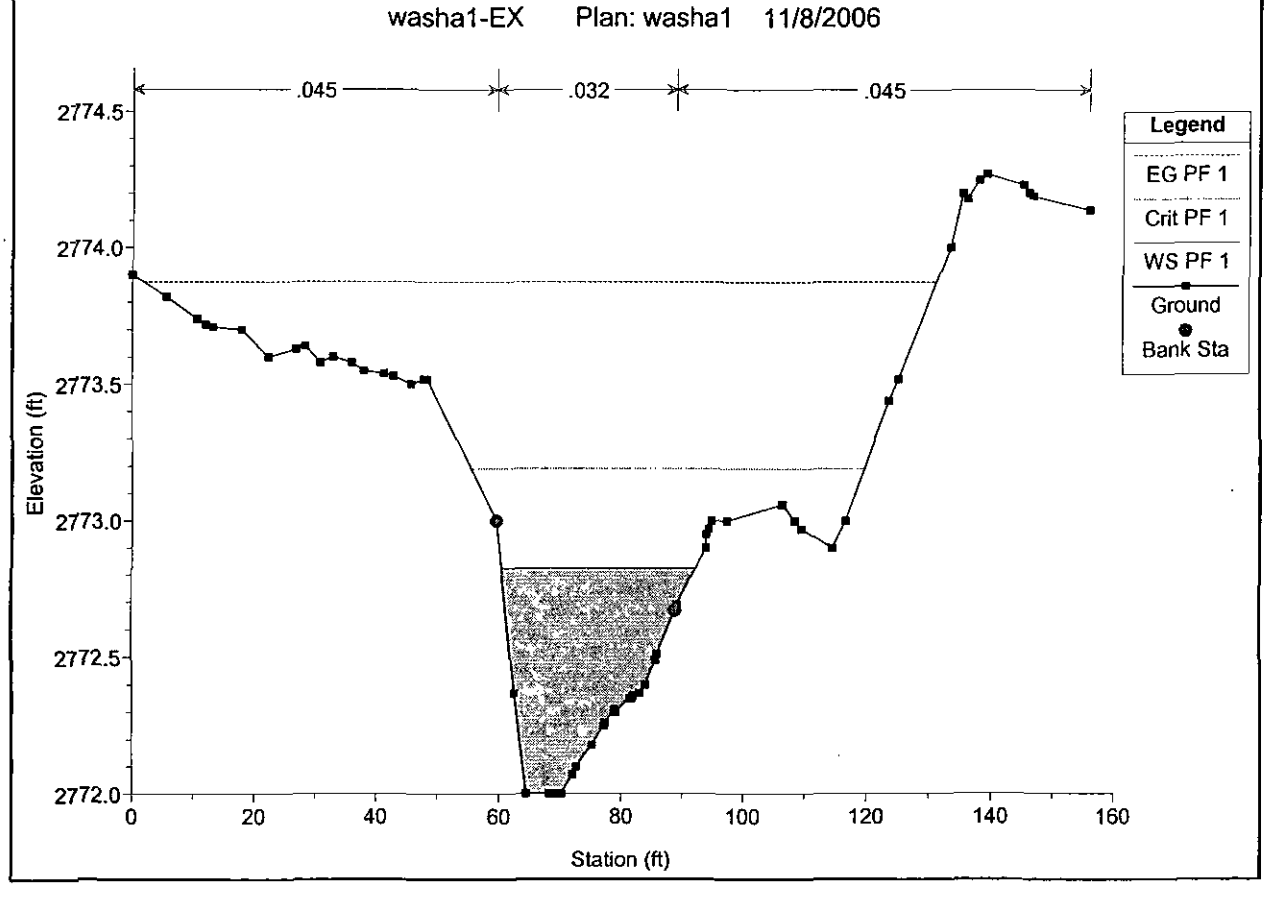

washa1-EX Plan: washa1 11/8/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2800.5
2800.0
2799.5
2799.0
2798.5
2798.0
2797.5
0
50
100
150
200
Station (ft)

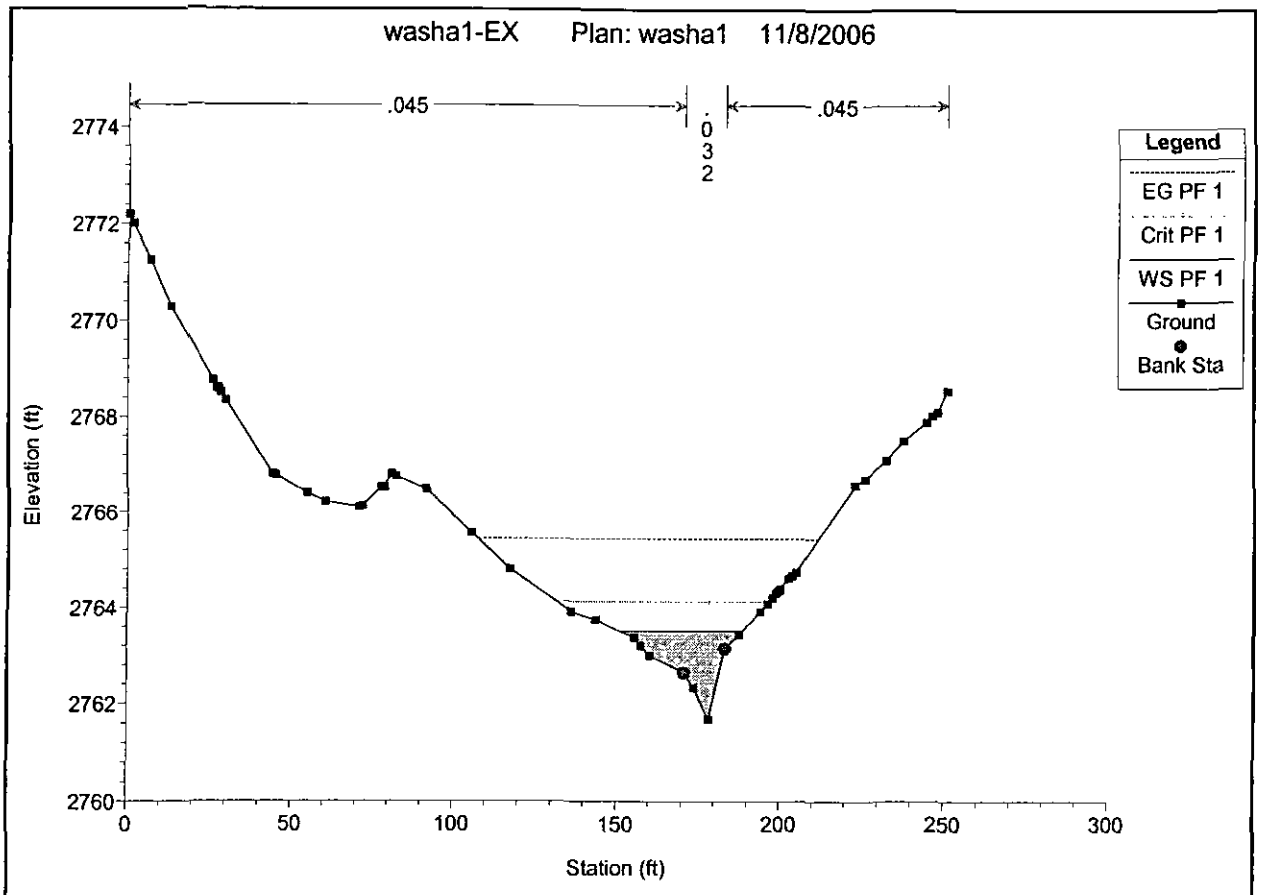

washa1-EX Plan: washa1 11/8/2006
.045
.032
0
4
5
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2797.0
2796.5
2796.0
2795.5
2795.0
2794.5
2794.0
2793.5
2793.0
0
20
40
60
80
100
Station (ft)

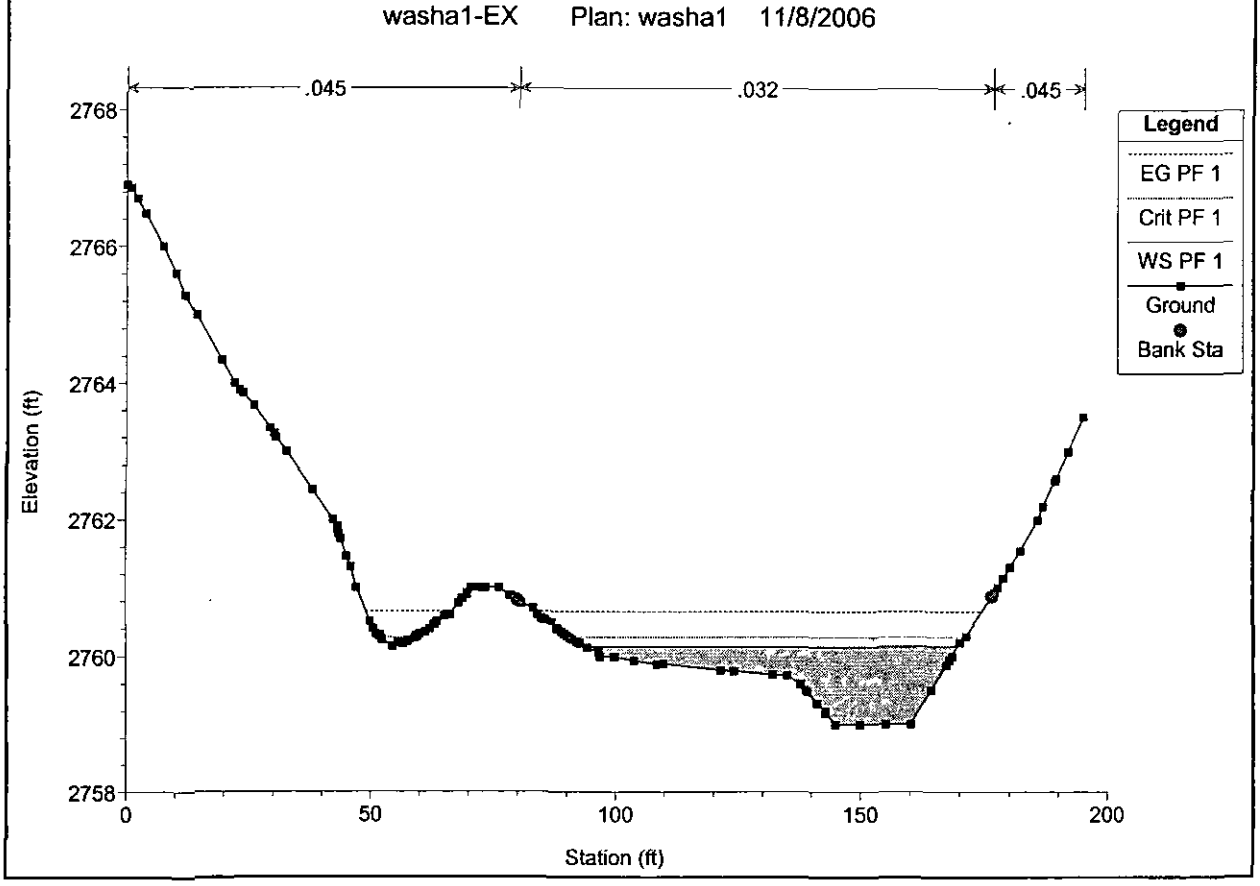

washa1-EX Plan: washa1 11/8/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2798
2796
2794
2792
2790
2788
2786
0
20
40
60
80
100
120
140
Station (ft)

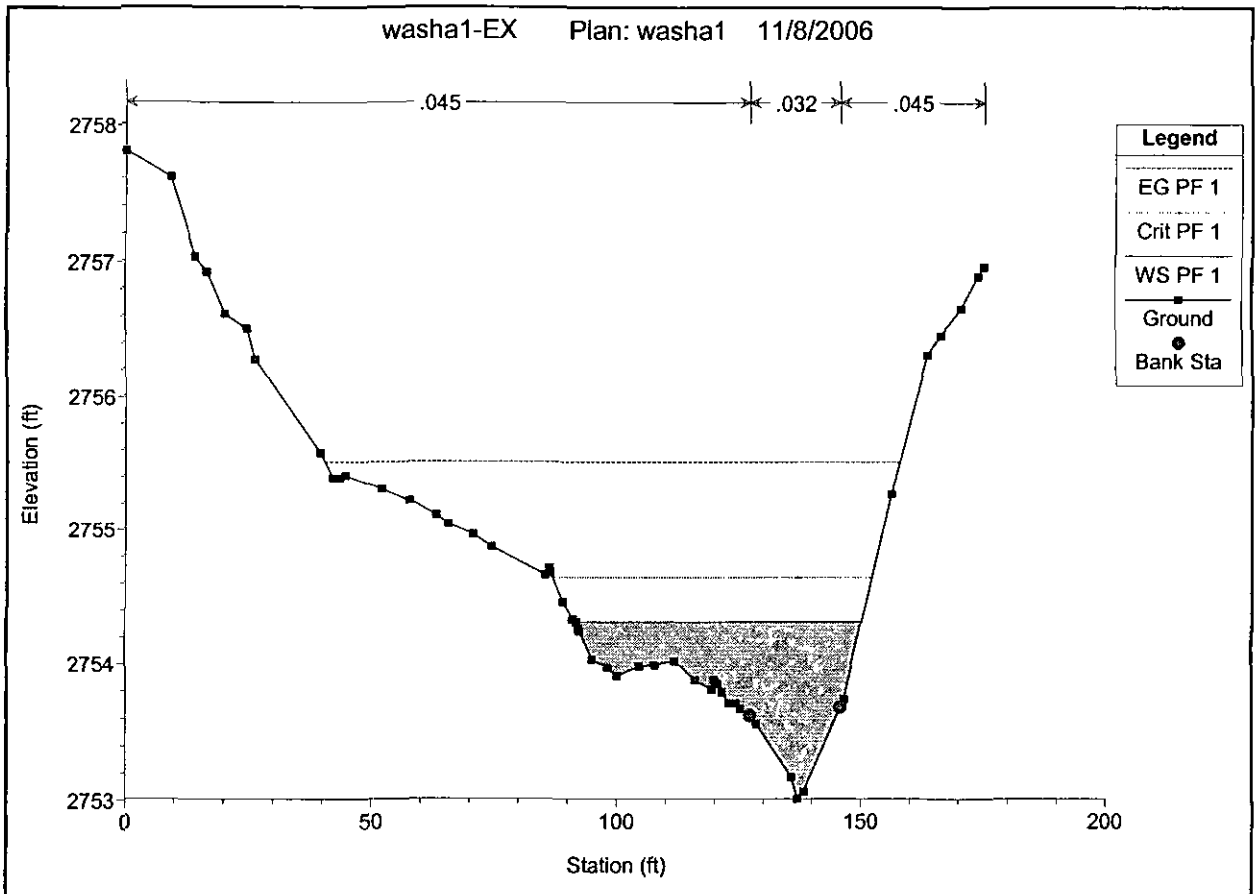

washa1-EX Plan: washa1 11/8/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2788
2787
2786
2785
2784
2783
2782
2781
2780
0
20
40
60
80
100
120
140
Station (ft)


washa1-EX Plan: washa1 11/8/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2784
2783
2782
2781
2780
2779
2778
2777
0
20
40
60
80
100
120
140
160
Station (ft)


washa1-EX Plan: washa1 11/8/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2774.5
2774.0
2773.5
2773.0
2772.5
2772.0
0
20
40
60
80
100
120
140
160
Station (ft)


washa1-EX Plan: washa1 11/8/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2774
2772
2770
2768
2766
2764
2762
2760
0
50
100
150
200
250
300

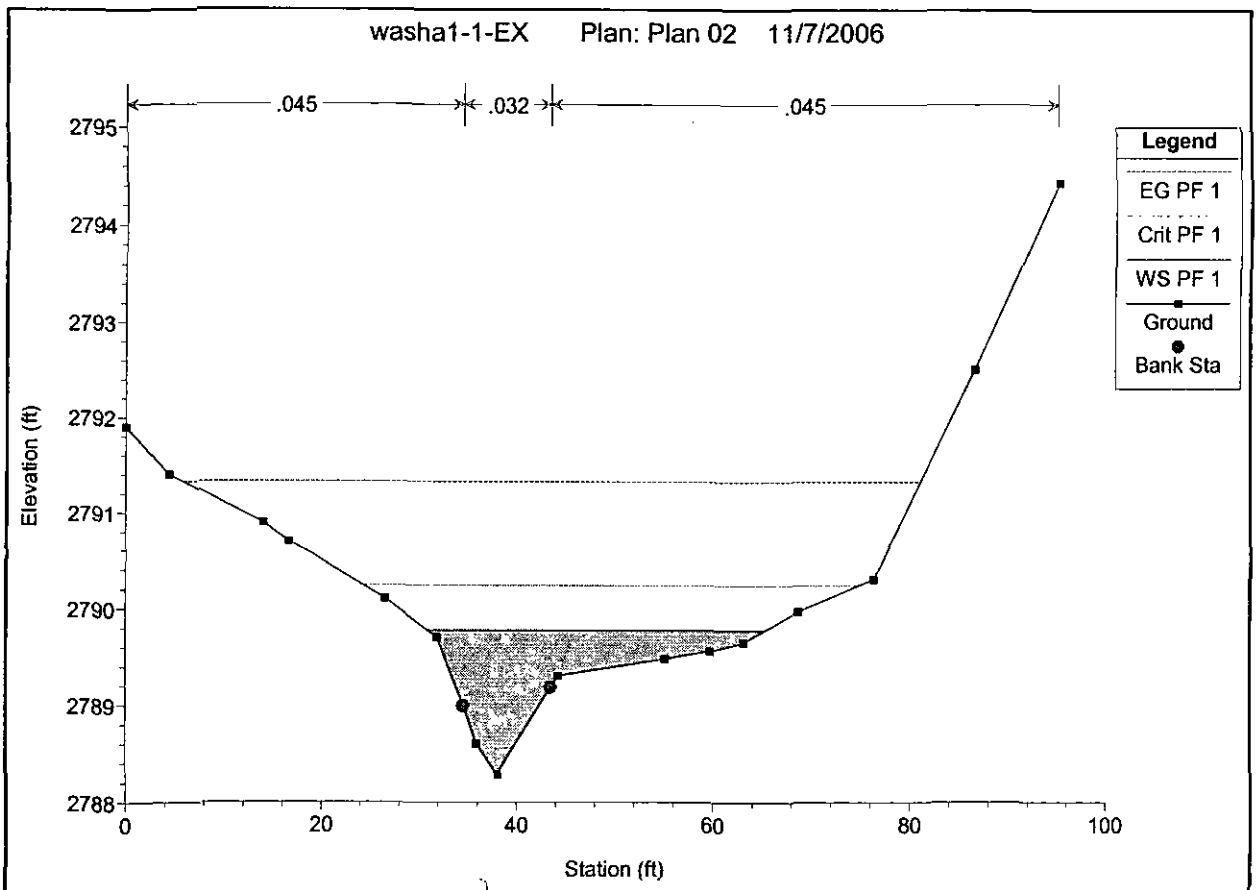

washa1-EX Plan: washa1 11/8/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2768
2766
2764
2762
2760
2758
0
50
100
150
200

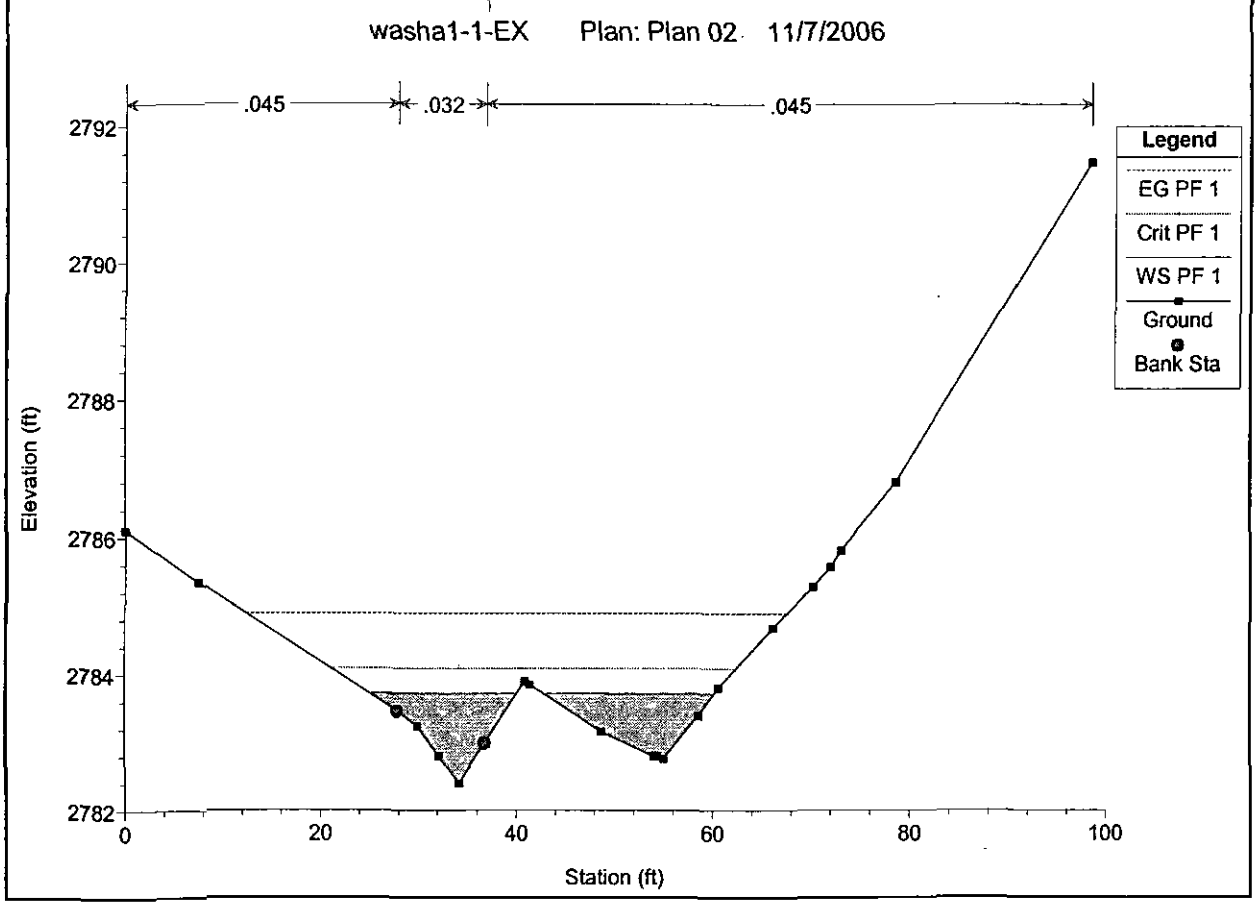

washa1-EX Plan: washa1 11/8/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2758
2757
2756
2755
2754
2753
0
50
100
150
200
Station (ft)

WASH A1-1

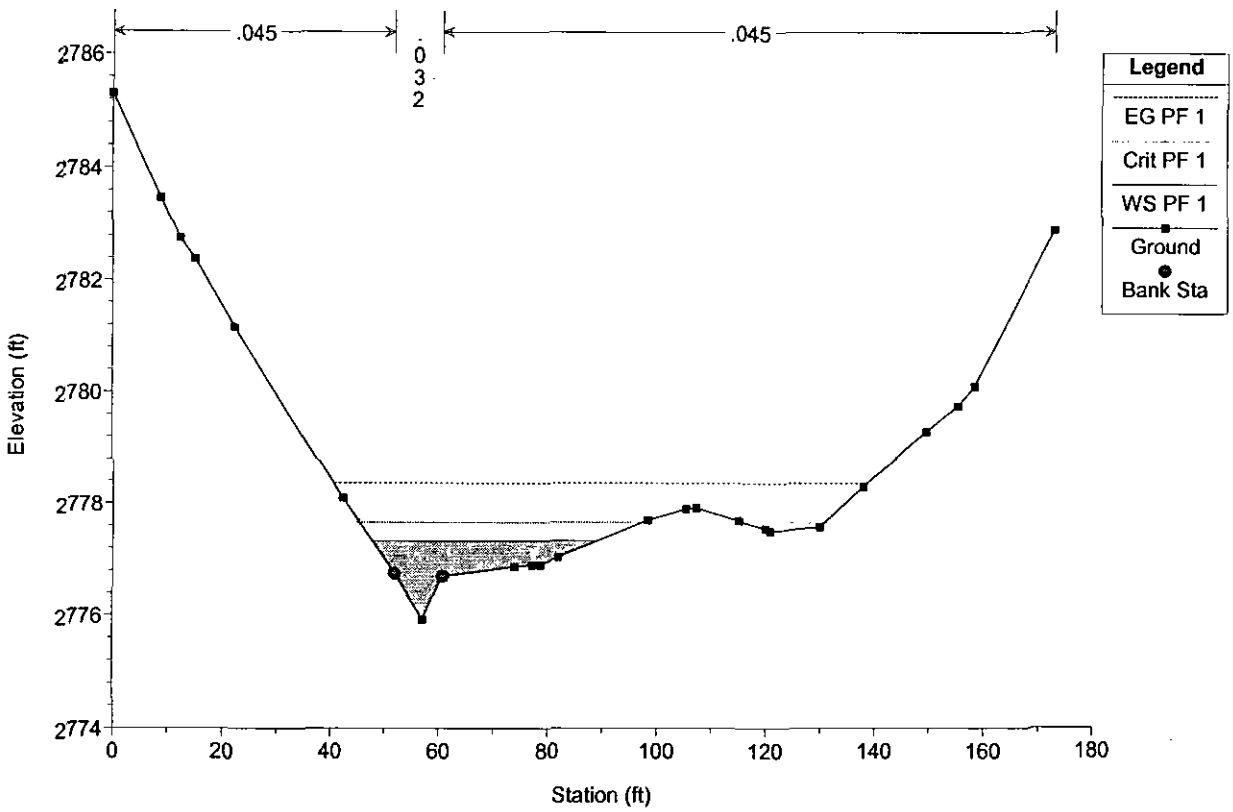
HEC-RAS Plan: Plan 02 River: RIVER-1 Reach: Reach-1 Profile: PF 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	6	PF 1	133.00	2788.28	2789.77	2790.23	2791.32	0.050087	10.97	17.44	34.33	1.84
Reach-1	5	PF 1	133.00	2782.40	2783.72	2784.08	2784.89	0.068076	10.46	17.98	32.56	2.04
Reach-1	4	PF 1	133.00	2775.92	2777.33	2777.66	2778.36	0.045547	9.75	21.33	41.25	1.72
Reach-1	3	PF 1	133.00	2769.16	2770.48	2771.05	2772.19	0.061709	10.66	13.50	19.67	1.98
Reach-1	2.5	PF 1	133.00	2766.00	2767.19	2767.51	2768.15	0.057608	7.85	16.99	29.16	1.79
Reach-1	2	PF 1	133.00	2761.84	2763.45	2763.69	2764.23	0.028466	7.15	19.39	28.35	1.34
Reach-1	1.5	PF 1	133.00	2759.00	2759.88	2760.03	2760.39	0.048351	5.71	23.31	55.71	1.55
Reach-1	1	PF 1	235.00	2753.00	2754.37	2754.64	2755.33	0.035550	9.07	37.36	60.40	1.55

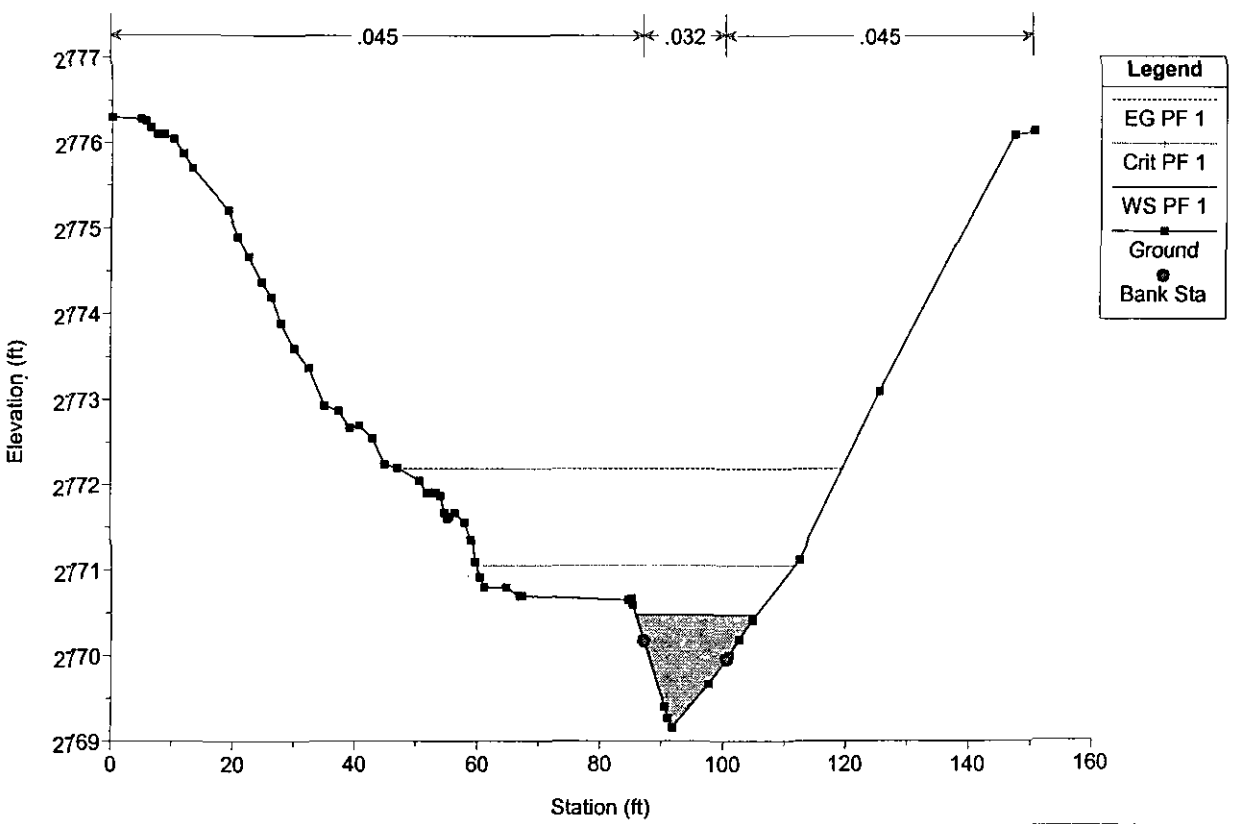

washa1-1-EX Plan: Plan 02 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2795
2794
2793
2792
2791
2790
2789
2788
0
20
40
60
80
100
Station (ft)


washa1-1-EX Plan: Plan 02 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2792
2790
2788
2786
2784
2782
0
20
40
60
80
100
Station (ft)

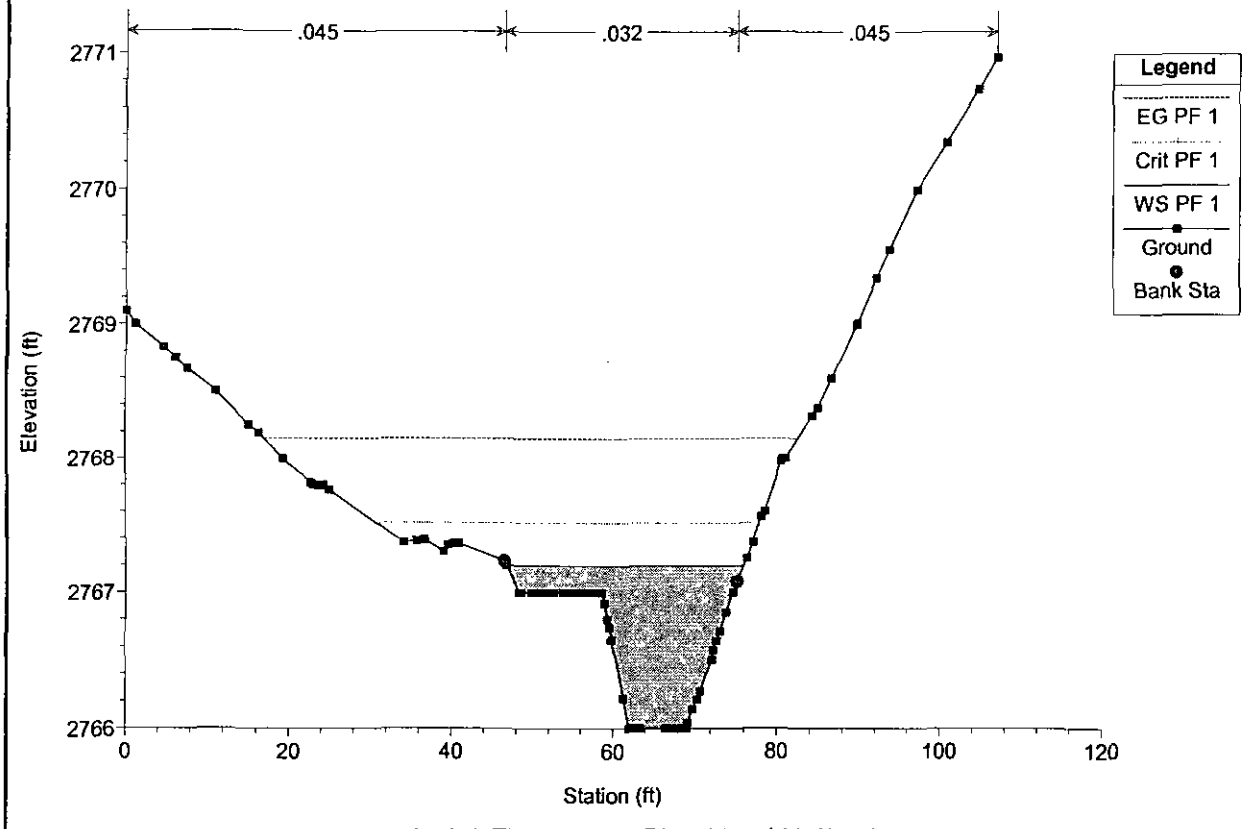
washa1-1-EX Plan: Plan 02 11/7/2006



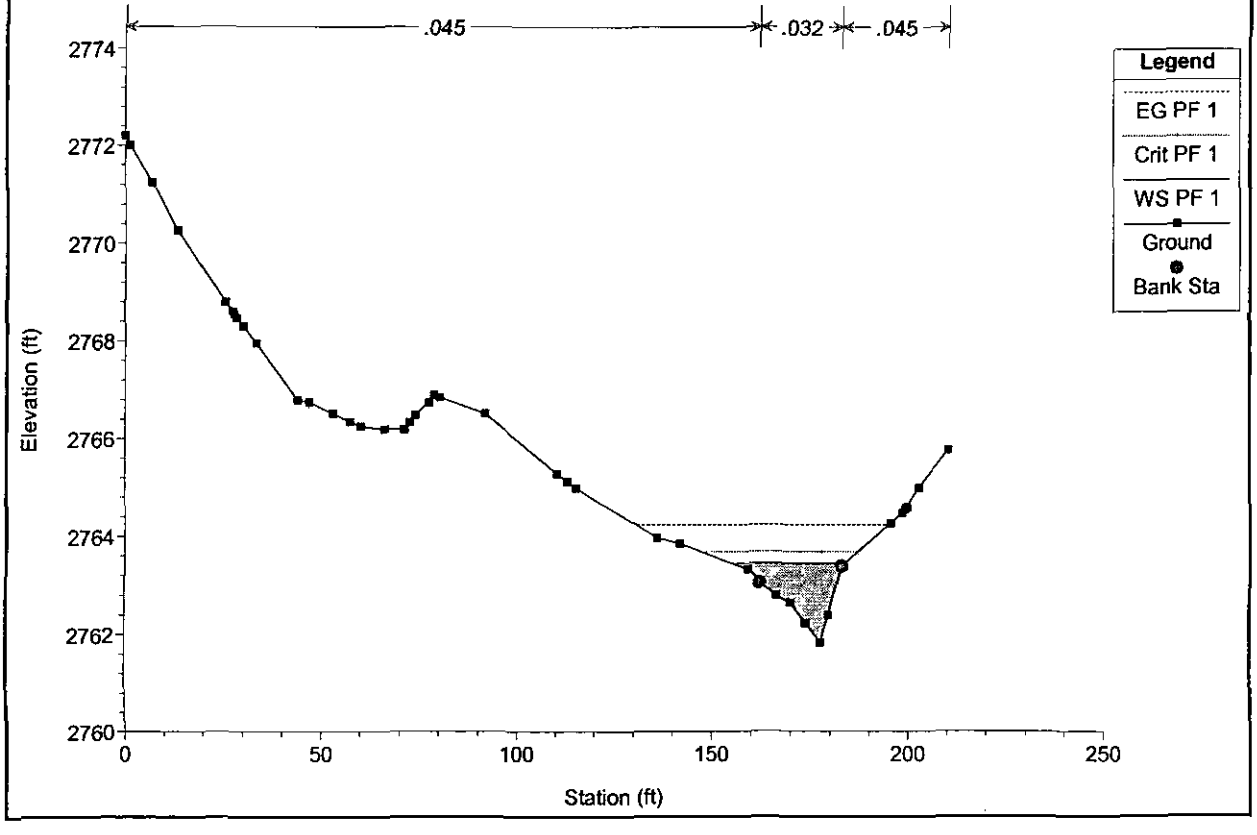
washa1-1-EX Plan: Plan 02 11/7/2006

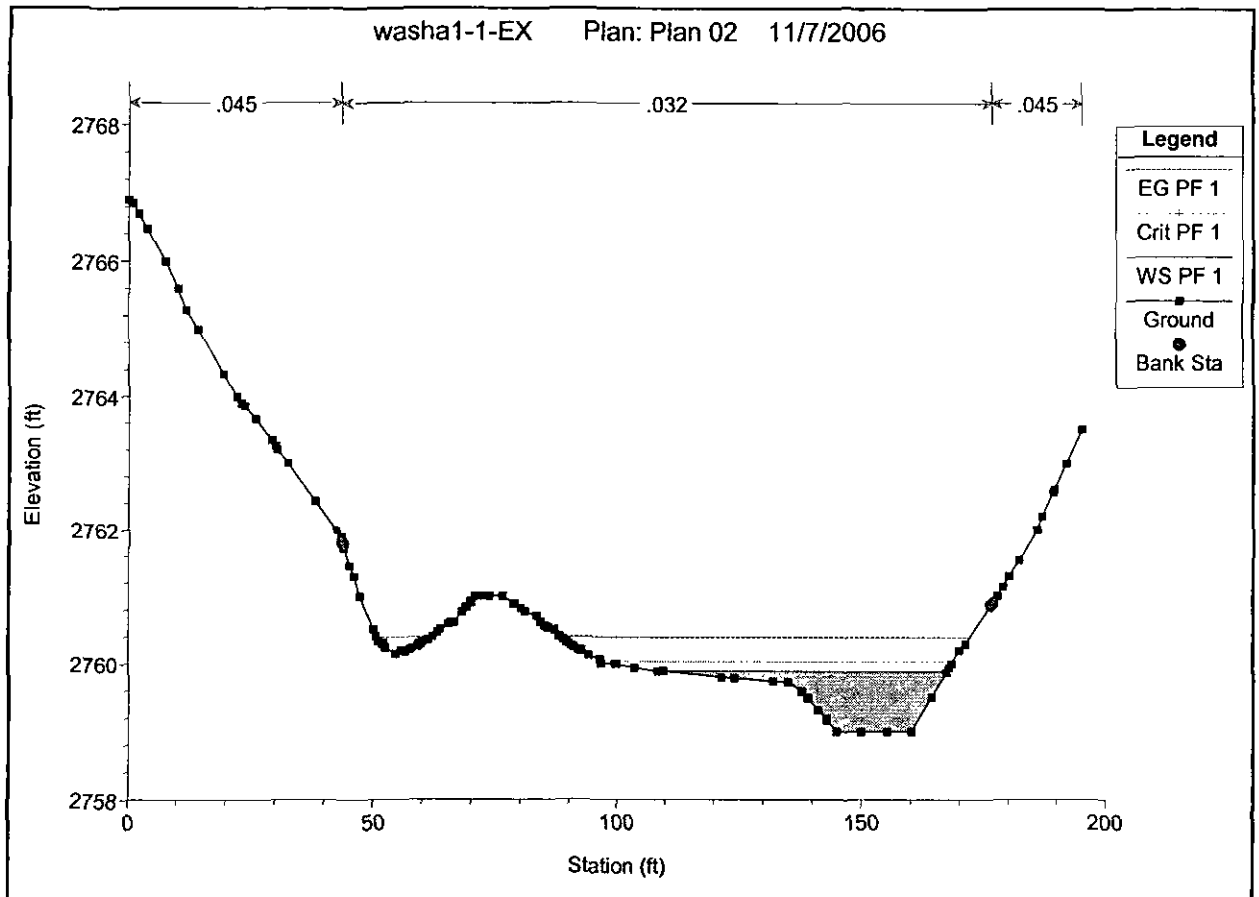


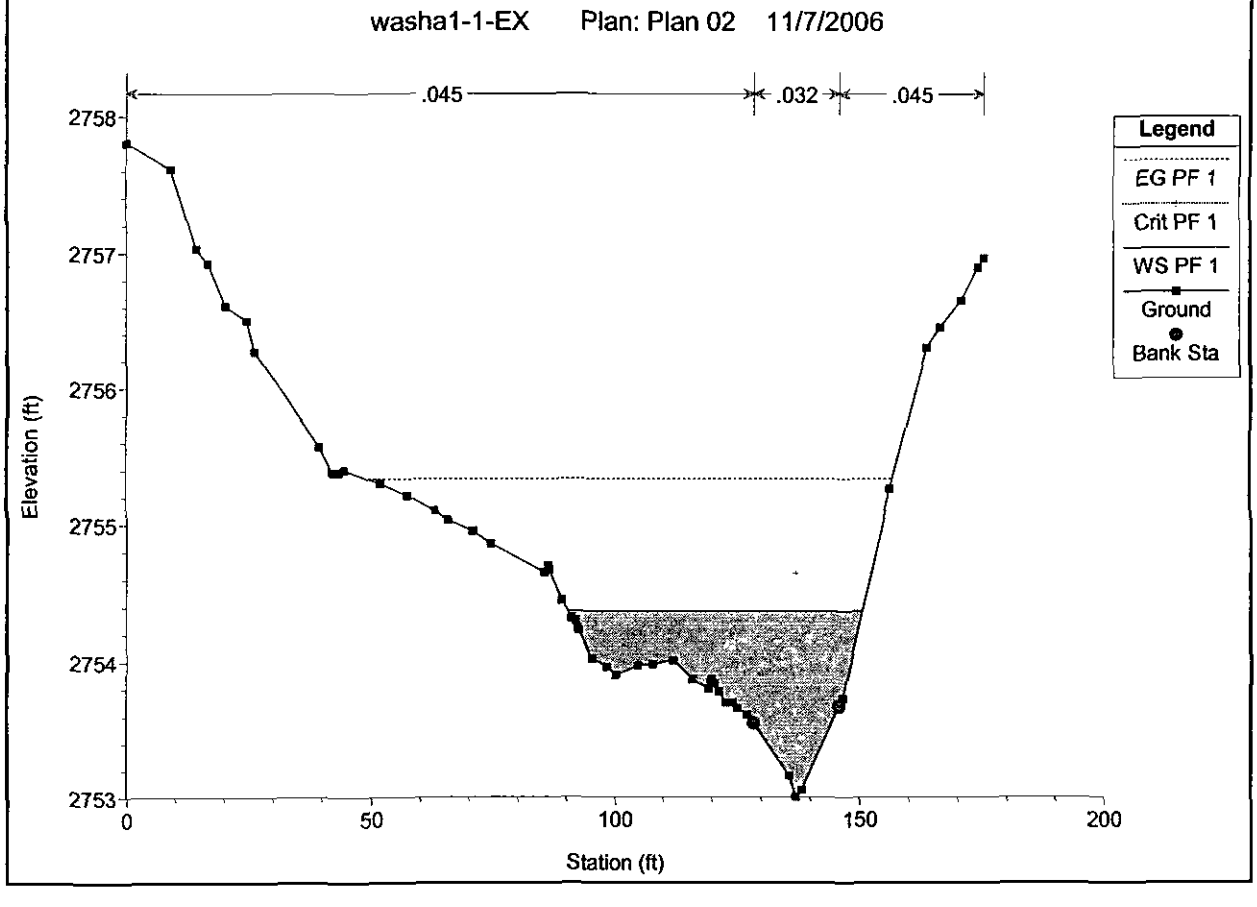
washa1-1-EX Plan: Plan 02 11/7/2006



washa1-1-EX Plan: Plan 02 11/7/2006




washa1-1-EX Plan: Plan 02 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2768
2766
2764
2762
2760
2758
0
50
100
150
200
Station (ft)

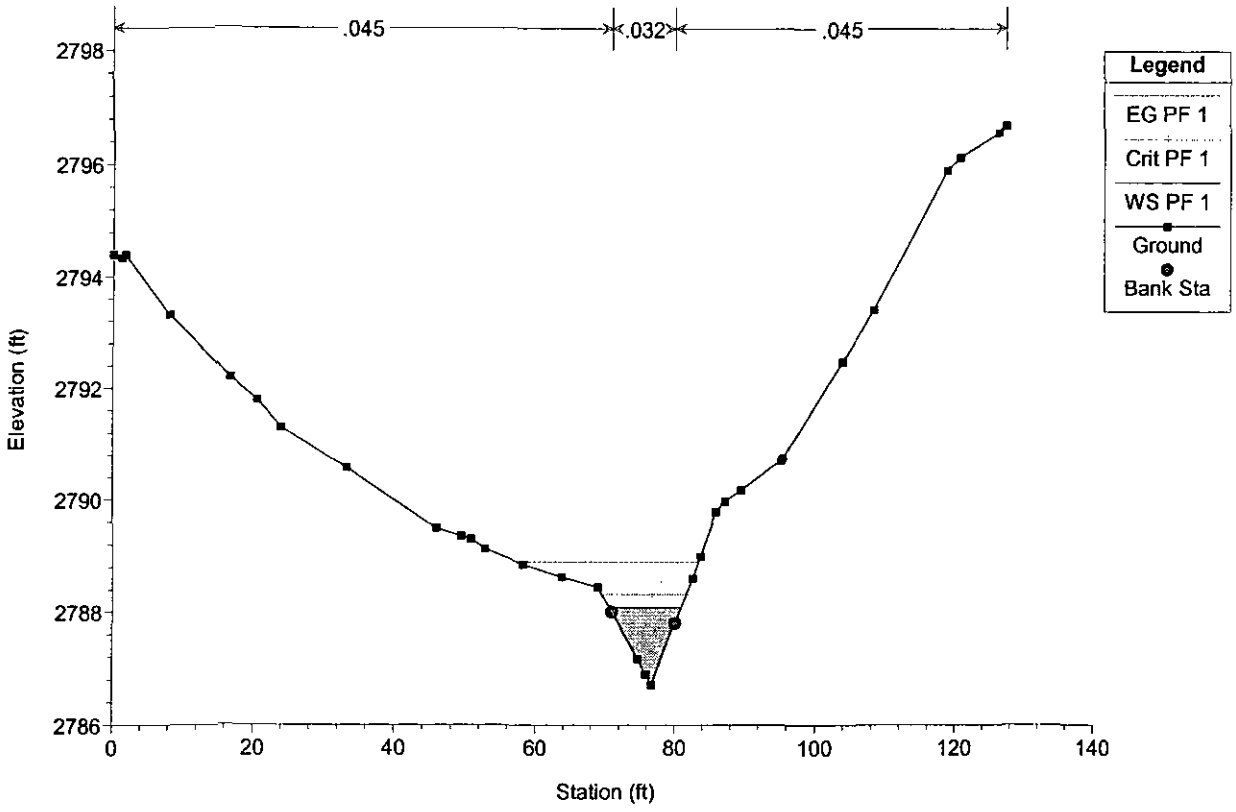

washa1-1-EX Plan: Plan 02 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2758
2757
2756
2755
2754
2753
0
50
100
150
200
Station (ft)

WASH A2

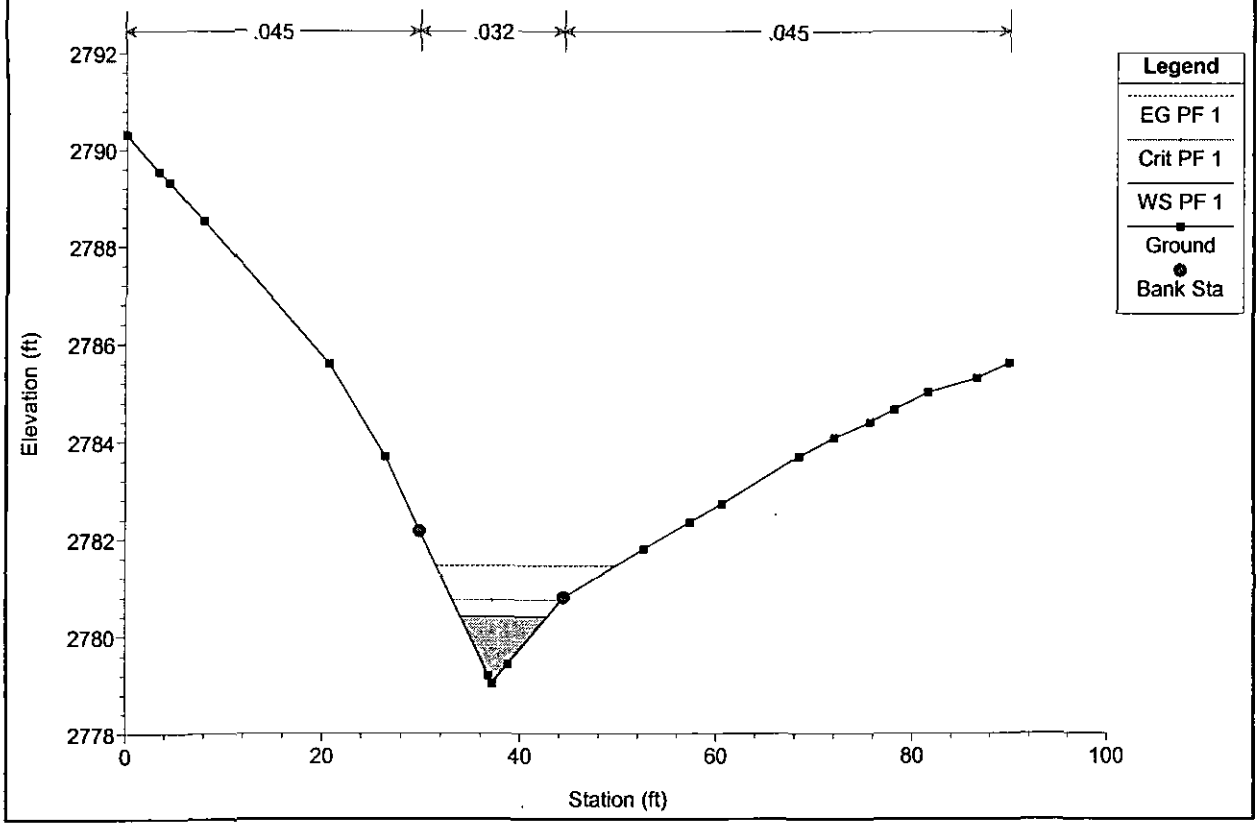
HEC-RAS Plan: Plan 01 River: RIVER-1 Reach: Reach-1 Profile: PF 1

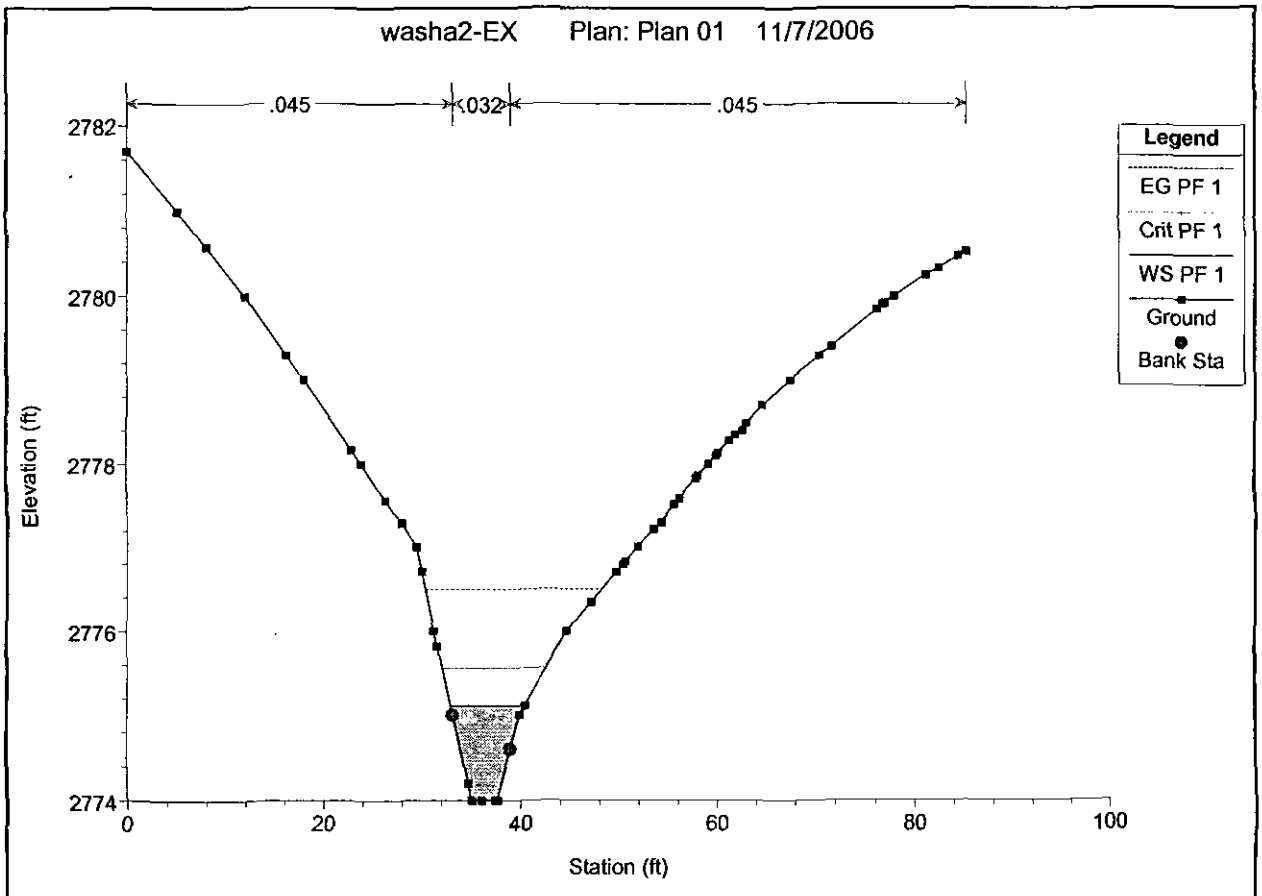
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev.	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	8	PF 1	50.00	2786.70	2788.08	2788.32	2788.89	0.037052	7.25	7.00	10.29	1.47
Reach-1	7	PF 1	50.00	2779.03	2780.41	2780.75	2781.45	0.054930	8.20	6.09	8.86	1.74
Reach-1	6.5	PF 1	50.00	2774.00	2775.12	2775.56	2776.49	0.053771	9.50	5.51	7.56	1.78
Reach-1	6	PF 1	50.00	2769.58	2771.38	2771.63	2772.27	0.035829	7.60	6.58	7.35	1.41
Reach-1	5.5	PF 1	50.00	2766.00	2767.37	2767.82	2768.78	0.045155	9.98	5.95	8.05	1.70
Reach-1	5	PF 1	65.00	2760.85	2762.45	2762.98	2764.14	0.060416	10.47	6.36	7.80	1.89
Reach-1	4	PF 1	65.00	2754.30	2756.01	2756.26	2756.93	0.034820	7.73	8.44	9.82	1.44
Reach-1	3	PF 1	65.00	2749.02	2750.53	2750.80	2751.42	0.041151	7.55	8.61	11.61	1.55
Reach-1	2	PF 1	109.00	2742.10	2743.52	2743.88	2744.58	0.039966	8.35	13.80	21.60	1.58
Reach-1	1.5	PF 1	109.00	2739.00	2740.27	2740.51	2741.01	0.023936	7.10	18.25	35.03	1.26
Reach-1	1	PF 1	109.00	2733.30	2734.60	2735.10	2736.05	0.078453	9.68	11.58	21.73	2.12

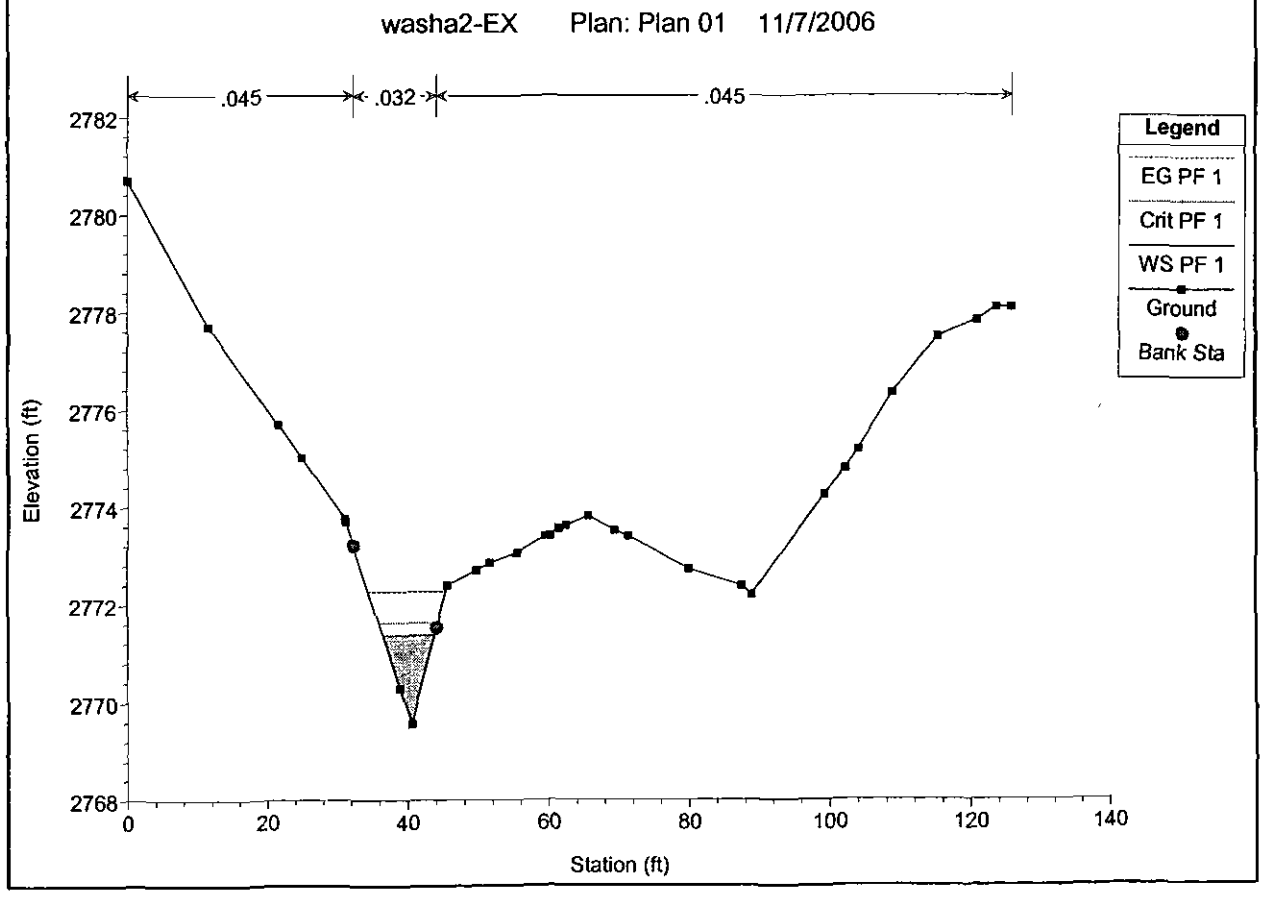
washa2-EX Plan: Plan 01 11/7/2006

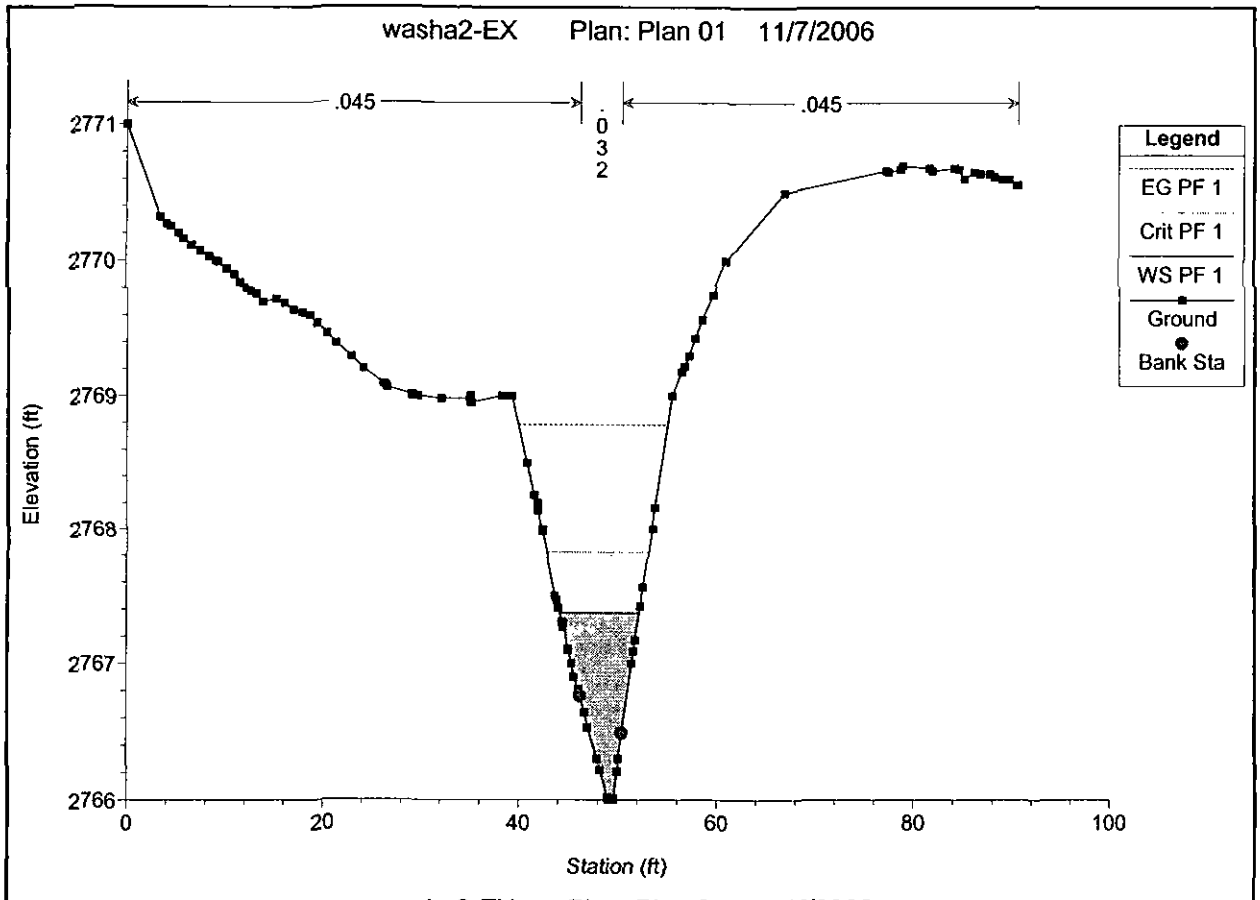


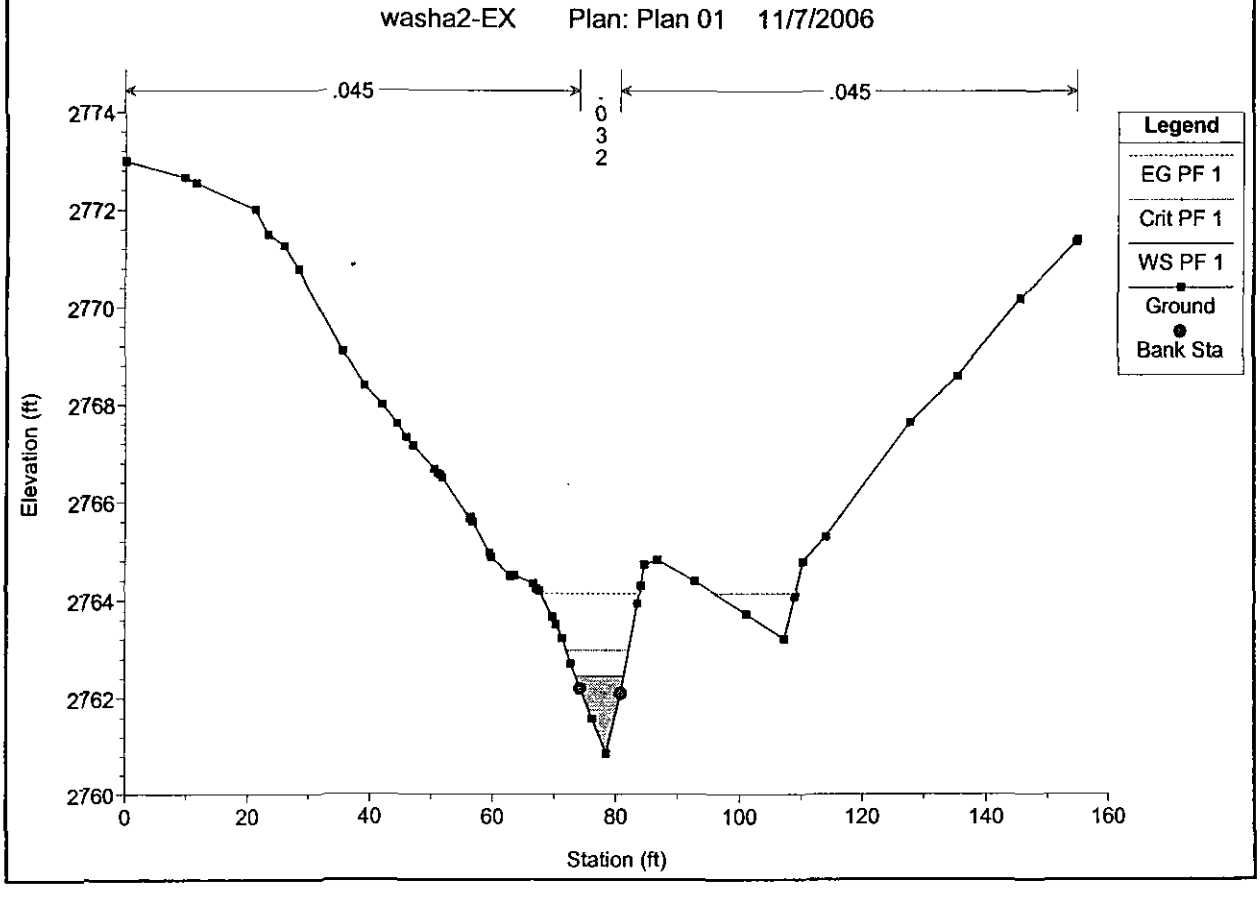
washa2-EX Plan: Plan 01 11/7/2006




washa2-EX Plan: Plan 01 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2782
2780
2778
2776
2774
0
20
40
60
80
100
Station (ft)


washa2-EX Plan: Plan 01 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2782
2780
2778
2776
2774
2772
2770
2768
0
20
40
60
80
100
120
140
Station (ft)


washa2-EX Plan: Plan 01 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


washa2-EX Plan: Plan 01 11/7/2006
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.032
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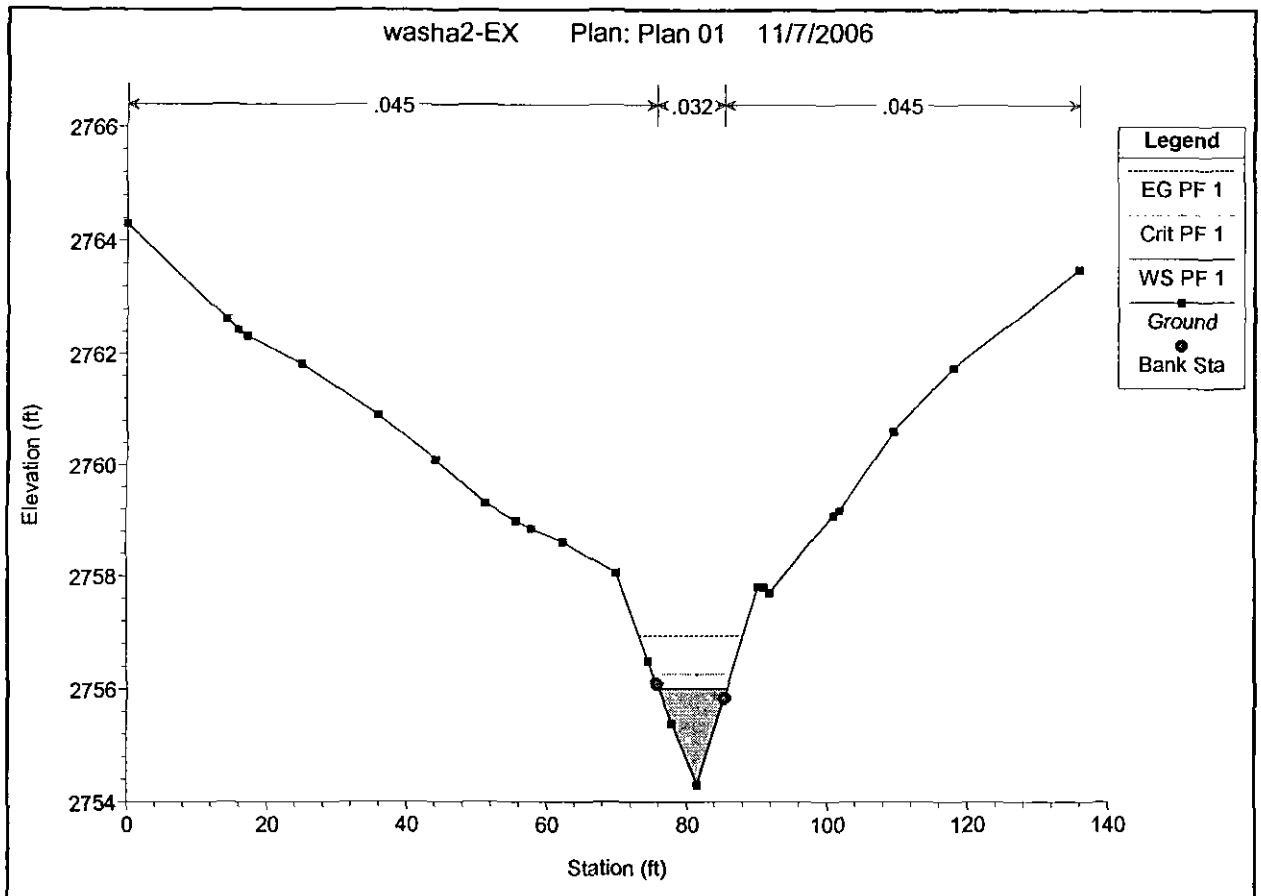
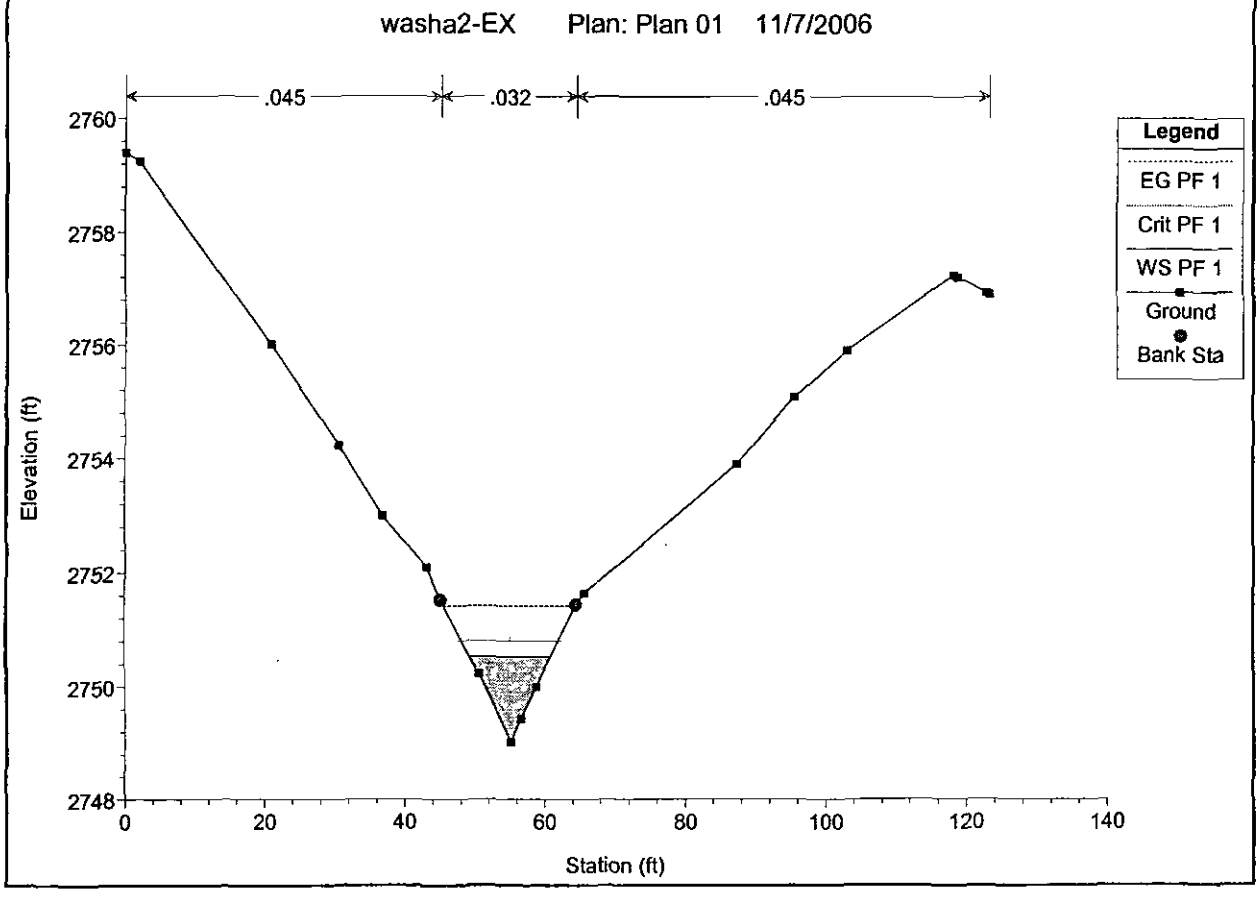
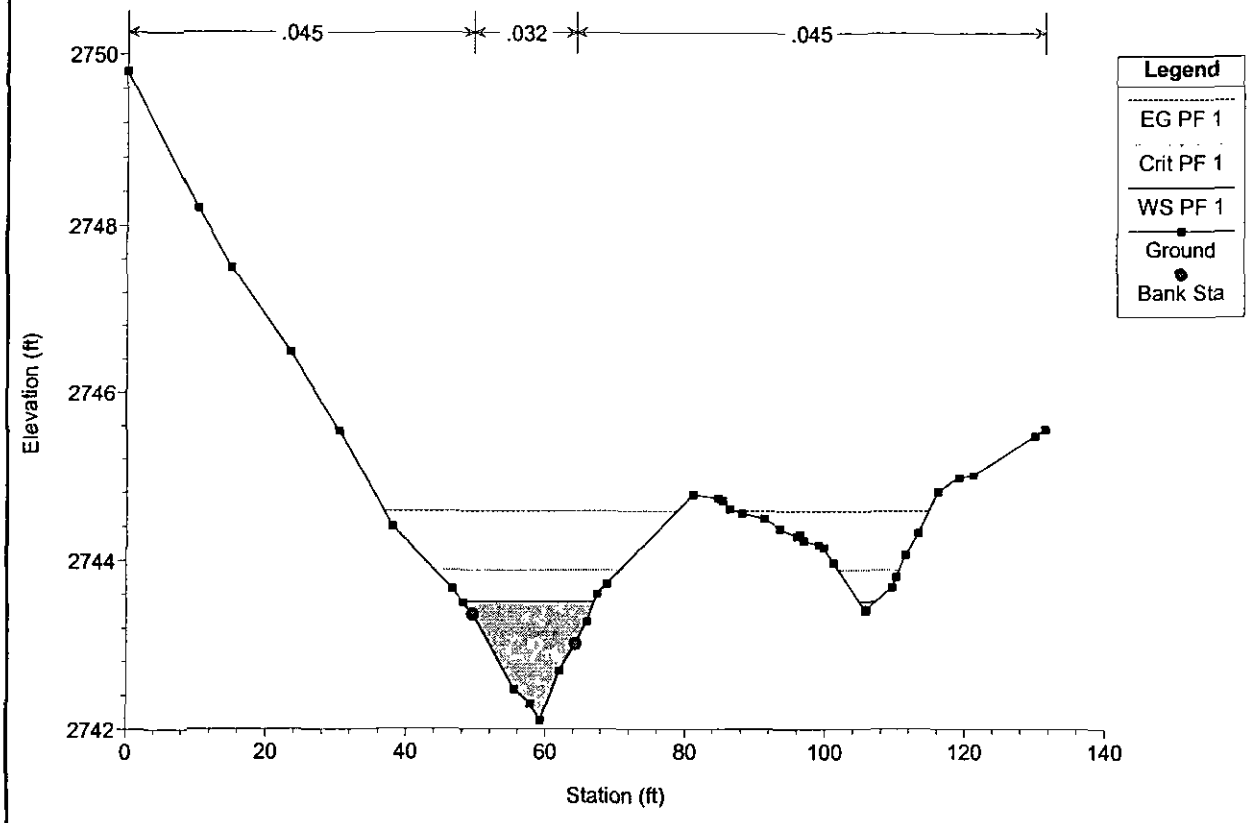
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

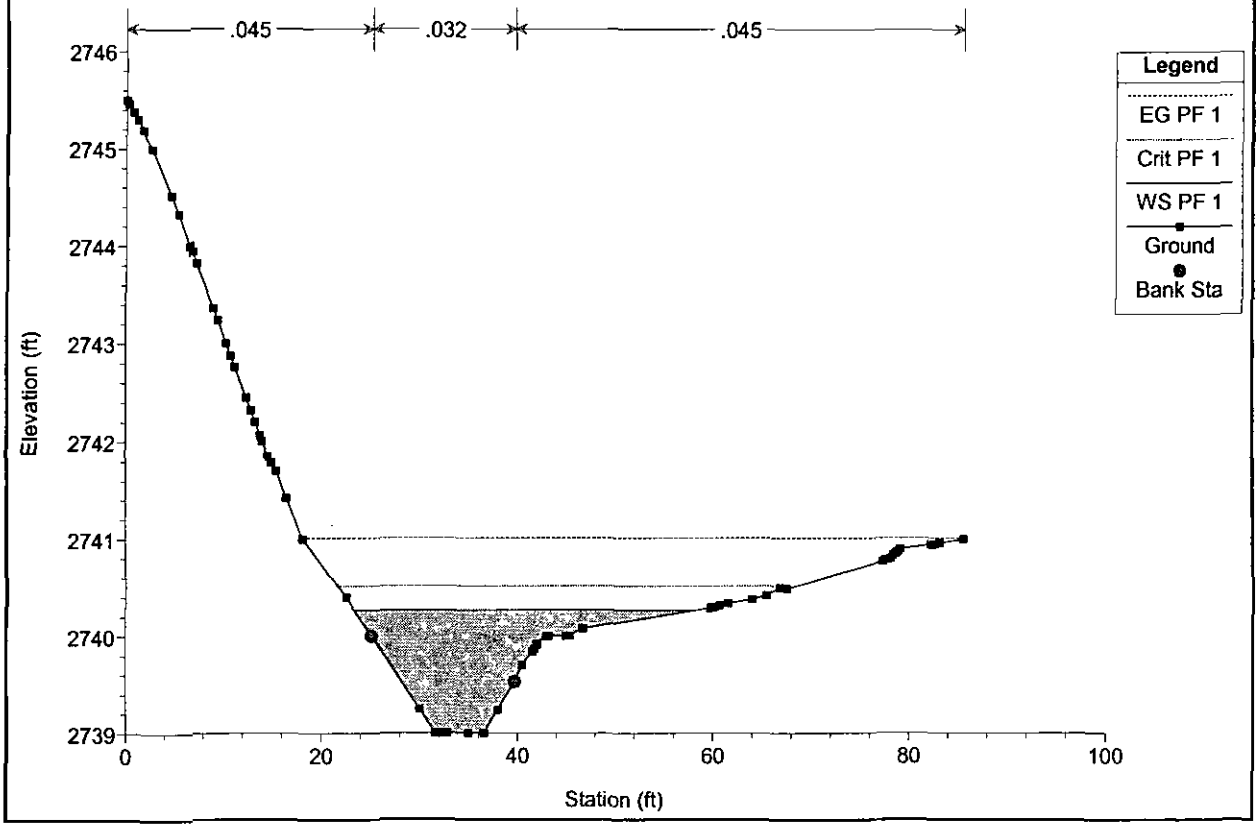

washa2-EX Plan: Plan 01 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2754
2756
2758
2760
2762
2764
2766
0
20
40
60
80
100
120
140


washa2-EX Plan: Plan 01 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2748
2750
2752
2754
2756
2758
2760
0
20
40
60
80
100
120
140

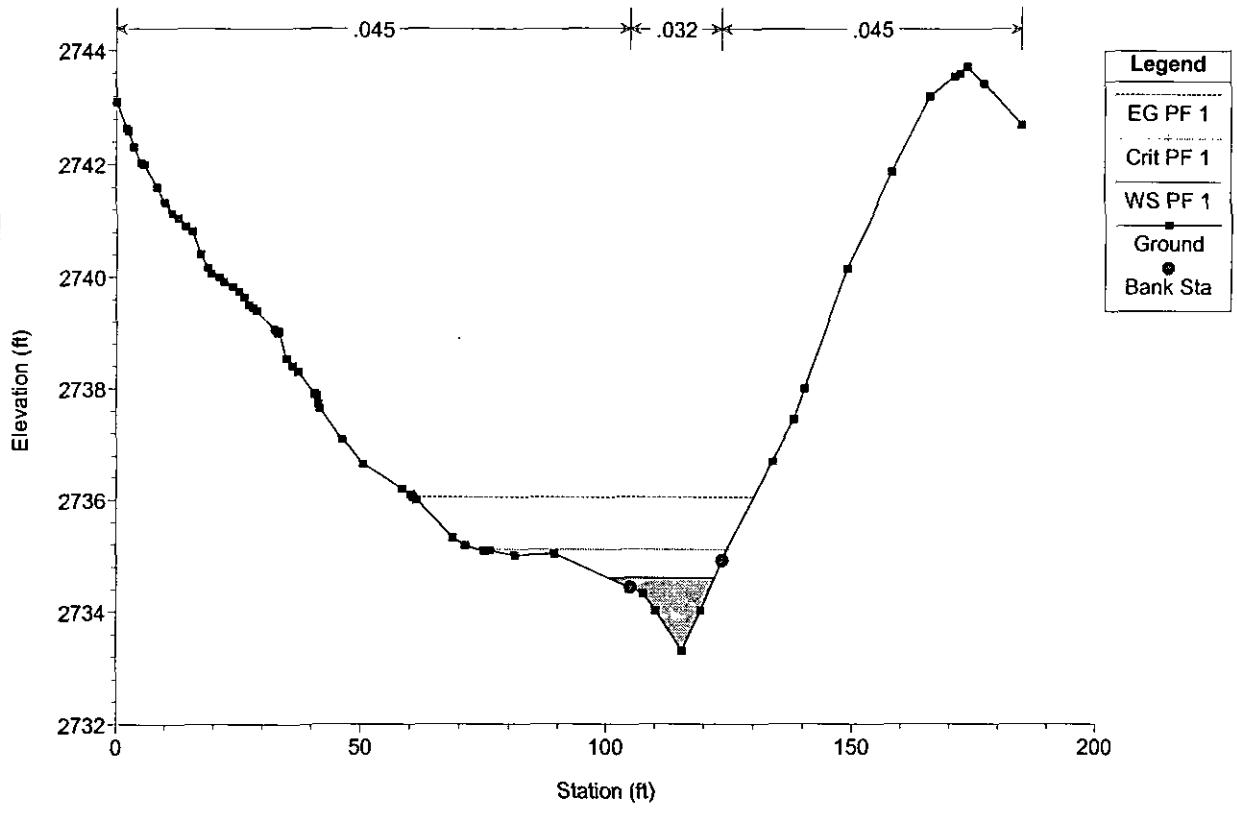
washa2-EX Plan: Plan 01 11/7/2006



washa2-EX Plan: Plan 01 11/7/2006



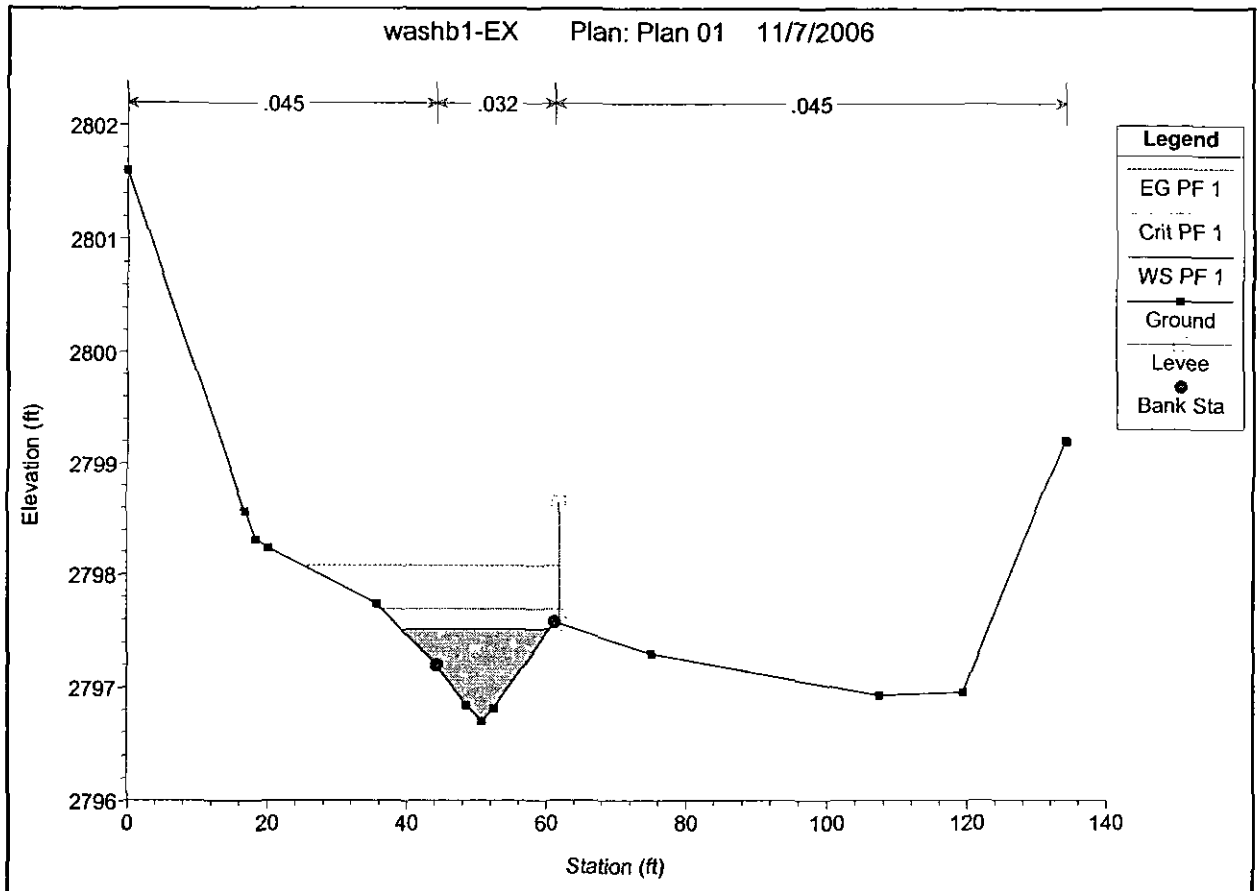
washa2-EX Plan: Plan 01 11/7/2006

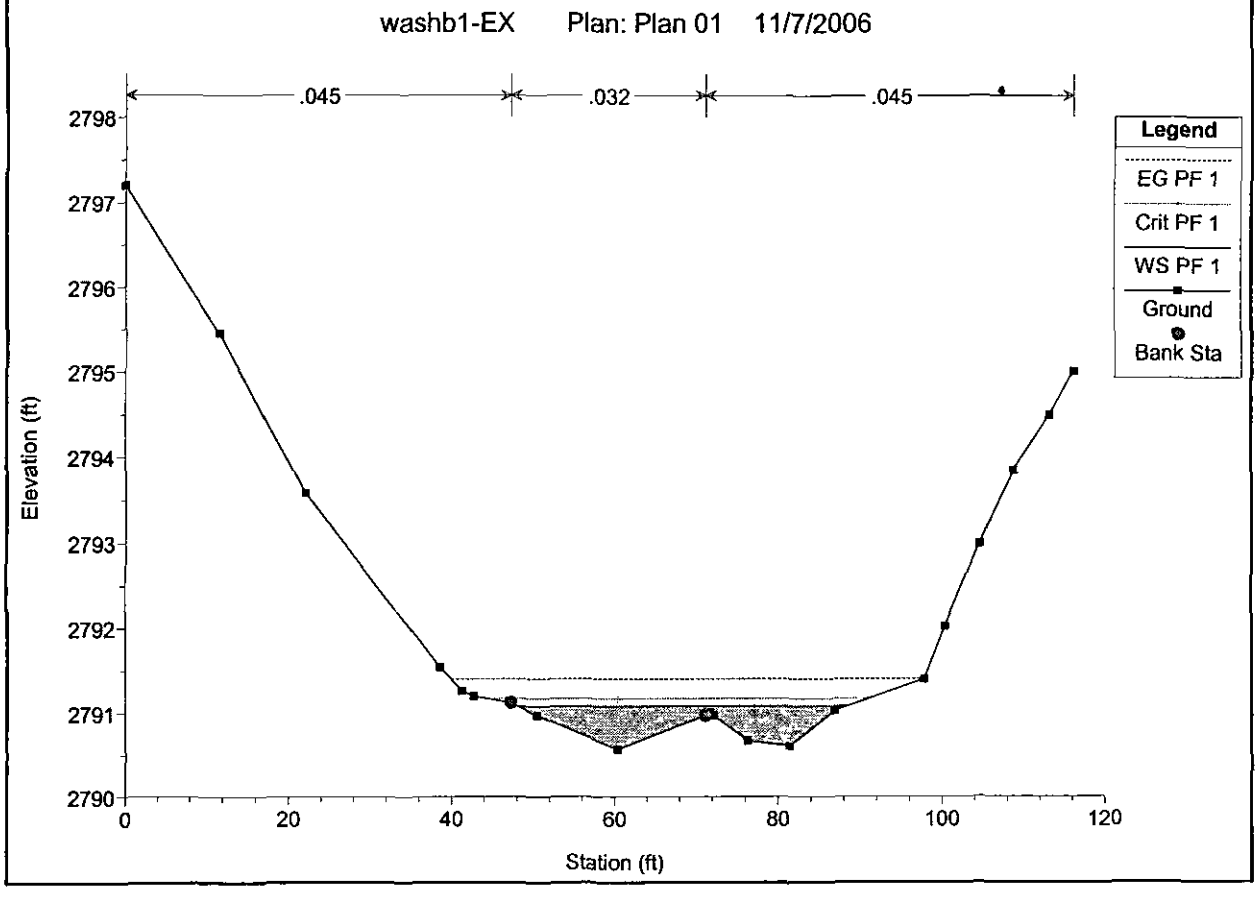


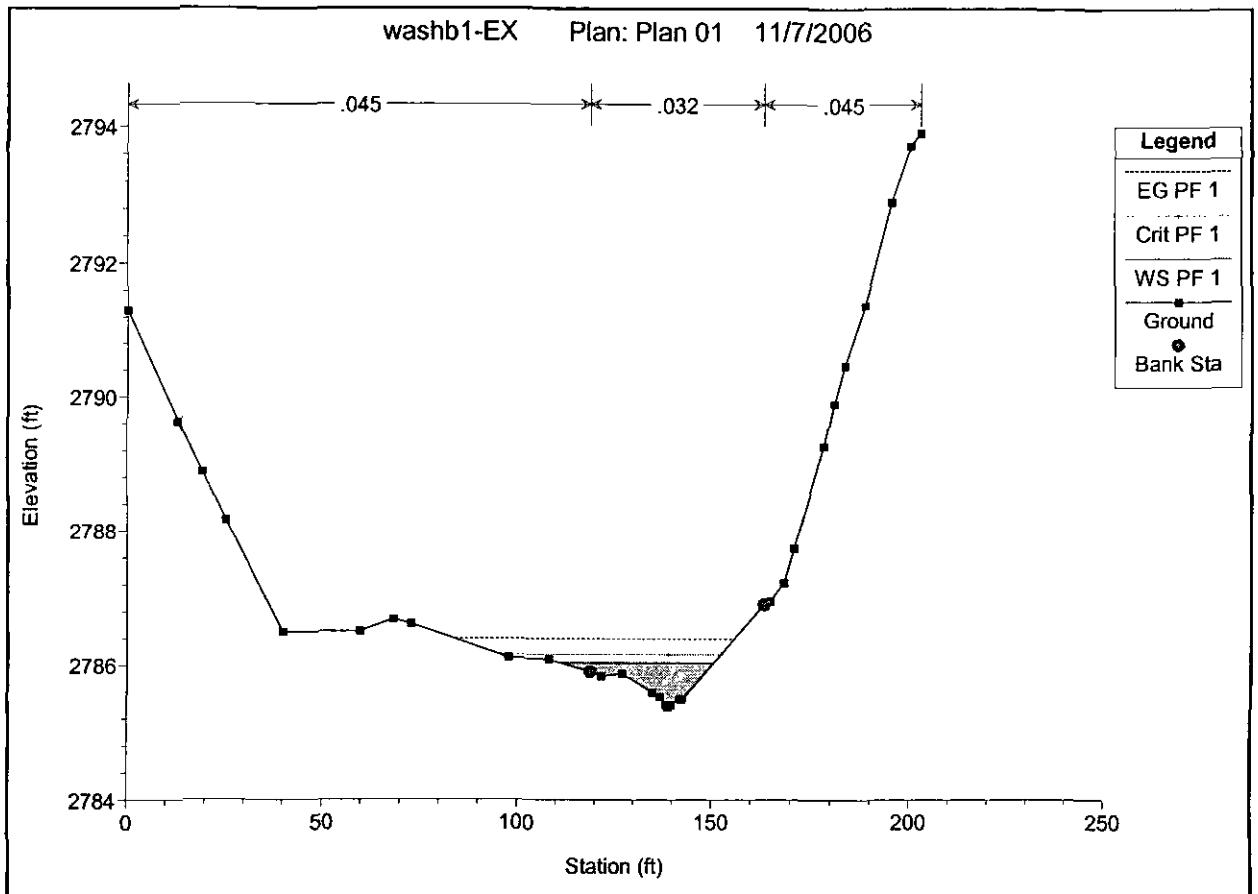
WASH B1

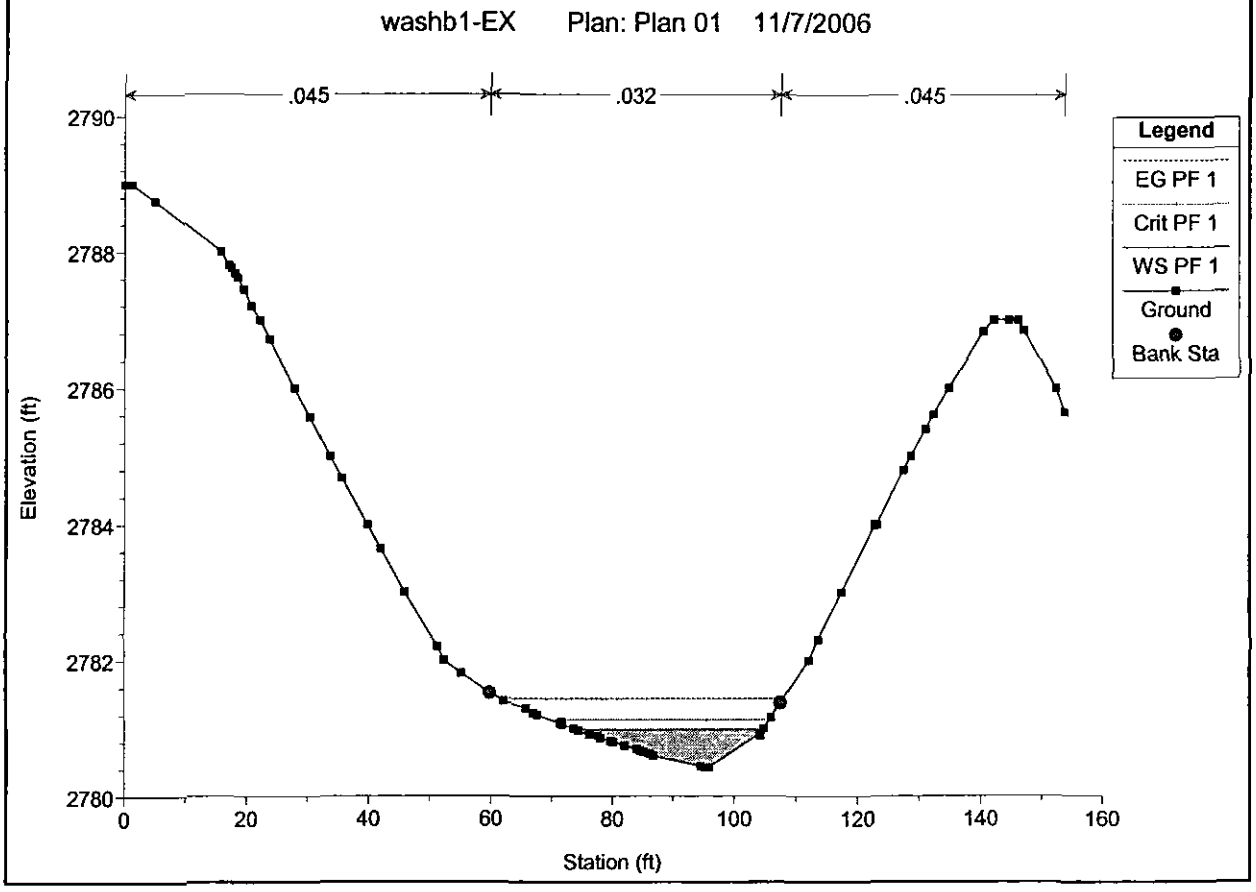
HEC-RAS Plan: Plan 01 River: RIVER-1 Reach: Reach-1 Profile: PF 1

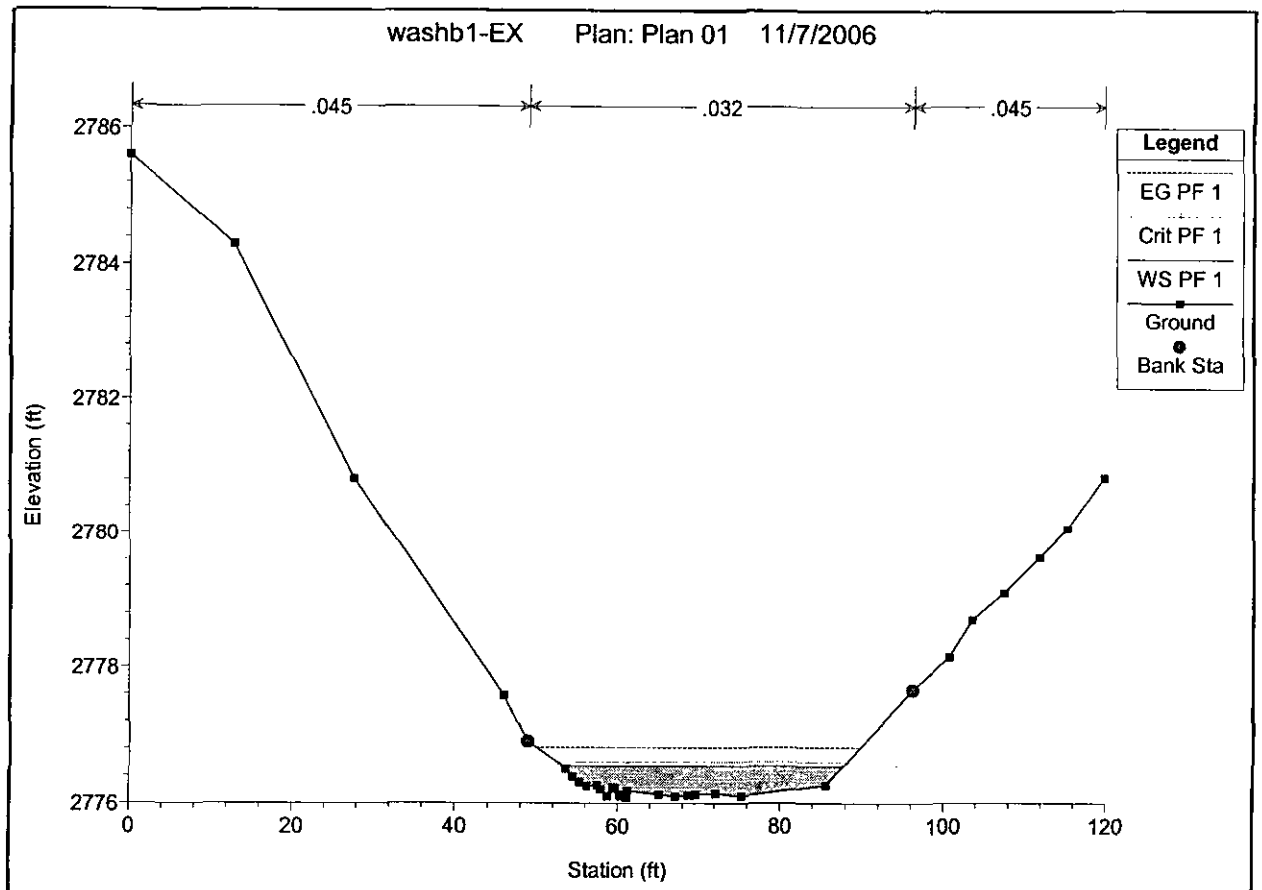
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	9	PF 1	50.00	2796.70	2797.52	2797.69	2798.08	0.045030	6.09	8.74	21.32	1.54
Reach-1	8	PF 1	50.00	2790.57	2791.08	2791.17	2791.40	0.059767	4.94	11.57	40.41	1.62
Reach-1	7	PF 1	50.00	2785.37	2786.03	2786.15	2786.38	0.048169	4.80	10.80	39.56	1.49
Reach-1	6.5	PF 1	50.00	2780.43	2780.99	2781.13	2781.43	0.065773	5.37	9.31	30.67	1.72
Reach-1	6	PF 1	50.00	2776.08	2776.54	2776.59	2776.81	0.033697	4.19	11.94	34.58	1.26
Reach-1	5	PF 1	65.00	2771.10	2771.91	2772.14	2772.65	0.053926	7.02	10.88	49.99	1.70
Reach-1	4.5	PF 1	65.00	2768.38	2768.90	2769.02	2769.32	0.046654	5.18	12.54	33.73	1.50
Reach-1	4	PF 1	65.00	2764.68	2765.43	2765.61	2766.02	0.043096	7.04	12.39	29.28	1.57
Reach-1	3	PF 1	65.00	2759.60	2760.51	2760.70	2761.15	0.041337	6.54	10.57	22.11	1.52
Reach-1	2	PF 1	83.00	2754.10	2754.86	2755.04	2755.46	0.046948	6.27	13.96	33.71	1.57
Reach-1	1	PF 1	204.00	2745.67	2747.01	2747.17	2747.53	0.048666	7.85	40.62	87.83	1.67

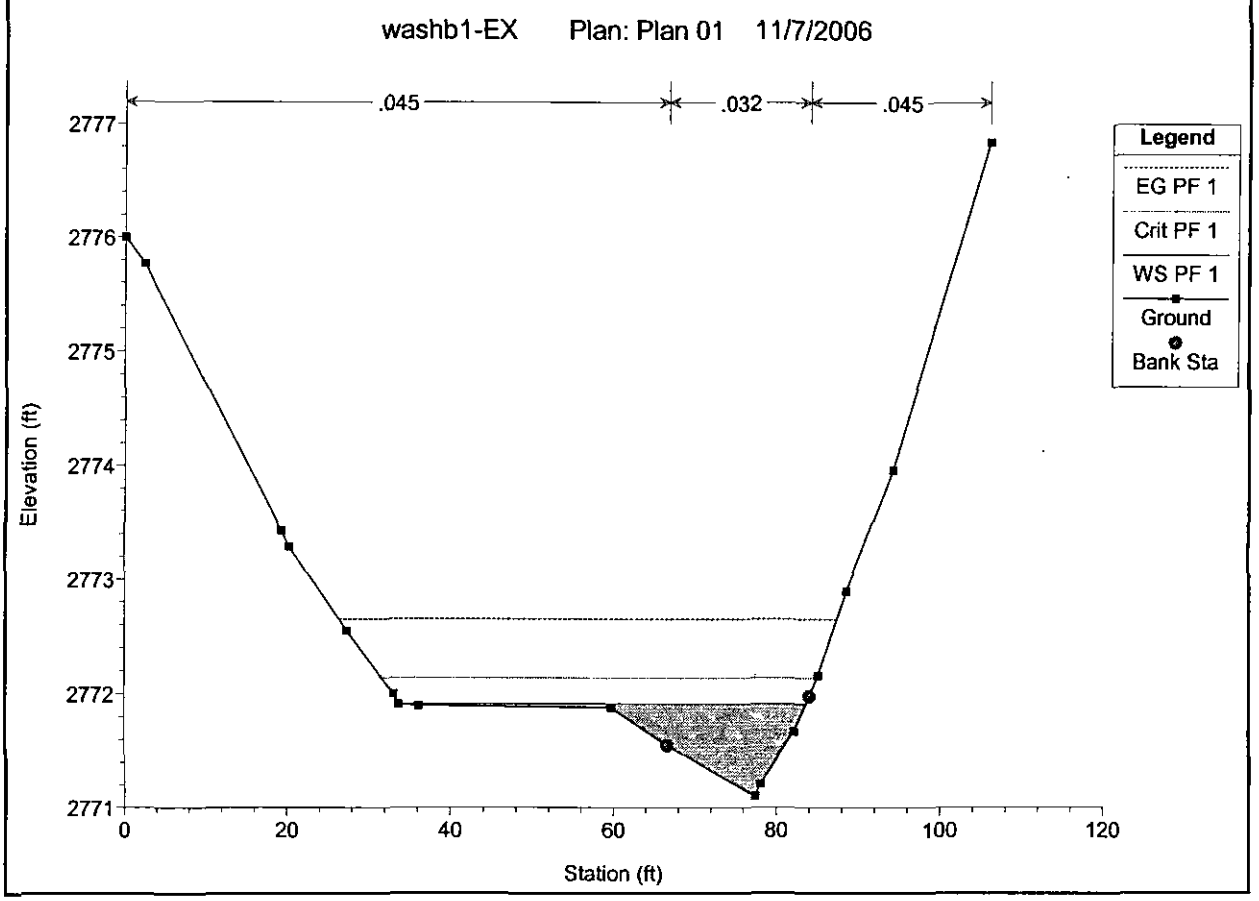

washb1-EX Plan: Plan 01 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Levee
Bank Sta
Elevation (ft)
2802
2801
2800
2799
2798
2797
2796
0
20
40
60
80
100
120
140
Station (ft)

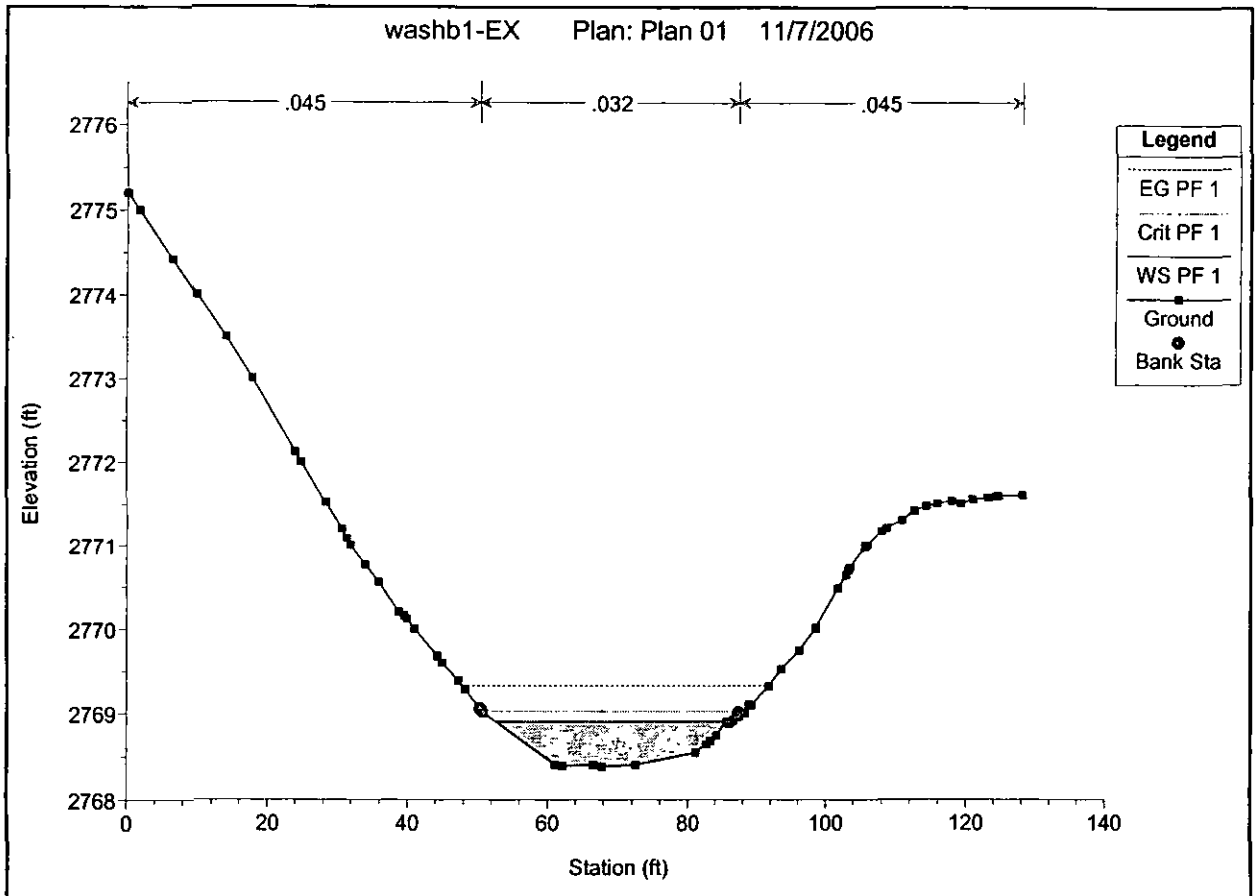

washb1-EX Plan: Plan 01 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2798
2797
2796
2795
2794
2793
2792
2791
2790
0
20
40
60
80
100
120
Station (ft)

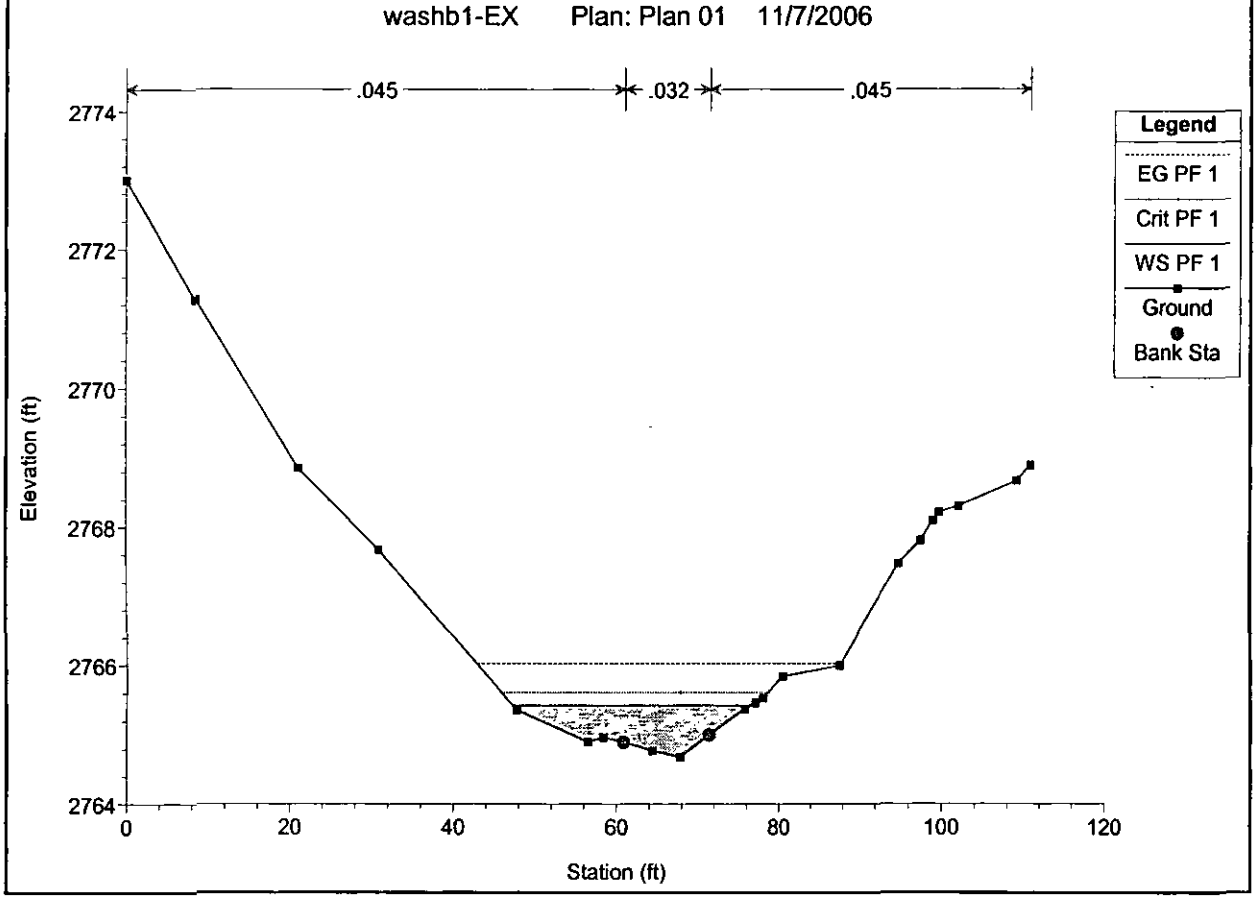

washb1-EX Plan: Plan 01 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2794
2792
2790
2788
2786
2784
0
50
100
150
200
250
Station (ft)


washb1-EX Plan: Plan 01 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2790
2788
2786
2784
2782
2780
0
20
40
60
80
100
120
140
160
Station (ft)


washb1-EX Plan: Plan 01 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2786
2784
2782
2780
2778
2776
0
20
40
60
80
100
120
Station (ft)


washb1-EX Plan: Plan 01 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2777
2776
2775
2774
2773
2772
2771
0
20
40
60
80
100
120
Station (ft)


washb1-EX Plan: Plan 01 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2776
2775
2774
2773
2772
2771
2770
2769
2768
0
20
40
60
80
100
120
140
Station (ft)


washb1-EX Plan: Plan 01 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2774
2772
2770
2768
2766
2764
0
20
40
60
80
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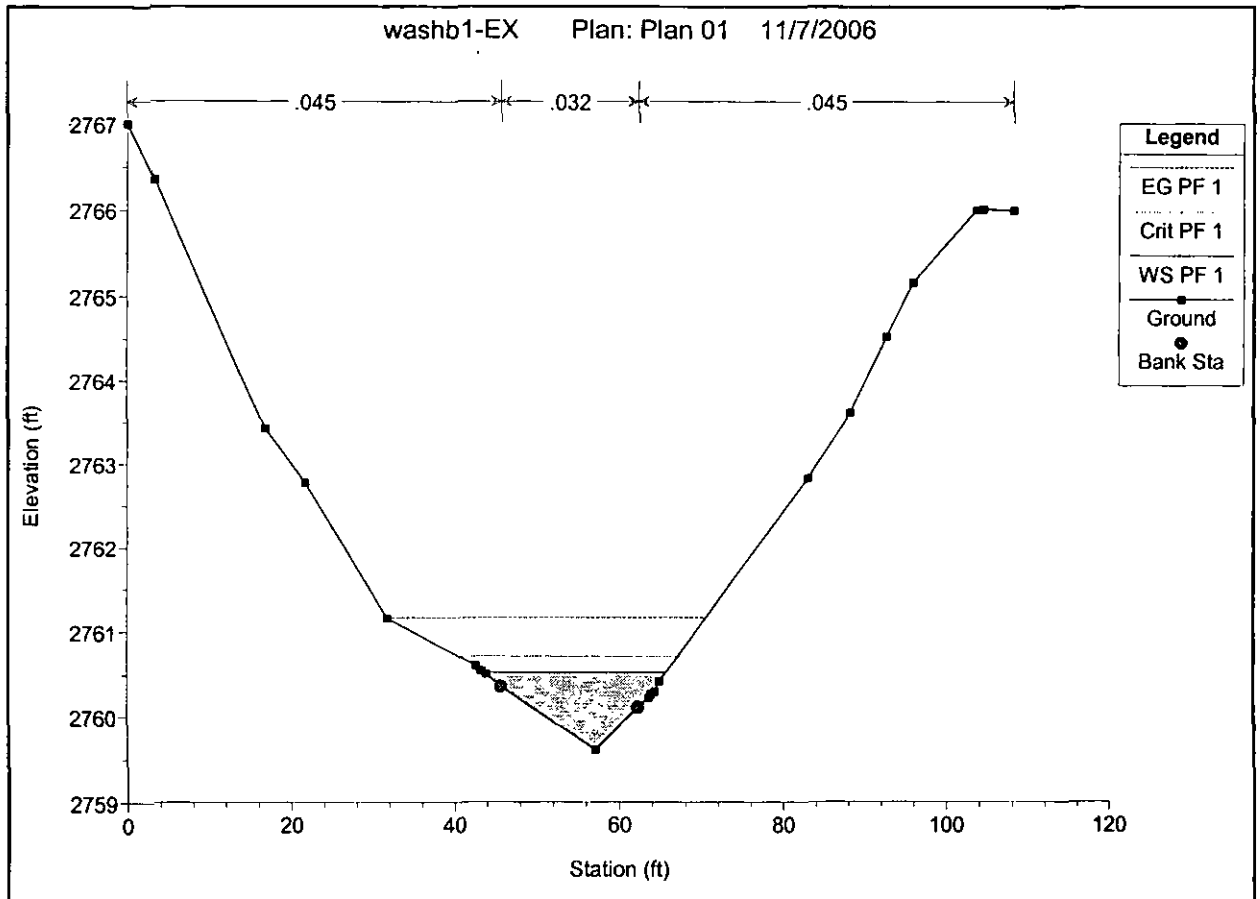
Station (ft)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Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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2762
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2764
2765
2766
2767
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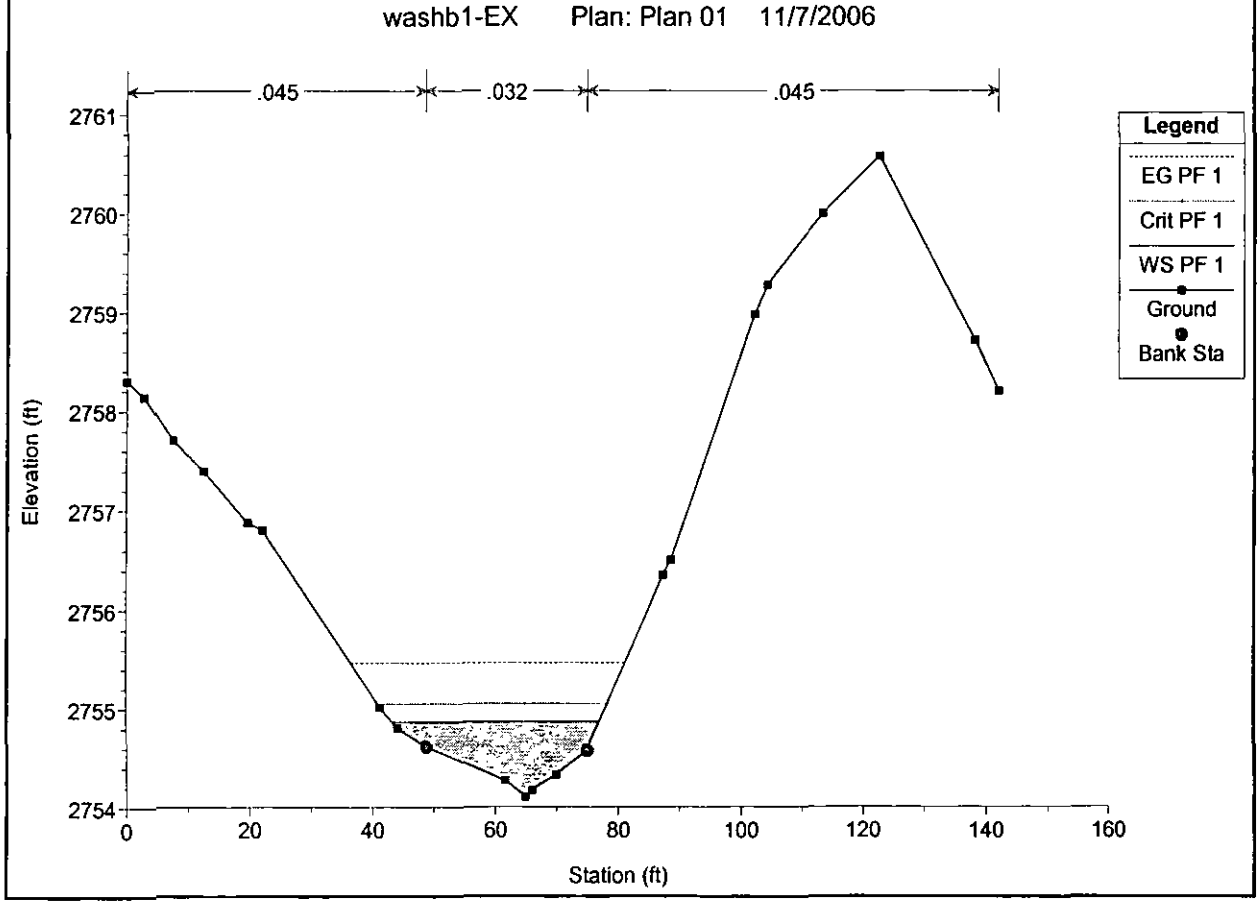
40
60
80
100
120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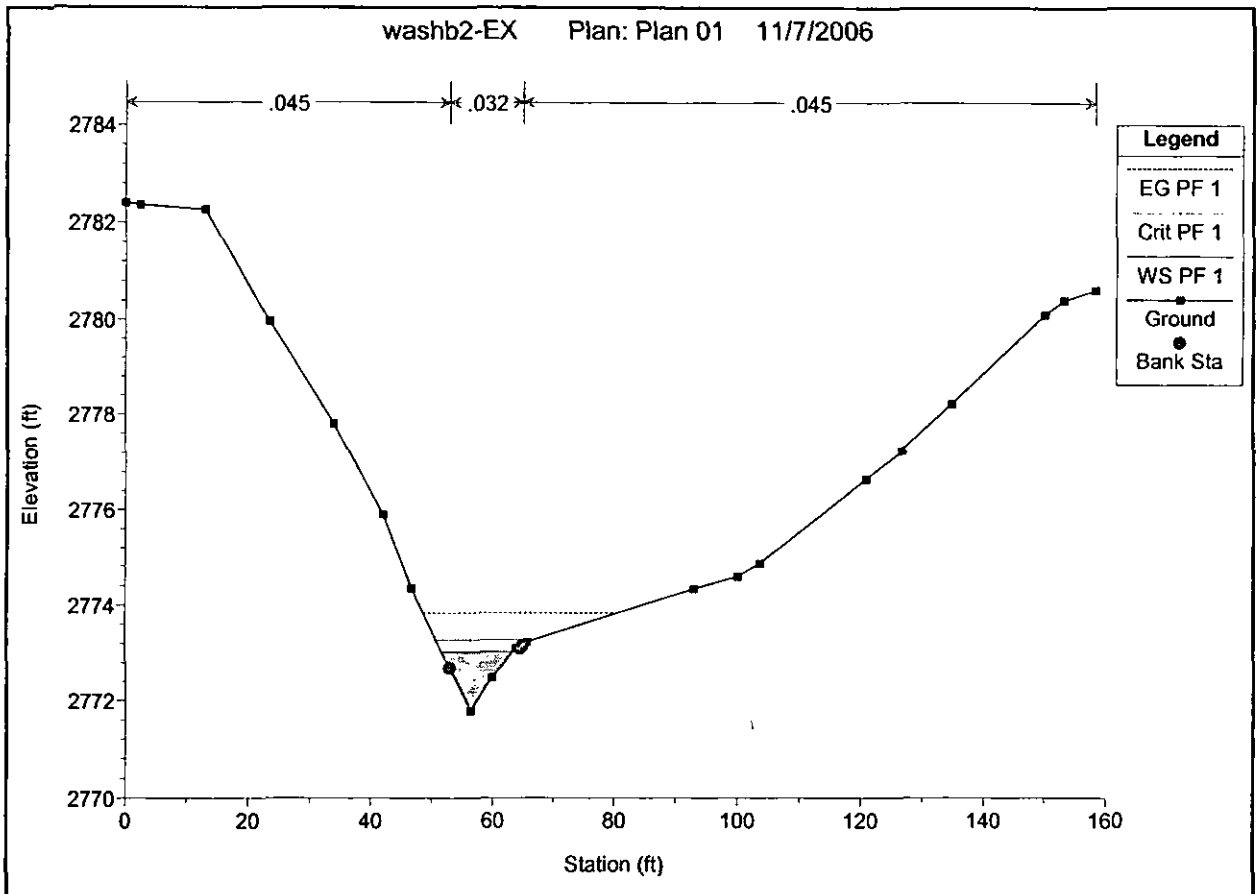
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2754
2755
2756
2757
2758
2759
2760
2761
0
20
40
60
80
100
120
140
160

WASH B2

HEC-RAS Plan: Plan 01 River: RIVER-1 Reach: Reach-1 Profile: PF 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	5	PF 1	50.00	2771.78	2773.02	2773.28	2773.84	0.045021	7.27	7.03	11.78	1.59
Reach-1	4	PF 1	50.00	2767.23	2768.51	2768.64	2769.01	0.030968	5.67	8.82	15.02	1.30
Reach-1	3.5	PF 1	50.00	2765.00	2765.78	2765.88	2766.22	0.029393	5.31	9.41	17.14	1.26
Reach-1	3	PF 1	126.00	2762.00	2762.76	2762.84	2763.13	0.035706	4.86	25.91	62.70	1.33
Reach-1	2.5	PF 1	126.00	2759.70	2760.27	2760.30	2760.53	0.024149	4.17	31.63	79.13	1.11
Reach-1	2	PF 1	126.00	2755.39	2756.77	2757.08	2757.69	0.044435	7.69	16.51	26.88	1.68
Reach-1	1.5	PF 1	126.00	2753.00	2754.56	2754.82	2755.36	0.022867	8.53	24.06	38.24	1.29
Reach-1	1	PF 1	204.00	2745.67	2747.03	2747.17	2747.50	0.043743	7.55	42.67	90.73	1.59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EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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2778
2776
2774
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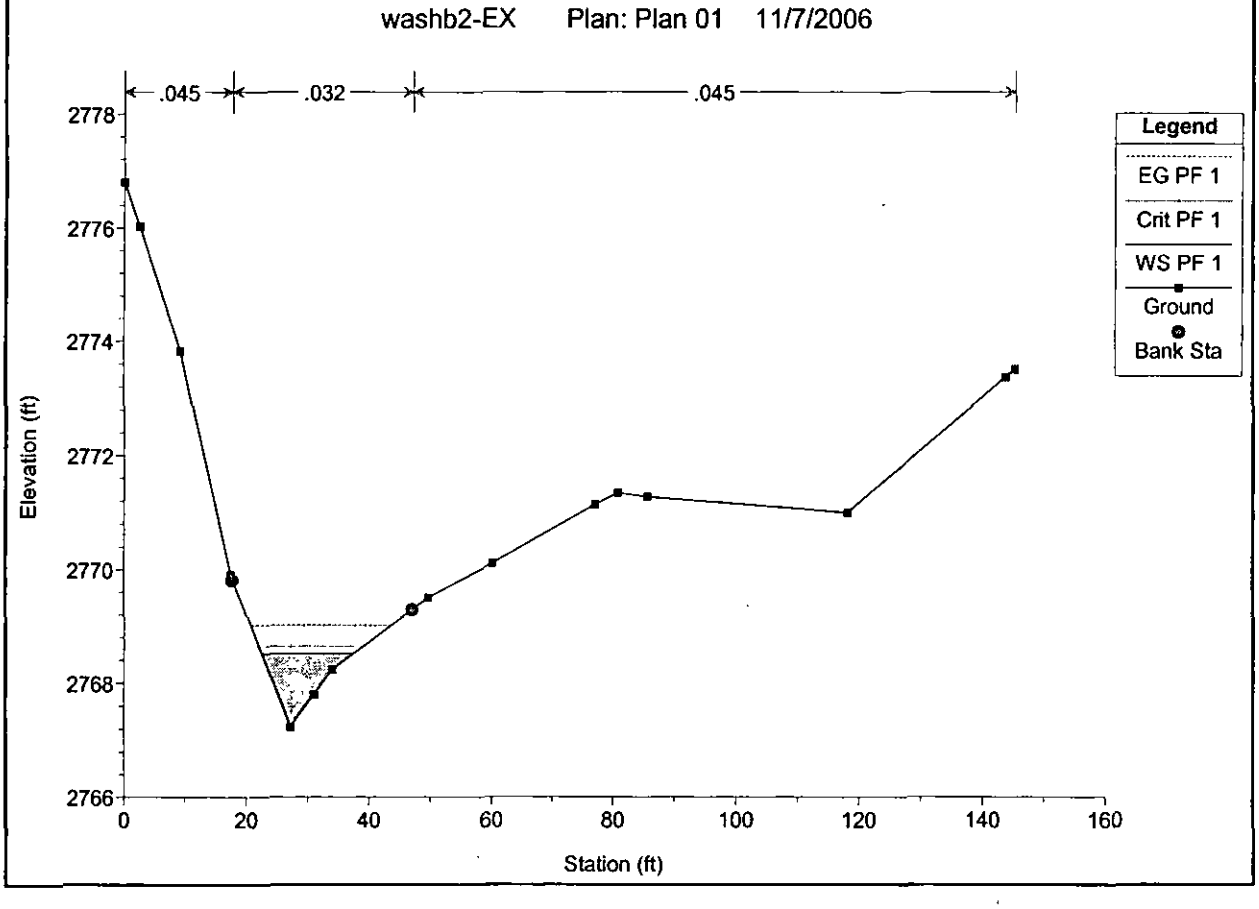
20
40
60
80
100
120
140
160


washb2-EX Plan: Plan 01 11/7/2006
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Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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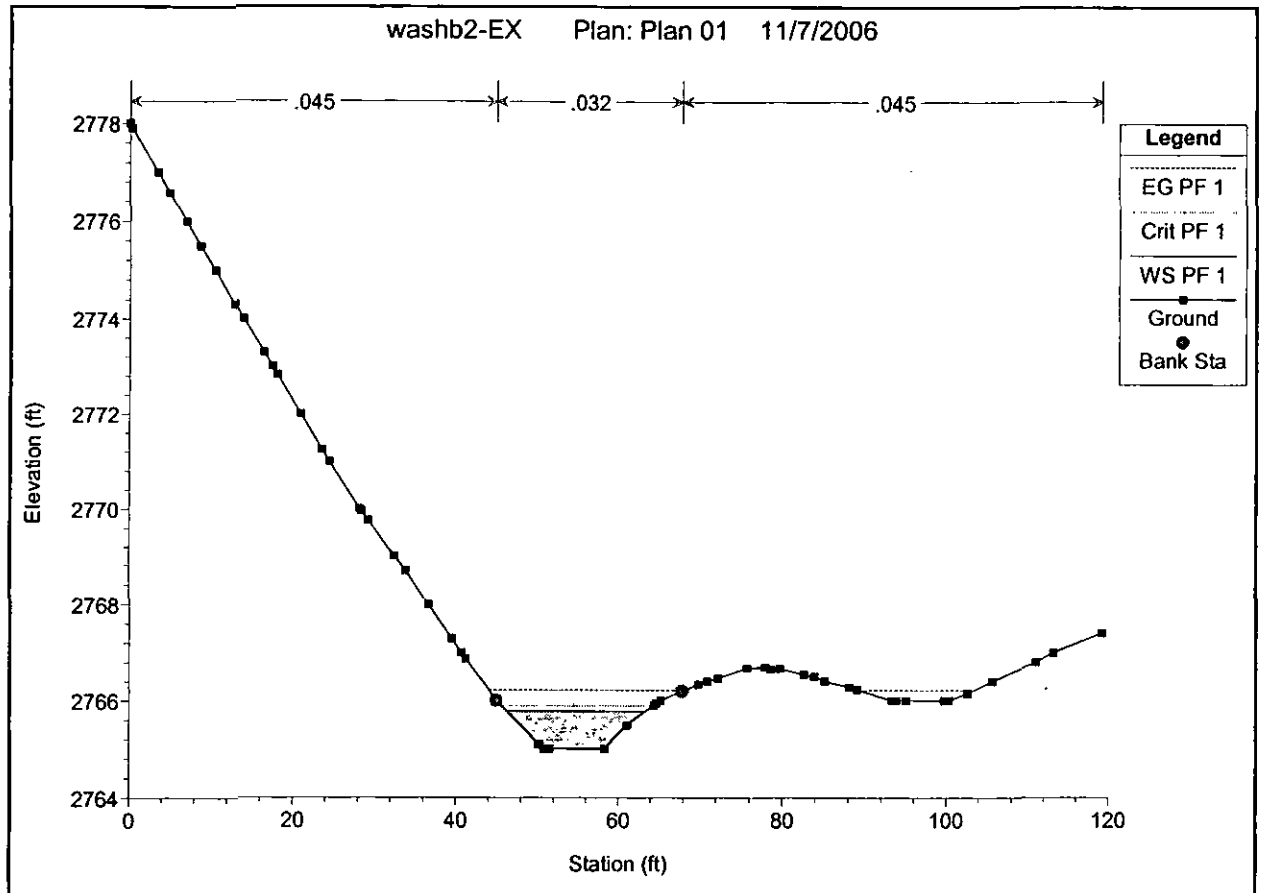
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Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
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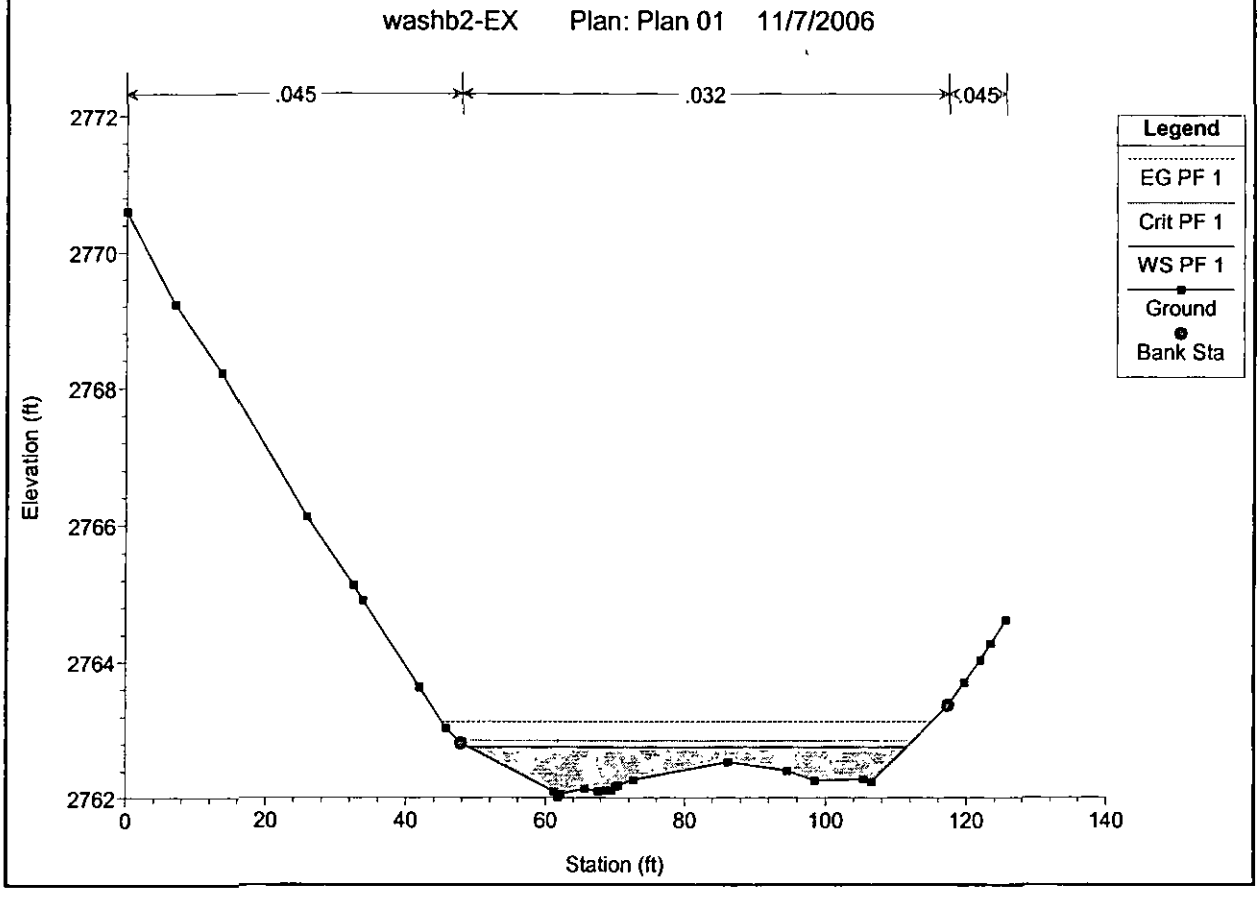
60
80
100
120
Station (ft)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EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
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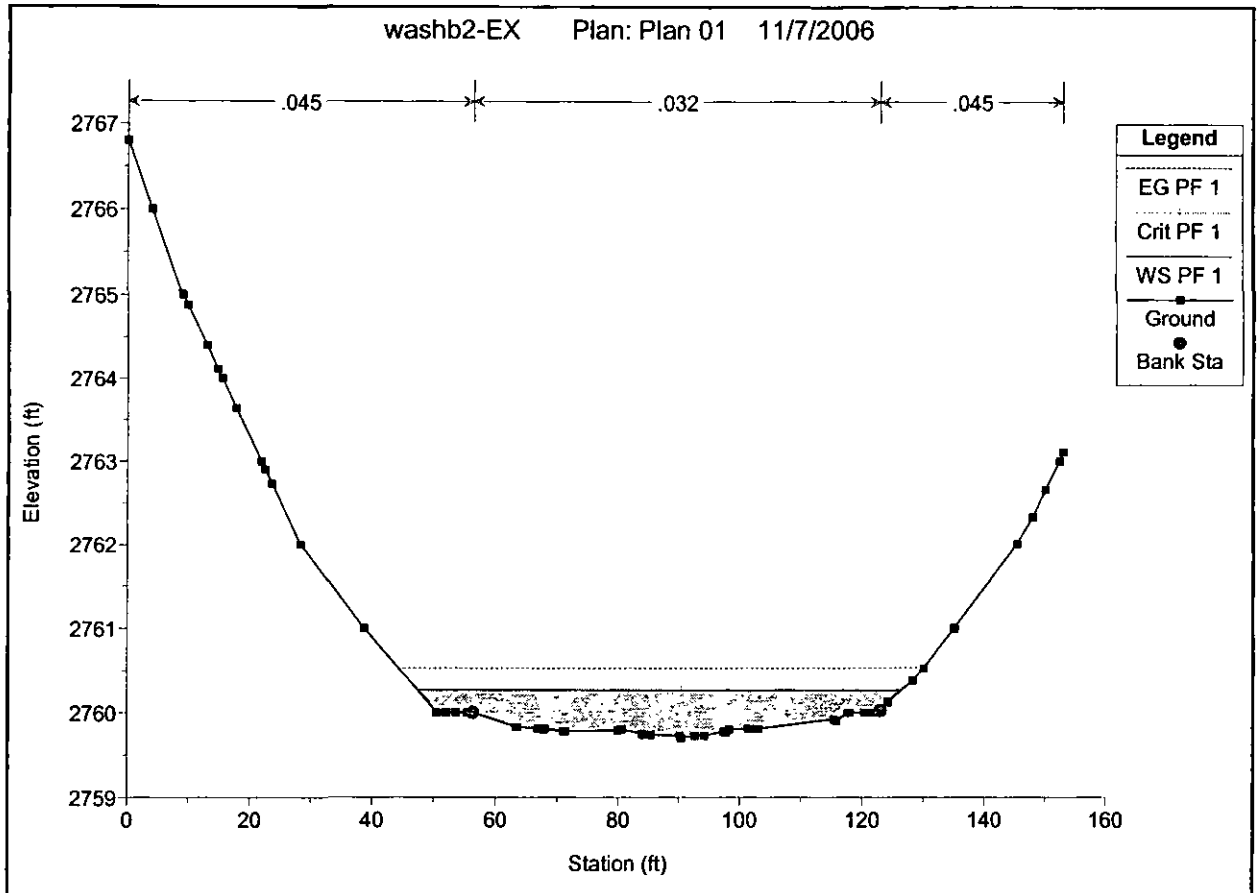
120
140
Station (ft)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Crit PF 1
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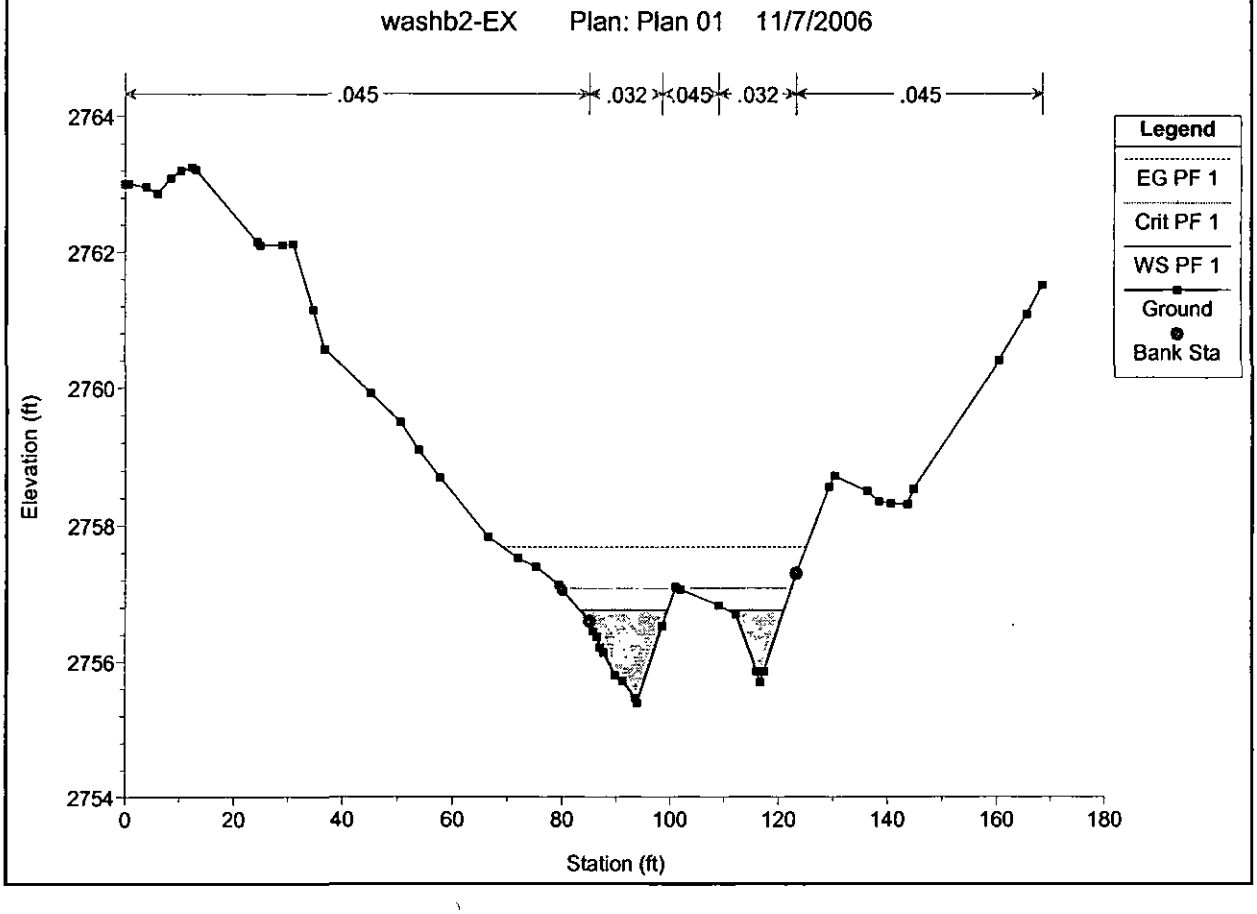
Bank Sta
Elevation (ft)
Station (ft)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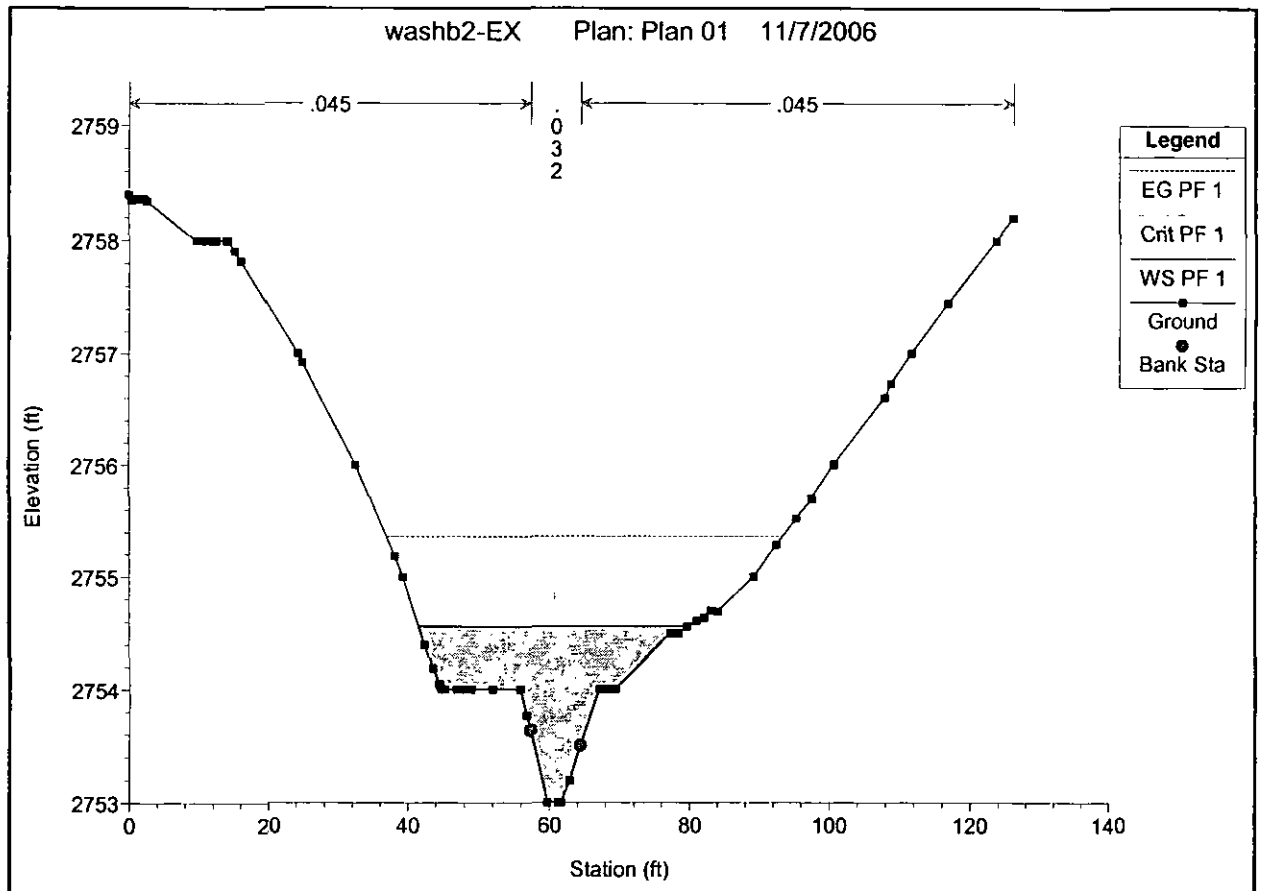
Bank Sta
Elevation (ft)
Station (ft)


washb2-EX Plan: Plan 01 11/7/2006
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Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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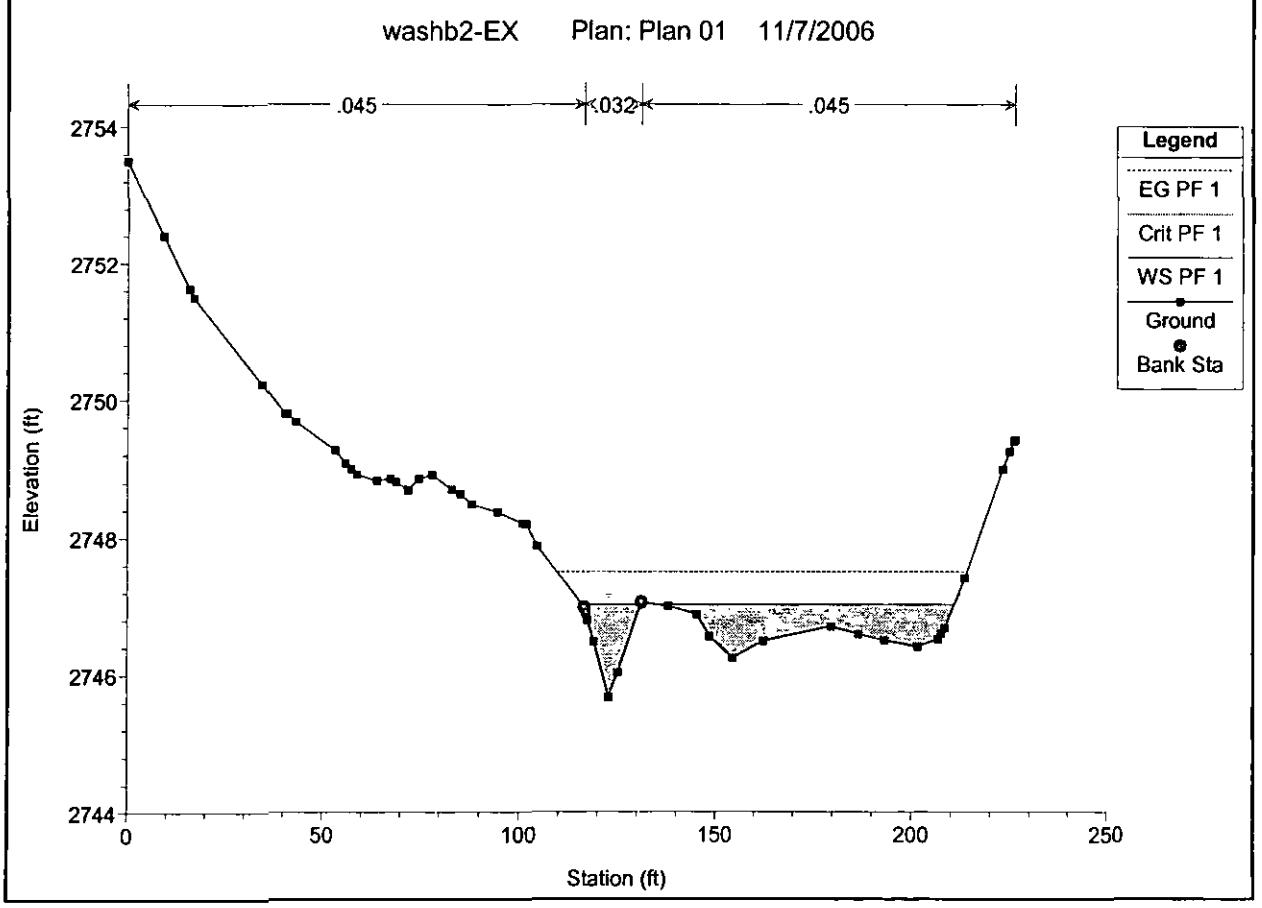
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Crit PF 1
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Ground
Bank Sta
Elevation (ft)
Station (ft)
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200
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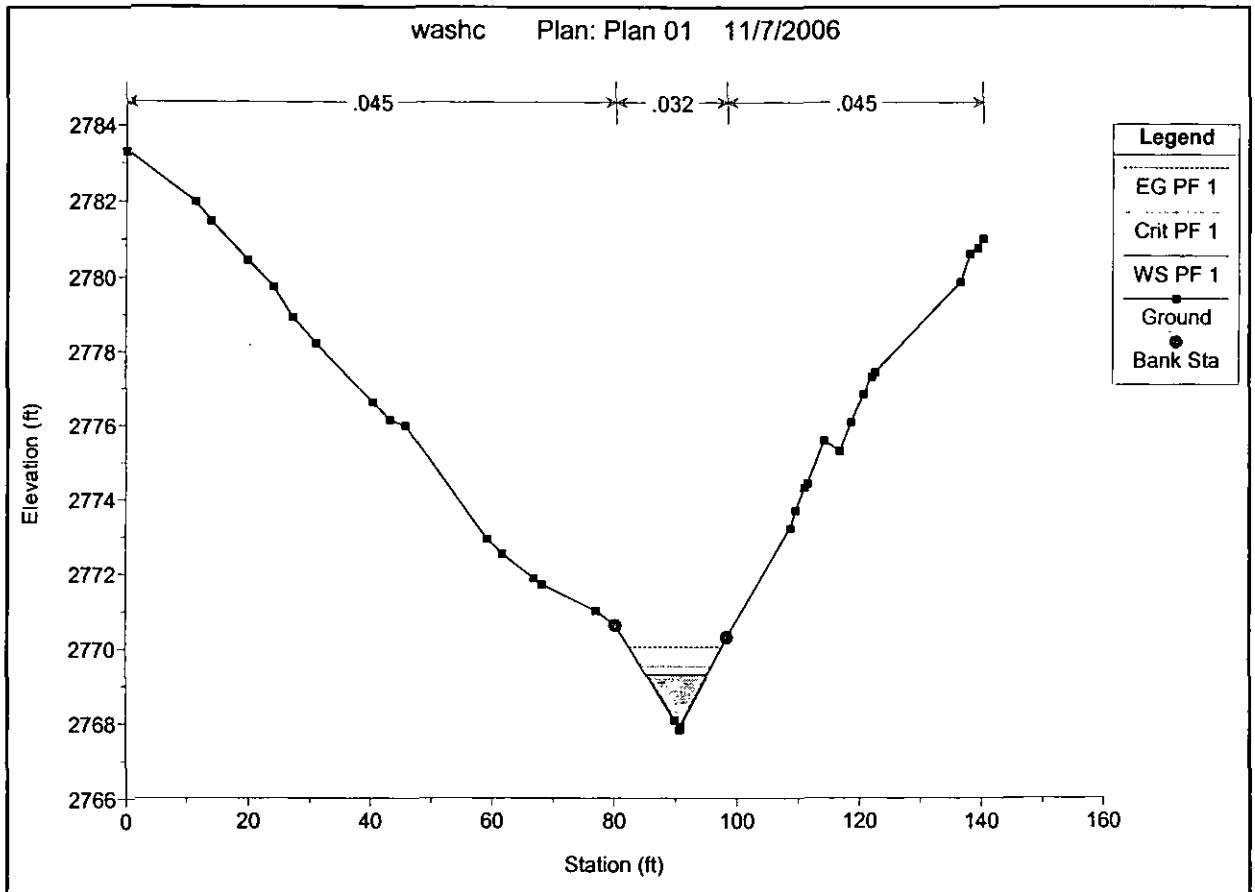
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Legend
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Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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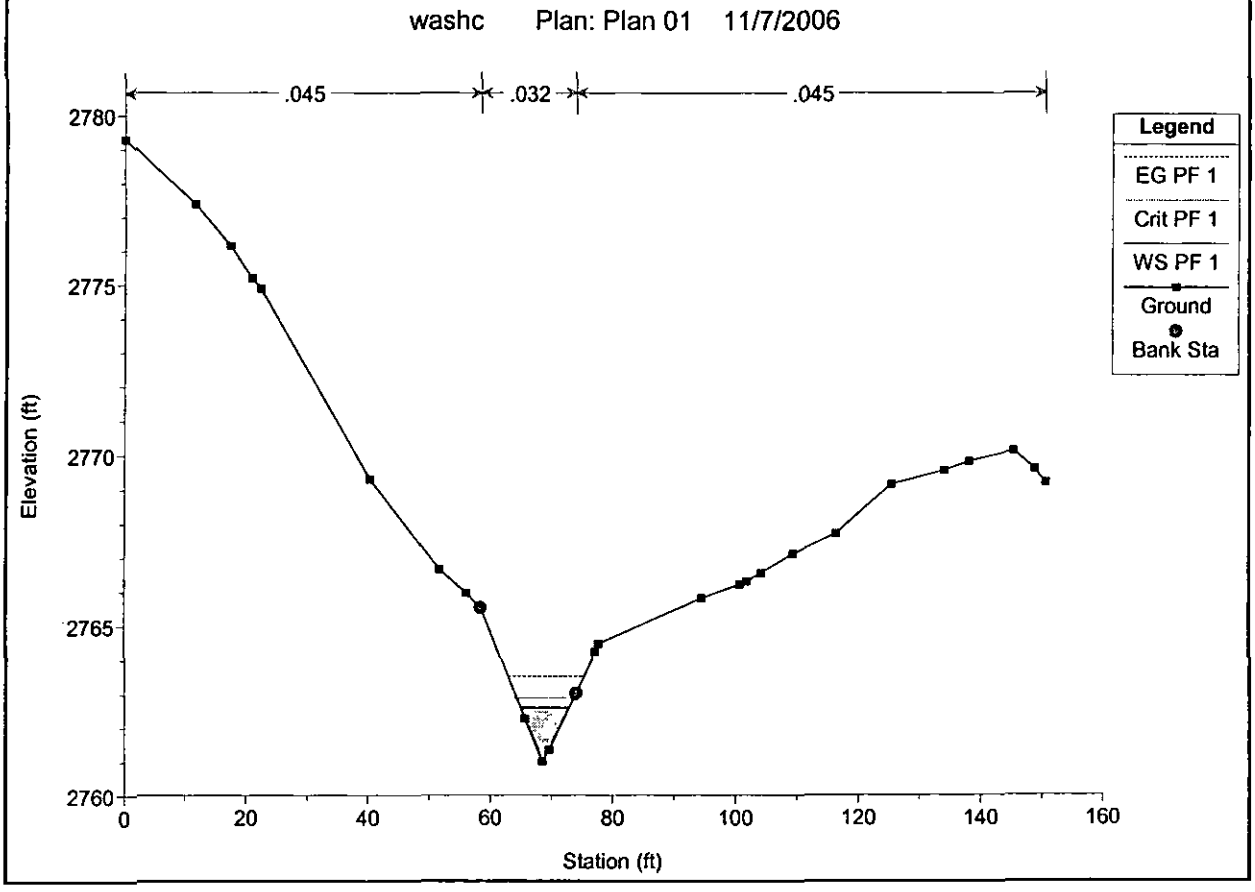
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Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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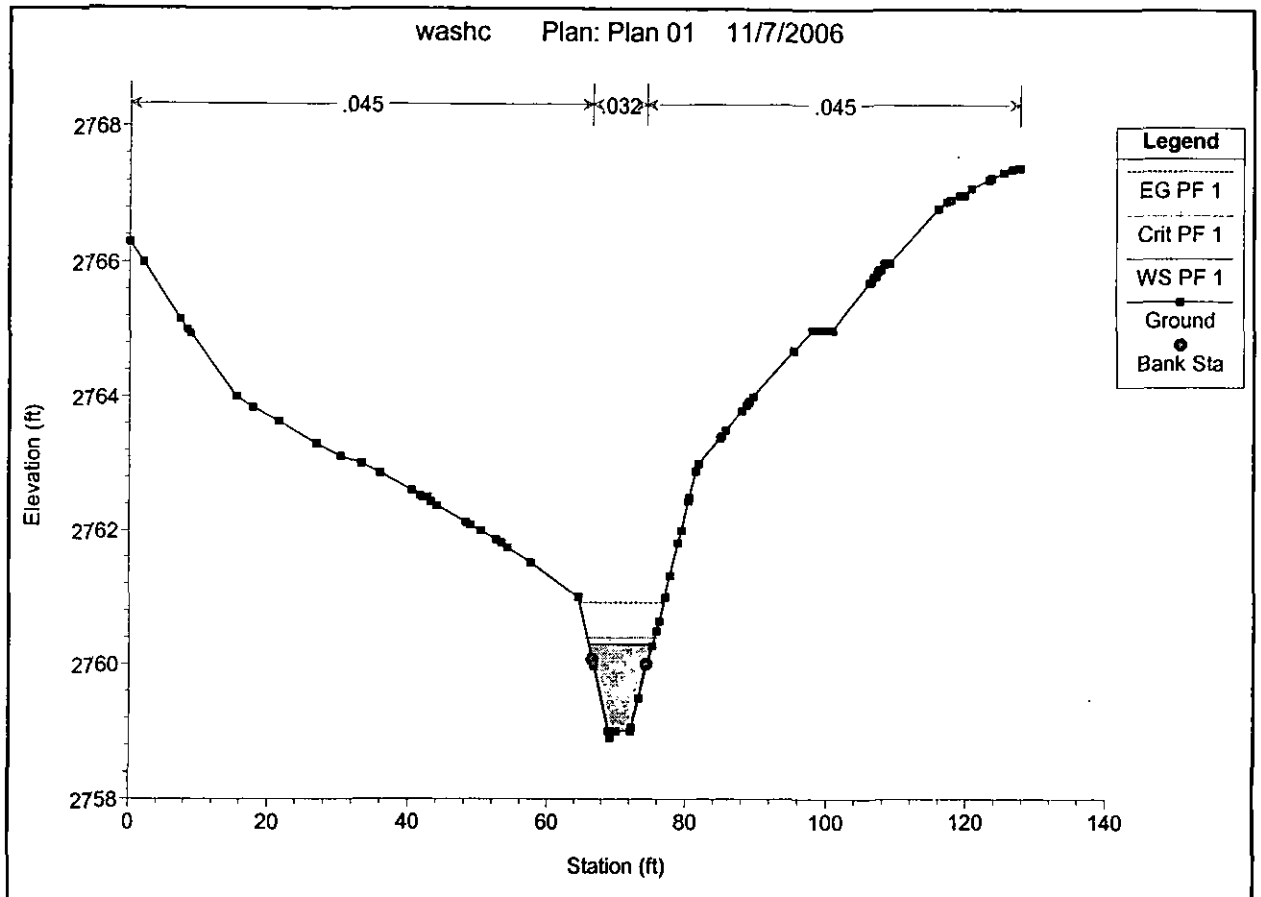
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Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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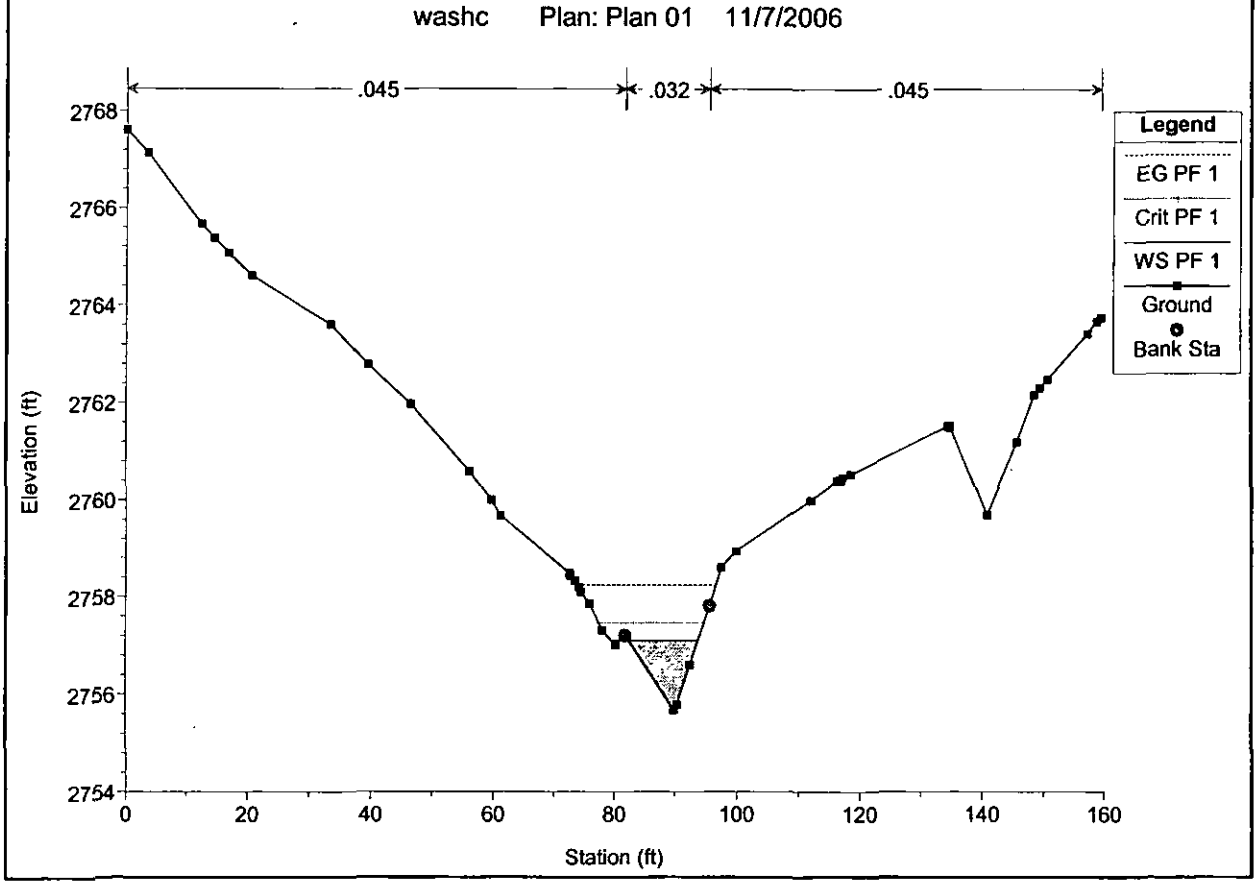
60
80
100
120
140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Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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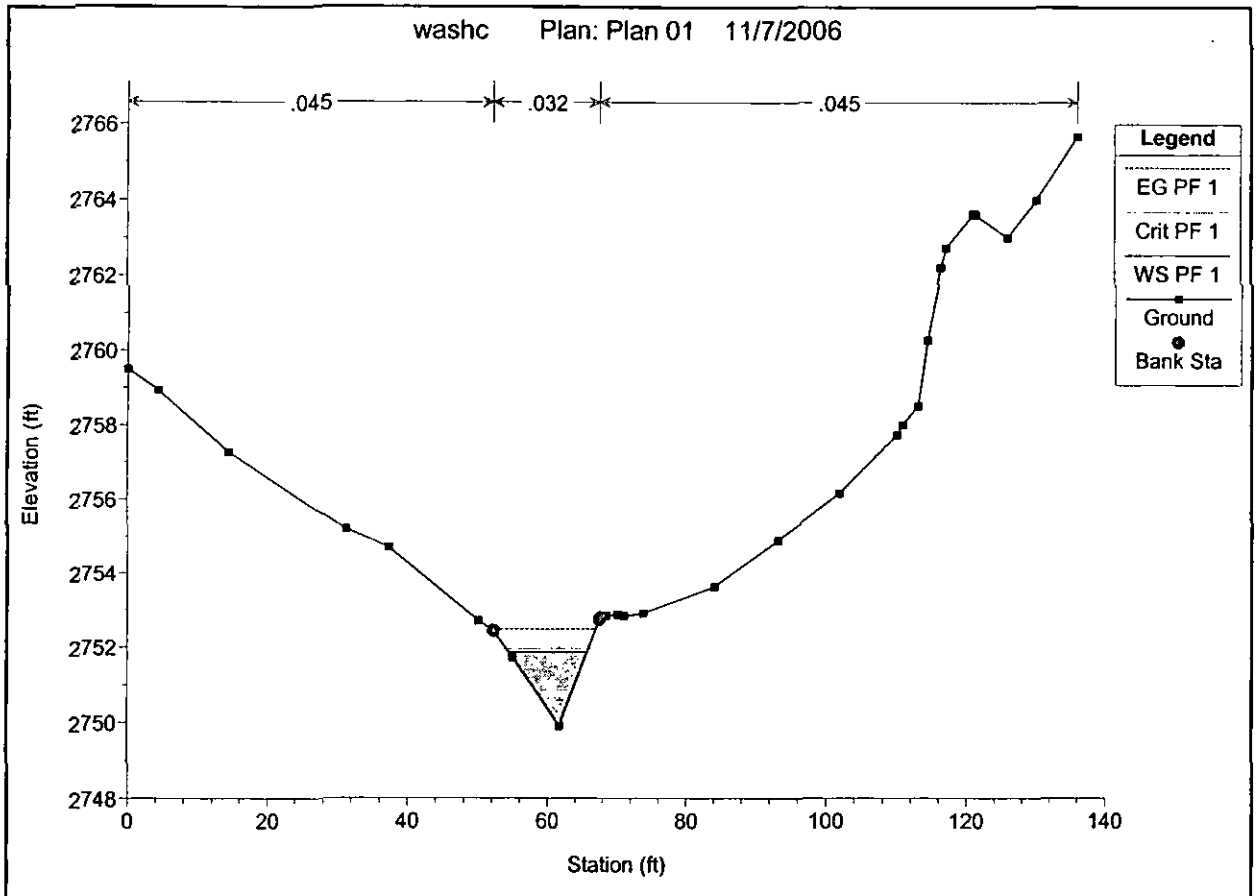
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EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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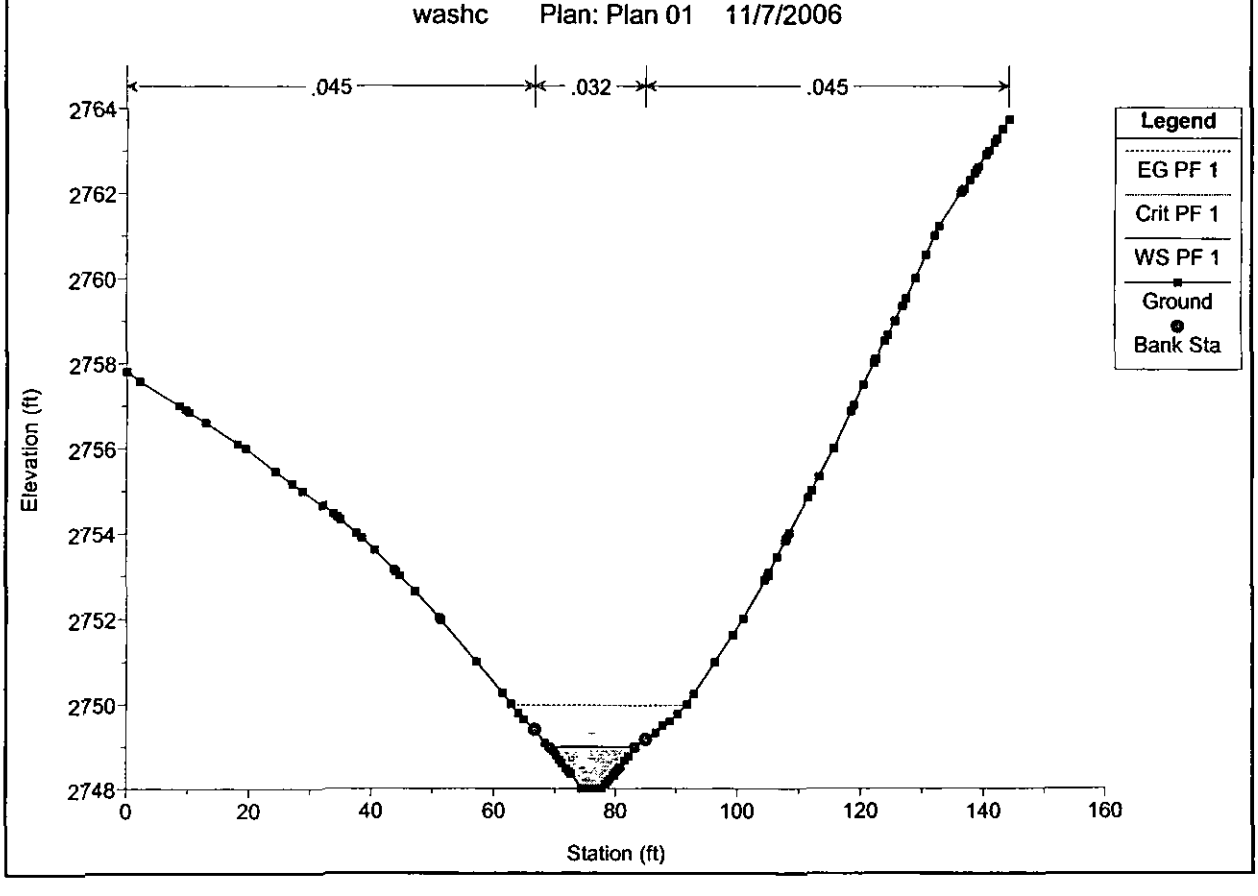
80
100
120
140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Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2748
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2752
2754
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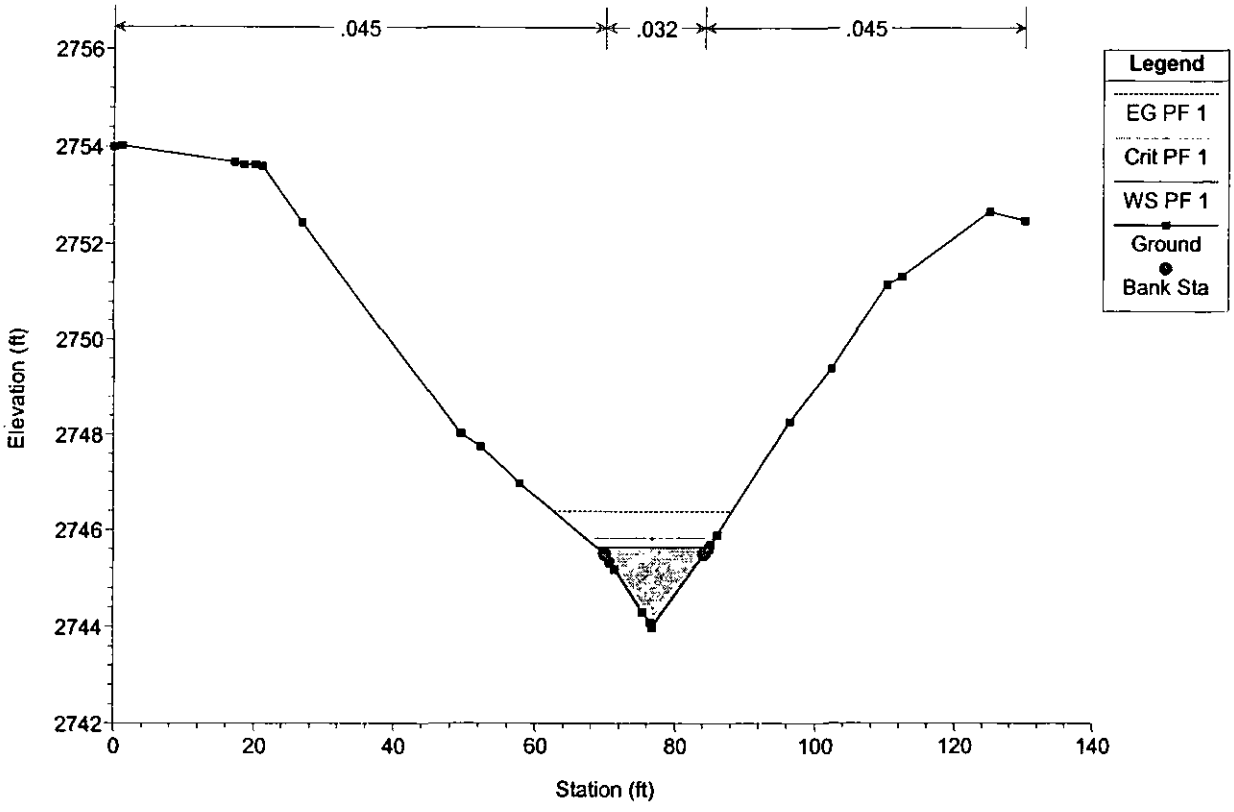
100
120
140
160

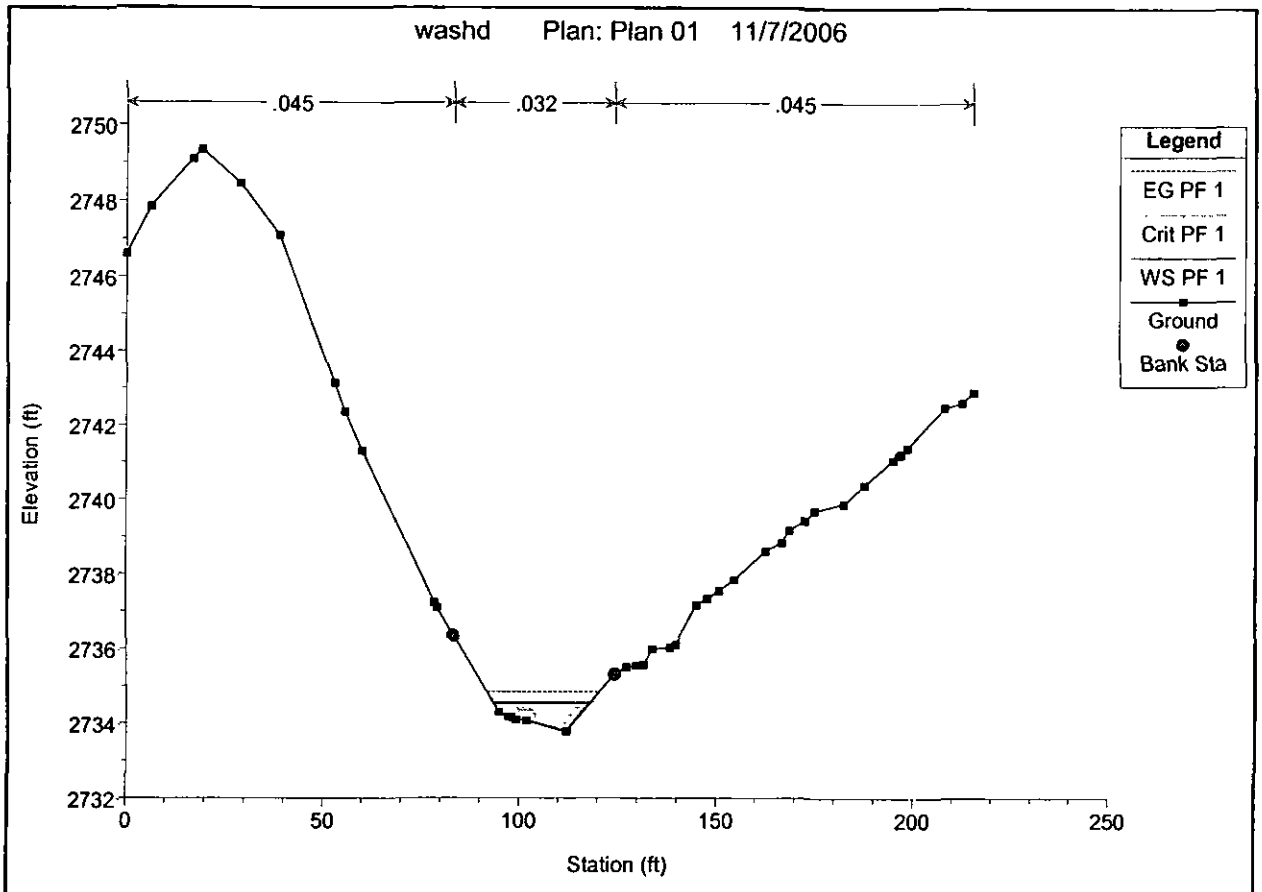
washc Plan: Plan 01 11/7/2006



WASH D

HEC-RAS Plan: Plan 01 River: RIVER-1 Reach: Reach-1 Profile: PF 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	4	PF 1	50.00	2733.77	2734.54	2734.58	2734.84	0.025006	4.39	11.38	24.53	1.14
Reach-1	3	PF 1	50.00	2728.90	2729.90	2730.06	2730.45	0.038474	5.94	8.42	15.86	1.44
Reach-1	2.5	PF 1	50.00	2727.51	2728.11	2728.12	2728.28	0.023407	3.32	15.16	49.07	1.03
Reach-1	2	PF 1	93.00	2723.41	2724.56	2724.78	2725.31	0.029370	7.14	14.78	24.24	1.36
Reach-1	1	PF 1	93.00	2718.95	2719.84	2719.88	2720.16	0.023707	4.50	20.86	44.50	1.12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Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2750
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2746
2744
2742
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2732
0
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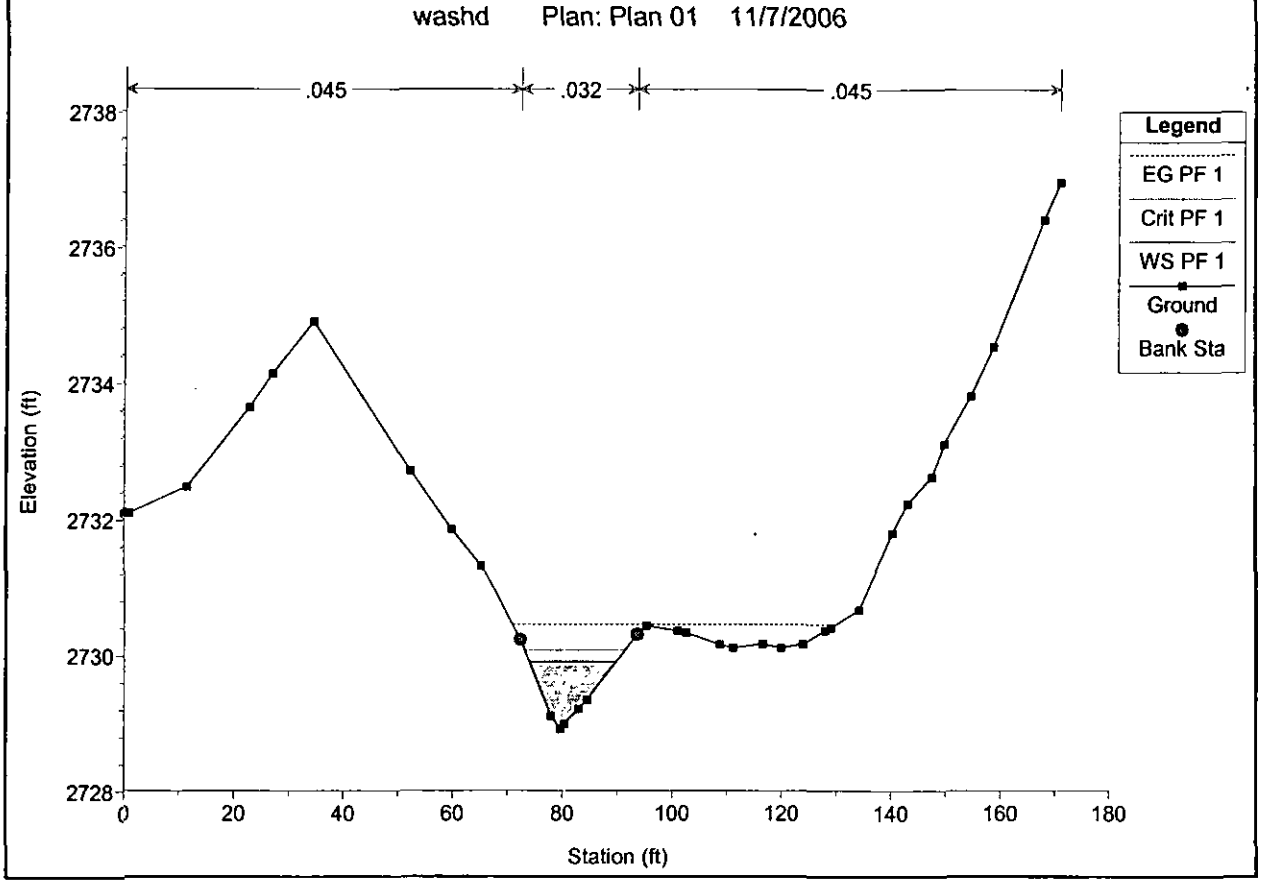
100
150
200
250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Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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2736
2734
2732
2730
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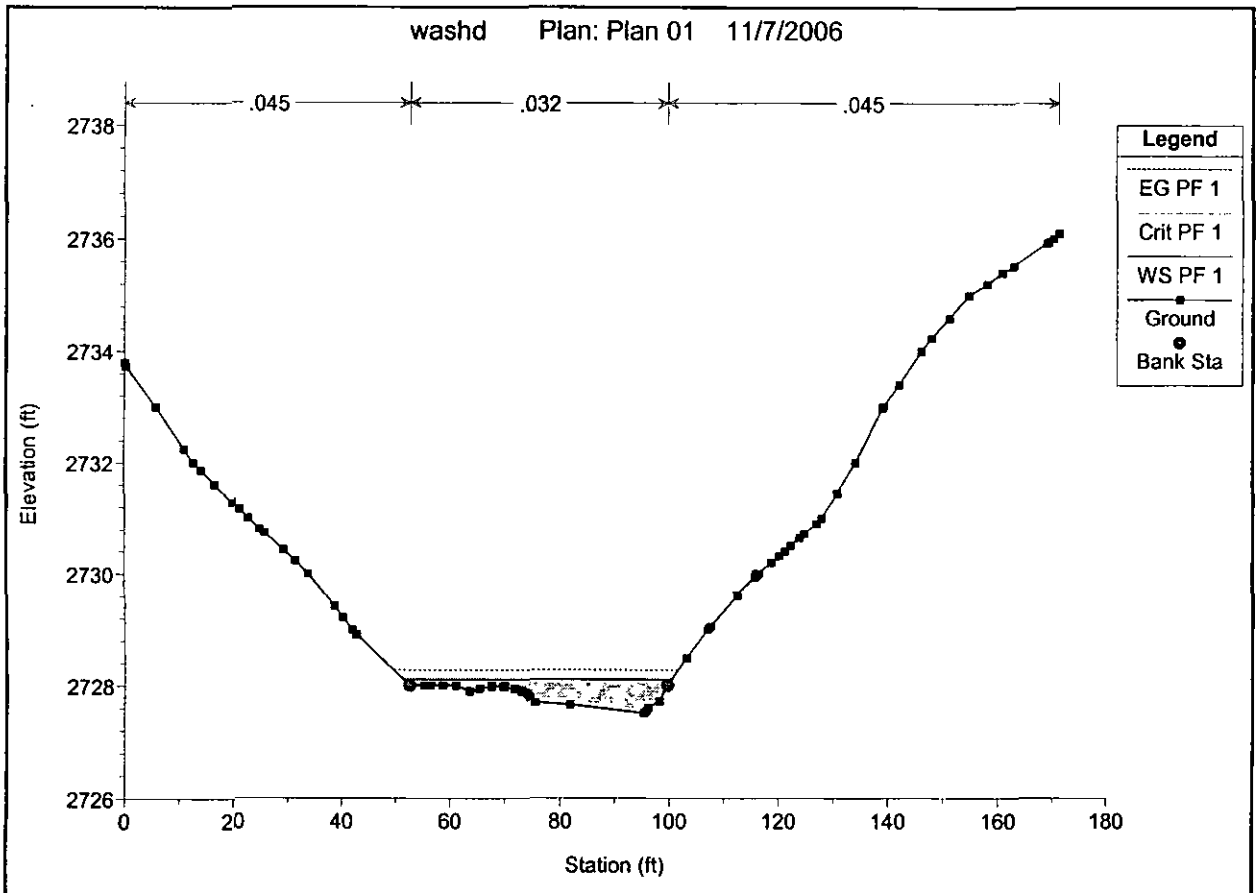
40
60
80
100
120
140
160
180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.032
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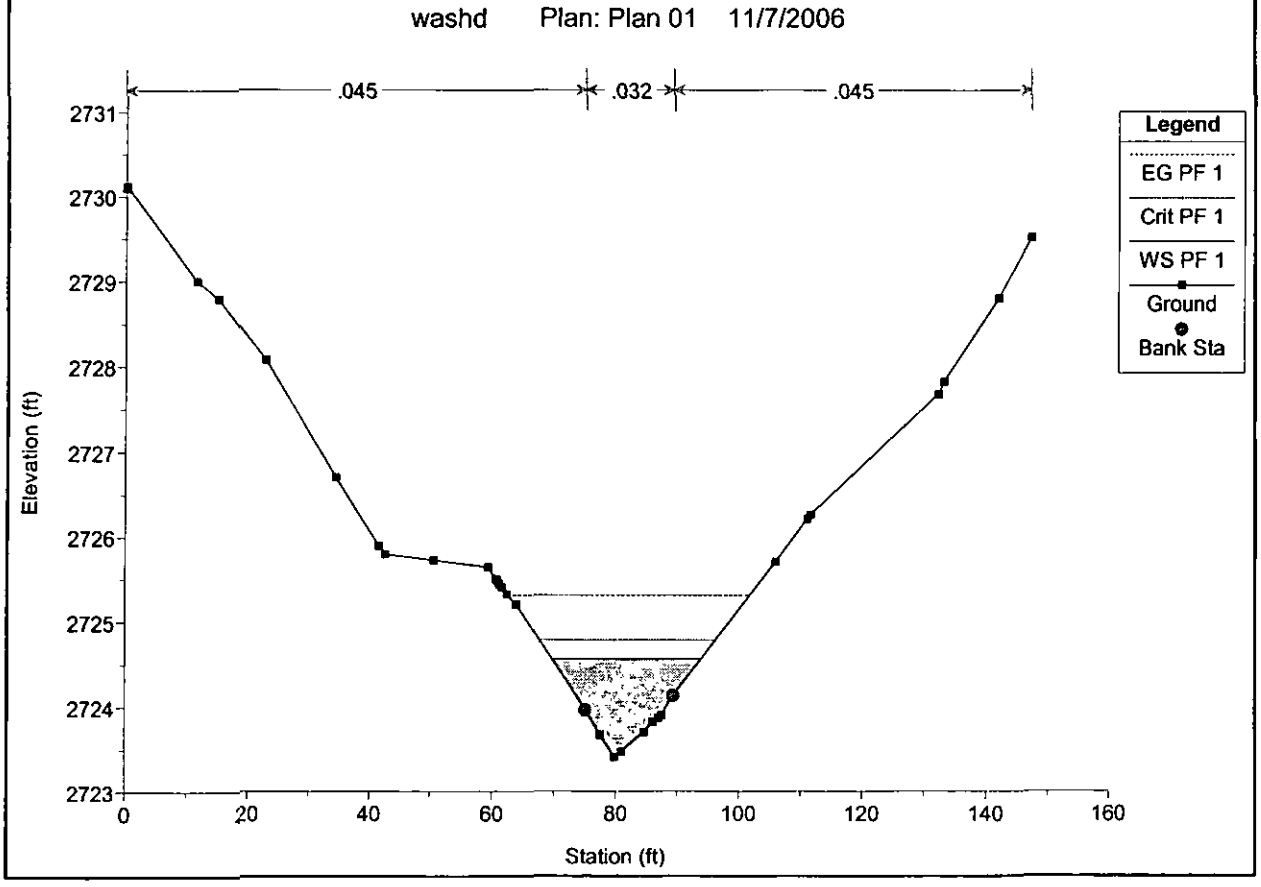
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2738
2736
2734
2732
2730
2728
2726
0
20
40
60
80
100
120
140
160
180
Station (ft)


washd Plan: Plan 01 11/7/2006
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Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2731
2730
2729
2728
2727
2726
2725
2724
2723
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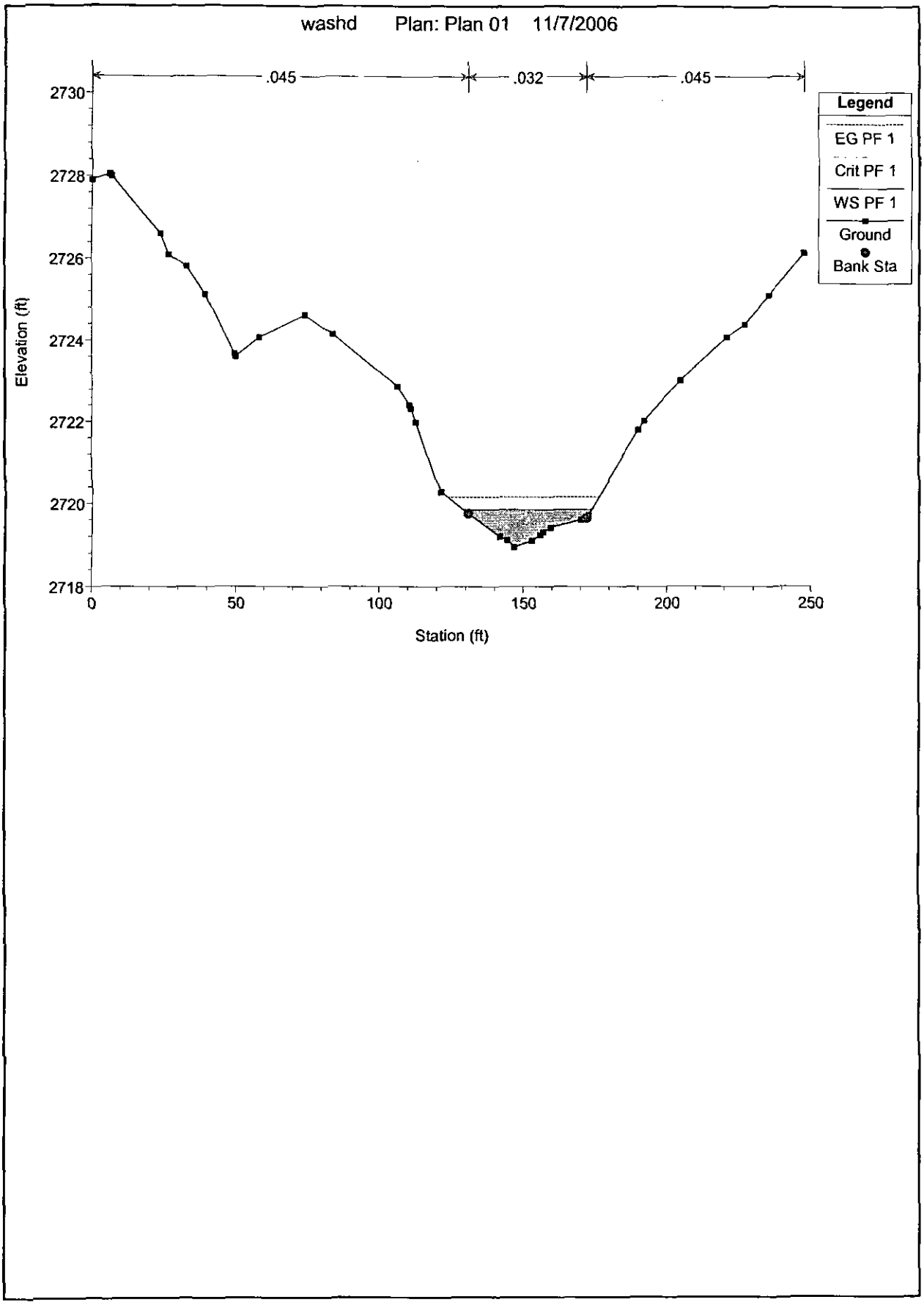
20
40
60
80
100
120
140
160
Station (ft)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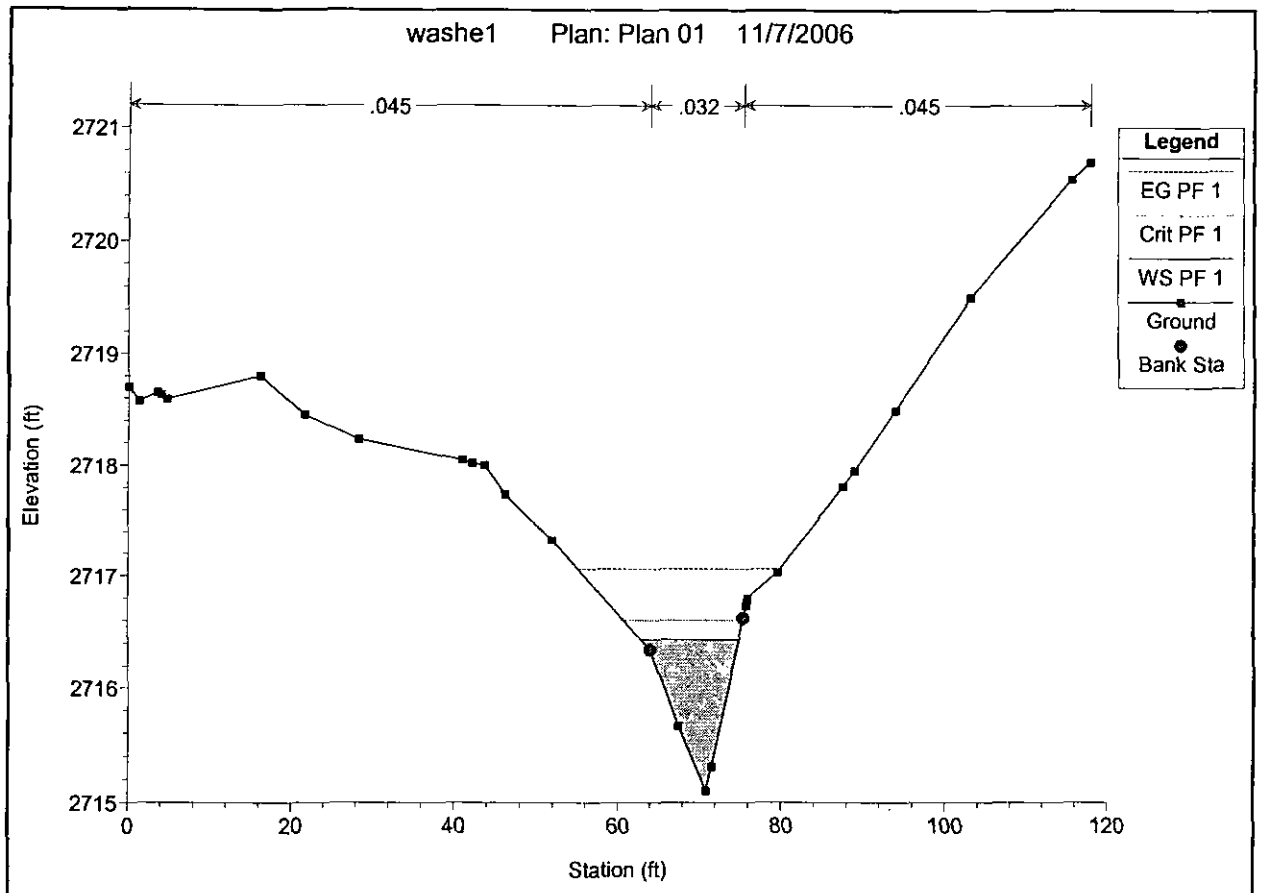
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2730
2728
2726
2724
2722
2720
2718
0
50
100
150
200
250
Station (ft)

WASH E 1

HEC-RAS Plan: Plan 01 River: RIVER-1 Reach: Reach-1 Profile: PF 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	13	PF 1	50.00	2715.10	2716.43	2716.60	2717.06	0.030018	6.34	7.93	12.10	1.32
Reach-1	12	PF 1	50.00	2713.32	2714.73	2714.77	2715.16	0.017142	5.31	10.05	15.35	1.02
Reach-1	11	PF 1	50.00	2711.10	2712.13	2712.36	2712.87	0.045013	6.89	7.38	13.63	1.58
Reach-1	10	PF 1	50.00	2708.30	2709.94	2710.07	2710.51	0.018336	6.16	9.08	14.42	1.07
Reach-1	9	PF 1	50.00	2706.40	2707.58	2707.84	2708.40	0.040012	7.29	7.00	11.58	1.52
Reach-1	8	PF 1	50.00	2703.40	2704.77	2705.10	2705.82	0.046780	8.23	6.21	9.25	1.65
Reach-1	7	PF 1	50.00	2701.44	2702.70	2702.85	2703.29	0.030785	6.17	8.11	12.04	1.32
Reach-1	6	PF 1	50.00	2700.00	2701.35	2701.35	2701.71	0.016870	4.84	10.45	15.48	1.00
Reach-1	5	PF 1	110.00	2696.59	2698.23	2698.33	2698.83	0.023198	6.20	17.84	22.36	1.20
Reach-1	4	PF 1	110.00	2692.81	2694.53	2694.74	2695.31	0.024021	7.14	16.08	20.48	1.25
Reach-1	3.5	PF 1	110.00	2692.00	2692.91	2692.96	2693.32	0.017181	5.30	23.38	38.13	1.04
Reach-1	3	PF 1	146.00	2689.21	2690.98	2691.23	2691.71	0.019310	7.16	25.54	49.17	1.16
Reach-1	2	PF 1	275.00	2679.83	2681.81	2682.35	2683.49	0.037223	10.45	27.53	27.33	1.63
Reach-1	1	PF 1	275.00	2677.00	2679.36	2679.56	2680.26	0.015675	8.37	43.76	40.47	1.10


washe1 Plan: Plan 01 11/7/2006
.045
.032
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Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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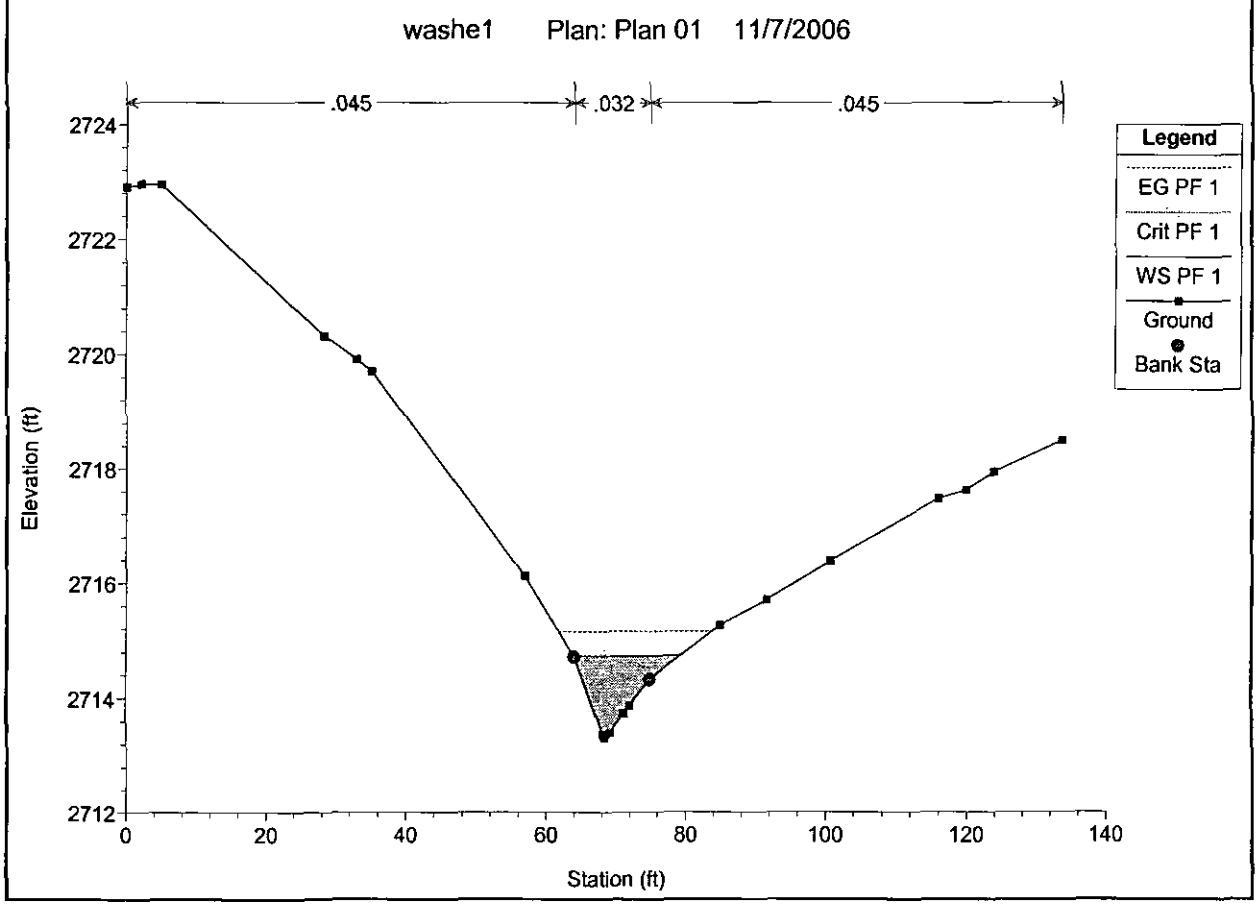
40
60
80
100
120


washe1 Plan: Plan 01 11/7/2006
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Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2724
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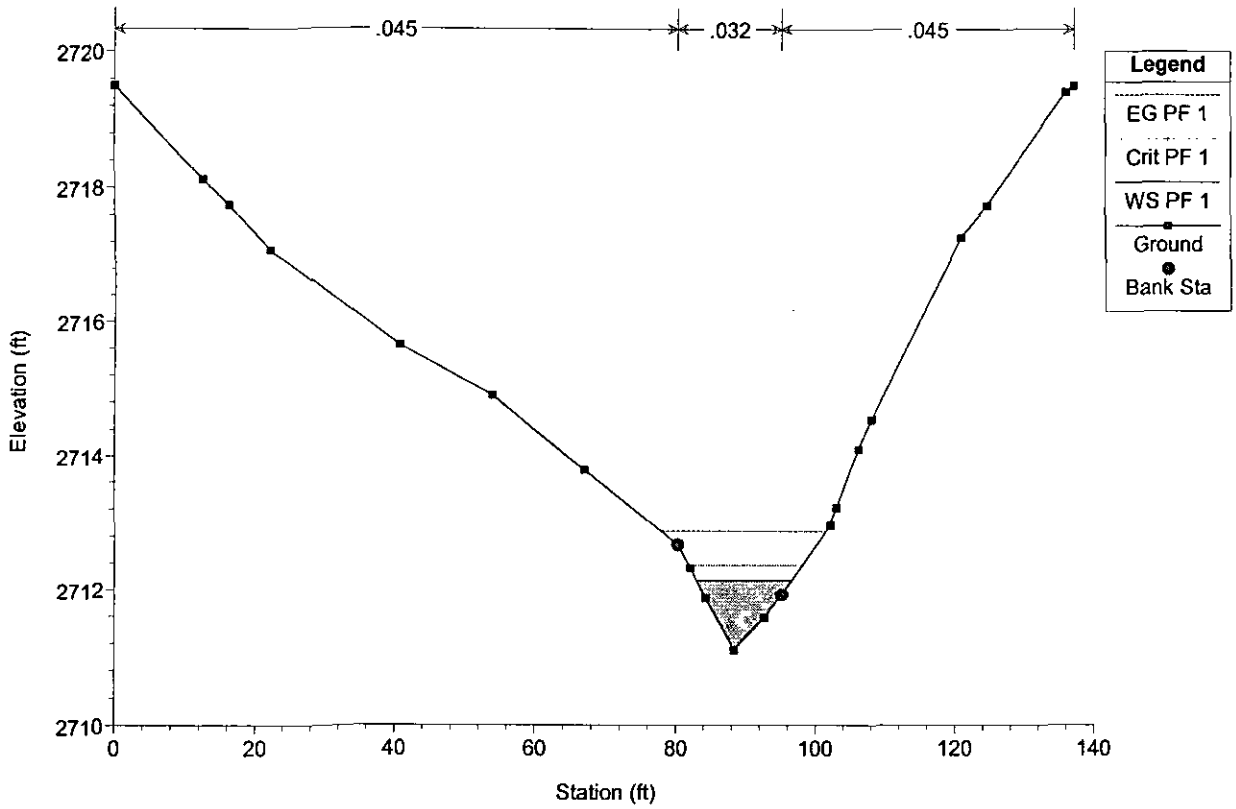
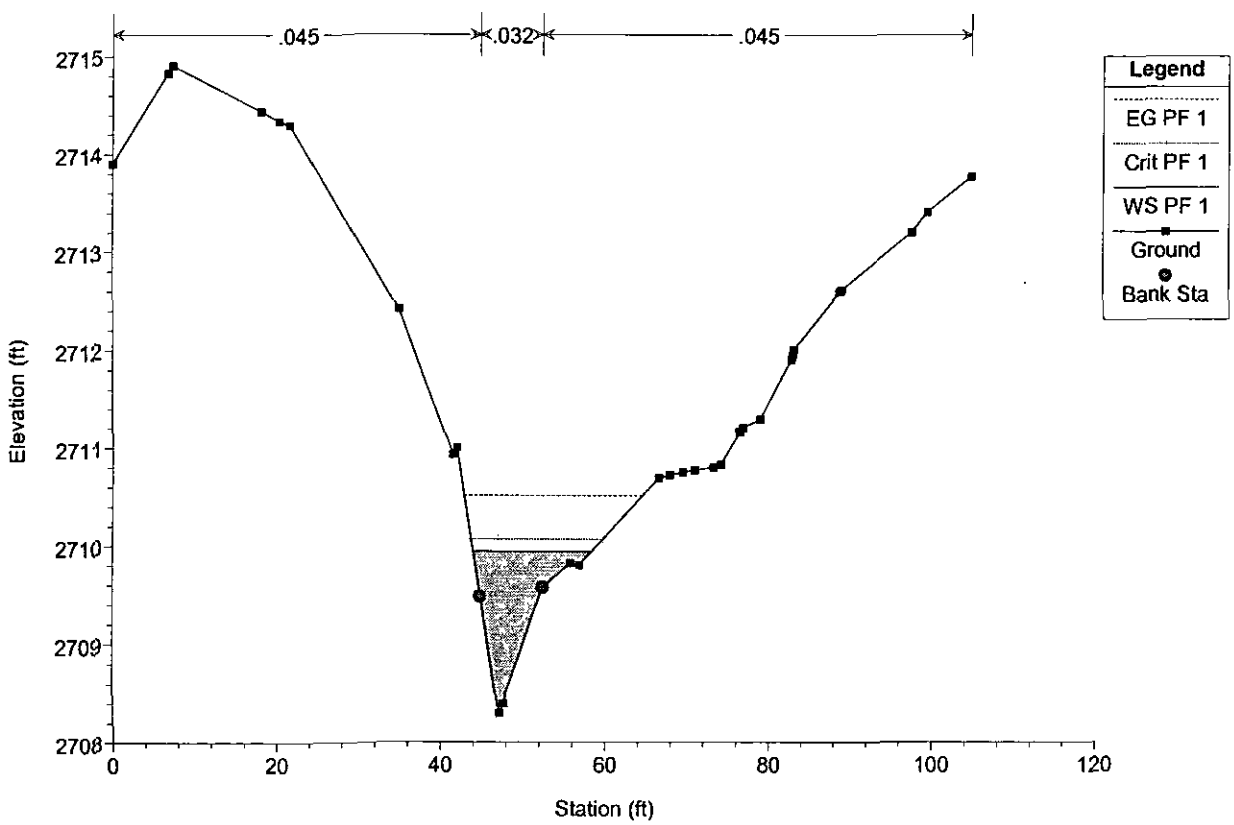
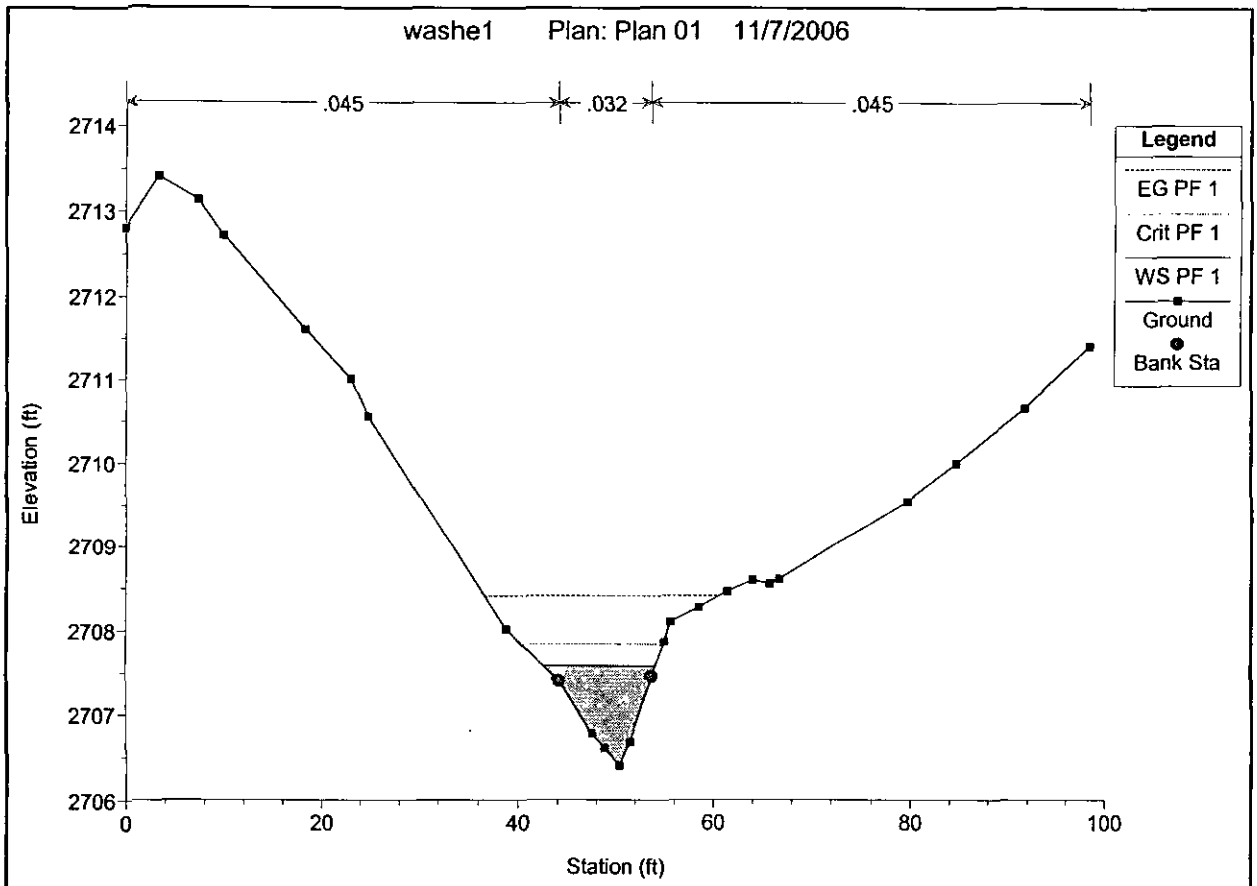
40
60
80
100
120
140

washe1 Plan: Plan 01 11/7/2006



washe1 Plan: Plan 01 11/7/2006




washe1 Plan: Plan 01 11/7/2006
.045
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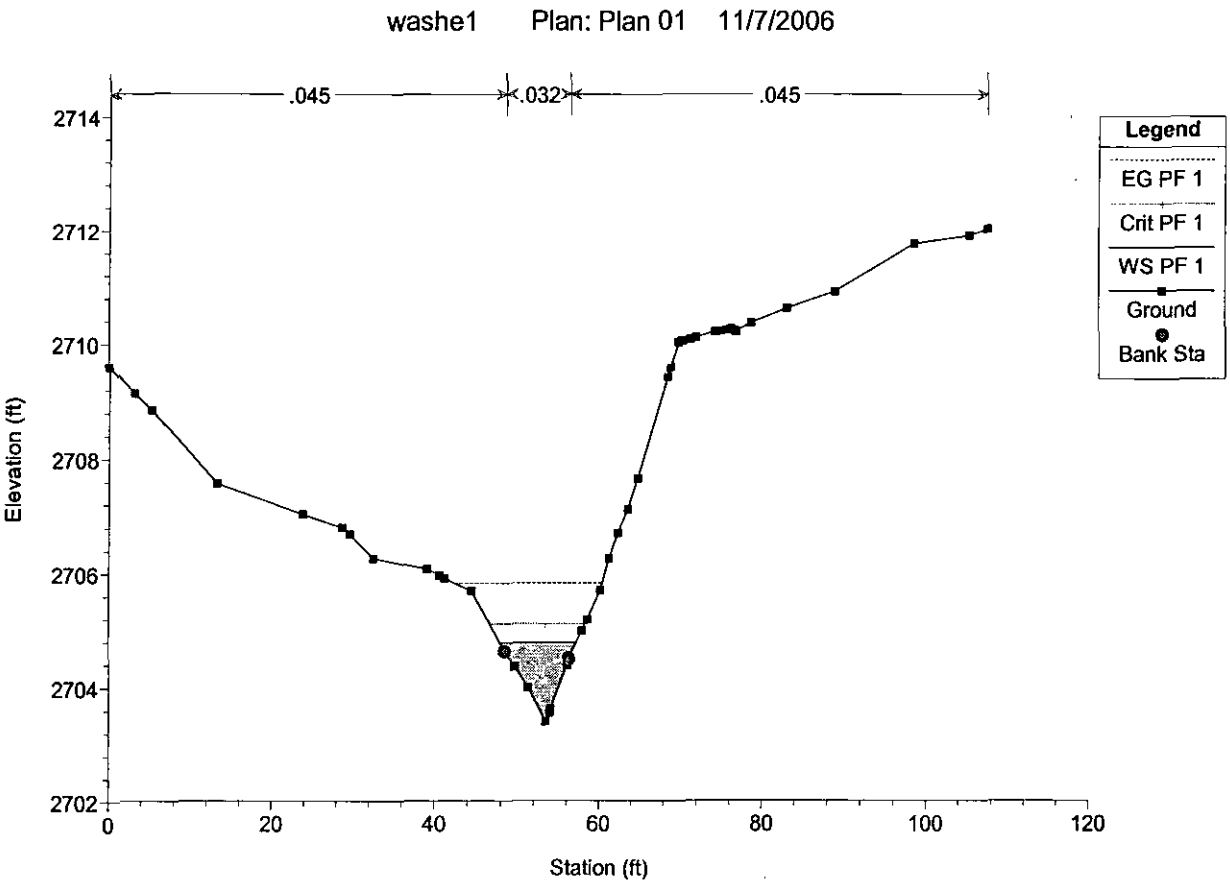
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2714
2713
2712
2711
2710
2709
2708
2707
2706
0
20
40
60
80
100
Station (ft)


washe1 Plan: Plan 01 11/7/2006
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Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2714
2712
2710
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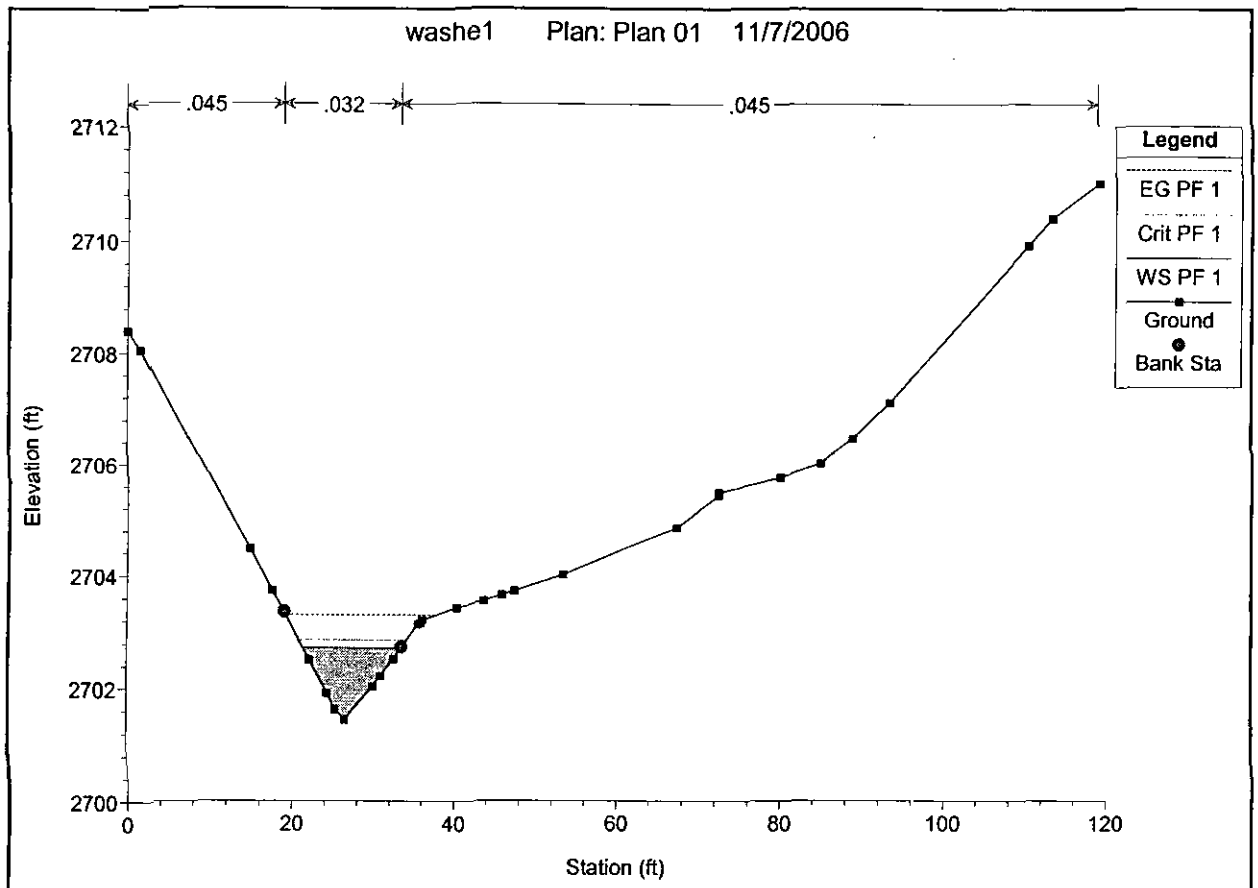
2706
2704
2702
0
20
40
60
80
100
120
Station (ft)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Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
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2702
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0
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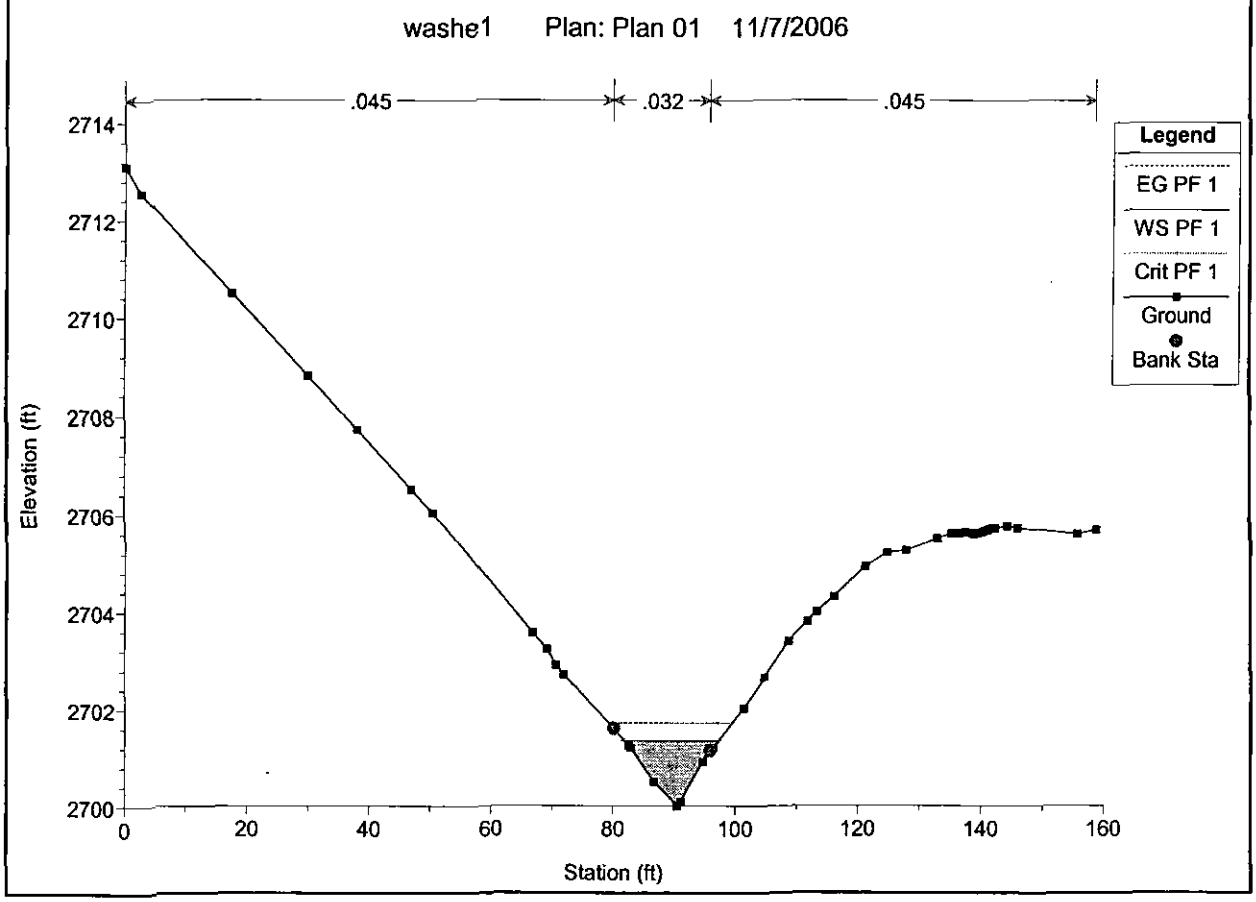
40
60
80
100
120
Station (ft)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Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2714
2712
2710
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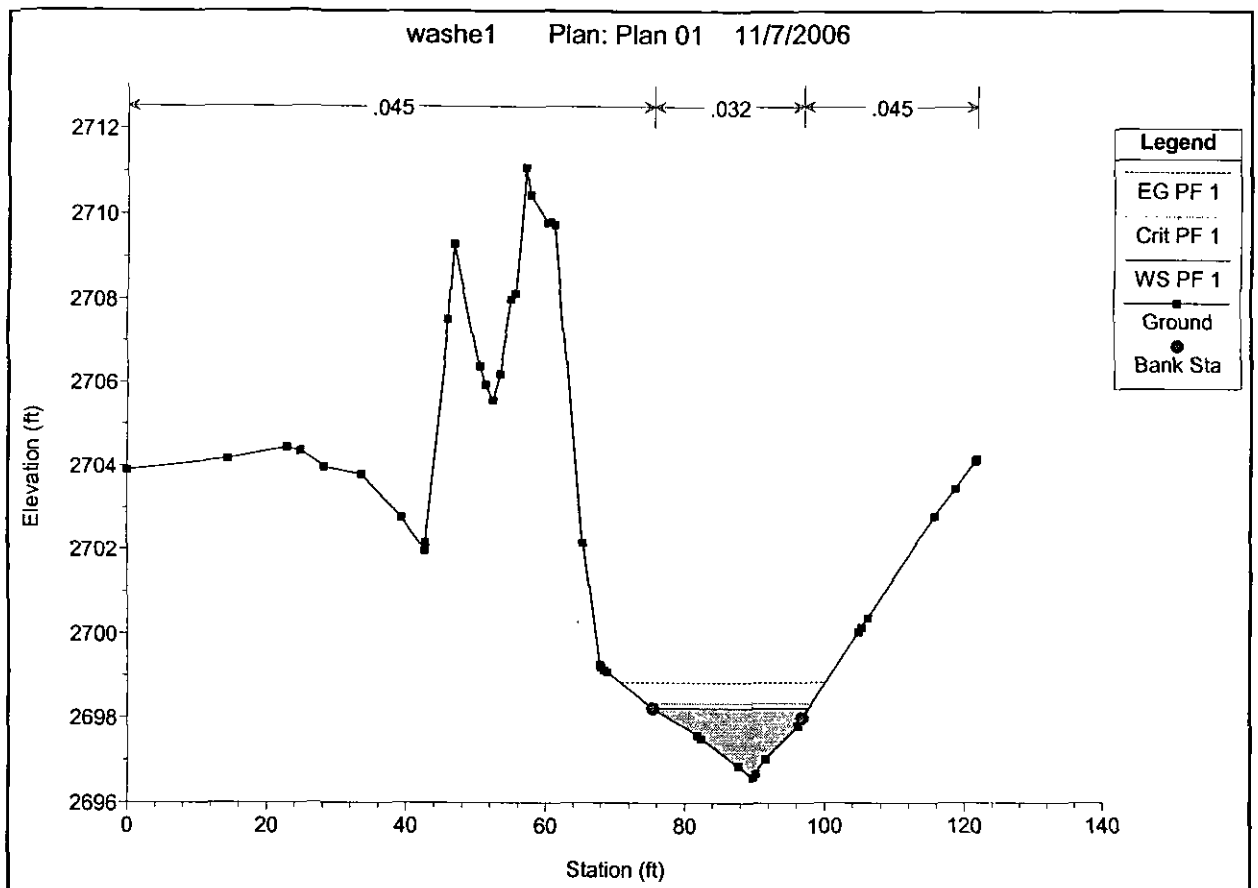
2704
2702
2700
0
20
40
60
80
100
120
140
160
Station (ft)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Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2712
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2704
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2700
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0
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100
120
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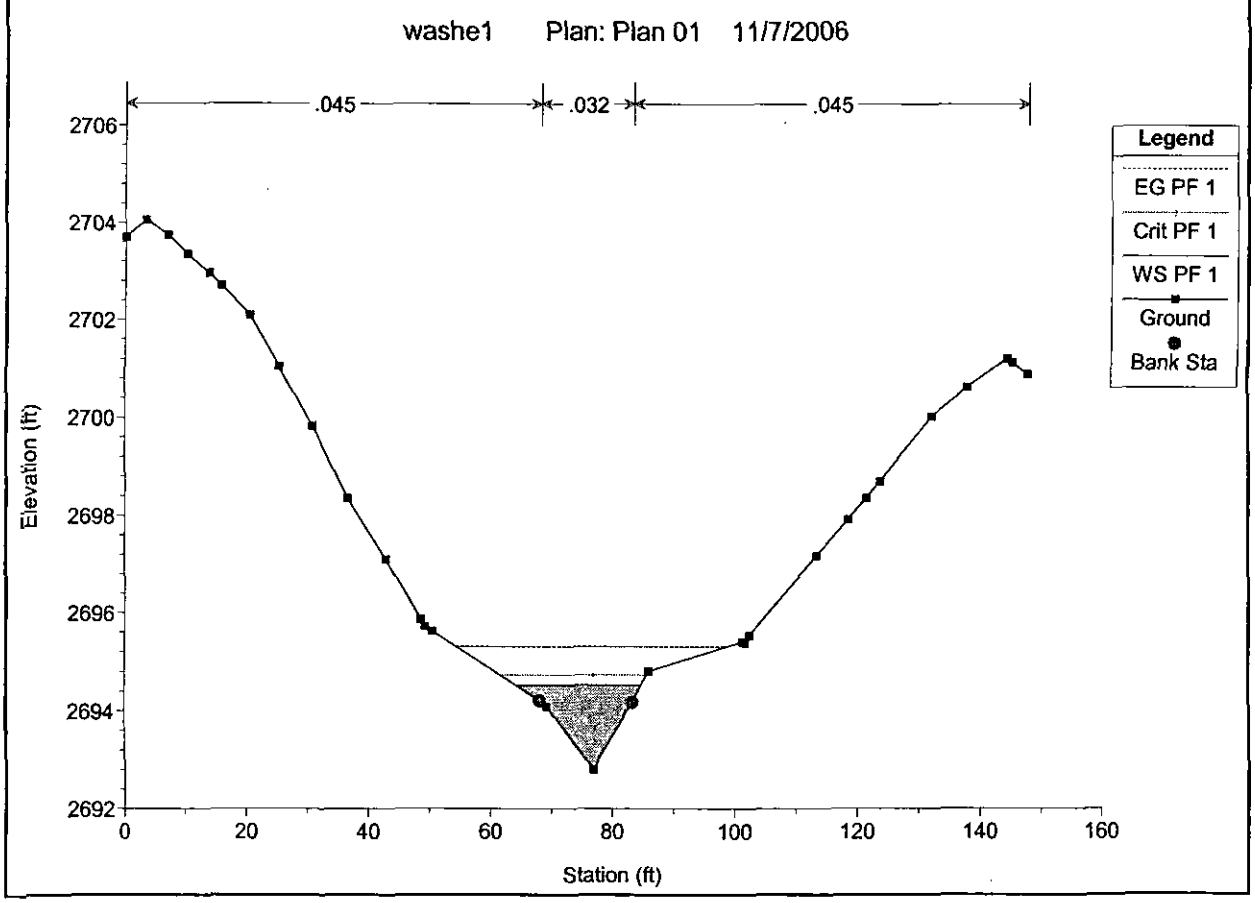
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EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2706
2704
2702
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2698
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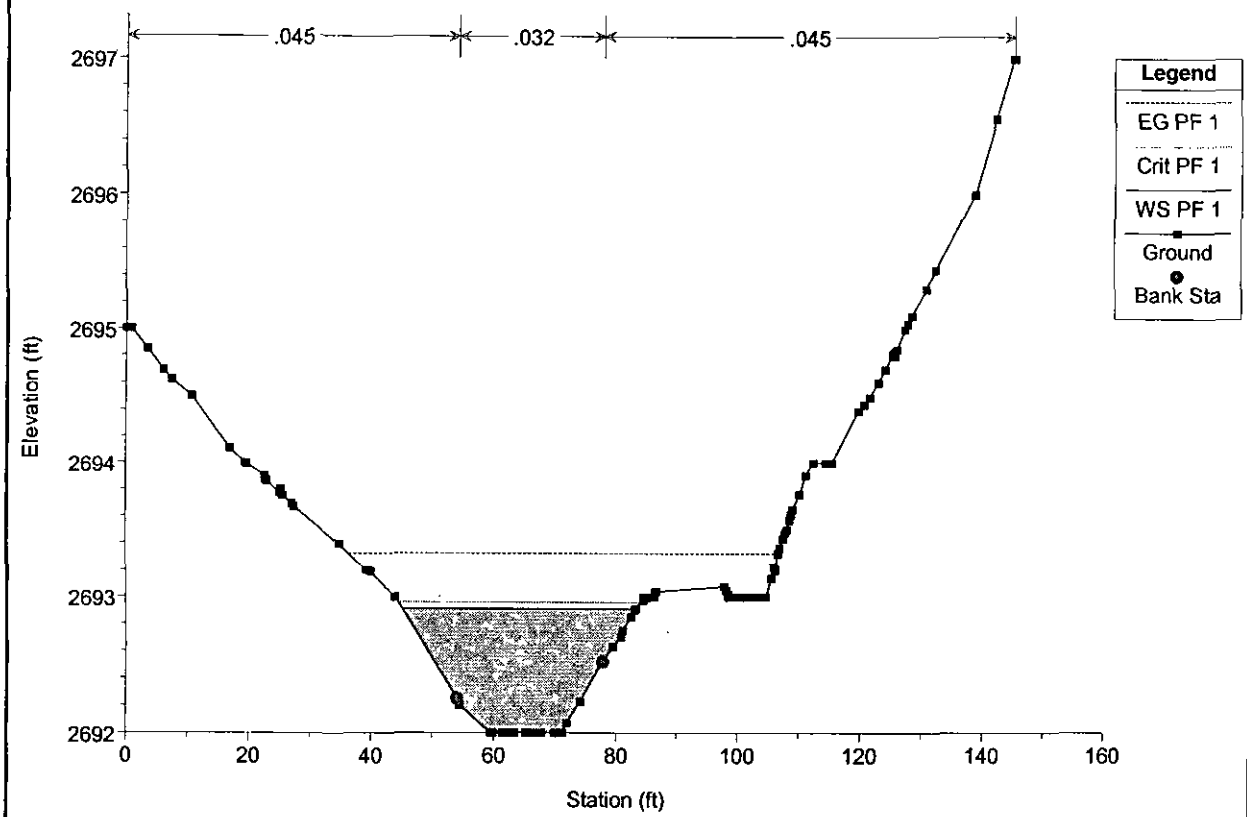
2694
2692
0
20
40
60
80
100
120
140
160

washe1 Plan: Plan 01 11/7/2006



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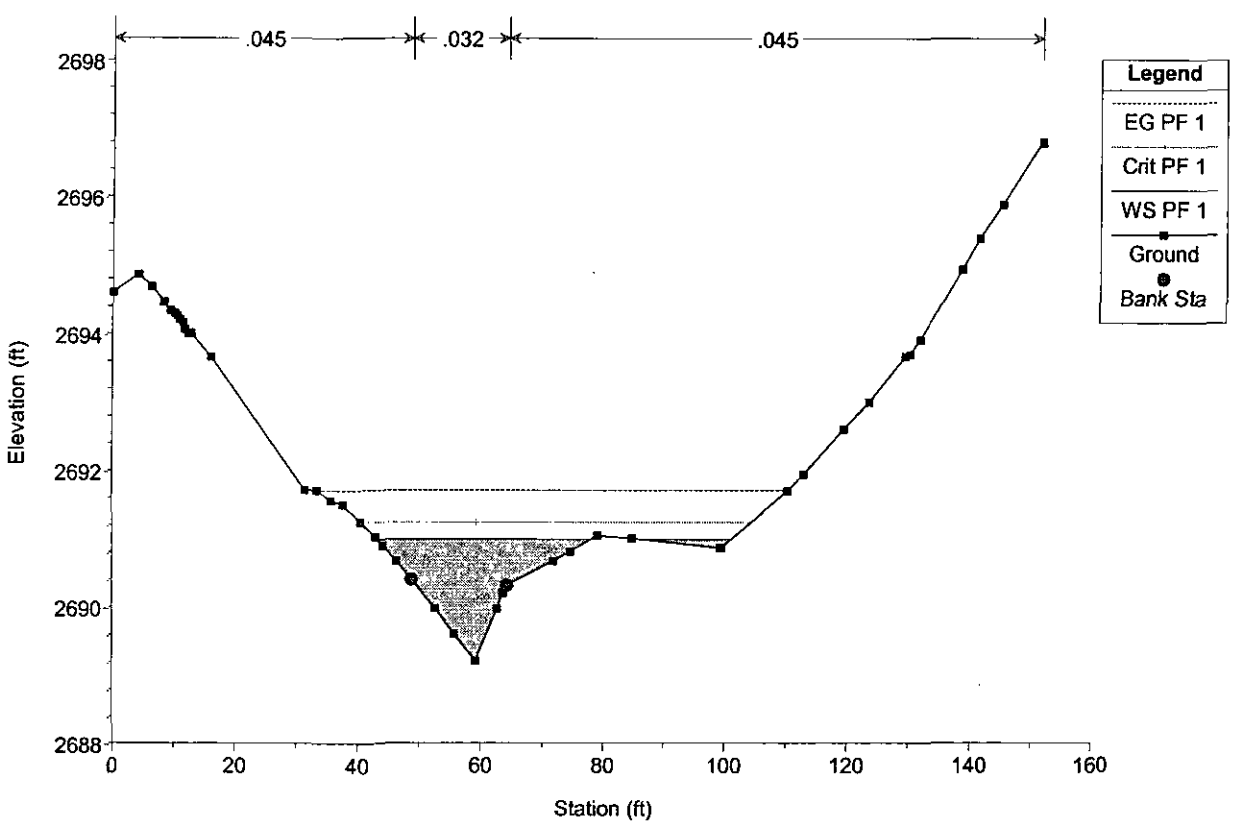

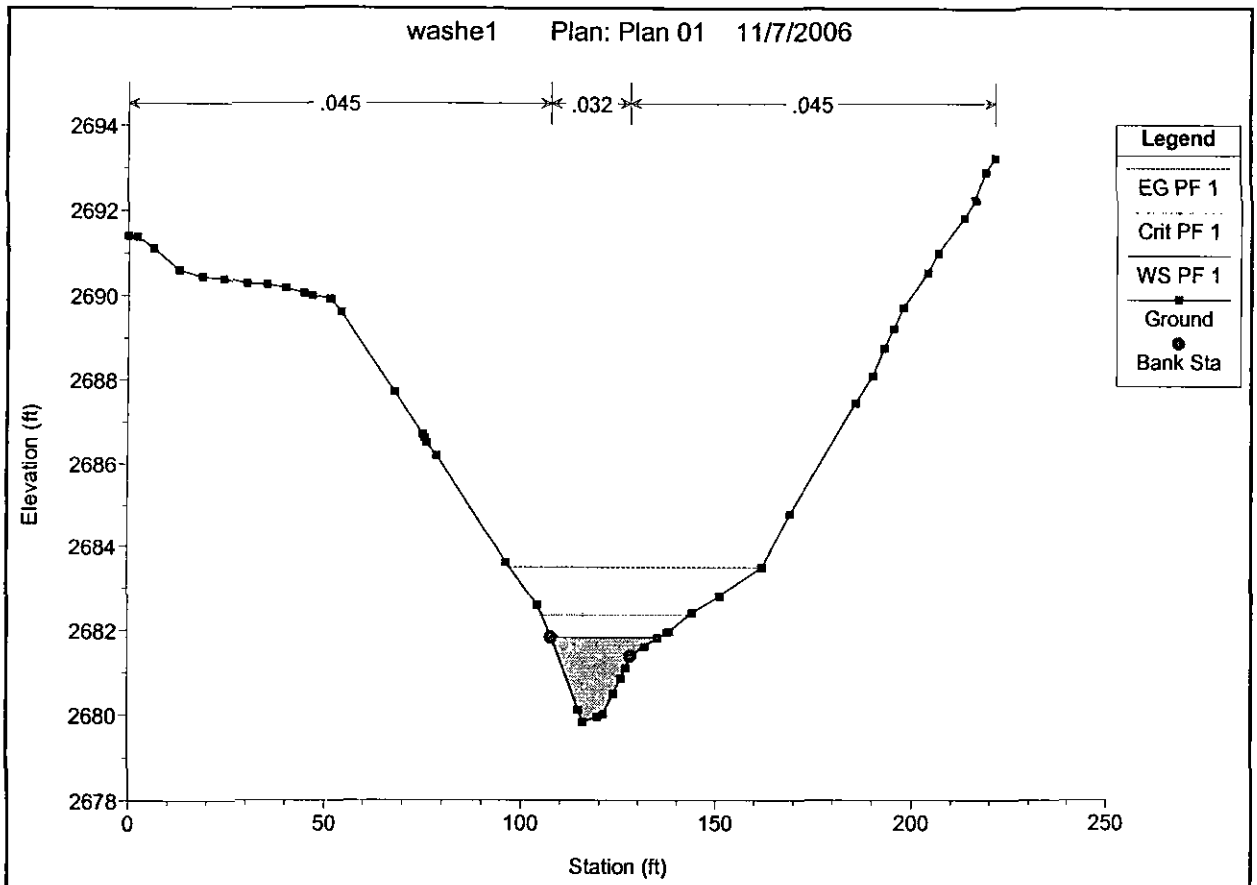
washe1 Plan: Plan 01 11/7/2006
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Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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2692
2690
2688
2686
2684
2682
2680
2678
0
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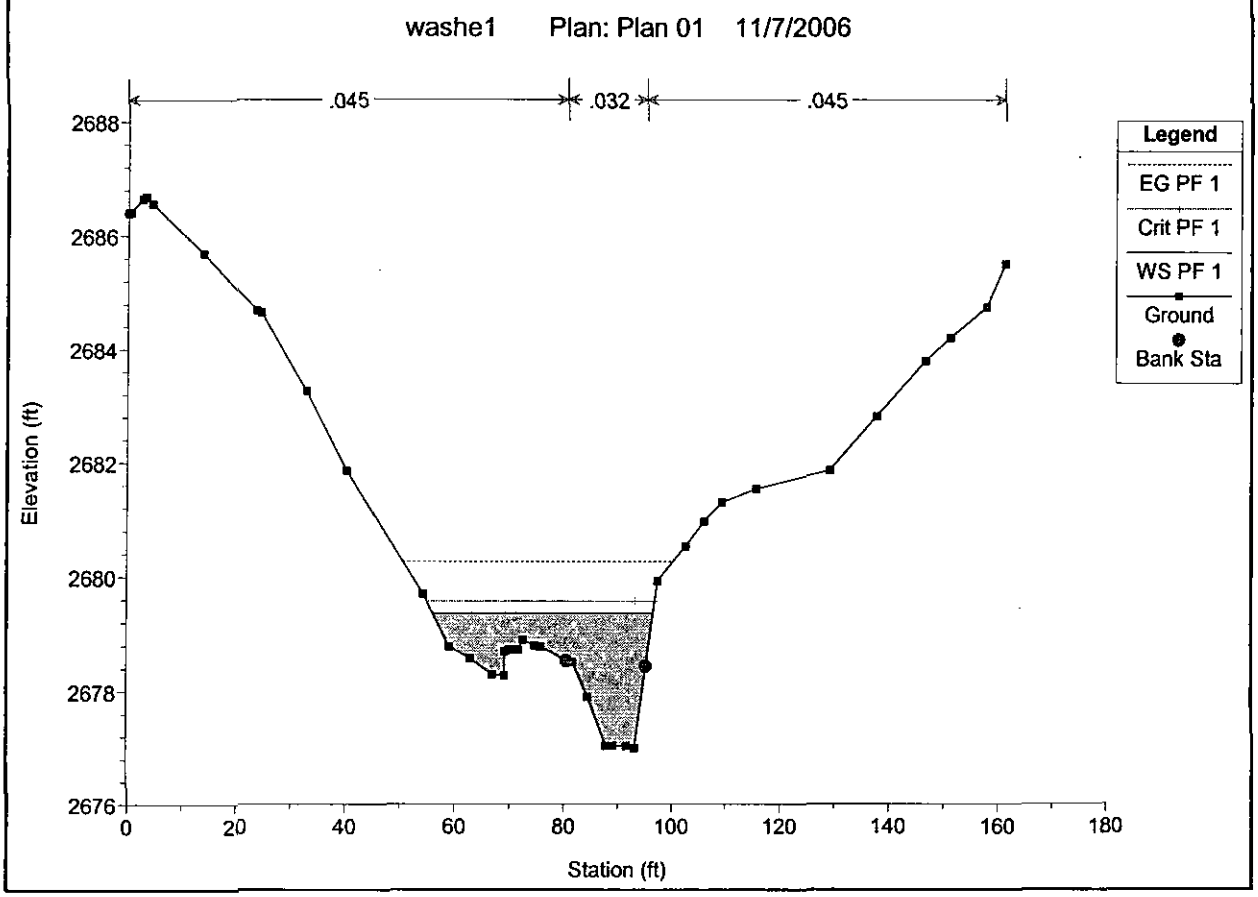
100
150
200
250


washe1 Plan: Plan 01 11/7/2006
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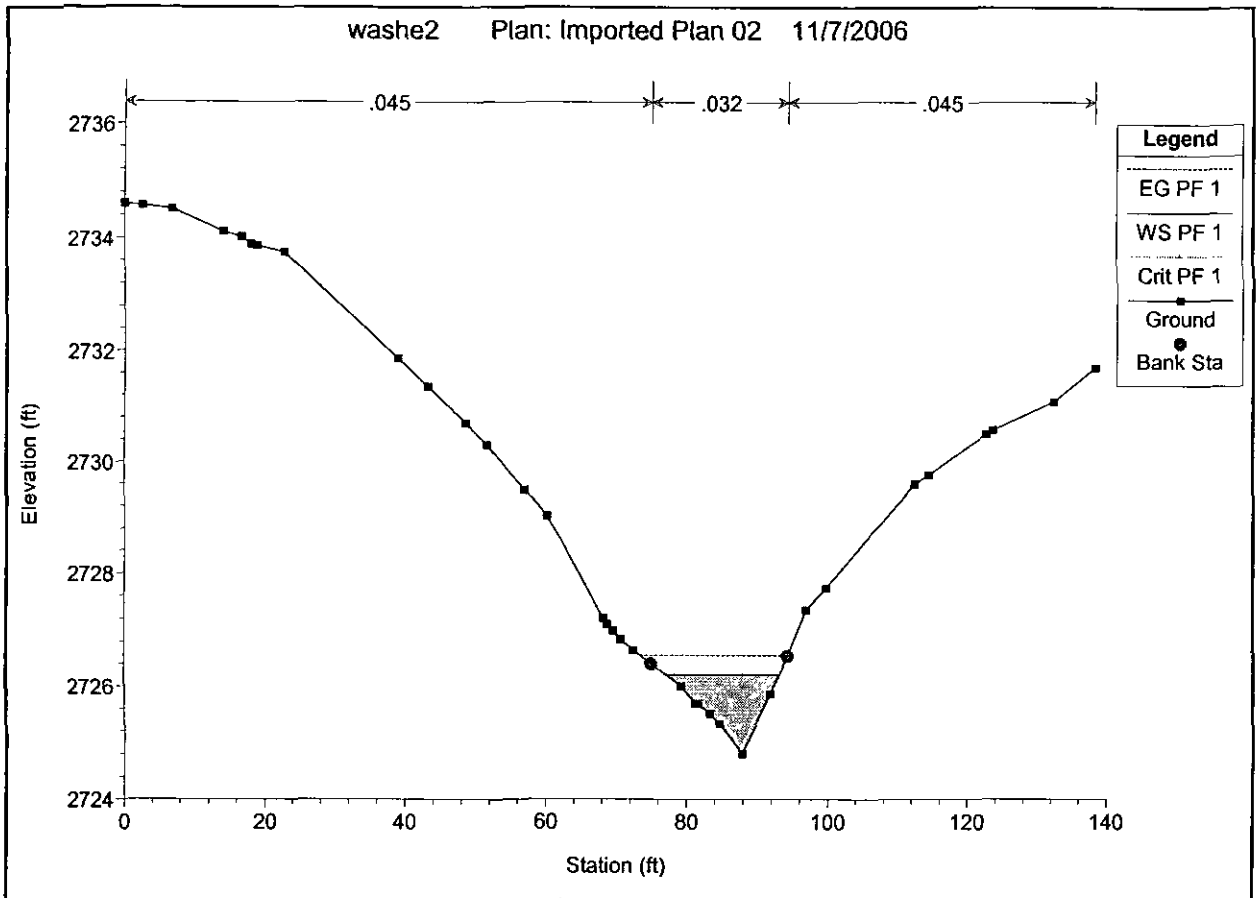
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2688
2686
2684
2682
2680
2678
2676
0
20
40
60
80
100
120
140
160
180

WASH E2

HEC-RAS Plan: Imported Pla River: RIVER-1 Reach: Reach-1 Profile: PF 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	11	PF 1	50.00	2724.80	2726.21	2726.21	2726.55	0.018084	4.69	10.67	16.13	1.02
Reach-1	10	PF 1	50.00	2719.62	2721.45	2721.45	2721.87	0.015739	5.17	9.65	14.80	0.98
Reach-1	9	PF 1	50.00	2715.71	2717.28	2717.28	2717.71	0.013081	5.64	10.87	14.46	0.94
Reach-1	8	PF 1	75.00	2709.10	2711.09	2711.09	2711.55	0.010257	5.57	16.18	22.55	0.85
Reach-1	7.5	PF 1	75.00	2708.00	2709.19	2709.19	2709.62	0.013563	5.49	15.49	19.83	0.95
Reach-1	7	PF 1	75.00	2705.46	2706.94	2706.94	2707.36	0.015127	5.18	14.90	20.27	0.98
Reach-1	6	PF 1	75.00	2701.53	2703.58	2703.58	2704.11	0.014543	5.84	13.21	14.90	0.97
Reach-1	5	PF 1	75.00	2697.79	2699.88	2699.88	2700.43	0.010621	6.48	15.38	16.38	0.89
Reach-1	4.5	PF 1	75.00	2697.00	2698.52	2698.52	2699.00	0.012220	5.77	14.89	17.87	0.92
Reach-1	4	PF 1	75.00	2694.91	2696.38	2696.38	2696.78	0.016000	5.09	14.92	21.12	0.99
Reach-1	3	PF 1	131.00	2687.45	2689.81	2689.81	2690.44	0.012785	6.41	21.80	21.14	0.95
Reach-1	2	PF 1	275.00	2679.83	2682.39	2682.39	2683.11	0.009982	7.12	46.76	38.39	0.90
Reach-1	1	PF 1	275.00	2677.00	2679.55	2679.55	2680.11	0.016423	7.02	51.48	41.70	0.83


washe2 Plan: Imported Plan 02 11/7/2006
.045
.032
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Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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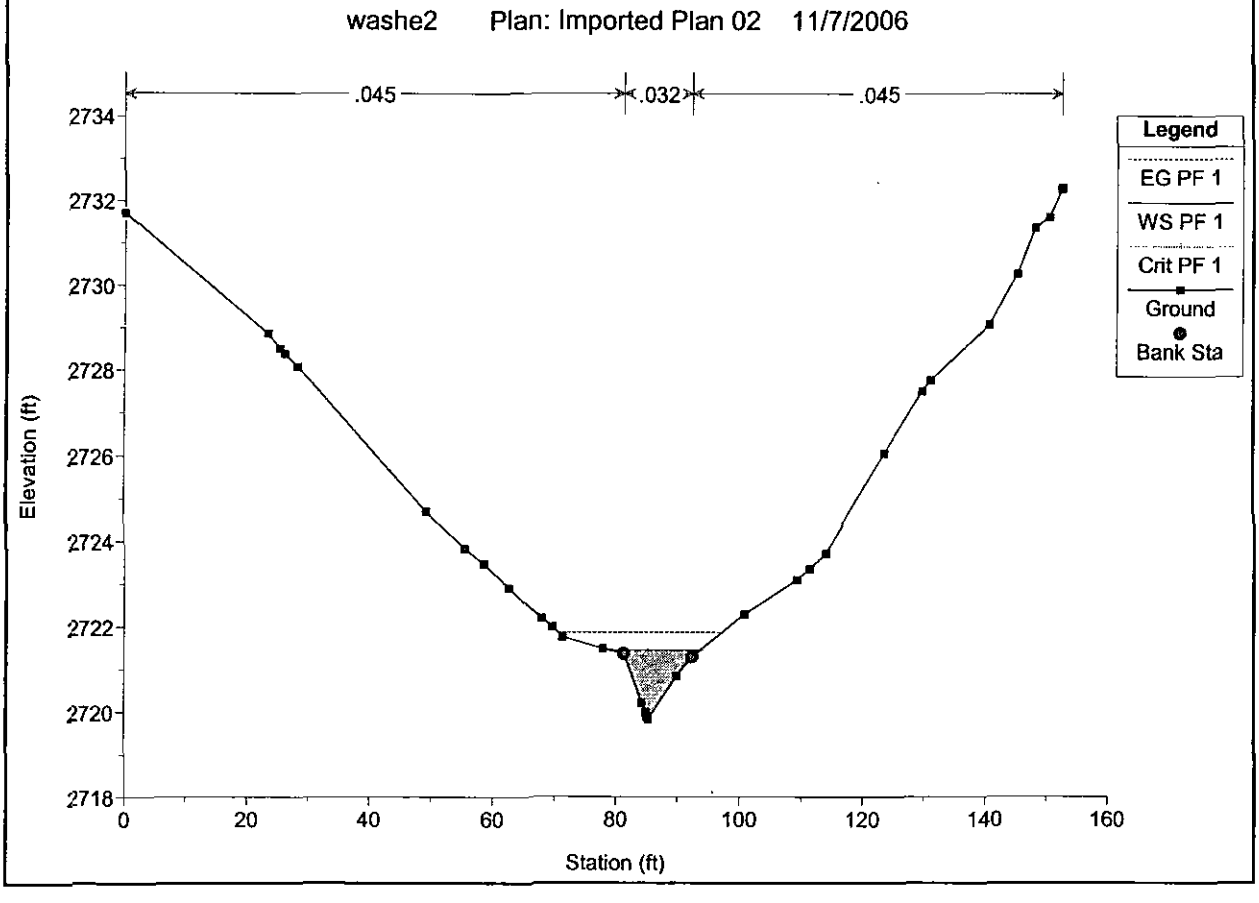
2734
2732
2730
2728
2726
2724
0
20
40
60
80
100
120
140


washe2 Plan: Imported Plan 02 11/7/2006
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.032
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Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2734
2732
2730
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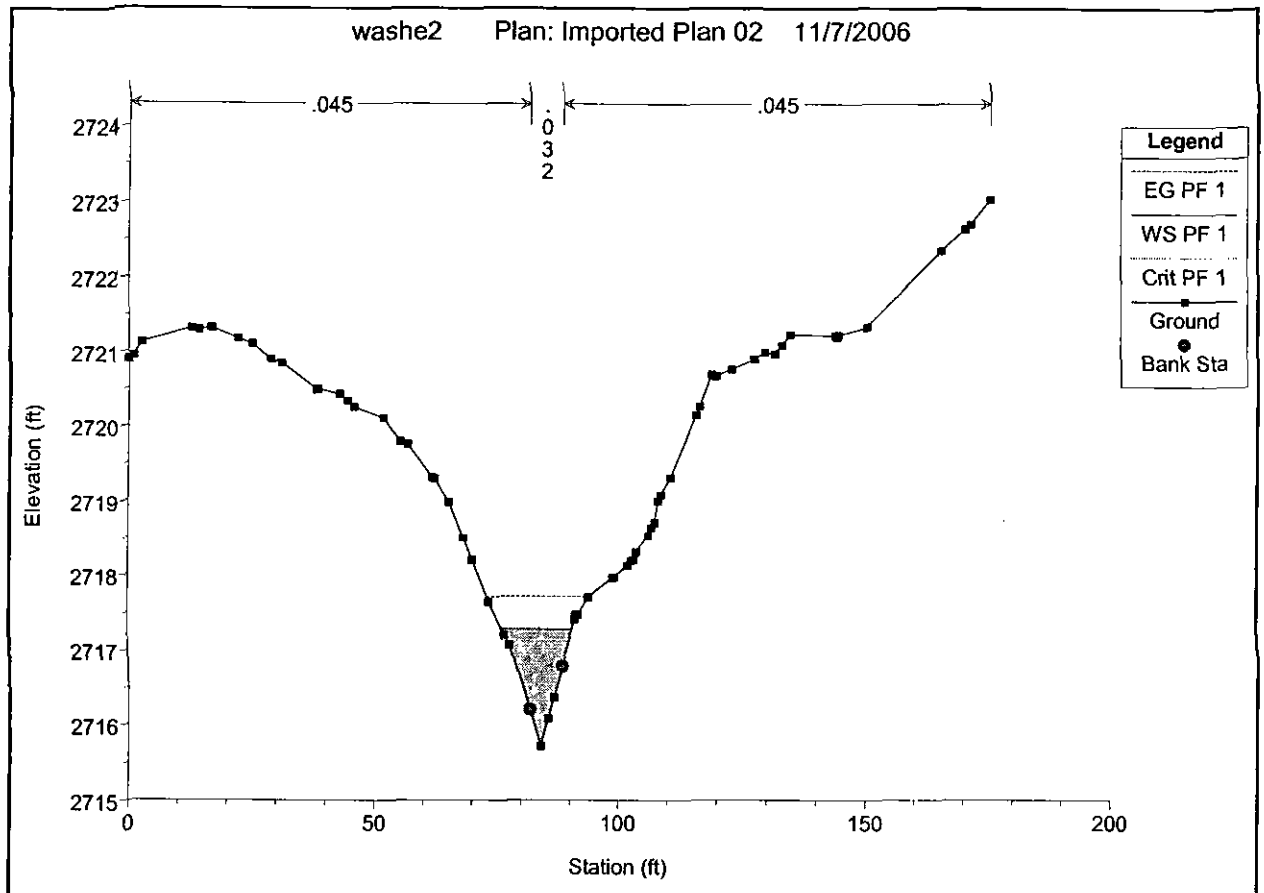
2726
2724
2722
2720
2718
0
20
40
60
80
100
120
140
160


washe2 Plan: Imported Plan 02 11/7/2006
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.032
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Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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2723
2722
2721
2720
2719
2718
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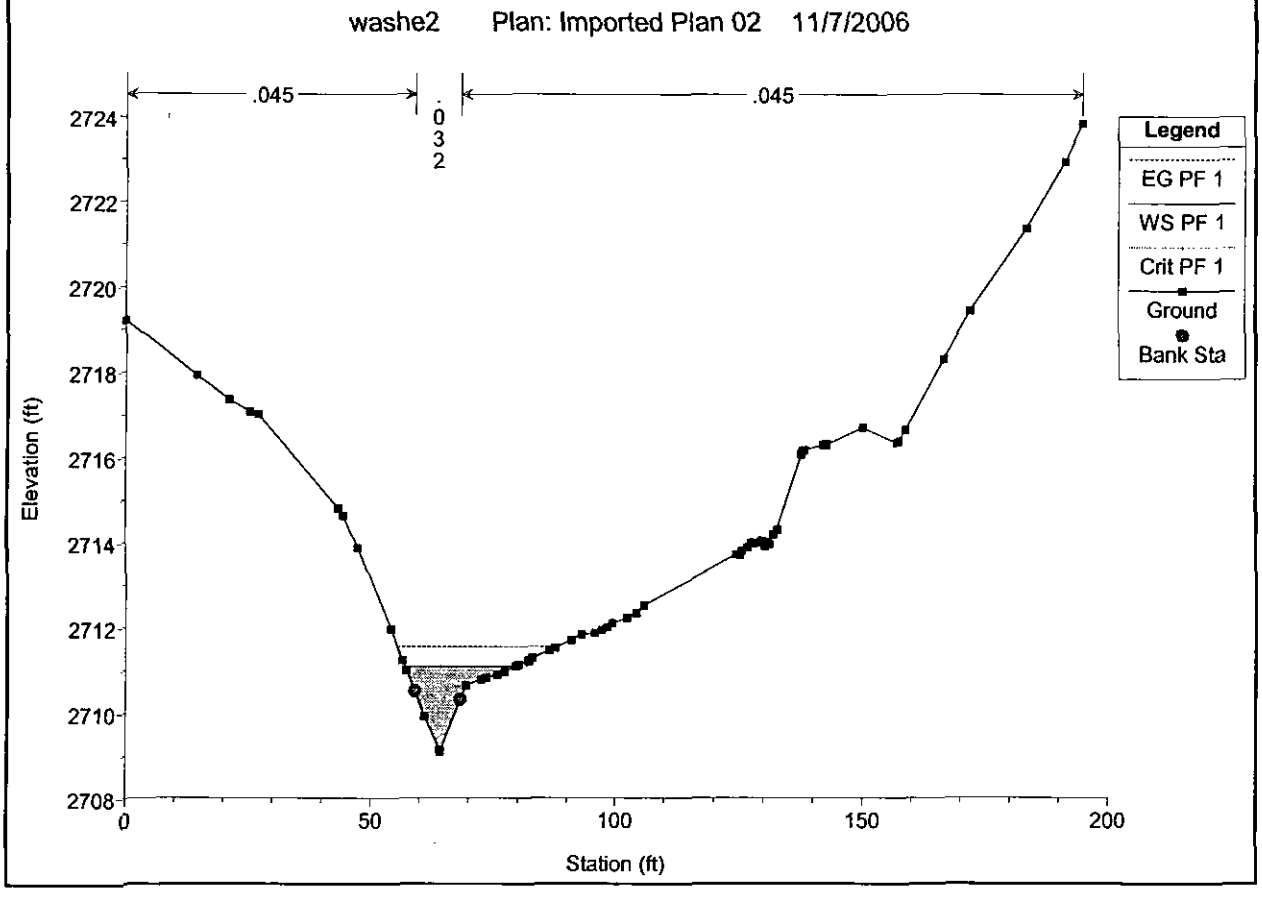
2716
2715
0
50
100
150
200


washe2 Plan: Imported Plan 02 11/7/2006
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.032
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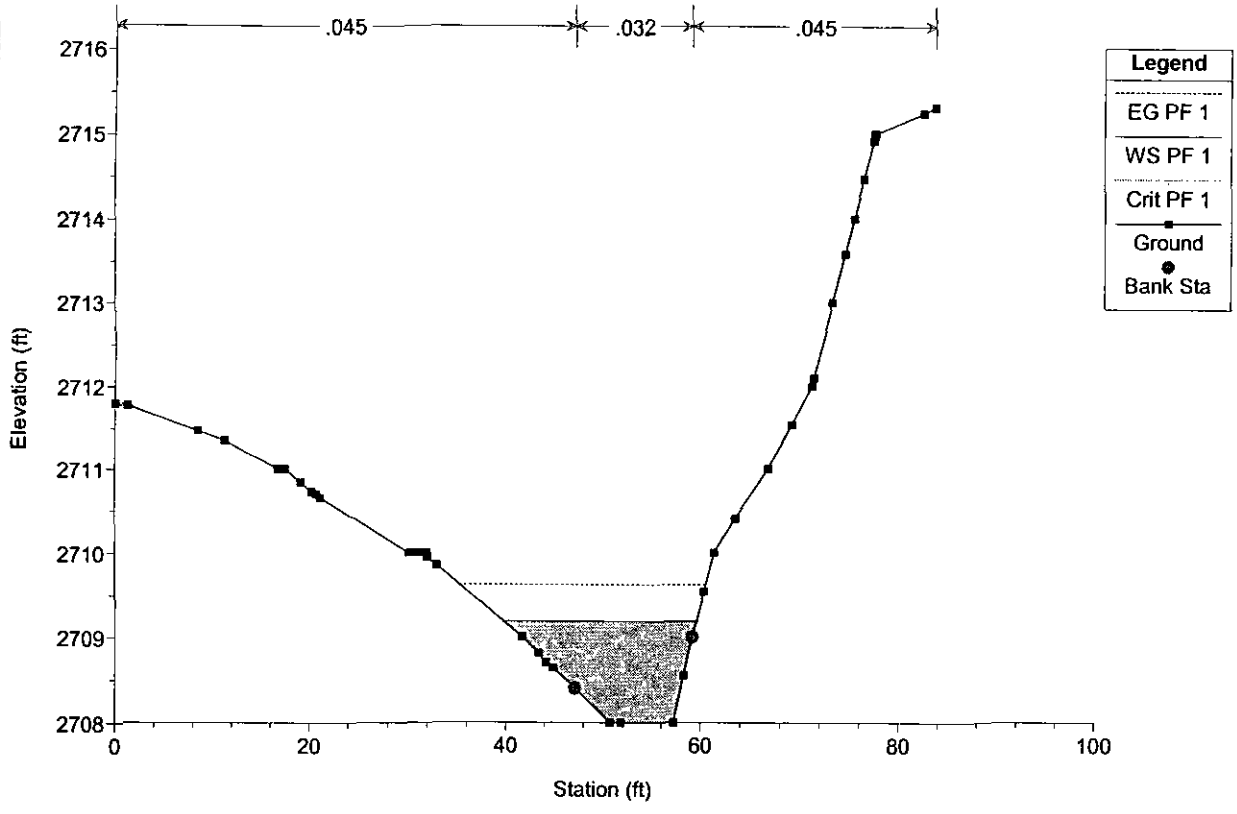
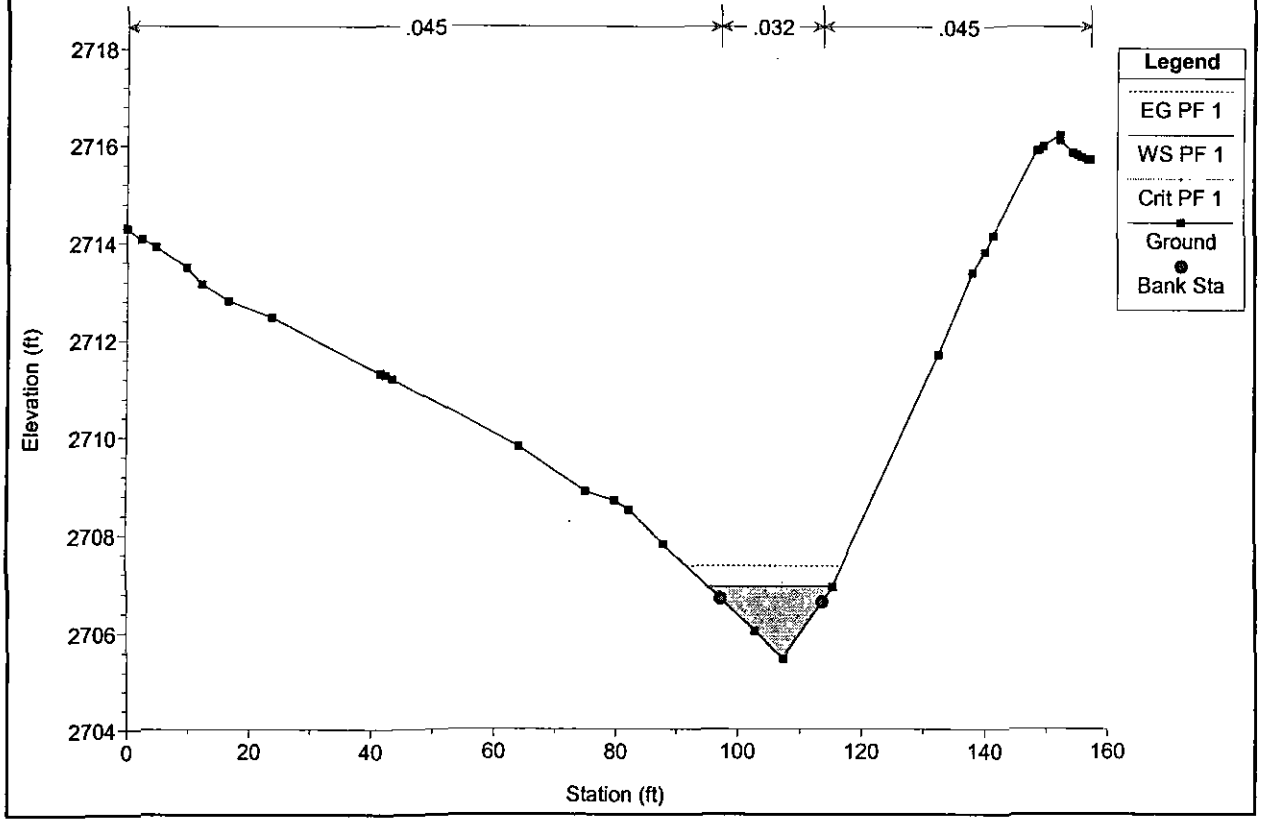
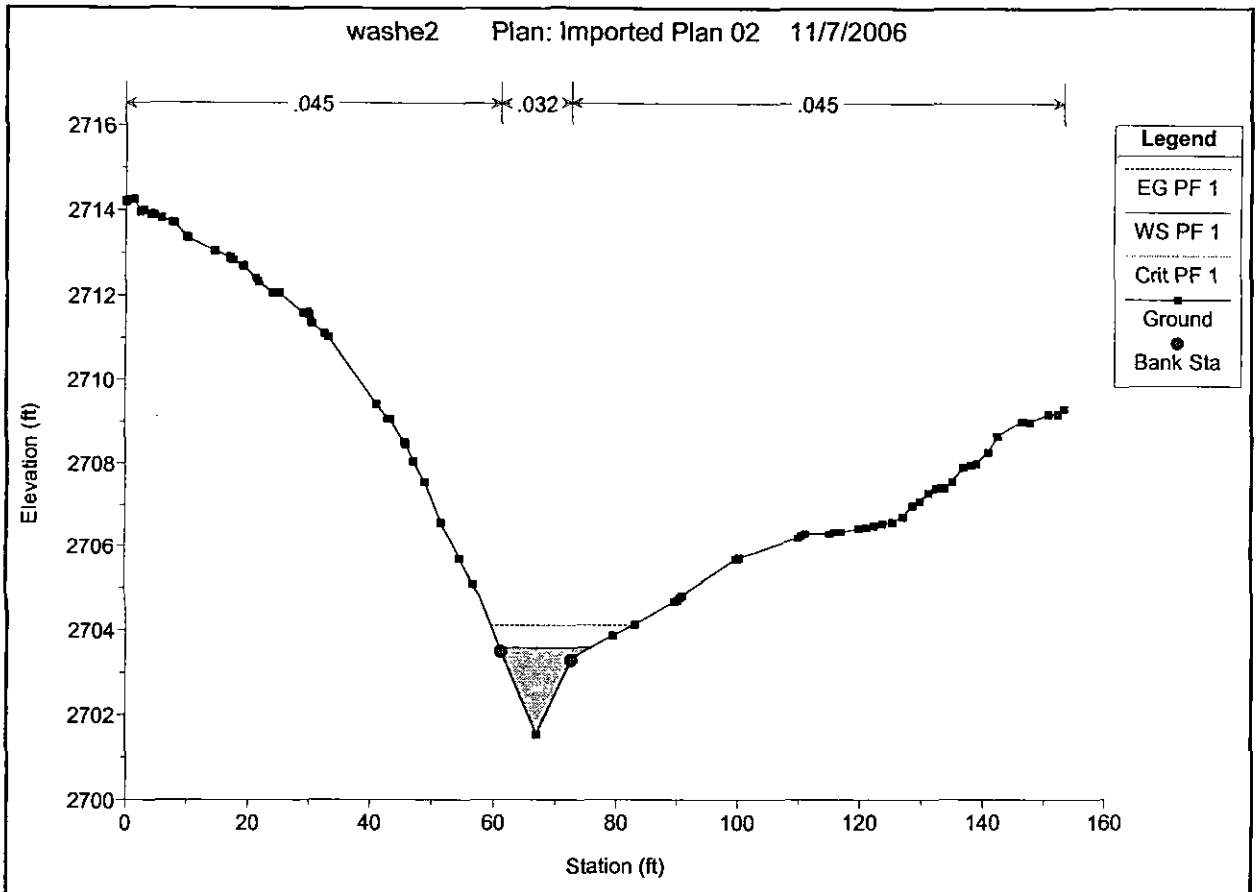
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2724
2722
2720
2718
2716
2714
2712
2710
2708
0
50
100
150
200

washe2 Plan: Imported Plan 02 11/7/2006



washe2 Plan: Imported Plan 02 11/7/2006




washe2 Plan: Imported Plan 02 11/7/2006
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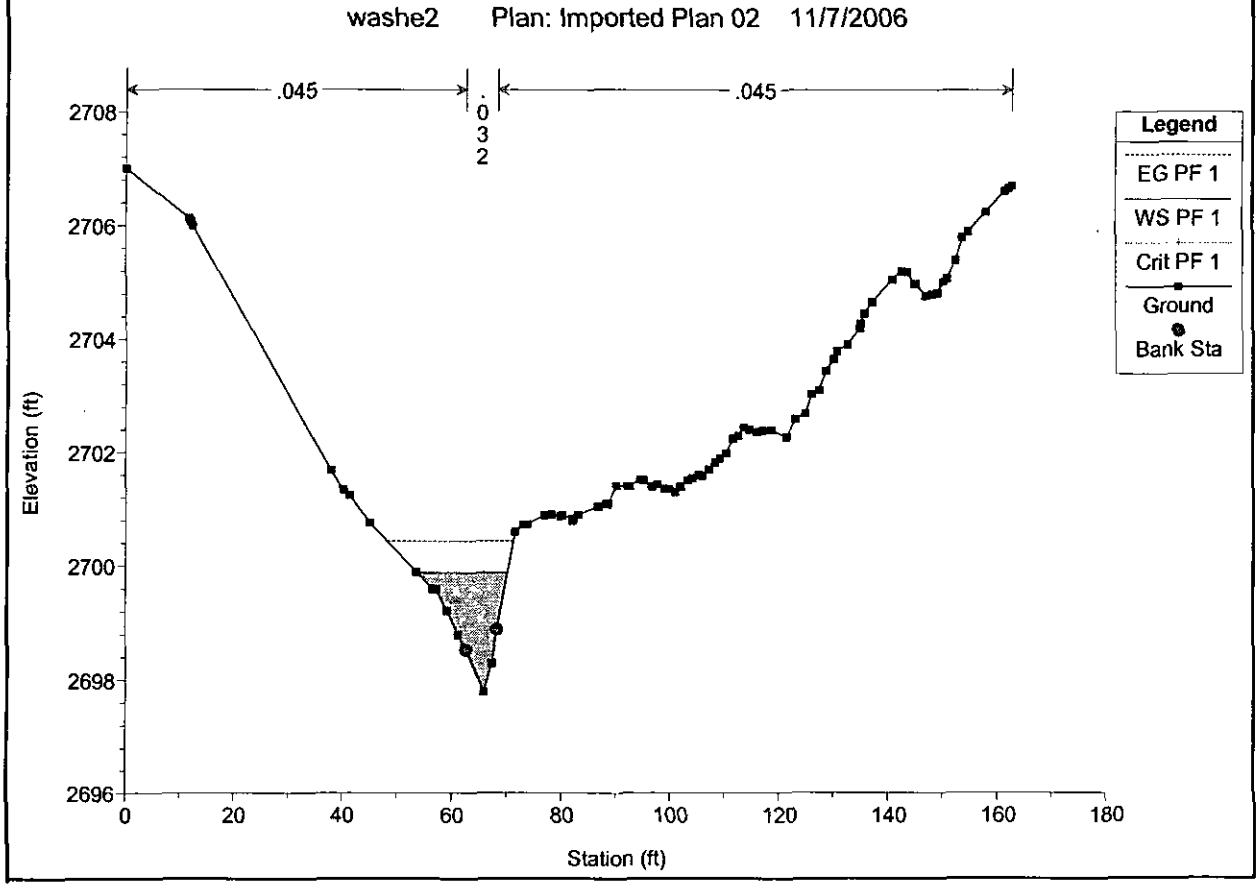
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


washe2 Plan: Imported Plan 02 11/7/2006
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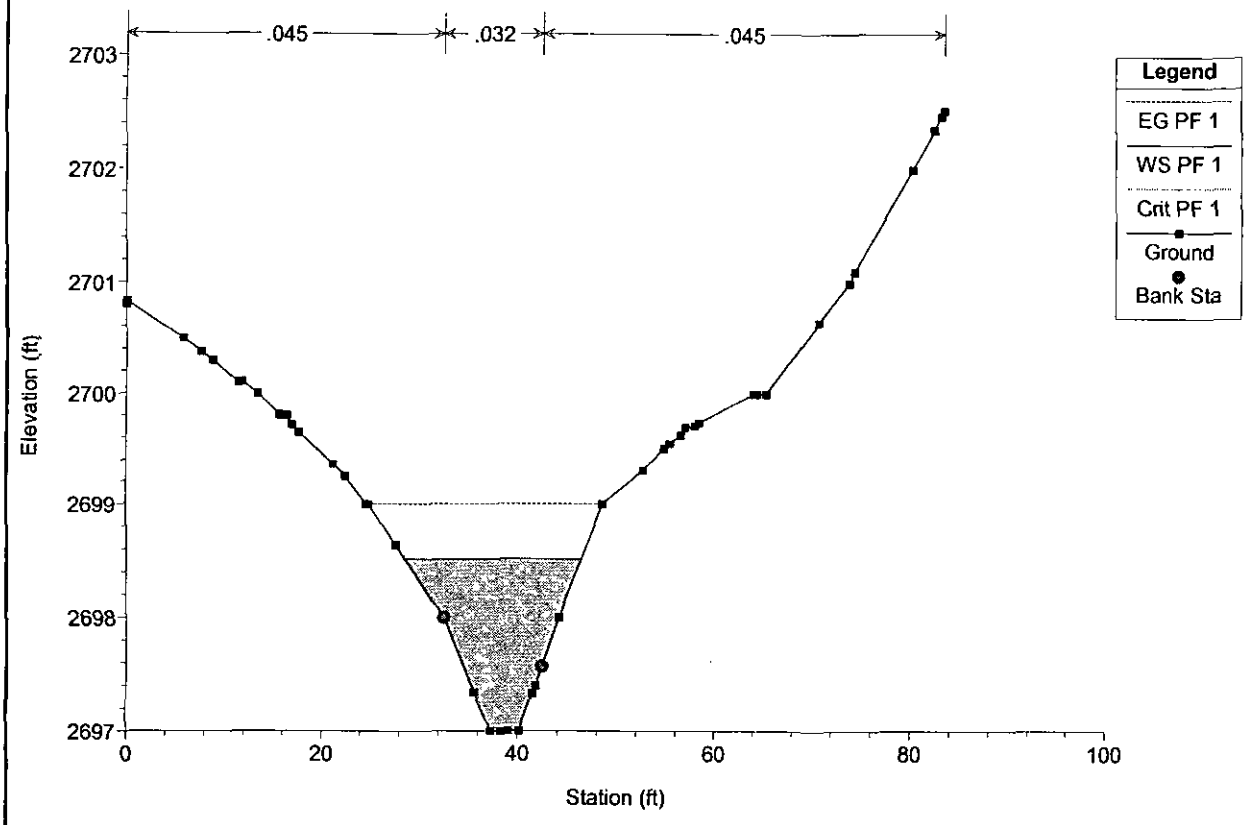
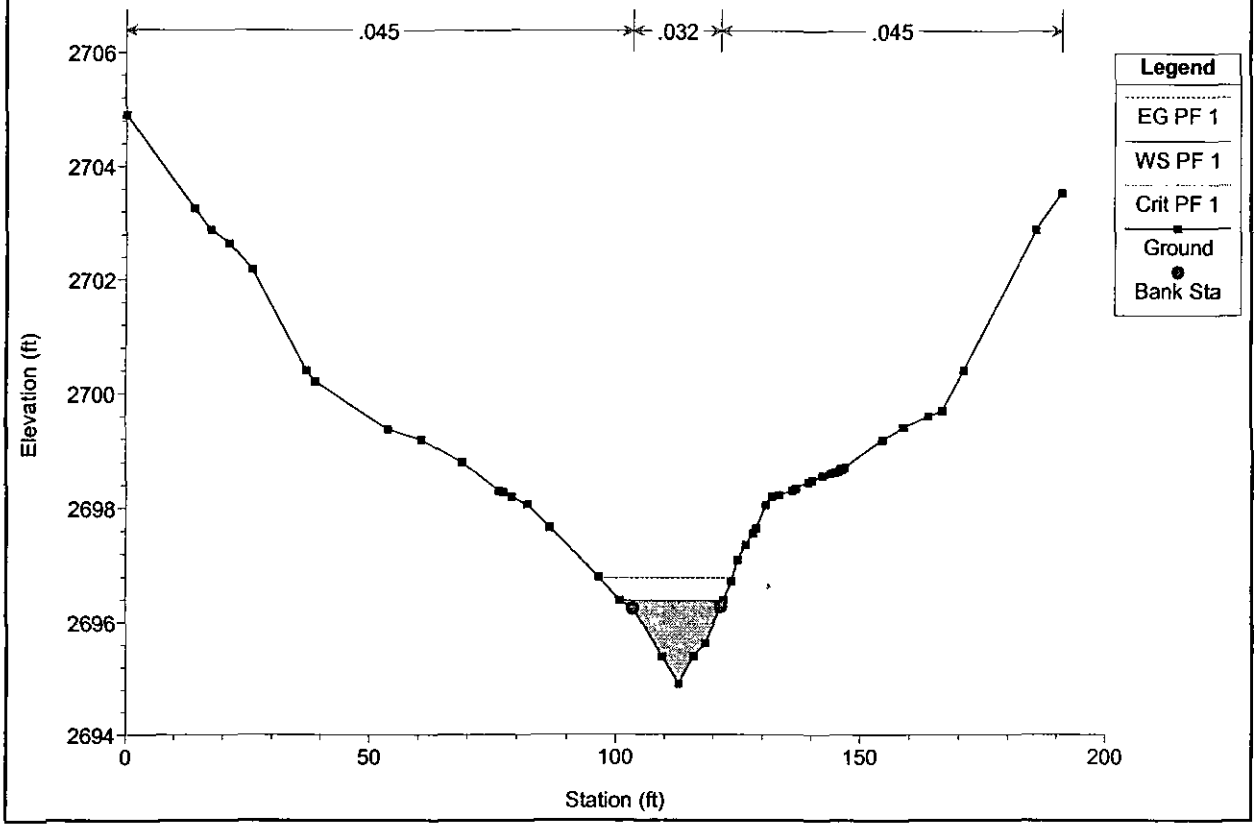
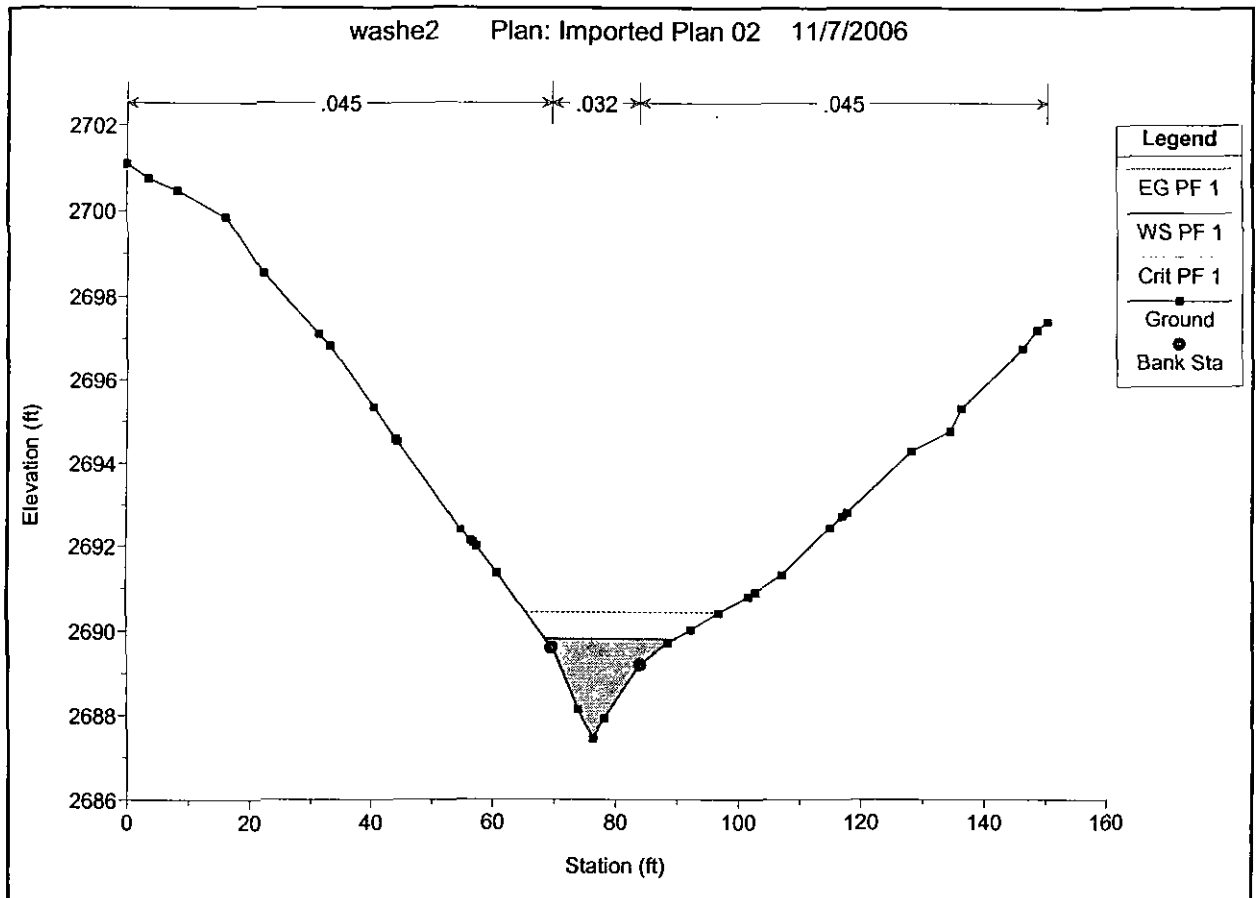
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

washe2 Plan: Imported Plan 02 11/7/2006



washe2 Plan: Imported Plan 02 11/7/2006




washe2 Plan: Imported Plan 02 11/7/2006
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.032
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Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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2690
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2694
2696
2698
2700
2702
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40
60
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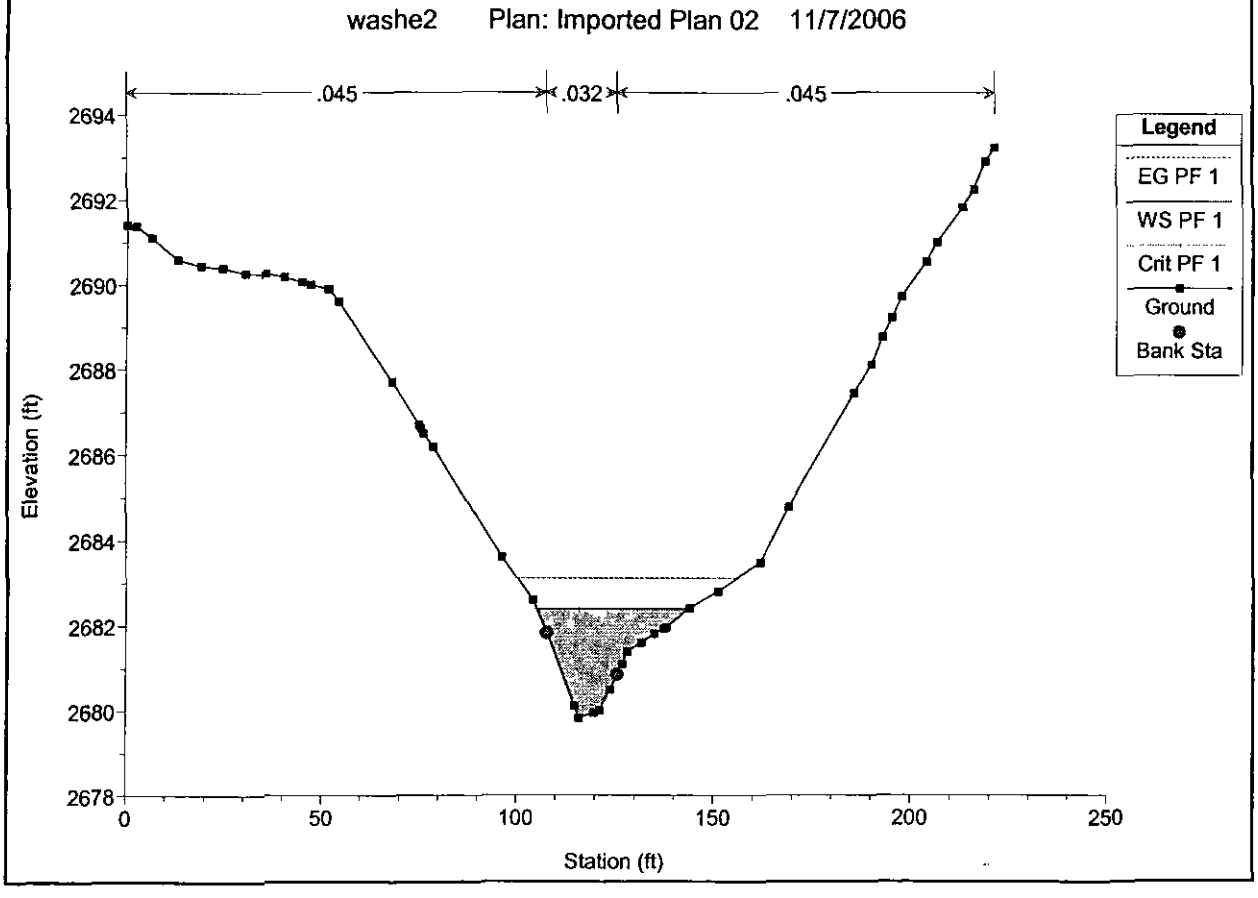
100
120
140
160


washe2 Plan: Imported Plan 02 11/7/2006
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Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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2680
2682
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2692
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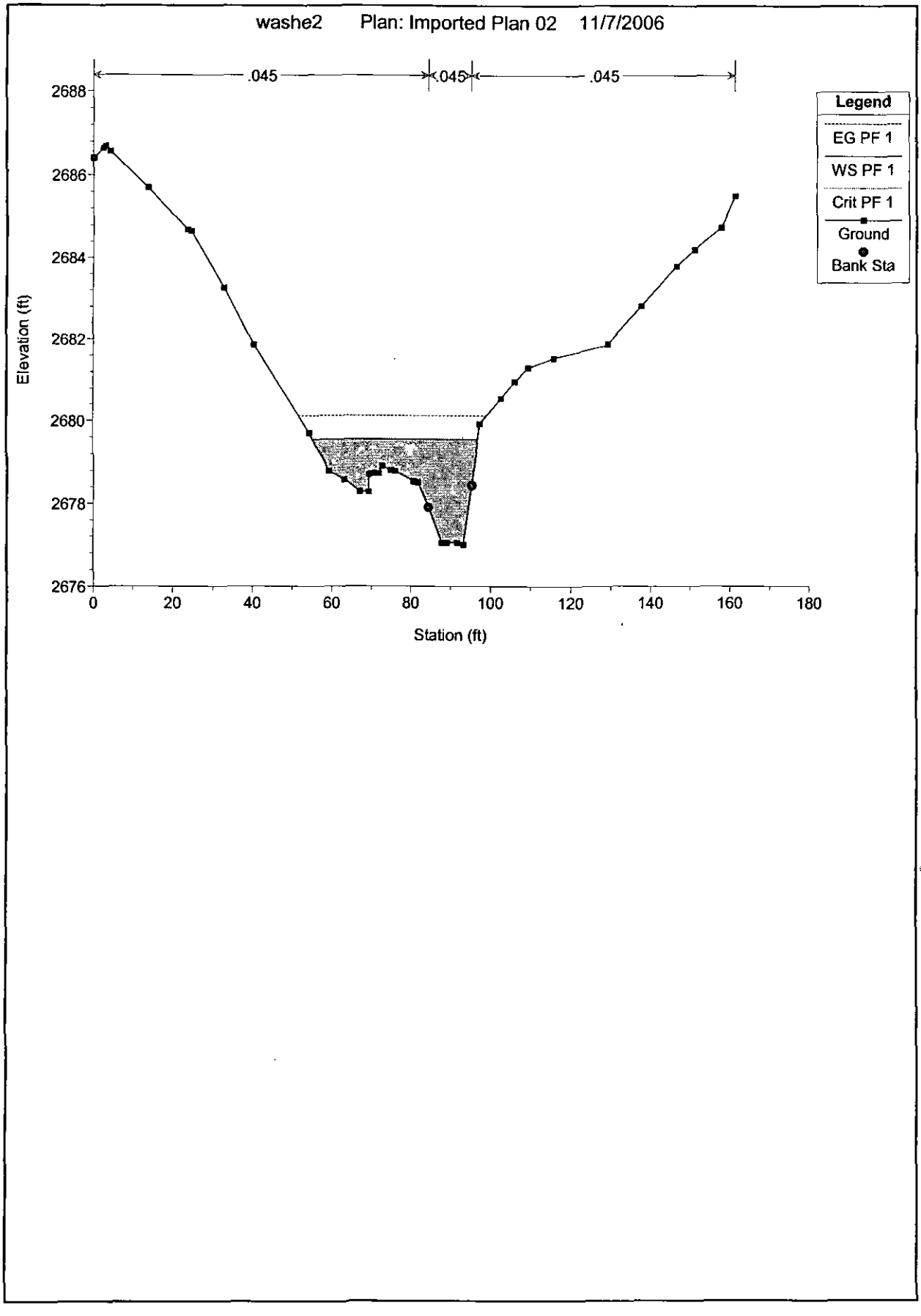
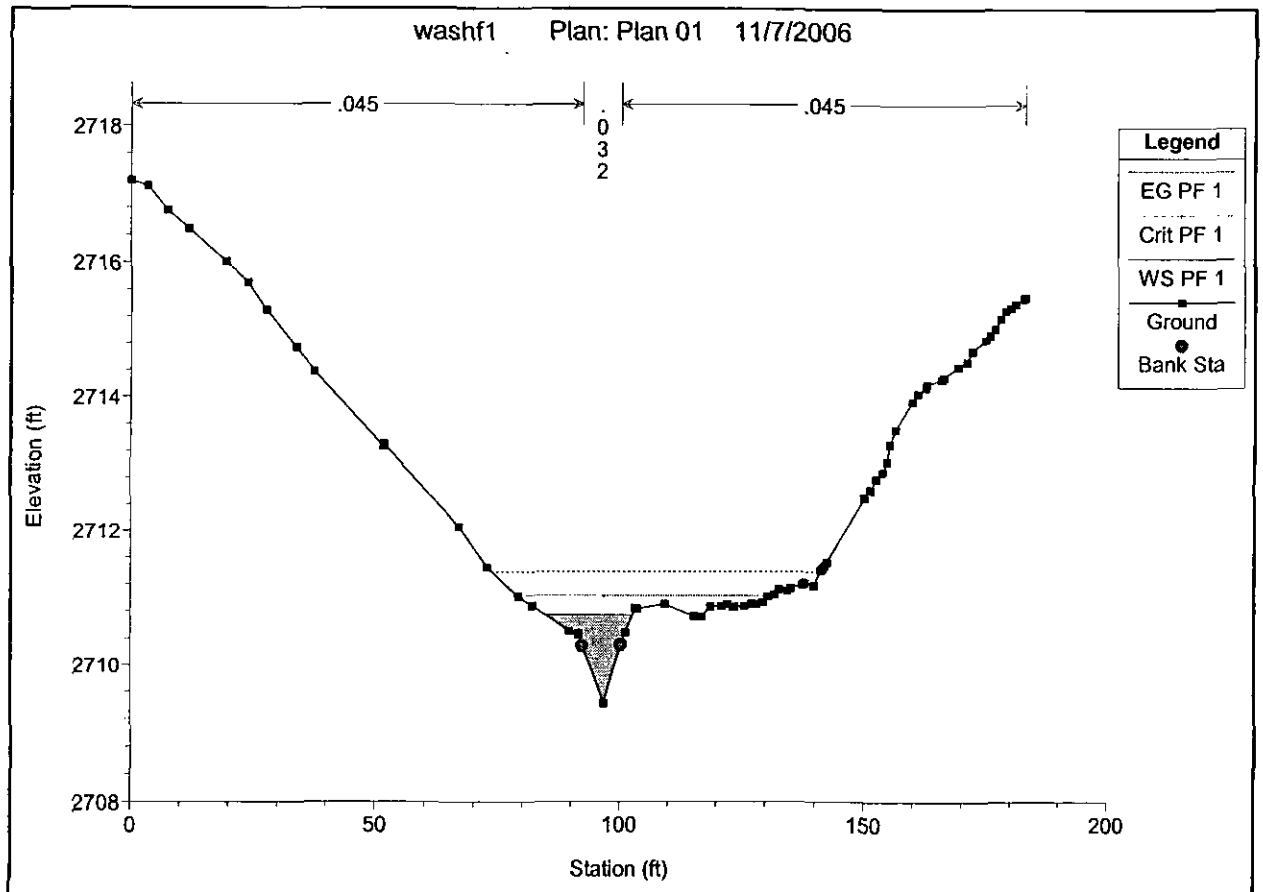
0
50
100
150
200
250

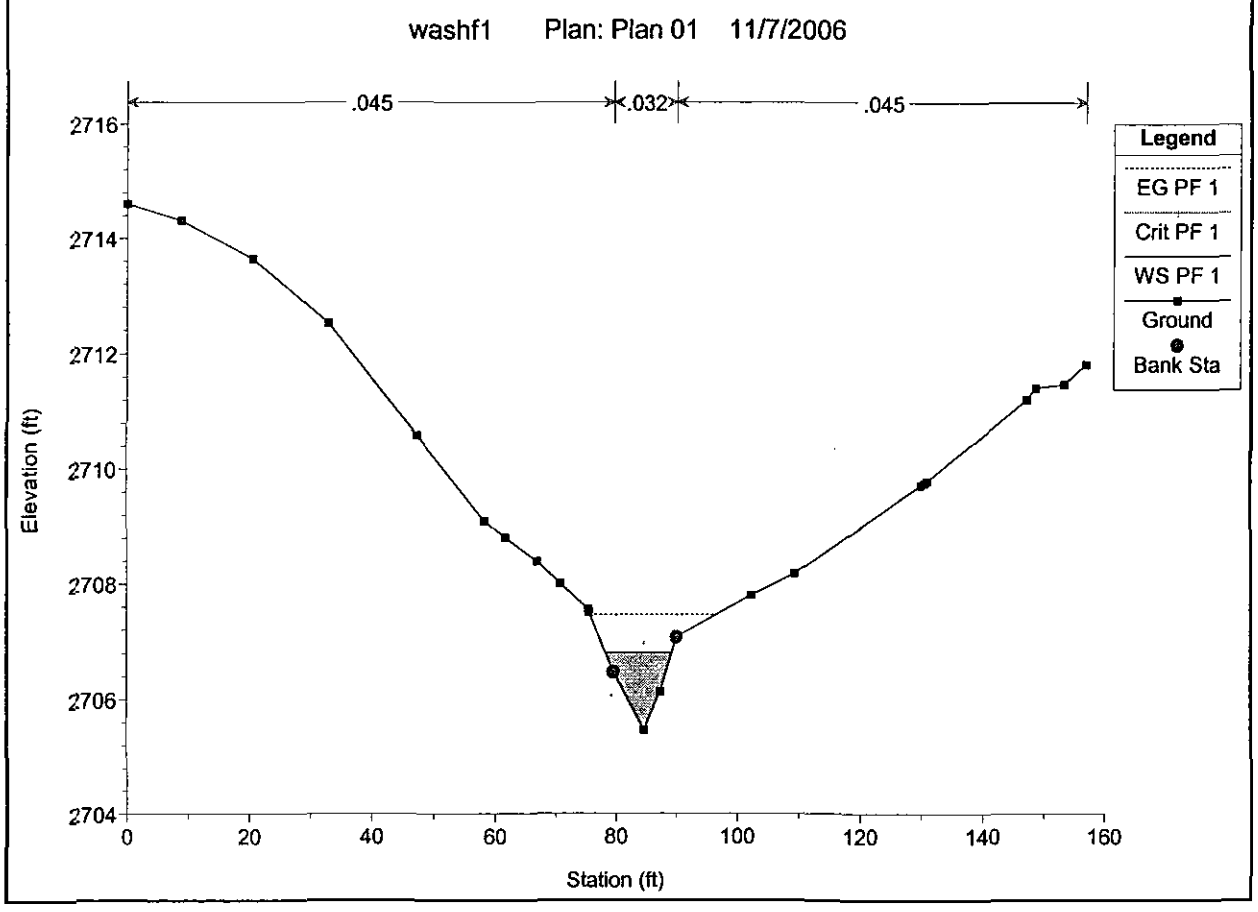

washe2 Plan: Imported Plan 02 11/7/2006
.045
.045
.045
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2688
2686
2684
2682
2680
2678
2676
0
20
40
60
80
100
120
140
160
180
Station (ft)

WASH F1

HEC-RAS Plan: Plan 01 River: RIVER-1 Reach: Reach-1 Profile: PF 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	8	PF 1	50.00	2709.42	2710.74	2711.03	2711.38	0.025021	6.65	8.95	20.46	1.25
Reach-1	7	PF 1	50.00	2705.46	2706.81	2706.97	2707.46	0.027912	6.49	7.87	11.03	1.29
Reach-1	6	PF 1	50.00	2700.54	2701.76	2702.06	2702.68	0.039439	7.86	7.10	12.34	1.54
Reach-1	5	PF 1	50.00	2698.48	2699.81	2699.89	2700.28	0.022728	5.49	9.24	14.33	1.15
Reach-1	4.5	PF 1	50.00	2697.00	2697.81	2697.96	2698.38	0.028656	6.06	8.42	13.96	1.29
Reach-1	4	PF 1	76.00	2692.65	2693.93	2694.09	2694.58	0.029509	6.47	11.91	17.84	1.33
Reach-1	3.5	PF 1	76.00	2689.00	2690.62	2690.62	2691.05	0.011337	5.57	16.92	22.78	0.89
Reach-1	3	PF 1	76.00	2686.57	2687.81	2688.10	2688.70	0.034574	7.61	10.42	15.66	1.46
Reach-1	2	PF 1	76.00	2681.90	2683.33	2683.35	2683.65	0.017537	4.63	18.17	36.25	1.00
Reach-1	1	PF 1	99.00	2677.60	2678.80	2679.01	2679.50	0.034655	7.02	18.30	54.08	1.44


washf1 Plan: Plan 01 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2708
2710
2712
2714
2716
2718
0
50
100
150
200


washf1 Plan: Plan 01 11/7/2006
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.032
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Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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2708
2710
2712
2714
2716
0
20
40
60
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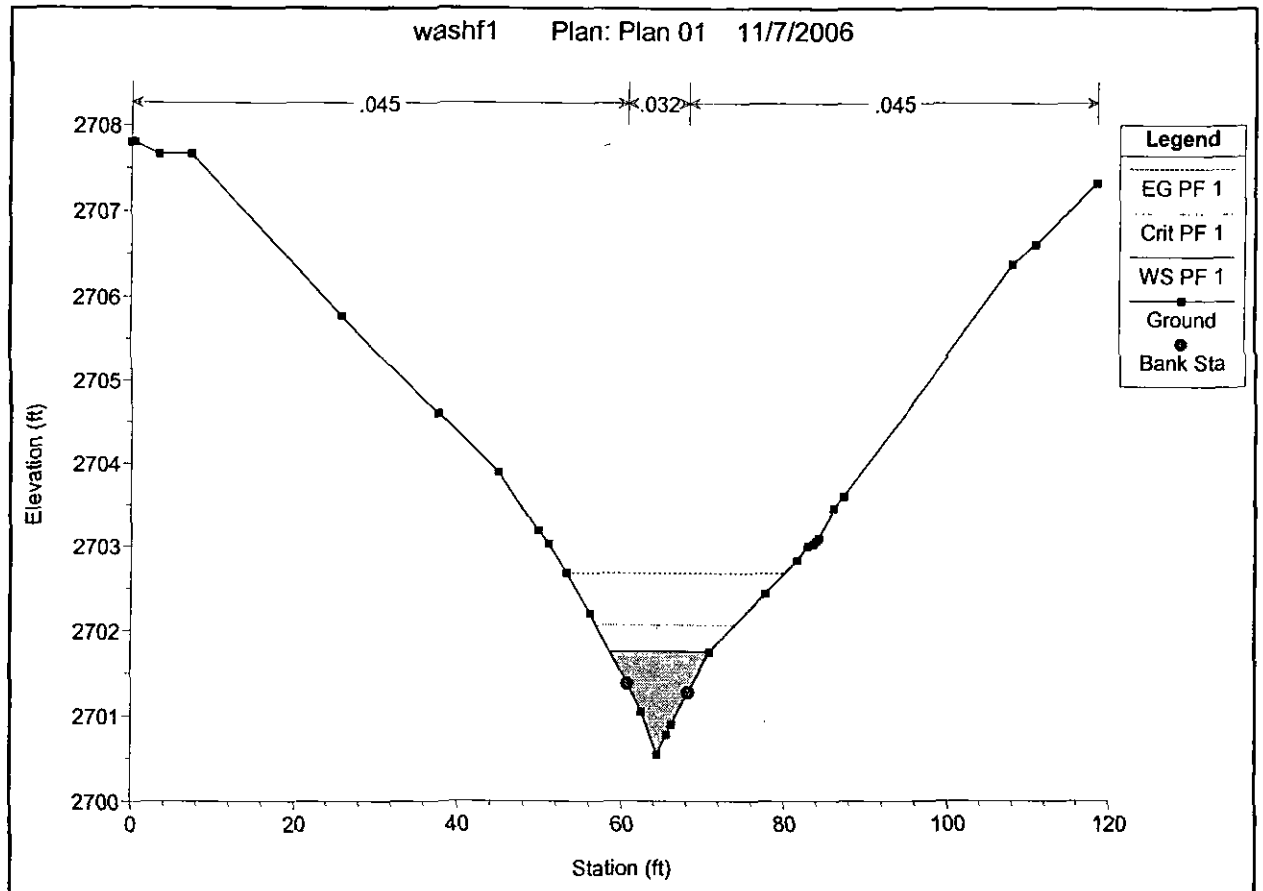
100
120
140
160


washf1 Plan: Plan 01 11/7/2006
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Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2708
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2706
2705
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2703
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2701
2700
0
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60
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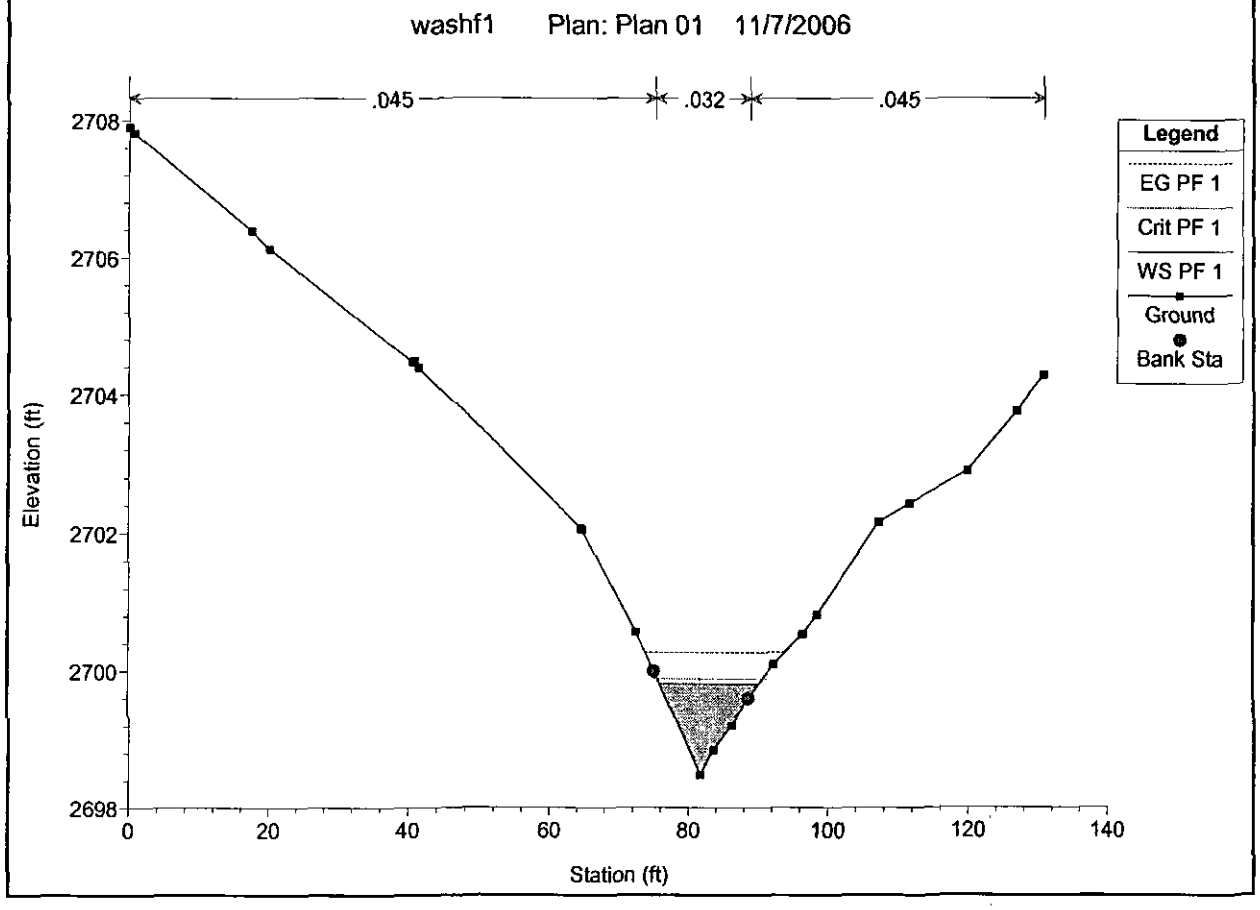
100
120


washf1 Plan: Plan 01 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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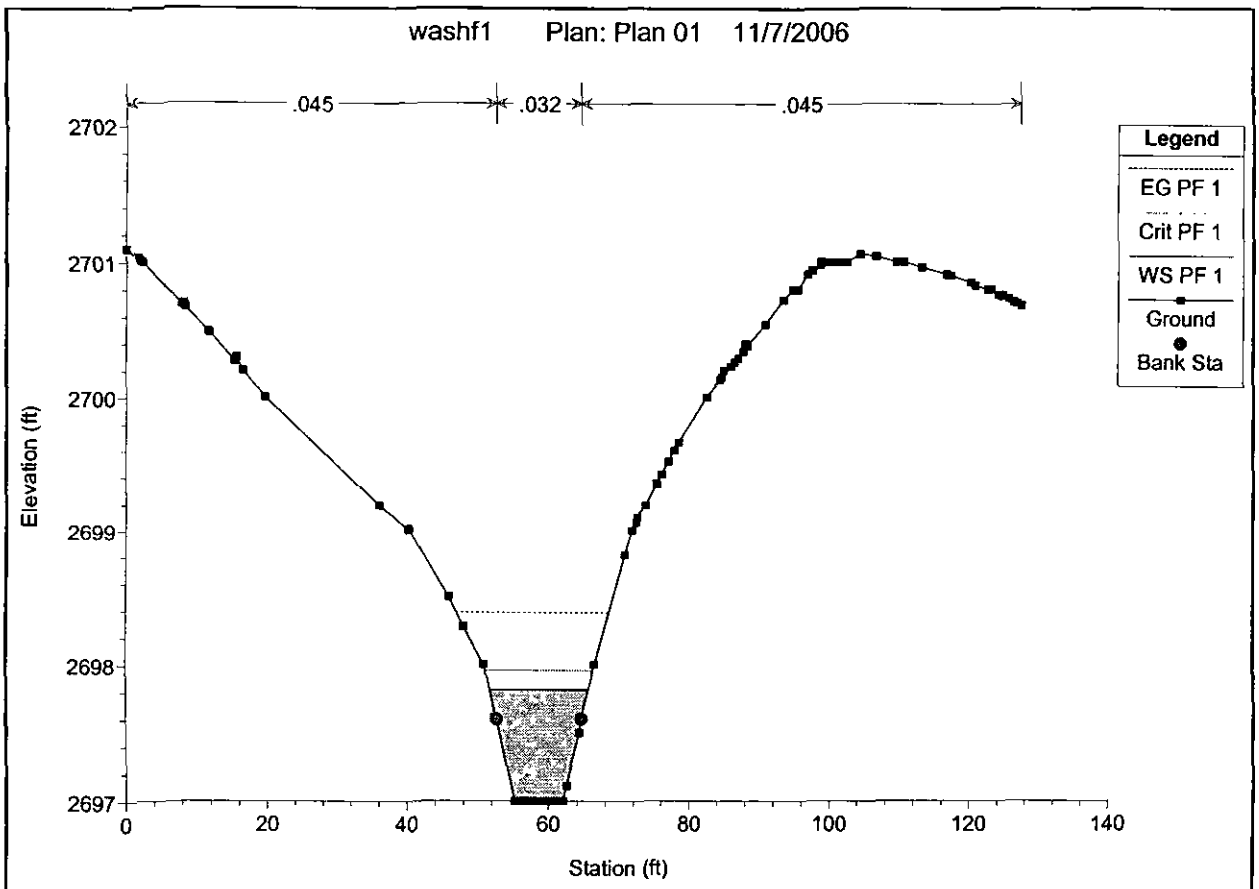
2706
2704
2702
2700
2698
0
20
40
60
80
100
120
140


washf1 Plan: Plan 01 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
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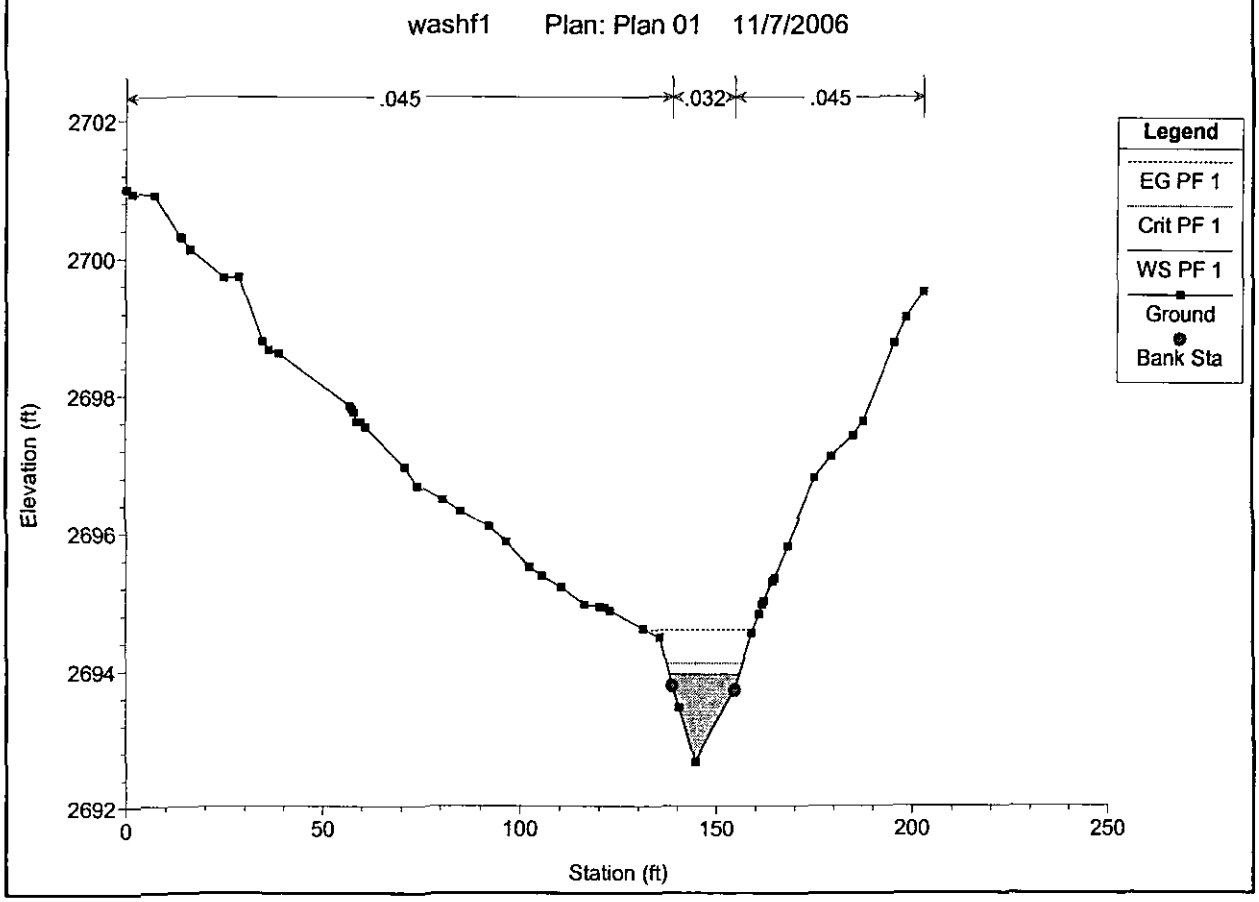
2701
2700
2699
2698
2697
0
20
40
60
80
100
120
140
Station (ft)


washf1 Plan: Plan 01 11/7/2006
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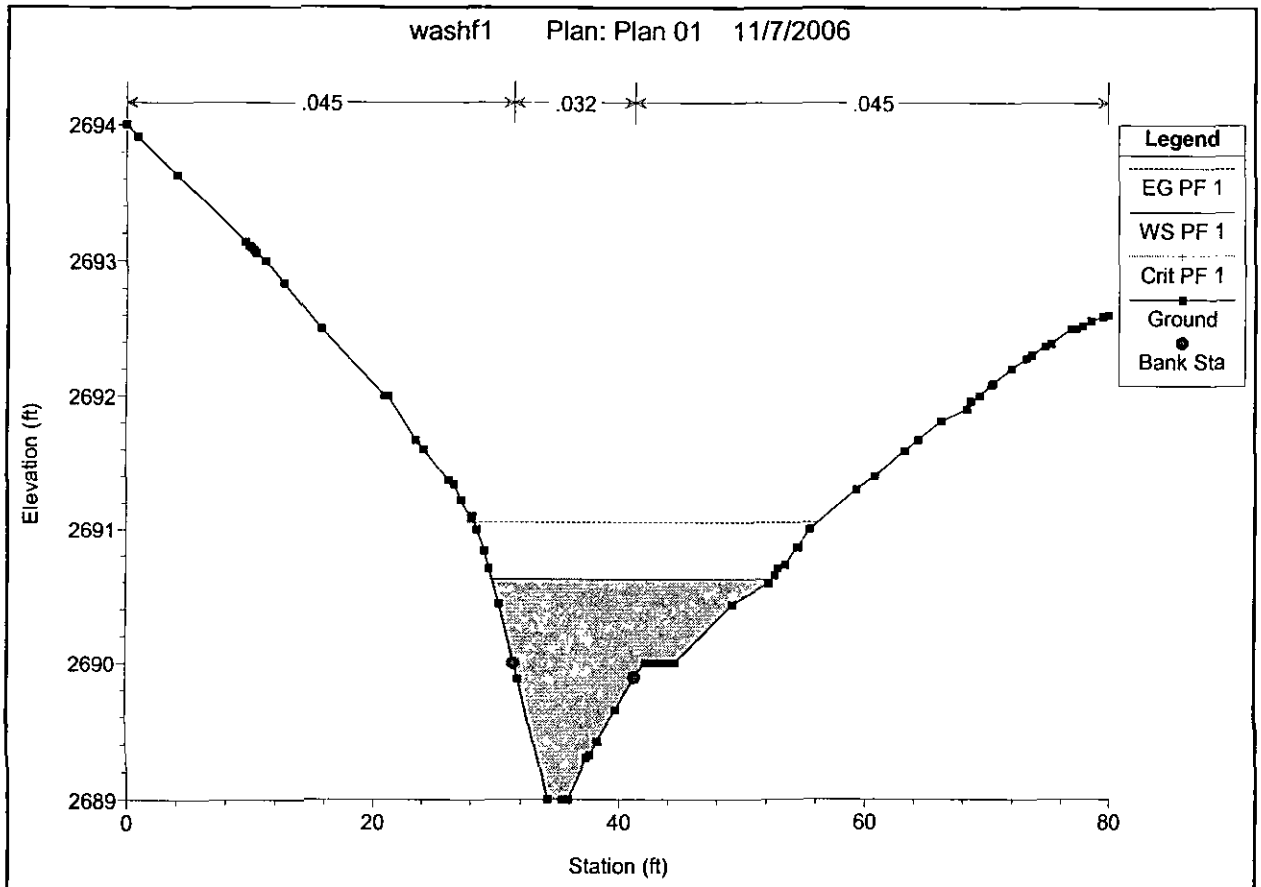
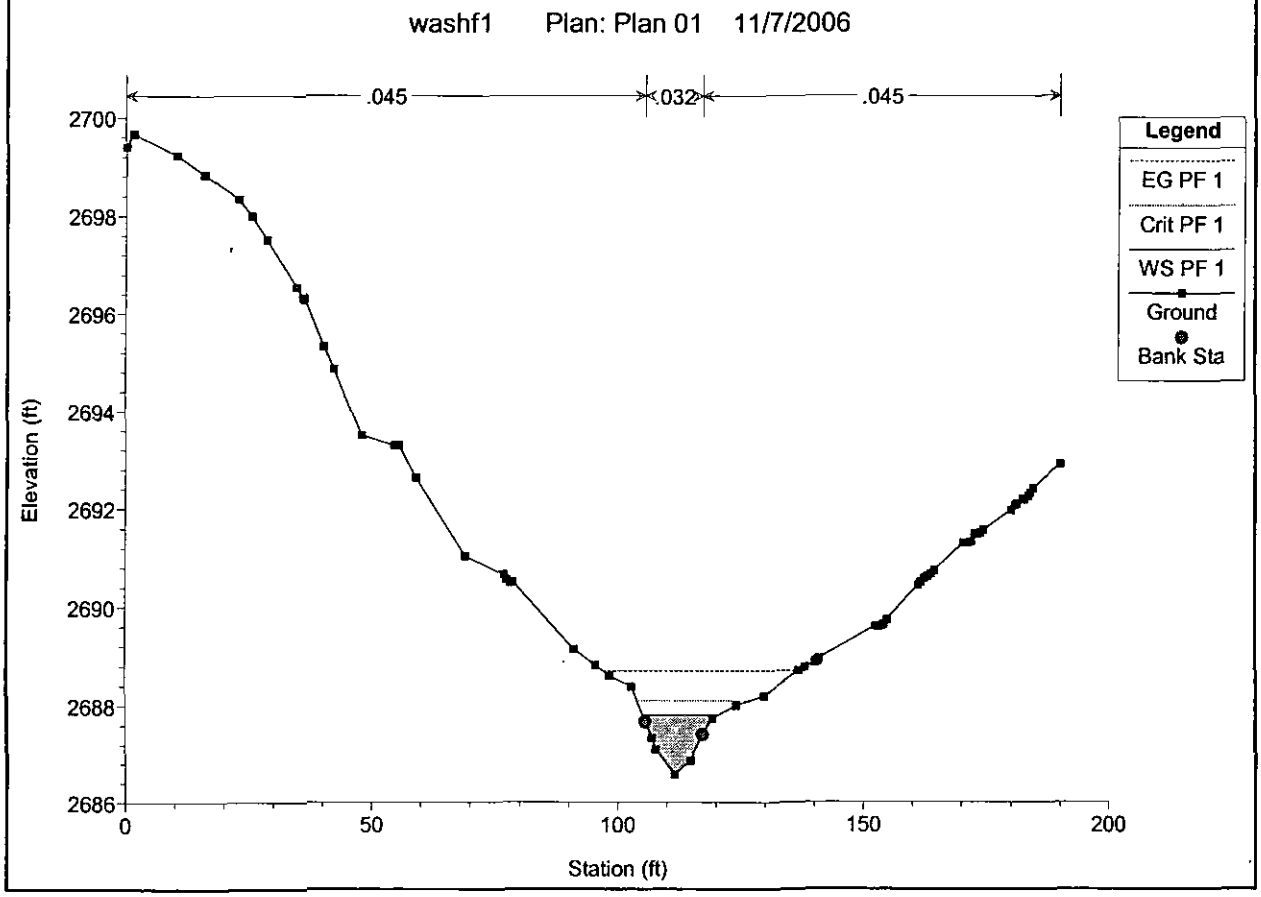
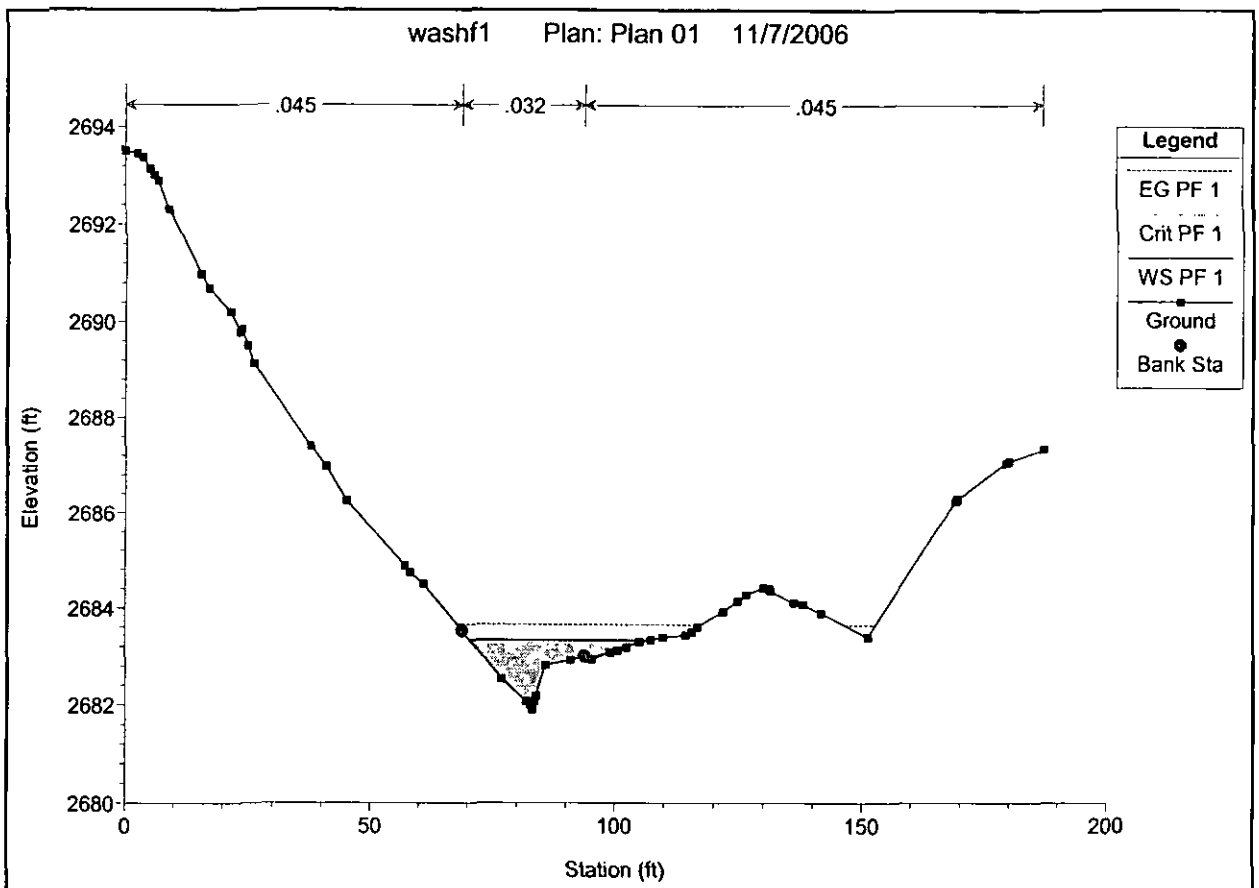
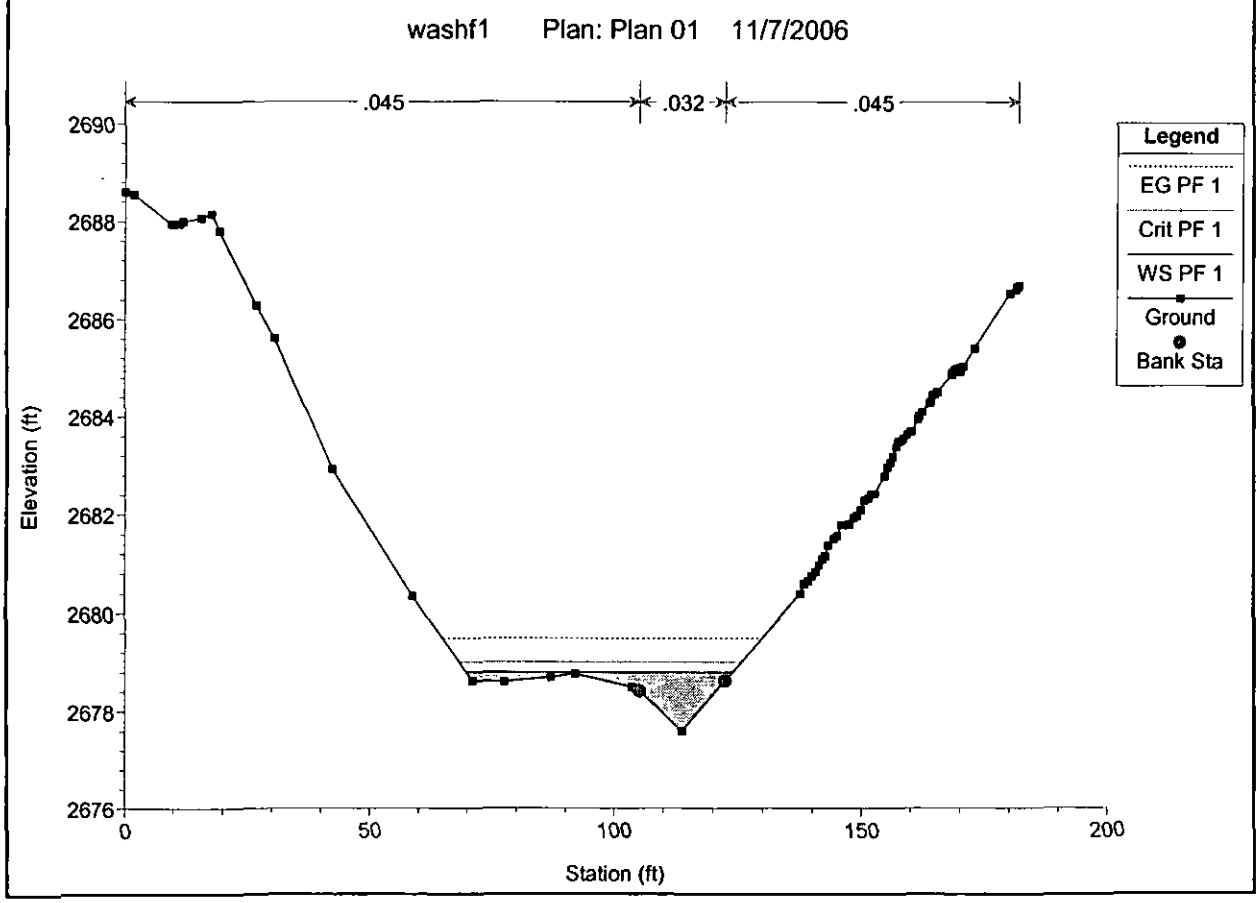
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2702
2700
2698
2696
2694
2692
0
50
100
150
200
250
Station (ft)


washf1 Plan: Plan 01 11/7/2006
.045
.032
.045
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2694
2693
2692
2691
2690
2689
0
20
40
60
80
Station (ft)


washf1 Plan: Plan 01 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2700
2698
2696
2694
2692
2690
2688
2686
0
50
100
150
200
Station (ft)

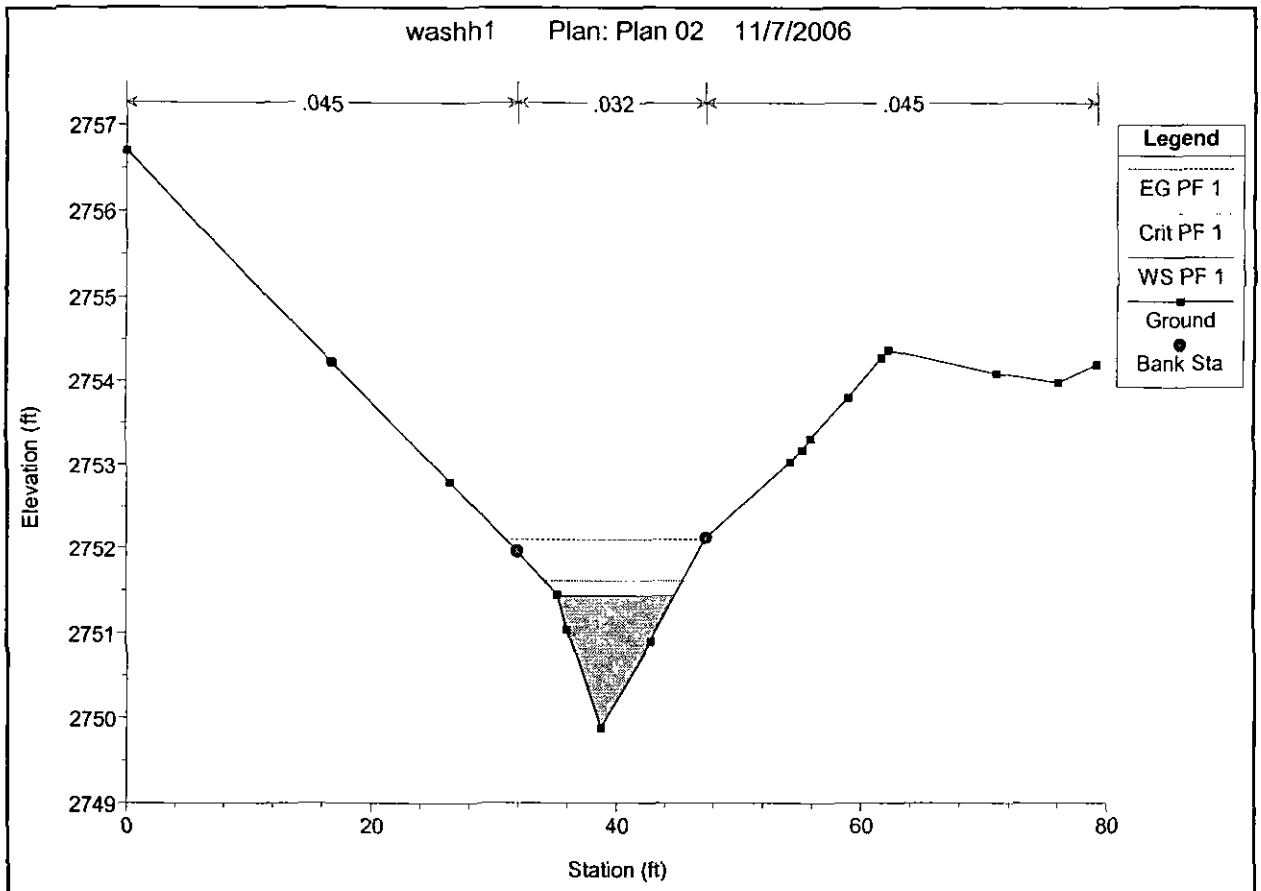

washf1 Plan: Plan 01 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2694
2692
2690
2688
2686
2684
2682
2680
0
50
100
150
200
Station (ft)

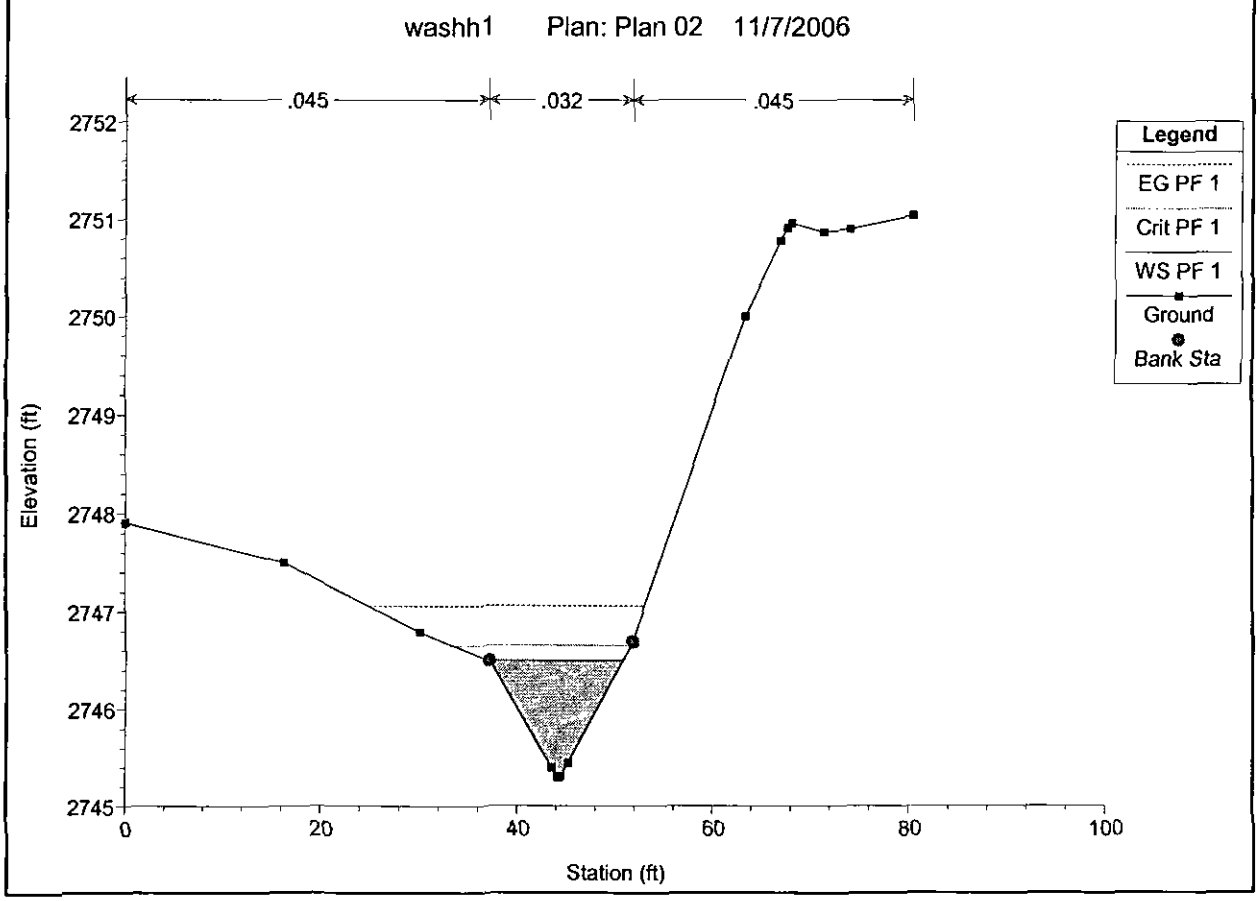

washf1 Plan: Plan 01 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2690
2688
2686
2684
2682
2680
2678
2676
0
50
100
150
200
Station (ft)

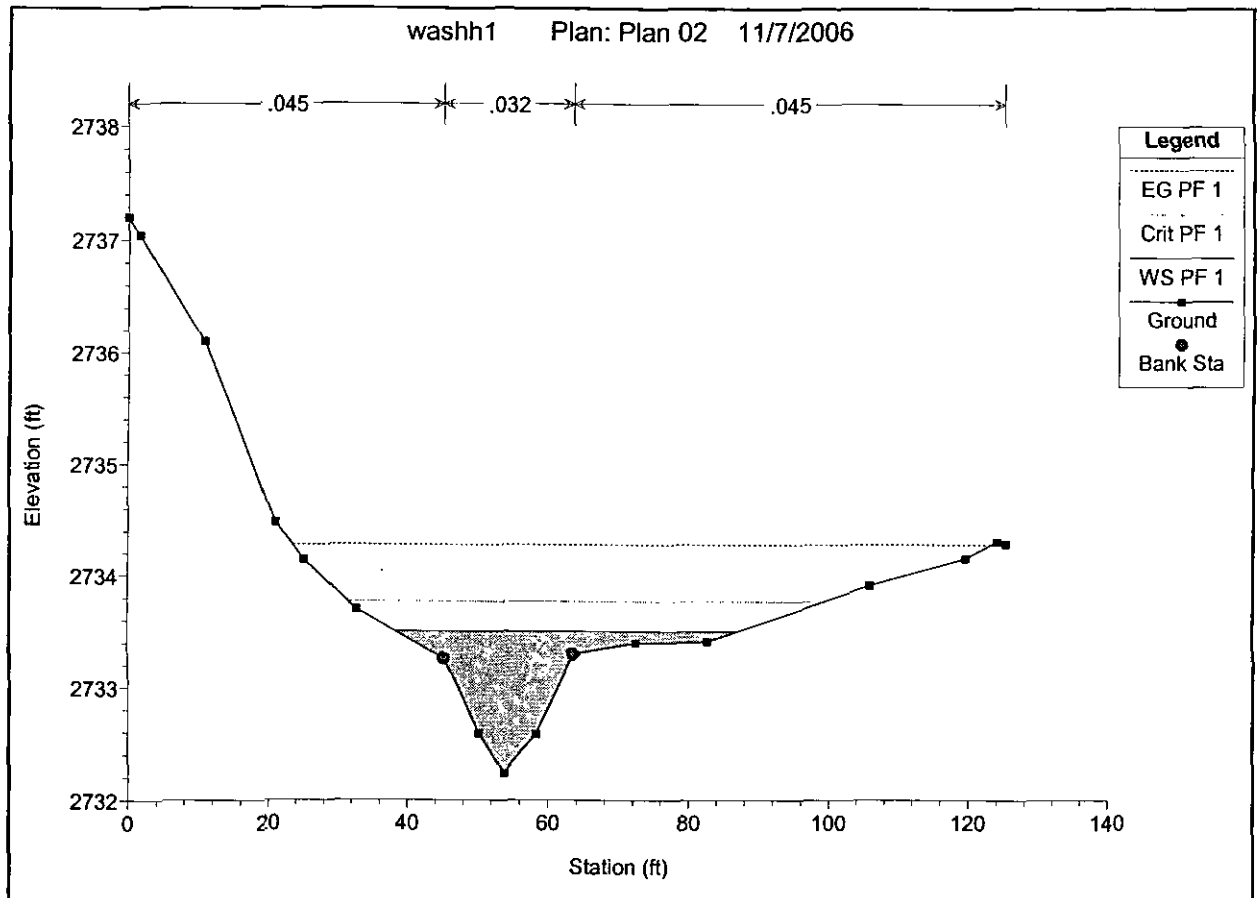
WASH H1

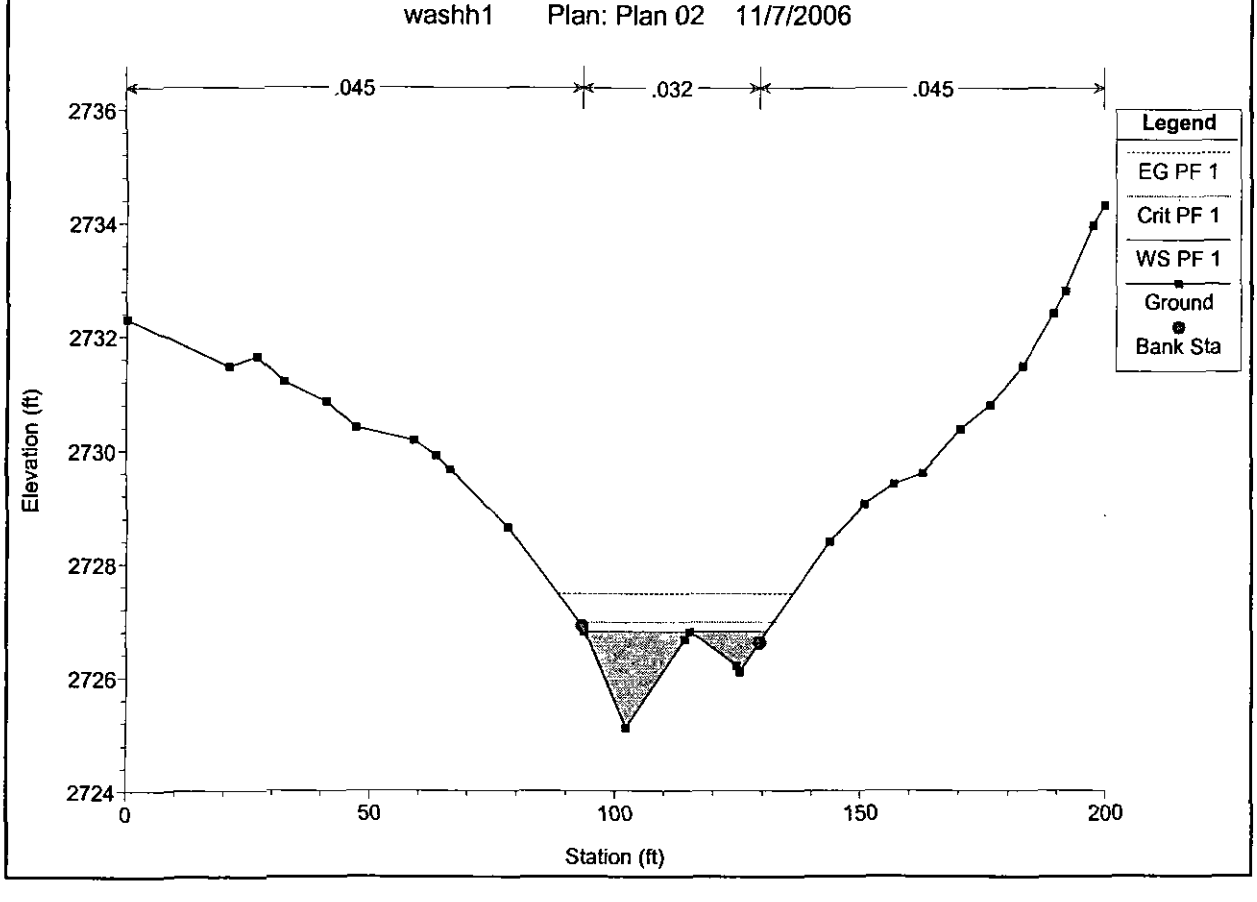
HEC-RAS Plan: Plan 02 River: RIVER-1 Reach: Reach-1 Profile: PF 1

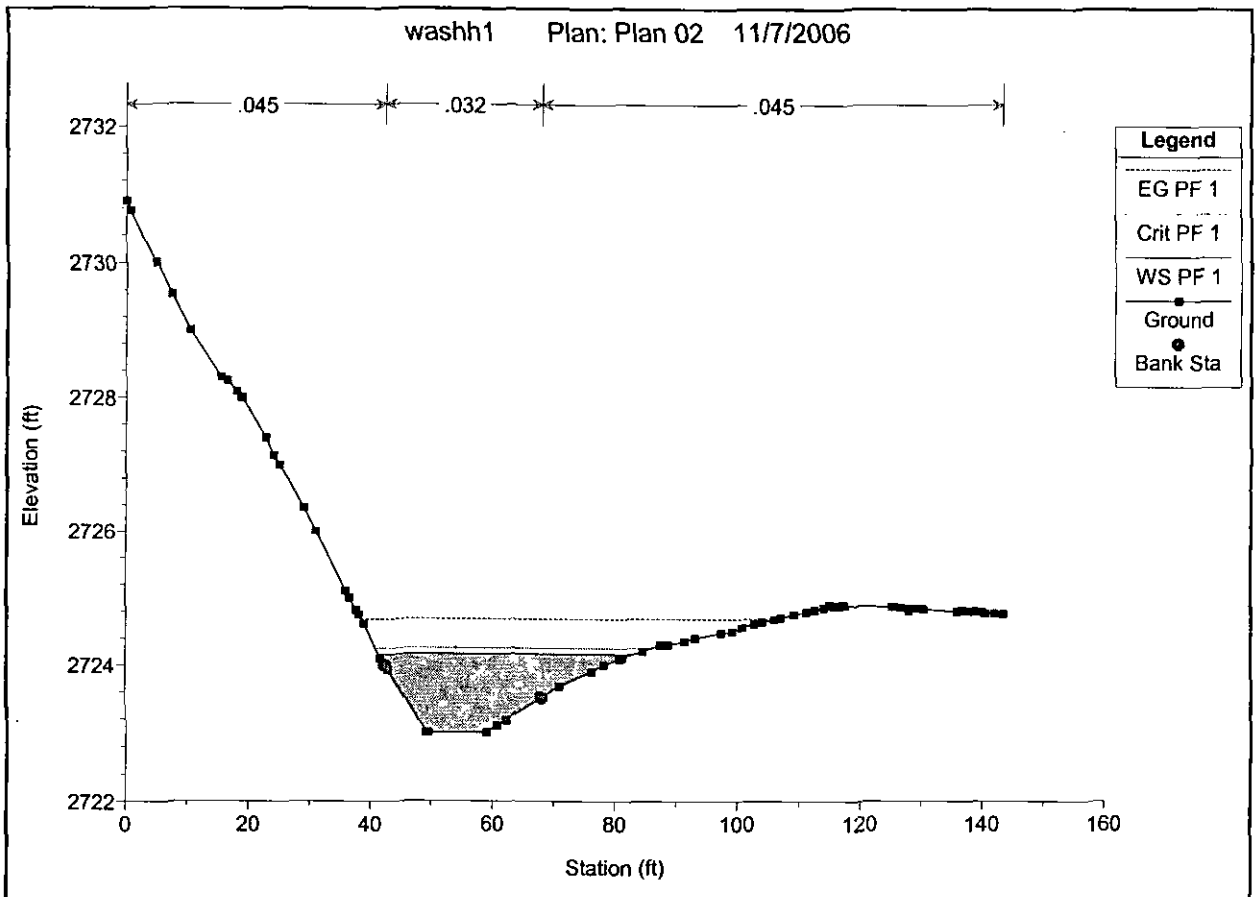
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	6	PF 1	50.00	2749.88	2751.43	2751.61	2752.10	0.028975	6.55	7.63	9.59	1.29
Reach-1	5	PF 1	50.00	2745.29	2746.49	2746.65	2747.06	0.033087	6.02	8.30	13.57	1.36
Reach-1	4.5	PF 1	50.00	2741.00	2741.71	2741.89	2742.19	0.040197	5.61	9.42	27.11	1.44
Reach-1	4	PF 1	110.00	2737.70	2739.10	2739.19	2739.51	0.028653	5.14	21.65	43.74	1.24
Reach-1	3	PF 1	110.00	2732.24	2733.50	2733.77	2734.27	0.032757	7.19	17.98	48.55	1.42
Reach-1	2	PF 1	152.00	2725.11	2726.80	2726.97	2727.47	0.035951	6.57	23.25	37.04	1.44
Reach-1	1.5	PF 1	152.00	2723.00	2724.16	2724.25	2724.68	0.017807	5.94	28.69	41.89	1.08
Reach-1	1	PF 1	152.00	2720.27	2721.00	2720.98	2721.22	0.028998	4.37	40.92	87.59	1.20

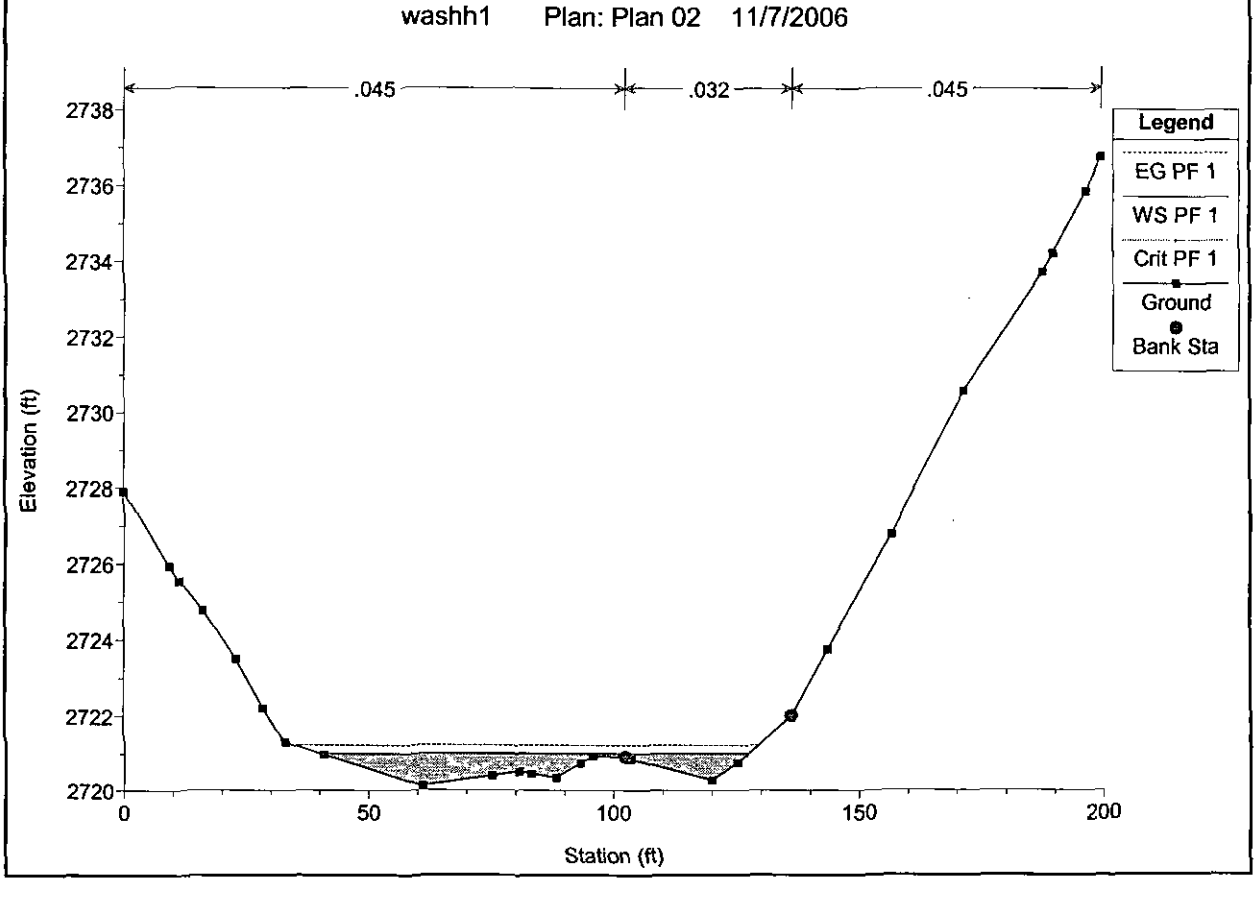

washh1 Plan: Plan 02 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2757
2756
2755
2754
2753
2752
2751
2750
2749
0
20
40
60
80


washh1 Plan: Plan 02 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2752
2751
2750
2749
2748
2747
2746
2745
0
20
40
60
80
100


washh1 Plan: Plan 02 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2738
2737
2736
2735
2734
2733
2732
0
20
40
60
80
100
120
140
Station (ft)


washh1 Plan: Plan 02 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2736
2734
2732
2730
2728
2726
2724
0
50
100
150
200
Station (ft)


washh1 Plan: Plan 02 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2732
2730
2728
2726
2724
2722
0
20
40
60
80
100
120
140
160
Station (ft)

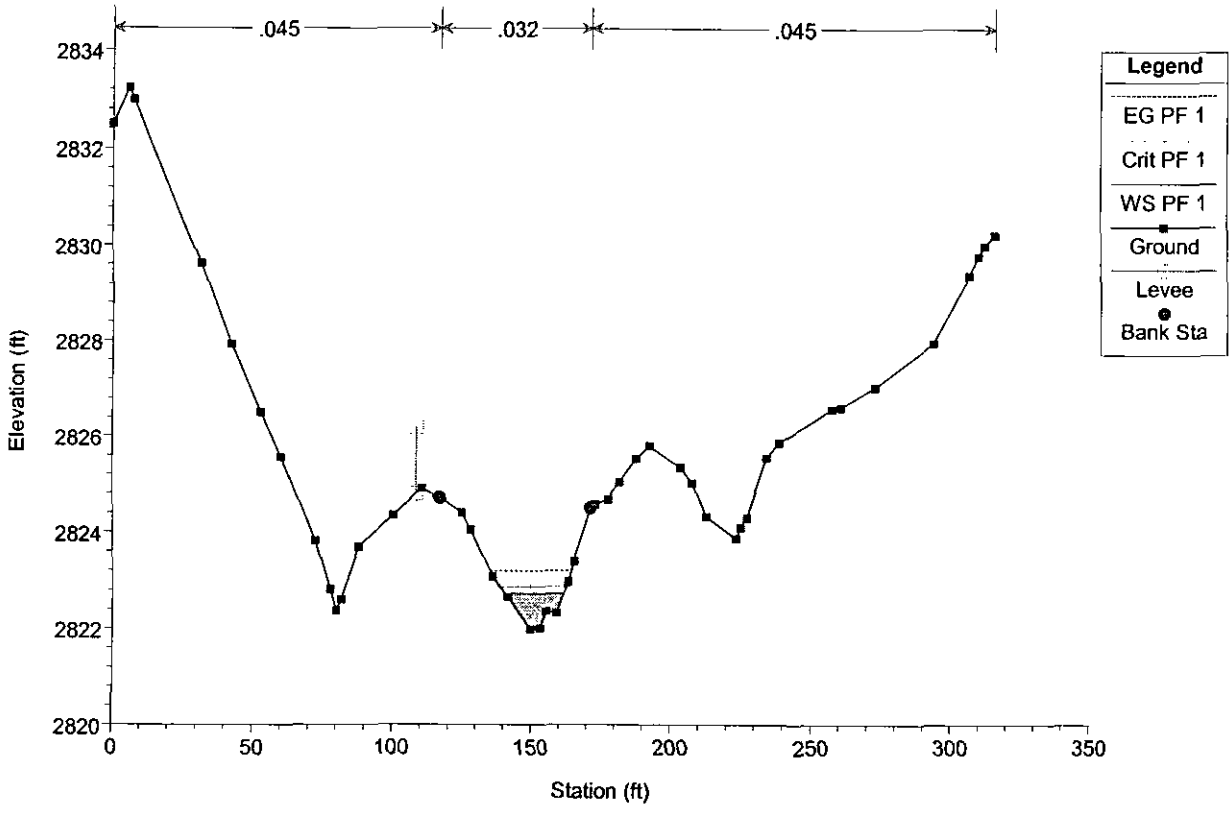

washh1 Plan: Plan 02 11/7/2006
.045
.032
.045
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2738
2736
2734
2732
2730
2728
2726
2724
2722
2720
0
50
100
150
200
Station (ft)

WASH H2

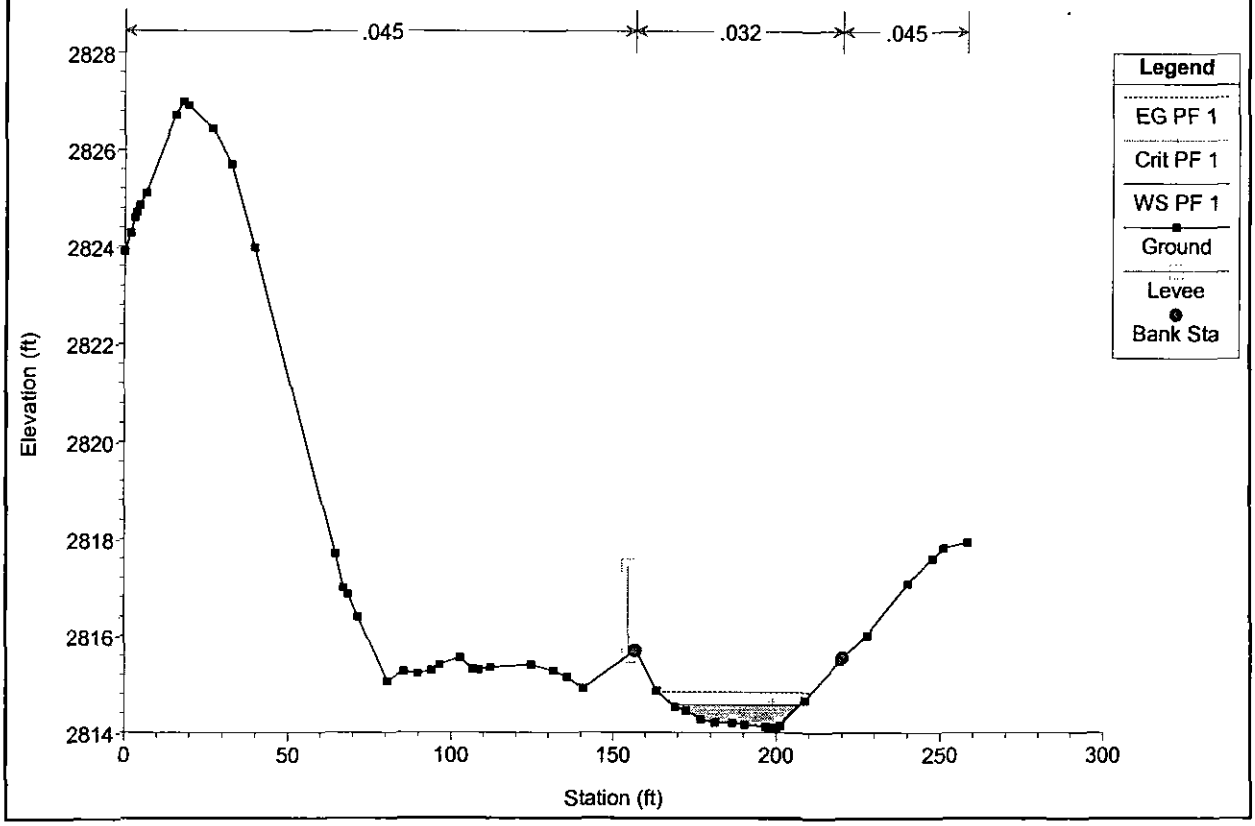
HEC-RAS Plan: Plan 02 River: RIVER-1 Reach: Reach-1 Profile: PF 1

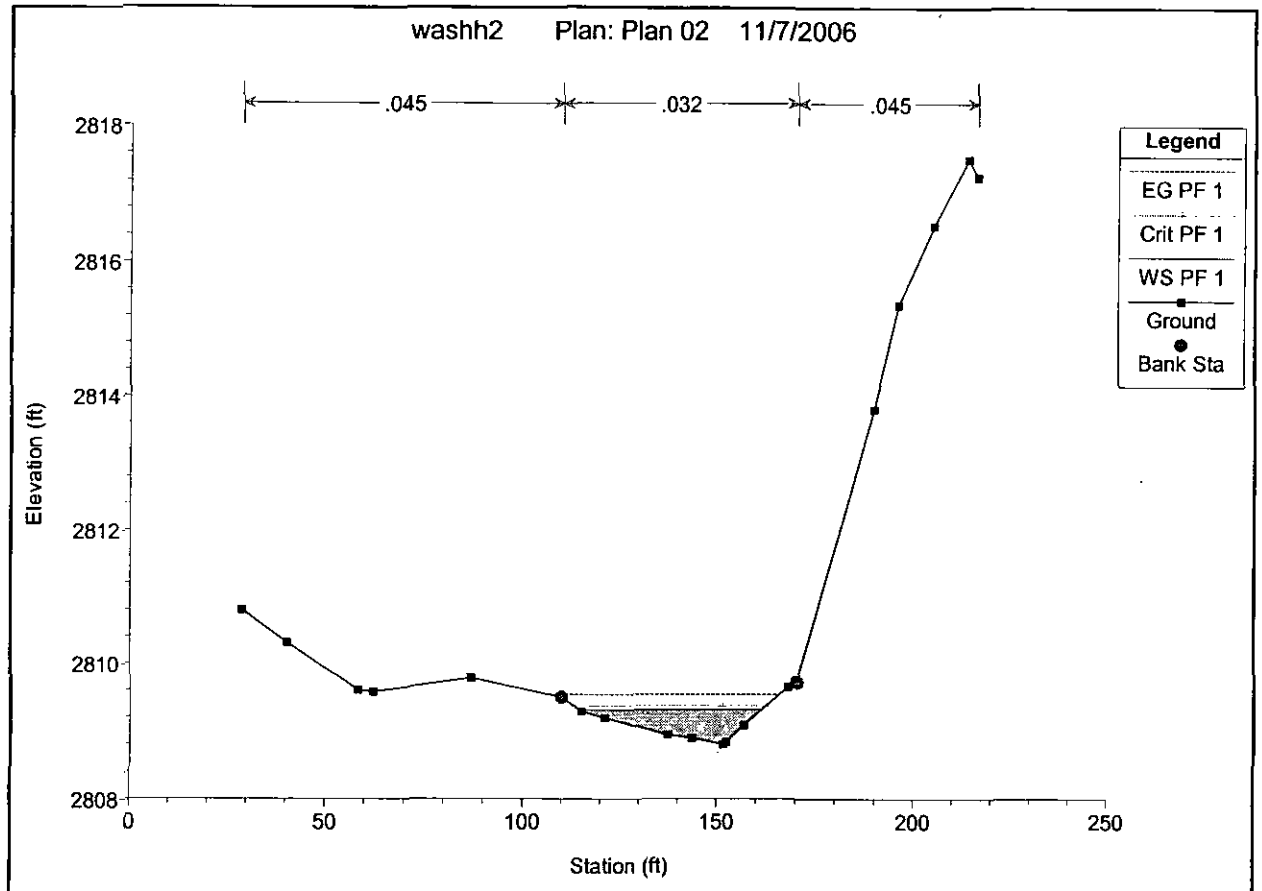
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	15	PF 1	50.00	2821.98	2822.73	2822.87	2823.20	0.043010	5.50	9.10	21.01	1.47
Reach-1	14	PF 1	50.00	2814.10	2814.57	2814.63	2814.83	0.038439	4.16	12.02	38.88	1.32
Reach-1	13	PF 1	50.00	2808.80	2809.31	2809.36	2809.54	0.036980	3.82	13.10	46.83	1.27
Reach-1	12	PF 1	50.00	2800.73	2801.22	2801.30	2801.52	0.063174	4.36	11.47	50.18	1.61
Reach-1	11.5	PF 1	50.00	2795.20	2795.75	2795.81	2796.03	0.026258	4.34	12.81	37.70	1.16
Reach-1	11	PF 1	110.00	2783.25	2784.72	2785.16	2786.12	0.060907	9.51	11.56	14.98	1.91
Reach-1	10	PF 1	110.00	2773.90	2775.20	2775.38	2775.77	0.031318	6.28	19.82	40.55	1.35
Reach-1	9	PF 1	110.00	2764.93	2766.03	2766.36	2767.06	0.053740	8.14	13.52	20.43	1.76
Reach-1	8.5	PF 1	110.00	2761.97	2762.95	2762.99	2763.16	0.009485	4.31	45.60	141.04	0.79
Reach-1	8	PF 1	110.00	2757.40	2757.99	2758.36	2760.10	0.470942	11.67	9.42	42.33	4.36
Reach-1	7	PF 1	110.00	2751.66	2752.64	2752.67	2752.98	0.016247	4.71	24.44	41.48	0.98
Reach-1	6	PF 1	110.00	2749.39	2749.94	2750.26	2751.09	0.119556	8.63	12.75	32.33	2.42
Reach-1	5	PF 1	110.00	2746.81	2747.80	2747.91	2748.30	0.028449	5.70	19.29	30.93	1.27
Reach-1	4	PF 1	110.00	2744.09	2744.94	2745.29	2746.05	0.056779	8.44	13.03	19.34	1.81
Reach-1	3	PF 1	110.00	2739.56	2740.88	2741.04	2741.47	0.031414	6.12	17.97	28.08	1.34
Reach-1	2	PF 1	172.00	2735.23	2736.24	2736.57	2737.29	0.051494	8.26	20.84	29.92	1.74
Reach-1	1	PF 1	172.00	2731.01	2731.62	2731.82	2732.31	0.049538	6.63	25.94	50.07	1.62

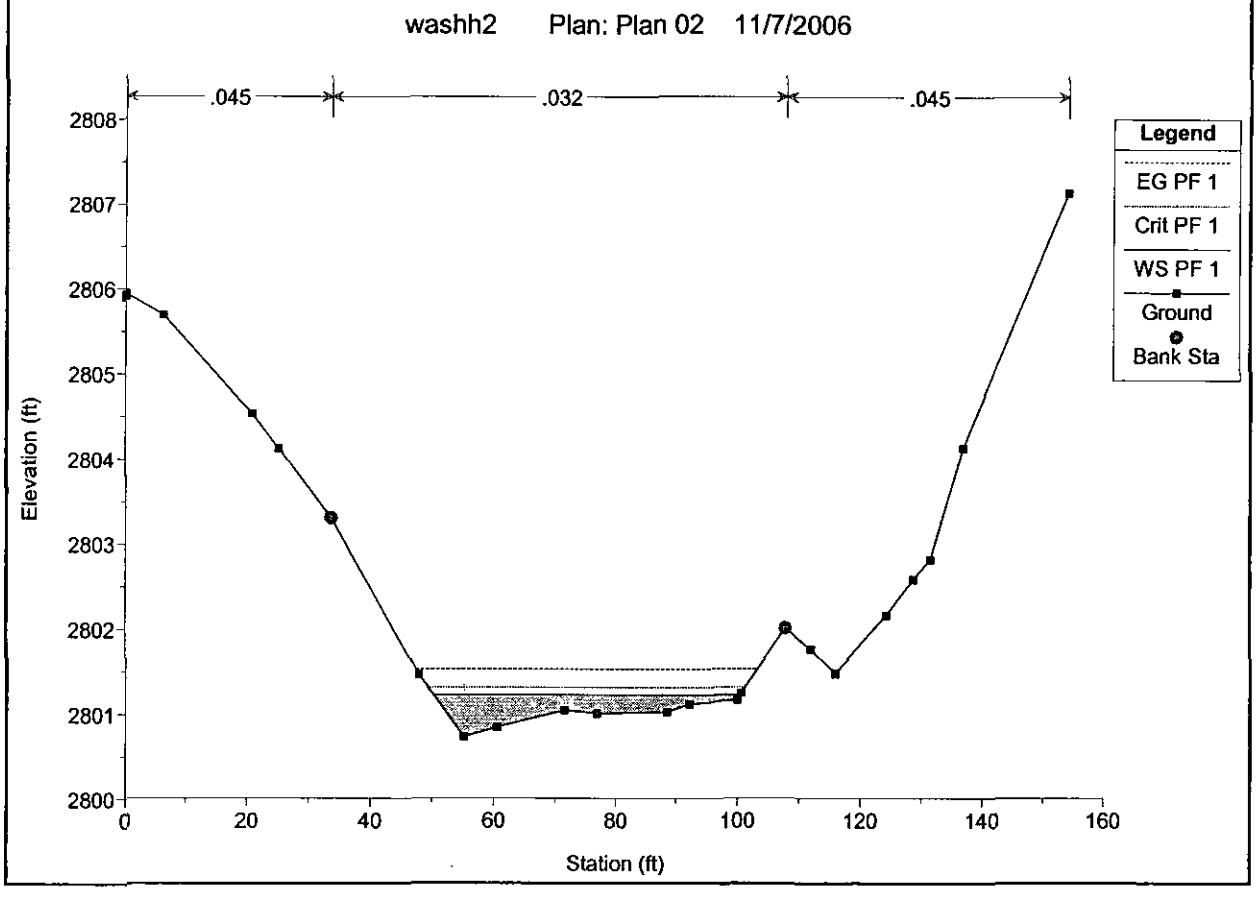
washh2 Plan: Plan 02 11/7/2006

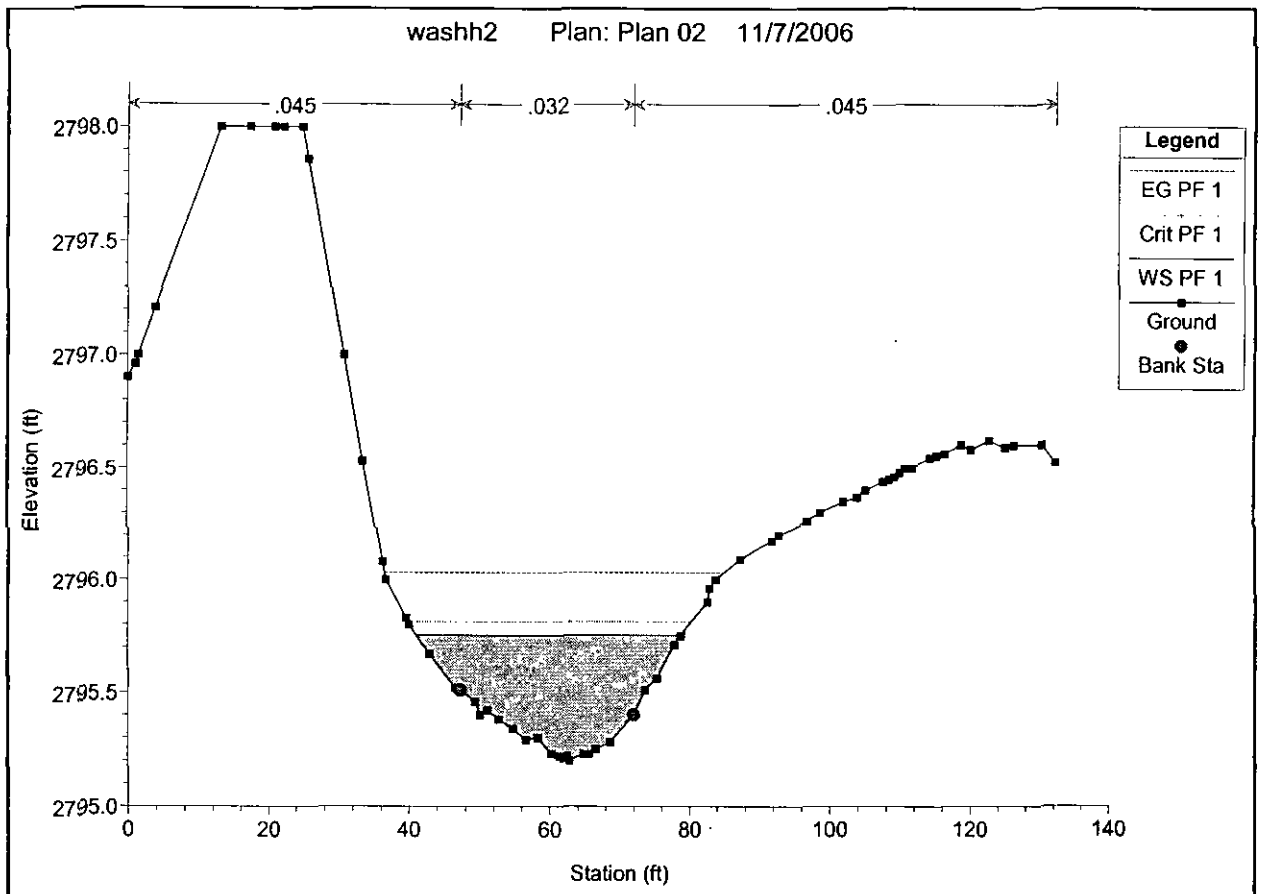


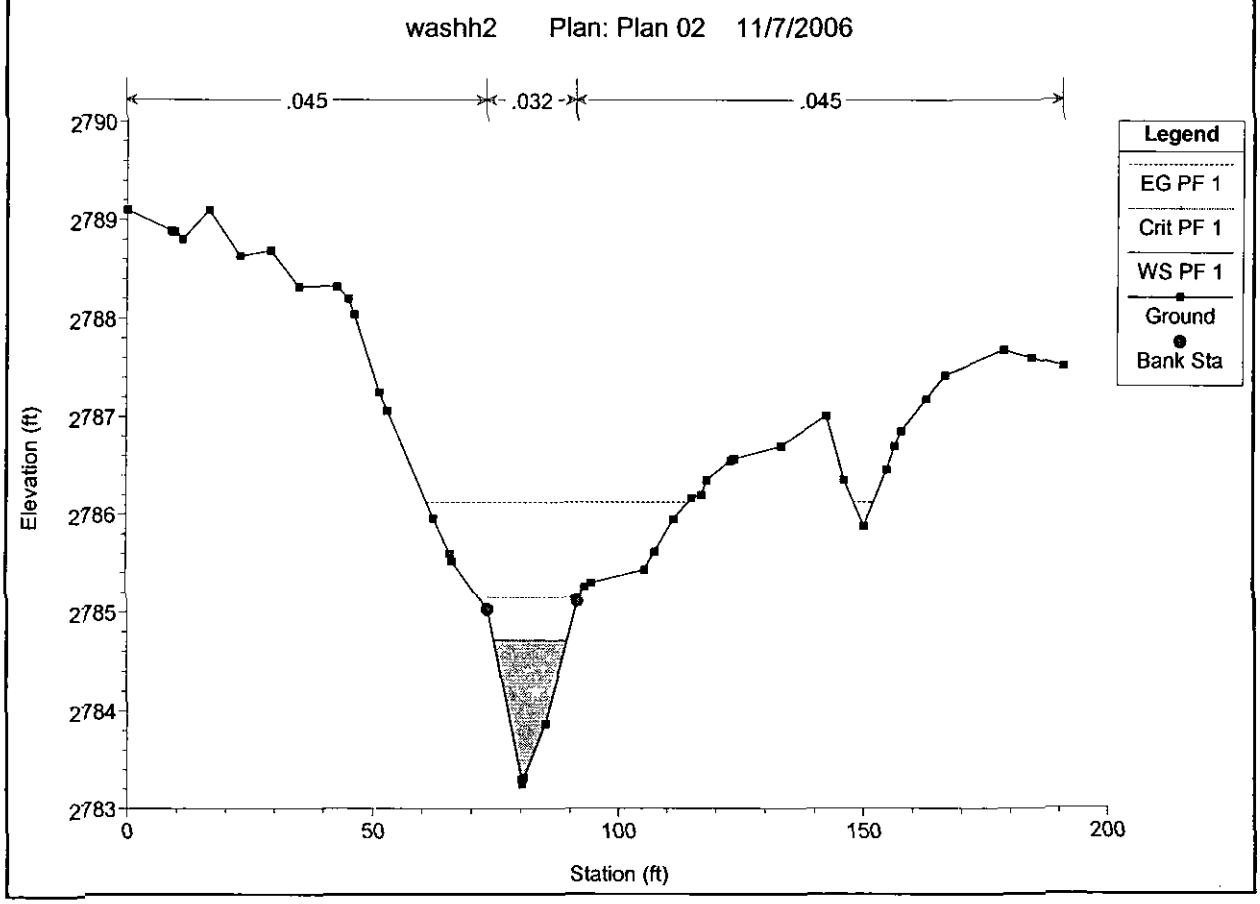
washh2 Plan: Plan 02 11/7/2006

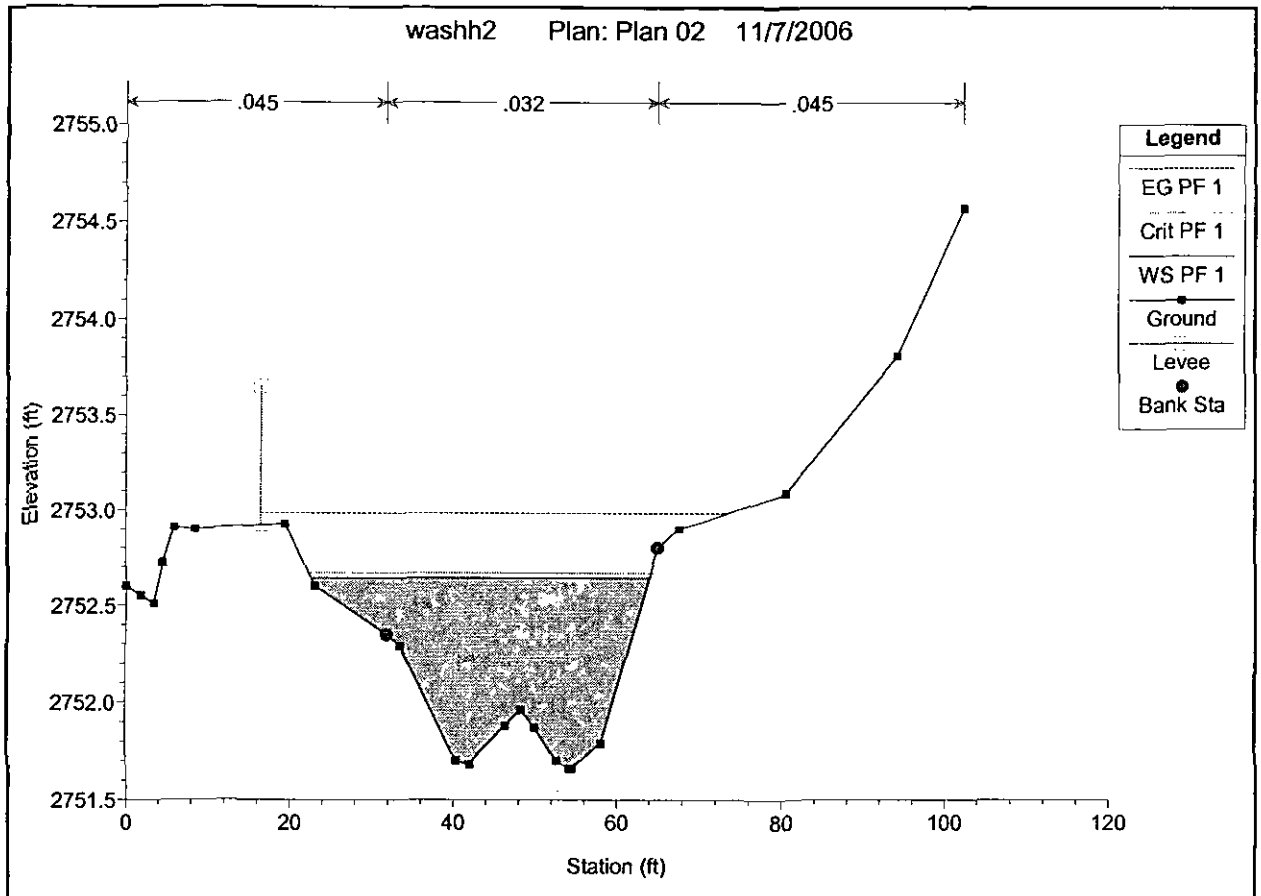


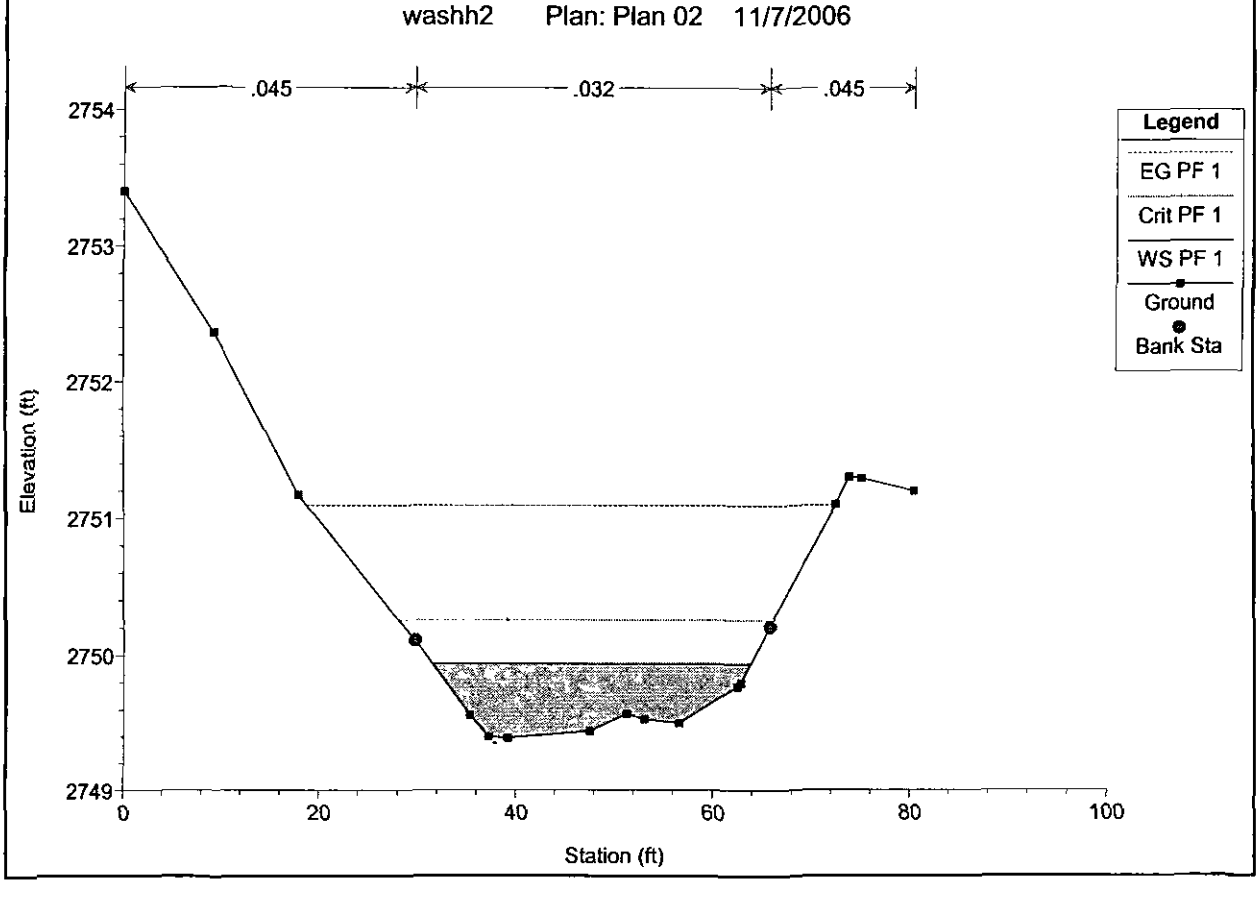

washh2 Plan: Plan 02 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2818
2816
2814
2812
2810
2808
0
50
100
150
200
250
Station (ft)

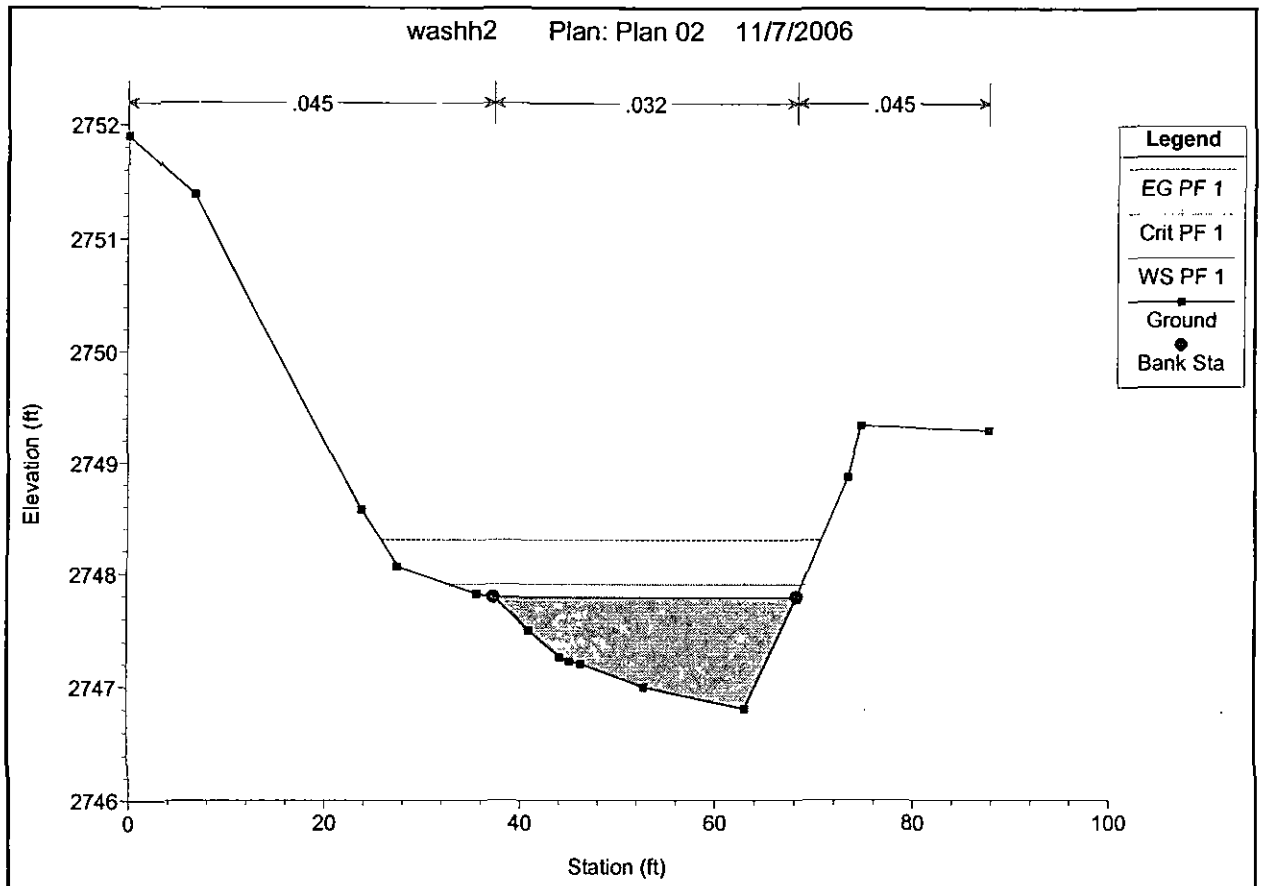

washh2 Plan: Plan 02 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2808
2807
2806
2805
2804
2803
2802
2801
2800
0
20
40
60
80
100
120
140
160
Station (ft)

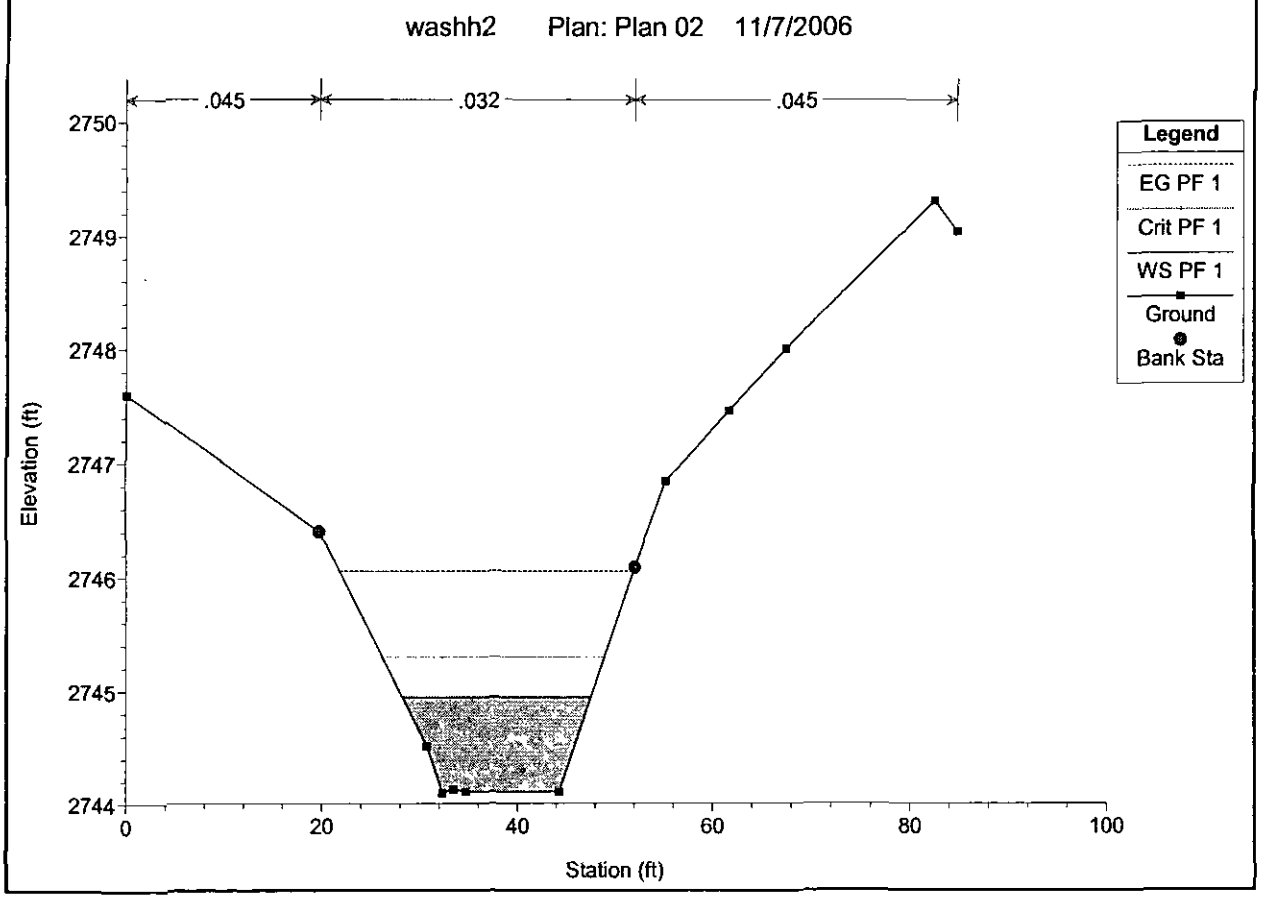

washh2 Plan: Plan 02 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2798.0
2797.5
2797.0
2796.5
2796.0
2795.5
2795.0
0
20
40
60
80
100
120
140

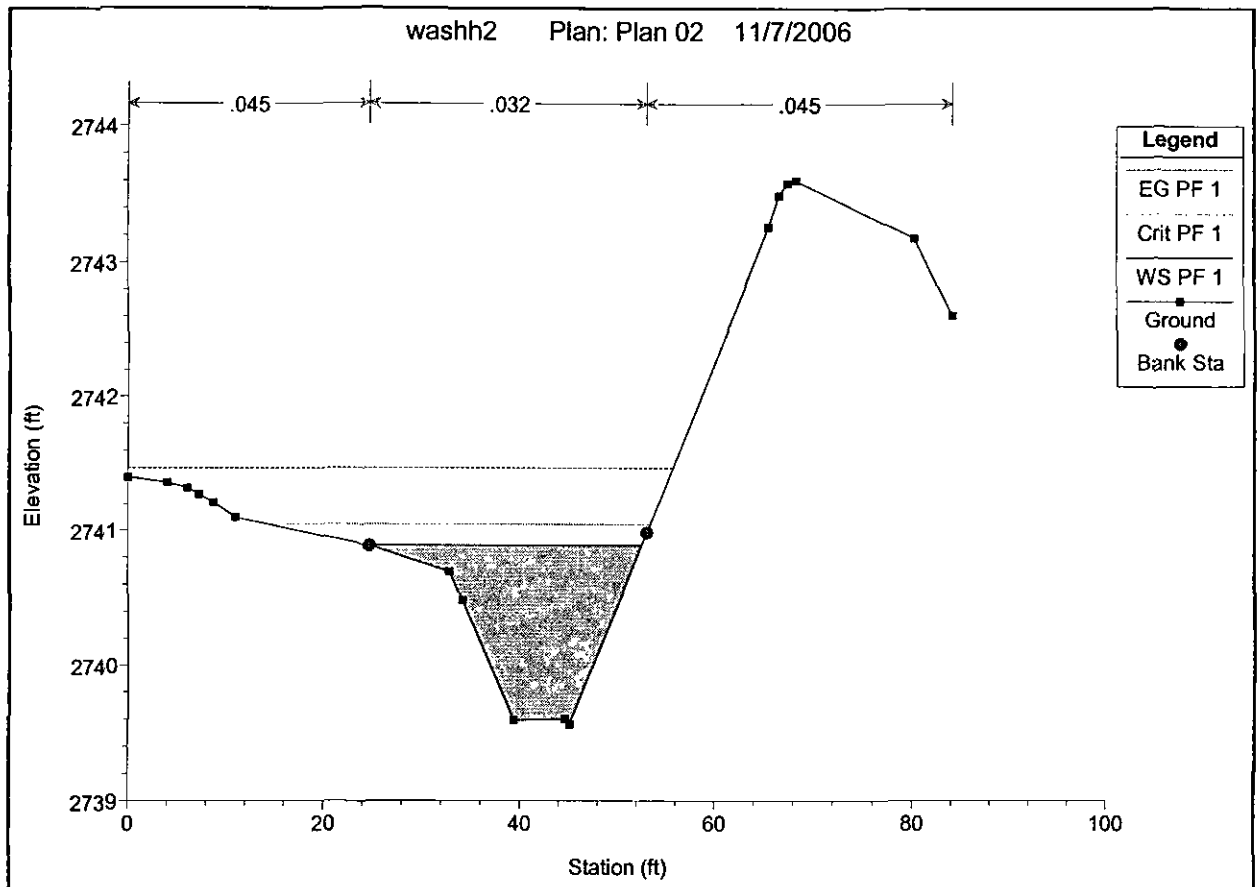

washh2 Plan: Plan 02 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2790
2789
2788
2787
2786
2785
2784
2783
0
50
100
150
200

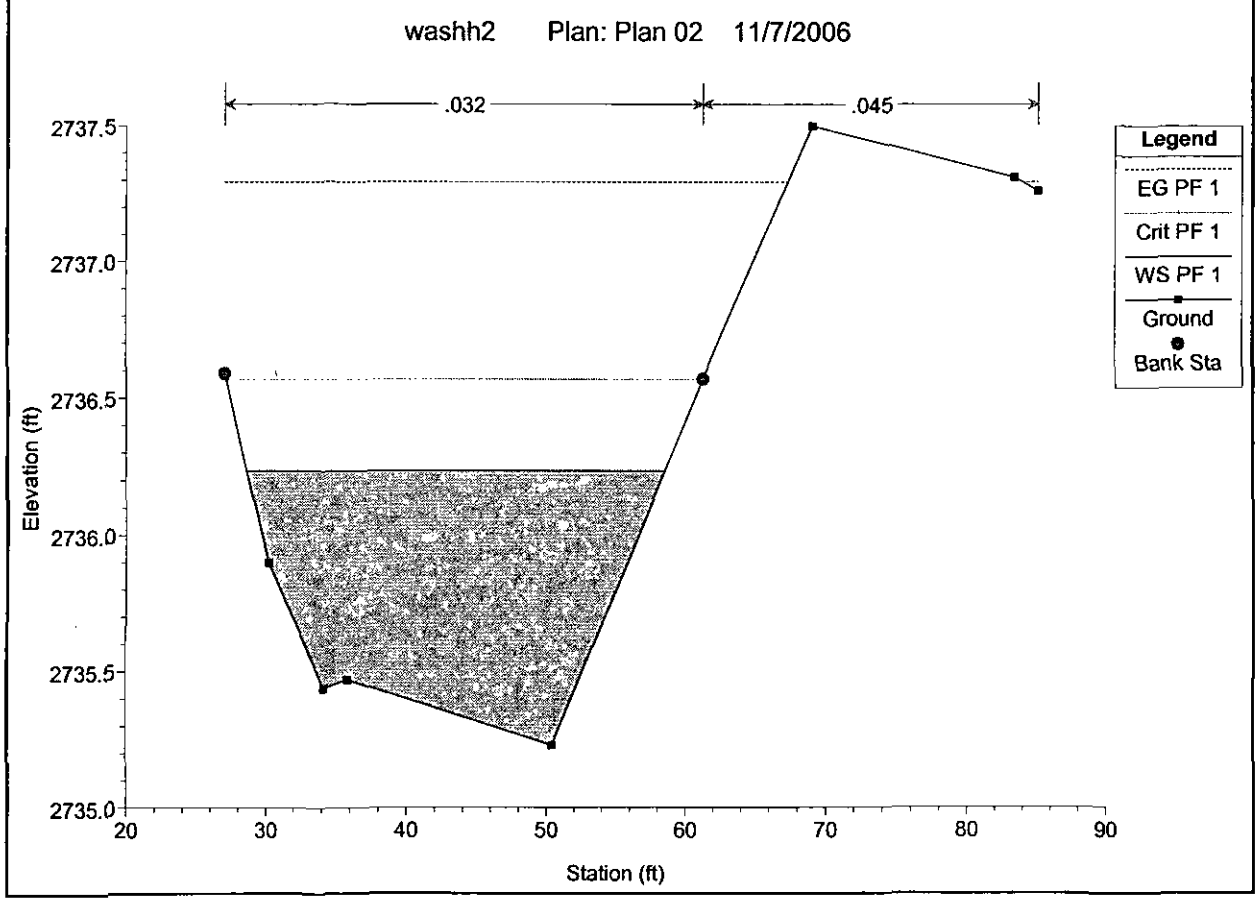

washh2 Plan: Plan 02 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

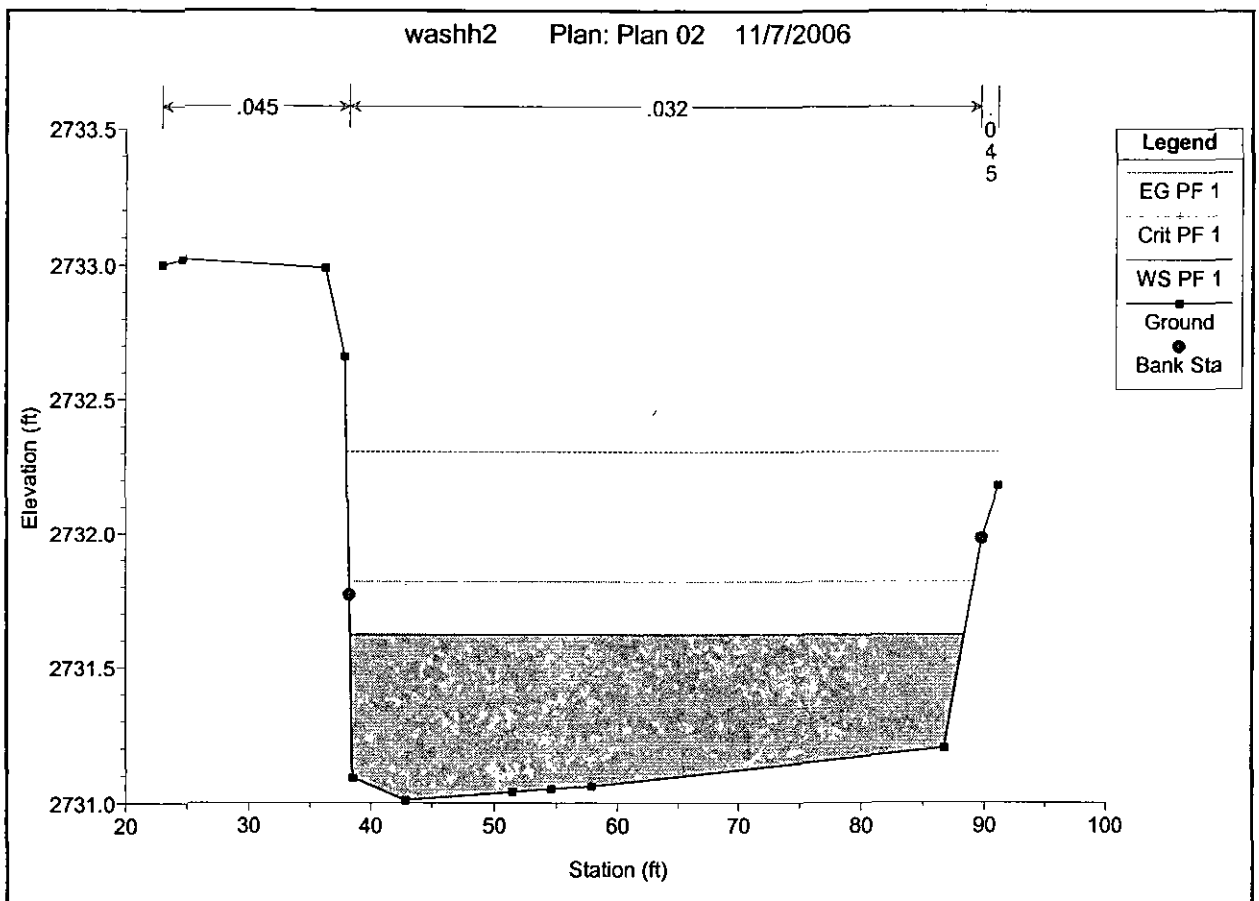

washh2 Plan: Plan 02 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


washh2 Plan: Plan 02 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2752
2751
2750
2749
2748
2747
2746
0
20
40
60
80
100
Station (ft)


washh2 Plan: Plan 02 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2750
2749
2748
2747
2746
2745
2744
0
20
40
60
80
100
Station (ft)


washh2 Plan: Plan 02 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2744
2743
2742
2741
2740
2739
0
20
40
60
80
100
Station (ft)

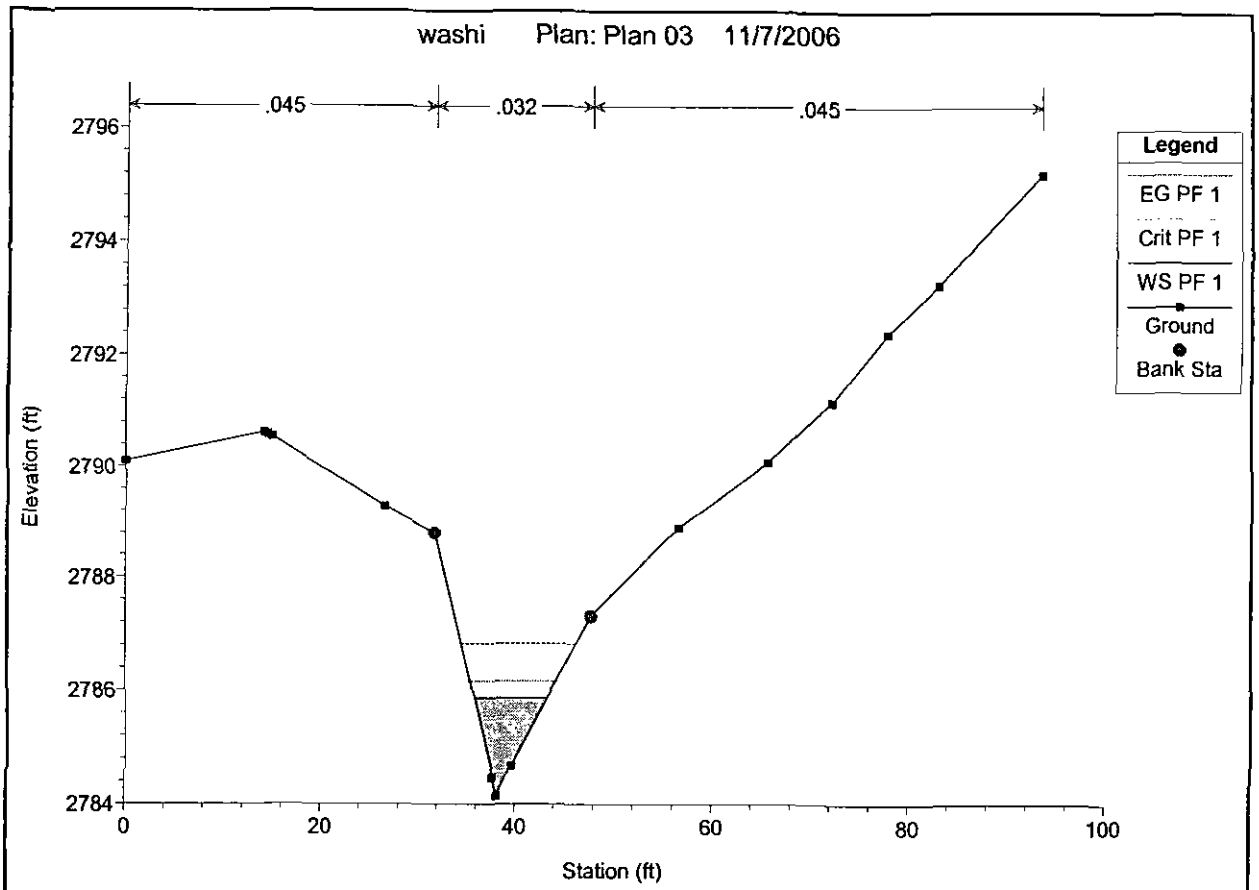

washh2 Plan: Plan 02 11/7/2006
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2737.5
2737.0
2736.5
2736.0
2735.5
2735.0
20
30
40
50
60
70
80
90
Station (ft)

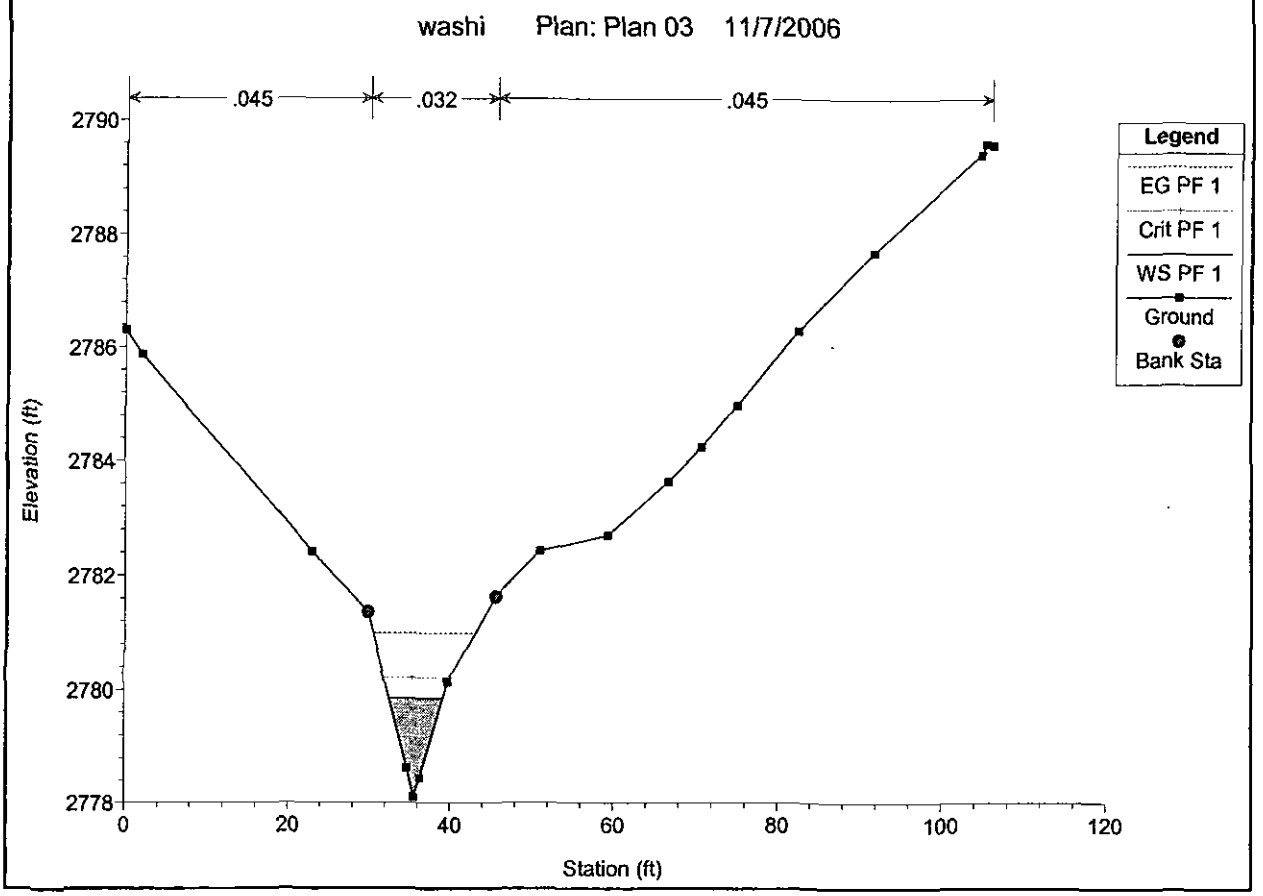

washh2 Plan: Plan 02 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2733.5
2733.0
2732.5
2732.0
2731.5
2731.0
20
30
40
50
60
70
80
90
100
Station (ft)

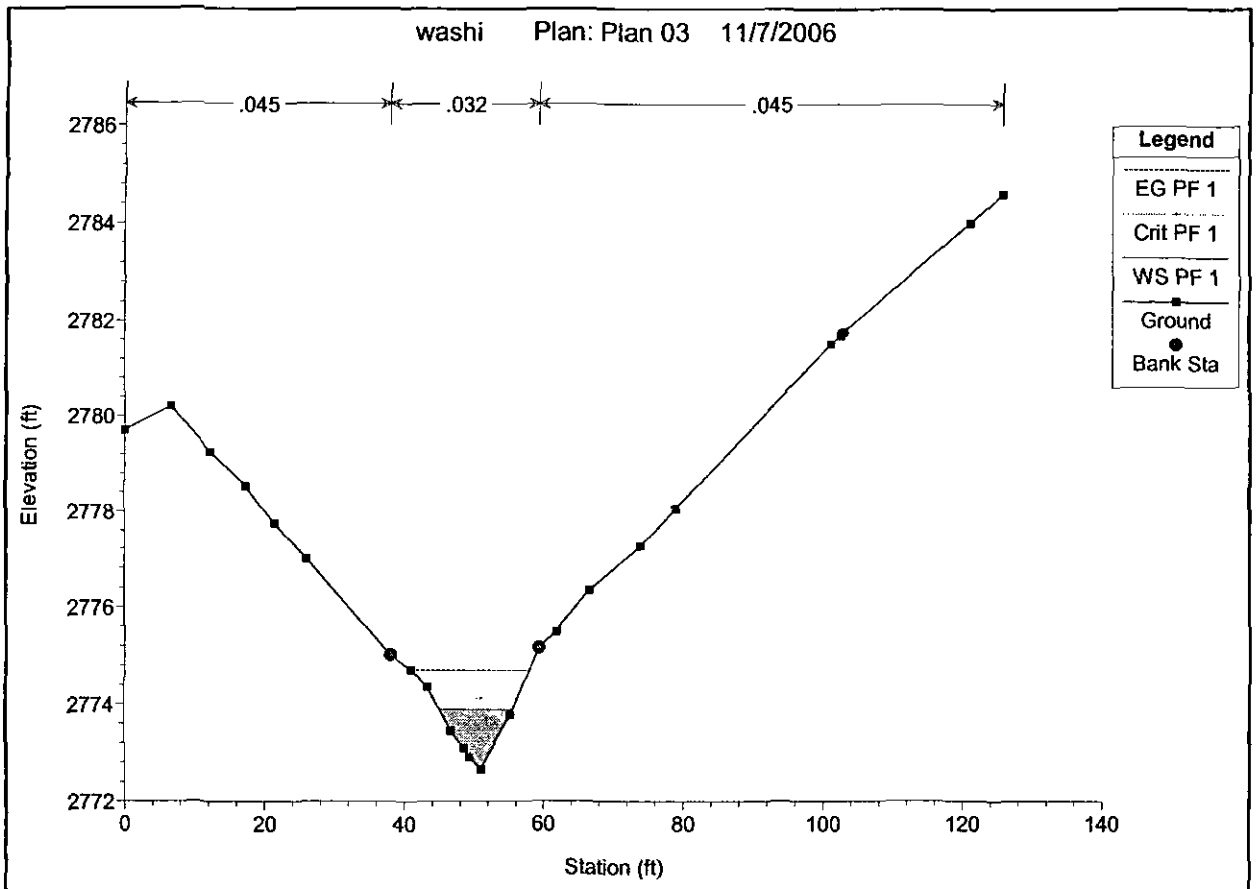
WASH I

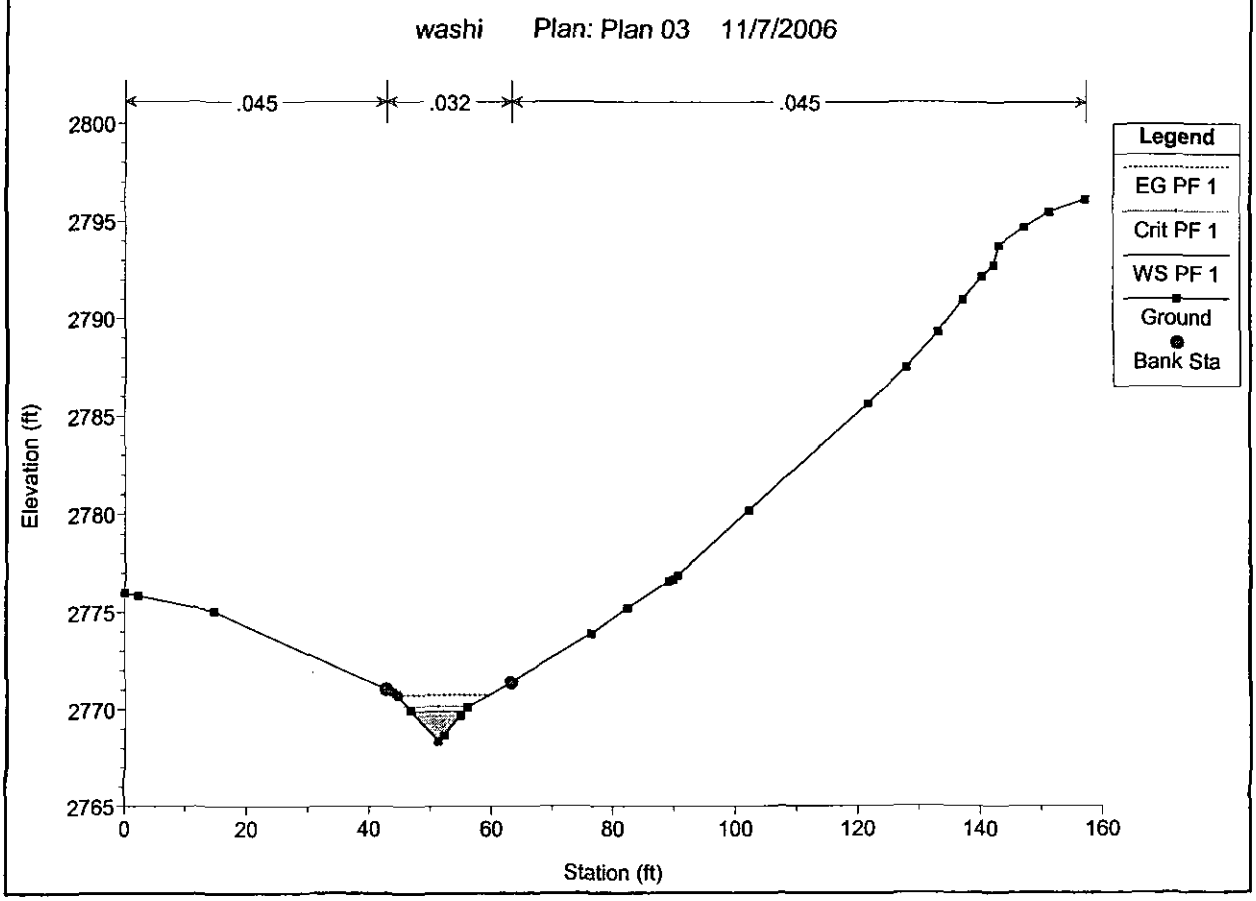
HEC-RAS Plan: Plan 03 River: RIVER-1 Reach: Reach-1 Profile: PF 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	7	PF 1	50.00	2784.14	2785.86	2786.15	2786.82	0.041077	7.86	6.36	7.51	1.50
Reach-1	6	PF 1	50.00	2778.10	2779.85	2780.22	2780.99	0.047685	8.57	5.84	6.64	1.61
Reach-1	5	PF 1	50.00	2772.66	2773.89	2774.14	2774.70	0.043982	7.22	6.92	10.54	1.57
Reach-1	4	PF 1	50.00	2768.37	2769.92	2770.18	2770.77	0.038173	7.42	6.74	8.58	1.47
Reach-1	3	PF 1	51.00	2764.31	2765.70	2766.03	2766.69	0.049526	7.97	6.40	9.02	1.67
Reach-1	2	PF 1	51.00	2760.53	2761.93	2762.26	2762.86	0.049033	7.75	6.58	9.66	1.65
Reach-1	1.5	PF 1	51.00	2757.88	2758.42	2758.54	2758.75	0.058439	4.61	11.07	42.05	1.58
Reach-1	1	PF 1	73.00	2754.90	2755.88	2755.98	2756.24	0.034060	4.84	15.07	35.24	1.30


washi Plan: Plan 03 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2796
2794
2792
2790
2788
2786
2784
0
20
40
60
80
100
Station (ft)


washi Plan: Plan 03 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2790
2788
2786
2784
2782
2780
2778
0
20
40
60
80
100
120
Station (ft)


washi Plan: Plan 03 11/7/2006
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2786
2784
2782
2780
2778
2776
2774
2772
0
20
40
60
80
100
120
140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.032
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Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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2785
2780
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2765
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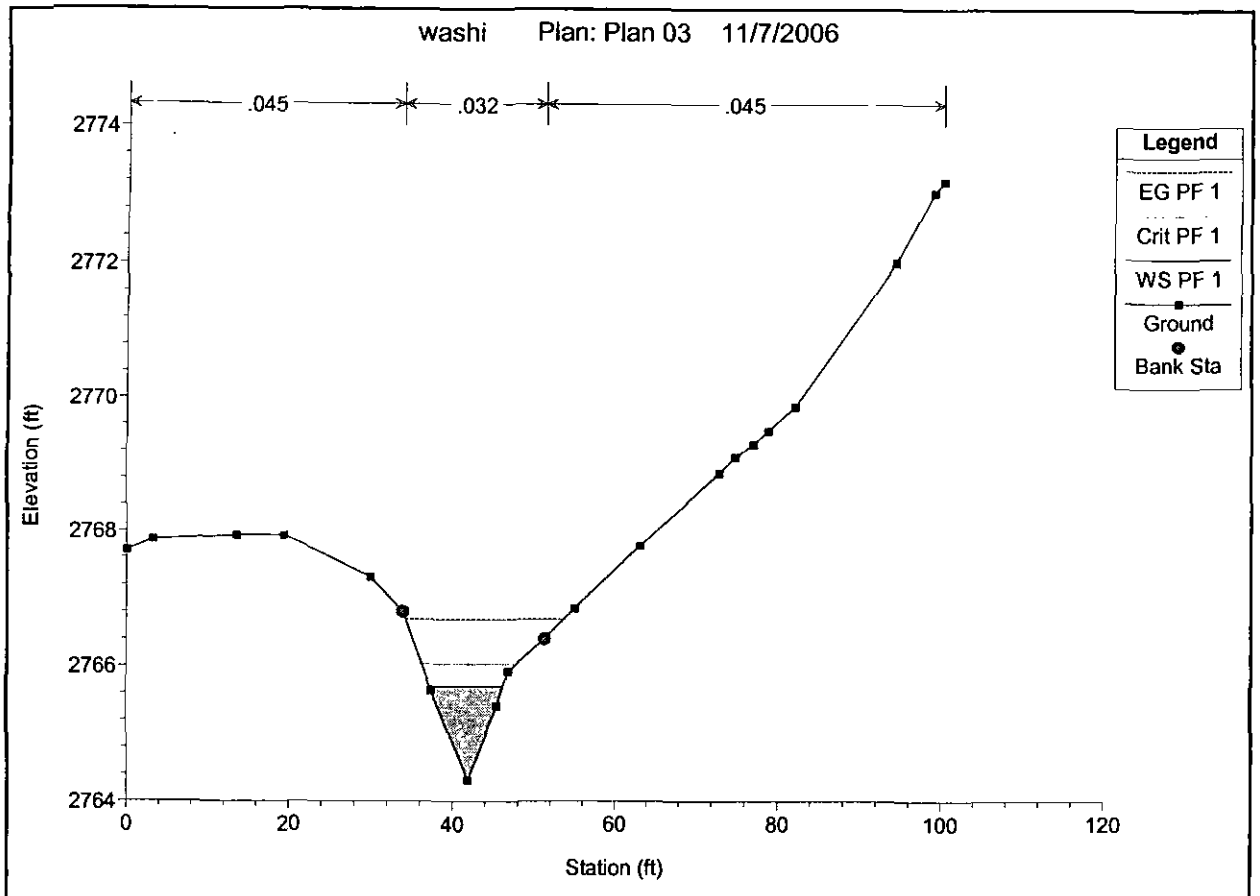
20
40
60
80
100
120
140
160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Ground
Bank Sta
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2770
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2764
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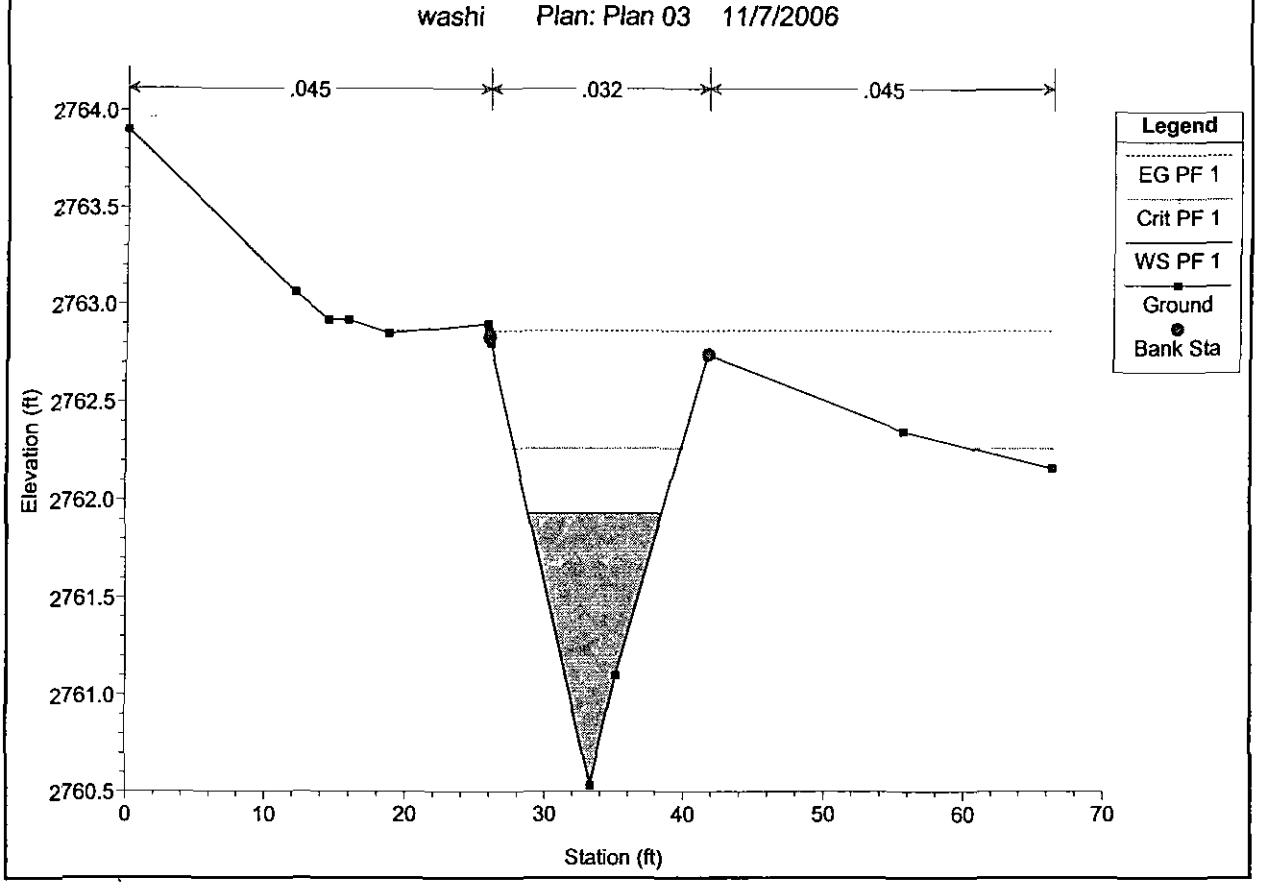
20
40
60
80
100
120
Station (ft)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.032
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Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
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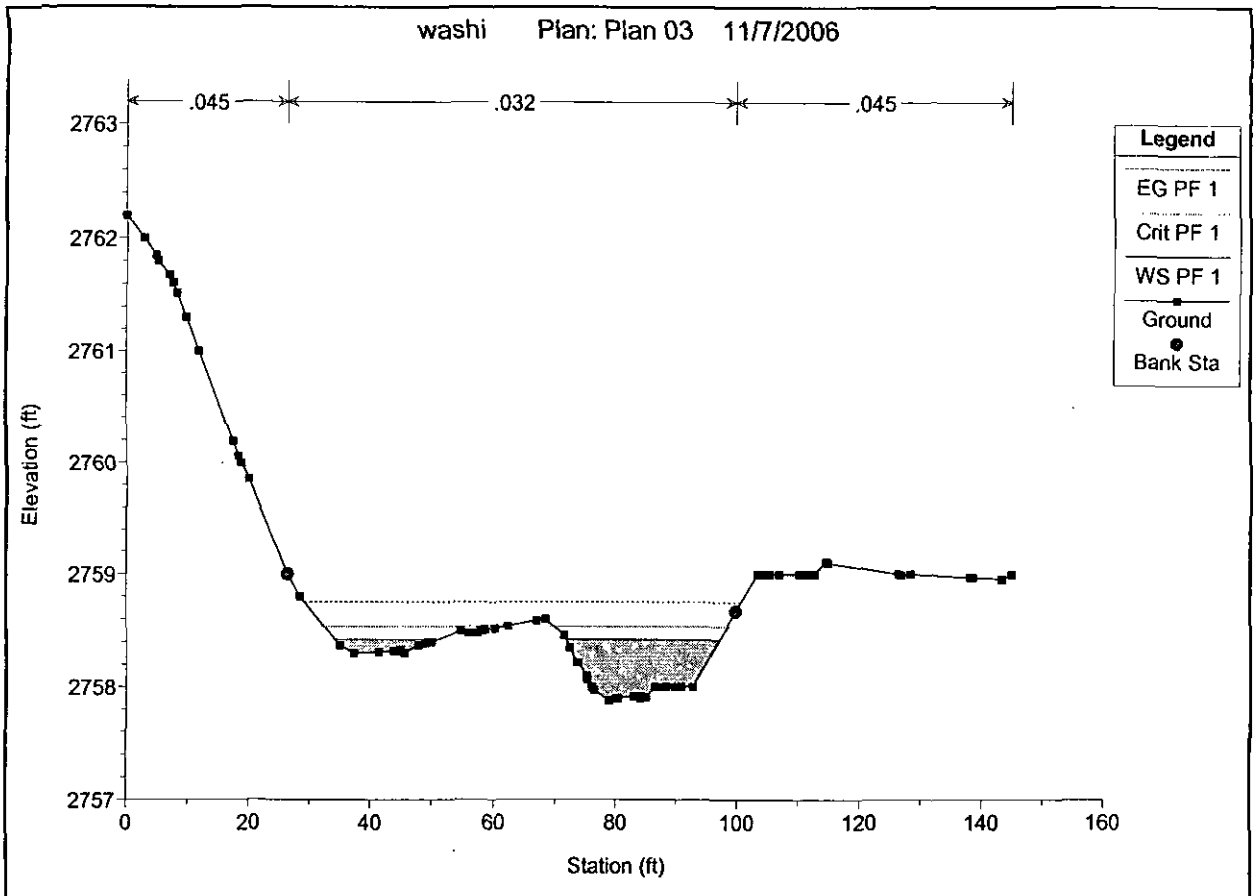
2763.5
2763.0
2762.5
2762.0
2761.5
2761.0
2760.5
0
10
20
30
40
50
60
70
Station (ft)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Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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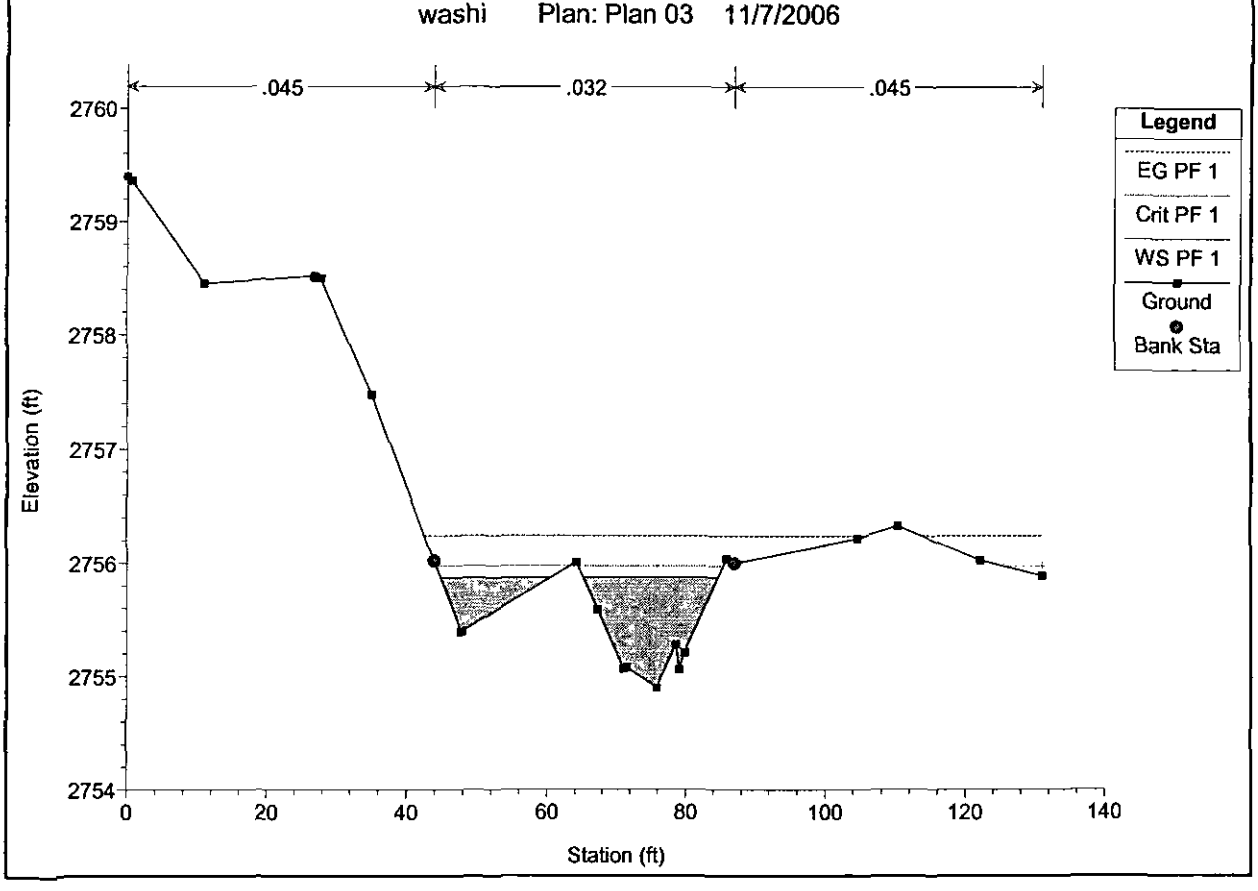
2762
2761
2760
2759
2758
2757
0
20
40
60
80
100
120
140
160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.032
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Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2760
2759
2758
2757
2756
2755
2754
0
20
40
60
80
100
120
140

Orifice Plate Calculation

WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon*
Location: *City of Scottsdale*
Reference: *Orifice Equation*

W/P#: *042054*
Date: *11/15/2006*

$$Q = CA\sqrt{2gh}$$

Where:

C = Orifice Coefficient =	0.60	
d = Diamter of Orfice =	6.00	in
A = Cross-sectional area of orifice =	0.20	Sq.ft
H = Depth above Orifice =	1.50	ft
Q = Orifice Flow =	1.16	cfs
Time to Drain 2 ac-ft =	20.9	hours

A 6 inch diameter orifice plate will bleed at a rate of 1.16 cfs.

APPENDIX G

Storm Water Storage Volume Calculations

Summary of 100-yr, 2-hr Storm Water Storage Calculations

Drainage Basin	Total Development Area (Acre)	100yr-2 hr. Required Volume (acre-ft)	Provided Volume (acre-ft)	Volume Excess / Shortage ± (acre-ft)
A1	3.79	0.53	0.60	0.07
A2	7.17	1.01	1.01	0.00
B	10.94	1.54	1.78	0.24
C	3.65	0.51	0.57	0.06
D	7.73	1.09	1.25	0.16
E1	14.24	2.01	2.01	0.00
E2	13.23	1.87	2.02	0.15
E3	2.19	0.32	0.58	0.26
F1	10.24	1.44	1.99	0.55
F2	3.56	0.5	0.51	0.01
F3	2.93	0.41	0.40	-0.01
G	3.7	0.52	0.51	-0.01
H1	12.94	1.82	1.98	0.16
H2	8.5	1.2	1.31	0.11
I	4.44	0.63	0.64	0.01
J	4.81	0.68	0.66	-0.02
K	2.06	0.29	0.38	0.09
L	1.49	0.21	0.20	-0.01
M	1.44	0.2	0.21	0.01
N	2.81	0.4	0.49	0.09
O	0.55	0.08	0.22	0.14
P	1.73	0.24	0.37	0.13
Q	0.52	0.07	0.07	0.00
R	0.18	0.02	0.00	-0.02
Total	125	17.59	19.76	2.17

WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon*
Location: *City of Scottsdale*
Date: *15-Nov-06*

Project Number: *062654*
Project Engineer: *Geoff Brownell, P.E.*

100-yr, 2-hr Storm Water Storage Calculations

BASIN - A1-1

STAGE	AREA [ft²]	AREA [acres]	VOLUME INC [acre-feet]	VOLUME CUM [acre-feet]
2756	4193.3	0.096	0.000	0.000
2757	5251	0.121	0.108	0.108
2758	6404	0.147	0.134	0.242
2759	7655	0.176	0.161	0.404
2760	9474.23	0.217	0.197	0.600
2762	11468.06	0.263	0.481	1.081

TOTAL PROVIDED VOLUME: **0.600**

VOLUME BREAKDOWN

Drainage Boundary	Sub-Basin Volumes	Disturbance Areas (acres)	100yr-2hr. Provided ac-ft	100yr-2hr. Required ac-ft	Volume Shortage / Excess ±
A1	A1-1	0.1757	0.600		
	TOTAL	0.1757	0.600	0.53	0.070

BASIN - A2-1

STAGE	AREA [ft²]	AREA [acres]	VOLUME INC [acre-feet]	VOLUME CUM [acre-feet]
2760	492	0.011	0.000	0.000
2761	1062	0.024	0.018	0.018
2762	1981	0.045	0.035	0.053
2763	3373	0.077	0.061	0.114
2764	4971	0.114	0.096	0.210
2765	7030	0.161	0.138	0.348

TOTAL PROVIDED VOLUME: **0.348**

BASIN - A2-2

STAGE	AREA [ft²]	AREA [acres]	VOLUME INC [acre-feet]	VOLUME CUM [acre-feet]
2759	200	0.005	0.000	0.000
2760	446	0.010	0.007	0.007
2761	816	0.019	0.014	0.022
2762	1277	0.029	0.024	0.046
2763	1932	0.044	0.037	0.083
2764	2937	0.067	0.056	0.139

TOTAL PROVIDED VOLUME: **0.139**

BASIN - A2-3

STAGE	AREA [ft²]	AREA [acres]	VOLUME INC [acre-feet]	VOLUME CUM [acre-feet]
2733	2268	0.052	0.000	0.000
2734	2913	0.067	0.059	0.059
2735	3632	0.083	0.075	0.135
2736	4466	0.103	0.093	0.228
2737	5369	0.123	0.113	0.340
2738	6297	0.145	0.134	0.474

TOTAL PROVIDED VOLUME: **0.474**

BASIN - A2-4

STAGE	AREA [ft²]	AREA [acres]	VOLUME INC [acre-feet]	VOLUME CUM [acre-feet]
2792	168	0.004	0.000	0.000
2793	425	0.010	0.007	0.007
2794	866	0.020	0.015	0.022
2795	1638	0.038	0.029	0.050

TOTAL PROVIDED VOLUME: **0.050**

VOLUME BREAKDOWN

Drainage Boundary	Sub-Basin Volumes	Disturbance Areas (acres)	100yr-2hr. Provided ac-ft	100yr-2hr. Required ac-ft	Volume Shortage / Excess ±
A2	A2-1	0.1614	0.348		
	A2-2	0.0674	0.139		
	A2-3	0.1446	0.474		
	A2-4	0.0376	0.050		
	TOTAL	0.4110	1.011	1.01	0.00

BASIN - B-1

STAGE	AREA [ft²]	AREA [acres]	VOLUME INC [acre-feet]	VOLUME CUM [acre-feet]
2798	809	0.019	0.000	0.000
2799	1241	0.028	0.024	0.024
2800	1804	0.041	0.035	0.058
2801	2456	0.056	0.049	0.107

TOTAL PROVIDED VOLUME: **0.107**

BASIN - B-2

STAGE	AREA [ft²]	AREA [acres]	VOLUME INC [acre-feet]	VOLUME CUM [acre-feet]
2798	2378	0.055	0.000	0.000
2799	3095	0.071	0.063	0.063
2800	3952	0.091	0.081	0.144
2801	4986	0.114	0.103	0.246

TOTAL PROVIDED VOLUME: **0.246**

BASIN - B-3

STAGE	AREA [ft²]	AREA [acres]	VOLUME INC [acre-feet]	VOLUME CUM [acre-feet]
2781	3419	0.078	0.000	0.000
2782	4333	0.099	0.089	0.089
2783	5371	0.123	0.111	0.200

VOLUME BREAKDOWN

Drainage Boundary	Sub-Basin Volumes	Disturbance Areas (acres)	100yr-2hr. provided ac-ft	100yr-2hr. Required ac-ft	Volume Shortage / Excess ±
B	B-1	0.0564	0.107		
	B-2	0.1145	0.246		
	B-3	0.1523	0.338		
	B-4	0.1144	0.241		
	B-5	0.2549	0.843		
	TOTAL	0.6924	1.776	1.54	0.236

2784	6633	0.152	0.138	0.338
2785	7269	0.167	0.160	0.498

TOTAL PROVIDED VOLUME: **0.338**

BASIN - B-4				
STAGE	AREA		VOLUME	
	[ft^2]	[acres]	INC [acre-feet]	CUM [acre-feet]
2768	2154	0.049	0.000	0.000
2769	2990	0.069	0.059	0.059
2770	3950	0.091	0.080	0.139
2771	4983	0.114	0.103	0.241

TOTAL PROVIDED VOLUME: **0.241**

BASIN - B-5				
STAGE	AREA		VOLUME	
	[ft^2]	[acres]	INC [acre-feet]	CUM [acre-feet]
2742	5494	0.126	0.000	0.000
2743	7220	0.166	0.146	0.146
2744	9089.9	0.209	0.187	0.333
2745	11105	0.255	0.232	0.565
2746	13101	0.301	0.278	0.843

TOTAL PROVIDED VOLUME: **0.843**

BASIN - C-1				
STAGE	AREA		VOLUME	
	[ft^2]	[acres]	INC [acre-feet]	CUM [acre-feet]
2779	4198	0.096	0.000	0.000
2780	5112	0.117	0.107	0.107
2781	6102	0.140	0.129	0.236
2782	7169	0.165	0.152	0.388
2783	8375	0.192	0.178	0.566

TOTAL PROVIDED VOLUME: **0.566**

VOLUME BREAKDOWN

Drainage Boundary	Sub-Basin Volumes	Disturbance Areas (acres)	100yr-2hr. provided ac-ft	100yr-2hr. Required ac-ft	Volume Shortage / Excess ±
C	C-1	0.1923	0.566		
	TOTAL	0.1923	0.566	0.51	0.056

BASIN - D-1				
STAGE	AREA		VOLUME	
	[ft^2]	[acres]	INC [acre-feet]	CUM [acre-feet]
2749	2054	0.047	0.000	0.000
2750	2819	0.065	0.056	0.056
2751	3699	0.085	0.075	0.131
2752	4712	0.108	0.097	0.227
2753	5928	0.136	0.122	0.349

TOTAL PROVIDED VOLUME: **0.349**

BASIN - D-2				
STAGE	AREA		VOLUME	
	[ft^2]	[acres]	INC [acre-feet]	CUM [acre-feet]
2719	732.75	0.017	0.000	0.000
2720	2673.44	0.061	0.039	0.039
2721	5208.95	0.120	0.090	0.130
2722	8803	0.202	0.161	0.290
2723	13007	0.299	0.250	0.541
2724	18123.75	0.416	0.357	0.898

TOTAL PROVIDED VOLUME: **0.898**

VOLUME BREAKDOWN

Drainage Boundary	Sub-Basin Volumes	Disturbance Areas (acres)	100yr-2hr. provided ac-ft	100yr-2hr. Required ac-ft	Volume Shortage / Excess ±
D	D-1	0.1361	0.349		
	D-2	0.2021	0.898		
	TOTAL	0.3382	1.248	1.09	0.158

BASIN - E1-1				
STAGE	AREA		VOLUME	
	[ft^2]	[acres]	INC [acre-feet]	CUM [acre-feet]
2723	5198	0.119	0.000	0.000
2724	6100	0.140	0.130	0.130
2725	7068	0.162	0.151	0.281
2726	8098	0.186	0.174	0.455
2727	9189	0.211	0.198	0.653
2728	10351	0.238	0.224	0.878

TOTAL PROVIDED VOLUME: **0.878**

BASIN - E1-2				
STAGE	AREA		VOLUME	
	[ft^2]	[acres]	INC [acre-feet]	CUM [acre-feet]
2695	5427	0.125	0.000	0.000
2696	7366	0.169	0.147	0.147
2697	8975	0.206	0.188	0.334
2698	10686	0.245	0.226	0.560
2699	12497	0.287	0.266	0.826
2700	14406	0.331	0.309	1.135

TOTAL PROVIDED VOLUME: **1.135**

VOLUME BREAKDOWN

Drainage Boundary	Sub-Basin Volumes	Disturbance Areas (acres)	100yr-2hr. provided ac-ft	100yr-2hr. Required ac-ft	Volume Shortage / Excess ±
E1	E1-1	0.1859	0.878		
	E1-2	0.3307	1.135		
	TOTAL	0.5166	2.013	2.010	0.003

BASIN - E2-1				
STAGE	AREA		VOLUME	
	[ft^2]	[acres]	INC [acre-feet]	CUM [acre-feet]
2693	13886	0.319	0.000	0.000

VOLUME BREAKDOWN

Drainage Boundary	Sub-Basin Volumes	Disturbance Areas (acres)	100yr-2hr. provided ac-ft	100yr-2hr. Required ac-ft	Volume Shortage / Excess ±
E2	E2-1	0.4963	2.020	1.87	

2694	15293	0.351	0.335	0.335
2695	16761	0.385	0.368	0.703
2696	18290	0.420	0.402	1.105
2697	19880	0.456	0.438	1.543
2698	21620	0.496	0.476	2.020

TOTAL PROVIDED VOLUME: **2.020**

TOTAL	0.4963	2.020	1.870	0.150

BASIN - E3-1

STAGE	AREA [ft²]	AREA [acres]	VOLUME INC [acre-feet]	VOLUME CUM [acre-feet]
2711	3064	0.070	0.000	0.000
2712	4065	0.093	0.082	0.082
2713	5197	0.119	0.106	0.188
2714	6456	0.148	0.134	0.322

TOTAL PROVIDED VOLUME: **0.322**

VOLUME BREAKDOWN

Drainage Boundary	Sub-Basin Volumes	Disturbance Areas (acres)	100yr-2hr. provided ac-ft	100yr-2hr. Required ac-ft	Volume Shortage / Excess ±
E3	E3-1	0.1482	0.322		
	E3-2	0.1557	0.257		
	TOTAL	0.3039	0.579	0.32	0.259

BASIN - E3-2

STAGE	AREA [ft²]	AREA [acres]	VOLUME INC [acre-feet]	VOLUME CUM [acre-feet]
2683	65.87	0.002	0.000	0.000
2684	317.95	0.007	0.004	0.004
2685	1008.73	0.023	0.015	0.020
2686	2251.36	0.052	0.037	0.057
2687	4199.64	0.096	0.074	0.131
2688	6780.55	0.156	0.126	0.257

TOTAL PROVIDED VOLUME: **0.257**

BASIN - F1-1

STAGE	AREA [ft²]	AREA [acres]	VOLUME INC [acre-feet]	VOLUME CUM [acre-feet]
2725	5323.24	0.122	0.000	0.000
2726	5822.09	0.134	0.128	0.128
2727	6327.79	0.145	0.139	0.267
2728	6840.34	0.157	0.151	0.419

TOTAL PROVIDED VOLUME: **0.419**

VOLUME BREAKDOWN

Drainage Boundary	Sub-Basin Volumes	Disturbance Areas (acres)	100yr-2hr. provided ac-ft	100yr-2hr. Required ac-ft	Volume Shortage / Excess ±
F1	F1-1	0.1570	0.419		
	F1-2	0.2161	0.537		
	F1-3	0.2707	0.701		
	F1-4	0.1630	0.338		
	TOTAL	0.8067	1.995	1.44	0.555

BASIN - F1-2

STAGE	AREA [ft²]	AREA [acres]	VOLUME INC [acre-feet]	VOLUME CUM [acre-feet]
2708	6246.38	0.143	0.000	0.000
2709	7252.9	0.167	0.155	0.155
2710	8307.83	0.191	0.179	0.334
2711	9411.15	0.216	0.203	0.537

TOTAL PROVIDED VOLUME: **0.537**

BASIN - F1-3

STAGE	AREA [ft²]	AREA [acres]	VOLUME INC [acre-feet]	VOLUME CUM [acre-feet]
2696	8712.31	0.200	0.000	0.000
2697	9621.58	0.221	0.210	0.210
2698	10649.01	0.244	0.233	0.443
2699	11791.2	0.271	0.258	0.701

TOTAL PROVIDED VOLUME: **0.701**

BASIN - F1-4

STAGE	AREA [ft²]	AREA [acres]	VOLUME INC [acre-feet]	VOLUME CUM [acre-feet]
2676	3139.86	0.072	0.000	0.000
2677	4162.11	0.096	0.084	0.084
2678	5460.19	0.125	0.110	0.194
2679	7098.73	0.163	0.144	0.338

TOTAL PROVIDED VOLUME: **0.338**

BASIN - F2-1

STAGE	AREA [ft²]	AREA [acres]	VOLUME INC [acre-feet]	VOLUME CUM [acre-feet]
2700	765	0.018	0.000	0.000
2701	1324	0.030	0.024	0.024
2702	1953.89	0.045	0.038	0.062
2703	2662.39	0.061	0.053	0.115

TOTAL PROVIDED VOLUME: **0.115**

VOLUME BREAKDOWN

Drainage Boundary	Sub-Basin Volumes	Disturbance Areas (acres)	100yr-2hr. provided ac-ft	100yr-2hr. Required ac-ft	Volume Shortage / Excess ±
F2	F2-1	0.0611	0.115		
	F2-2	0.1637	0.396		
	TOTAL	0.2248	0.511	0.5	0.011

BASIN - F2-2

STAGE	AREA [ft²]	AREA [acres]	VOLUME INC [acre-feet]	VOLUME CUM [acre-feet]
2681	4470.86	0.103	0.000	0.000
2682	5282.49	0.121	0.112	0.112
2683	6174.37	0.142	0.132	0.243
2684	7130.31	0.164	0.153	0.396

TOTAL PROVIDED VOLUME: **0.396**

BASIN - F3-1				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]
2704	1240	0.028	0.000	0.000
2705	2048.96	0.047	0.038	0.038
2706	2915.75	0.067	0.057	0.095
2707	3851.96	0.088	0.078	0.172
2708	4957.71	0.114	0.101	0.274
2709	6277.08	0.144	0.129	0.403

TOTAL PROVIDED VOLUME: **0.403**

VOLUME BREAKDOWN

Drainage Boundary	Sub-Basin Volumes	Disturbance Areas (acres)	100yr-2hr. provided ac-ft	100yr-2hr. Required ac-ft	Volume Shortage / Excess ±
F3	F3-1	0.0884	0.403		
	TOTAL	0.0884	0.403	0.41	-0.007

BASIN - G-1				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]
2722	3720	0.085	0.000	0.000
2723	4513	0.104	0.095	0.095
2724	5460	0.125	0.114	0.209
2725	6561	0.151	0.138	0.347
2726	7817	0.179	0.165	0.512
2727	9484	0.218	0.199	0.711

TOTAL PROVIDED VOLUME: **0.512**

VOLUME BREAKDOWN

Drainage Boundary	Sub-Basin Volumes	Disturbance Areas (acres)	100yr-2hr. provided ac-ft	100yr-2hr. Required ac-ft	Volume Shortage / Excess ±
G	G-1	0.0000	0.512		
	TOTAL	0.0000	0.512	0.520	-0.008

BASIN - H1-1				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]
2738	36.36	0.001	0.000	0.000
2739	715.37	0.016	0.009	0.009
2740	2504.5	0.057	0.037	0.046
2741	5064.58	0.116	0.087	0.132
2742	8155.31	0.187	0.152	0.284
2743	11514.5	0.264	0.226	0.510
2744	15653.69	0.359	0.312	0.822
2745	20773.56	0.477	0.418	1.240
2745.5	24068.465	0.553	0.257	1.497
2746	27363.37	0.628	0.988	1.809

TOTAL PROVIDED VOLUME: **1.497**

VOLUME BREAKDOWN

Drainage Boundary	Sub-Basin Volumes	Disturbance Areas (acres)	100yr-2hr. provided ac-ft	100yr-2hr. Required ac-ft	Volume Shortage / Excess ±
H1	H1-1	0.5525	1.497		
	H1-2	0.2491	0.484		
	TOTAL	0.8016	1.98	1.82	0.2

BASIN - H1-2				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]
2721	49.02	0.001	0.000	0.000
2722	1008	0.023	0.012	0.012
2723	2630	0.060	0.042	0.054
2724	4685	0.108	0.084	0.138
2725	7311	0.168	0.138	0.276
2726	10849	0.249	0.208	0.484

TOTAL PROVIDED VOLUME: **0.484**

BASIN - H2-1				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]
2772	6103	0.140	0.000	0.000
2773	6926	0.159	0.150	0.150
2774	7774	0.178	0.169	0.318
2775	8675	0.199	0.189	0.507
2776	9692	0.222	0.211	0.718

TOTAL PROVIDED VOLUME: **0.718**

VOLUME BREAKDOWN

Drainage Boundary	Sub-Basin Volumes	Disturbance Areas (acres)	100yr-2hr. provided ac-ft	100yr-2hr. Required ac-ft	Volume Shortage / Excess ±
H2	H2-1	0.2225	0.718		
	H2-2	0.2463	0.590		
	TOTAL	0.4688	1.308	1.2	0.108

BASIN - H2-2				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]
2785	6526	0.150	0.000	0.000
2786	7846	0.180	0.165	0.165
2787	9247	0.212	0.196	0.361
2788	10730	0.246	0.229	0.590

TOTAL PROVIDED VOLUME: **0.590**

BASIN - I-1				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]
2755	7532	0.173	0.000	0.000
2756	8664	0.199	0.186	0.186
2757	9863	0.226	0.213	0.399
2758	11132	0.256	0.241	0.640

TOTAL PROVIDED VOLUME: **0.640**

VOLUME BREAKDOWN

Drainage Boundary	Sub-Basin Volumes	Disturbance Areas (acres)	100yr-2hr. provided ac-ft	100yr-2hr. Required ac-ft	Volume Shortage / Excess ±
I	I-1	0.2556	0.640		
	TOTAL	0.2556	0.640	0.63	0.010

BASIN - J-1				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC	CUM

VOLUME BREAKDOWN

Drainage Boundary	Sub-Basin Volumes	Disturbance Areas (acres)	100yr-2hr. provided ac-ft	100yr-2hr. Required ac-ft	Volume Shortage / Excess ±

	[ft²]	[acres]	[acre-feet]	[acre-feet]
2770	3543	0.081	0.000	0.000
2771	4264	0.098	0.090	0.090
2772	5183	0.119	0.108	0.198
2773	6092	0.140	0.129	0.327
2774	7205	0.165	0.153	0.480
2775	8610	0.198	0.182	0.662

TOTAL PROVIDED VOLUME: **0.662**

J	J-1	0.1977	0.662		
	TOTAL	0.1977	0.662	0.68	-0.018

BASIN - K-1

STAGE	AREA [ft²]	AREA [acres]	VOLUME INC [acre-feet]	VOLUME CUM [acre-feet]
2737	4211	0.097	0.000	0.000
2738	5026	0.115	0.106	0.106
2739	5909	0.136	0.126	0.232
2740	6860	0.157	0.147	0.378

TOTAL PROVIDED VOLUME: **0.378**

VOLUME BREAKDOWN

Drainage Boundary	Sub-Basin Volumes	Disturbance Areas (acres)	100yr-2hr. provided ac-ft	100yr-2hr. Required ac-ft	Volume Shortage / Excess ±
K	K-1	0.1575	0.378		
	TOTAL	0.1575	0.378	0.29	0.088

BASIN - L-1

STAGE	AREA [ft²]	AREA [acres]	VOLUME INC [acre-feet]	VOLUME CUM [acre-feet]
2722	1286.47	0.030	0.000	0.000
2723	2258.57	0.052	0.041	0.041
2724	3415.36	0.078	0.065	0.106
2725	4774.68	0.110	0.094	0.200

TOTAL PROVIDED VOLUME: **0.200**

VOLUME BREAKDOWN

Drainage Boundary	Sub-Basin Volumes	Disturbance Areas (acres)	100yr-2hr. provided ac-ft	100yr-2hr. Required ac-ft	Volume Shortage / Excess ±
L	L-1	0.0000	0.200		
	TOTAL	0.0000	0.200	0.21	-0.010

BASIN - M-1

STAGE	AREA [ft²]	AREA [acres]	VOLUME INC [acre-feet]	VOLUME CUM [acre-feet]
2713	2180	0.050	0.000	0.000
2714	2684.4	0.062	0.056	0.056
2715	3242.27	0.074	0.068	0.124
2716	3851.17	0.088	0.081	0.205

TOTAL PROVIDED VOLUME: **0.205**

VOLUME BREAKDOWN

Drainage Boundary	Sub-Basin Volumes	Disturbance Areas (acres)	100yr-2hr. provided ac-ft	100yr-2hr. Required ac-ft	Volume Shortage / Excess ±
M	M-1	0.0884	0.205		
	TOTAL	0.0884	0.205	0.2	0.005

BASIN - N-1

STAGE	AREA [ft²]	AREA [acres]	VOLUME INC [acre-feet]	VOLUME CUM [acre-feet]
2688	3077.83	0.071	0.000	0.000
2689	4145.22	0.095	0.083	0.083
2690	5272.59	0.121	0.108	0.191
2691	6491.16	0.149	0.135	0.326
2692	7806.7	0.179	0.164	0.490

TOTAL PROVIDED VOLUME: **0.490**

VOLUME BREAKDOWN

Drainage Boundary	Sub-Basin Volumes	Disturbance Areas (acres)	100yr-2hr. provided ac-ft	100yr-2hr. Required ac-ft	Volume Shortage / Excess ±
N	N-1	0.1792	0.490		
	TOTAL	0.1792	0.490	0.4	0.090

BASIN - O-1

STAGE	AREA [ft²]	AREA [acres]	VOLUME INC [acre-feet]	VOLUME CUM [acre-feet]
2721	527	0.012	0.000	0.000
2722	1798	0.041	0.027	0.027
2723	4070	0.093	0.067	0.094
2724	7173	0.165	0.129	0.223

TOTAL PROVIDED VOLUME: **0.223** acre-feet

VOLUME BREAKDOWN

Drainage Boundary	Sub-Basin Volumes	Disturbance Areas (acres)	100yr-2hr. provided ac-ft	100yr-2hr. Required ac-ft	Volume Shortage / Excess ±
O	O-1	0.1647	0.223		
	TOTAL	0.1647	0.223	0.08	0.143

BASIN - P-1

STAGE	AREA [ft²]	AREA [acres]	VOLUME INC [acre-feet]	VOLUME CUM [acre-feet]	
2764	2082	0.048	0.000	0.000	
2765	2732	0.063	0.055	0.055	1.0' depth

TOTAL PROVIDED VOLUME: **0.055** acre-feet

VOLUME BREAKDOWN

Drainage Boundary	Sub-Basin Volumes	Disturbance Areas (acres)	100yr-2hr. provided ac-ft	100yr-2hr. Required ac-ft	Volume Shortage / Excess ±
P	P-1	0.0627	0.055		
	P-2	0.1149	0.318		
	TOTAL	0.1776	0.373	0.24	0.133

BASIN - P-2

STAGE	AREA [ft²]	AREA [acres]	VOLUME INC [acre-feet]	VOLUME CUM [acre-feet]
2739	88.86	0.002	0.000	0.000
2740	493.65	0.011	0.007	0.007
2741	1522.96	0.035	0.023	0.030
2742	2955.84	0.068	0.051	0.081
2743	5005.28	0.115	0.091	0.173
2744	7620.68	0.175	0.145	0.318

TOTAL PROVIDED VOLUME: **0.318**

BASIN - Q-1

VOLUME BREAKDOWN

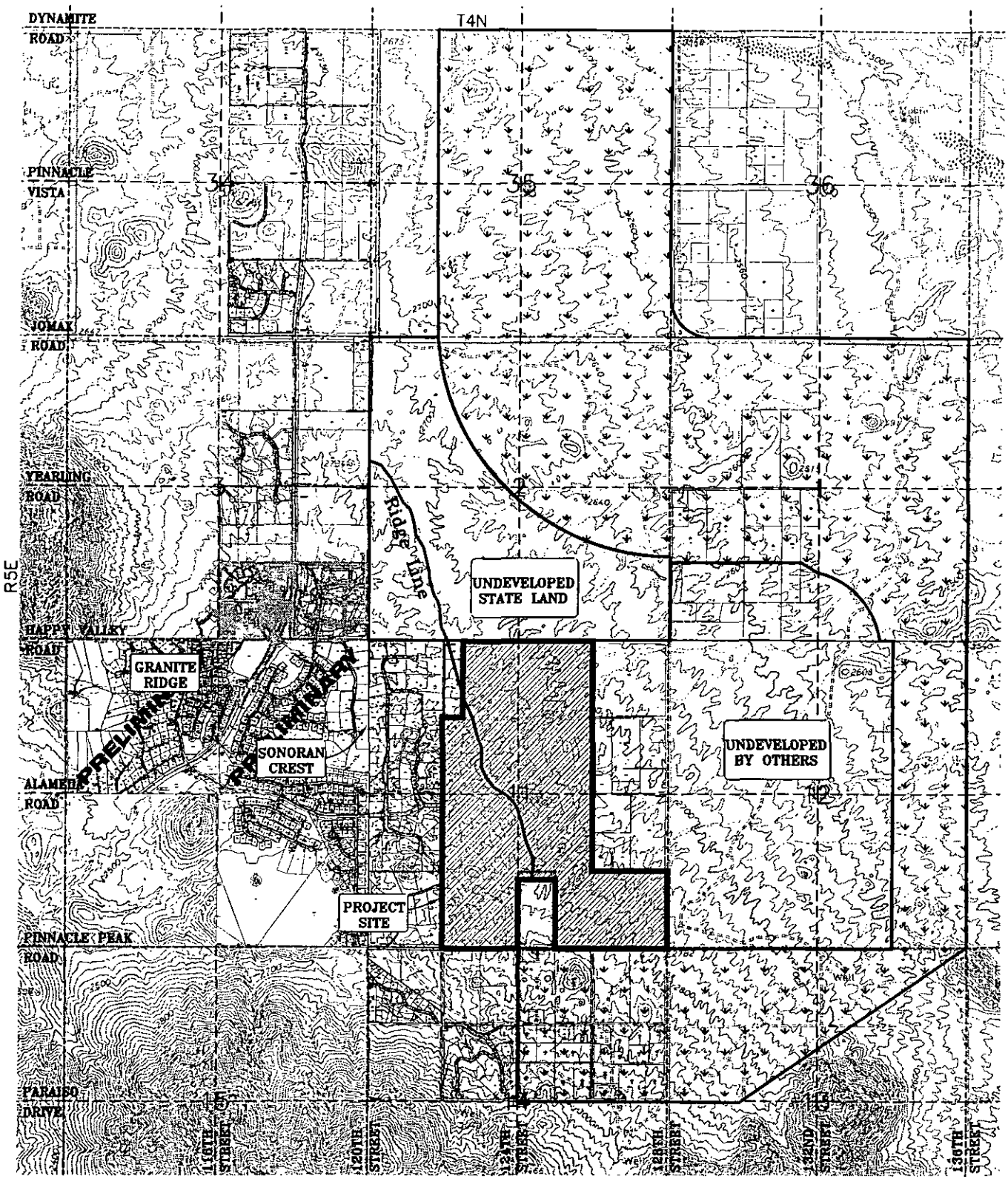
STAGE	AREA		VOLUME	
	[ft^2]	[acres]	INC [acre-feet]	CUM [acre-feet]
2774	2722	0.062	0.000	0.000
2775	3568	0.082	0.072	0.072

TOTAL PROVIDED VOLUME: **0.072**

Drainage Boundary	Sub-Basin Volumes	Disturbance Areas (acres)	100yr-2hr. provided ac-ft	100yr-2hr. Required ac-ft	Volume Shortage / Excess ±
Q	Q-1	0.0819	0.072		
	TOTAL	0.0819	0.072	0.07	0.002

PLATE 1

Vicinity Map



LEGEND

Project Boundry

Project Site

McDowell Sonoran Preserve

Existing 5 Foot Contours

2500 0 1250 2500

1 inch = 2500 ft.

CROWN COMMUNITY DEVELOPMENT
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SERENO CANYON

Plate 1
"Vicinity Map"

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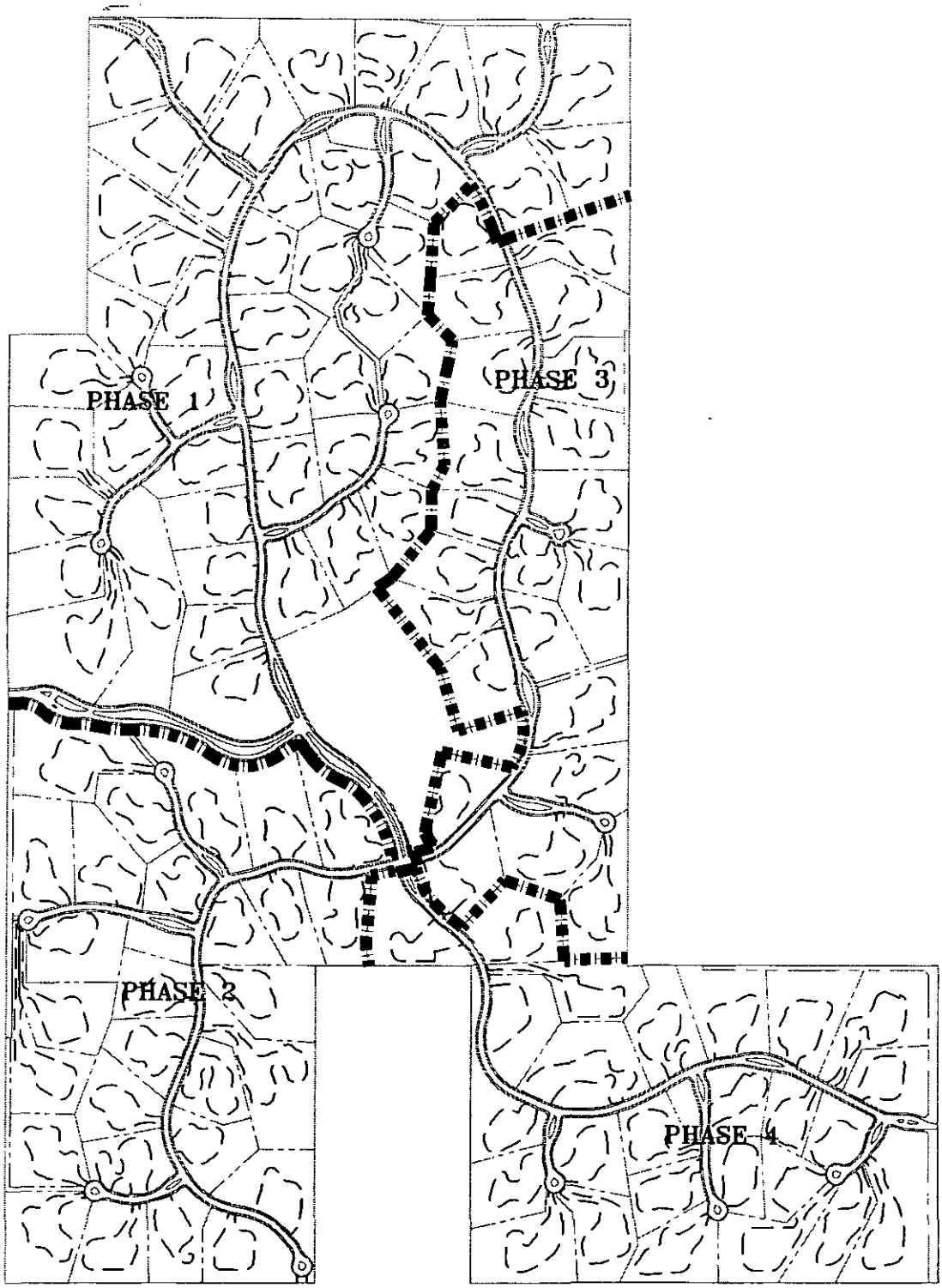
N:\2004\042054\Project Support\Hydro\Exhibits\FDR\ PLATE 01-VICINITYMAP.dwg - Feb 22,2006

PLATE 1A

Phasing Map



700 0 350 700

1 inch = 700 ft.

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Plate 1A

"Phasing Map"

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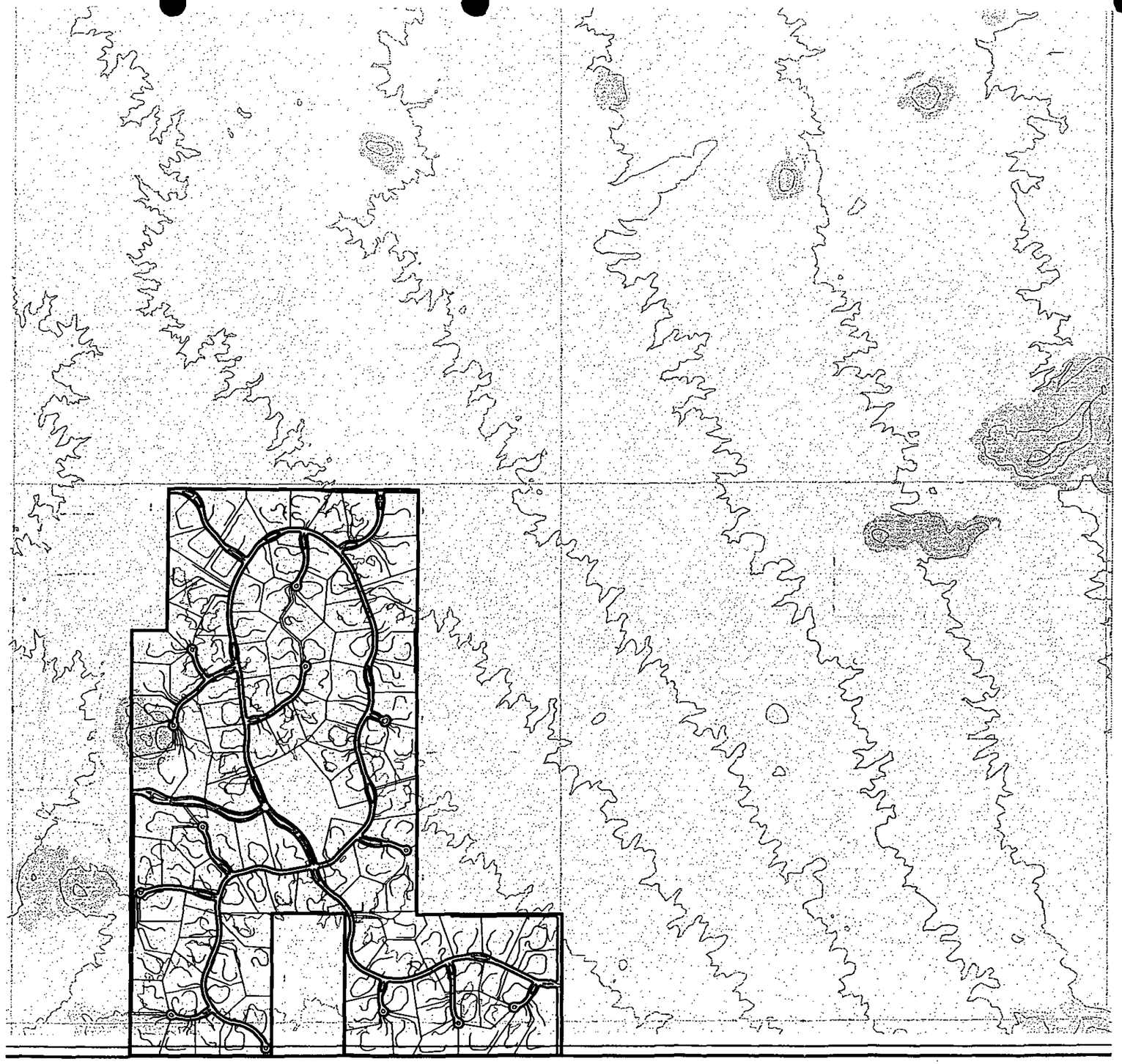
PLATE 2

ESL Classification



ESL Landforms and Protected Peaks and Ridges

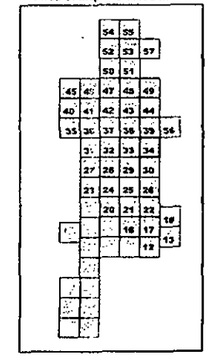
City Limits
Section Boundary
Streets

Landforms
- Lower Desert
- Upper Desert
- Hillside

Elevation
- 50' Contour
- 20' Contour

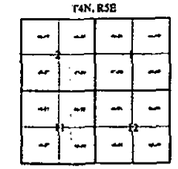
Protected Peaks and Ridges
- Peak or Ridge Line

Area of Map indicated in red



Official Detail Map
Map 34

T4N, R5E



Data Source: City of Scottsdale

1000 0 500 1000
Horz. 1 in. = 1000 ft.

PLATE 2
ESL CLASSIFICATION

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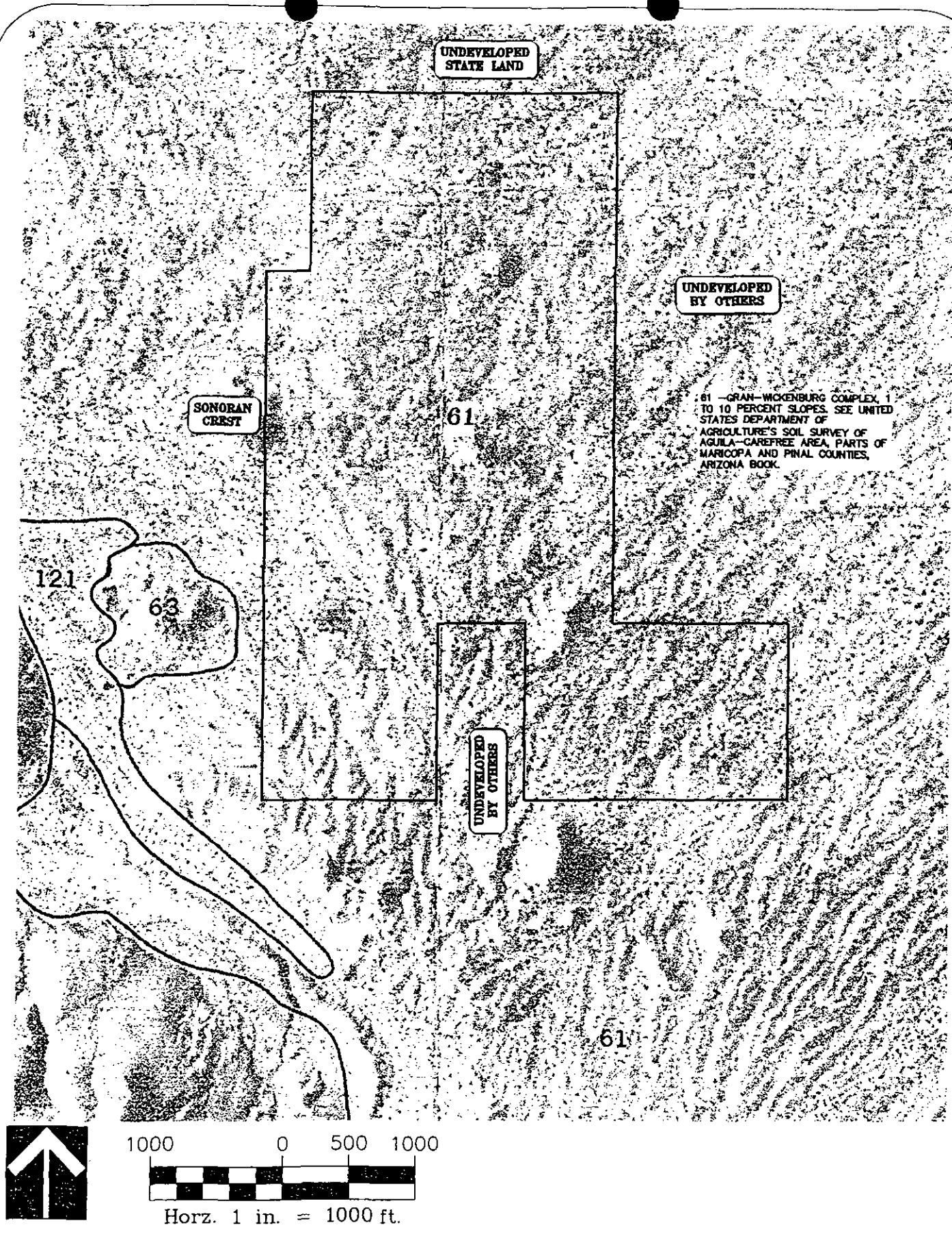
PLATE 3

Soils Classification Map



CROWN COMMUNITY DEVELOPMENT
A Harvey Crown Company

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Plate 3
"Soils Classification"

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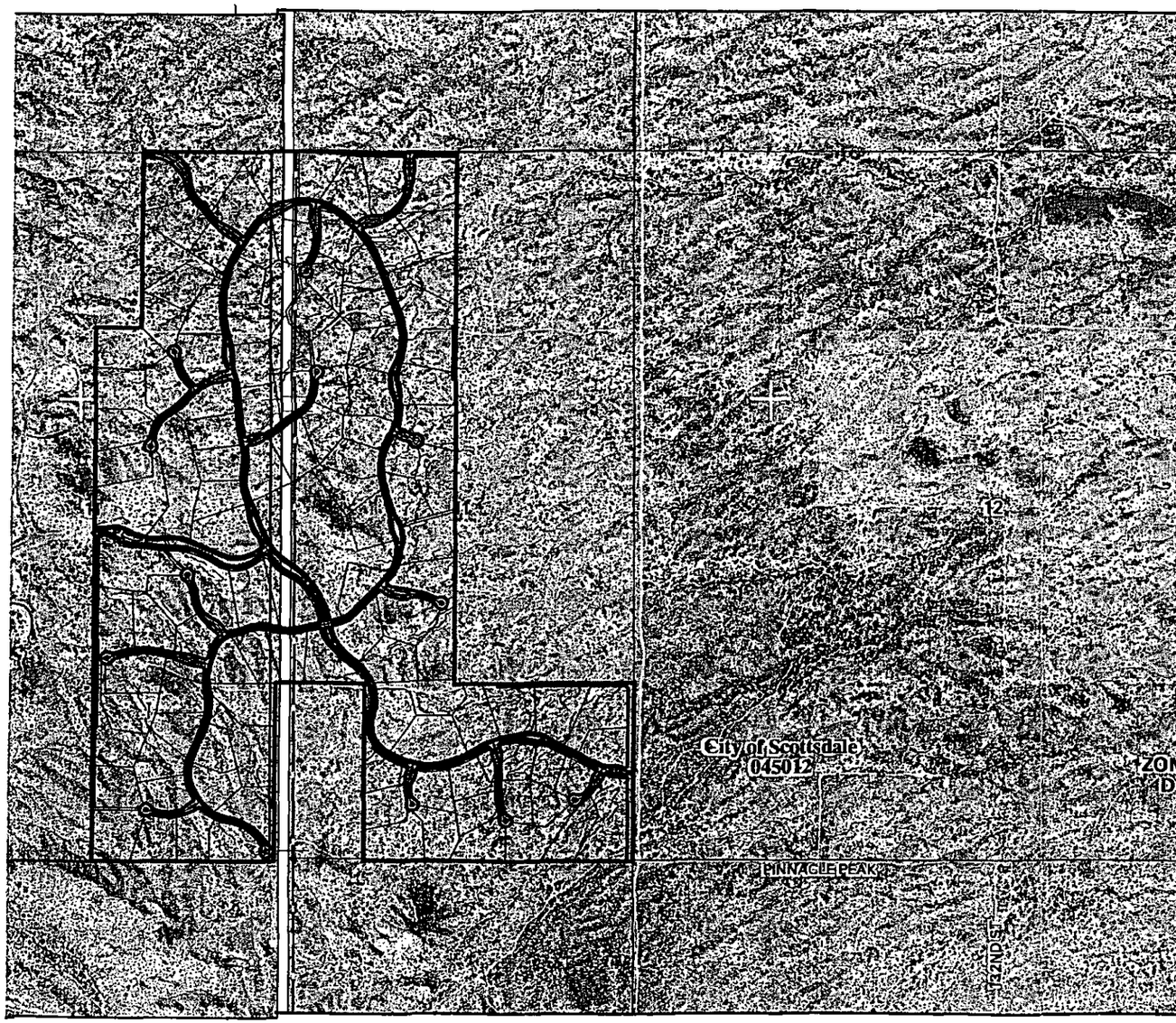
N:\2004\042054\Dwg\Exhibits\Soils Exhibit.dwg

PLATE 4

Flood Insurance Rate Map (FIRM)



MAP SCALE 1" = 1000'

0 1000 2000 FEET

0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1260F

FIRM
FLOOD INSURANCE RATE MAP
MARICOPA COUNTY, ARIZONA
AND INCORPORATED AREAS

PANEL 1260 OF 4350

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY	040037	1260	F
SCOTTSDALE, CITY OF	045012	1260	F

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
04013C1260F
MAP REVISED
SEPTEMBER 30, 2005

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

MAP SCALE 1" = 1000'

0 1000 2000 FEET

0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1255G

FIRM
FLOOD INSURANCE RATE MAP
MARICOPA COUNTY, ARIZONA
AND INCORPORATED AREAS

PANEL 1255 OF 4350

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
SCOTTSDALE, CITY OF	045012	1255	G

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

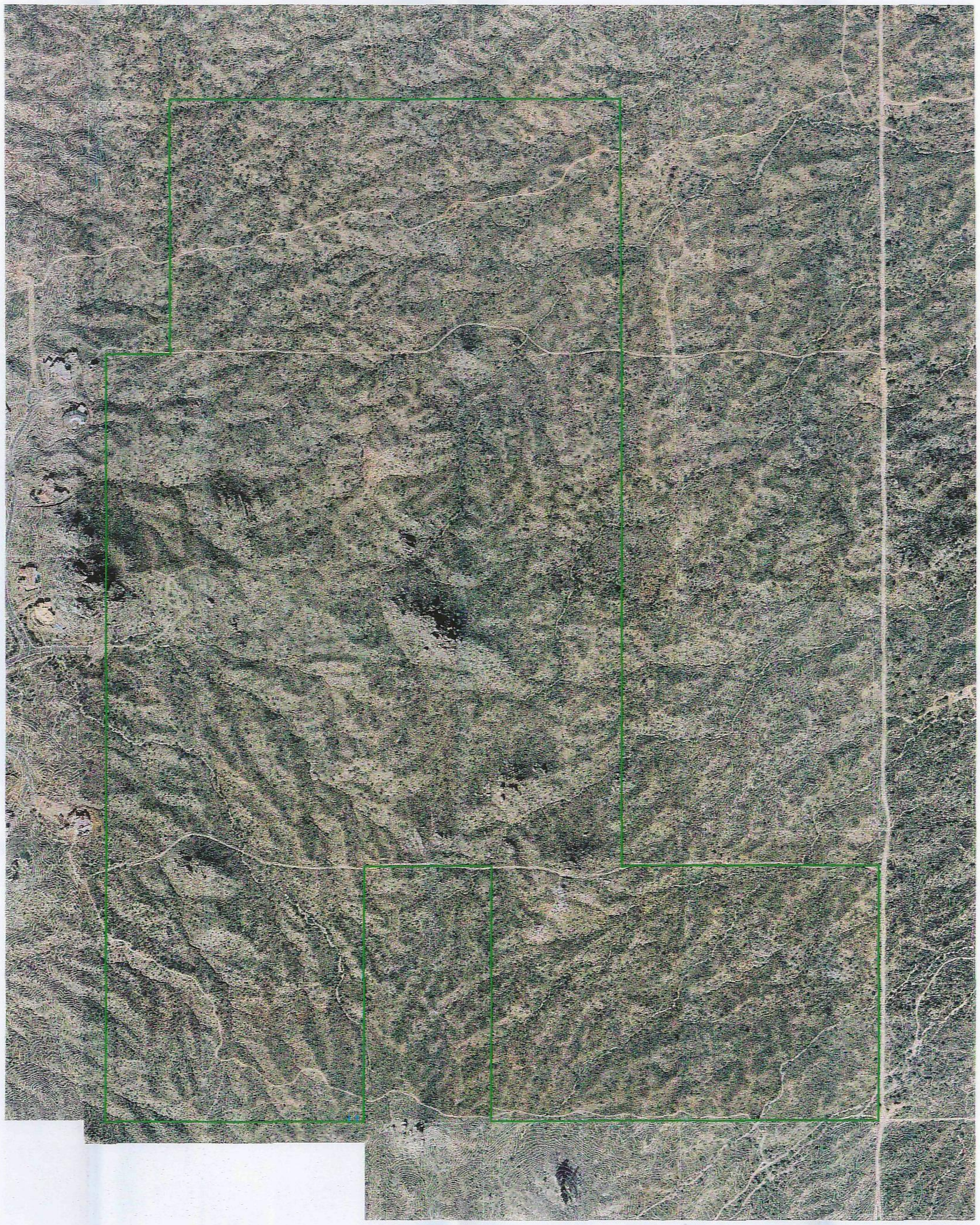
MAP NUMBER
04013C1255G
MAP REVISED
SEPTEMBER 30, 2005

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

PLATE 5

Color Topographic Aerial Photograph



300 0 150 300

Horz. 1 in. = 300 ft.

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Plate 5

"Topographic Aerial "

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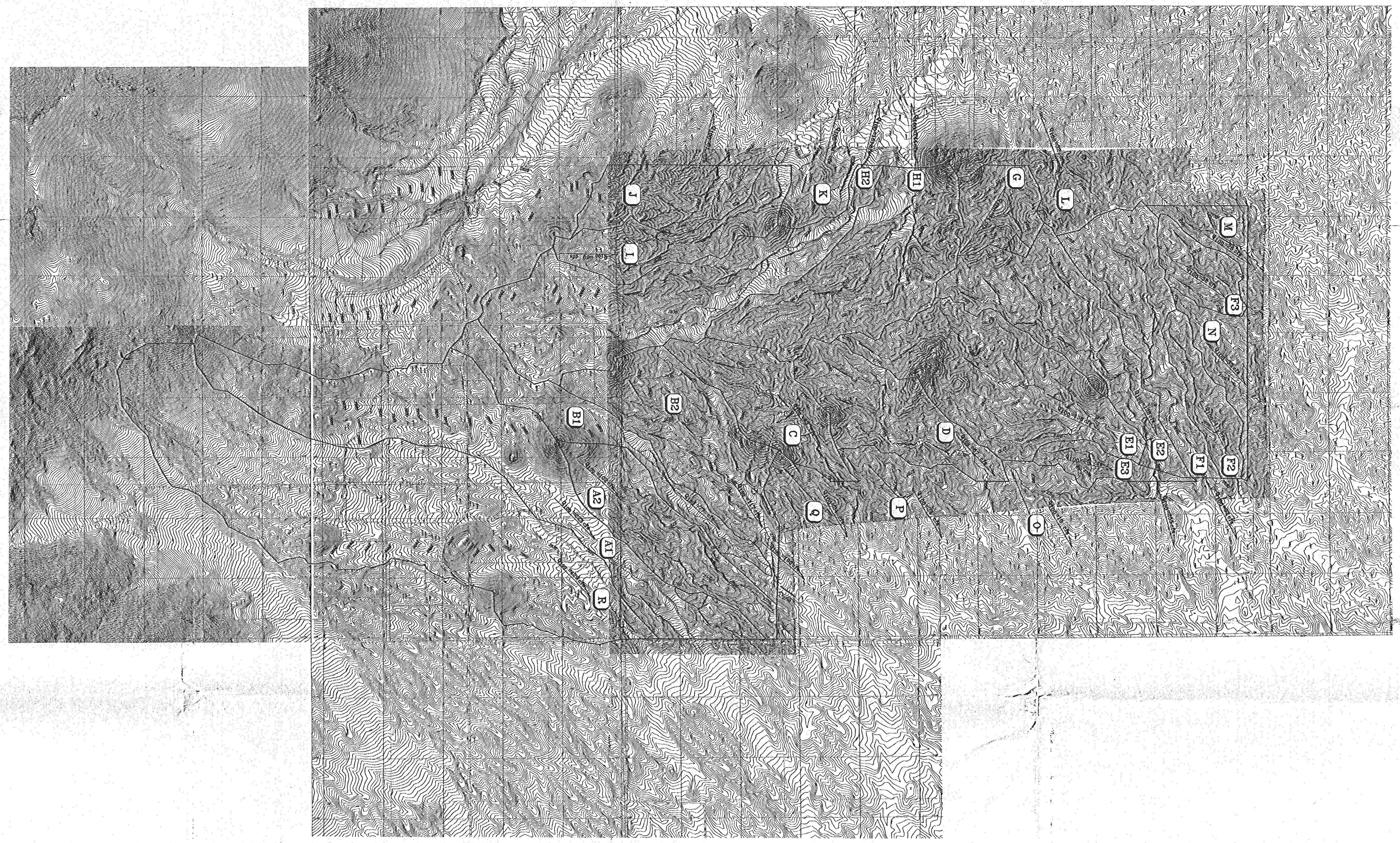
PLATE 6

Off-Site Watershed Area Map



400 0 200 400

1 inch = 400 ft.

LEGEND

H2 — HEC-1 SUB-BASIN ID AND CONCENTRATION POINT

SUB-BASIN BOUNDARY

FLOWLINE

PRE-DEVELOPMENT PEAK FLOW

PROJECT BOUNDARY

2799 — EXISTING CONTOUR LABELS

FLOW ARROW

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Plate 6

"Off-Site Watershed Area Map"

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PLATE 7

Section 404 Washes

250 0 125 250
1 inch = 250 ft.

LEGEND

PRELIMINARY SECTION 404 JURISDICTIONAL DELINEATION. A REQUEST FOR VERIFICATION HAS BEEN SUBMITTED TO THE A.C.O.E. FOR REVIEW AND APPROVAL.

N:\2004\04-205-A\Project Support\Hydro\Exhibits\FDR\PLATE 01-404.DWG - Feb 22,2006

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Plate 7

"404 Washes"

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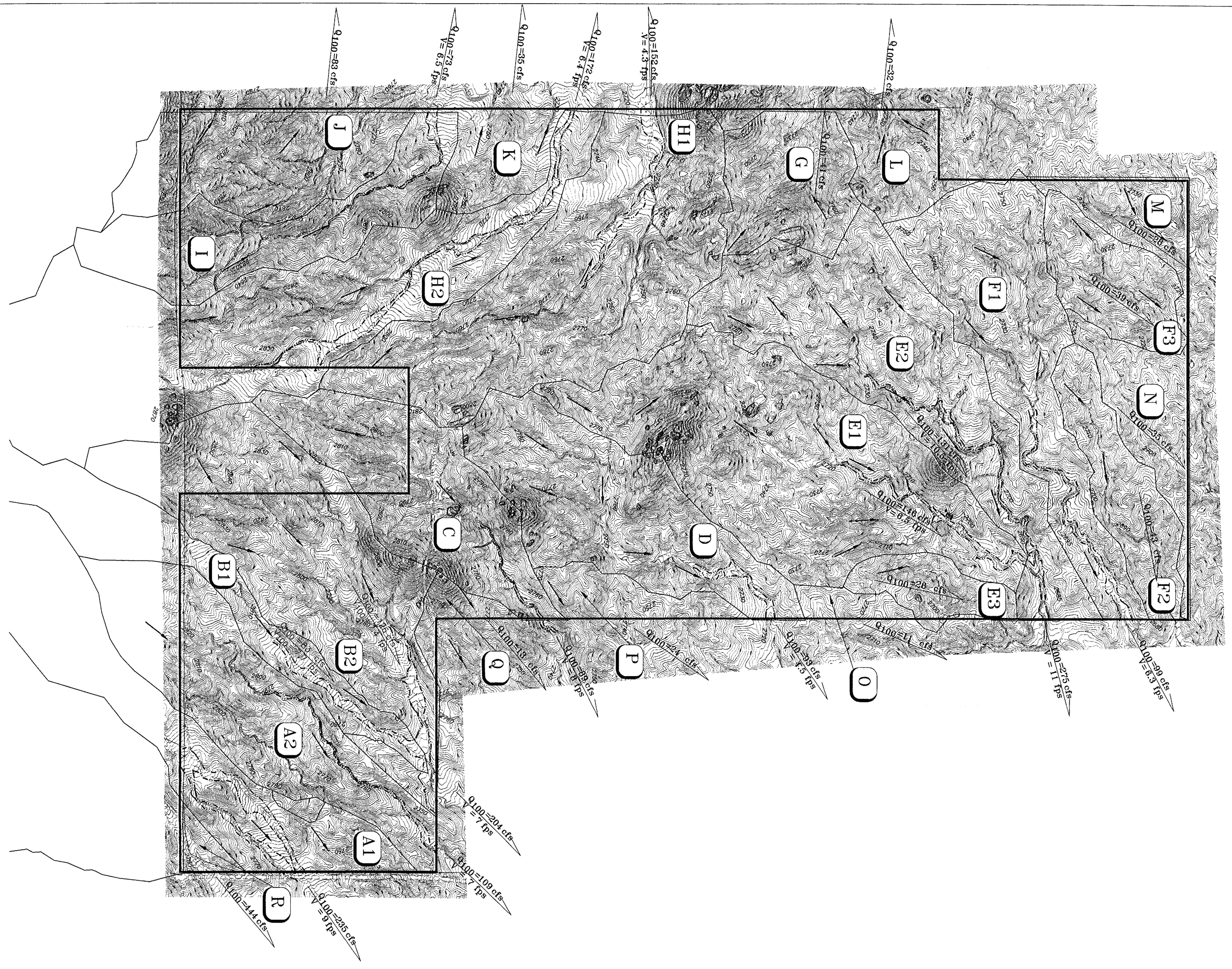
PLATE 8

Pre-Development Drainage Site Plan



250 0 125 250
1 inch = 250 ft.

LEGEND

- H2 — HEC-1 SUB-BASIN ID AND CONCENTRATION POINT
- SUB-BASIN BOUNDARY
- FLOODPLAIN BOUNDARY
- Q100=41 cfs V=5 fps — PRE-DEVELOPMENT PEAK FLOW AND CORRESPONDING VELOCITY
- PROJECT BOUNDARY
- 2799 — EXISTING 1 FOOT CONTOURS LABEL
- FLOW ARROW

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A Henry Crown Company

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Plate 8

"Pre-Development Drainage Site Plan"

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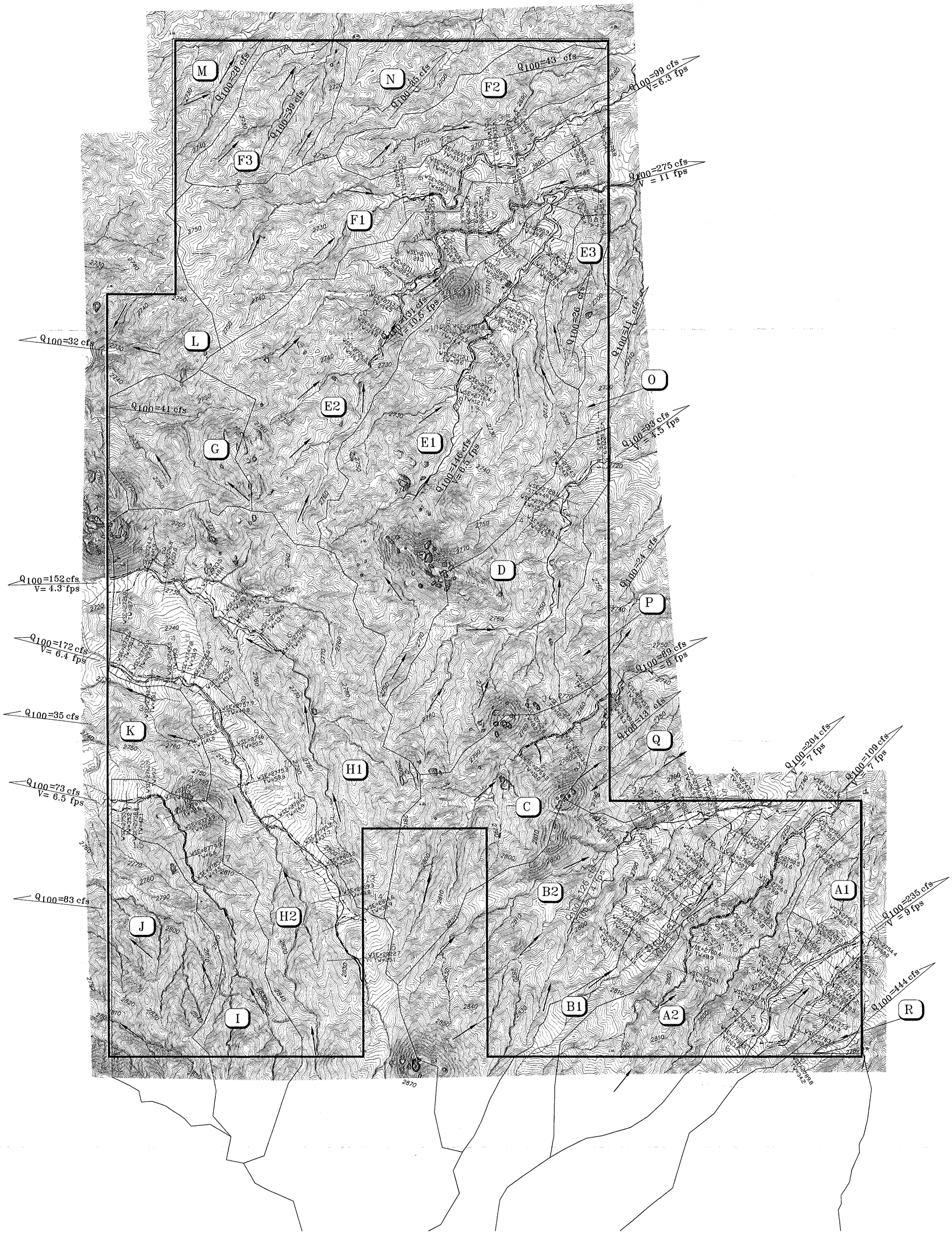
PLATE 9

Pre-Development Grading and Drainage Plan



LEGEND

H2	HEC–1 SUB–BASIN ID AND CONCENTRATION POINT
	SUB–BASIN BOUNDARY
	FLOWLINE
	FLOODPLAIN BOUNDARY
	404 WASH
Q100=41 cfs / V=5 fps	PRE–DEVELOPMENT PEAK FLOW AND CORRESPONDING VELOCITY
	PROJECT BOUNDARY
2790	EXISTING 1 FOOT CONTOUR LABEL
	FLOW ARROW
3 / WSE=2,762.70 / TW=61.10	HEC–RAS CROSS SECTION WITH RIVER STATION, WATER SURFACE ELEVATION AND TOP WIDTH

200 0 100 200
1 in. = 200 ft.

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Plate 9

"Pre-Development Grading and Drainage Site Plan"

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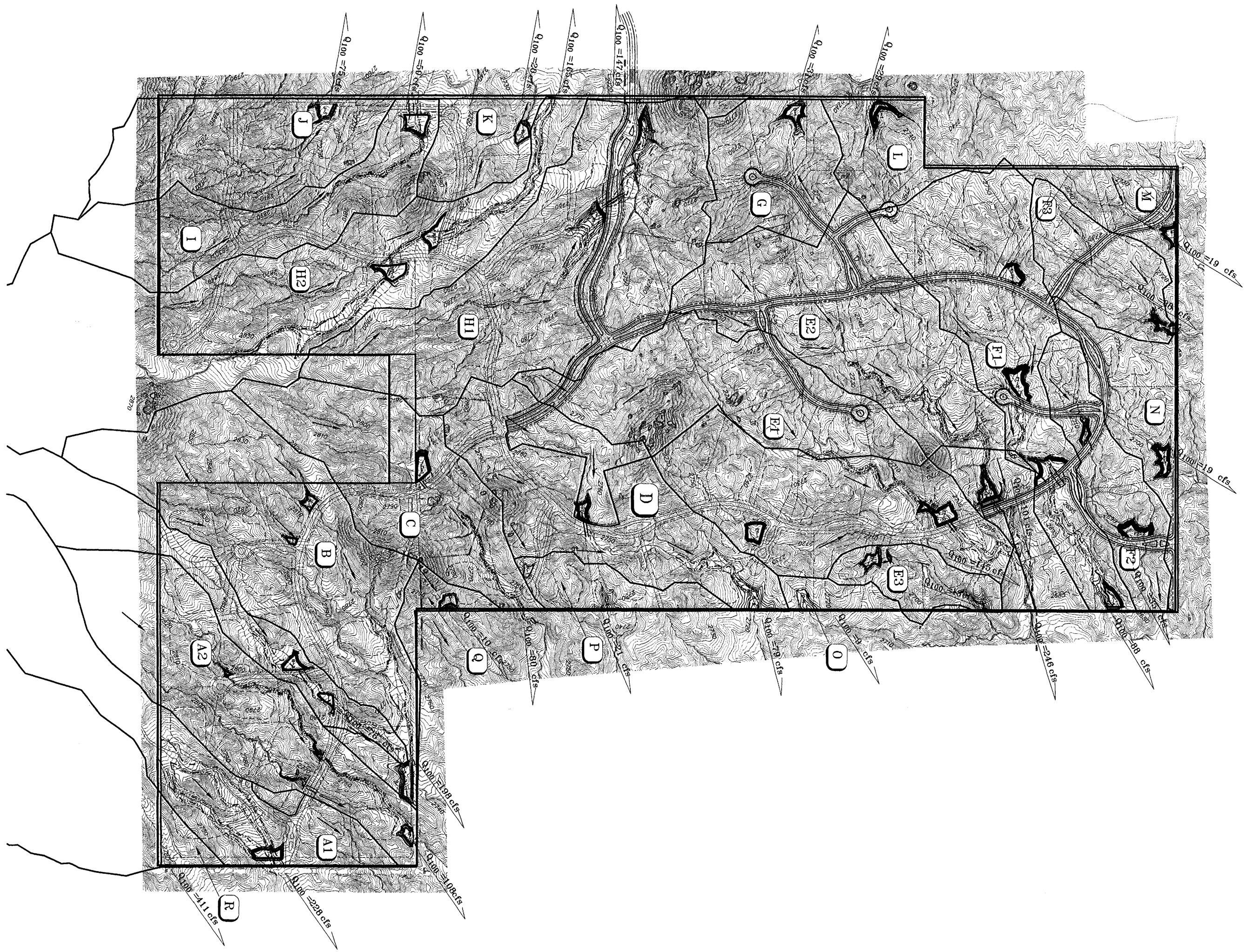
PLATE 10

Post-Development Drainage Site Plan



250 0 125 250

1 inch = 250 ft.

LEGEND

H2 — HEC-1 SUB-BASIN ID AND CONCENTRATION POINT

SUB-BASIN BOUNDARY

FLOWLINE

FLOODPLAIN BOUNDARY

Q100=41 cfs — POST-DEVELOPMENT PEAK FLOW

PROJECT BOUNDARY

2790 — EXISTING 1 FOOT CONTOURS LABEL

FLOW ARROW

DETENTION BASIN

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Plate 10

"Post-Development Drainage Site Plan"

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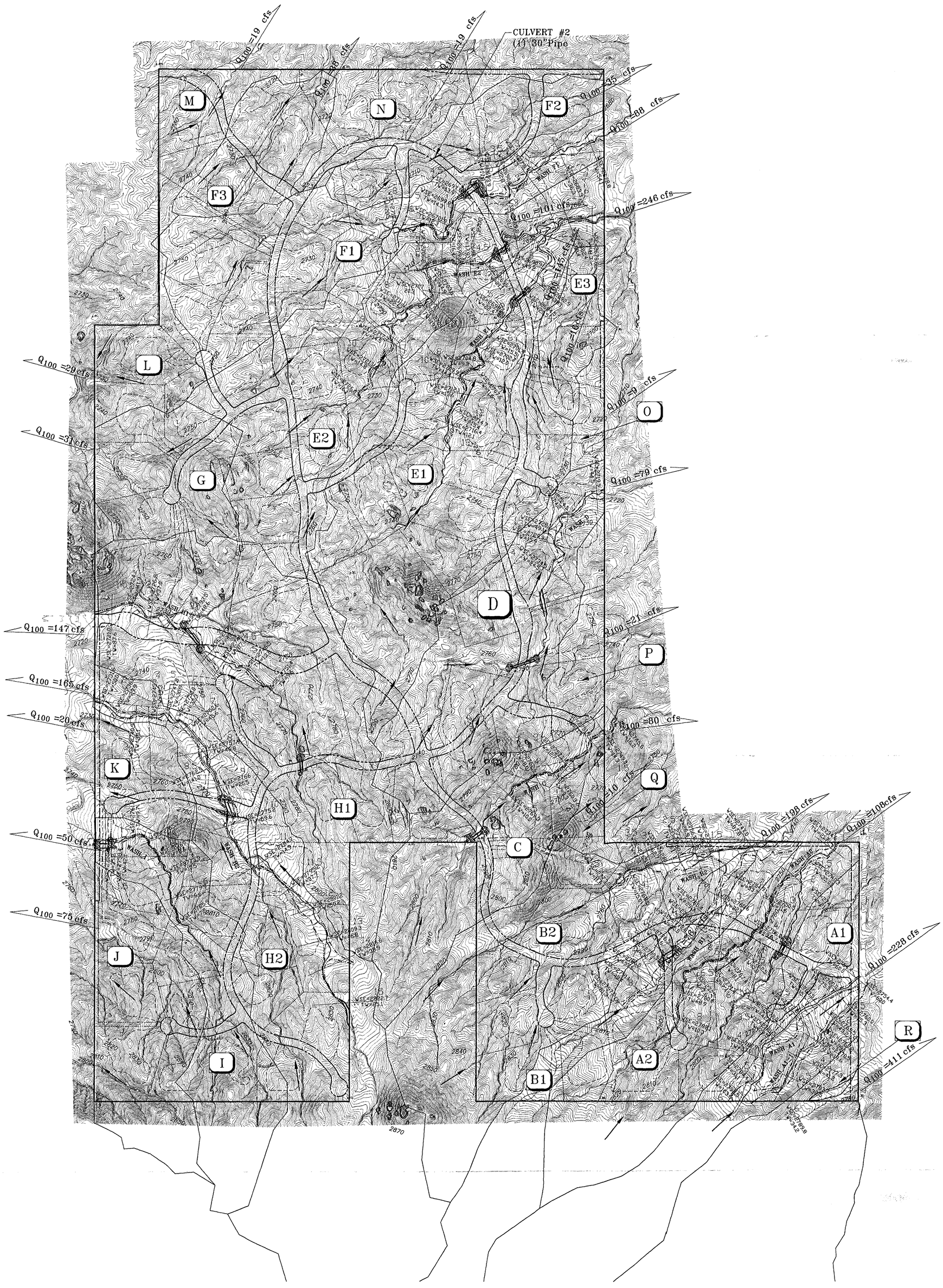
PLATE 11

Post-Development Grading and Drainage Plan



LEGEND

H2	HEC-1 SUB-BASIN ID AND CONCENTRATION POINT
	SUB-BASIN BOUNDARY
	FLOWLINE
	FLOODPLAIN BOUNDARY
	404 WASH
Q100=41 cfs	POST-DEVELOPMENT PEAK FLOW
	PROPOSED STORM DRAIN LOCATION
	PROJECT BOUNDARY
2790	EXISTING 1 FOOT CONTOUR LABEL
	FLOW ARROW
3 VSE=2762.70 TW=61.10	HEC-RAS CROSS SECTION WITH RIVER STATION, WATER SURFACE ELEVATION AND TOP WIDTH
	RIP RAP

200 0 100 200
1 in. = 200 ft.

WOOD/PATEL ASSOCIATES
Civil Engineers
Hydrologists
Land Surveyors
(602) 335-8500

SERENO CANYON
Plate II
"Post-Development Grading and Drainage Site Plan"

CROWN COMMUNITY DEVELOPMENT
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