CONCEPTUAL
MASTER DRAINAGE REPORT
FOR
SERENO CANYON

May 12, 2006

WP# 042054

Prepared for.

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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) 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 storm water storage requirements by providing retention 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 entents along with determination of the 100-year water surface elevations for the major drainage courses using HEC RAS.

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 is not mass graded and the outcroppings will be the same in both the existing and proposed conditions and does 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 flows are 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 the 100-year, 6-hour water surface entents 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 flows 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 washes 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 offsite 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 Retention/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 retention 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 retention 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 Please note that the proposed storage basins act as retention basins up to a height of 3 feet and as detention basins above 3 feet A detailed description on the design and analysis of these basins is provided in Section 3 5 1 Also included is a discussion on how retention and detention is achieved through these storage basins

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 a curb opening 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 offsite 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 storm water storage requirements, on-site storm water 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 storm water storage volumes 100-year, 2-hour event storm water runoff is proposed to be retained on site through retention basins upstream of culvert crossings and at other strategic locations along existing on-site washes Several basins were designed to retain runoff at a depth of four feet (4') in order to meet the volume provided requirements, and because of ESL and NAOS constraints During final design when roadway profile and pad elevations have been established, these basins will be reconfigured to pond a maximum depth of three feet (3') 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 retention volumes are discussed in Section 5 2 4

Provided below is a summary of the storm water storage required and provided for each individual drainage basin The following table, Table 3 3 below indicates that the storm water storage provided is in excess of the storm water storage required for the entire site by 2 28 ac-ft Please refer to Appendix E for detailed storm water storage calculations

3.3.1 Dissipation of Stormwater

18-inch bleedoff pipes with removable orifice plates are proposed for the dissipation of the stormwater retained within the stipulated time of 36 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 at a rate of 1 1 cfs The calculation is included in Appendix F

Table 3.3: Storm Water 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	1.04	0.51
A2	7.17	1.01	1.01	0.00
B	10.94	1.54	1.68	0.14
C	3.65	0.51	0.79	0.28
D	7.73	1.09	1.21	0.12
E1	14.24	2.01	2.03	0.02
E2	13.23	1.87	1.93	0.06
E3	2.19	0.32	0.34	0.02
F1	10.24	1.44	1.60	0.16
F2	3.56	0.5	0.78	0.28
F3	2.93	0.41	0.56	0.15
G	3.7	0.52	0.59	0.07
H1	12.94	1.82	1.94	0.12
H2	8.5	1.2	1.21	0.01
I	4.44	0.63	0.64	0.01
J	4.81	0.68	0.71	0.03
K	2.06	0.29	0.38	0.09
L	1.49	0.21	0.23	0.02
M	1.44	0.2	0.28	0.08
N	2.81	0.4	0.42	0.02
O	0.55	0.08	0.09	0.01
P	1.73	0.24	0.27	0.03
Q	0.52	0.07	0.07	0.00
R	0.18	0.02	0.05	0.03
Total	**125**	**17.59**	**19.87**	**2.28**

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 retention upstream of the culvert road crossings and other strategic locations reduced the combined peak flow to below the pre-development peak flow for the 2-year, 10-year, and 100-year, 6-hour storm events Further, the post-development flows were reduced to at or below the pre-development flows at every drainage basin 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 flows at concentration points 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	43	39	-4
A2	20	14	-6
B1	16	9	-7
COMB B	34	23	-11
C	16	11	-5
D	16	9	-7
E1	24	13	-11
E2	25	17	-8
COMBE	45	21	-24
E3	5	0	-5
F1	18	12	-6
F2	8	5	-3
F3	7	4	-3
G	7	0	-7
H1	26	4	-22
H2	29	16	-13
I	13	2	-11
J	17	9	-8
K	9	0	-9
L	7	3	-4
M	6	0	-6
N	7	0	-7
O	2	2	0
P	5	5	0
Q	3	3	0
R	89	83	-6

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

Concentration Point	Existing Flow (cfs)	Developed Flow (cfs)	Net Downstream Effect (cfs)
A1	225	223	-2
A2	103	100	-3
B1	79	73	-6
COMB B	192	186	-6
C	85	78	-7
D	88	82	-6
E1	136	131	-5
E2	129	123	-6
COMBE	258	233	-25
E3	26	15	-11
F1	93	88	-5
F2	42	41	-1
F3	38	34	-4
G	39	25	-14
H1	143	117	-26
H2	161	154	-7
I	70	49	-21
J	81	73	-8
K	34	20	-14
L	31	29	-2
M	27	18	-9
N	34	19	-15
O	11	9	-2
P	24	21	-3
Q	12	10	-2
R	429	402	-27

3.5 Proposed Drainage Structures

3.5.1 On-site Retention/Detention

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

These basins are designed to retain the volume collected for the first three feet of basin depth, and detain any additional volume above 3 feet (3') deep. This is accomplished through an outlet structure consisting of a 3 foot (3') high weir Please refer to Figure 3 5 1 for an illustration of this design Further, an 18-inch bleed-off pipe with a removable orifice plate is proposed at the outlet to drain the water retained in the retention basin behind the weir within the stipulated time of 36 hours Storm water volumes will be retained in the basin up to a height of 3 feet (3') Several basins were designed to retain runoff at a depth of four feet (4') in order to meet the volume provided requirements, and because of ESL and NAOS constraints During final design when roadway profile and pad elevations have been established, these basins will be reconfigured to pond a maximum depth of three feet (3').The bleed-off pipe with orifice plate will drain the water into the natural watercourses downstream of the basin Thus no dry wells are needed for draining the basins as required by the drainage ordinance of the City of Scottsdale The orifice plate will only be removed for maintenance purposes

Storm water volumes above 3 feet (3') high will overflow over the weir For the 2-year, 10-year, and 100-year, 6-hour storm events, these basins act as detention basins to attenuate the post-development flows to at or below the pre-development flows Peak flows are routed through these basins acting as on-line detention for the 2-year, 10-year, and 100-year, 6-hour storm events 100-year, 6-hour peak flows overtop the weirs detained at a depth less than 2 feet (2') as shown in Table 3 4-1 The peak flow volume during the smaller events (2-year, 6-hour) is completely retained in the basins as indicated by zero discharge at post-development conditions in the HEC-1 model The volume retained will be drained through the bleed-off pipe This attenuation is modeled using HEC-1

Provided below in Figures 3.5 1A and 3 5 1B is a graphical illustration of storm water routing/storage through a detention basin

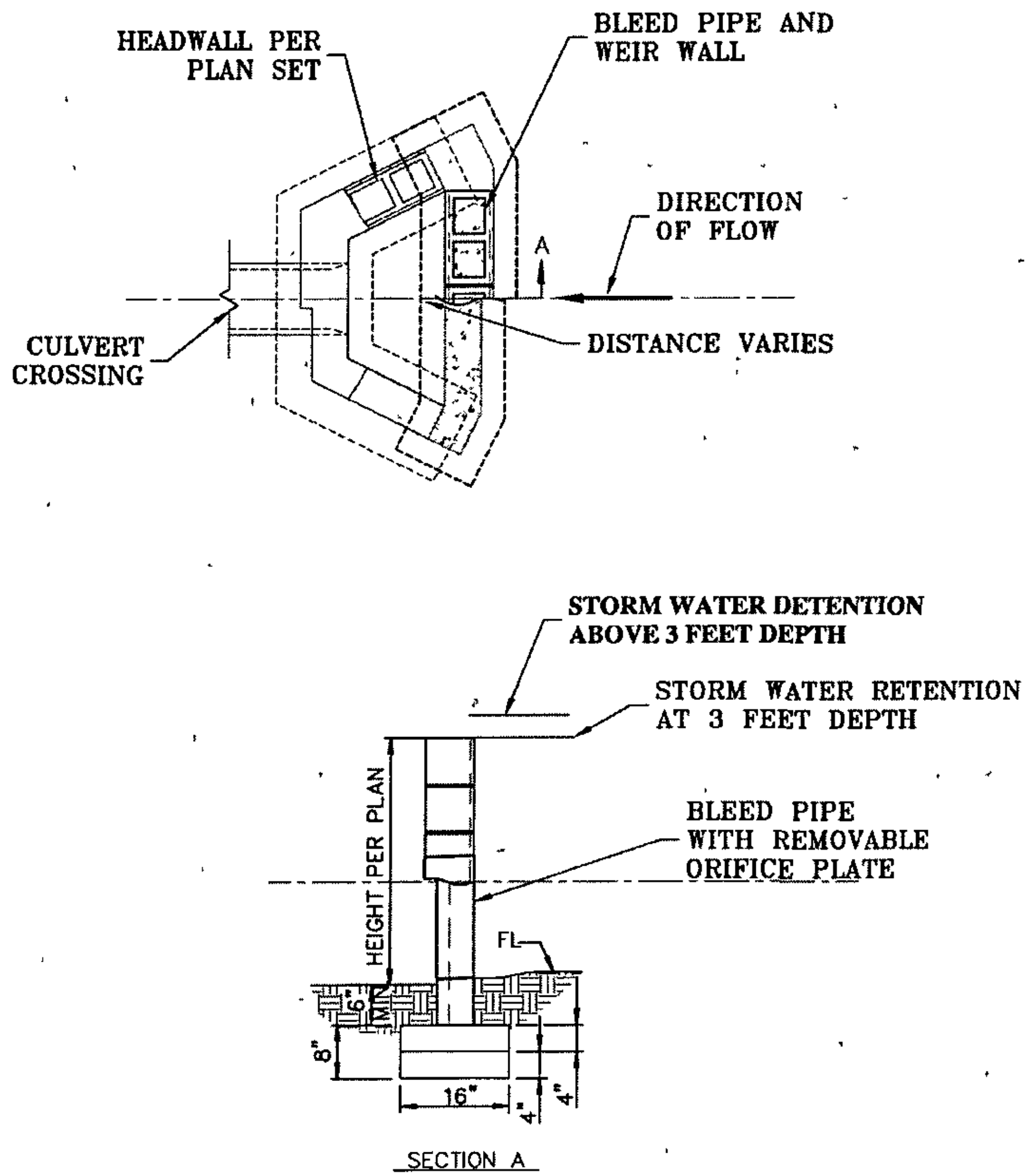


Figure 3.5.1A– Weir Wall and Bleed Pipe at Headwall

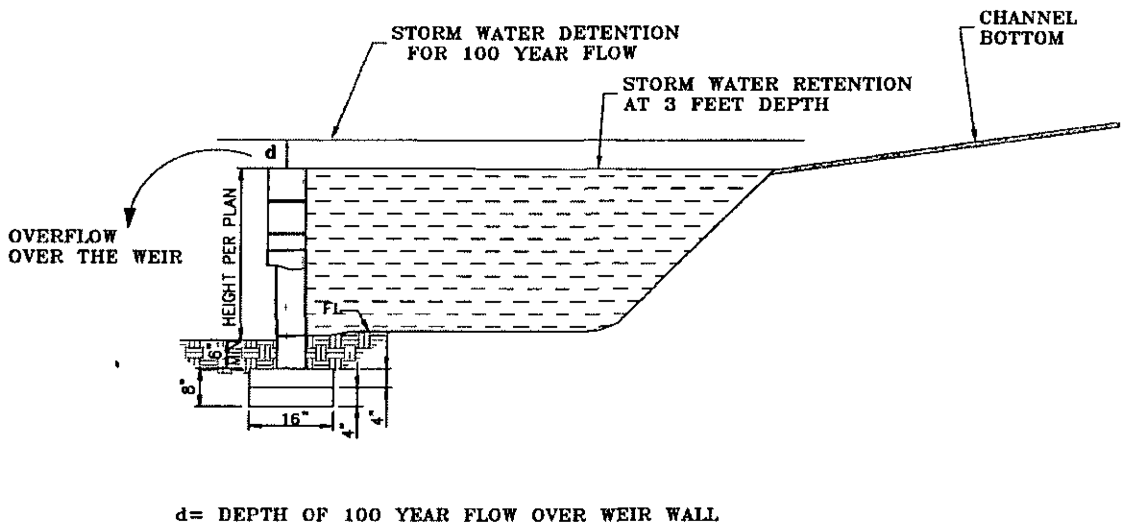


Figure 3.5.1B – Storm Water Routing through a Detention Basin

3.5.2 Roadway Crossing Structures

Please note that the culvert crossings under the roadways were not sized for this report 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. However, care should be taken that the headwater behind the culvert does not inundate the building envelopes Also, where weirs are present, the headwater elevation at the culvert should be at or below the water surface elevation over the weir during 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

4.1 404 Washes

All washes within the project were investigated to identify those that may be deemed jurisdictional The United States Army Corp of Engineers approved 404 Jurisdictional Delineation is presented on Plate 7 – *404 Washes* This plate provides the approved 404 wash locations within the project site The 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 based on Table 3 5 provided in the HEC-1 manual A copy of this table is included in Appendix A· Based on the site conditions illustrated by the photographs in Appendix A, the site is considered to be sparse rangeland with debris and 20 percent cover From the aforementioned table in the HEC-1 manual an average resistance factor for overland flow of 15 was chosen

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 Please note that the values in Table 3 5 are not specific to Arizona The closest category and value applicable to the site was chosen

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 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 storm water storage requirements, on-site storm water 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 storm water storage volumes 100-year, 2-hour storm water retention volume is to be provided for the proposed development at a depth not to exceed three feet (3') 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 retention volumes are presented below

5.1.4.1 Required Retention Volume

Retention volume required for the 100-year, 2-hour event is

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

Where

- V is the required retention 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 Retention Volume

Retention 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 retention volume in acre-feet
- A is the contour area in acres
- ELEV is the contour elevation

Section 3.3 of this report describes the storm water storage provided through proposed detention basins. Assumptions that were made when determining provided volume were maximum side slopes of 4 1 and a maximum ponding depth of three (3) feet

Please refer to retention basin volume calculations in Appendix G

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 retention/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	225	2754 31	2754 27	0 03
A2	112	103	2734 62	2734 57	0 04
B	210	192	2747.05	2746 98	0 07
H2	193	161	2731 65	2731.61	0 04
I	76	70	2755 89	2755 85	0 03

The table indicates that the water surface elevations change by only up to 0 07 feet for increases in flow up to 32 cfs 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 retention 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 riprap at both the inlet and the outlet to dissipate energy and provide flow line scour protection Retention basins upstream of the roadways will incorporate a protected overflow area (using native riprap and filter fabric) in the event of overtopping The bleed-off pipes will also incorporate riprap 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 retention/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 storm water retention
5. Several basins were designed to retain runoff at a depth of four feet (4') in order to meet the volume provided requirements, and because of ESL and NAOS constraints During final design when roadway profile and pad elevations have been established, these basins will be reconfigured to pond a maximum depth of three feet (3')
6. 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
7. The stormwater retained will be drained within 36 hours through bleed-off pipes with orifice plates
8. The design of hydraulic structures is to be based on generally accepted engineering practices and in accordance with City of Scottsdale requirements
9. On-going maintenance is required for all drainage systems in order to assure design performance
10. 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

6. U S Army Corps of Engineers, *HEC-RAS, Version 3 1 2*, April 2004

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

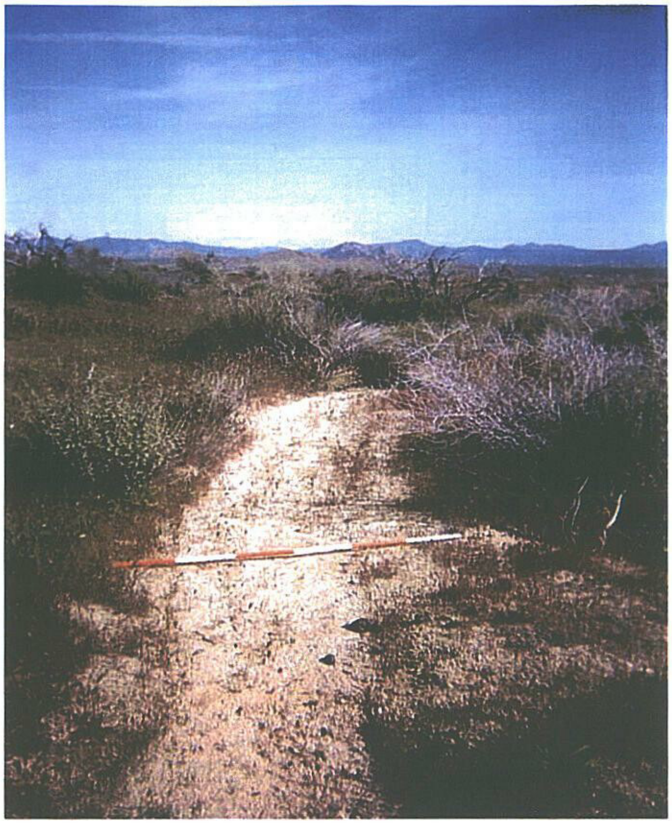


Photo 3

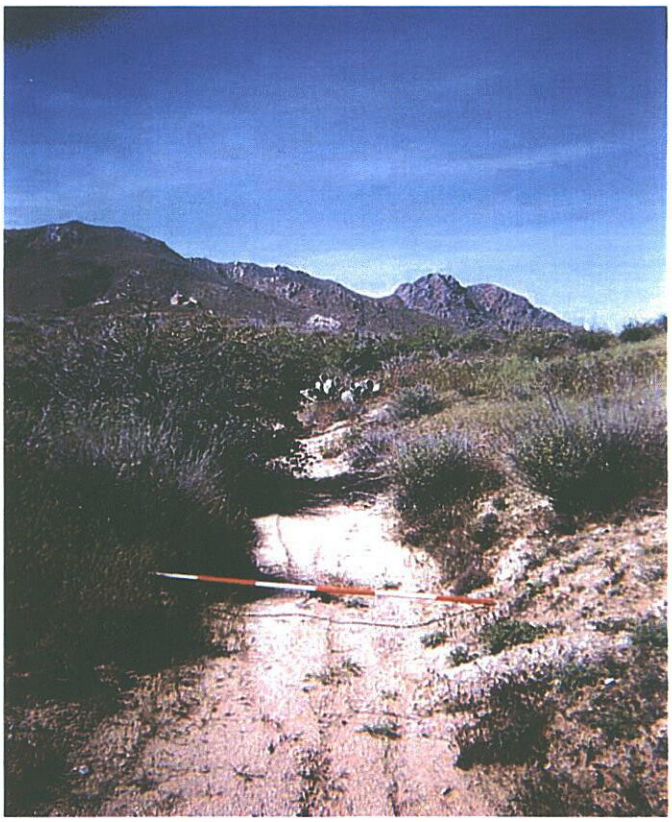


Photo 4

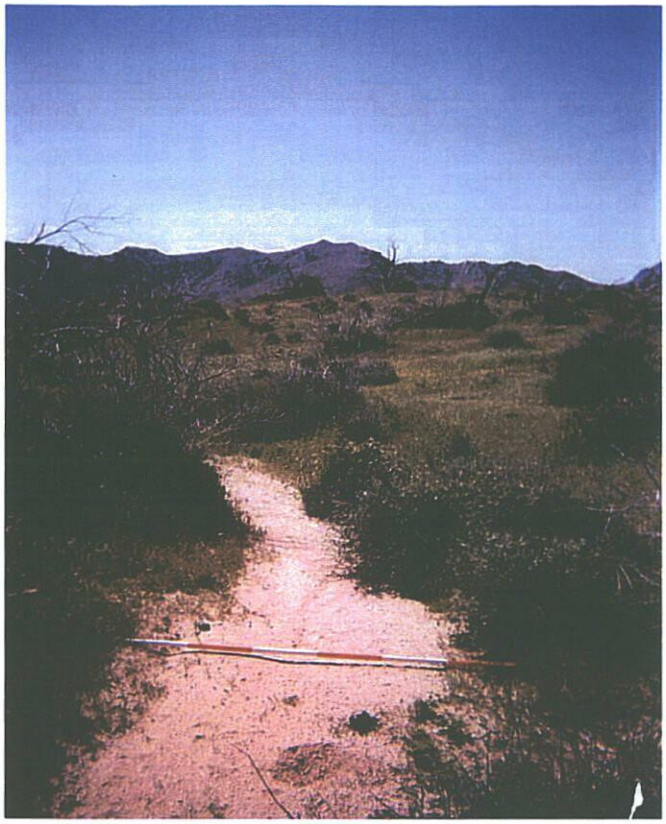


Photo 11

Photo 12

Photo 13

Photo 14

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

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	Bedrock: Depth	Bedrock: Hardness	Cemented pan: Depth	Cemented pan: Hardness	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					In		In			
[redacted]*,59*: [redacted]enure	B	None	---	---	>60	---	---	---	High	Low.
60*: [redacted]lenbar, [redacted]oncalcareous	B	Rare	---	---	>60	---	---	---	High	Low.
Glenbar, Calcareous	B	Rare	---	---	>60	---	---	---	High	Low
[redacted]*, 62*: [redacted]ran	D	None	---	---	20-40	Hard	---	---	High	Low.
Wickenburg	D	None	---	---	3-20	Soft	---	---	High	Low.
[redacted]*, 64*: [redacted]ran	D	None	---	---	20-40	Hard	---	---	High	Low.
Wickenburg	D	None	---	---	3-20	Soft	---	---	High	Low
[redacted]ck outcrop.										
65*: Greyeagle	D	None	---	---	>60	---	4-20	Thick	High	Low.
[redacted]ntinental	C	None	---	---	>60	---	---	---	High	Low.
Nickel	B	None	---	---	>60	---	---	---	High	Low.
[redacted]: [redacted]eyeagle	D	None	---	---	>60	---	4-20	Thick	High	Low.
Suncity Variant	D	None	---	---	>60	---	5-20	Thick	High	Low.
[redacted]: [redacted]uest	D	Rare	---	---	>60	---	---	---	High	Low.
58*, 69*: Gunsight	B	None	---	---	>60	---	---	---	High	Low.
[redacted]priano	D	None	---	---	>60	---	5-20	Thick	High	Low.
70*, 71*: Gunsight	B	None	---	---	>60	---	---	---	High	Low.
[redacted]llito	B	None	---	---	>60	---	---	---	High	Low.
72*, 73*: Lehmans	D	None	---	---	6-20	Hard	---	---	High	Low.
[redacted]ck outcrop										
74*: Luke	C	None	---	---	>60	---	20-40	Thick	High	Low.
[redacted]priano	D	None	---	---	>60	---	4-20	Thick	High	Low.
75, 76, 77, 78, 79: [redacted]ohall	B	None	---	---	>60	---	---	---	High	Low
[redacted]*, 81*: Mohall	B	None	---	---	>60	---	---	---	High	Low

[redacted] See footnote at end of table

Flood Control District of Maricopa County

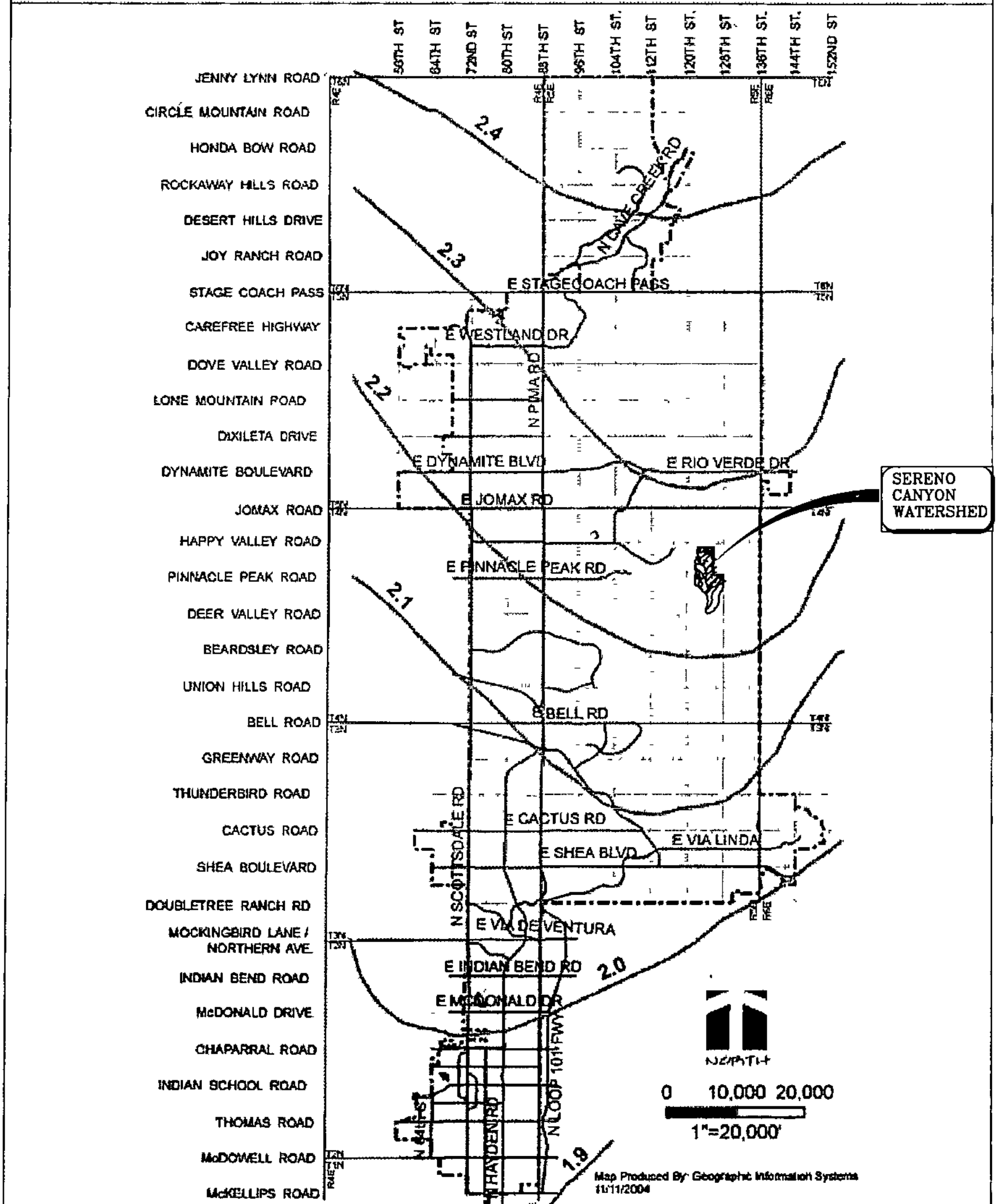
Rainfall Data

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

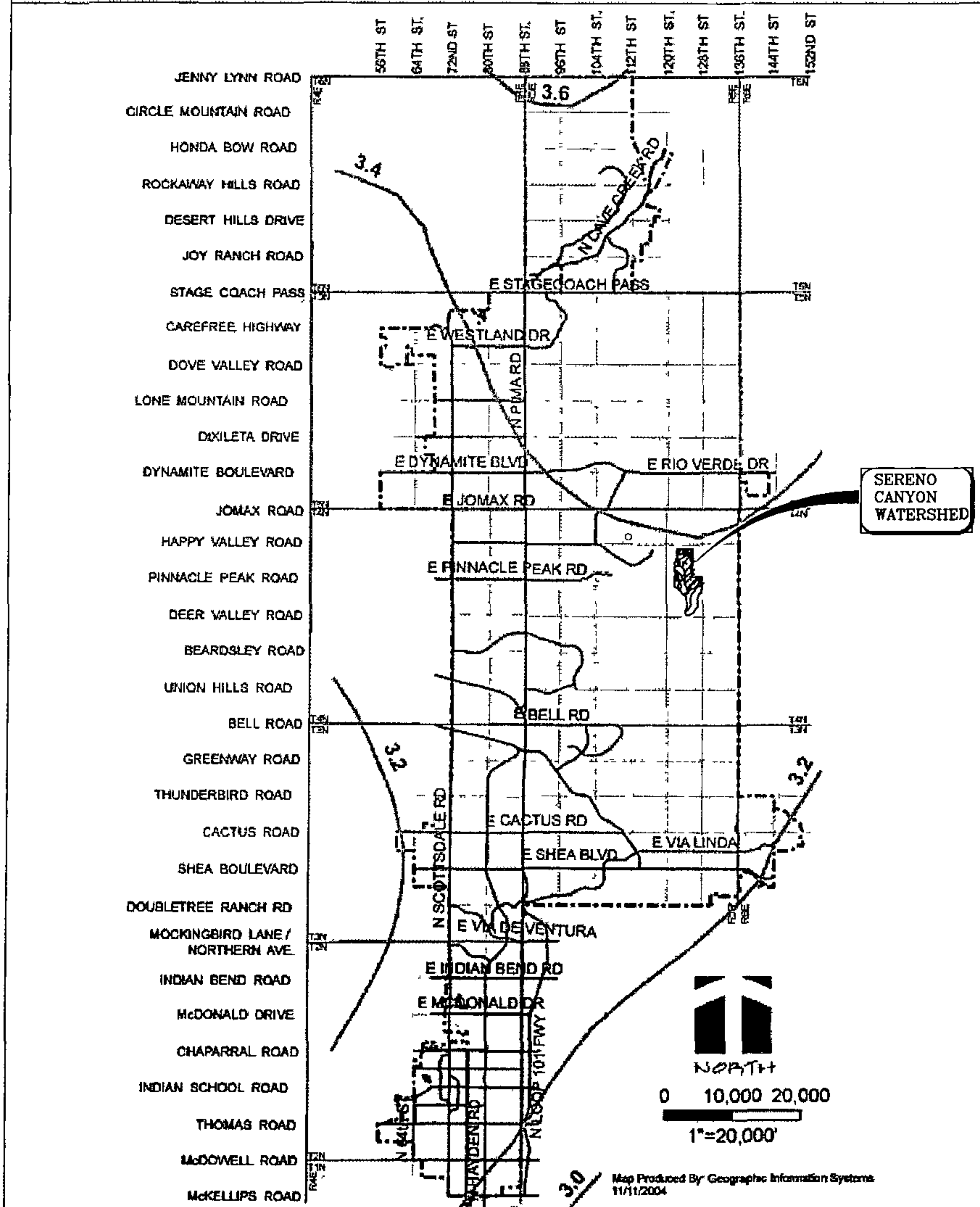
ISOPLUVIALS

10 Year 6 Hour Precipitation in Inches



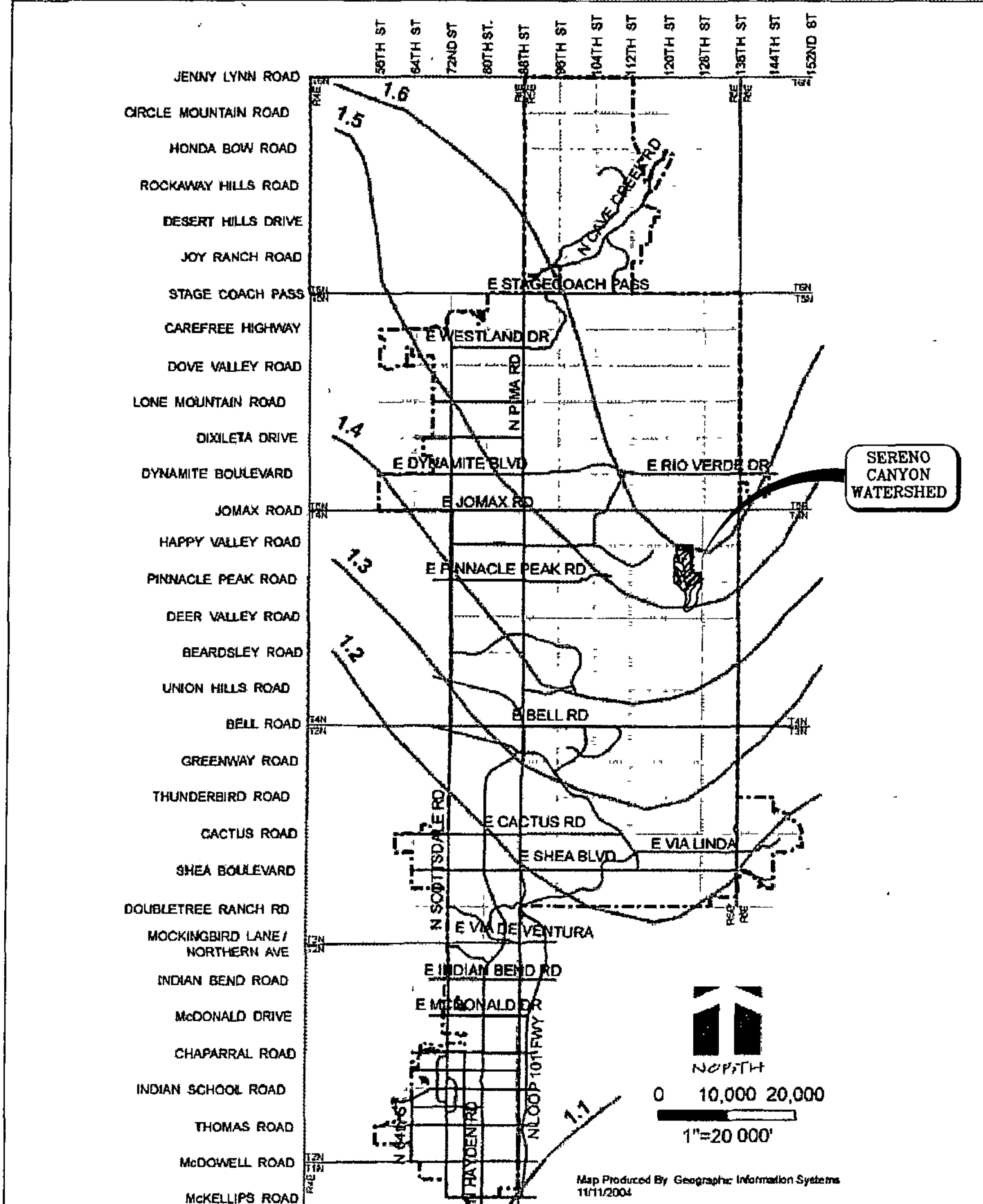
ISOPLUVIALS

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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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

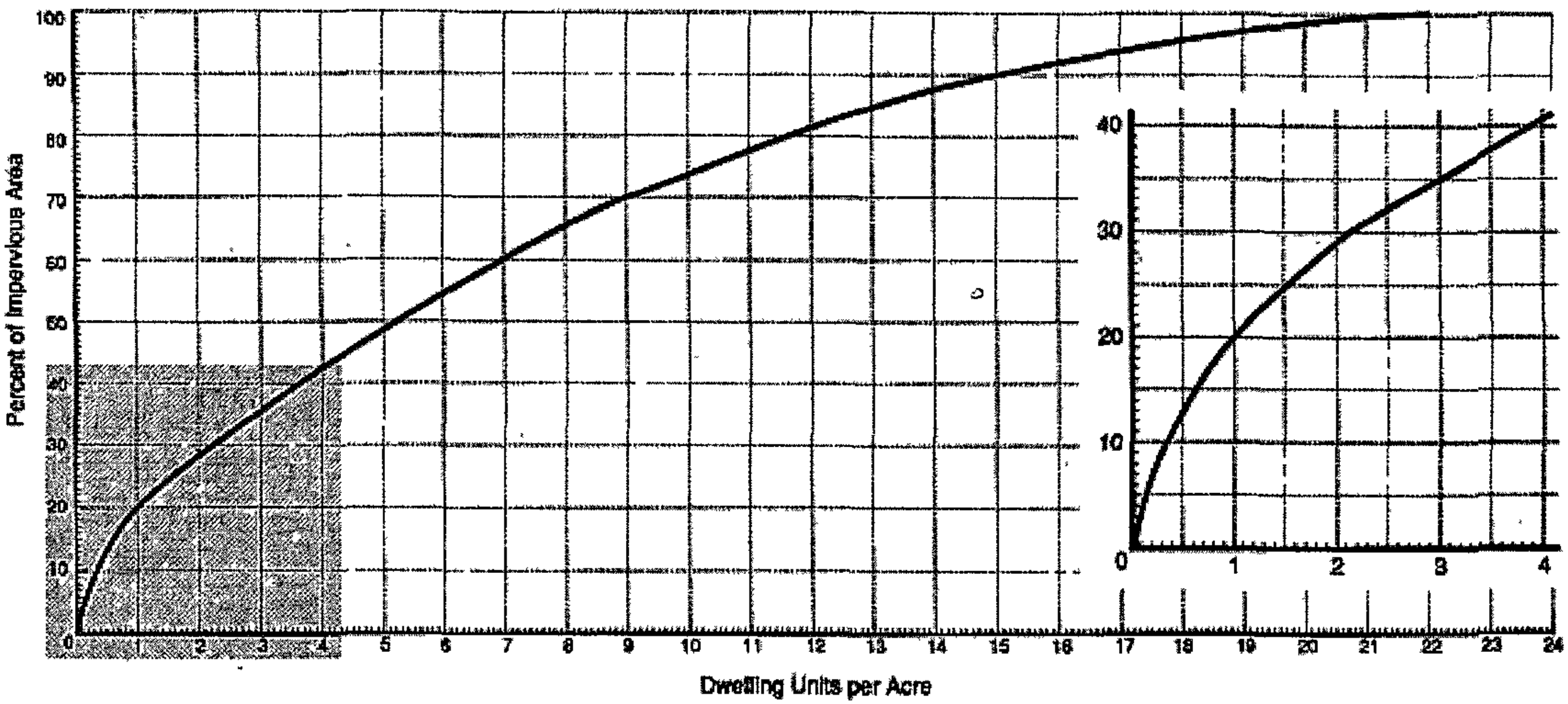

FIGURE 2.2-16

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

The model requires that at least one overland flow plane and one main channel be used in kinematic wave applications   In the above example, fewer elements might have been used depending on the level of detail required for the hydrologic analysis

3.5 Base Flow

Two distinguishable contributions to a stream flow hydrograph are direct runoff (described earlier) and base flow which results from releases of water from subsurface storage   The HEC-1 model provides means to include the effects of base flow on the streamflow hydrograph as a function of three input parameters, STRTQ, QRCSN and RTIOR   Figure 3.~~8~~ defines the relation between the streamflow hydrograph and these variables 9

Table 3 6

Typical Kinematic Wave/Muskingum-Cunge Data

Overland Flow Plane Data

Identification	Overland Flow Length (ft)	Average Slope (ft/ft)	Roughness Coefficient	Percentage of Subbasin Area
Pervious Area	200	01	3	80%
Impervious Area	100	01	1	20%

Channel Data

	Channel Length (ft)	Channel Slope (ft/ft)	Channel Roughness	Contributing Area (sq mi)	Shape
Collector Channel	500	005	02	05	2 0 (ft) (Diameter)
Collector Channel	1500	001	015	25	2 0 (ft) (Diameter)
**Main Channel	4000	001	03	1 0 *	Trapezoidal

* Main channel always assumed to service total subbasin area.

** Note main channel may be eight-point cross section when using Muskingum-Cunge routing, Muskingum-Cunge and kinematic wave channel elements cannot be inter-mixed

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)   *                                          *   U S  ARMY CORPS OF ENGINEERS         *
 *             JUN   1998                *                                          *   HYDROLOGIC ENGINEERING CENTER        *
 *           VERSION 4 1                 *                                          *        609 SECOND STREET               *
 *                                       *                                          *     DAVIS, CALIFORNIA 95616            *
 *  RUN DATE   04MAY06  TIME  17 46 07   *                                          *        (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 15    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 15    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 15    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 15    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 15    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
```

```
                                                              EX-2 OH1
     57          UK       300      02     0 15      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 15      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 15      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 15      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 15      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 15      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 15      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 15      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 15      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 15      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 15      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 15      100
145      RK      965     026      032              TRAP       5       5
                                                     22
146      KO

147      KK        K
148      KM   RUNOFF FROM SUB-BASIN K
149      BA      009
150      LS              88         0
151      UK       81     025     0 15      100
152      RK      715     022      032              TRAP       5       5
                                                     22
153      KO

154      KK        L
155      KM   RUNOFF FROM SUB-BASIN L
156      BA      009
157      LS              88         0
158      UK      113     018     0 15      100
159      RK      450     012      032              TRAP       5       5
                                                     22
160      KO

161      KK        M
162      KM   RUNOFF FROM SUB-BASIN M
163      BA      008
164      LS              88         0
165      UK      137     018     0 15      100
166      RK      750     012      032              TRAP       4       5
                                                     22
167      KO

168      KK        N
169      KM   RUNOFF FROM SUB-BASIN N
170      BA       01
171      LS              88         0
172      UK      117     018     0 15      100
173      RK     1036     012      032              TRAP       5       5
                                                     22
174      KO

175      KK        O
176      KM   RUNOFF FROM SUB-BASIN O
177      BA     0029
178      LS              88         0
179      UK      108     02      0 15      100
180      RK      174     014      032              TRAP       4       5
                                                     22
181      KO
1                                         HEC-1 INPUT                                    PAGE  5

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 15      100
187      RK      354     014      032              TRAP       5       5
                                                     22
188      KO

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 15      100
197      RK      160     014      032              TRAP       4       5
                                                     22
198      KO

199      KK        R
200      KM   RUNOFF FROM SUB-BASIN R
201      BA       15
202      LS              88
203      UK      180     025     0 15      100
204      RK     4300     023      032              TRAP      15       5
                                                     22
205      KO
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)  *                        *  U S  ARMY CORPS OF ENGINEERS         *
 *             JUN   1998                *                        *  HYDROLOGIC ENGINEERING CENTER        *
 *           VERSION 4 1                 *                        *        609 SECOND STREET              *
 *                                       *                        *     DAVIS, CALIFORNIA 95616           *
 *  RUN DATE    04MAY06  TIME  17 46 07  *                        *        (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
                        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


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

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

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                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	43.	3.33	6.	1.	1.	.08		
+	HYDROGRAPH AT	A2	20.	3.30	2.	1.	0.	.04		
+	HYDROGRAPH AT	B1	16.	3.27	2.	0.	0.	.03		
+	HYDROGRAPH AT	B2	21.	3.43	3.	1.	1.	.05		
+	2 COMBINED AT	COMBB	34.	3.33	5.	1.	1.	.08		
	HYDROGRAPH AT									

+		C	16	3 30	2	1	0	03
+	HYDROGRAPH AT	D	16	3 37	2	1	0	03
+	HYDROGRAPH AT	E1	24	3 47	4	1	1	06
+	HYDROGRAPH AT	E2	25	3 30	3	1	1	05
+	2 COMBINED AT	COMBE	45	3 37	7	2	1	11
+	6 COMBINED AT	CLEAR	174	3 33	25	6	5	37
+	HYDROGRAPH AT	E3	5	3 20	1	0	0	01
+	HYDROGRAPH AT	F1	18	3 37	2	1	0	04
+	HYDROGRAPH AT	F2	8	3 30	1	0	0	01
+	HYDROGRAPH AT	F3	7	3 30	1	0	0	01
+	HYDROGRAPH AT	G	7	3 40	1	0	0	02
+	HYDROGRAPH AT	H1	26	3 43	4	1	1	06
+	HYDROGRAPH AT	H2	29	3 47	5	1	1	07
+	HYDROGRAPH AT	I	13	3 33	2	0	0	03
+	8 COMBINED AT	CLEAR	105	3 37	16	4	3	24
+	HYDROGRAPH AT	J	17	3 20	2	0	0	02
+	HYDROGRAPH AT	K	9	3 13	1	0	0	01
+	HYDROGRAPH AT	L	7	3 17	1	0	0	01
+	HYDROGRAPH AT	M	6	3 20	1	0	0	01
+	HYDROGRAPH AT	N	7	3 20	1	0	0	01
+	HYDROGRAPH AT	O	2	3 17	0	0	0	00
+	HYDROGRAPH AT	P	5	3 17	0	0	0	01
+	8 COMBINED AT	CLEAR	134	3 33	21	5	4	31
+	HYDROGRAPH AT	Q	3	3 13	0	0	0	00
+	HYDROGRAPH AT	R	89	3 30	10	3	2	15

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR STORM = 1 STORM AREA (SQ MI) = 01									
A1	MANE	1 86	43 40	201 06	63	2 00	43 09	200 00	63

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 2833E+01 OUTFLOW= 2811E+01 BASIN STORAGE= 1422E-02 PERCENT ERROR= 7

FOR STORM = 1 STORM AREA (SQ MI) = 01									
A2	MANE	2 00	20 40	197 76	63	2 00	20 32	198 00	63

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 1214E+01 OUTFLOW= 1205E+01 BASIN STORAGE= 4691E-03 PERCENT ERROR= 7

FOR STORM = 1 STORM AREA (SQ MI) = 01									
B1	MANE	2 00	15 93	195 89	63	2 00	15 93	196 00	63

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 9106E+00 OUTFLOW= 9030E+00 BASIN STORAGE= 2704E-03 PERCENT ERROR= 8

FOR STORM = 1 STORM AREA (SQ MI) = 01									
B2	MANE	1 77	21 18	206 52	63	2 00	21 08	206 00	63

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 1686E+01 OUTFLOW= 1676E+01 BASIN STORAGE= 1425E-02 PERCENT ERROR= 6

FOR STORM = 1 STORM AREA (SQ MI) = 01
C MANE 1 84 16 24 197 74 63 2 00 16 24 198 00 63

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 1012E+01 OUTFLOW= 1004E+01 BASIN STORAGE= 4595E-03 PERCENT ERROR= 7

FOR STORM = 1 STORM AREA (SQ MI) = 01
D MANE 1 74 16 01 201 93 63 2 00 16 00 202 00 63

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 1147E+01 OUTFLOW= 1139E+01 BASIN STORAGE= 6731E-03 PERCENT ERROR= 6

FOR STORM = 1 STORM AREA (SQ MI) = 01
E1 MANE 1 87 24 22 208 02 63 2 00 24 21 208 00 63

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 2057E+01 OUTFLOW= 2046E+01 BASIN STORAGE= 1822E-02 PERCENT ERROR= 4

FOR STORM = 1 STORM AREA (SQ MI) = 01
E2 MANE 2 00 25 67 199 33 63 2 00 25 49 198 00 63

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 1551E+01 OUTFLOW= 1540E+01 BASIN STORAGE= 6121E-03 PERCENT ERROR= 7

FOR STORM = 1 STORM AREA (SQ MI) = 01
E3 MANE 93 5 49 192 15 63 2 00 5 47 192 00 63

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 2698E+00 OUTFLOW= 2681E+00 BASIN STORAGE= 6786E-04 PERCENT ERROR= 6

FOR STORM = 1 STORM AREA (SQ MI) = 01
F1 MANE 1 95 18 10 202 12 63 2 00 18 09 202 00 63

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 1214E+01 OUTFLOW= 1207E+01 BASIN STORAGE= 5783E-03 PERCENT ERROR= 6

FOR STORM = 1 STORM AREA (SQ MI) = 01
F2 MANE 1 72 8 06 198 12 63 2 00 8 06 198 00 63

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 4722E+00 OUTFLOW= 4691E+00 BASIN STORAGE= ,1912E-03 PERCENT ERROR= 6

FOR STORM = 1 STORM AREA (SQ MI) = 01
F3 MANE 1 02 7 10 197 64 63 2 00 7 09 198 00 63

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 4385E+00 OUTFLOW= 4359E+00 BASIN STORAGE= 1862E-03 PERCENT ERROR= 5

FOR STORM = 1 STORM AREA (SQ MI) = 01
G MANE 1 02 6 92 203 91 63 2 00 6 91 204 00 63

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 5396E+00 OUTFLOW= 5363E+00 BASIN STORAGE= 4299E-03 PERCENT ERROR= 5

FOR STORM = 1 STORM AREA (SQ MI) = 01
H1 MANE 2 00 25 66 205 92 63 2 00 25 63 206 00 63

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 1990E+01 OUTFLOW= 1975E+01 BASIN STORAGE= 1494E-02 PERCENT ERROR= 7

FOR STORM = 1 STORM AREA (SQ MI) = 01
H2 MANE 2 00 29 40 208 72 63 2 00 29 35 208 00 63

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 2428E+01 OUTFLOW= 2411E+01 BASIN STORAGE= 2200E-02 PERCENT ERROR= 6

FOR STORM = 1 STORM AREA (SQ MI) = 01
I MANE 1 77 13 52 198 63 63 2 00 13 43 200 00 63

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 8432E+00 OUTFLOW= 8364E+00 BASIN STORAGE= 3859E-03 PERCENT ERROR= 8

FOR STORM = 1 STORM AREA (SQ MI) = 01
J MANE 94 17 19 192 27 63 2 00 17 19 192 00 63

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 8095E+00 OUTFLOW= 8051E+00 BASIN STORAGE= 1749E-03 PERCENT ERROR= 5

FOR STORM = 1 STORM AREA (SQ MI) = 01
K MANE 96 8 95 187 64 63 2 00 8 90 188 00 63

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 3035E+00 OUTFLOW= 3024E+00 BASIN STORAGE= 2356E-04 PERCENT ERROR= 4

FOR STORM = 1 STORM AREA (SQ MI) = 01
L MANE 71 7 23 190 82 63 2 00 7 19 190 00 63

```
CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  3035E+00 OUTFLOW=  3020E+00 BASIN STORAGE=  4446E-04 PERCENT ERROR=     5

          FOR STORM = 1  STORM AREA (SQ MI) =          01
                 M  MANE          1 33       5 68     193 42        63       2 00       5 63     192 00          63

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  2698E+00 OUTFLOW=  2683E+00 BASIN STORAGE=  6045E-04 PERCENT ERROR=     5

          FOR STORM = 1  STORM AREA (SQ MI) =          01
                 N  MANE          1 63       7 42     191 98        63       2 00       7 42     192 00          63

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  3373E+00 OUTFLOW=  3352E+00 BASIN STORAGE=  5862E-04 PERCENT ERROR=     6

          FOR STORM = 1  STORM AREA (SQ MI) =          01
                 O  MANE            44       2 47     189 94        63       2 00       2 45     190 00          63

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  9781E-01 OUTFLOW=  9730E-01 BASIN STORAGE=  1338E-04 PERCENT ERROR=     5

          FOR STORM = 1  STORM AREA (SQ MI) =          01
                 P  MANE            62       5 25     190 85        63       2 00       5 18     190 00          63

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  2327E+00 OUTFLOW=  2314E+00 BASIN STORAGE=  4631E-04 PERCENT ERROR=     5

          FOR STORM = 1  STORM AREA (SQ MI) =          01
                 Q  MANE            39       3 06     187 56        63       2 00       3 00     188 00          63

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  1079E+00 OUTFLOW=  1075E+00 BASIN STORAGE=  9685E-05 PERCENT ERROR=     4

          FOR STORM = 1  STORM AREA (SQ MI) =          01
                 R  MANE          1 84      89 97     197 31        63       2 00      89 03     198 00          63

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  5059E+01 OUTFLOW=  5017E+01 BASIN STORAGE=  1598E-02 PERCENT ERROR=     8


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

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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   04MAY06  TIME  17 47 14    *                            *          (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
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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      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-100 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 15     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 15     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 15     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 15     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 15     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 15    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 15    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 15    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 15    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 15    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 15    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 15    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 15    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 15    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 15    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 15    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 15       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 15       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 15       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 15       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 15       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 15       100
 180      RK      174     014      032                TRAP       4         5
 181      KO                                            22
1                                          HEC-1 INPUT                                              PAGE  5

 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 15       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 15       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 15       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
```

```
 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)   *                         *   U S  ARMY CORPS OF ENGINEERS        *
 *            JUN   1998                 *                         *   HYDROLOGIC ENGINEERING CENTER       *
 *          VERSION 4 1                  *                         *        609 SECOND STREET              *
 *                                       *                         *      DAVIS, CALIFORNIA 95616          *
 *  RUN DATE   04MAY06  TIME  17 47 14   *                         *          (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
                    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         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
```

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

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


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

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

```
              *            *
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	106	3 23	11	3	2	08		
+	HYDROGRAPH AT	A2	51	3 20	5	1	1	04		
+	HYDROGRAPH AT	B1	39	3 20	3	1	1	03		
+	HYDROGRAPH AT	B2	53	3 27	6	2	1	05		
+	2 COMBINED AT	COMBB	87	3 23	10	2	2	08		
	HYDROGRAPH AT									

+		C	40	3 20	4	1	1	03
+	HYDROGRAPH AT	D	41	3 23	4	1	1	03
+	HYDROGRAPH AT	E1	62	3 30	8	2	2	06
+	HYDROGRAPH AT	E2	62	3 20	6	1	1	05
+	2 COMBINED AT	COMBE	117	3 23	14	3	3	11
+	6 COMBINED AT	CLEAR	438	3 23	47	12	9	37
+	HYDROGRAPH AT	E3	13	3 13	1	0	0	01
+	HYDROGRAPH AT	F1	45	3 23	5	1	1	04
+	HYDROGRAPH AT	F2	20	3 20	2	0	0	01
+	HYDROGRAPH AT	F3	18	3 20	2	0	0	01
+	HYDROGRAPH AT	G	18	3 27	2	1	0	02
+	HYDROGRAPH AT	H1	65	3 27	8	2	2	06
+	HYDROGRAPH AT	H2	74	3 33	9	2	2	07
+	HYDROGRAPH AT	I	33	3 23	3	1	1	03
+	8 COMBINED AT	CLEAR	267	3 27	31	8	6	24
+	HYDROGRAPH AT	J	41	3 13	3	1	1	02
+	HYDROGRAPH AT	K	19	3 10	1	0	0	01
+	HYDROGRAPH AT	L	16	3 10	1	0	0	01
+	HYDROGRAPH AT	M	13	3 13	1	0	0	01
+	HYDROGRAPH AT	N	17	3 13	1	0	0	01
+	HYDROGRAPH AT	O	6	3 10	0	0	0	00
+	HYDROGRAPH AT	P	12	3 13	1	0	0	01
+	8 COMBINED AT	CLEAR	341	3 23	40	10	8	31
+	HYDROGRAPH AT	Q	6	3 10	0	0	0	00
+	HYDROGRAPH AT	R	216	3 20	19	5	4	15

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	DT	INTERPOLATED TO COMPUTATION INTERVAL PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR STORM = 1 STORM AREA (SQ MI) =				01					
A1	MANE	1 84	107 02	194 53	1 19	2 00	106 46	194 00	1 19

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 5392E+01 OUTFLOW= 5353E+01 BASIN STORAGE= 1364E-02 PERCENT ERROR= 7

FOR STORM = 1 STORM AREA (SQ MI) =				01					
A2	MANE	1 75	50 71	191 79	1 20	2 00	50 52	192 00	1 20

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 2311E+01 OUTFLOW= 2297E+01 BASIN STORAGE= 5304E-03 PERCENT ERROR= 6

FOR STORM = 1 STORM AREA (SQ MI) =				01					
B1	MANE	2 00	39 12	191 38	1 20	2 00	38 66	192 00	1 20

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 1733E+01 OUTFLOW= 1724E+01 BASIN STORAGE= 3053E-03 PERCENT ERROR= 5

FOR STORM = 1 STORM AREA (SQ MI) =				01					
B2	MANE	1 74	53 59	197 45	1 20	2 00	53 26	196 00	1 20

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 3209E+01 OUTFLOW= 3189E+01 BASIN STORAGE= 1515E-02 PERCENT ERROR= 6

FOR STORM = 1 STORM AREA (SQ MI) = 01
C MANE 1 47 40 57 192 64 1 20 2 00 40 37 192 00 1 20

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 1926E+01 OUTFLOW= 1915E+01 BASIN STORAGE= 4279E-03 PERCENT ERROR= 5

FOR STORM = 1 STORM AREA (SQ MI) = 01
D MANE 1 48 40 88 194 62 1 20 2 00 40 61 194 00 1 20

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 2182E+01 OUTFLOW= 2171E+01 BASIN STORAGE= 6675E-03 PERCENT ERROR= 5

FOR STORM = 1 STORM AREA (SQ MI) = 01
E1 MANE 1 90 62 27 198 97 1 20 2 00 61 72 198 00 1 20

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 3915E+01 OUTFLOW= 3896E+01 BASIN STORAGE= 1974E-02 PERCENT ERROR= 4

FOR STORM = 1 STORM AREA (SQ MI) = 01
E2 MANE 2 00 62 46 191 99 1 20 2 00 62 45 192 00 1 20

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 2953E+01 OUTFLOW= 2935E+01 BASIN STORAGE= 5918E-03 PERCENT ERROR= 6

FOR STORM = 1 STORM AREA (SQ MI) = 01
E3 MANE 85 13 38 188 41 1 20 2 00 13 30 188 00 1 20

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 5135E+00 OUTFLOW= 5118E+00 BASIN STORAGE= 6173E-04 PERCENT ERROR= 3

FOR STORM = 1 STORM AREA (SQ MI) = 01
F1 MANE 1 92 44 93 195 61 1 20 2 00 44 61 194 00 1 20

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 2311E+01 OUTFLOW= 2295E+01 BASIN STORAGE= 5646E-03 PERCENT ERROR= 6

FOR STORM = 1 STORM AREA (SQ MI) = 01
F2 MANE 1 34 19 98 191 29 1 20 2 00 19 66 192 00 1 20

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 8986E+00 OUTFLOW= 8943E+00 BASIN STORAGE= 1658E-03 PERCENT ERROR= 5

FOR STORM = 1 STORM AREA (SQ MI) = 01
F3 MANE 96 17 90 191 29 1 20 2 00 17 72 192 00 1 20

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 8344E+00 OUTFLOW= 8306E+00 BASIN STORAGE= 1816E-03 PERCENT ERROR= 4

FOR STORM = 1 STORM AREA (SQ MI) = 01
G MANE 80 17 64 196 31 1 20 2 00 17 63 196 00 1 20

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 1027E+01 OUTFLOW= 1021E+01 BASIN STORAGE= 4573E-03 PERCENT ERROR= 6

FOR STORM = 1 STORM AREA (SQ MI) = 01
H1 MANE 1 72 65 74 196 70 1 20 2 00 65 49 196 00 1 20

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 3787E+01 OUTFLOW= 3769E+01 BASIN STORAGE= 1393E-02 PERCENT ERROR= 4

FOR STORM = 1 STORM AREA (SQ MI) = 01
H2 MANE 2 00 74 37 199 20 1 20 2 00 73 61 200 00 1 19

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 4621E+01 OUTFLOW= 4590E+01 BASIN STORAGE= 2307E-02 PERCENT ERROR= 6

FOR STORM = 1 STORM AREA (SQ MI) = 01
I MANE 1 77 33 15 193 81 1 20 2 00 32 93 194 00 1 20

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 1605E+01 OUTFLOW= 1595E+01 BASIN STORAGE= 3572E-03 PERCENT ERROR= 6

FOR STORM = 1 STORM AREA (SQ MI) = 01
J MANE 81 41 44 187 95 1 20 2 00 41 39 188 00 1 20

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 1540E+01 OUTFLOW= 1535E+01 BASIN STORAGE= 1760E-03 PERCENT ERROR= 4

FOR STORM = 1 STORM AREA (SQ MI) = 01
K MANE 84 18 86 185 93 1 20 2 00 18 81 186 00 1 20

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 5777E+00 OUTFLOW= 5767E+00 BASIN STORAGE= 2665E-04 PERCENT ERROR= 2

FOR STORM = 1 STORM AREA (SQ MI) = 01
L MANE 57 16 78 187 06 1 20 2 00 16 44 186 00 1 20

```
CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  5777E+00 OUTFLOW=  5758E+00 BASIN STORAGE=  4539E-04 PERCENT ERROR=    3

          FOR STORM = 1  STORM AREA (SQ MI) =        01
                 M  MANE            1 04      13 56     188 38      1 20       2 00      13 42     188 00        1 20

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  5135E+00 OUTFLOW=  5117E+00 BASIN STORAGE=  6097E-04 PERCENT ERROR=    3

          FOR STORM = 1  STORM AREA (SQ MI) =        01
                 N  MANE            1 44      17 49     188 21      1 20       2 00      17 32     188 00        1 20

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  6419E+00 OUTFLOW=  6397E+00 BASIN STORAGE=  6706E-04 PERCENT ERROR=    3

          FOR STORM = 1  STORM AREA (SQ MI) =        01
                 O  MANE             35       5 62     185 78      1 20       2 00       5 60     186 00        1 20

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  1861E+00 OUTFLOW=  1856E+00 BASIN STORAGE=  1265E-04 PERCENT ERROR=    3

          FOR STORM = 1  STORM AREA (SQ MI) =        01
                 P  MANE             53      12 32     187 06      1 20       2 00      12 07     188 00        1 20

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  4429E+00 OUTFLOW=  4413E+00 BASIN STORAGE=  4819E-04 PERCENT ERROR=    3

          FOR STORM = 1  STORM AREA (SQ MI) =        01
                 Q  MANE             25       6 56     184 90      1 20       2 00       6 43     186 00        1 20

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  2054E+00 OUTFLOW=  2049E+00 BASIN STORAGE=  1025E-04 PERCENT ERROR=    3

          FOR STORM = 1  STORM AREA (SQ MI) =        01
                 R  MANE            1 86     217 34     191 54      1 20       2 00     216 26     192 00        1 20

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  9628E+01 OUTFLOW=  9581E+01 BASIN STORAGE=  1564E-02 PERCENT ERROR=    5


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

EX-100 OH1

```
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   04MAY06  TIME  13 31 20    *                              *         (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 15     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 15     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 15     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 15     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 15     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
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                                                            EX-100 OH1
  57         UK     300      02      0 15      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 15      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 15      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 15      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 15      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 15      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 15      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 15      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 15      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 15      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 15      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 15       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 15       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 15       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 15       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 15       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 15       100
 180      RK      174      014      032               TRAP        4        5
 181      KO                                             22
1                                           HEC-1 INPUT                                                 PAGE  5

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 15       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 15       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 15       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
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                                                 EX-100 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)   *                 *   U S  ARMY CORPS OF ENGINEERS        *
 *              JUN   1998               *                 *   HYDROLOGIC ENGINEERING CENTER       *
 *            VERSION 4 1                *                 *        609 SECOND STREET              *
 *                                       *                 *     DAVIS, CALIFORNIA 95616           *
 * RUN DATE   04MAY06  TIME  13 31 20    *                 *        (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
                         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
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                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
```

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

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

              **************
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```
               *            *
 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
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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	225	3 17	19	5	4	08		
+	HYDROGRAPH AT	A2	103	3 13	8	2	2	04		
+	HYDROGRAPH AT	B1	79	3 13	6	2	1	03		
+	HYDROGRAPH AT	B2	117	3 20	11	3	2	05		
+	2 COMBINED AT	COMBB	192	3 17	18	4	4	08		
	HYDROGRAPH AT									

+		C	85	3 13	7	2	1	03
+	HYDROGRAPH AT	D	88	3 17	8	2	2	03
+	HYDROGRAPH AT	E1	136	3 20	14	4	3	06
+	HYDROGRAPH AT	E2	129	3 17	11	3	2	05
+	2 COMBINED AT	COMBE	258	3 17	25	6	5	11
+	6 COMBINED AT	CLEAR	948	3 17	84	21	17	37
+	HYDROGRAPH AT	E3	26	3 10	2	0	0	01
+	HYDROGRAPH AT	F1	93	3 17	8	2	2	04
+	HYDROGRAPH AT	F2	42	3 13	3	1	1	01
+	HYDROGRAPH AT	F3	38	3 13	3	1	1	01
+	HYDROGRAPH AT	G	39	3 17	4	1	1	02
+	HYDROGRAPH AT	H1	143	3 17	13	3	3	06
+	HYDROGRAPH AT	H2	161	3 23	16	4	3	07
+	HYDROGRAPH AT	I	70	3 17	6	1	1	03
+	8 COMBINED AT	CLEAR	584	3 17	56	14	11	24
+	HYDROGRAPH AT	J	81	3 10	6	1	1	02
+	HYDROGRAPH AT	K	34	3 07	2	1	0	01
+	HYDROGRAPH AT	L	31	3 10	2	1	0	01
+	HYDROGRAPH AT	M	27	3 10	2	0	0	01
+	HYDROGRAPH AT	N	34	3 10	2	1	0	01
+	HYDROGRAPH AT	O	11	3 07	1	0	0	00
+	HYDROGRAPH AT	P	24	3 10	2	0	0	01
+	8 COMBINED AT	CLEAR	758	3 17	72	18	14	31
+	HYDROGRAPH AT	Q	12	3 07	1	0	0	00
+	HYDROGRAPH AT	R	429	3 17	34	9	7	15

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SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	DT	INTERPOLATED TO COMPUTATION INTERVAL PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR STORM = 1 STORM AREA (SQ MI) = 01									
A1	MANE	1 85	225 20	189 38	2 14	2 00	224 80	190 00	2 14

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 9633E+01 OUTFLOW= 9604E+01 BASIN STORAGE= 1456E-02 PERCENT ERROR= 3

FOR STORM = 1 STORM AREA (SQ MI) = 01									
A2	MANE	1 35	104 77	188 43	2 14	2 00	103 27	188 00	2 15

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 4129E+01 OUTFLOW= 4118E+01 BASIN STORAGE= 4516E-03 PERCENT ERROR= 2

FOR STORM = 1 STORM AREA (SQ MI) = 01									
B1	MANE	1 60	79 81	189 36	2 15	2 00	78 60	188 00	2 14

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 3096E+01 OUTFLOW= 3089E+01 BASIN STORAGE= 2797E-03 PERCENT ERROR= 2

FOR STORM = 1 STORM AREA (SQ MI) = 01									
B2	MANE	1 48	118 10	190 89	2 14	2 00	117 30	192 00	2 14

```
CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 5734E+01 OUTFLOW= 5701E+01 BASIN STORAGE= 1520E-02 PERCENT ERROR= 5

          FOR STORM = 1  STORM AREA (SQ MI) =         01
             C  MANE          1 23     85 59    188 20       2 15       2 00      84 94     188 00         2 14

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 3440E+01 OUTFLOW= 3432E+01 BASIN STORAGE= 4680E-03 PERCENT ERROR= 2

          FOR STORM = 1  STORM AREA (SQ MI) =         01
             D  MANE          1 11     88 51    190 19       2 14       2 00      88 33     190 00         2 14

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 3899E+01 OUTFLOW= 3887E+01 BASIN STORAGE= 7476E-03 PERCENT ERROR= 3

          FOR STORM = 1  STORM AREA (SQ MI) =         01
            E1  MANE          1 51    136 89    192 60       2 14       2 00     136 17     192 00         2 14

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 6996E+01 OUTFLOW= 6958E+01 BASIN STORAGE= 2145E-02 PERCENT ERROR= 5

          FOR STORM = 1  STORM AREA (SQ MI) =         01
            E2  MANE          1 81    130 97    189 38       2 15       2 00     128 84     190 00         2 15

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 5275E+01 OUTFLOW= 5263E+01 BASIN STORAGE= 5523E-03 PERCENT ERROR= 2

          FOR STORM = 1  STORM AREA (SQ MI) =         01
            E3  MANE            67     26 55    186 39       2 15       2 00      26 42     186 00         2 15

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 9174E+00 OUTFLOW= 9155E+00 BASIN STORAGE= 6540E-04 PERCENT ERROR= 2

          FOR STORM = 1  STORM AREA (SQ MI) =         01
            F1  MANE          2 00     95 18    190 56       2 14       2 00      93 24     190 00         2 14

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 4129E+01 OUTFLOW= 4114E+01 BASIN STORAGE= 5693E-03 PERCENT ERROR= 3

          FOR STORM = 1  STORM AREA (SQ MI) =         01
            F2  MANE          1 06     41 56    187 91       2 15       2 00      41 51     188 00         2 15

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 1606E+01 OUTFLOW= 1602E+01 BASIN STORAGE= 1682E-03 PERCENT ERROR= 2

          FOR STORM = 1  STORM AREA (SQ MI) =         01
            F3  MANE            68     37 67    188 19       2 15       2 00      37 65     188 00         2 15

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 1491E+01 OUTFLOW= 1487E+01 BASIN STORAGE= 1820E-03 PERCENT ERROR= 2

          FOR STORM = 1  STORM AREA (SQ MI) =         01
             G  MANE            68     38 57    190 59       2 14       2 00      38 55     190 00         2 14

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 1835E+01 OUTFLOW= 1825E+01 BASIN STORAGE= 4585E-03 PERCENT ERROR= 5

          FOR STORM = 1  STORM AREA (SQ MI) =         01
            H1  MANE          1 45    144 51    190 20       2 14       2 00     143 37     190 00         2 14

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 6766E+01 OUTFLOW= 6737E+01 BASIN STORAGE= 1486E-02 PERCENT ERROR= 4

          FOR STORM = 1  STORM AREA (SQ MI) =         01
            H2  MANE          2 00    162 43    193 50       2 14       2 00     160 92     194 00         2 14

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 8257E+01 OUTFLOW= 8205E+01 BASIN STORAGE= 2345E-02 PERCENT ERROR= 6

          FOR STORM = 1  STORM AREA (SQ MI) =         01
             I  MANE          1 51     70 53    189 63       2 14       2 00      69 68     190 00         2 14

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 2867E+01 OUTFLOW= 2858E+01 BASIN STORAGE= 4040E-03 PERCENT ERROR= 3

          FOR STORM = 1  STORM AREA (SQ MI) =         01
             J  MANE            63     81 49    185 81       2 15       2 00      81 34     186 00         2 15

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 2752E+01 OUTFLOW= 2749E+01 BASIN STORAGE= 1872E-03 PERCENT ERROR= 1

          FOR STORM = 1  STORM AREA (SQ MI) =         01
             K  MANE            69     34 56    184 48       2 15       2 00      34 08     184 00         2 15

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 1032E+01 OUTFLOW= 1032E+01 BASIN STORAGE= 2351E-04 PERCENT ERROR= 0

          FOR STORM = 1  STORM AREA (SQ MI) =         01
             L  MANE            58     32 05    185 30       2 15       2 00      31 42     186 00         2 15
```

```
CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 1032E+01 OUTFLOW= 1030E+01 BASIN STORAGE= 5207E-04 PERCENT ERROR=    2

          FOR STORM = 1  STORM AREA (SQ MI) =        01
                 M  MANE          86      26 78     186 51      2 15       2 00      26 60     186 00        2 15

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 9174E+00 OUTFLOW= 9164E+00 BASIN STORAGE= 6575E-04 PERCENT ERROR=    1

          FOR STORM = 1  STORM AREA (SQ MI) =        01
                 N  MANE        1 22      33 96     186 87      2 15       2 00      33 62     186 00        2 15

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 1147E+01 OUTFLOW= 1146E+01 BASIN STORAGE= 5856E-04 PERCENT ERROR=    1

          FOR STORM = 1  STORM AREA (SQ MI) =        01
                 O  MANE          25      10 68     184 44      2 15       2 00      10 55     184 00        2 15

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 3326E+00 OUTFLOW= 3320E+00 BASIN STORAGE= 1358E-04 PERCENT ERROR=   .2

          FOR STORM = 1  STORM AREA (SQ MI) =        01
                 P  MANE          42      24 13     185 54      2 15       2 00      23 71     186 00        2 15

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 7913E+00 OUTFLOW= 7897E+00 BASIN STORAGE= 4642E-04 PERCENT ERROR=    2

          FOR STORM = 1  STORM AREA (SQ MI) =        01
                 Q  MANE          28      12 25     184 34      2 15       2 00      12 20     184 00        2 15

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 3670E+00 OUTFLOW= 3665E+00 BASIN STORAGE= 1048E-04 PERCENT ERROR=    1

          FOR STORM = 1  STORM AREA (SQ MI) =        01
                 R  MANE        1 93     438 22     189 49      2 14       2 00     429 09     190 00        2 14

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 1720E+02 OUTFLOW= 1715E+02 BASIN STORAGE= 1546E-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

```
                                                   DEV-2 OH1
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    08MAY06  TIME  09 29 20  *                               *            (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-100 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 15     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     151     342   0 574   0 807    1 04
           26           SE       0       1       2       3       4       5
           27           SQ       0       0       0       0      81     230

           28           KK      A2
           29           KM        RUNOFF FROM SUB-BASIN A2
           30           BA     036
           31           LS              88     7 4
           32           UK     235     025    0 15     100
           33           RK    2000      02     032            TRAP       8       5

           34           KK   BASA2      -5
           35           KM  14' WEIR AT OUTLET
           36           RS       1    STOR       0
           37           SV       0   0 125   0 273   0 448   0 623   0 798
           38           SE    2772    2773    2774    2775    2776    2777
           39           SQ       0       0       0       0      39     111
                        *

           40           KK      B1
           41           KM  RUNOFF FROM SUB-BASIN B1
           42           BA     027
           43           LS              88     3 7
           44           UK     200     025    0 15     100
           45           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

           46           KK    BASB      -3
           47           KM  11' WEIR AT HEADWALL
           48           RS       1    STOR       0
           49           SV       0     089     0 2     338    0 49   0 643
           50           SE    2781    2782    2783    2784    2785    2786
           51           SQ       0       0       0       0      31      87
                        *

           52           KK      B2
           53           KM  RUNOFF FROM SUB-BASIN B2
```

```
 54          BA    050
 55          LS              88      6 7
 56          UK    400      025     0 15      100
 57          RK   2340      024      032              TRAP        8        5
             *

 58          KK   COMBB
 59          KM  COMBINE SECTIONS B1 AND B2
 60          HC      2
             *

 61          KK    BASB      -5
 62          KM  23  WEIR
 63          RS      1     STOR        0
 64          SV      0       21      459      750     1 04     1 33
 65          SE   2746     2747     2748     2749     2750     2751
 66          SQ      0        0        0        0       64      182
             *

 67          KK      C
 68          KM  RUNOFF FROM SUB-BASIN C
 69          BA     03
 70          LS              88      5 9
 71          UK    250      023     0 15      100
 72          RK   1570      017      032              TRAP        5        5
             *

 73          KK    BASC      -1
 74          KM  11' WEIR
 75          RS      1     STOR        0
 76          SV      0      107      236      388      540    0 745
 77          SE   2779     2780     2781     2782     2783     2784
 78          SQ      0        0        0        0       31       87
             *

 79          KK      D
 80          KM  RUNOFF FROM SUB-BASIN D
 81          BA    034
 82          LS              88       10
 83          UK    300       02     0 15      100
 84          RK   1425      014      032              TRAP        6        5
             *
```

1 HEC-1 INPUT

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

 85          KK  BASD-1
 86          KM  12  WEIR AT HEAD WALL
 87          RS      1     STOR        0
 88          SV      0      056      131      227      324    0 472
 89          SE   2749     2750     2751     2752     2753     2754
 90          SQ      0        0        0        0       34       95

 91          KK    BASD      -2
 92          KM  10' WEIR AT HEAD WALL
 93          RS      1     STOR        0
 94          SV      0      097      218      364     0 51    0 657
 95          SE   2724     2725     2726     2727     2728     2729
 96          SQ      0        0        0        0       28       79
             *

 97          KK     E1        5
 98          KM  RUNOFF FROM SUB-BASIN E1
 99          BA    061
100          LS              88       10
101          UK    400       02     0 15      100
102          RK   2050      013      032              TRAP        7        5

103          KK  BASE1-       2
104          KM  19' WEIR AT HEADWALL
105          RS      1     STOR        0
106          SV      0      181      396      648      0 9    1 152
107          SE   2716     2717     2718     2719     2720     2721
108          SQ      0        0        0        0       53      150

109          KK  BASE1-       3
110          KM  18' WEIR AT HEAD WALL
111          RS      1     STOR        0
112          SV      0      138      316      532      747      963
113          SE   2695     2696     2697     2698     2699     2700
114          SQ      0        0        0        0       50      143

115          KK     E2
116          KM  RUNOFF FROM SUB-BASIN E2
117          BA    046
118          LS              88       10
119          UK    200       02     0 15      100
120          RK   2370      013      032              TRAP       10        5
             *

121          KK   BASE2
122          KM  18' WEIR AT HEAD WALL
123          RS      1     STOR        0
124          SV      0      176      385      632      919    1 205
125          SE   2694     2695     2696     2697     2698     2699
126          SQ      0        0        0        0       50      143
             *
```

1 HEC-1 INPUT

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

127          KK   COMBE
128          KM  COMBINE SECTIONS E1 AND E2
129          HC      2
```

```
            *
130         KK   CLEAR
131         KM  CLEAR HYDROGRAPH STACK
132         HC       6
            *

133         KK      E3
134         KM  RUNOFF FROM SUB-BASIN E3
135         BA     008
136         LS             88      10
137         UK     175    025    0 15     100
138         RK     750    032     032             TRAP      6      5
            *

139         KK   BASE3
140         KM  10' WEIR AT HEAD WALL
141         RS       1   STOR       0
142         SV       0    082     188     322    0 456
143         SE    2711   2712    2713    2714     2715
144         SQ       0      0       0       0       28
            *

145         KK      F1
146         KM  RUNOFF FROM SUB-BASIN F1
147         BA     036
148         LS             88      10
149         UK     225    018    0 15     100
150         RK    2500    012     032             TRAP      7      5
            *

151         KK   BASF1
152         KM  12' WEIR AT HEAD WALL
153         RS       1   STOR       0
154         SV       0    132     293     483    0 706   0 929
155         SE    2696   2697    2698    2699     2700    2701
156         SQ       0      0       0       0       34      95
            *

157         KK      F2
158         KM  RUNOFF FROM SUB-BASIN F2
159         BA     014
160         LS             88      10
161         UK     200    018    0 15     100
162         RK    1440    028     032             TRAP      6      5
            *
1                                      HEC-1 INPUT                                       PAGE  5

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

163         KK   BASF2
164         KM  16' WEIR AT HEAD WALL
165         RS       1   STOR       0
166         SV       0    055     135     240    0 345
167         SE    2701   2702    2703    2704     2705
168         SQ       0      0       0       0       45
            *

169         KK      F3
170         KM  RUNOFF FROM SUB-BASIN F3
171         BA     013
172         LS             88      10
173         UK     225    018    0 15     100
174         RK     850    026     032             TRAP      6      5
            *

175         KK   BASF3
176         KM  14' WEIR AT HEAD WALL
177         RS       1   STOR       0
178         SV       0    055     133     239      378
179         SE    2706   2707    2708    2709     2710
180         SQ       0      0       0       0       39
            *

181         KK       G
182         KM  RUNOFF FROM SUB-BASIN G
183         BA   0 016
184         LS             88      10
185         UK     400    025    0 15     100
186         RK     720    022     032             TRAP      4      5

187         KK    BASG
188         KM  14' WEIR AT HEAD WALL
189         RS       1   STOR       0
190         SV       0  0 159     356     592    0 828
191         SE    2723   2724    2725    2726     2727
192         SQ       0      0       0       0       39
            *

193         KK      H1
194         KM  RUNOFF FROM SUB-BASIN H1
195         BA     059
196         LS             88     9 4
197         UK     375    025    0 15     100
198         RK    2210    019     032             TRAP      8      5

199         KK  BASH1-          4
200         KM  20' WEIR
201         RS       1   STOR       0
202         SV       0    169     363     585    0 807   1 029
203         SE    2735   2736    2737    2738     2739    2740
204         SQ       0      0       0       0       56     158
1                                      HEC-1 INPUT                                       PAGE  6

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

```
 205          KK  BASH1-      3
 206          KM  19' WEIR
 207          RS       1   STOR        0
 208          SV       0    086      192      321   0 474   0 627
 209          SE    2736   2737     2738     2739    2740    2741
 210          SQ       0      0        0        0      53     150

 211          KK  BASH1-      5
 212          KM  19' WEIR
 213          RS       1   STOR        0
 214          SV       0    219      467      747   1 026   1 306
 215          SE    2727   2728     2729     2730    2731    2732
 216          SQ       0      0        0        0      53     150
              *

 217          KK      H2
 218          KM  RUNOFF FROM SUB-BASIN H2
 219          BA     072
 220          LS             88     4 78
 221          UK     400    025     0 15      100
 222          RK    3480    019      032             TRAP      12       5

 223          KK  BASH2-      1
 224          KM  21' WEIR AT HEADWALL
 225          RS       1   STOR        0
 226          SV       0    175      382      624     905   1 185
 227          SE       0   2772     2773     2774    2775    2776
 228          SQ       0      0        0        0      59     166

 229          KK  BASH2-      2
 230          KM  21' WEIR AT HEADWALL
 231          RS       1   STOR        0
 232          SV       0    165      361      590     820   1 049
 233          SE       0   2785     2786     2787    2788    2789
 234          SQ       0      0        0        0      59     166
              *

 235          KK       I
 236          KM  RUNOFF FROM SUB-BASIN I
 237          BA     025
 238          LS             88      7 4
 239          UK     225     02     0 15      100
 240          RK    2100    026      032             TRAP      10       5
              *

 241          KK    BASI
 242          KM  10' WEIR
 243          RS       1   STOR        0
 244          SV       0    186      399      640   0 881   1 122
 245          SE    2755   2756     2757     2758    2759    2760
 246          SQ       0      0        0        0      28      79
              *
1                                       HEC-1 INPUT                                            PAGE  7

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

 247          KK   CLEAR
 248          KM  CLEAR HYDROGRAPH STACK
 249          HC       8
              *

 250          KK       J
 251          KM  RUNOFF FROM SUB-BASIN J
 252          BA     024
 253          LS             88      7 9
 254          UK     145     02     0 15      100
 255          RK     965    026      032             TRAP       5       5
              *

 256          KK    BASJ
 257          KM  11' WEIR
 258          RS       1   STOR        0
 259          SV       0    098      217      359     528   0 698
 260          SE    2769   2770     2771     2772    2773    2774
 261          SQ       0      0        0        0      31      87
              *

 262          KK       K
 263          KM  RUNOFF FROM SUB-BASIN K
 264          BA     009
 265          LS             88       10
 266          UK      81    025     0 15      100
 267          RK     715    022      032             TRAP       5       5
              *

 268          KK    BASK
 269          KM  13' WEIR
 270          RS       1   STOR        0
 271          SV       0    106      232      378   0 525
 272          SE    2737   2738     2739     2740    2741
 273          SQ       0      0        0        0      36
              *

 274          KK       L
 275          KM  RUNOFF FROM SUB-BASIN L
 276          BA     009
 277          LS             88       10
 278          UK     113    018     0 15      100
 279          RK     450    012      032             TRAP       5       5
              *

 280          KK    BASL
 281          KM  12' WEIR
```

```
                                                                     DEV-2 OH1
     282          RS        1    STOR       0
     283          SV        0     035     096     188    0 28
     284          SE     2722    2723    2724    2725    2726
     285          SQ        0       0       0       0      34
                  *
1                                                 HEC-1 INPUT                                                   PAGE  8

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


     286          KK        M
     287          KM   RUNOFF FROM SUB-BASIN M
     288          BA      008
     289          LS               88      10
     290          UK      137     018    0 15     100
     291          RK      750     012     032            TRAP       4       5
                  *

     292          KK     BASM
     293          KM   10' WEIR
     294          RS        1    STOR       0
     295          SV        0     069     160     278   0 396
     296          SE     2721    2722    2723    2724    2725
     297          SQ        0       0       0       0      28
                  *

     298          KK        N
     299          KM   RUNOFF FROM SUB-BASIN N
     300          BA       01
     301          LS               88      10
     302          UK      117     018    0 15     100
     303          RK     1036     012     032            TRAP       5       5
                  *

     304          KK     BASN
     305          KM   13' WEIR
     306          RS        1    STOR       0
     307          SV        0      11      25     422   0 594
     308          SE     2691    2692    2693    2694    2695
     309          SQ        0       0       0       0      36
                  *

     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 15     100
     316          RK      174     014     032            TRAP       4       5

     317          KK        P
     318          KM   RUNOFF FROM SUB-BASIN P
     319          KM   Area of Basin subtrating the area to be retained for 100 year event
     320          BA     0058
     321          LS               88      10
     322          UK      135      02    0 15     100
     323          RK      354     014     032            TRAP       5       5

     324          KK    CLEAR
     325          KM   CLEAR HYDROGRAPH STACK
     326          HC        8
1                                                 HEC-1 INPUT                                                   PAGE  9

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


     327          KK        Q
     328          KM   RUNOFF FROM SUB-BASIN Q
     329          KM   Area of Basin subtrating the area to be retained for 100 year event
     330          BA     0024
     331          LS               88      10
     332          UK       86      02    0 15     100
     333          RK      160     014     032            TRAP       4       5

     334          KK        R
     335          KM   RUNOFF FROM SUB-BASIN R
     336          KM   Area of Basin subtrating the area to be retained for 100 year event
     337          BA       14       8
     338          LS               88      14
     339          UK      180     025    0 15     100
     340          RK     4300     023     032            TRAP      15       5
     341          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

   28                     A2
                          V
                          V
   34                   BASA2

   40                                 B1
                                      V
                                      V
   46                               BASB
```

```
52                                  B2

58                       COMBB
                             V
                             V
61                        BASB

67                                  C
                                    V
                                    V
73                               BASC

79                                        D
                                          V
                                          V
85                                   BASD-1
                                          V
                                          V
91                                     BASD

97                                              E1
                                                 V
                                                 V
103                                         BASE1-
                                                 V
                                                 V
109                                         BASE1-

115                                                    E2
                                                        V
                                                        V
121                                                 BASE2

127                                          COMBE

130  CLEAR

133             E3
                 V
                 V
139          BASE3

145                        F1
                            V
                            V
151                     BASF1

157                                 F2
                                     V
                                     V
163                              BASF2

169                                       F3
                                           V
                                           V
175                                    BASF3

181                                              G
                                                 V
                                                 V
187                                           BASG

193                                                    H1
                                                        V
                                                        V
199                                                BASH1-
                                                        V
                                                        V
205                                                BASH1-
                                                        V
                                                        V
211                                                BASH1-

217                                                          H2
                                                              V
                                                              V
223                                                      BASH2-
                                                              V
                                                              V
229                                                      BASH2-

235                                                                 I
                                                                    V
                                                                    V
241                                                              BASI

247        CLEAR
```

```
                                              DEV-2 OH1
 250                      J
                          V
                          V
 256                    BASJ

 262                             K
                                 V
                                 V
 268                           BASK

 274                                    L
                                        V
                                        V
 280                                  BASL

 286                                          M
                                              V
                                              V
 292                                        BASM

 298                                                N
                                                    V
                                                    V
 304                                              BASN

 310                                                      O

 317                                                            P

 324            CLEAR

 327                      Q

 334                             R
(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
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    08MAY06  TIME  09 29 20   *                          *         (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      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
```

DEV-2 OH1

00	00	00	00	00	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

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	44	3 33	6	1	1	08		
+ +	ROUTED TO	BASA1	39	3 43	5	1	1	08	3 48	3 43
+	HYDROGRAPH AT	A2	23	3 27	3	1	1	04		
+ +	ROUTED TO	BASA2	14	3 47	2	0	0	04	2775 36	3 47
+	HYDROGRAPH AT	B1	17	3 27	2	0	0	03		
+ +	ROUTED TO	BASB	9	3 50	1	0	0	03	2784 30	3 50
+	HYDROGRAPH AT	B2	24	3 40	4	1	1	05		
+	2 COMBINED AT	COMBB	32	3 47	5	1	1	08		
+ +	ROUTED TO	BASB	23	3 63	3	1	1	08	2749 36	3 63
+	HYDROGRAPH AT	C	18	3 30	2	1	0	03		
+ +	ROUTED TO	BASC	11	3 50	1	0	0	03	2782 34	3 50
+	HYDROGRAPH AT	D	20	3 33	3	1	1	03		
+ +	ROUTED TO	BASD-1	19	3 37	2	1	0	03	2752 55	3 37
+ +	ROUTED TO	BASD	9	3 67	1	0	0	03	2727 33	3 67
+	HYDROGRAPH AT	E1	29	3 40	5	1	1	06		
+ +	ROUTED TO	BASE1-	24	3 57	3	1	1	06	2719 45	3 57
+ +	ROUTED TO	BASE1-	13	3 90	2	1	0	06	2698 26	3 90
+	HYDROGRAPH AT	E2	31	3 27	4	1	1	05		
+ +	ROUTED TO	BASE2	17	3 50	2	1	0	05	2697 33	3 50
+	2 COMBINED AT	COMBE	21	3 87	5	1	1	11		
+	6 COMBINED AT	CLEAR	92	3 60	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	25 50
+	HYDROGRAPH AT	F1	22	3 30	3	1	1	04		

+ +	ROUTED TO	BASF1	12	3 57	2	0	0	04	2699 37	3 57
+	HYDROGRAPH AT	F2	10	3 23	1	0	0	01		
+ +	ROUTED TO	BASF2	5	3 50	1	0	0	01	2704 11	3 50
+	HYDROGRAPH AT	F3	9	3 27	1	0.	0	01		
+ +	ROUTED TO	BASF3	4	3 53	1	0	0	01	2709 10	3 53
+	HYDROGRAPH AT	G	8	3 33	1	0	0	02		
+ +	ROUTED TO	BASG	0	7 03	0	0	0	02	2726 00	7 00
+	HYDROGRAPH AT	H1	31	3 37	4	1	1	06		
+ +	ROUTED TO	BASH1-	26	3 50	3	1	1	06	2738 46	3 50
+ +	ROUTED TO	BASH1-	19	3 63	3	1	1	06	2739 36	3 63
+ +	ROUTED TO	BASH1-	4	4 57	1	0	0	06	2730 08	4 57
+	HYDROGRAPH AT	H2	33	3 43	5	1	1	07		
+ +	ROUTED TO	BASH2-	27	3 60	4	1	1	07	2774 45	3 60
+ +	ROUTED TO	BASH2-	16	3 90	3	1	1	07	2787 26	3 90
+	HYDROGRAPH AT	I	16	3 30	2	0	0	03		
+ +	ROUTED TO	BASI	2	4 20	1	0	0	03	2758 08	4 20
+	8 COMBINED AT	CLEAR	26	3 87	7	2	2	24		
+	HYDROGRAPH AT	J	20	3 17	2	0	0	02		
+ +	ROUTED TO	BASJ	9	3 40	1	0	0	02	2772 28	3 40
+	HYDROGRAPH AT	K	10	3 13	1	0	0	01		
+ +	ROUTED TO	BASK	0	00	0	0	0	01	2739 79	23 63
+	HYDROGRAPH AT	L	8	3 13	1	0	0	01		
+ +	ROUTED TO	BASL	3	3 47	0	0	0	01	2725 07	3 47
+	HYDROGRAPH AT	M	7	3 17	1	0	0	01		
+ +	ROUTED TO	BASM	0	5 43	0	0	0	01	2724 01	5 40
+	HYDROGRAPH AT	N	9	3 20	1	0	0	01		
+ +	ROUTED TO	BASN	0	00	0	0	0	01	2693 79	29 40
+	HYDROGRAPH AT	O	2	3 13	0	0	0	00		
+	HYDROGRAPH AT	P	5	3 17	0	0	0	01		
+	8 COMBINED AT	CLEAR	32	3 53	9	2	2	31		

HYDROGRAPH AT

```
                                                               DEV-2 OH1
+                                    Q        3     3 10 ·        0          0          0          00

        HYDROGRAPH AT
+                                    R       83     3 30          9          2          2          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 81       44 43     199 91        64        2 00      44 41    200 00         64

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  2879E+01 OUTFLOW=  2862E+01 BASIN STORAGE=  1427E-02 PERCENT ERROR=     5

         FOR STORM = 1  STORM AREA (SQ MI) =          01
             A2  MANE            2 00       23 14     196 93        70        2 00      23 11    196 00         70

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  1347E+01 OUTFLOW=  1337E+01 BASIN STORAGE=  4402E-03 PERCENT ERROR=     7

         FOR STORM = 1  STORM AREA (SQ MI) =          01
             B1  MANE            1 82       17 37     196 36        66        2 00      17 31    196 00         66

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  9606E+00 OUTFLOW=  9538E+00 BASIN STORAGE=  2816E-03 PERCENT ERROR=     7

         FOR STORM = 1  STORM AREA (SQ MI) =          01
             B2  MANE            2 00       24 22     202 87        69        2 00      24 19    204 00         69

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  1854E+01 OUTFLOW=  1843E+01 BASIN STORAGE=  1436E-02 PERCENT ERROR=     5

         FOR STORM = 1  STORM AREA (SQ MI) =          01
              C  MANE            1 71       18 42     197 00        68        2 00      18 27    198 00         68

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  1100E+01 OUTFLOW=  1094E+01 BASIN STORAGE=  4081E-03 PERCENT ERROR=     5

         FOR STORM = 1  STORM AREA (SQ MI) =          01
              D  MANE            1 69       19 55     199 84        72        2 00      19 51    200 00         72

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  1317E+01 OUTFLOW=  1311E+01 BASIN STORAGE=  6952E-03 PERCENT ERROR=     4

         FOR STORM = 1  STORM AREA (SQ MI) =          01
             E1  MANE            1 83       29 49     205 48        72        2 00      29 44    204 00         72

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  2362E+01 OUTFLOW=  2351E+01 BASIN STORAGE=  1977E-02 PERCENT ERROR=     4

         FOR STORM = 1  STORM AREA (SQ MI) =          01
             E2  MANE            2 12       31 07     196 77        72        2 00      30 75    196 00         72

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  1781E+01 OUTFLOW=  1771E+01 BASIN STORAGE=  6282E-03 PERCENT ERROR=     5

         FOR STORM = 1  STORM AREA (SQ MI) =          01
             E3  MANE              90        6 59     190 91        72        2 00       6 55    190 00         72

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  3098E+00 OUTFLOW=  3087E+00 BASIN STORAGE=  6155E-04 PERCENT ERROR=     3

         FOR STORM = 1  STORM AREA (SQ MI) =          01
             F1  MANE            1 88       22 37     198 54        72        2 00      22 18    198 00         72

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  1394E+01 OUTFLOW=  1387E+01 BASIN STORAGE=  5776E-03 PERCENT ERROR=     5

         FOR STORM = 1  STORM AREA (SQ MI) =          01
             F2  MANE            1 65        9 77     194 89        72        2 00       9 67    194 00         72

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  5422E+00 OUTFLOW=  5396E+00 BASIN STORAGE=  1940E-03 PERCENT ERROR=     4

         FOR STORM = 1  STORM AREA (SQ MI) =          01
             F3  MANE            1 03        8 63     196 00        72        2 00       8 63    196 00         72

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  5035E+00 OUTFLOW=  5014E+00 BASIN STORAGE=  1864E-03 PERCENT ERROR=     4

         FOR STORM = 1  STORM AREA (SQ MI) =          01
              G  MANE              87        8 43     200 90        72        2 00       8 38    200 00         72

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  6196E+00 OUTFLOW=  6165E+00 BASIN STORAGE=  3944E-03 PERCENT ERROR=     4

         FOR STORM = 1  STORM AREA (SQ MI) =          01
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           H1  MANE          2 18      31 15     201 14       72       2 00      31 08     202 00          72

 CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  2267E+01 OUTFLOW=  2255E+01 BASIN STORAGE=  1559E-02 PERCENT ERROR=    5

         FOR STORM = 1  STORM AREA (SQ MI) =          01
           H2  MANE          2 00      32.86     206 02       67       2 00      32 85     206 00          67

 CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  2600E+01 OUTFLOW=  2587E+01 BASIN STORAGE=  2161E-02 PERCENT ERROR=    4

         FOR STORM = 1  STORM AREA (SQ MI) =          01
            I  MANE          2 00      15 82     197 38       70       2 00      15 64     198 00          70

 CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  9357E+00 OUTFLOW=  9317E+00 BASIN STORAGE=  3884E-03 PERCENT ERROR=    4

         FOR STORM = 1  STORM AREA (SQ MI) =          01
            J  MANE          1 03      19 95     190 49       70       2 00      19 75     190 00          70

 CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  9043E+00 OUTFLOW=  9008E+00 BASIN STORAGE=  1637E-03 PERCENT ERROR=    4

         FOR STORM = 1  STORM AREA (SQ MI) =          01
            K  MANE            97      10 24     187 13       72       2 00       9 96     188 00          72

 CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  3485E+00 OUTFLOW=  3477E+00 BASIN STORAGE=  2342E-04 PERCENT ERROR=    2

         FOR STORM = 1  STORM AREA (SQ MI) =          01
            L  MANE            70       8 57     188 86       72       2 00       8 40     188 00          72

 CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  3485E+00 OUTFLOW=  3475E+00 BASIN STORAGE=  4365E-04 PERCENT ERROR=    3

         FOR STORM = 1  STORM AREA (SQ MI) =          01
            M  MANE          1 27       6 79     191 05       72       2 00       6 67     190 00          72

 CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  3098E+00 OUTFLOW=  3086E+00 BASIN STORAGE=  5717E-04 PERCENT ERROR=    4

         FOR STORM = 1  STORM AREA (SQ MI) =          01
            N  MANE          1 55       8 92     190 45       72       2 00       8 79     192 00          72

 CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  3873E+00 OUTFLOW=  3862E+00 BASIN STORAGE=  6205E-04 PERCENT ERROR=    3

         FOR STORM = 1  STORM AREA (SQ MI) =          01
            O  MANE            36       2 41     188 39       72       2 00       2 40     188 00          72

 CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  9295E-01 OUTFLOW=  9265E-01 BASIN STORAGE=  1053E-04 PERCENT ERROR=    3

         FOR STORM = 1  STORM AREA (SQ MI) =          01
            P  MANE            67       5 20     189 25       72       2 00       5 17     190 00          72

 CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  2246E+00 OUTFLOW=  2237E+00 BASIN STORAGE=  3648E-04 PERCENT ERROR=    4

         FOR STORM = 1  STORM AREA (SQ MI) =          01
            Q  MANE            35       2 65     187 27       72       2 00       2 62     186 00          72

 CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  9295E-01 OUTFLOW=  9267E-01 BASIN STORAGE=  7453E-05 PERCENT ERROR=    3

         FOR STORM = 1  STORM AREA (SQ MI) =          01
            R  MANE          1 91      83 84     197 65       63       2 00      83 28     198 00          63

 CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  4732E+01 OUTFLOW=  4696E+01 BASIN STORAGE=  1577E-02 PERCENT ERROR=    7


 *** NORMAL END OF HEC-1 ***
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DEV-10 OH1

```
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   05MAY06  TIME  08 37 11    *                    *        (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-100 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 15     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     151      342   0 574   0 807    1 04
           26         SE      0       1        2       3       4       5
           27         SQ      0       0        0       0      81     230

           28         KK     A2
           29         KM       RUNOFF FROM SUB-BASIN A2
           30         BA    036
           31         LS              88     7 4
           32         UK    235      025    0 15     100
           33         RK   2000       02     032            TRAP       8       5

           34         KK  BASA2       -5
           35         KM 14' WEIR AT OUTLET
           36         RS      1    STOR        0
           37         SV      0   0 125    0 273   0 448   0 623   0 798
           38         SE   2772    2773     2774    2775    2776    2777
           39         SQ      0       0        0       0      39     111
                      *

           40         KK     B1
           41         KM RUNOFF FROM SUB-BASIN B1
           42         BA    027
           43         LS              88     3 7
           44         UK    200      025    0 15     100
           45         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

           46         KK   BASB       -3
           47         KM 11' WEIR AT HEADWALL
           48         RS      1    STOR        0
           49         SV      0     089      0 2     338    0 49   0 643
           50         SE   2781    2782     2783    2784    2785    2786
           51         SQ      0       0        0       0      31      87
                      *

           52         KK     B2
           53         KM RUNOFF FROM SUB-BASIN B2
```

```
 54        BA    050
 55        LS             88     6 7
 56        UK    400     025    0 15     100
 57        RK   2340     024     032             TRAP       8       5
           *

 58        KK   COMBB
 59        KM  COMBINE SECTIONS B1 AND B2
 60        HC      2
           *

 61        KK    BASB     -5
 62        KM  23' WEIR
 63        RS      1    STOR       0
 64        SV      0      21     459     750     1 04     1 33
 65        SE   2746    2747    2748    2749     2750     2751
 66        SQ      0       0       0       0       64      182
           *

 67        KK      C
 68        KM  RUNOFF FROM SUB-BASIN C
 69        BA     03
 70        LS             88     5 9
 71        UK    250     023    0 15     100
 72        RK   1570     017     032             TRAP       5       5
           *

 73        KK    BASC     -1
 74        KM  11' WEIR
 75        RS      1    STOR       0
 76        SV      0     107     236     388      540    0 745
 77        SE   2779    2780    2781    2782     2783     2784
 78        SQ      0       0       0       0       31       87
           *

 79        KK      D
 80        KM  RUNOFF FROM SUB-BASIN D
 81        BA    034
 82        LS             88      10
 83        UK    300      02    0 15     100
 84        RK   1425     014     032             TRAP       6       5
           *
1                                    HEC-1 INPUT                                          PAGE  3

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

 85        KK  BASD-1
 86        KM  12' WEIR AT HEAD WALL
 87        RS      1    STOR       0
 88        SV      0     056     131     227      324    0 472
 89        SE   2749    2750    2751    2752     2753     2754
 90        SQ      0       0       0       0       34       95

 91        KK    BASD     -2
 92        KM  10' WEIR AT HEAD WALL
 93        RS      1    STOR       0
 94        SV      0     097     218     364     0 51    0 657
 95        SE   2724    2725    2726    2727     2728     2729
 96        SQ      0       0       0       0       28       79
           *

 97        KK     E1       5
 98        KM  RUNOFF FROM SUB-BASIN E1
 99        BA    061
100        LS             88      10
101        UK    400      02    0 15     100
102        RK   2050     013     032             TRAP       7       5

103        KK  BASE1-      2
104        KM  19' WEIR AT HEADWALL
105        RS      1    STOR       0
106        SV      0     181     396     648      0 9    1 152
107        SE   2716    2717    2718    2719     2720     2721
108        SQ      0       0       0       0       53      150

109        KK  BASE1-      3
110        KM  18' WEIR AT HEAD WALL
111        RS      1    STOR       0
112        SV      0     138     316     532      747      963
113        SE   2695    2696    2697    2698     2699     2700
114        SQ      0       0       0       0       50      143

115        KK     E2
116        KM  RUNOFF FROM SUB-BASIN E2
117        BA    046
118        LS             88      10
119        UK    200      02    0 15     100
120        RK   2370     013     032             TRAP      10       5
           *

121        KK   BASE2
122        KM  18' WEIR AT HEAD WALL
123        RS      1    STOR       0
124        SV      0     176     385     632      919    1 205
125        SE   2694    2695    2696    2697     2698     2699
126        SQ      0       0       0       0       50      143
           *
1                                    HEC-1 INPUT                                          PAGE  4

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

127        KK   COMBE
128        KM  COMBINE SECTIONS E1 AND E2
129        HC      2
```

```
                 *
130              KK   CLEAR
131              KM  CLEAR HYDROGRAPH STACK
132              HC        6
                 *
133              KK       E3
134              KM  RUNOFF FROM SUB-BASIN E3
135              BA      008
136              LS                88        10
137              UK      175      025      0 15       100
138              RK      750      032       032                TRAP         6         5
                 *
139              KK    BASE3
140              KM  10' WEIR AT HEAD WALL
141              RS        1     STOR         0
142              SV        0      082       188       322     0 456
143              SE     2711     2712      2713      2714      2715
144              SQ        0        0         0         0        28
                 *
145              KK       F1
146              KM  RUNOFF FROM SUB-BASIN F1
147              BA      036
148              LS                88        10
149              UK      225      018      0 15       100
150              RK     2500      012       032                TRAP         7         5
                 *
151              KK    BASF1
152              KM  12' WEIR AT HEAD WALL
153              RS        1     STOR         0
154              SV        0      132       293       483     0 706     0 929
155              SE     2696     2697      2698      2699      2700      2701
156              SQ        0        0         0         0        34        95
                 *
157              KK       F2
158              KM  RUNOFF FROM SUB-BASIN F2
159              BA      014
160              LS                88        10
161              UK      200      018      0 15       100
162              RK     1440      028       032                TRAP         6         5
                 *
1                                           HEC-1 INPUT                                                       PAGE  5

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

163              KK    BASF2
164              KM  16' WEIR AT HEAD WALL
165              RS        1     STOR         0
166              SV        0      055       135       240     0 345
167              SE     2701     2702      2703      2704      2705
168              SQ        0        0         0         0        45
                 *
169              KK       F3
170              KM  RUNOFF FROM SUB-BASIN F3
171              BA      013
172              LS                88        10
173              UK      225      018      0 15       100
174              RK      850      026       032                TRAP         6         5
                 *
175              KK    BASF3
176              KM  14' WEIR AT HEAD WALL
177              RS        1     STOR         0
178              SV        0      055       133       239       378
179              SE     2706     2707      2708      2709      2710
180              SQ        0        0         0         0        39
                 *
181              KK        G
182              KM  RUNOFF FROM SUB-BASIN G
183              BA    0 016
184              LS                88        10
185              UK      400      025      0 15       100
186              RK      720      022       032                TRAP         4         5
187              KK     BASG
188              KM  14' WEIR AT HEAD WALL
189              RS        1     STOR         0
190              SV        0    0 159       356       592     0 828
191              SE     2723     2724      2725      2726      2727
192              SQ        0        0         0         0        39
                 *
193              KK       H1
194              KM  RUNOFF FROM SUB-BASIN H1
195              BA      059
196              LS                88       9 4
197              UK      375      025      0 15       100
198              RK     2210      019       032                TRAP         8         5
199              KK  BASH1-         4
200              KM  20' WEIR
201              RS        1     STOR         0
202              SV        0      169       363       585     0 807     1 029
203              SE     2735     2736      2737      2738      2739      2740
204              SQ        0        0         0         0        56       158
1                                           HEC-1 INPUT                                                       PAGE  6

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

```
205          KK  BASH1-      3
206          KM  19' WEIR
207          RS      1    STOR       0
208          SV      0     086     192     321   0 474   0 627
209          SE   2736    2737    2738    2739    2740    2741
210          SQ      0       0       0       0      53     150

211          KK  BASH1-      5
212          KM  19' WEIR
213          RS      1    STOR       0
214          SV      0     219     467     747   1 026   1 306
215          SE   2727    2728    2729    2730    2731    2732
216          SQ      0       0       0       0      53     150
             *

217          KK      H2
218          KM  RUNOFF FROM SUB-BASIN H2
219          BA    072
220          LS             88    4 78
221          UK    400     025    0 15     100
222          RK   3480     019     032            TRAP      12       5

223          KK  BASH2-      1
224          KM  21' WEIR AT HEADWALL
225          RS      1    STOR       0
226          SV      0     175     382     624     905   1 185
227          SE      0    2772    2773    2774    2775    2776
228          SQ      0       0       0       0      59     166

229          KK  BASH2-      2
230          KM  21' WEIR AT HEADWALL
231          RS      1    STOR       0
232          SV      0     165     361     590     820   1 049
233          SE      0    2785    2786    2787    2788    2789
234          SQ      0       0       0       0      59     166
             *

235          KK      I
236          KM  RUNOFF FROM SUB-BASIN I
237          BA    025
238          LS             88     7 4
239          UK    225      02    0 15     100
240          RK   2100     026     032            TRAP      10       5
             *

241          KK    BASI
242          KM  10' WEIR
243          RS      1    STOR       0
244          SV      0     186     399     640   0 881   1 122
245          SE   2755    2756    2757    2758    2759    2760
246          SQ      0       0       0       0      28      79
             *
1                                     HEC-1 INPUT                                             PAGE  7

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

247          KK   CLEAR
248          KM  CLEAR HYDROGRAPH STACK
249          HC      8
             *

250          KK      J
251          KM  RUNOFF FROM SUB-BASIN J
252          BA    024
253          LS             88     7 9
254          UK    145      02    0 15     100
255          RK    965     026     032            TRAP       5       5
             *

256          KK    BASJ
257          KM  11' WEIR
258          RS      1    STOR       0
259          SV      0     098     217     359     528   0 698
260          SE   2769    2770    2771    2772    2773    2774
261          SQ      0       0       0       0      31      87
             *

262          KK      K
263          KM  RUNOFF FROM SUB-BASIN K
264          BA    009
265          LS             88      10
266          UK     81     025    0 15     100
267          RK    715     022     032            TRAP       5       5
             *

268          KK    BASK
269          KM  13' WEIR
270          RS      1    STOR       0
271          SV      0     106     232     378   0 525
272          SE   2737    2738    2739    2740    2741
273          SQ      0       0       0       0      36
             *

274          KK      L
275          KM  RUNOFF FROM SUB-BASIN L
276          BA    009
277          LS             88      10
278          UK    113     018    0 15     100
279          RK    450     012     032            TRAP       5       5
             *

280          KK    BASL
281          KM  12' WEIR
```

```
                                                                  DEV-10 OH1
 282           RS        1    STOR       0
 283           SV        0     035     096     188    0 28
 284           SE     2722    2723    2724    2725    2726
 285           SQ        0       0       0       0      34
               *
1                                                  HEC-1 INPUT                                          PAGE  8

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


 286           KK        M
 287           KM   RUNOFF FROM SUB-BASIN M
 288           BA      008
 289           LS               88      10
 290           UK      137     018    0 15     100
 291           RK      750     012     032            TRAP       4       5
               *

 292           KK     BASM
 293           KM   10' WEIR
 294           RS        1    STOR       0
 295           SV        0     069     160     278   0 396
 296           SE     2721    2722    2723    2724    2725
 297           SQ        0       0       0       0      28
               *

 298           KK        N
 299           KM   RUNOFF FROM SUB-BASIN N
 300           BA       01
 301           LS               88      10
 302           UK      117     018    0 15     100
 303           RK     1036     012     032            TRAP       5       5
               *

 304           KK     BASN
 305           KM   13' WEIR
 306           RS        1    STOR       0
 307           SV        0      11      25     422   0 594
 308           SE     2691    2692    2693    2694    2695
 309           SQ        0       0       0       0      36
               *

 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 15     100
 316           RK      174     014     032            TRAP       4       5

 317           KK        P
 318           KM   RUNOFF FROM SUB-BASIN P
 319           KM   Area of Basin subtrating the area to be retained for 100 year event
 320           BA     0058
 321           LS               88      10
 322           UK      135      02    0 15     100
 323           RK      354     014     032            TRAP       5       5

 324           KK    CLEAR
 325           KM   CLEAR HYDROGRAPH STACK
 326           HC        8
1                                                  HEC-1 INPUT                                          PAGE  9

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


 327           KK        Q
 328           KM   RUNOFF FROM SUB-BASIN Q
 329           KM   Area of Basin subtrating the area to be retained for 100 year event
 330           BA     0024
 331           LS               88      10
 332           UK       86      02    0 15     100
 333           RK      160     014     032            TRAP       4       5

 334           KK        R
 335           KM   RUNOFF FROM SUB-BASIN R
 336           KM   Area of Basin subtrating the area to be retained for 100 year event
 337           BA       14       8
 338           LS               88      14
 339           UK      180     025    0 15     100
 340           RK     4300     023     032            TRAP      15       5
 341           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

  28                     A2
                         V
                         V
  34                  BASA2

  40                                 B1
                                     V
                                     V
  46                                BASB
```

```
52                              B2

58                   COMBB
                         V
                         V
61                    BASB

67                               C
                                 V
                                 V
73                            BASC

79                                      D
                                        V
                                        V
85                                 BASD-1
                                        V
                                        V
91                                   BASD

97                                            E1
                                               V
                                               V
103                                       BASE1-
                                               V
                                               V
109                                       BASE1-

115                                                  E2
                                                      V
                                                      V
121                                               BASE2

127                                        COMBE

130     CLEAR

133              E3
                  V
                  V
139           BASE3

145                    F1
                        V
                        V
151                 BASF1

157                             F2
                                 V
                                 V
163                          BASF2

169                                    F3
                                        V
                                        V
175                                 BASF3

181                                          G
                                             V
                                             V
187                                       BASG

193                                                 H1
                                                     V
                                                     V
199                                             BASH1-
                                                     V
                                                     V
205                                             BASH1-
                                                     V
                                                     V
211                                             BASH1-

217                                                       H2
                                                           V
                                                           V
223                                                   BASH2-
                                                           V
                                                           V
229                                                   BASH2-

235                                                              I
                                                                 V
                                                                 V
241                                                           BASI

247             CLEAR
```

DEV-10 OH1

```
250                          J
                             V
                             V
256                       BASJ

262                                    K
                                       V
                                       V
268                                 BASK

274                                              L
                                                 V
                                                 V
280                                           BASL

286                                                         M
                                                            V
                                                            V
292                                                      BASM

298                                                                   N
                                                                      V
                                                                      V
304                                                                BASN

310                                                                            O

317                                                                                      P

324               CLEAR

327                          Q

334                                    R
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
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   05MAY06  TIME  08 37 11    *              *          (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       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
```

DEV-10 OH1

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

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	108	3 23	11	3	2	08		
+ +	ROUTED TO	BASA1	105	3 27	10	2	2	08	4 16	3 27
+	HYDROGRAPH AT	A2	53	3 20	5	1	1	04		
+ +	ROUTED TO	BASA2	44	3 27	4	1	1	04	2776 07	3 27
+	HYDROGRAPH AT	B1	40	3 20	4	1	1	03		
+ +	ROUTED TO	BASB	30	3 30	3	1	1	03	2784 96	3 30
+	HYDROGRAPH AT	B2	58	3 27	7	2	1	05		
+	2 COMBINED AT	COMBB	87	3 27	10	2	2	08		
+ +	ROUTED TO	BASB	77	3 37	8	2	2	08	2750 11	3 37
+	HYDROGRAPH AT	C	43	3 20	4	1	1	03		
+ +	ROUTED TO	BASC	33	3 30	3	1	1	03	2783 04	3 30
+	HYDROGRAPH AT	D	45	3 23	5	1	1	03		
+ +	ROUTED TO	BASD-1	44	3 27	4	1	1	03	2753 16	3 27
+ +	ROUTED TO	BASD	34	3 37	4	1	1	03	2728 11	3 37
+	HYDROGRAPH AT	E1	69	3 30	8	2	2	06		
+ +	ROUTED TO	BASE1-	64	3 37	7	2	1	06	2720 11	3 37
+ +	ROUTED TO	BASE1-	50	3 50	6	2	1	06	2699 00	3 50
+	HYDROGRAPH AT	E2	68	3 20	6	2	1	05		
+ +	ROUTED TO	BASE2	49	3 33	5	1	1	05	2697 98	3 33
+	2 COMBINED AT	COMBE	86	3 47	11	3	2	11		
+	6 COMBINED AT	CLEAR	317	3 40	40	10	8	37		
+	HYDROGRAPH AT	E3	14	3 13	1	0	0	01		
+ +	ROUTED TO	BASE3	3	3 50	0	0	0	01	2714 13	3 50
+	HYDROGRAPH AT	F1	50	3 23	5	1	1	04		

+ +	ROUTED TO	BASF1	37	3 37	4	1	1	04	2700 04	3 37
+	HYDROGRAPH AT	F2	22	3 17	2	0	0	01		
+ +	ROUTED TO	BASF2	18	3 27	1	0.	0	01	2704 40	3 27
+	HYDROGRAPH AT	F3	19	3 17	2	0	0	01		
+ +	ROUTED TO	BASF3	15	3 27	1	0	0	01	2709 37	3 27
+	HYDROGRAPH AT	G	20	3 23	2	1	0	02		
+ +	ROUTED TO	BASG	7	3 63	1	0	0	02	2726 17	3 63
+	HYDROGRAPH AT	H1	72	3 27	8	2	2	06		
+ +	ROUTED TO	BASH1-	69	3 30	7	2	1	06	2739 12	3 30
+ +	ROUTED TO	BASH1-	63	3 37	6	2	1	06	2740 11	3 37
+ +	ROUTED TO	BASH1-	37	3 60	5	1	1	06	2730 70	3 60
+	HYDROGRAPH AT	H2	79	3 30	10	2	2	07		
+ +	ROUTED TO	BASH2-	73	3 37	8	2	2	07	2775 13	3 37
+ +	ROUTED TO	BASH2-	58	3 50	7	2	1	07	2787 99	3 50
+	HYDROGRAPH AT	I	36	3 20	3	1	1	03		
+ +	ROUTED TO	BASI	16	3 47	2	1	0	03	2758 55	3 47
+	8 COMBINED AT	CLEAR	152	3 53	23	6	5	24		
+	HYDROGRAPH AT	J	44	3 13	3	1	1	02		
+ +	ROUTED TO	BASJ	29	3 23	3	1	1	02	2772 93	3 23
+	HYDROGRAPH AT	K	20	3 10	1	0	0	01		
+ +	ROUTED TO	BASK	4	3 43	1	0	0	01	2740 11	3 43
+	HYDROGRAPH AT	L	18	3 10	1	0	0	01		
+ +	ROUTED TO	BASL	12	3 20	1	0	0	01	2725 37	3 20
+	HYDROGRAPH AT	M	15	3 13	1	0	0	01		
+ +	ROUTED TO	BASM	5	3 40	1	0	0	01	2724 17	3 40
+	HYDROGRAPH AT	N	19	3 13	1	0	0	01		
+ +	ROUTED TO	BASN	4	3 53	1	0	0	01	2694 11	3 53
+	HYDROGRAPH AT	O	5	3 10	0	0	0	00		
+	HYDROGRAPH AT	P	11	3 10	1	0	0	01		
+	8 COMBINED AT	CLEAR	181	3 53	29	7	6	31		
	HYDROGRAPH AT									

```
                                                         DEV-10 OH1
+                          Q        5    3 07        0        0        0        00
         HYDROGRAPH AT
+                          R      201    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     1 72   108 55   193 45     1 21     2 00    108 01   194 00      1 21

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  5445E+01 OUTFLOW=  5419E+01 BASIN STORAGE=  1398E-02 PERCENT ERROR=     5

         FOR STORM = 1  STORM AREA (SQ MI) =        01
            A2  MANE     1 72    54 13   190 95     1 28     2 00     53 34   192 00      1 28

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  2465E+01 OUTFLOW=  2454E+01 BASIN STORAGE=  5265E-03 PERCENT ERROR=     4

         FOR STORM = 1  STORM AREA (SQ MI) =        01
            B1  MANE     2 00    40 63   190 88     1 24     2 00     40 17   192 00      1 24

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  1791E+01 OUTFLOW=  1782E+01 BASIN STORAGE=  3254E-03 PERCENT ERROR=     5

         FOR STORM = 1  STORM AREA (SQ MI) =        01
            B2  MANE     1 73    58 08   197 19     1 27     2 00     58 01   196 00      1 27

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  3403E+01 OUTFLOW=  3391E+01 BASIN STORAGE=  1518E-02 PERCENT ERROR=     3

         FOR STORM = 1  STORM AREA (SQ MI) =        01
             C  MANE     1 51    43 22   191 39     1 26     2 00     42 84   192 00      1 26

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  2028E+01 OUTFLOW=  2019E+01 BASIN STORAGE=  4990E-03 PERCENT ERROR=     4

         FOR STORM = 1  STORM AREA (SQ MI) =        01
             D  MANE     1 32    45 23   193 38     1 31     2 00     44 83   194 00      1 31

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  2379E+01 OUTFLOW=  2372E+01 BASIN STORAGE=  7570E-03 PERCENT ERROR=     3

         FOR STORM = 1  STORM AREA (SQ MI) =        01
            E1  MANE     1 88    69 25   196 46     1 31     2 00     68 98   198 00      1 31

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  4269E+01 OUTFLOW=  4252E+01 BASIN STORAGE=  2035E-02 PERCENT ERROR=     4

         FOR STORM = 1  STORM AREA (SQ MI) =        01
            E2  MANE     2 00    67 82   190 94     1 30     2 00     67 80   192 00      1 30

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  3219E+01 OUTFLOW=  3196E+01 BASIN STORAGE=  5915E-03 PERCENT ERROR=     7

         FOR STORM = 1  STORM AREA (SQ MI) =        01
            E3  MANE       74    14 47   187 88     1 31     2 00     14 43   188 00      1 31

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  5598E+00 OUTFLOW=  5586E+00 BASIN STORAGE=  7059E-04 PERCENT ERROR=     2

         FOR STORM = 1  STORM AREA (SQ MI) =        01
            F1  MANE     2 00    49 85   193 84     1 31     2 00     49 70   194 00      1 31

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  2519E+01 OUTFLOW=  2507E+01 BASIN STORAGE=  5659E-03 PERCENT ERROR=     5

         FOR STORM = 1  STORM AREA (SQ MI) =        01
            F2  MANE     1 33    21 77   190 64     1 31     2 00     21 66   190 00      1 31

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  9797E+00 OUTFLOW=  9752E+00 BASIN STORAGE=  1820E-03 PERCENT ERROR=     4

         FOR STORM = 1  STORM AREA (SQ MI) =        01
            F3  MANE       82    19 45   190 00     1 31     2 00     19 45   190 00      1 31

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  9098E+00 OUTFLOW=  9062E+00 BASIN STORAGE=  1824E-03 PERCENT ERROR=     4

         FOR STORM = 1  STORM AREA (SQ MI) =        01
             G  MANE       84    19 78   194 57     1 31     2 00     19 72   194 00      1 31

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  1120E+01 OUTFLOW=  1115E+01 BASIN STORAGE=  4378E-03 PERCENT ERROR=     4

         FOR STORM = 1  STORM AREA (SQ MI) =        01
```

```
      H1  MANE          1 71      73 19     195 47      1 30       2 00      72 42     196 00          1 30

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  4108E+01 OUTFLOW=  4096E+01 BASIN STORAGE=  1496E-02 PERCENT ERROR=     3

          FOR STORM = 1  STORM AREA (SQ MI) =         01
      H2  MANE          1 97      79 42     197 45      1 25       2 00      79 26     198 00          1 25

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  4821E+01 OUTFLOW=  4799E+01 BASIN STORAGE=  2063E-02 PERCENT ERROR=     4

          FOR STORM = 1  STORM AREA (SQ MI) =         01
       I  MANE          1 80      36 22     191 38      1 28       2 00      36 00     192 00          1 28

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  1712E+01 OUTFLOW=  1704E+01 BASIN STORAGE=  4051E-03 PERCENT ERROR=     4

          FOR STORM = 1  STORM AREA (SQ MI) =         01
       J  MANE            79      44 02     187 79      1 29       2 00      43 80     188 00          1 28

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  1650E+01 OUTFLOW=  1647E+01 BASIN STORAGE=  1790E-03 PERCENT ERROR=     2

          FOR STORM = 1  STORM AREA (SQ MI) =         01
       K  MANE            75      20 24     185 09      1 31       2 00      19 86     186 00          1 31

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  6298E+00 OUTFLOW=  6294E+00 BASIN STORAGE=  2209E-04 PERCENT ERROR=     1

          FOR STORM = 1  STORM AREA (SQ MI) =         01
       L  MANE            70      18 01     186 91      1 31       2 00      17 87     186 00          1 31

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  6298E+00 OUTFLOW=  6286E+00 BASIN STORAGE=  5025E-04 PERCENT ERROR=     2

          FOR STORM = 1  STORM AREA (SQ MI) =         01
       M  MANE          1 09      14 81     187 46      1 31       2 00      14 71     188 00          1 31

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  5598E+00 OUTFLOW=  5587E+00 BASIN STORAGE=  5786E-04 PERCENT ERROR=     2

          FOR STORM = 1  STORM AREA (SQ MI) =         01
       N  MANE          1 27      18 77     188 39      1 31       2 00      18 69     188 00          1 31

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  6998E+00 OUTFLOW=  6988E+00 BASIN STORAGE=  5759E-04 PERCENT ERROR=     1

          FOR STORM = 1  STORM AREA (SQ MI) =         01
       O  MANE            37       5 03     185 12      1 31       2 00       4 98     186 00          1 31

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  1680E+00 OUTFLOW=  1677E+00 BASIN STORAGE=  1040E-04 PERCENT ERROR=     1

          FOR STORM = 1  STORM AREA (SQ MI) =         01
       P  MANE            53      11 16     187 13      1 31       2 00      11 07     186 00          1 31

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  4059E+00 OUTFLOW=  4050E+00 BASIN STORAGE=  3361E-04 PERCENT ERROR=     2

          FOR STORM = 1  STORM AREA (SQ MI) =         01
       Q  MANE            33       5 33     184 83      1 31       2 00       5 15     184 00          1 31

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  1680E+00 OUTFLOW=  1678E+00 BASIN STORAGE=  7015E-05 PERCENT ERROR=     1

          FOR STORM = 1  STORM AREA (SQ MI) =         01
       R  MANE          1 80     202 31     192 29      1 20       2 00     200 54     192 00          1 20

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  8998E+01 OUTFLOW=  8955E+01 BASIN STORAGE=  1432E-02 PERCENT ERROR=     5


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

DEV-100 OH1

```
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   05MAY06  TIME  10 18 38    *                    *          (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
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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

```
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 15     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     151     342   0 574   0 807    1 04
         26       SE       0       1       2       3       4       5
         27       SQ       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 15     100
         34       RK    2000      02     032            TRAP       8       5

         35       KK   BASA2      -5
         36       KM  14' WEIR AT OUTLET
         37       RS       1    STOR       0
         38       SV       0   0 125   0 273   0 448   0 623   0 798
         39       SE    2772    2773    2774    2775    2776    2777
         40       SQ       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 15     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 15      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  23' WEIR
 66        RS       1    STOR        0
 67        SV       0      21      459      750     1 04    1 33
 68        SE    2746    2747     2748     2749     2750    2751
 69        SQ       0       0        0        0       64     182
 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 15      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      540   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 15      100
 89        RK    1425     014      032              TRAP       6       5
           *
```

1 HEC-1 INPUT PAGE 3

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

 90        KK  BASD-1
 91        KM  12' WEIR AT HEAD WALL
 92        RS       1    STOR        0
 93        SV       0     056      131      227      324   0 472
 94        SE    2749    2750     2751     2752     2753    2754
 95        SQ       0       0        0        0       34      95

 96        KK    BASD      -2
 97        KM  10' WEIR AT HEAD WALL
 98        RS       1    STOR        0
 99        SV       0     097      218      364     0 51   0 657
100        SE    2724    2725     2726     2727     2728    2729
101        SQ       0       0        0        0       28      79
102        KO                                         22
           *

103        KK      E1       5
104        KM  RUNOFF FROM SUB-BASIN E1
105        BA     061
106        LS              88       10
107        UK     400      02     0 15      100
108        RK    2050     013      032              TRAP       7       5

109        KK  BASE1-       2
110        KM  19' WEIR AT HEADWALL
111        RS       1    STOR        0
112        SV       0     181      396      648      0 9   1 152
113        SE    2716    2717     2718     2719     2720    2721
114        SQ       0       0        0        0       53     150

115        KK  BASE1-       3
116        KM  18' WEIR AT HEAD WALL
117        RS       1    STOR        0
118        SV       0     138      316      532      747     963
119        SE    2695    2696     2697     2698     2699    2700
120        SQ       0       0        0        0       50     143
121        KO                                         22

122        KK      E2
123        KM  RUNOFF FROM SUB-BASIN E2
124        BA     046
125        LS              88       10
126        UK     200      02     0 15      100
127        RK    2370     013      032              TRAP      10       5
           *

128        KK   BASE2
129        KM  18' WEIR AT HEAD WALL
130        RS       1    STOR        0
131        SV       0     176      385      632      919   1 205
132        SE    2694    2695     2696     2697     2698    2699
133        SQ       0       0        0        0       50     143
134        KO                                         22
           *
```

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

 135        KK   COMBE
 136        KM  COMBINE SECTIONS E1 AND E2
 137        HC     2
 138        KO                                    22
            *

 139        KK   CLEAR
 140        KM  CLEAR HYDROGRAPH STACK
 141        HC     6
            *

 142        KK     E3
 143        KM  RUNOFF FROM SUB-BASIN E3
 144        BA    008
 145        LS             88      10
 146        UK    175     025    0 15     100
 147        RK    750     032     032            TRAP       6       5
            *

 148        KK   BASE3
 149        KM  10' WEIR AT HEAD WALL
 150        RS     1     STOR       0
 151        SV     0      082     188     322   0 456
 152        SE  2711     2712    2713    2714    2715
 153        SQ     0        0       0       0      28
 154        KO                                     22
            *

 155        KK     F1
 156        KM  RUNOFF FROM SUB-BASIN F1
 157        BA    036
 158        LS             88      10
 159        UK    225     018    0 15     100
 160        RK   2500     012     032            TRAP       7       5
            *

 161        KK   BASF1
 162        KM  12' WEIR AT HEAD WALL
 163        RS     1     STOR       0
 164        SV     0      132     293     483   0 706   0 929
 165        SE  2696     2697    2698    2699    2700    2701
 166        SQ     0        0       0       0      34      95
 167        KO                                     22
            *

 168        KK     F2
 169        KM  RUNOFF FROM SUB-BASIN F2
 170        BA    014
 171        LS             88      10
 172        UK    200     018    0 15     100
 173        RK   1440     028     032            TRAP       6       5
            *
```



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

 174        KK   BASF2
 175        KM  16' WEIR AT HEAD WALL
 176        RS     1     STOR       0
 177        SV     0      055     135     240   0 345
 178        SE  2701     2702    2703    2704    2705
 179        SQ     0        0       0       0      45
 180        KO                                     22
            *

 181        KK     F3
 182        KM  RUNOFF FROM SUB-BASIN F3
 183        BA    013
 184        LS             88      10
 185        UK    225     018    0 15     100
 186        RK    850     026     032            TRAP       6       5
            *

 187        KK   BASF3
 188        KM  14' WEIR AT HEAD WALL
 189        RS     1     STOR       0
 190        SV     0      055     133     239     378
 191        SE  2706     2707    2708    2709    2710
 192        SQ     0        0       0       0      39
 193        KO                                     22
            *

 194        KK     G
 195        KM  RUNOFF FROM SUB-BASIN G
 196        BA  0 016
 197        LS             88      10
 198        UK    400     025    0 15     100
 199        RK    720     022     032            TRAP       4       5
 200        KK    BASG
 201        KM  14' WEIR AT HEAD WALL
 202        RS     1     STOR       0
 203        SV     0    0 159     356     592   0 828
 204        SE  2723     2724    2725    2726    2727
 205        SQ     0        0       0       0      39
 206        KO                                     22
            *

 207        KK     H1
 208        KM  RUNOFF FROM SUB-BASIN H1
```

```
  209          BA     059
  210          LS               88       9 4
  211          UK     375      025      0 15      100
  212          RK    2210      019       032               TRAP        8         5
1                                             HEC-1 INPUT                                             PAGE  6

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

  213          KK   BASH1-       4
  214          KM   20' WEIR
  215          RS       1     STOR         0
  216          SV       0      169       363      585     0 807     1 029
  217          SE    2735     2736      2737     2738      2739      2740
  218          SQ       0        0         0        0        56       158

  219          KK   BASH1-       3
  220          KM   19' WEIR
  221          RS       1     STOR         0
  222          SV       0      086       192      321     0 474     0 627
  223          SE    2736     2737      2738     2739      2740      2741
  224          SQ       0        0         0        0        53       150

  225          KK   BASH1-       5
  226          KM   19' WEIR
  227          RS       1     STOR         0
  228          SV       0      219       467      747     1 026     1 306
  229          SE    2727     2728      2729     2730      2731      2732
  230          SQ       0        0         0        0        53       150
  231          KO                                            22
               *

  232          KK      H2
  233          KM   RUNOFF FROM SUB-BASIN H2
  234          BA     072
  235          LS               88      4 78
  236          UK     400      025      0 15      100
  237          RK    3480      019       032               TRAP       12         5

  238          KK   BASH2-       1
  239          KM   21' WEIR AT HEADWALL
  240          RS       1     STOR         0
  241          SV       0      175       382      624       905     1 185
  242          SE       0     2772      2773     2774      2775      2776
  243          SQ       0        0         0        0        59       166

  244          KK   BASH2-       2
  245          KM   21' WEIR AT HEADWALL
  246          RS       1     STOR         0
  247          SV       0      165       361      590       820     1 049
  248          SE       0     2785      2786     2787      2788      2789
  249          SQ       0        0         0        0        59       166
  250          KO                                            22
               *

  251          KK       I
  252          KM   RUNOFF FROM SUB-BASIN I
  253          BA     025
  254          LS               88       7 4
  255          UK     225       02      0 15      100
  256          RK    2100      026       032               TRAP       10         5
               *
1                                             HEC-1 INPUT                                             PAGE  7

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

  257          KK    BASI
  258          KM   10' WEIR
  259          RS       1     STOR         0
  260          SV       0      186       399      640     0 881     1 122
  261          SE    2755     2756      2757     2758      2759      2760
  262          SQ       0        0         0        0        28        79
  263          KO                                            22
               *

  264          KK    CLEAR
  265          KM   CLEAR HYDROGRAPH STACK
  266          HC       8
               *

  267          KK       J
  268          KM   RUNOFF FROM SUB-BASIN J
  269          BA     024
  270          LS               88       7 9
  271          UK     145       02      0 15      100
  272          RK     965      026       032               TRAP        5         5
               *

  273          KK    BASJ
  274          KM   11' WEIR
  275          RS       1     STOR         0
  276          SV       0      098       217      359       528     0 698
  277          SE    2769     2770      2771     2772      2773      2774
  278          SQ       0        0         0        0        31        87
  279          KO                                            22
               *

  280          KK       K
  281          KM   RUNOFF FROM SUB-BASIN K
  282          BA     009
  283          LS               88        10
  284          UK      81      025      0 15      100
  285          RK     715      022       032               TRAP        5         5
               *
```

```
 286          KK    BASK
 287          KM  13' WEIR
 288          RS       1    STOR       0
 289          SV       0     106     232     378   0 525
 290          SE    2737    2738    2739    2740    2741
 291          SQ       0       0       0       0      36
 292          KO                                      22
              *

 293          KK       L
 294          KM  RUNOFF FROM SUB-BASIN L
 295          BA     009
 296          LS              88      10
 297          UK     113     018    0 15     100
 298          RK     450     012     032            TRAP       5       5
              *
```

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

 299          KK    BASL
 300          KM  12' WEIR
 301          RS       1    STOR       0
 302          SV       0     035     096     188    0 28
 303          SE    2722    2723    2724    2725    2726
 304          SQ       0       0       0       0      34
 305          KO                                      22
              *

 306          KK       M
 307          KM  RUNOFF FROM SUB-BASIN M
 308          BA     008
 309          LS              88      10
 310          UK     137     018    0 15     100
 311          RK     750     012     032            TRAP       4       5
              *

 312          KK    BASM
 313          KM  10' WEIR
 314          RS       1    STOR       0
 315          SV       0     069     160     278   0 396
 316          SE    2721    2722    2723    2724    2725
 317          SQ       0       0       0       0      28
 318          KO                                      22
              *

 319          KK       N
 320          KM  RUNOFF FROM SUB-BASIN N
 321          BA      01
 322          LS              88      10
 323          UK     117     018    0 15     100
 324          RK    1036     012     032            TRAP       5       5
              *

 325          KK    BASN
 326          KN  13' WEIR
 327          RS       1    STOR       0
 328          SV       0      11      25     422   0 594
 329          SE    2691    2692    2693    2694    2695
 330          SQ       0       0       0       0      36
 331          KO                                      22
              *

 332          KK       O
 333          KM  RUNOFF FROM SUB-BASIN O
 334          KM  Area of Basin subtrating the area to be retained for 100 year event
 335          BA  0 0024       9
 336          LS              88      10
 337          UK     108      02    0 15     100
 338          RK     174     014     032            TRAP       4       5
 339          KO                                      22
```

1 HEC-1 INPUT PAGE 9

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

 340          KK       P
 341          KM  RUNOFF FROM SUB-BASIN P
 342          KM  Area of Basin subtrating the area to be retained for 100 year event
 343          BA    0058
 344          LS              88      10
 345          UK     135      02    0 15     100
 346          RK     354     014     032            TRAP       5       5
 347          KO                                      22

 348          KK   CLEAR
 349          KM  CLEAR HYDROGRAPH STACK
 350          HC       8

 351          KK       Q
 352          KM  RUNOFF FROM SUB-BASIN Q
 353          KM  Area of Basin subtrating the area to be retained for 100 year event
 354          BA    0024
 355          LS              88      10
 356          UK      86      02    0 15     100
 357          RK     160     014     032            TRAP       4       5
 358          KO                                      22

 359          KK       R
 360          KM  RUNOFF FROM SUB-BASIN R
 361          KM  Area of Basin subtrating the area to be retained for 100 year event
 362          BA      14       8
 363          LS              88      14
 364          UK     180     025    0 15     100
 365          RK    4300     023     032            TRAP      15       5
```

```
                                                      DEV-100 OH1
            366          KO                             22
            367    -     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                BASA2

  42                        B1
                             V
                             V
  48                    BASB-3

  55                              B2

  61                     COMBB
                             V
                             V
  64                    BASB-5

  71                              C
                                  V
                                  V
  77                            BASC

  84                                    D
                                        V
                                        V
  90                                BASD-1
                                        V
                                        V
  96                                 BASD

 103                                          E1
                                               V
                                               V
 109                                      BASE1-
                                               V
                                               V
 115                                      BASE1-

 122                                                E2
                                                     V
                                                     V
 128                                             BASE2

 135                                         COMBE

 139        CLEAR

 142                   E3
                        V
                        V
 148                 BASE3

 155                         F1
                              V
                              V
 161                       BASF1

 168                               F2
                                    V
                                    V
 174                             BASF2

 181                                     F3
                                          V
                                          V
 187                                   BASF3

 194                                            G
                                                V
                                                V
 200                                          BASG

 207                                                  H1
                                                       V
                                                       V
 213                                               BASH1-
```

```
                                                            DEV-100 OH1
                                                                                  V
                                                                                  V
   219                                                  .                    BASH1-
                                                                                  V
                                                                                  V
   225                                                  .                    BASH1-

   232                                                                                       H2
                                                                                              V
                                                                                              V
   238                                                                                   BASH2-
                                                                                              V
                                                                                              V
   244                                                                                   BASH2-

   251                                                                                                  I
                                                                                                        V
                                                                                                        V
   257                                                                                               BASI

   264            CLEAR

   267                               J
                                     V
                                     V
   273                            BASJ

   280                                        K
                                              V
                                              V
   286                                     BASK

   293                                                  L
                                                        V
                                                        V
   299                                               BASL

   306                                                           M
                                                                 V
                                                                 V
   312                                                        BASM

   319                                                                      N
                                                                            V
                                                                            V
   325                                                                   BASN

   332                                                                                  O

   340                                                                                           P

   348            CLEAR

   351                               Q

   359                                       R
(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
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   05MAY06  TIME  10 18 38   *                                  *          (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
```

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

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

 WARNING --- ROUTED OUTFLOW (     186 ) IS GREATER THAN MAXIMUM OUTFLOW (      182 ) IN STORAGE-OUTFLOW TABLE

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

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

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

             **************
             *            *
   96 KK     *     BASD   *            -2
             *            *
             **************

  102 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

 WARNING --- ROUTED OUTFLOW (      82 ) IS GREATER THAN MAXIMUM OUTFLOW (       79 ) IN STORAGE-OUTFLOW TABLE

 WARNING --- ROUTED OUTFLOW (      80 ) IS GREATER THAN MAXIMUM OUTFLOW (       79 ) IN STORAGE-OUTFLOW TABLE

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

             **************
             *            *
  115 KK     *   BASE1-   *             3
             *            *
             **************

  121 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

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

             **************
             *            *
  128 KK     *    BASE2   *
             *            *
             **************
```

```
134 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


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

            **************
            *            *
135 KK      *    COMBE   *
            *            *
            **************

138 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


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

            **************
            *            *
148 KK      *    BASE3   *
            *            *
            **************

154 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      *    BASF1   *
            *            *
            **************

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


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

            **************
            *            *
174 KK      *    BASF2   *
            *            *
            **************

180 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


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

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

```
187 KK      *     BASF3  *
            *            *
            **************

193 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


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

            **************
            *            *
200 KK      *     BASG   *
            *            *
            **************

206 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


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

            **************
            *            *
225 KK      *   BASH1-   *          5
            *            *
            **************

231 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


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

            **************
            *            *
244 KK      *   BASH2-   *          2
            *            *
            **************

250 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


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

            **************
            *            *
257 KK      *     BASI   *
            *            *
            **************

263 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


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

```
              **************
              *            *
 273 KK       *     BASJ   *
              *            *
              **************

 279 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


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

              **************
              *            *
 286 KK       *     BASK   *
              *            *
              **************

 292 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


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

              **************
              *            *
 299 KK       *     BASL   *
              *            *
              **************

 305 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


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

              **************
              *            *
 312 KK       *     BASM   *
              *            *
              **************

 318 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


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

              **************
              *            *
 325 KK       *     BASN   *
              *            *
              **************

 331 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
```

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

              **************
              *            *
  332 KK      *        O   *
              *            *
              **************

  339 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

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

              **************
              *            *
  340 KK      *        P   *
              *            *
              **************

  347 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

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

              **************
              *            *
  351 KK      *        Q   *
              *            *
              **************

  358 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

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

              **************
              *            *
  359 KK      *        R   *
              *            *
              **************

  366 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	227	3 17	19	5	4	08		
+	ROUTED TO	BASA1	223	3 20	18	5	4	08		
+									4 95	3 20
+	HYDROGRAPH AT	A2	107	3 13	9	2	2	04		

+ +	ROUTED TO	BASA2	100	3 17	8	2	2	04	2776 85	3 17
+	HYDROGRAPH AT	B1	81	3 13	6	2	1	03		
+ +	ROUTED TO	BASB-3	73	3 20	6	1	1	03	2785 76	3 20
+	HYDROGRAPH AT	B2	122	3 20	12	3	2	05		
+	2 COMBINED AT	COMBB	195	3 20	18	4	4	08		
+ +	ROUTED TO	BASB-5	186	3 23	16	4	3	08	2751 03	3 23
+	HYDROGRAPH AT	C	87	3 13	7	2	1	03		
+ +	ROUTED TO	BASC	78	3 20	6	2	1	03	2783 83	3 20
+	HYDROGRAPH AT	D	92	3 17	8	2	2	03		
+ +	ROUTED TO	BASD-1	89	3 20	8	2	2	03	2753 90	3 20
+ +	ROUTED TO	BASD	82	3 23	7	2	1	03	2729 05	3 23
+	HYDROGRAPH AT	E1	144	3 20	15	4	3	06		
+ +	ROUTED TO	BASE1-	139	3 23	13	3	3	06	2720 89	3 23
+ +	ROUTED TO	BASE1-	131	3 30	12	3	2	06	2699 87	3 30
+	HYDROGRAPH AT	E2	135	3 17	11	3	2	05		
+ +	ROUTED TO	BASE2	123	3 20	10	2	2	05	2698 78	3 20
+	2 COMBINED AT	COMBE	233	3 27	22	6	4	11		
+	6 COMBINED AT	CLEAR	853	3 23	78	20	16	37		
+	HYDROGRAPH AT	E3	27	3 10	2	0	0	01		
+ +	ROUTED TO	BASE3	15	3 23	1	0	0	01	2714 55	3 23
+	HYDROGRAPH AT	F1	99	3 17	9	2	2	04		
+ +	ROUTED TO	BASF1	88	3 23	8	2	2	04	2700 88	3 23
+	HYDROGRAPH AT	F2	43	3 13	3	1	1	01		
+ +	ROUTED TO	BASF2	41	3 17	3	1	1	01	2704 91	3 17
+	HYDROGRAPH AT	F3	39	3 13	3	1	1	01		
+ +	ROUTED TO	BASF3	34	3 17	3	1	1	01	2709 88	3 17
+	HYDROGRAPH AT	G	41	3 17	4	1	1	02		
+ +	ROUTED TO	BASG	25	3 30	3	1	1	02	2726 65	3 30
+	HYDROGRAPH AT	H1	151	3 17	14	4	3	06		
+ +	ROUTED TO	BASH1-	147	3 20	13	3	3	06	2739 89	3 20

+ +	ROUTED TO	BASH1-	145	3 23	12	3	3	06	2740 95	3 23
+ +	ROUTED TO	BASH1-	117	3 33	11	3	2	06	2731 66	3 33
+	HYDROGRAPH AT	H2	166	3 20	17	4	3	07		
+ +	ROUTED TO	BASH2-	160	3 27	16	4	3	07	2775 94	3 27
+ +	ROUTED TO	BASH2-	154	3 30	15	4	3	07	2788 88	3 30
+	HYDROGRAPH AT	I	72	3 17	6	2	1	03		
+ +	ROUTED TO	BASI	49	3 27	5	1	1	03	2759 42	3 27
+	8 COMBINED AT	CLEAR	474	3 30	47	12	10	24		
+	HYDROGRAPH AT	J	84	3 10	6	1	1	02		
+ +	ROUTED TO	BASJ	73	3 13	5	1	1	02	2773 74	3 13
+	HYDROGRAPH AT	K	36	3 07	2	1	0	01		
+ +	ROUTED TO	BASK	20	3 17	1	0	0	01	2740 56	3 17
+	HYDROGRAPH AT	L	33	3 10	2	1	0	01		
+ +	ROUTED TO	BASL	29	3 13	2	0	0	01	2725 86	3 13
+	HYDROGRAPH AT	M	28	3 10	2	0	0	01		
+ +	ROUTED TO	BASM	18	3 20	1	0	0	01	2724 64	3 20
+	HYDROGRAPH AT	N	35	3 10	2	1	0	01		
+ +	ROUTED TO	BASN	19	3 23	2	0	0	01	2694 52	3 23
+	HYDROGRAPH AT	O	9	3 07	1	0	0	00		
+	HYDROGRAPH AT	P	21	3 10	1	0	0	01		
+	8 COMBINED AT	CLEAR	574	3 30	61	15	12	31		
+	HYDROGRAPH AT	Q	10	3 07	1	0	0	00		
+	HYDROGRAPH AT	R	402	3 17	32	8	6	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	1 82	228 04	190 15	2 16	2 00	227 13	190 00	2 16

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 9693E+01 OUTFLOW= 9660E+01 BASIN STORAGE= 1348E-02 PERCENT ERROR= 3

FOR STORM = 1 STORM AREA (SQ MI) = 01									
A2	MANE	1 35	107 48	187 90	2 24	2 00	107 42	188 00	2 24

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 4302E+01 OUTFLOW= 4297E+01 BASIN STORAGE= 4761E-03 PERCENT ERROR= 1

FOR STORM = 1 STORM AREA (SQ MI) = 01									
B1	MANE	1 65	81 16	187 86	2 19	2 00	81 11	188 00	2 19

```
CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 3161E+01 OUTFLOW= 3155E+01 BASIN STORAGE= 2836E-03 PERCENT ERROR= 2

        FOR STORM = 1  STORM AREA (SQ MI) =        01
              B2  MANE        1 43    123 24   191 05     2 22     2 00    121 98    192 00     2 22

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 5952E+01 OUTFLOW= 5927E+01 BASIN STORAGE= 1419E-02 PERCENT ERROR= 4

        FOR STORM = 1  STORM AREA (SQ MI) =        01
              C  MANE         1 27     87 99   188 69     2 22     2 00     87 35    188 00     2 22

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 3556E+01 OUTFLOW= 3548E+01 BASIN STORAGE= 4233E-03 PERCENT ERROR= 2

        FOR STORM = 1  STORM AREA (SQ MI) =        01
              D  MANE         1 12     92 55   189 50     2 27     2 00     92 44    190 00     2 27

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 4120E+01 OUTFLOW= 4112E+01 BASIN STORAGE= 7089E-03 PERCENT ERROR= .2

        FOR STORM = 1  STORM AREA (SQ MI) =        01
              E1  MANE        1 44    143 79   192 60     2 26     2 00    143 60    192 00     2 26

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 7392E+01 OUTFLOW= 7358E+01 BASIN STORAGE= 2255E-02 PERCENT ERROR= 4

        FOR STORM = 1  STORM AREA (SQ MI) =        01
              E2  MANE        1 86    136 41   188 26     2 27     2 00    135 19    190 00     2 27

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 5574E+01 OUTFLOW= 5562E+01 BASIN STORAGE= 6104E-03 PERCENT ERROR= 2

        FOR STORM = 1  STORM AREA (SQ MI) =        01
              E3  MANE          58     27 46   186 21     2 27     2 00     27 42    186 00     2 27

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 9695E+00 OUTFLOW= 9681E+00 BASIN STORAGE= 7116E-04 PERCENT ERROR= 1

        FOR STORM = 1  STORM AREA (SQ MI) =        01
              F1  MANE        2 12     99 31   189 90     2 27     2 00     99 17    190 00     2 27

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 4363E+01 OUTFLOW= 4350E+01 BASIN STORAGE= 6177E-03 PERCENT ERROR= 3

        FOR STORM = 1  STORM AREA (SQ MI) =        01
              F2  MANE        1 18     43 68   187 44     2 27     2 00     43 43    188 00     2 27

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 1697E+01 OUTFLOW= 1693E+01 BASIN STORAGE= 1776E-03 PERCENT ERROR= 2

        FOR STORM = 1  STORM AREA (SQ MI) =        01
              F3  MANE          73     39 42   187 56     2 27     2 00     39 12    188 00     2 27

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 1575E+01 OUTFLOW= 1573E+01 BASIN STORAGE= 2010E-03 PERCENT ERROR= 2

        FOR STORM = 1  STORM AREA (SQ MI) =        01
              G  MANE           62     40 97   190 48     2 27     2 00     40 95    190 00     2 27

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 1939E+01 OUTFLOW= 1933E+01 BASIN STORAGE= 4768E-03 PERCENT ERROR= 3

        FOR STORM = 1  STORM AREA (SQ MI) =        01
              H1  MANE        1 42    151 12   191 31     2 26     2 00    150 68    190 00     2 26

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 7127E+01 OUTFLOW= 7102E+01 BASIN STORAGE= 1651E-02 PERCENT ERROR= 3

        FOR STORM = 1  STORM AREA (SQ MI) =        01
              H2  MANE        2 00    166 95   192 21     2 20     2 00    165 66    192 00     2 20

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 8481E+01 OUTFLOW= 8442E+01 BASIN STORAGE= 2229E-02 PERCENT ERROR= 4

        FOR STORM = 1  STORM AREA (SQ MI) =        01
              I  MANE         1 53     73 51   188 62     2 24     2 00     71 95    190 00     2 23

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 2987E+01 OUTFLOW= 2982E+01 BASIN STORAGE= 4029E-03 PERCENT ERROR= 2

        FOR STORM = 1  STORM AREA (SQ MI) =        01
              J  MANE           68     83 64   186 16     2 24     2 00     83 52    186 00     2 25

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 2876E+01 OUTFLOW= 2873E+01 BASIN STORAGE= 1637E-03 PERCENT ERROR= 1

        FOR STORM = 1  STORM AREA (SQ MI) =        01
              K  MANE           62     36 08   184 33     2 27     2 00     35 83    184 00     2 27

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 1091E+01 OUTFLOW= 1090E+01 BASIN STORAGE= 2309E-04 PERCENT ERROR= 0
```

```
           FOR STORM = 1  STORM AREA (SQ MI) =          01
                  L  MANE            59      33 32    184 89       2 27        2 00       32 61     186 00          2 27

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  1091E+01 OUTFLOW=  1090E+01 BASIN STORAGE=  5388E-04 PERCENT ERROR=     1

           FOR STORM = 1  STORM AREA (SQ MI) =          01
                  M  MANE            83      27 89    186 03       2 27        2 00       27 86     186 00          2 27

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  9695E+00 OUTFLOW=  9682E+00 BASIN STORAGE=  6146E-04 PERCENT ERROR=     1

           FOR STORM = 1  STORM AREA (SQ MI) =          01
                  N  MANE          1 12      34 95    185 84       2 27        2 00       34 93     186 00          2 27

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  1212E+01 OUTFLOW=  1212E+01 BASIN STORAGE=  5737E-04 PERCENT ERROR=     0

           FOR STORM = 1  STORM AREA (SQ MI) =          01
                  O  MANE            33       9 15    184 64       2 27        2 00        9 05     184 00          2 27

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  2908E+00 OUTFLOW=  2905E+00 BASIN STORAGE=  1154E-04 PERCENT ERROR=     1

           FOR STORM = 1  STORM AREA (SQ MI) =          01
                  P  MANE            52      21 03    185 26       2 27        2 00       20 69     186 00          2 27

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  7029E+00 OUTFLOW=  7022E+00 BASIN STORAGE=  3389E-04 PERCENT ERROR=     1

           FOR STORM = 1  STORM AREA (SQ MI) =          01
                  Q  MANE            30       9 52    184 04       2 27        2 00        9 52     184 00          2 27

CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  2908E+00 OUTFLOW=  2905E+00 BASIN STORAGE=  7960E-05 PERCENT ERROR=     1

           FOR STORM = 1  STORM AREA (SQ MI) =          01
                  R  MANE          1 98     409 02    189 54       2 15        2 00      401 91     190 00          2 15

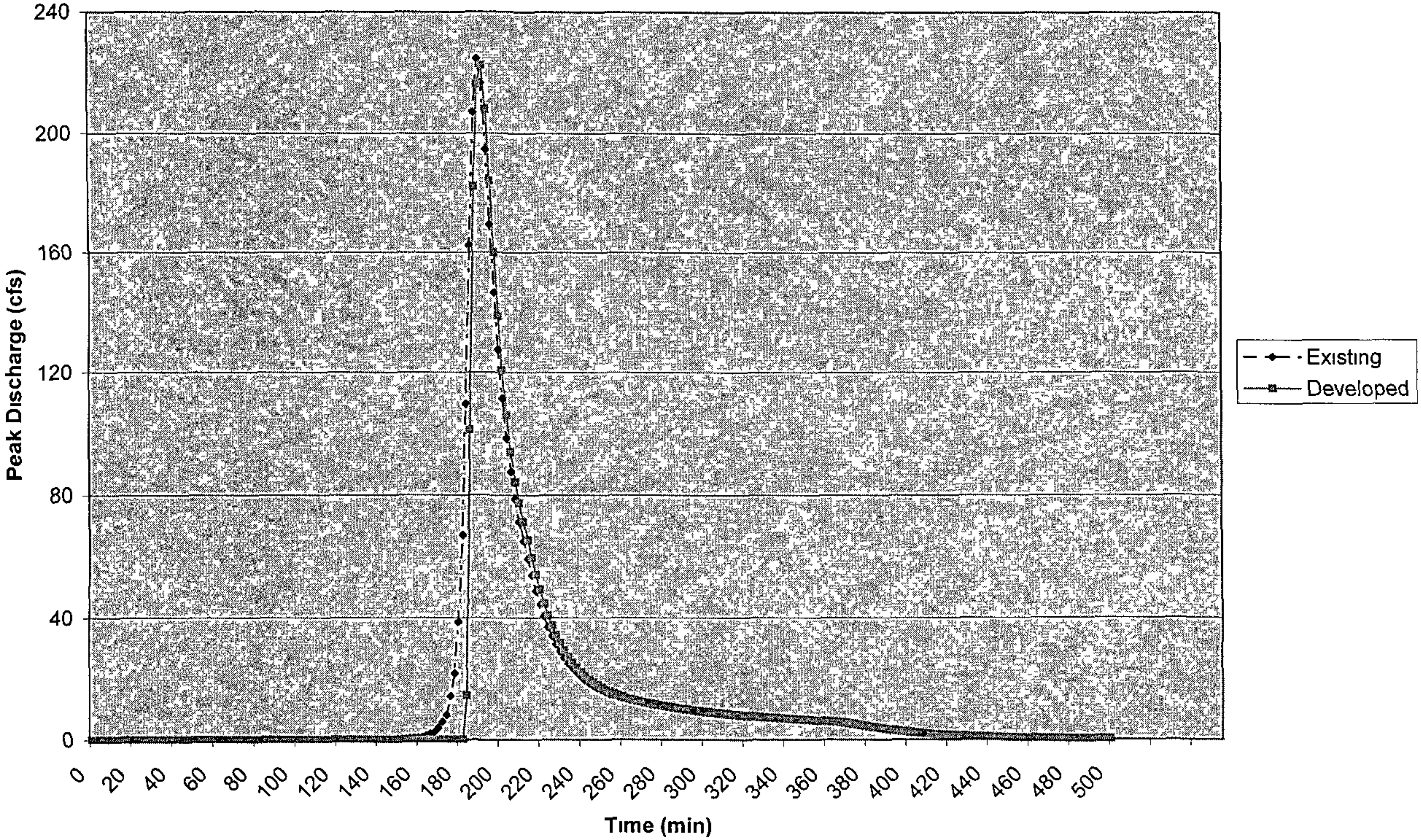
CONTINUITY SUMMARY (AC-FT) - INFLOW=  0000E+00 EXCESS=  1607E+02 OUTFLOW=  1602E+02 BASIN STORAGE=  1407E-02 PERCENT ERROR=     3


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

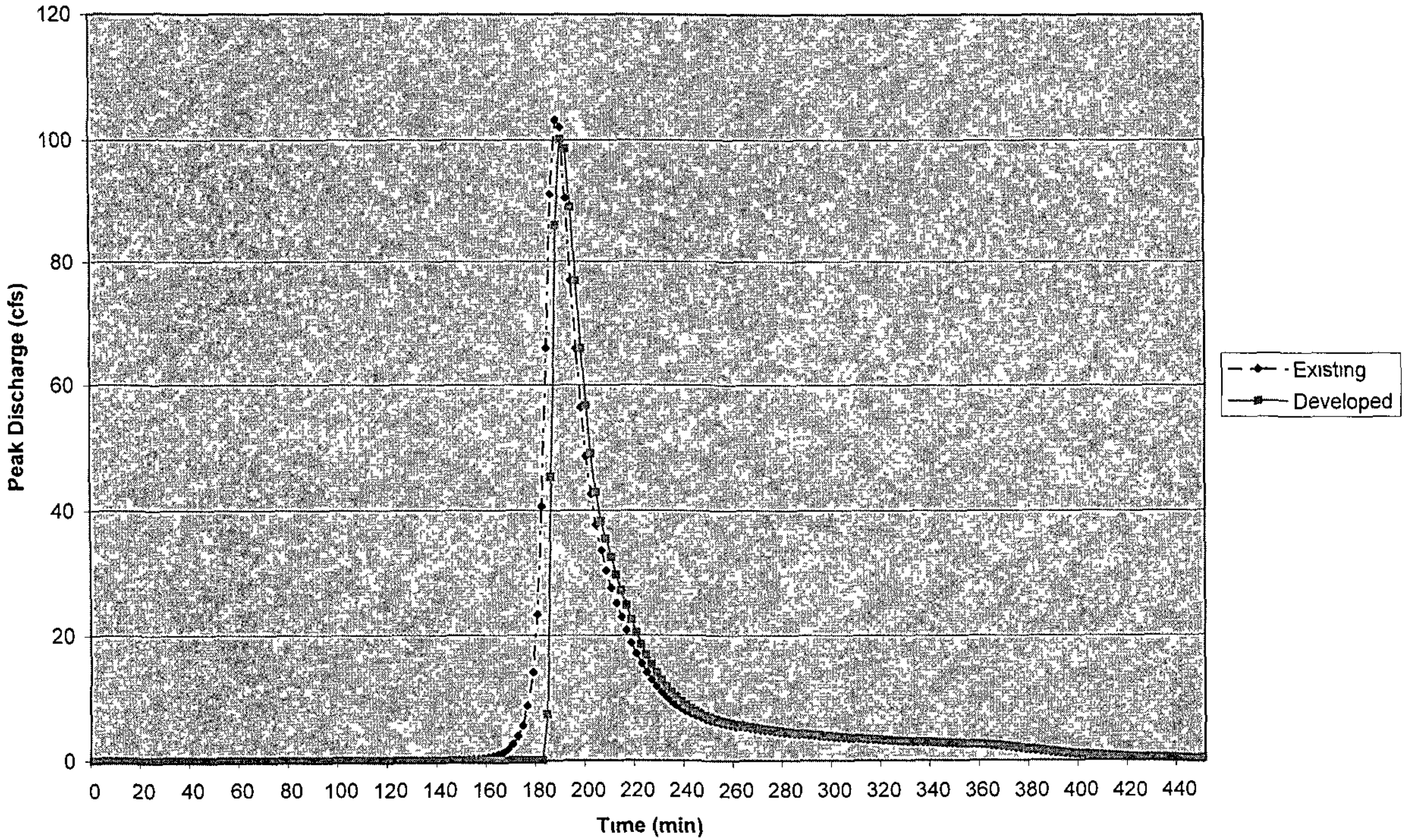
APPENDIX D

Hydrographs

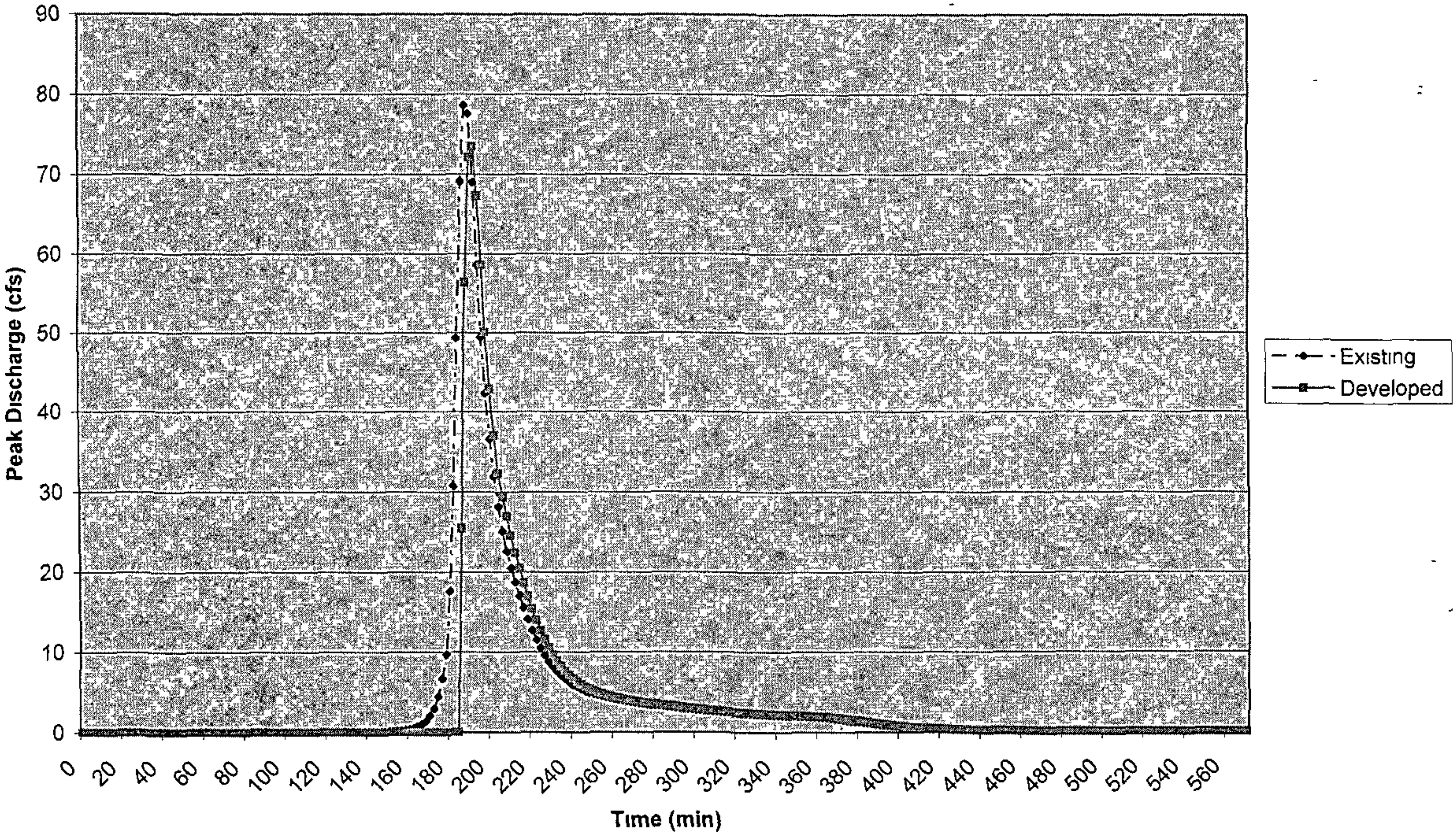
Hydrograph - A1

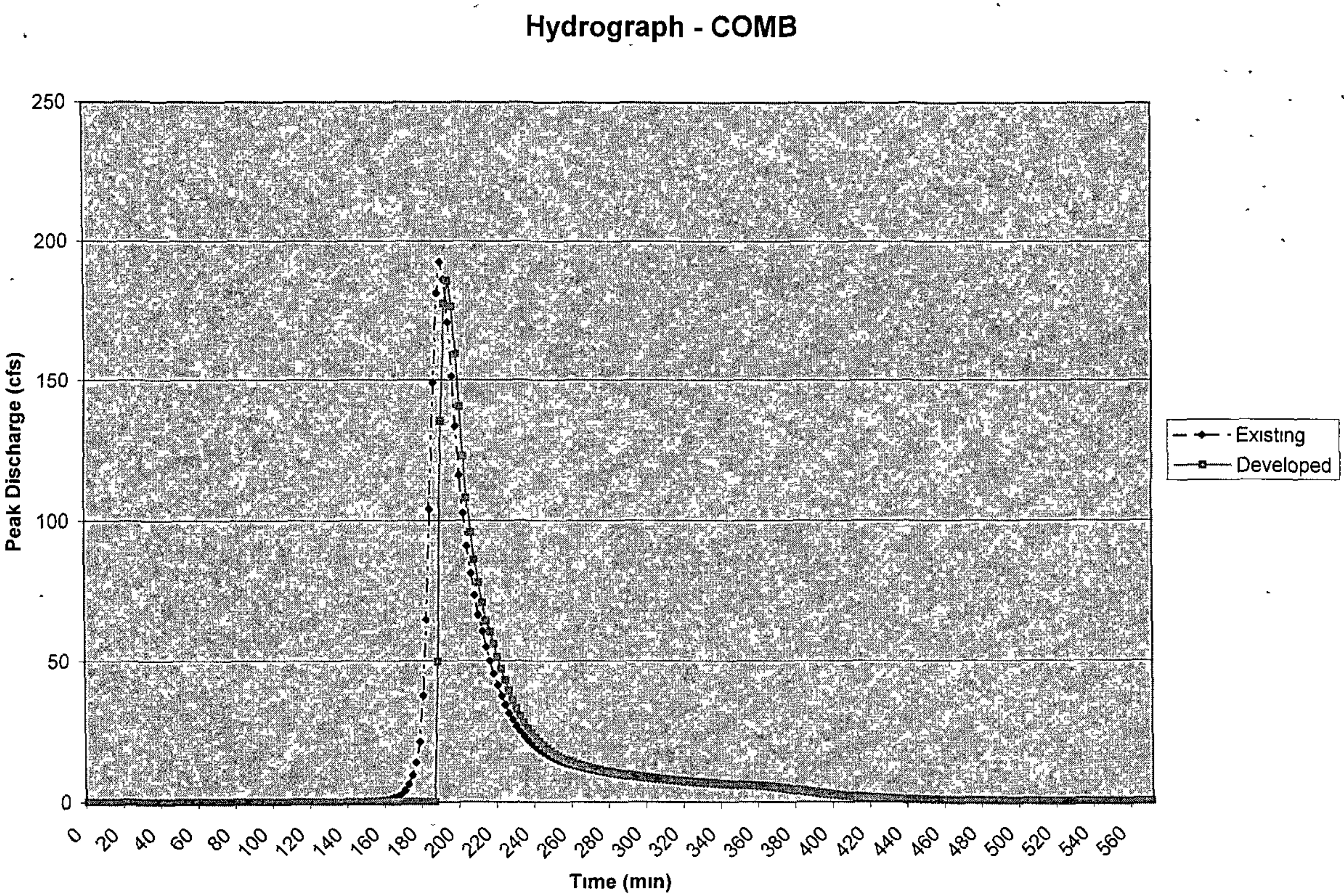


Hydrograph - A2



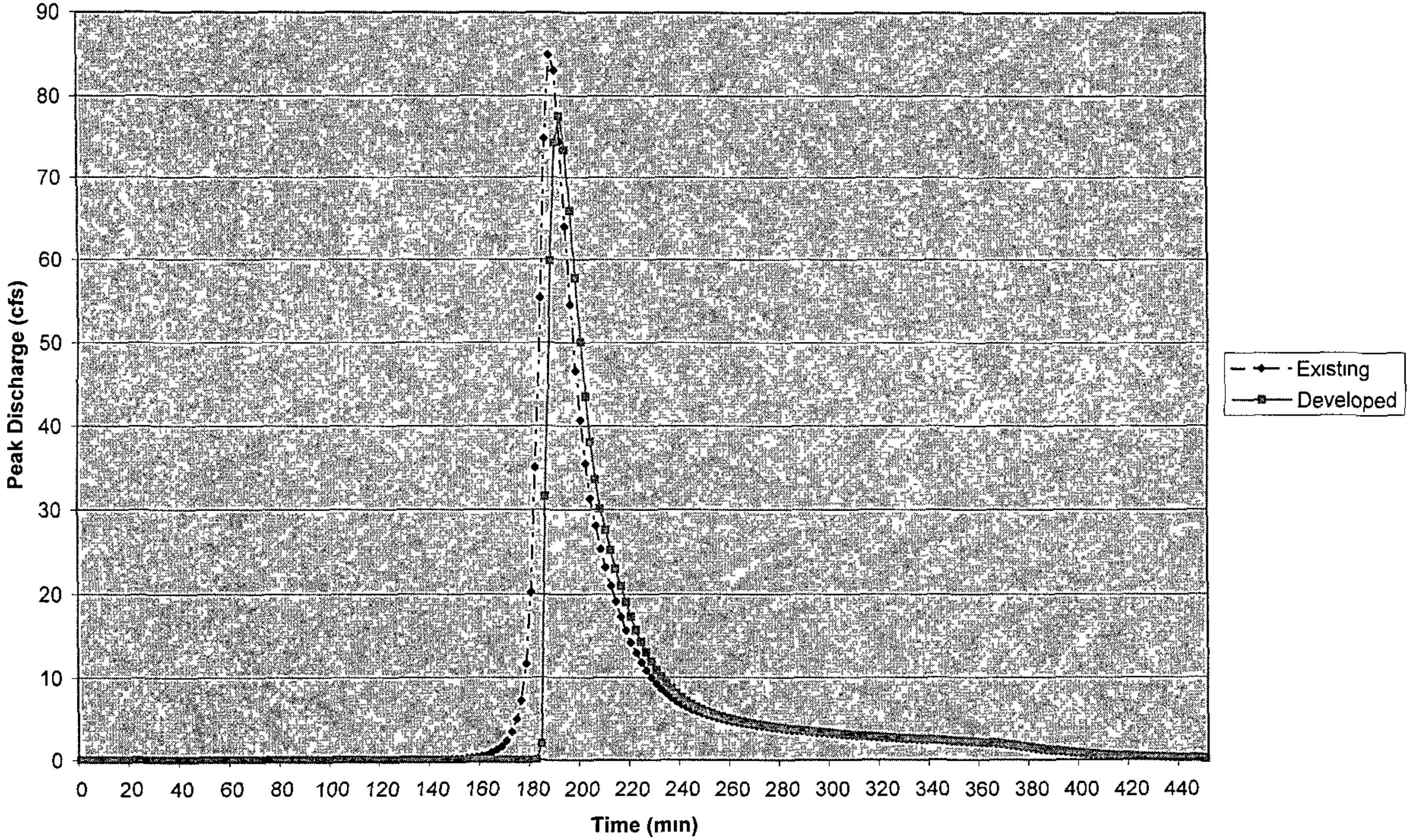
Hydrograph - B1

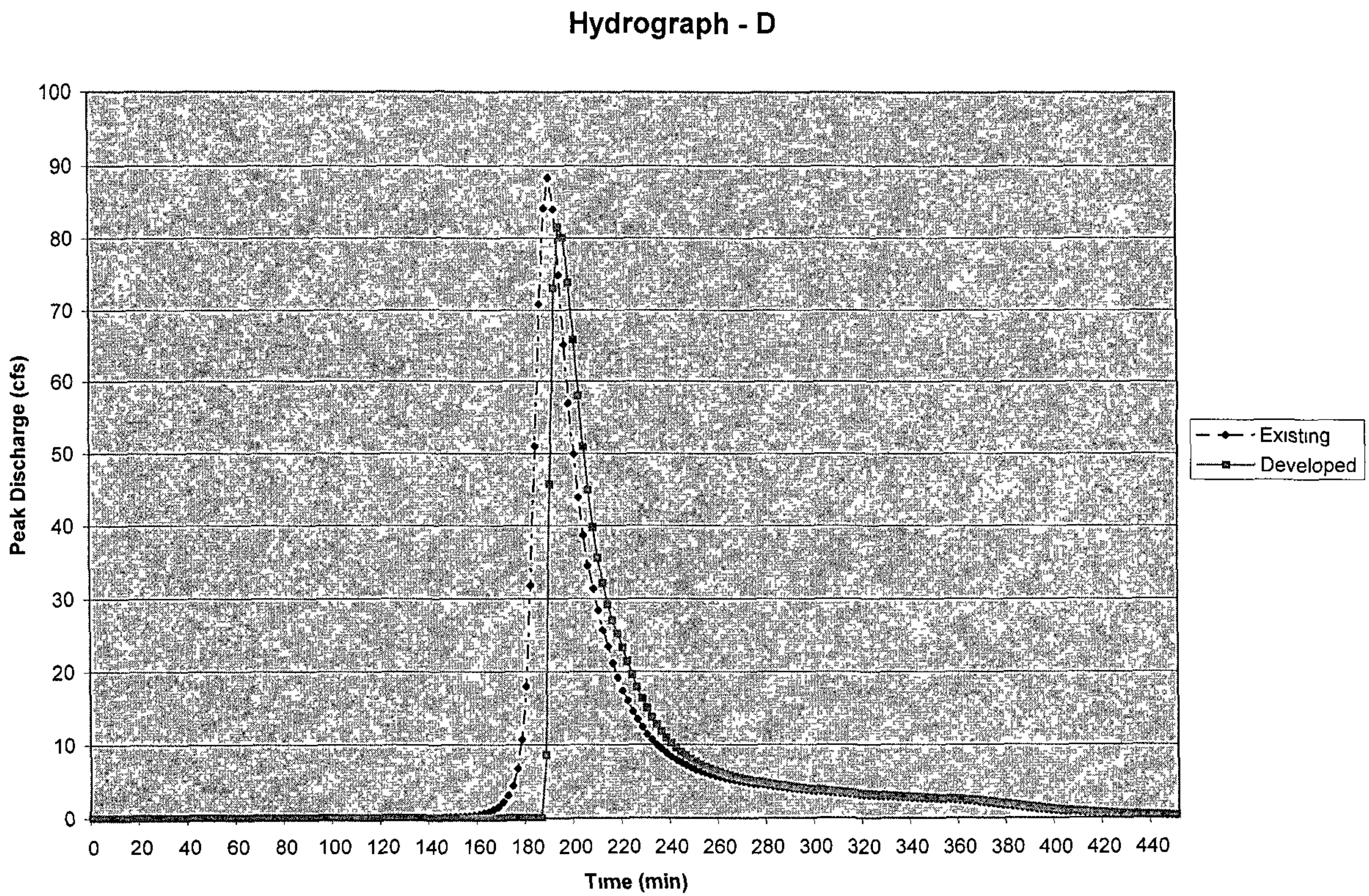




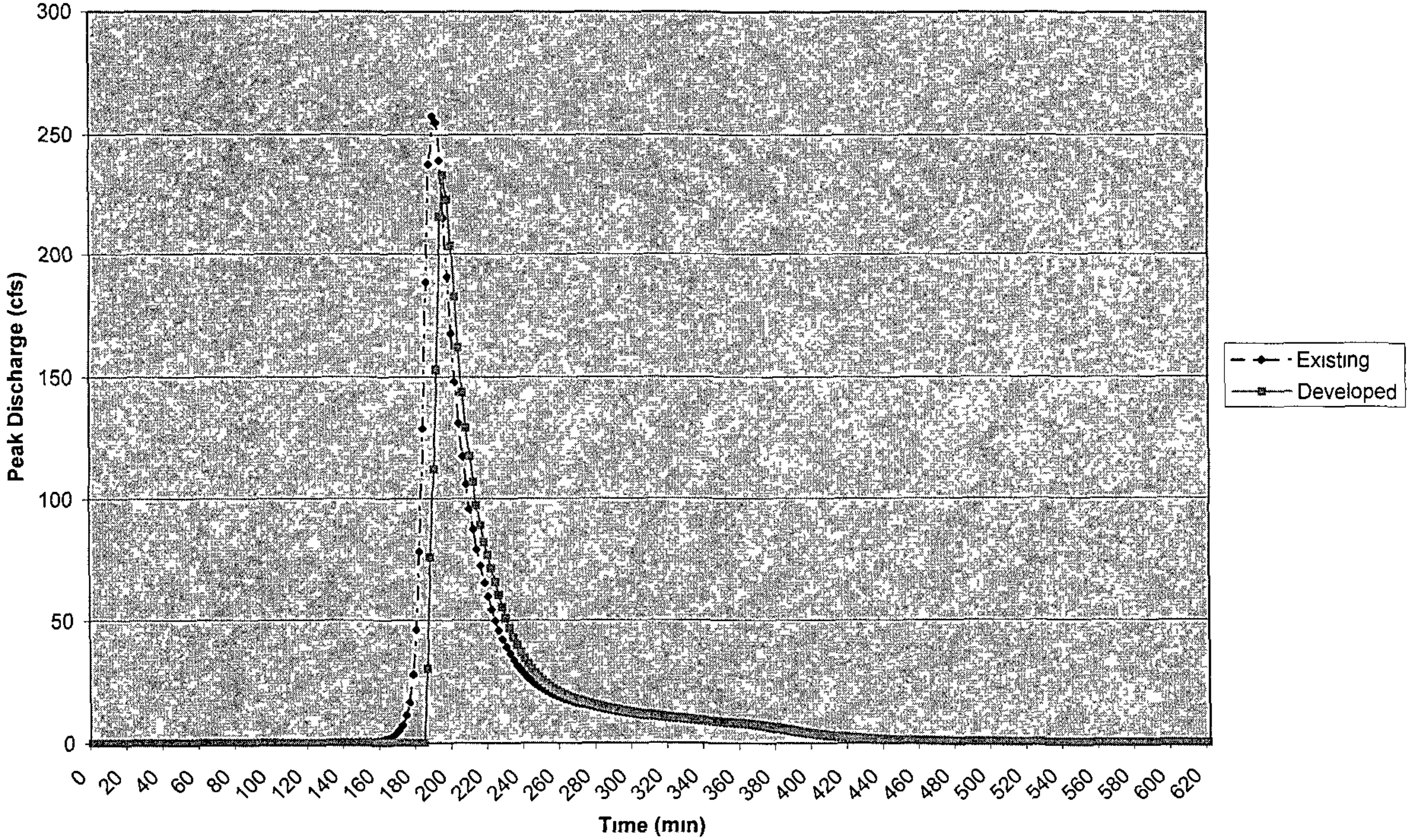
Hydrograph - COMB
Peak Discharge (cfs)
250
200
150
100
50
0
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
360
380
400
420
440
460
480
500
520
540
560
Time (min)
Existing
Developed

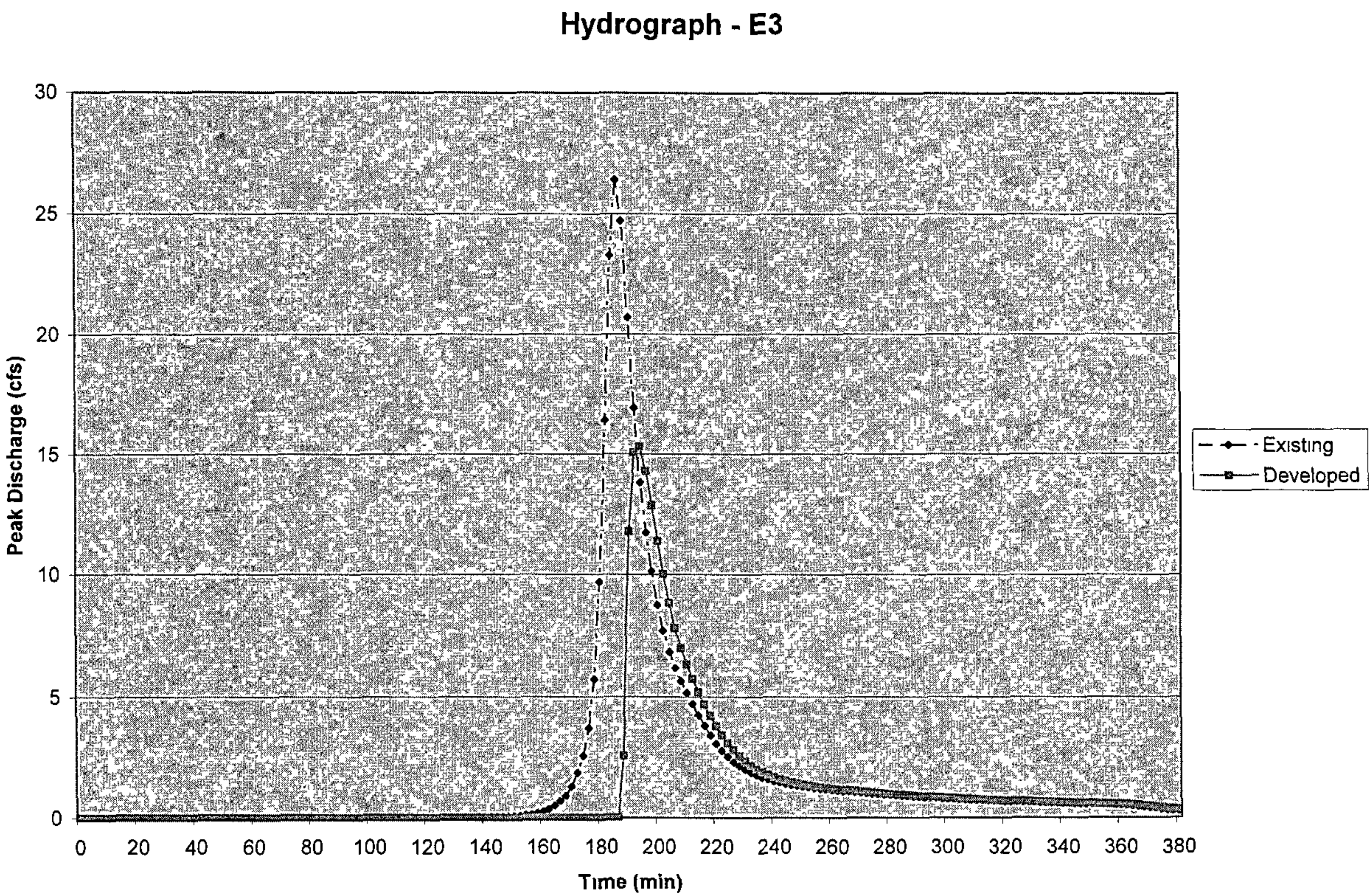
Hydrograph - C

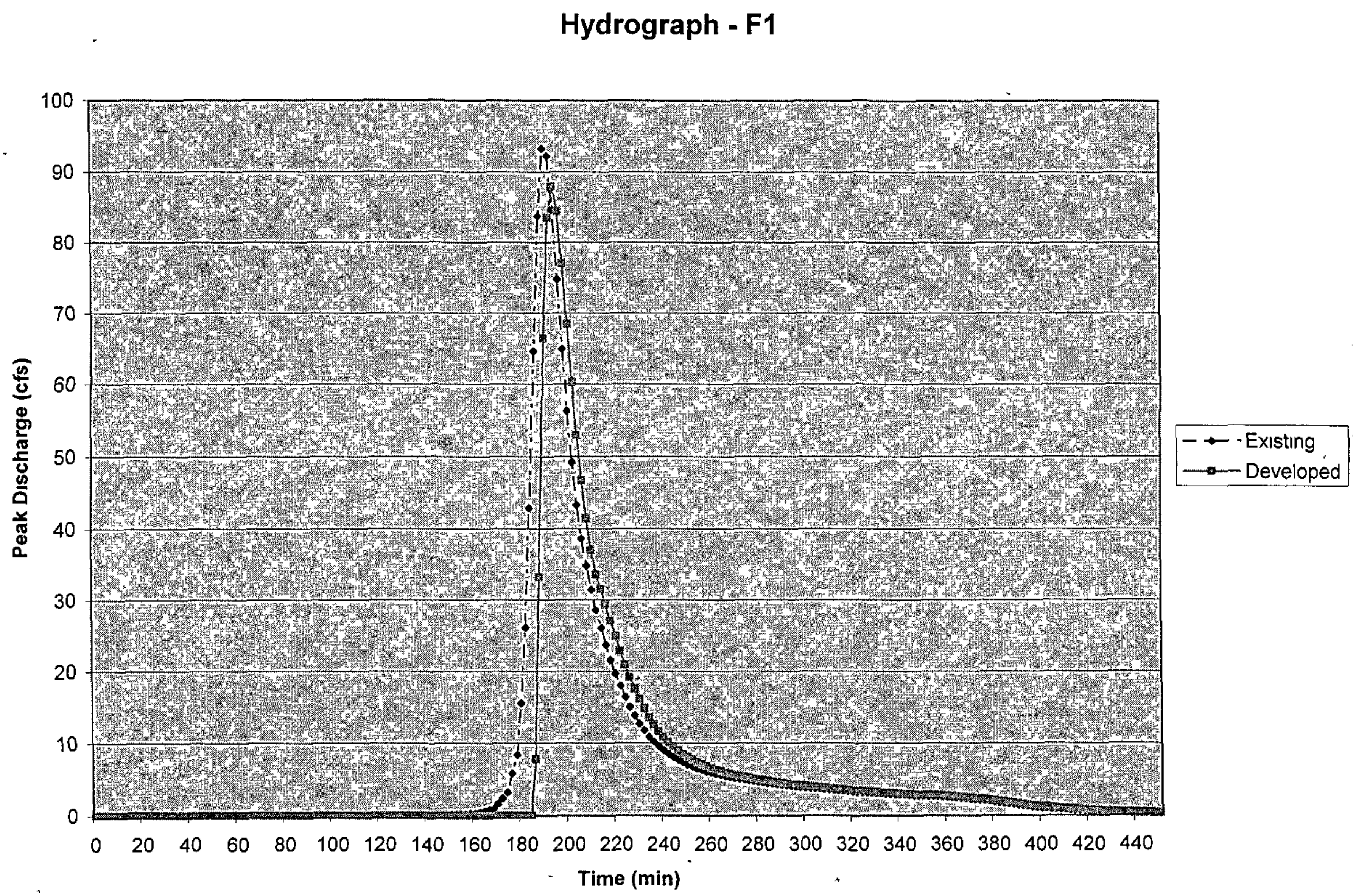


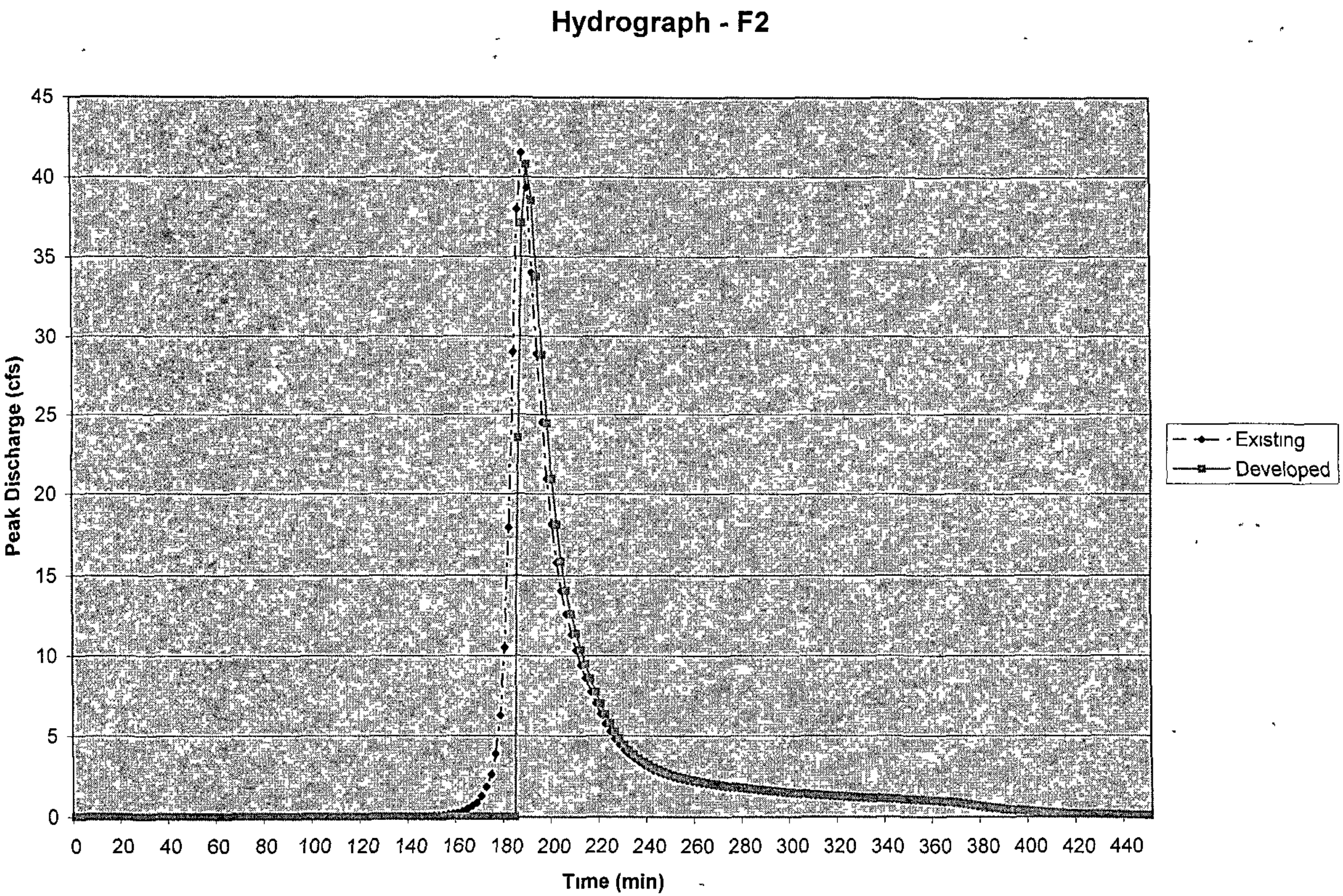

Hydrograph - D
Peak Discharge (cfs)
100
90
80
70
60
50
40
30
20
10
0
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440
Time (min)
Existing
Developed

Hydrograph - COMB E



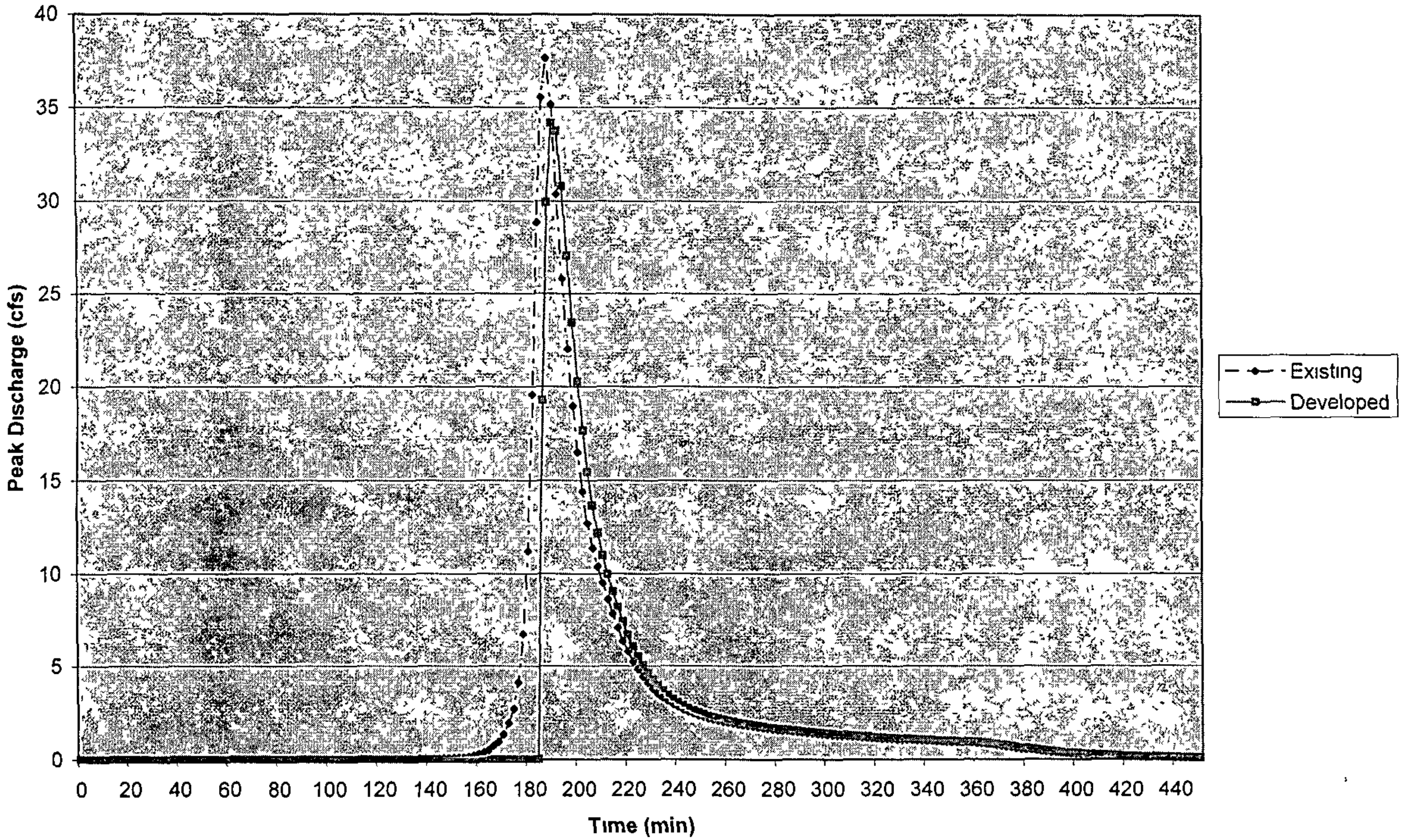

Hydrograph - E3
Peak Discharge (cfs)
30
25
20
15
10
5
0
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
360
380
Time (min)
Existing
Developed

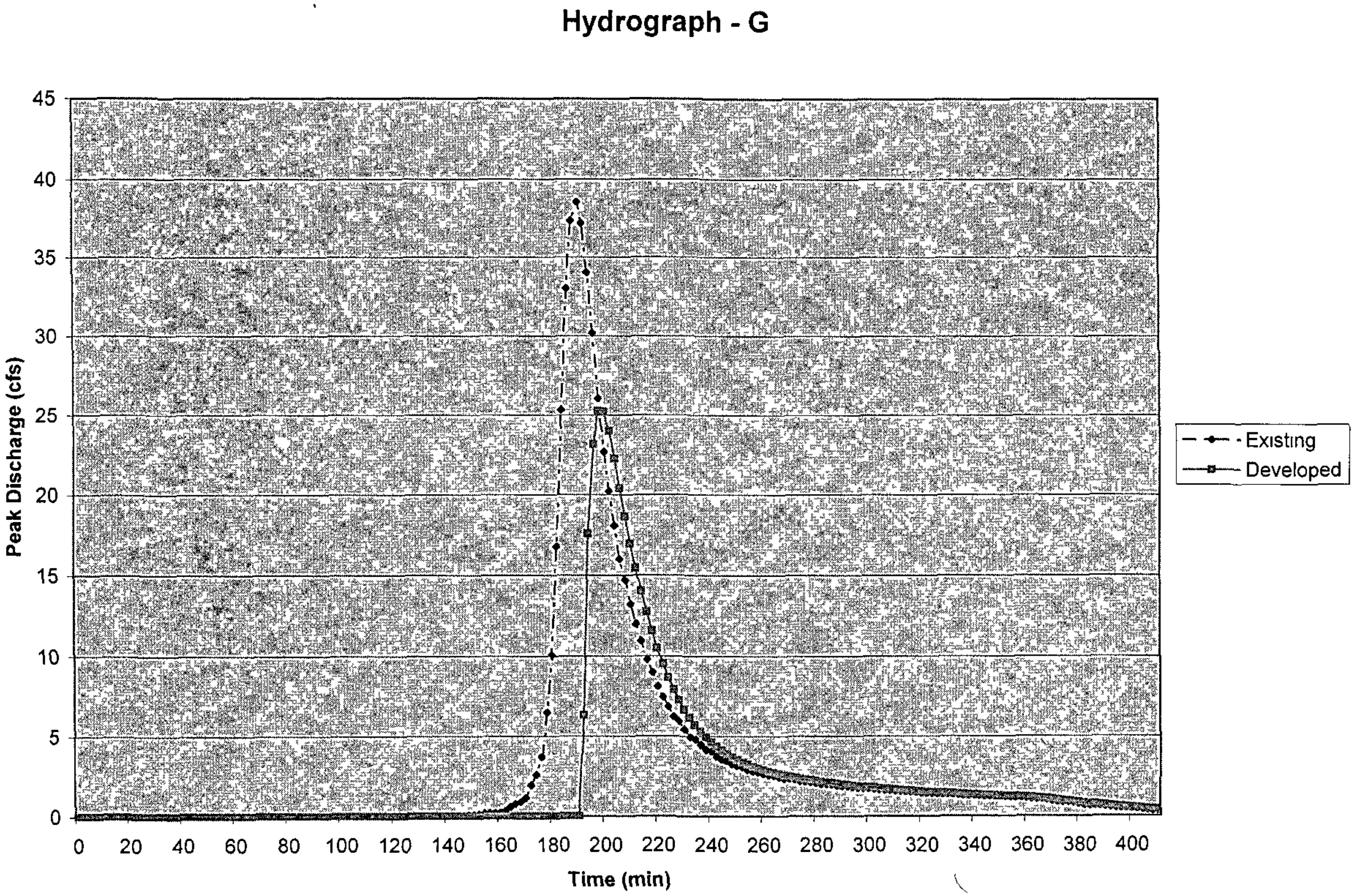

Hydrograph - F1
100
90
80
70
60
50
40
30
20
10
0
Peak Discharge (cfs)
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
360
380
400
420
440
Time (min)
Existing
Developed



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

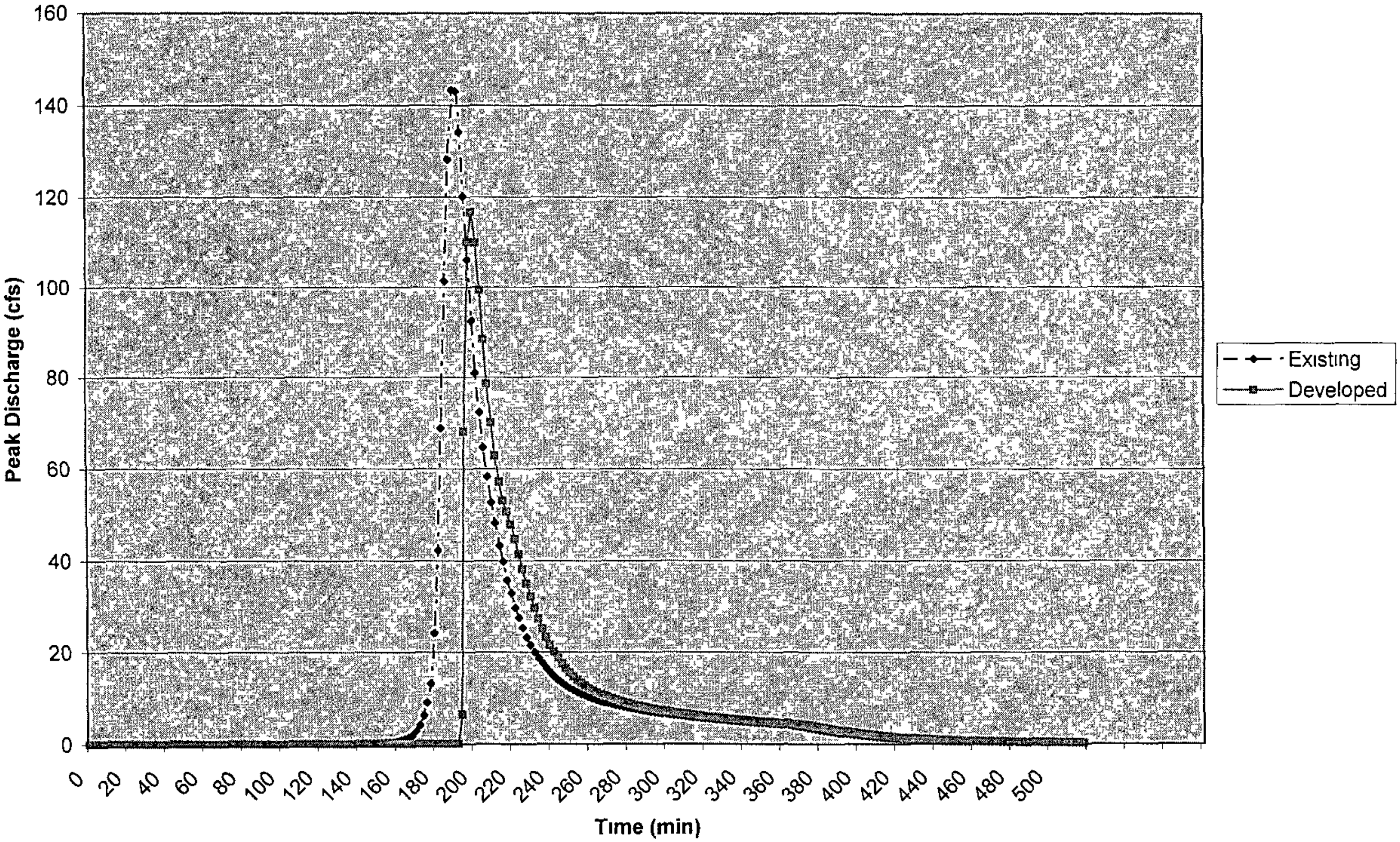
Hydrograph - F3



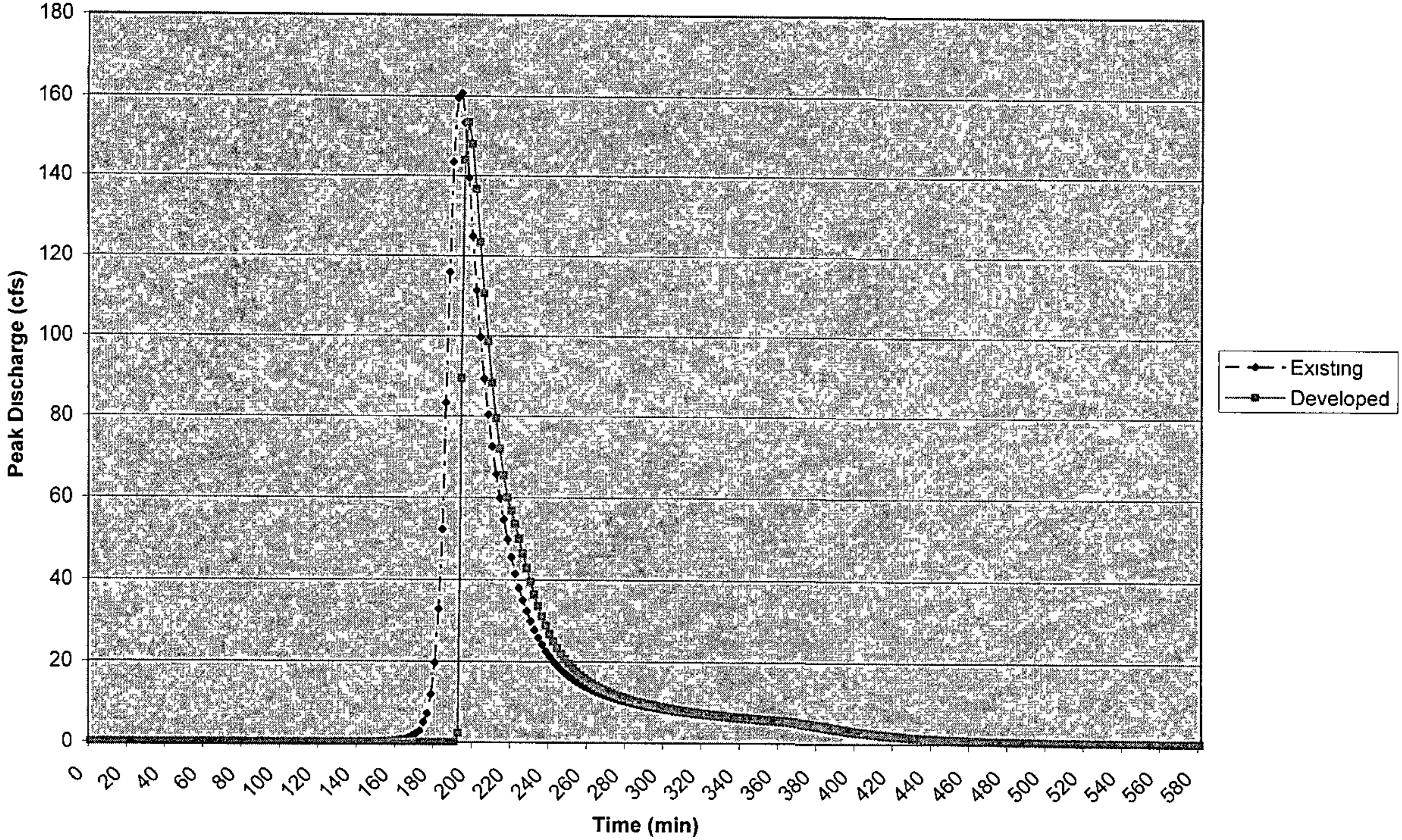


Hydrograph - G
Peak Discharge (cfs)
45
40
35
30
25
20
15
10
5
0
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
360
380
400
Time (min)
Existing
Developed

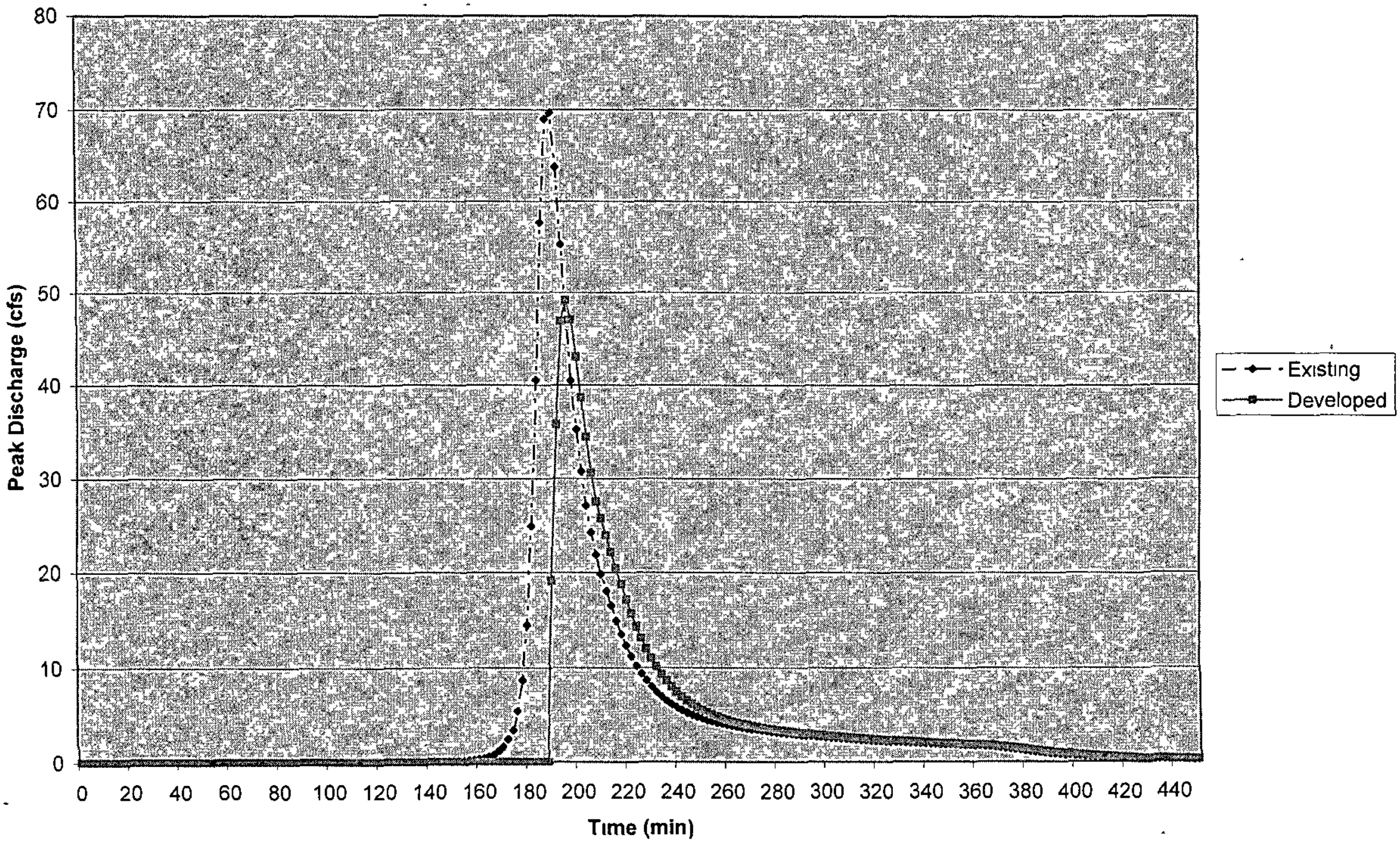
Hydrograph - H1



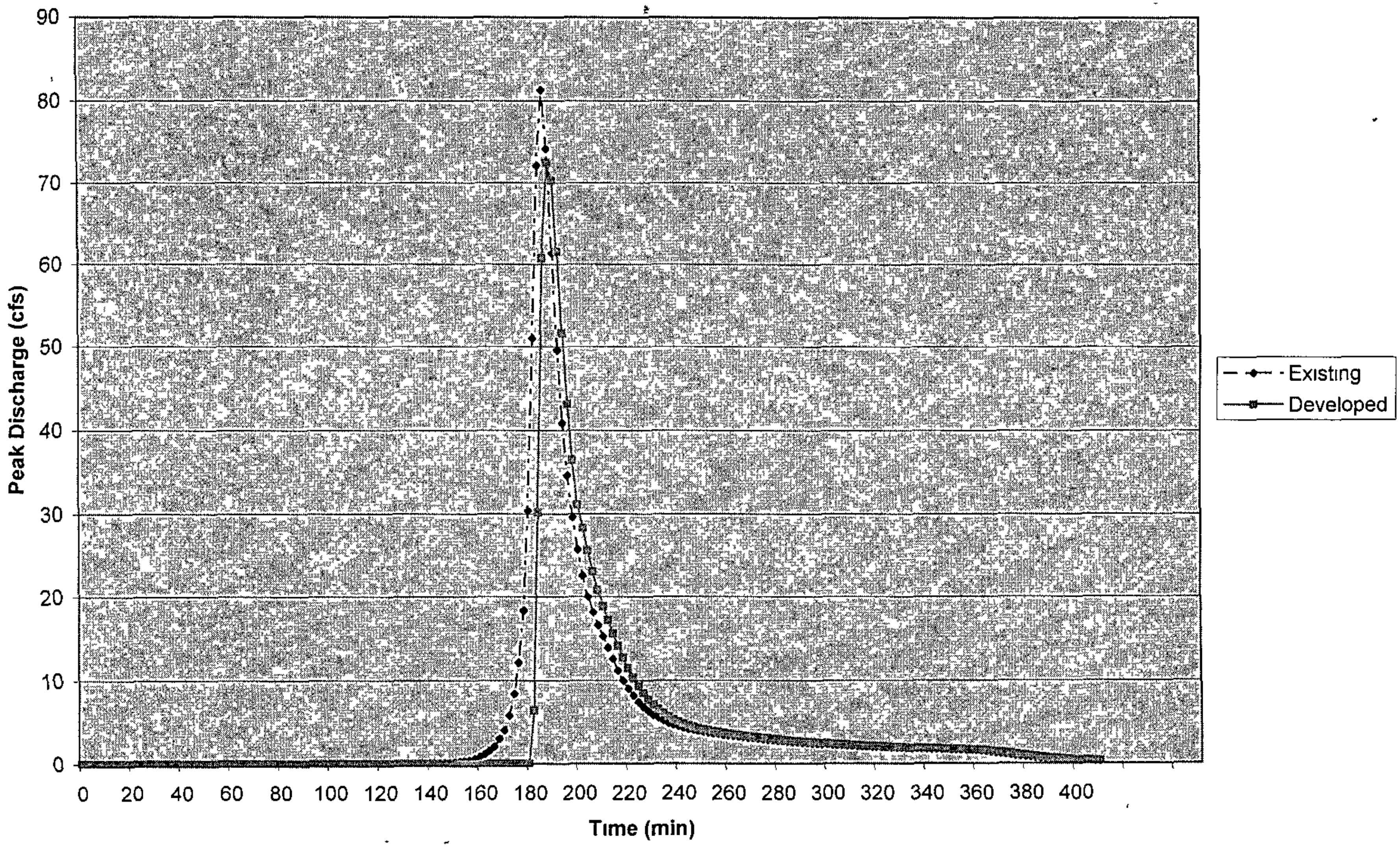
Hydrograph - H2

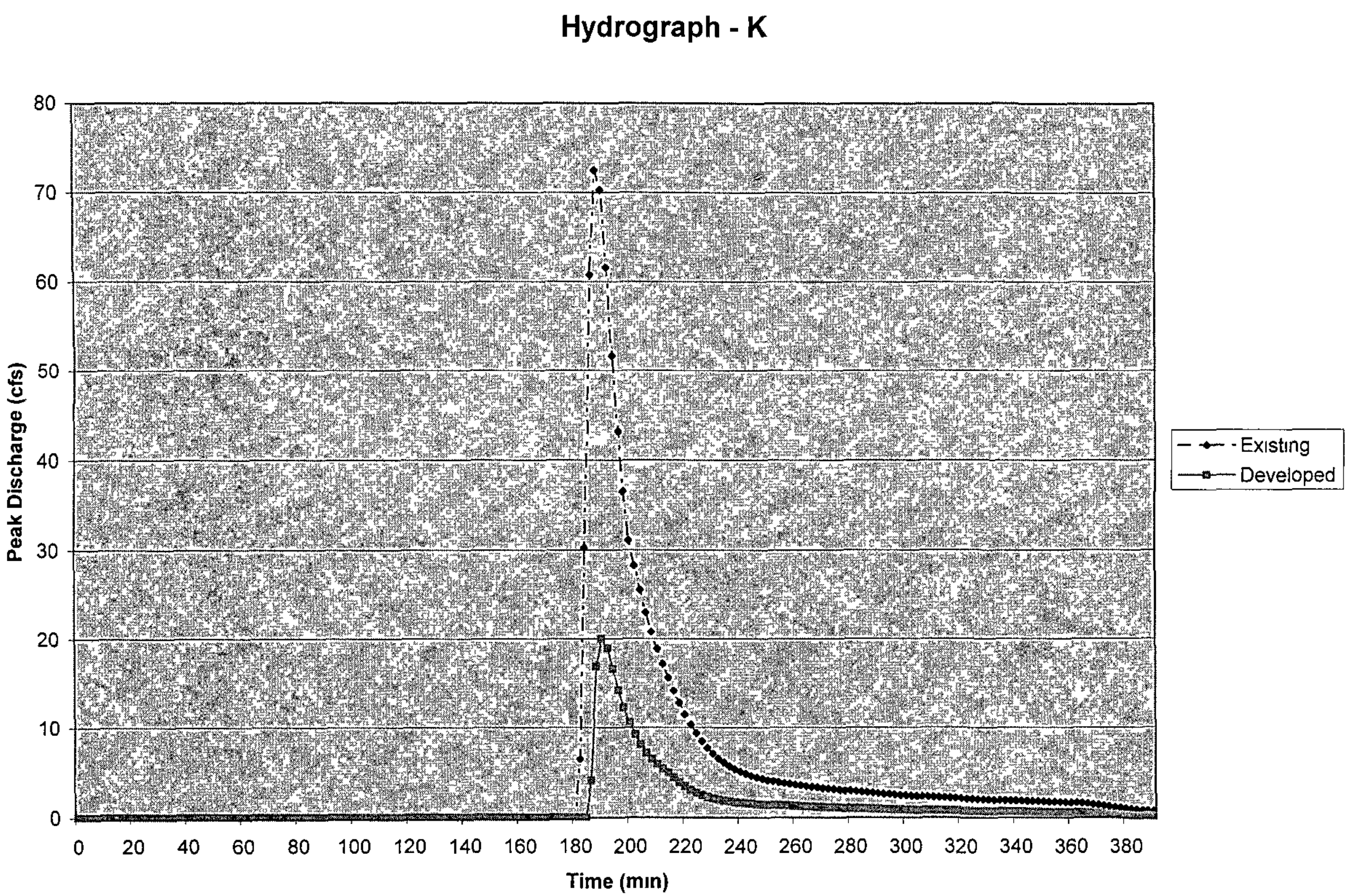


Hydrograph - I

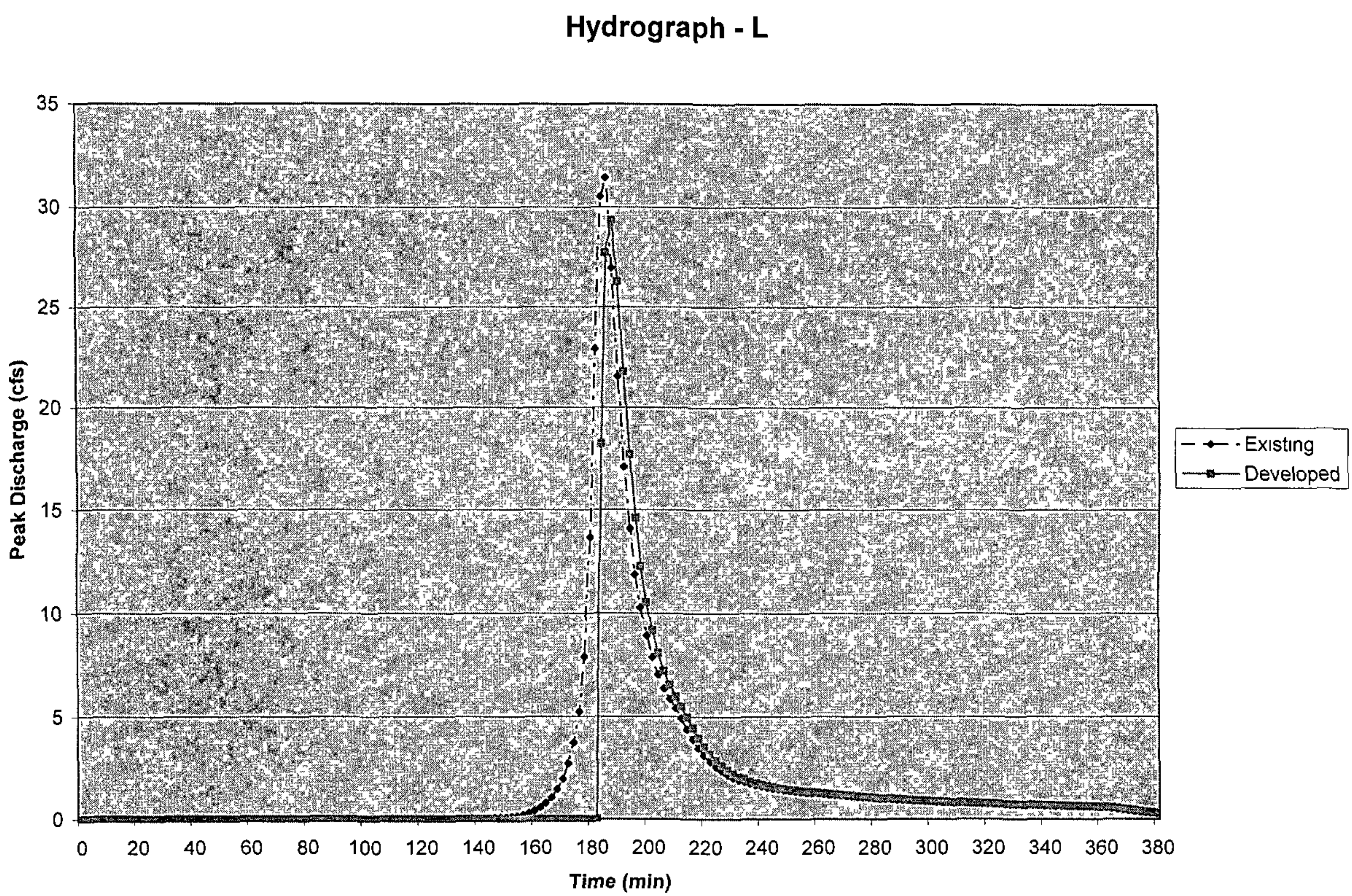


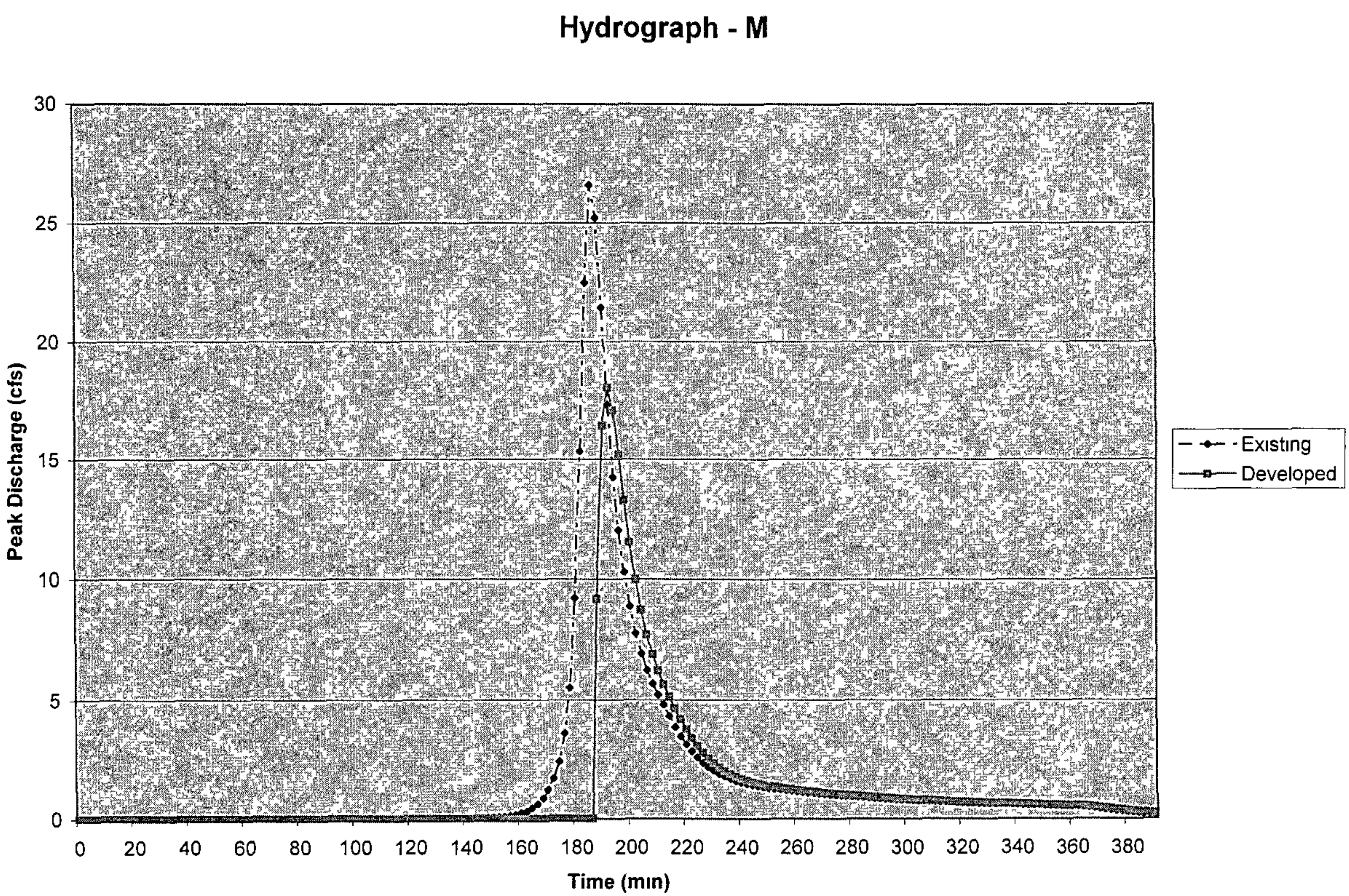
Hydrograph - J





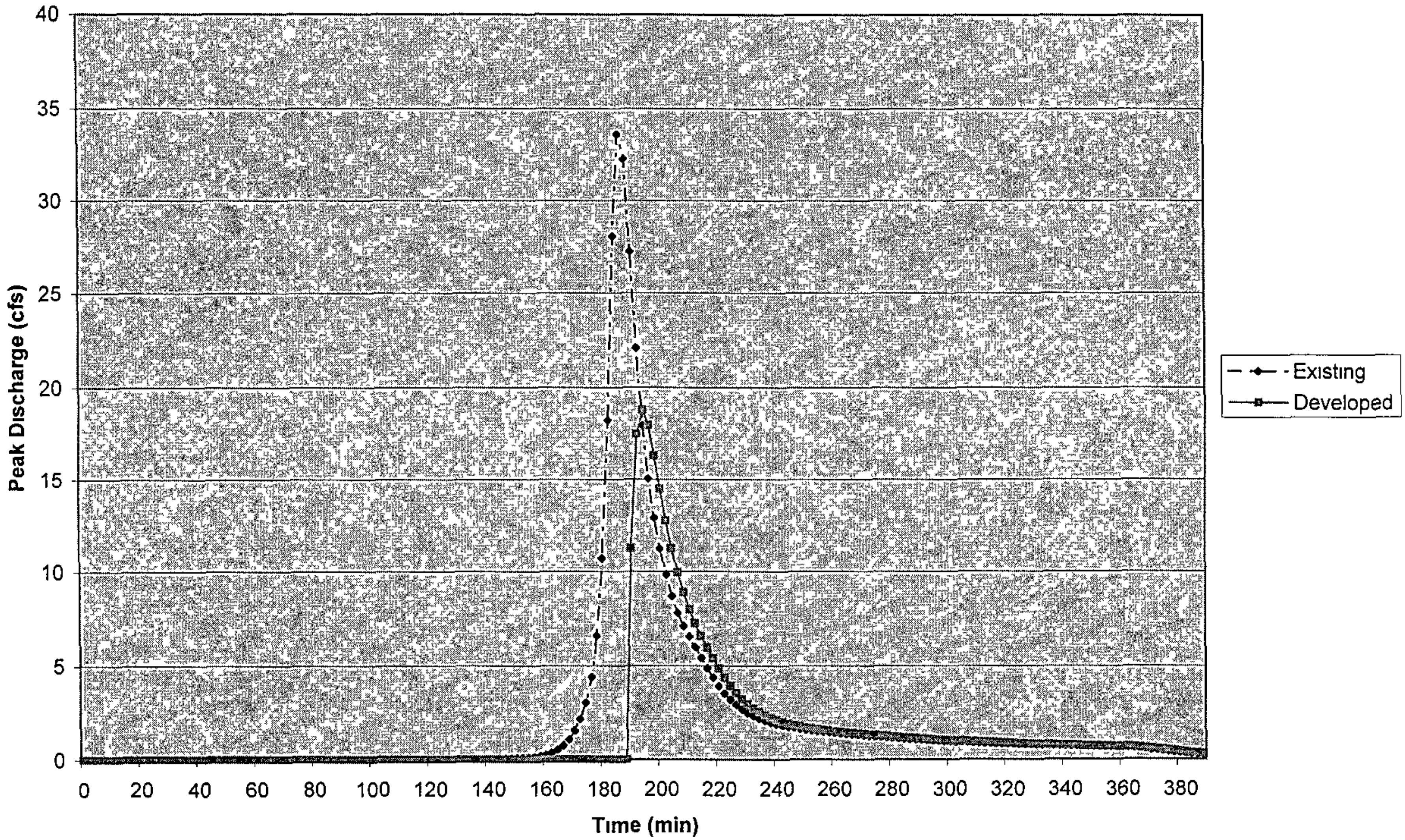
Hydrograph - K
Peak Discharge (cfs)
80
70
60
50
40
30
20
10
0
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
360
380
Time (min)
Existing
Developed

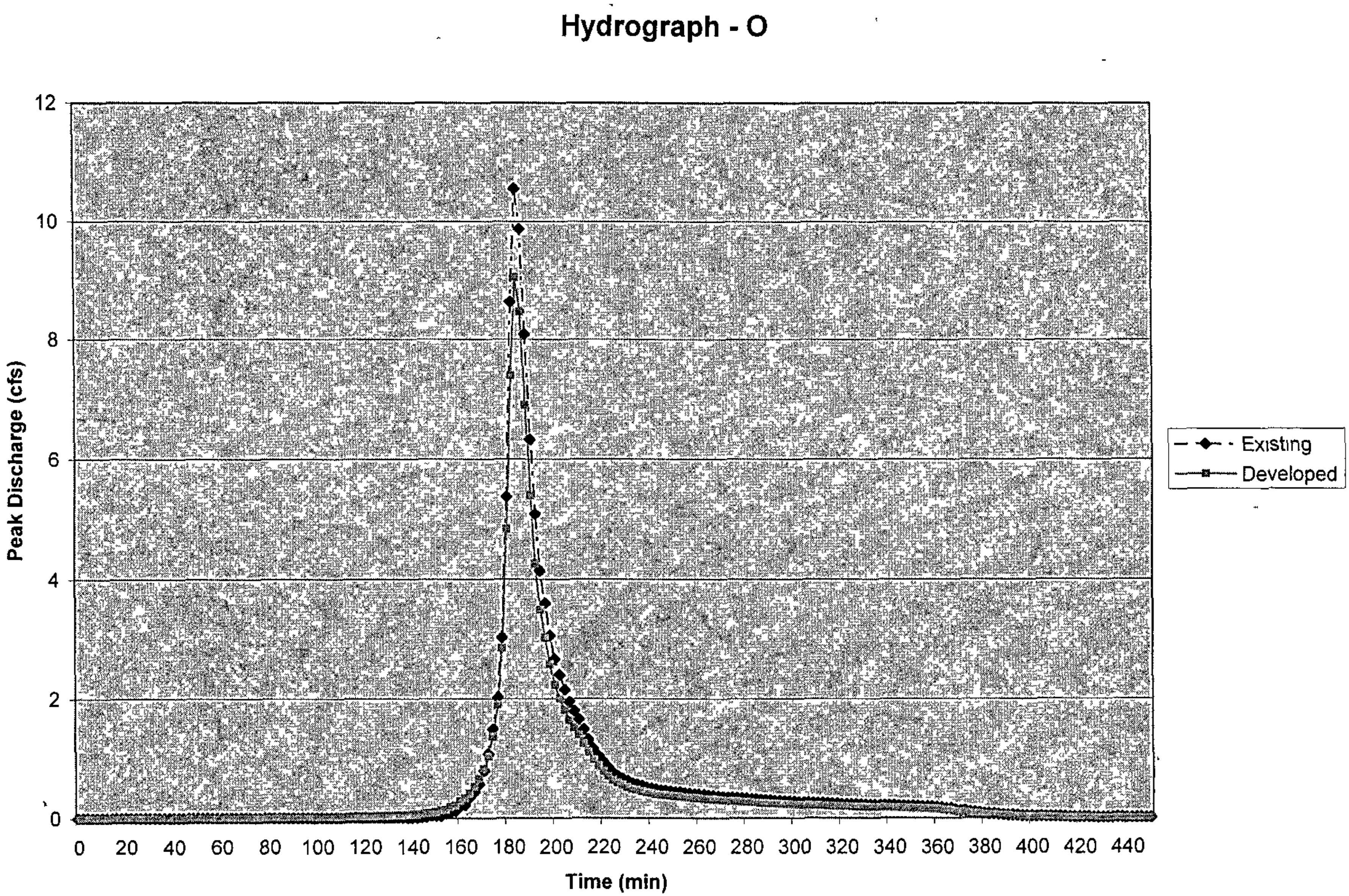

Hydrograph - L
Peak Discharge (cfs)
0
5
10
15
20
25
30
35
Time (min)
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
360
380
Existing
Developed



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

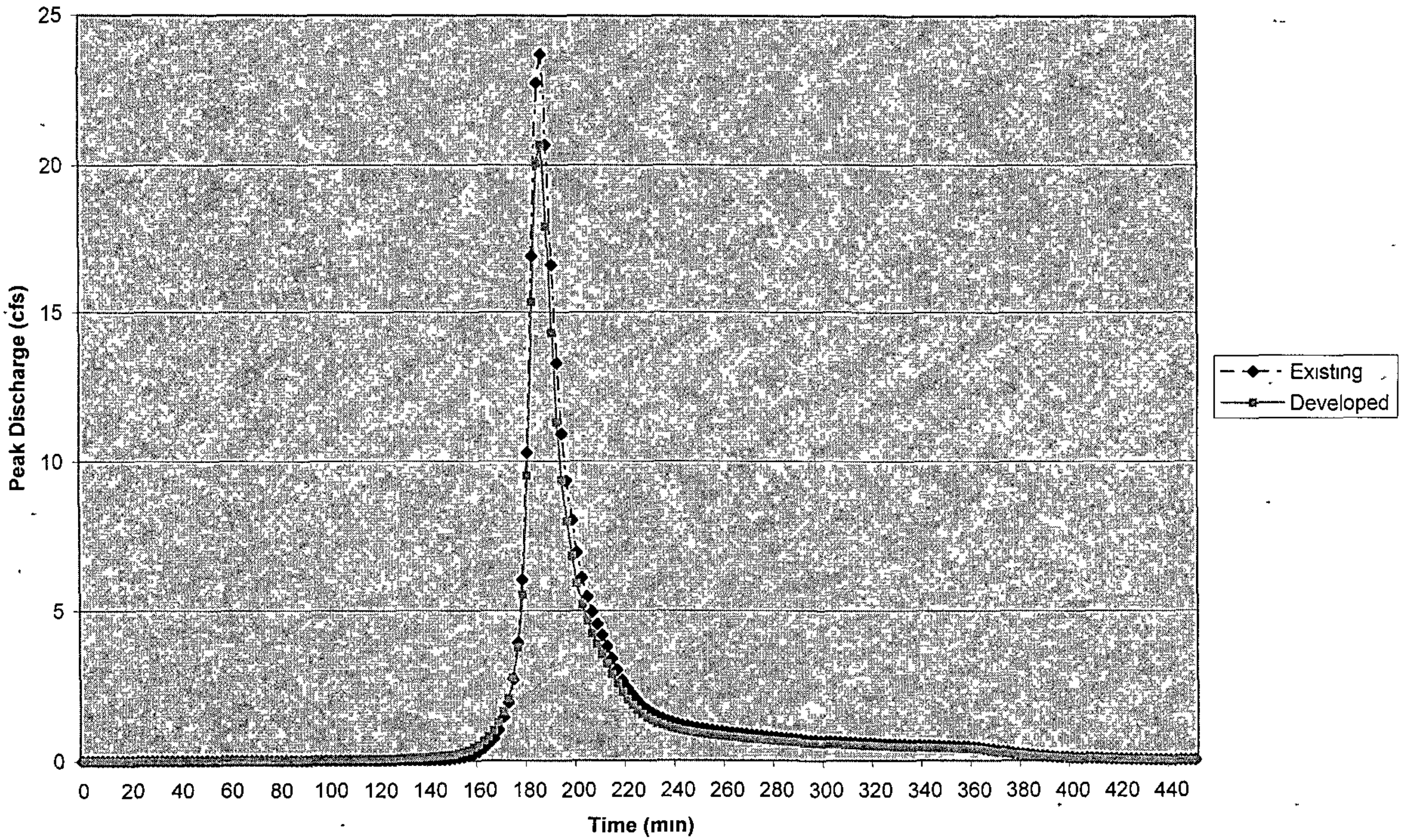
Hydrograph - N

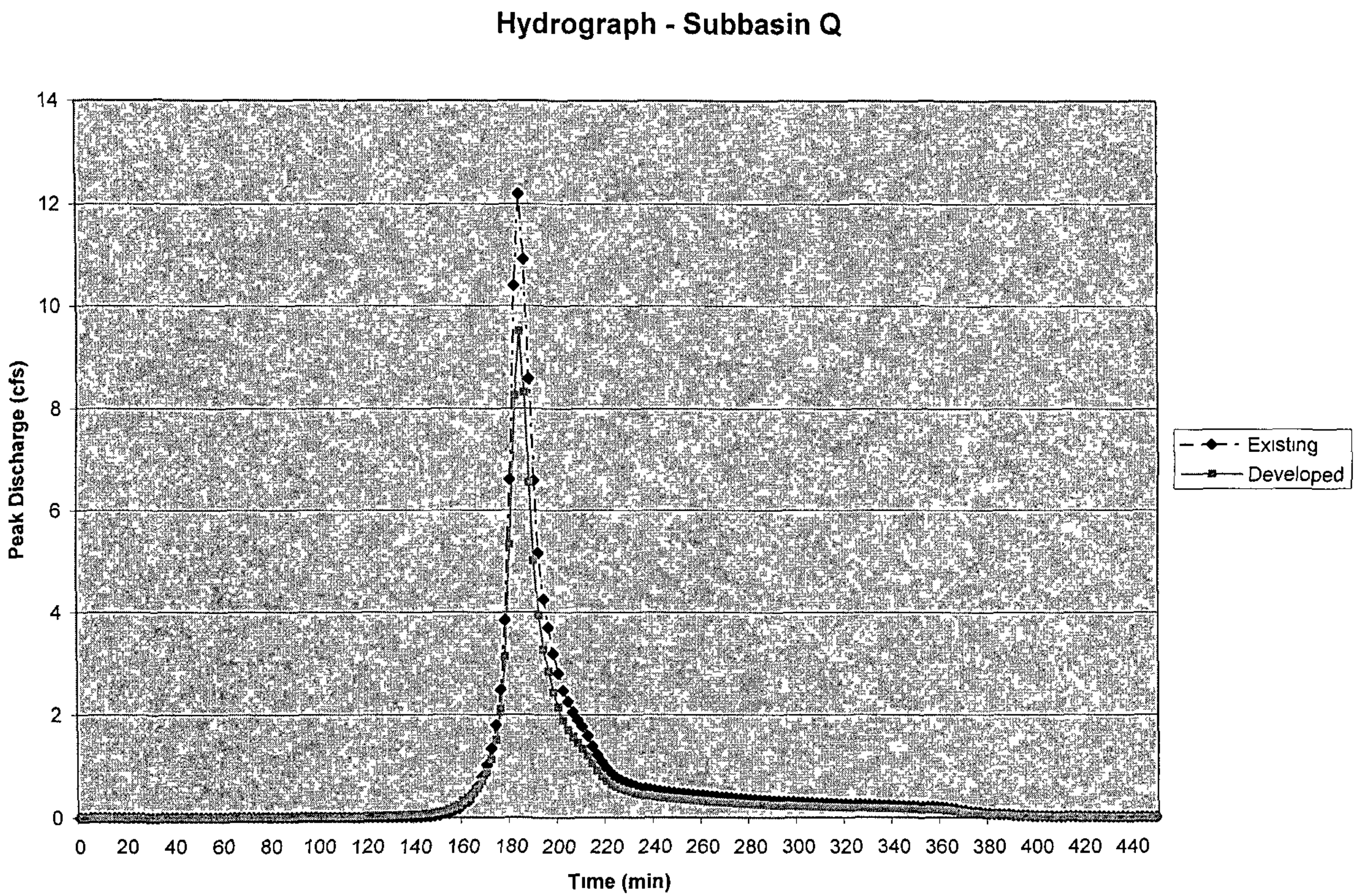


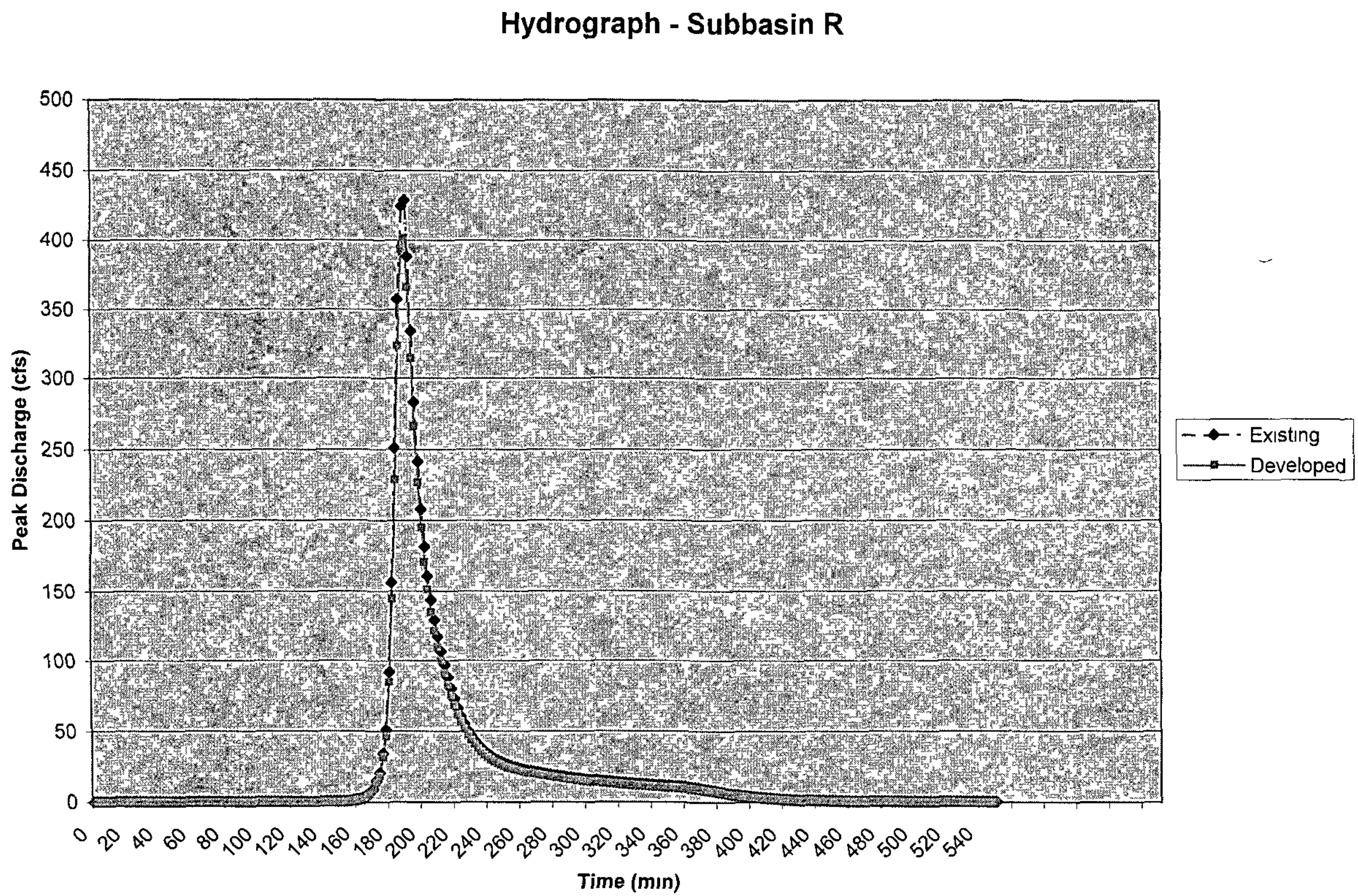


Hydrograph - O
Peak Discharge (cfs)
12
10
8
6
4
2
0
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440
Time (min)
Existing
Developed

Hydrograph - P




Hydrograph - Subbasin Q
Peak Discharge (cfs)
14
12
10
8
6
4
2
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 R
500
450
400
350
300
250
200
150
100
50
0
Peak Discharge (cfs)
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 (sq ft)	Area (ac)	"C" Value	Length of Area (ft)	2 - Year T_C (min)	2 - Year Intensity (in/hr)	2 - Year Q (cfs)	10-Year T_C (min)	10-Year Intensity (in/hr)	10-Year Q (cfs)	100-Year T_C (min)	100-Year Intensity (in/hr)	100-Year 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

Sub Basin Data - Rational Method

	Sub Basin Parameters					Return Period (Years)					
Sub Basin	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

WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *5/11/2006*
Reference: *Rectangular Weir Equation*

$$Q = CLH^{3/2}$$

Where

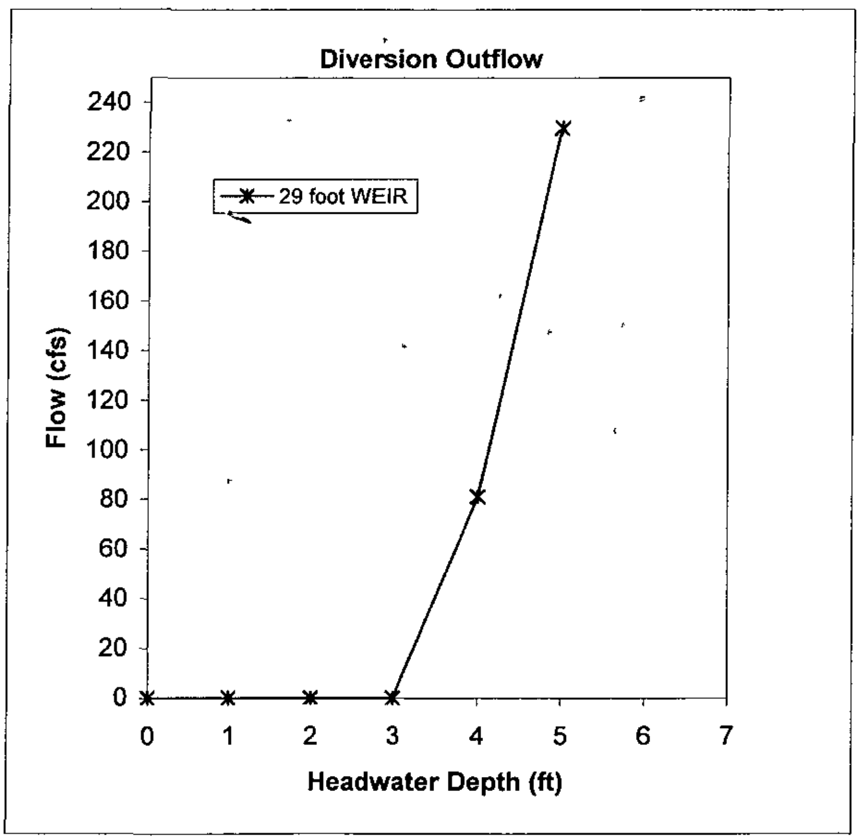
C = Weir Coefficient =	2 80	
L = Length of Weir =	10 00	ft
H = Head above Weir =	1 50	ft
Q = Weir Flow =	51 44	cfs

* The above equation is used to determine the rating curves for weir flow

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *5/9/2006*

Rating Curve for Diversion BASA1

29	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	81
5	230



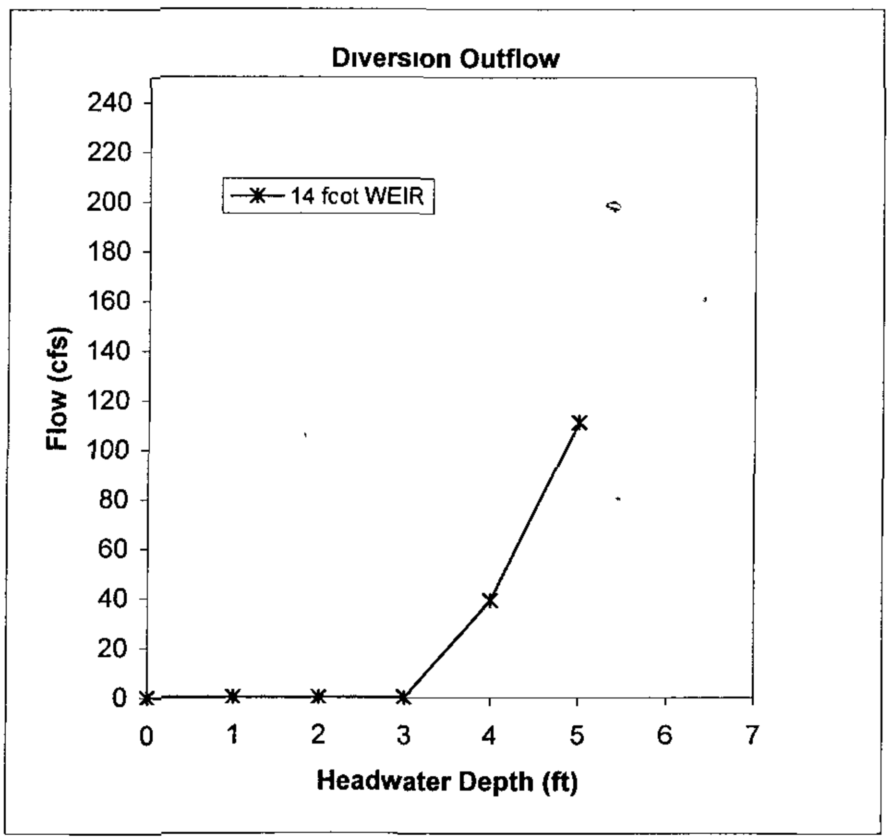
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date.** *5/9/2006*

Rating Curve for Diversion BAS A2-5

14	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	39
5	111



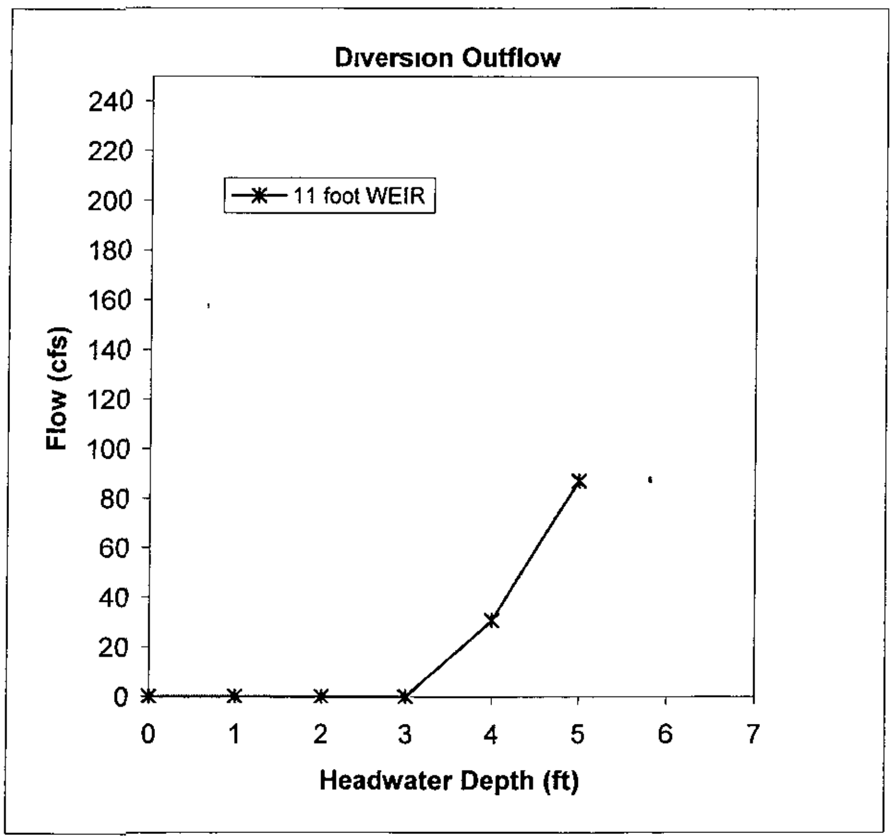
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date.** *5/9/2006*

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



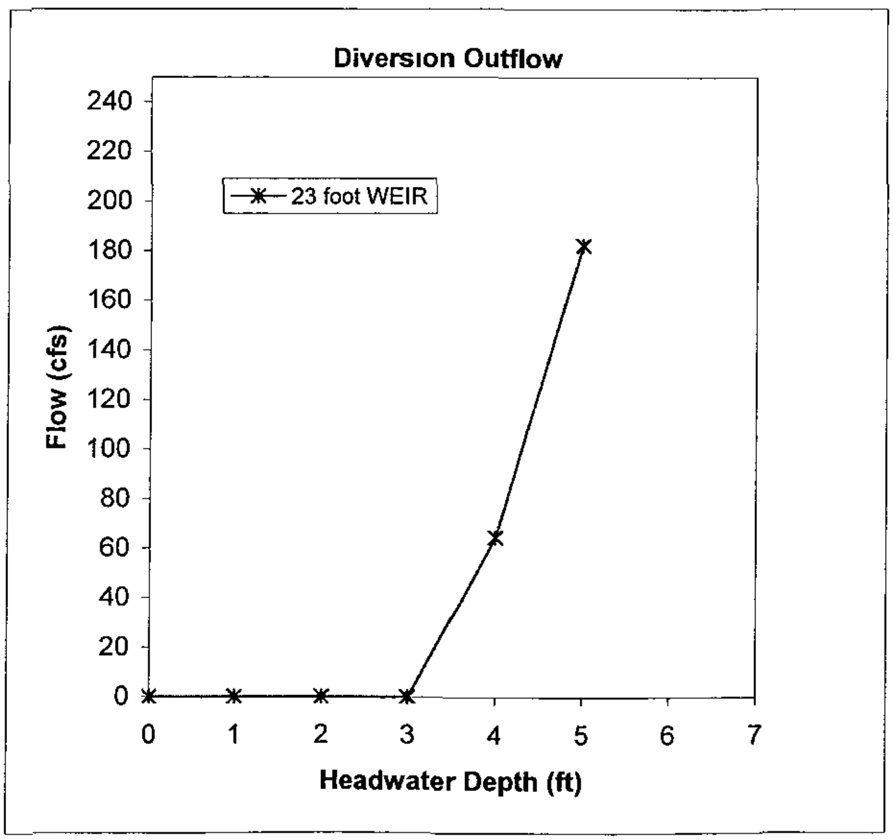
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location. *City of Scottsdale* **Date:** *5/9/2006*

Rating Curve for Diversion BAS B-4

23	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	64
5	182



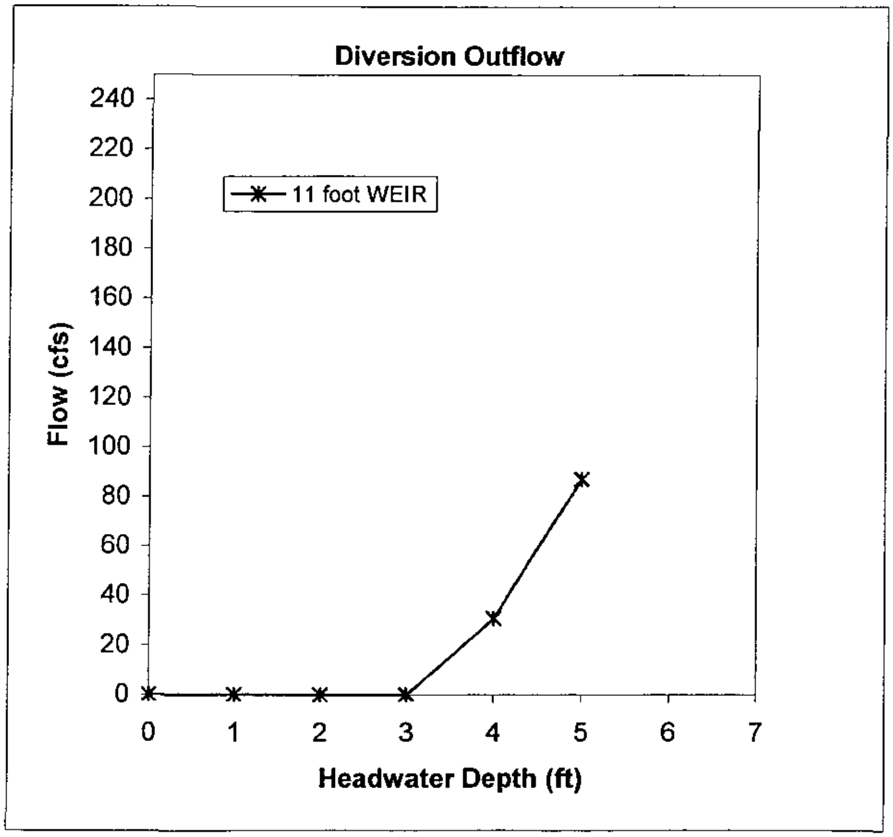
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date.** *5/9/2006*

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



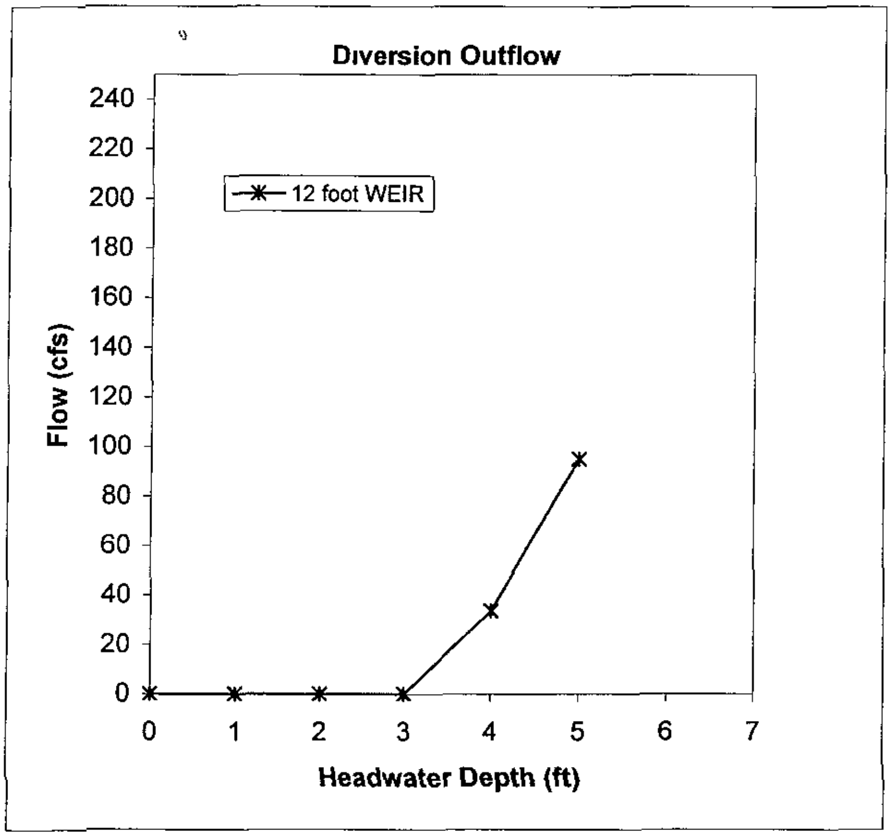
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *5/9/2006*

Rating Curve for Diversion BAS D-1

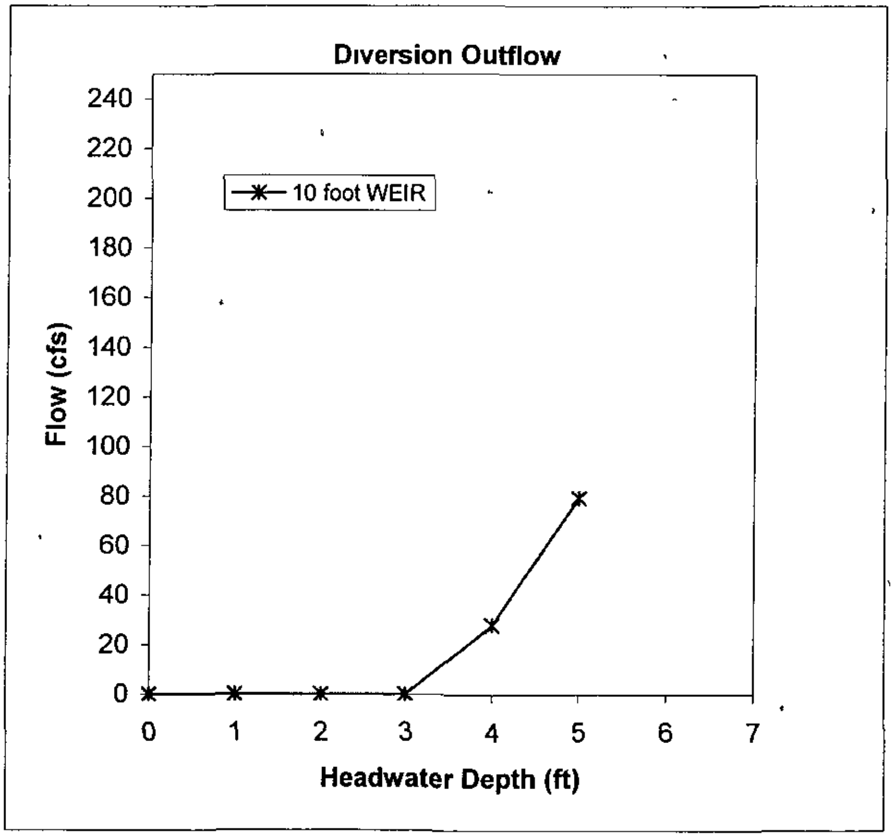
12	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	34
5	95



Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *5/9/2006*

Rating Curve for Diversion BAS D-1

10	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	28
5	79



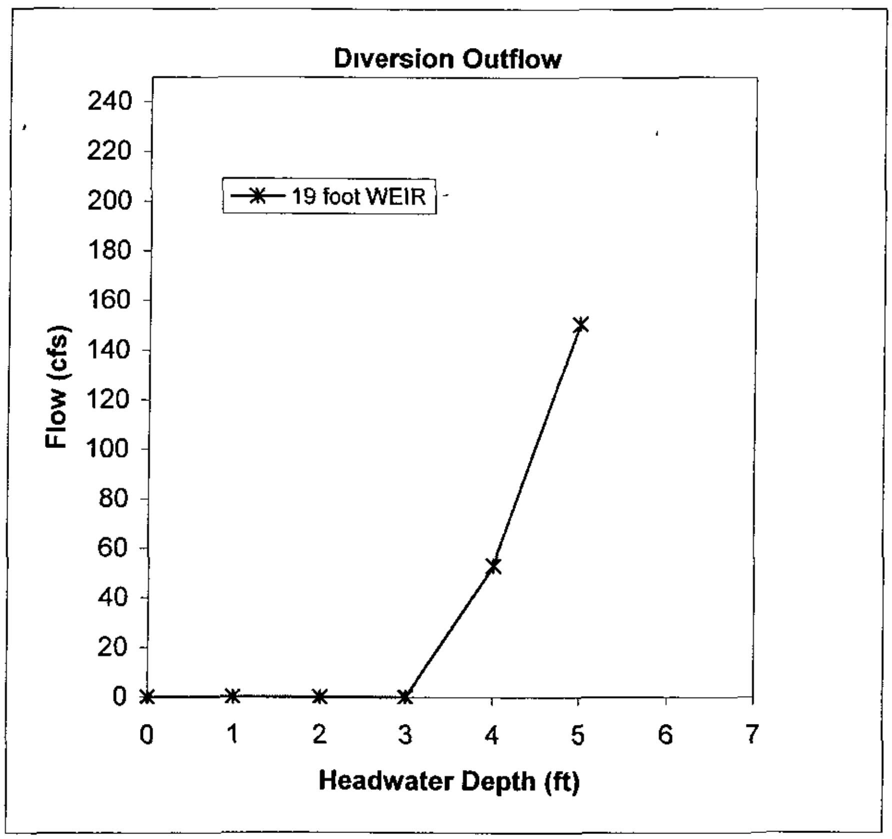
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *5/9/2006*

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



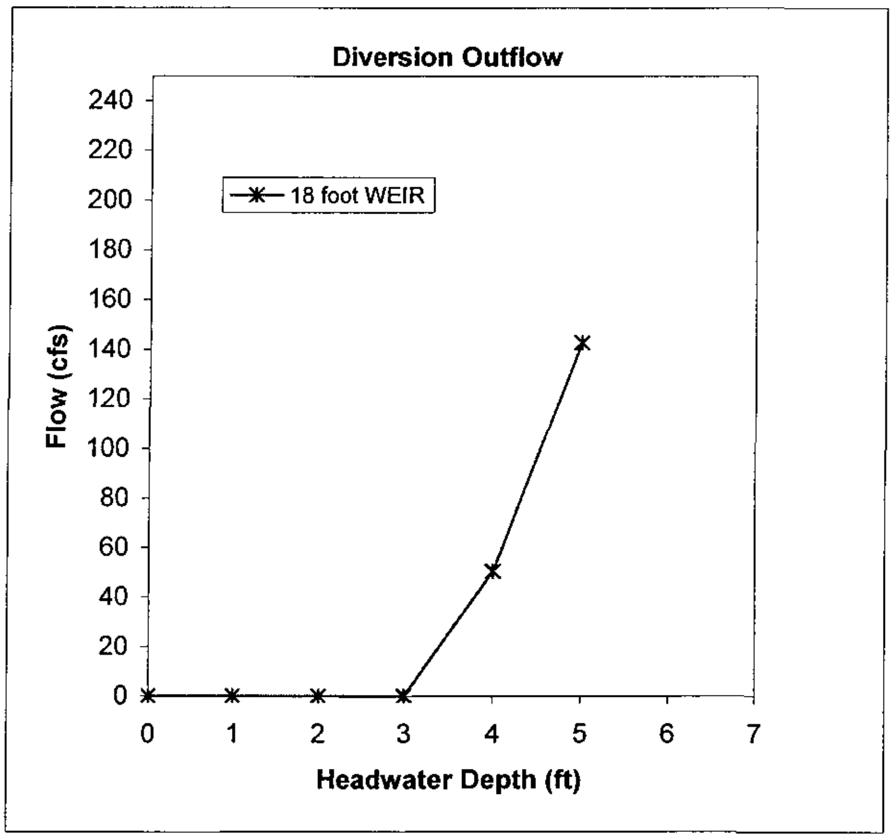
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *5/9/2006*

Rating Curve for Diversion BAS E1-3

18	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	50
5	143



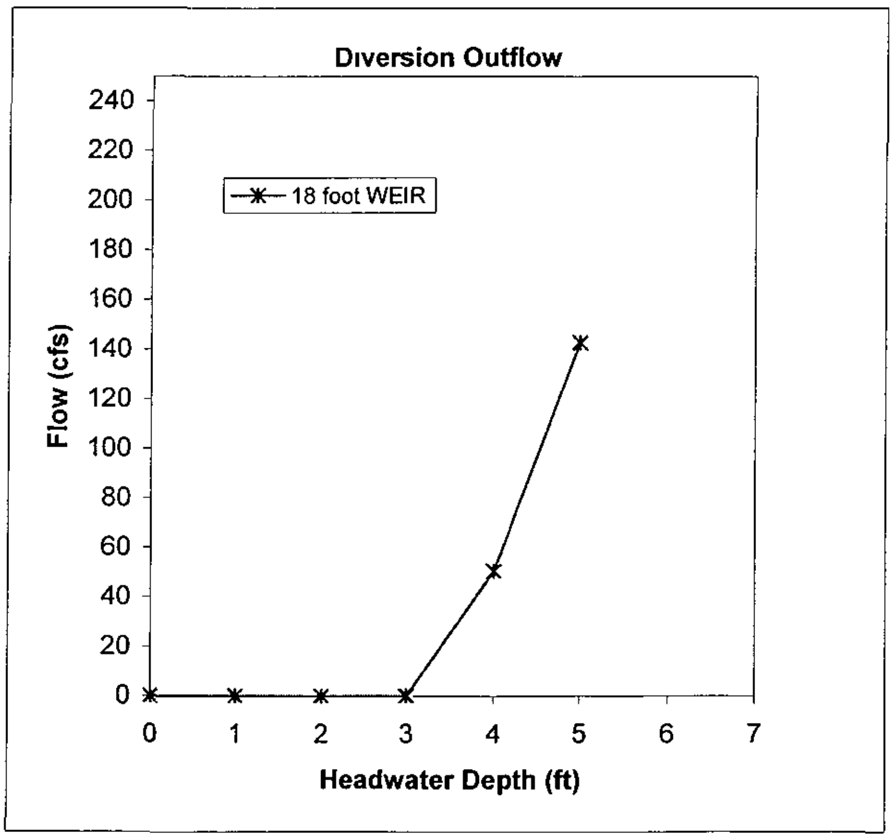
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *5/9/2006*

Rating Curve for Diversion BAS E2-2

18	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	50
5	143



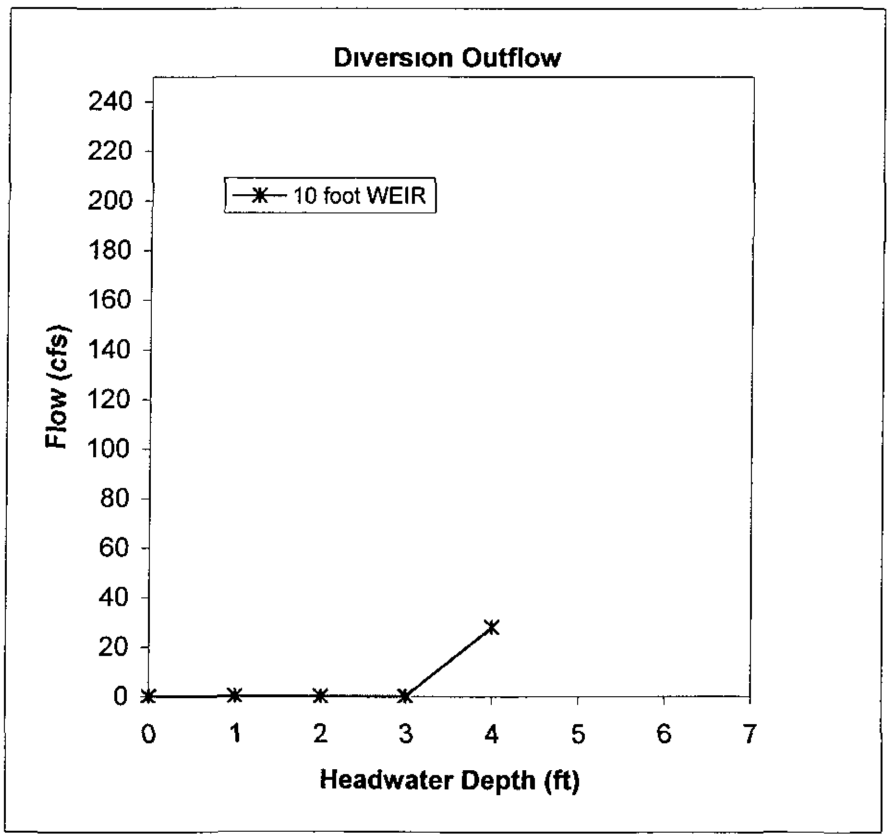
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *5/9/2006*

Rating Curve for Diversion BAS E3

10	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	28



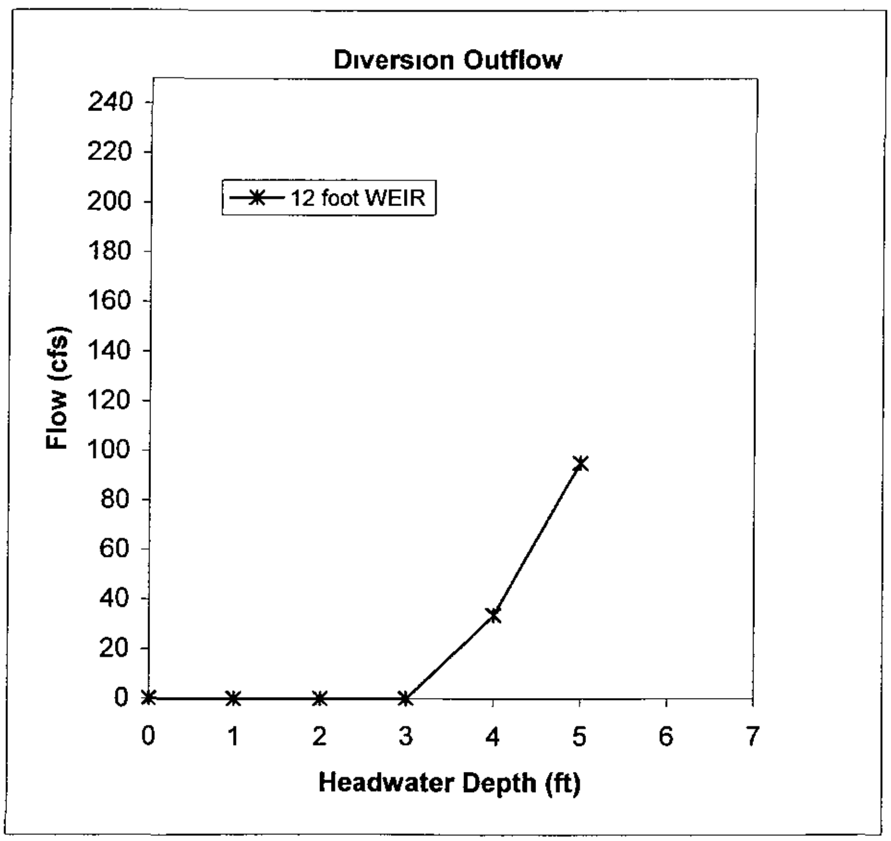
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *5/9/2006*

Rating Curve for Diversion BAS F1-3

12	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	34
5	95

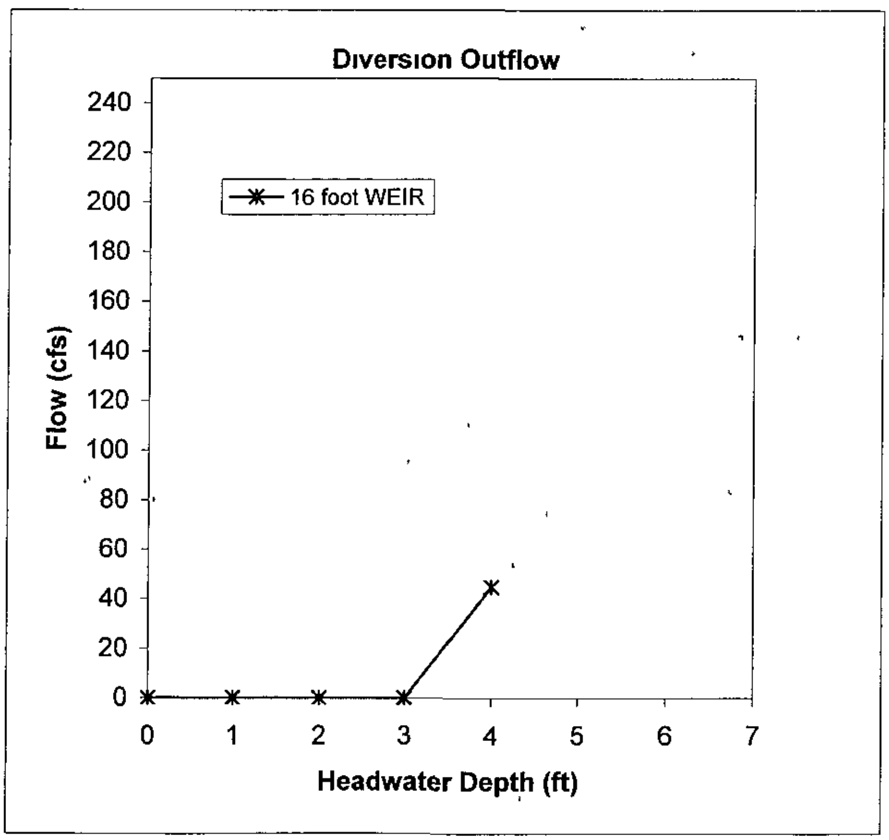


Project: *Sereno Canyon* **W/P#:** *042054*

Location: *City of Scottsdale* **Date:** *5/10/2006*

Rating Curve for Diversion BAS F2-1

16	**foot WEIR**
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	45



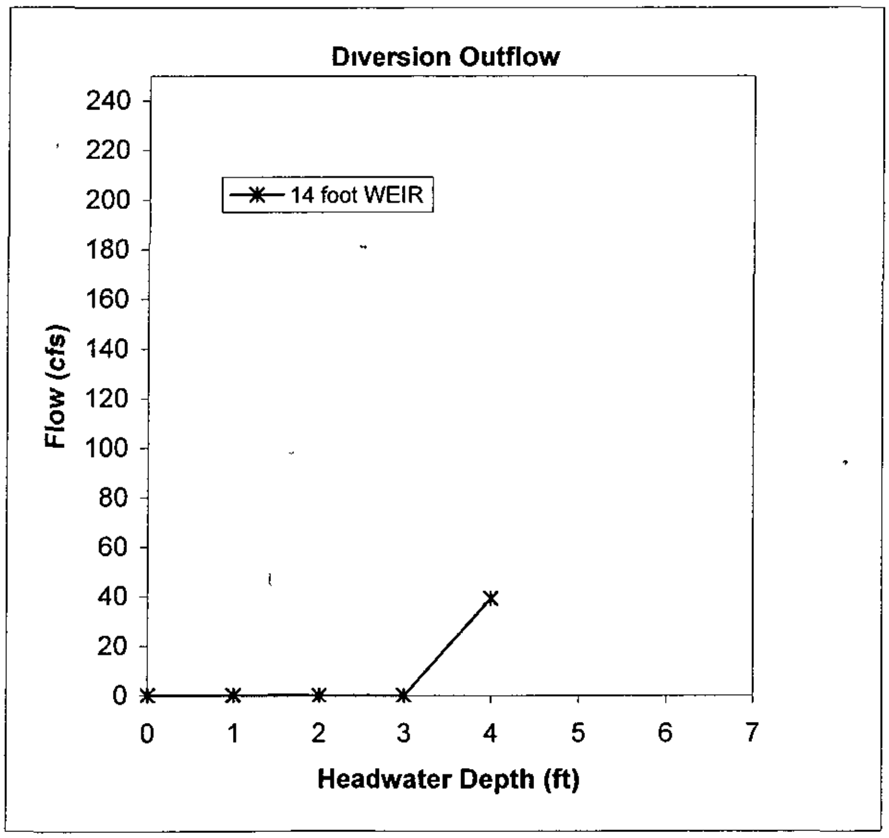
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *5/10/2006*

Rating Curve for Diversion BAS F3-2

14	**foot WEIR**
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	39



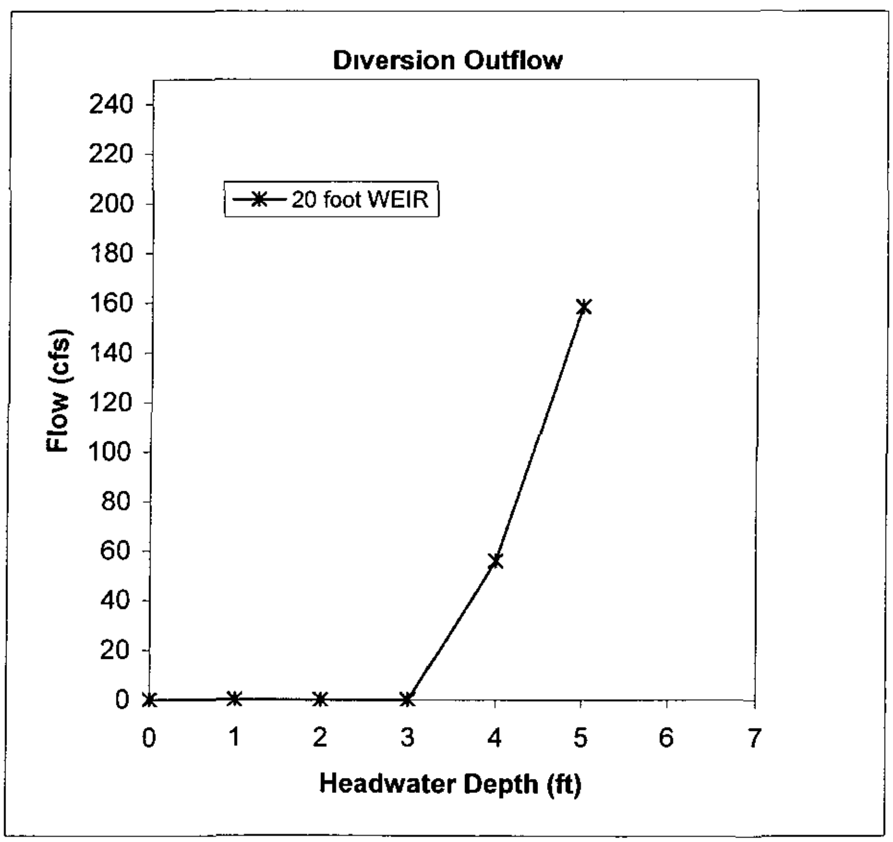
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *5/9/2006*

Rating Curve for Diversion BAS H1-4

20	**foot WEIR**
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	56
5	158



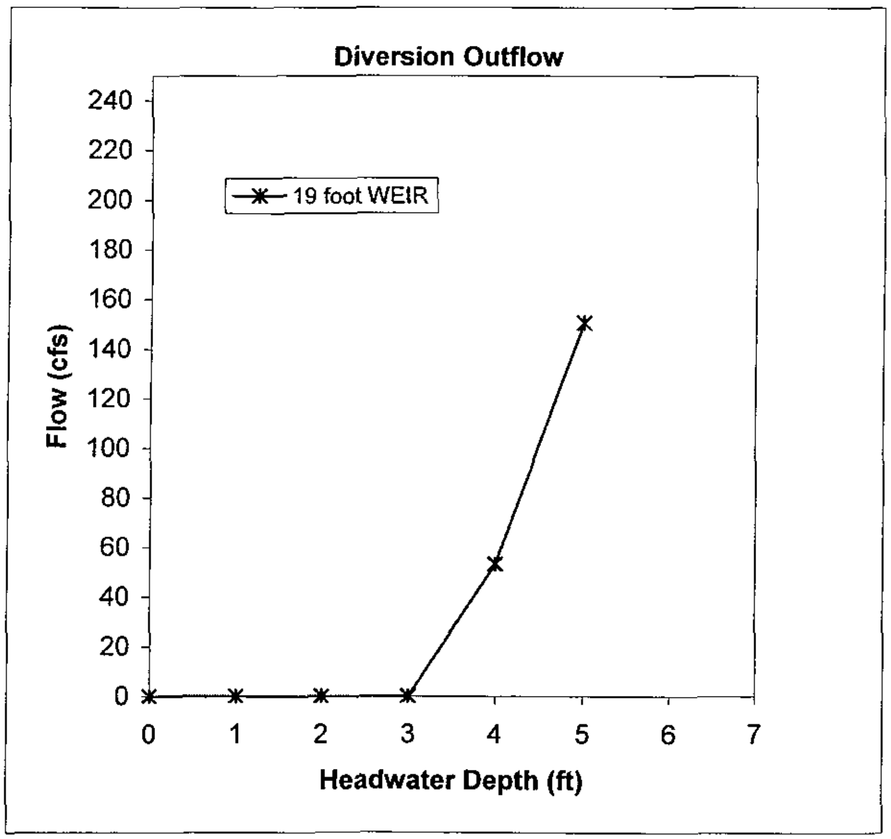
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *5/9/2006*

Rating Curve for Diversion BAS H1-3

19	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	53
5	150



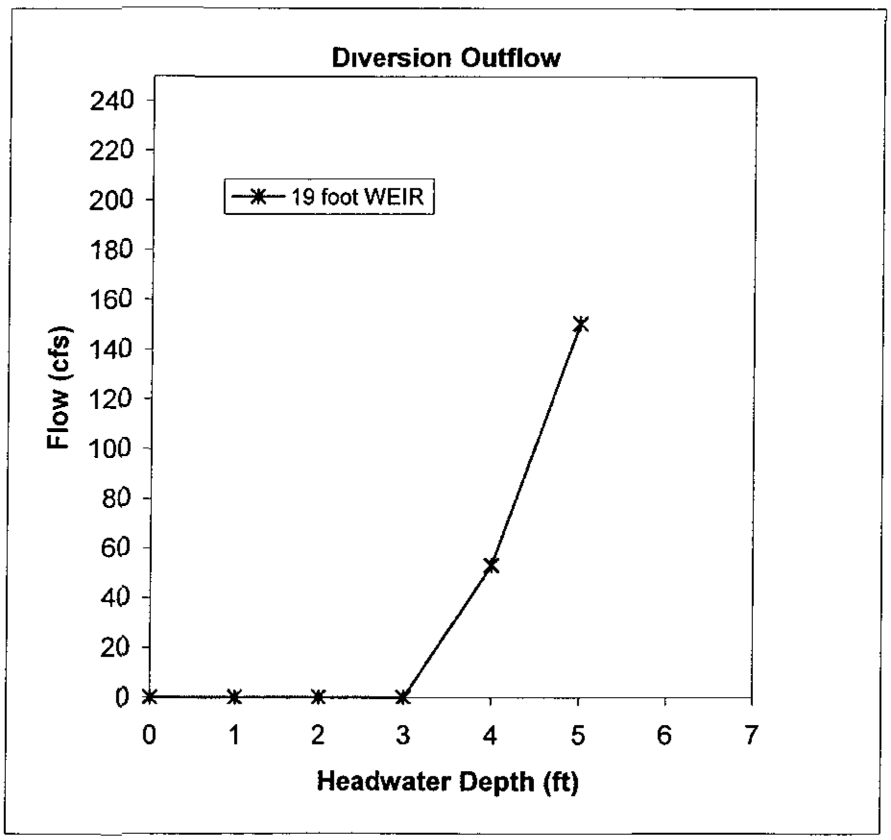
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *5/9/2006*

Rating Curve for Diversion BAS H1-5

19	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	53
5	150



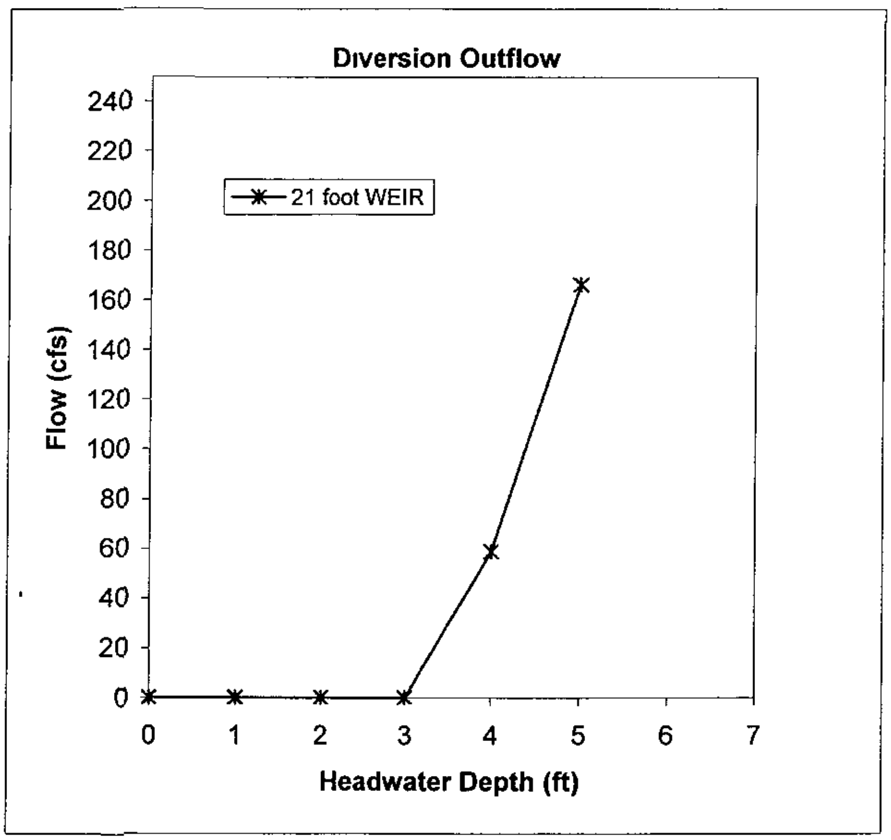
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date.** *5/9/2006*

Rating Curve for Diversion BAS H2-1

21	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	59
5	166



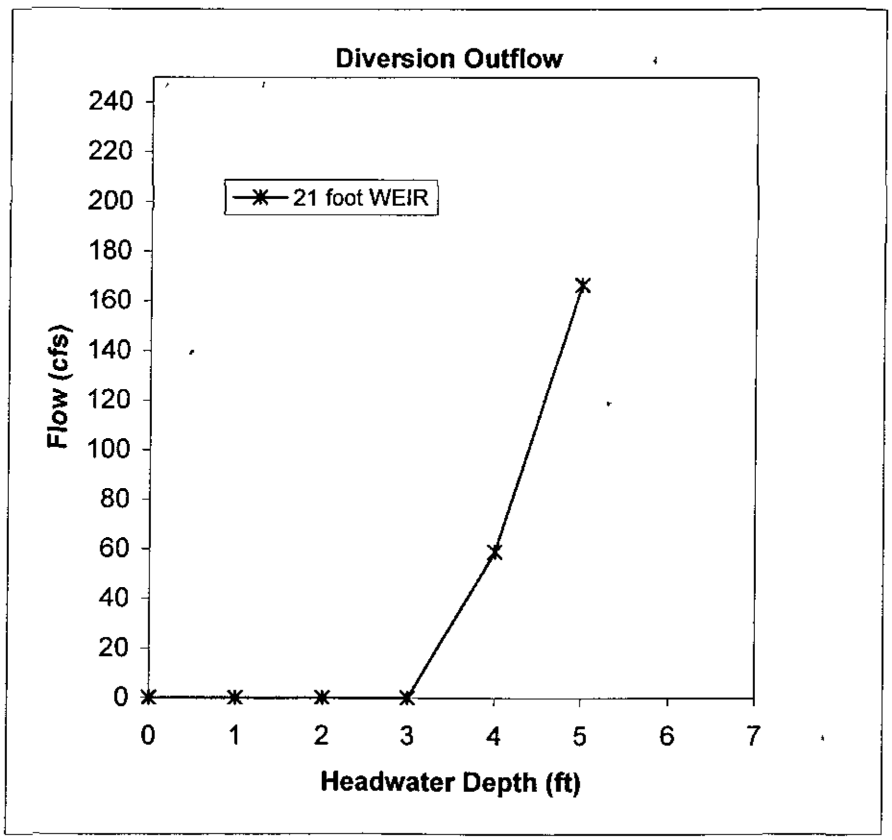
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *5/9/2006*

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



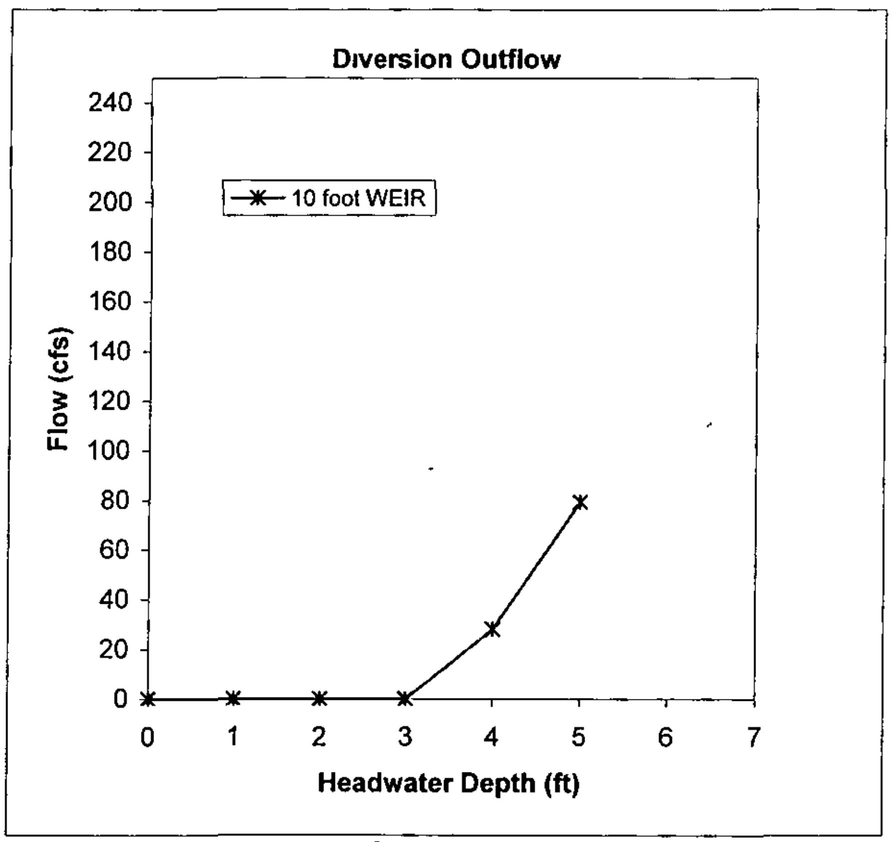
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *5/9/2006*

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



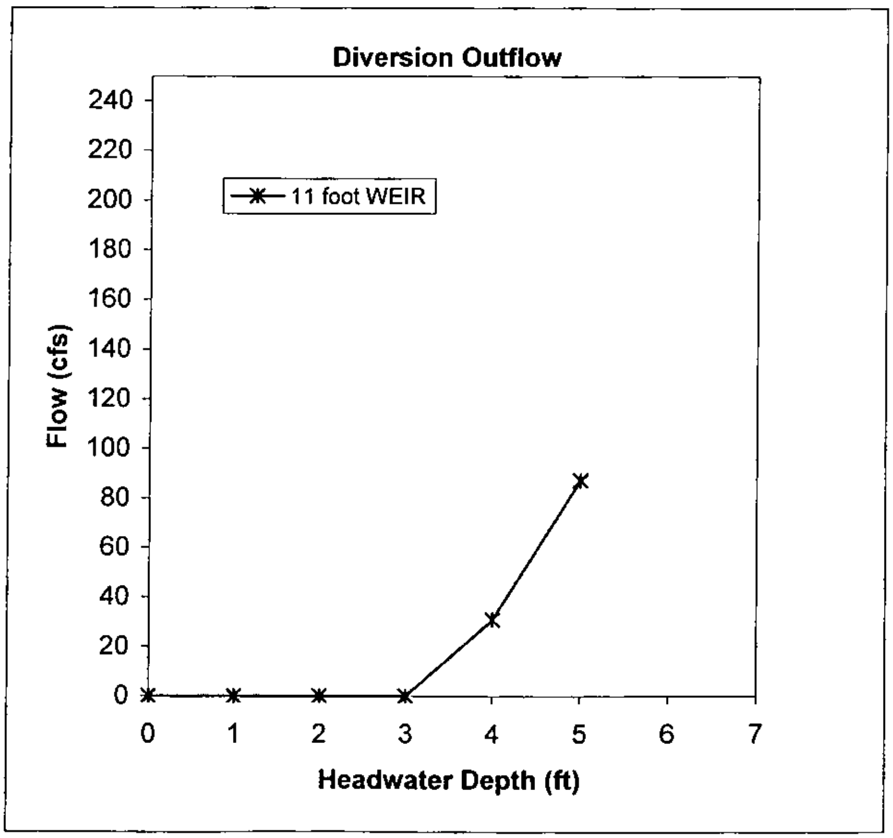
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#.** *042054*
Location: *City of Scottsdale* **Date:** *5/9/2006*

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



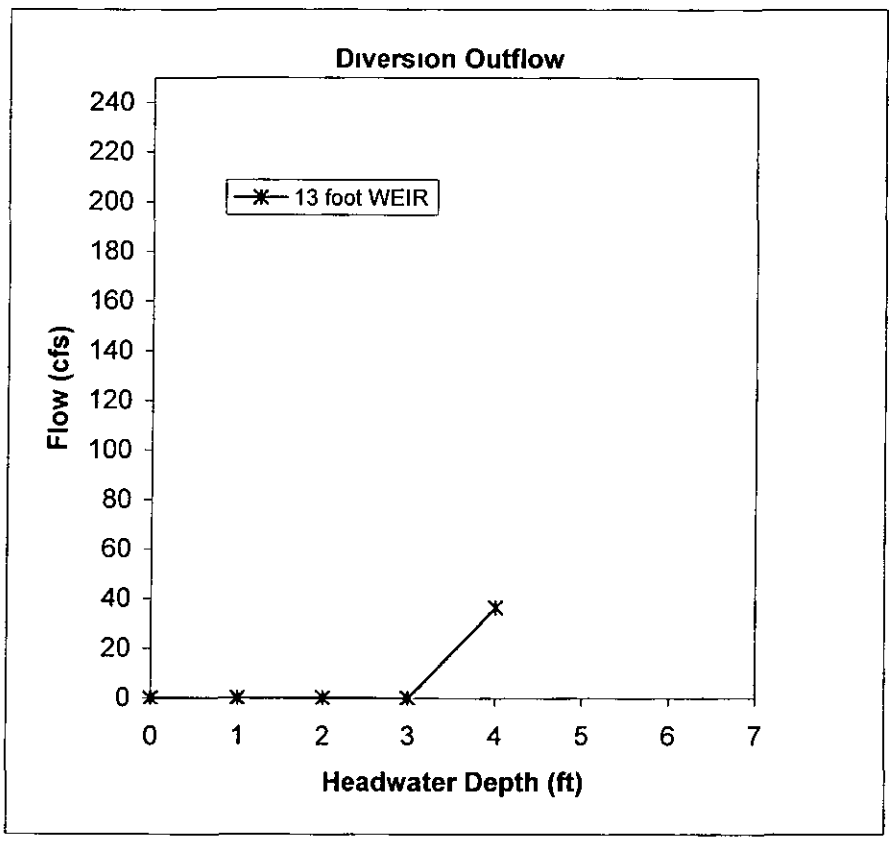
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date·** *5/9/2006*

Rating Curve for Diversion BAS K

13	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	36



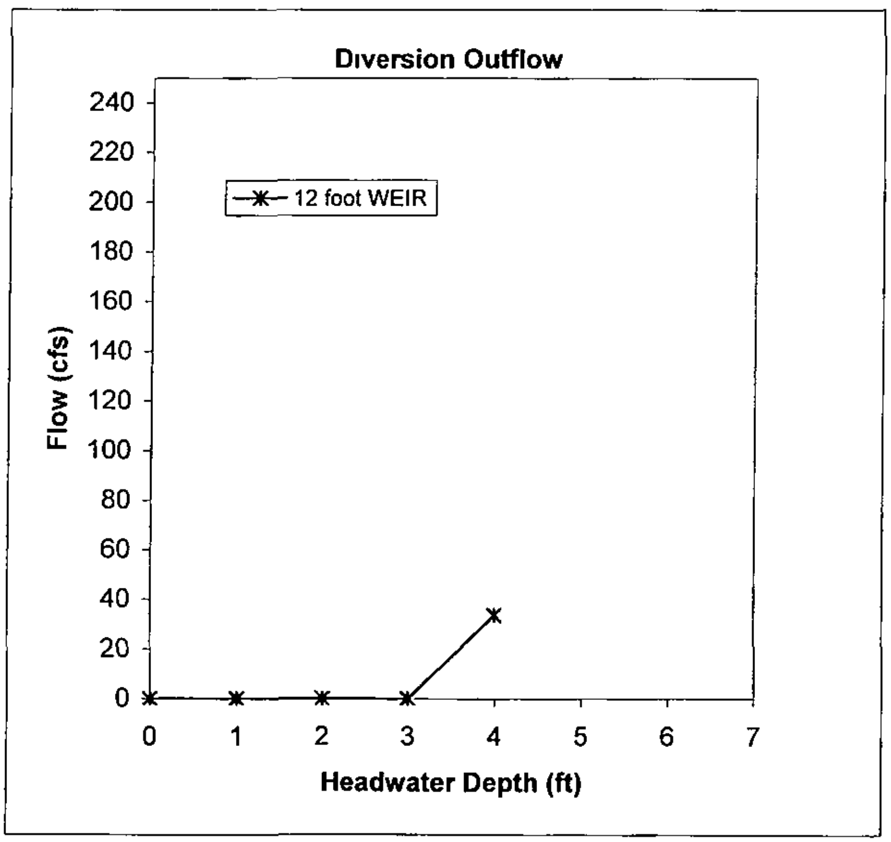
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date.** *5/9/2006*

Rating Curve for Diversion BAS L

12	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	34



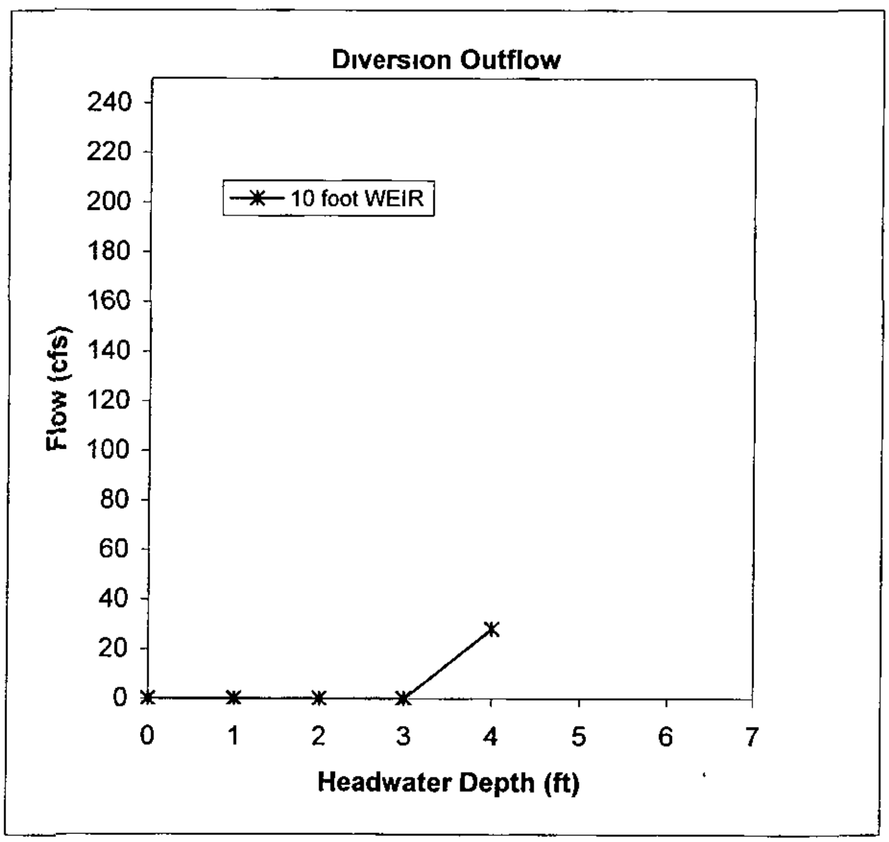
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location. *City of Scottsdale* **Date:** *5/9/2006*

Rating Curve for Diversion BAS M

10	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	28



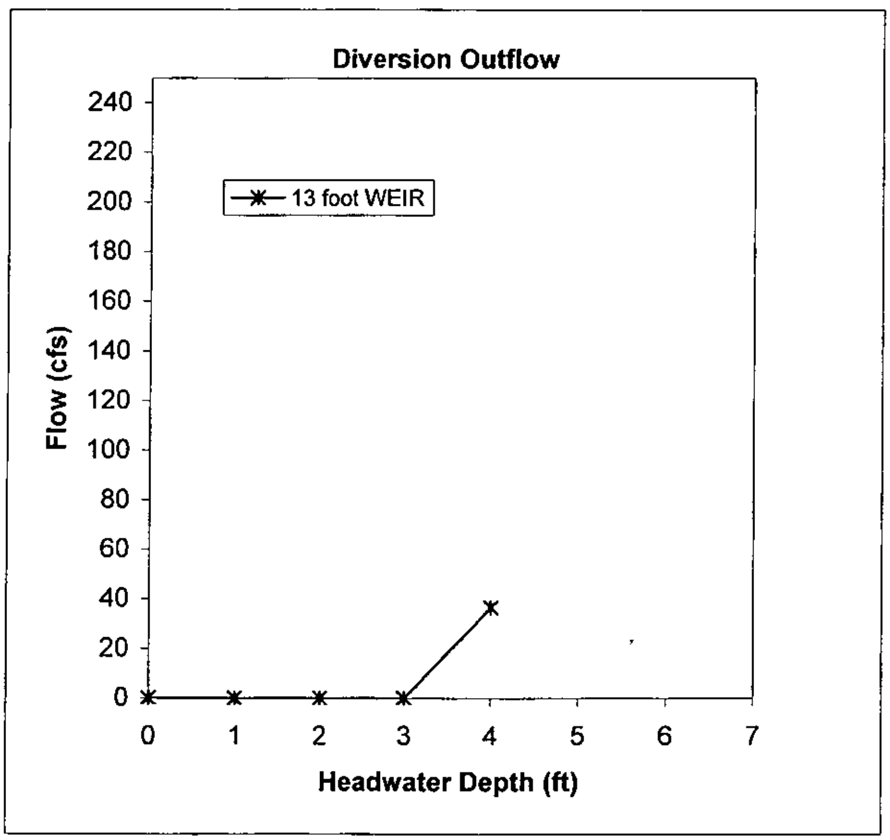
WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: *Sereno Canyon* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *5/9/2006*

Rating Curve for Diversion BAS N

13	foot WEIR
Headwater Depth	Flow
ft	cfs
0	0
1	0
2	0
3	0
4	36

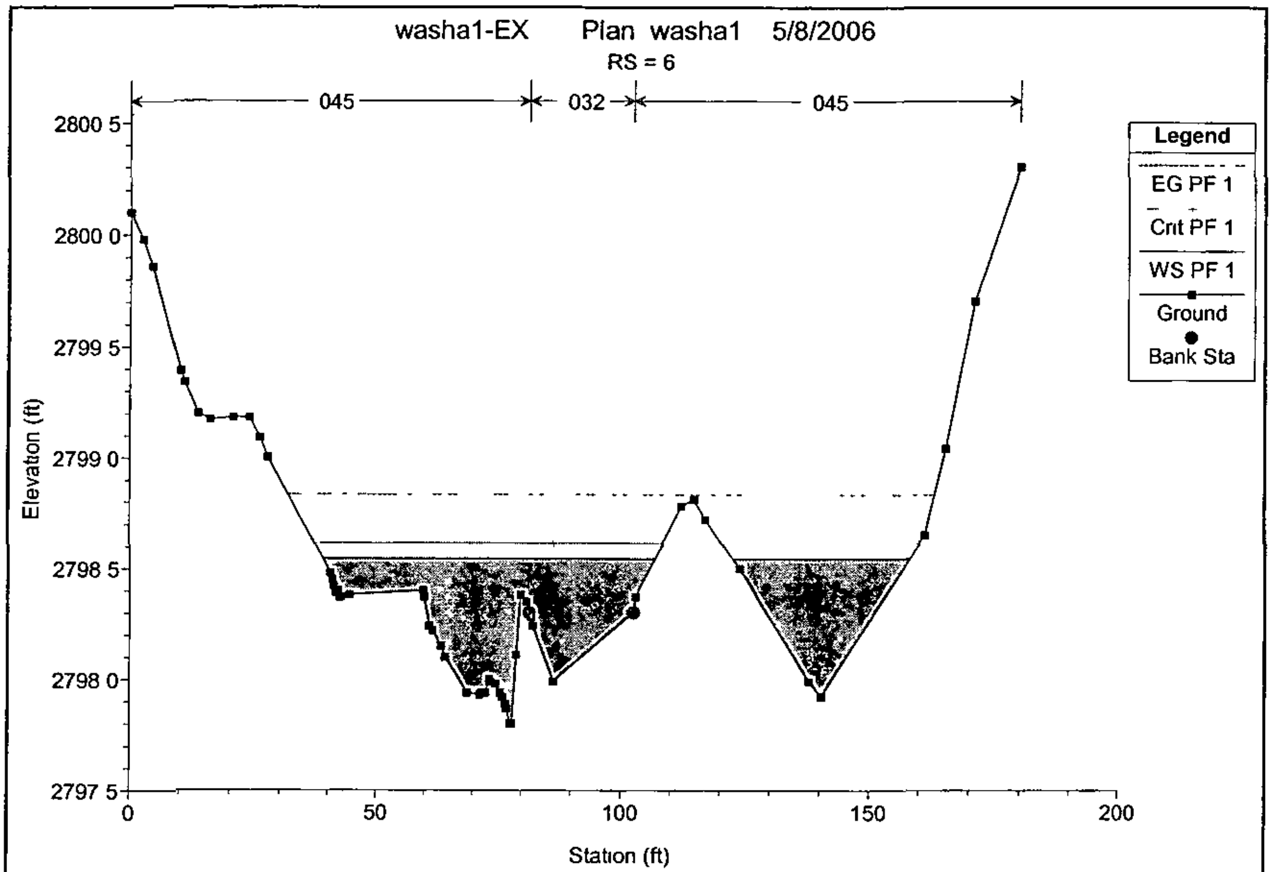


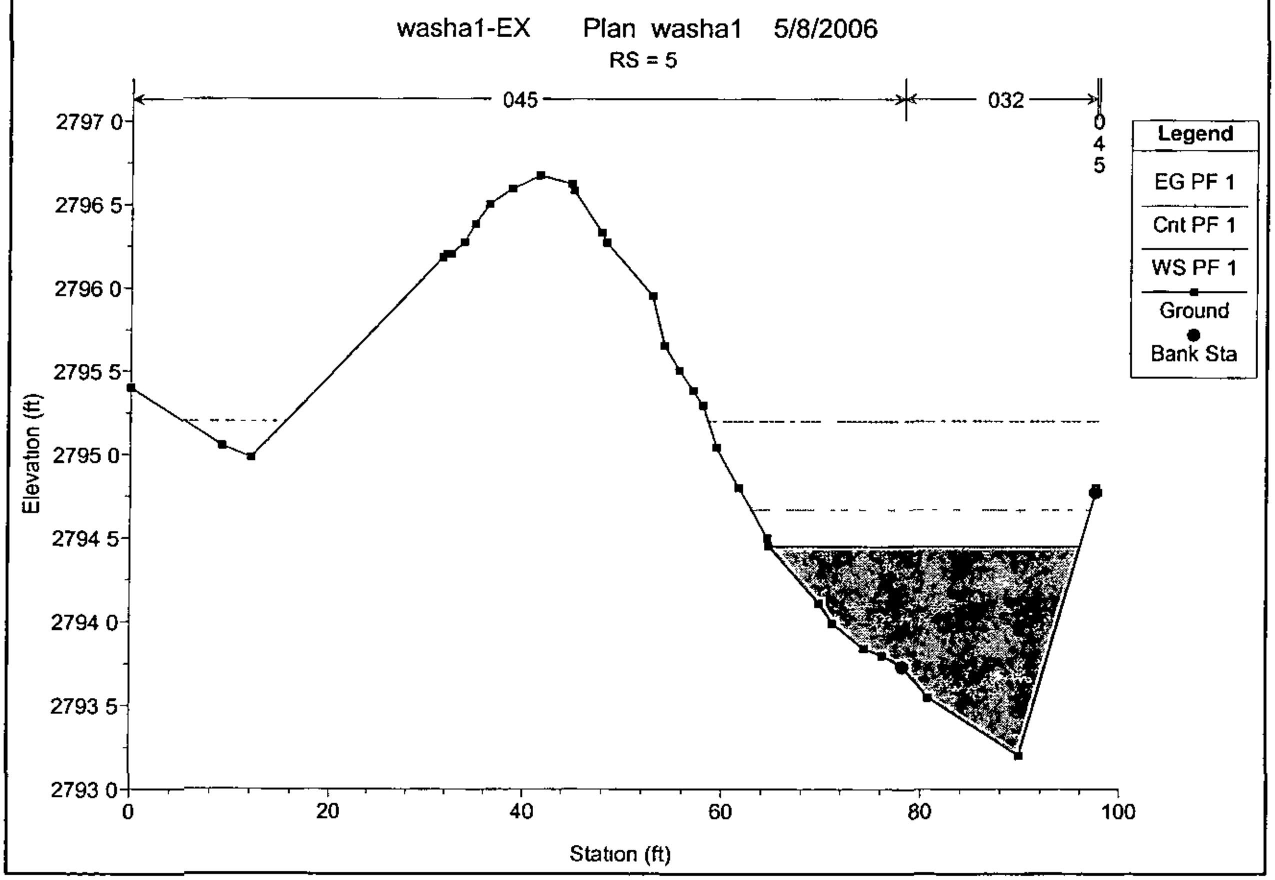
HEC-RAS Output Files

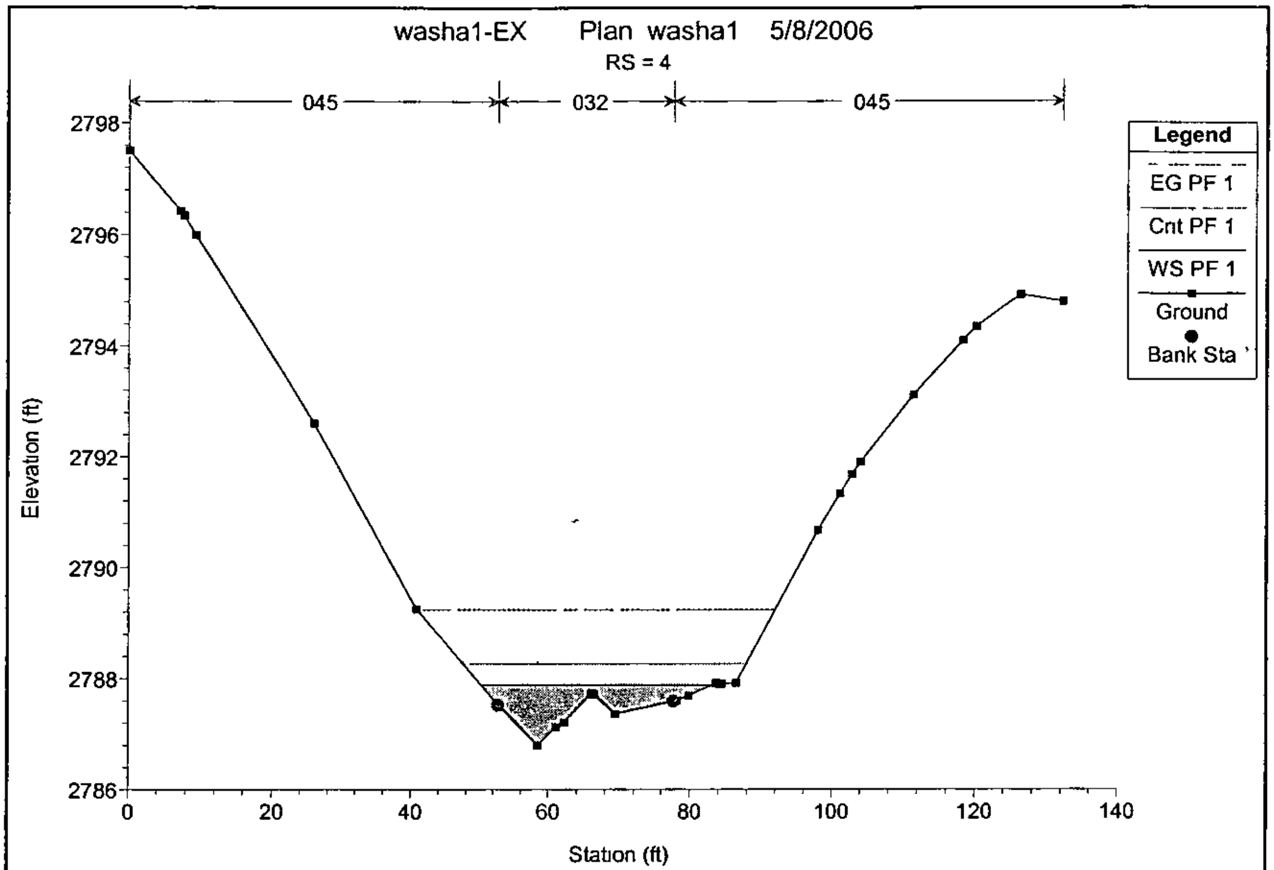
WASH A1

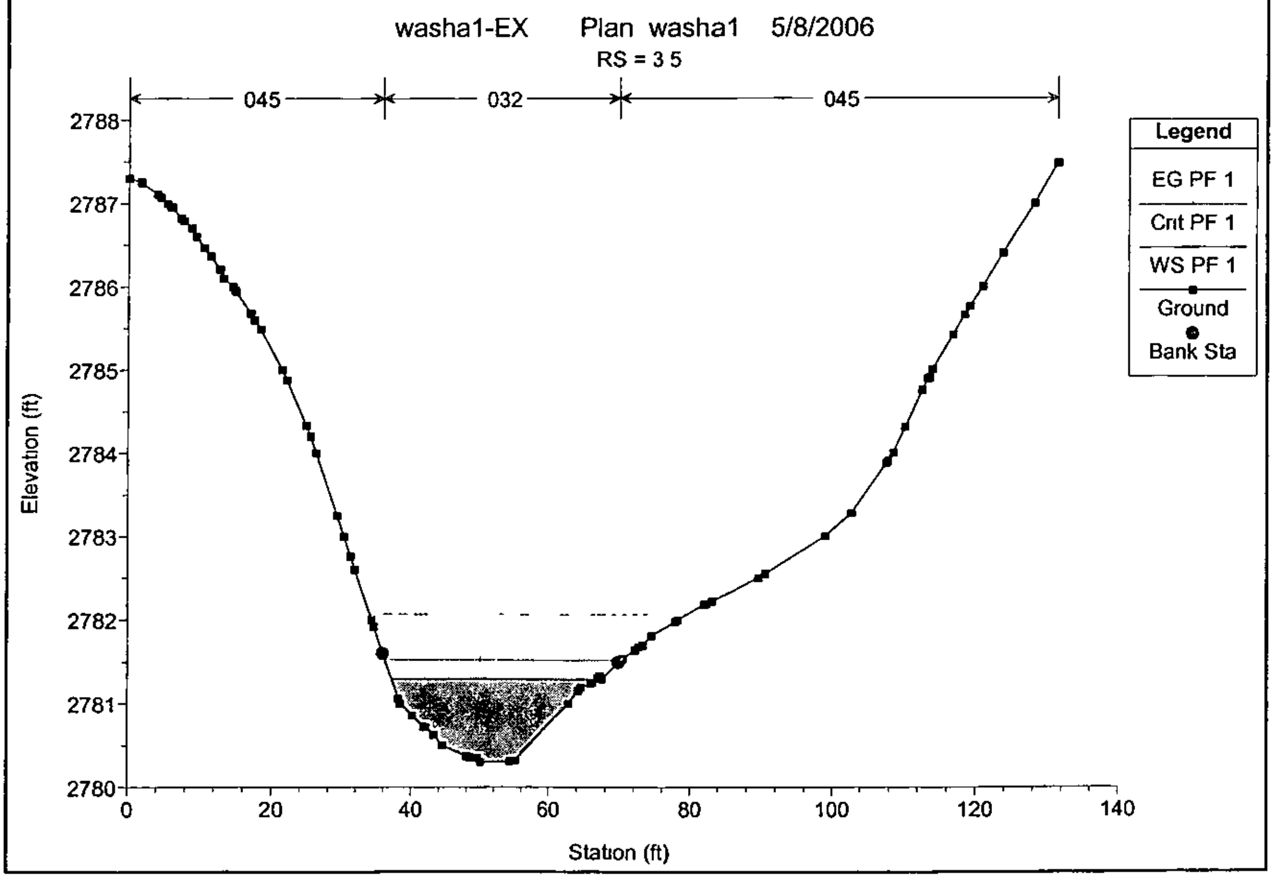
HEC-RAS Plan wasa1 River RIVER 1 Reach Reach-1 Profile PF 1

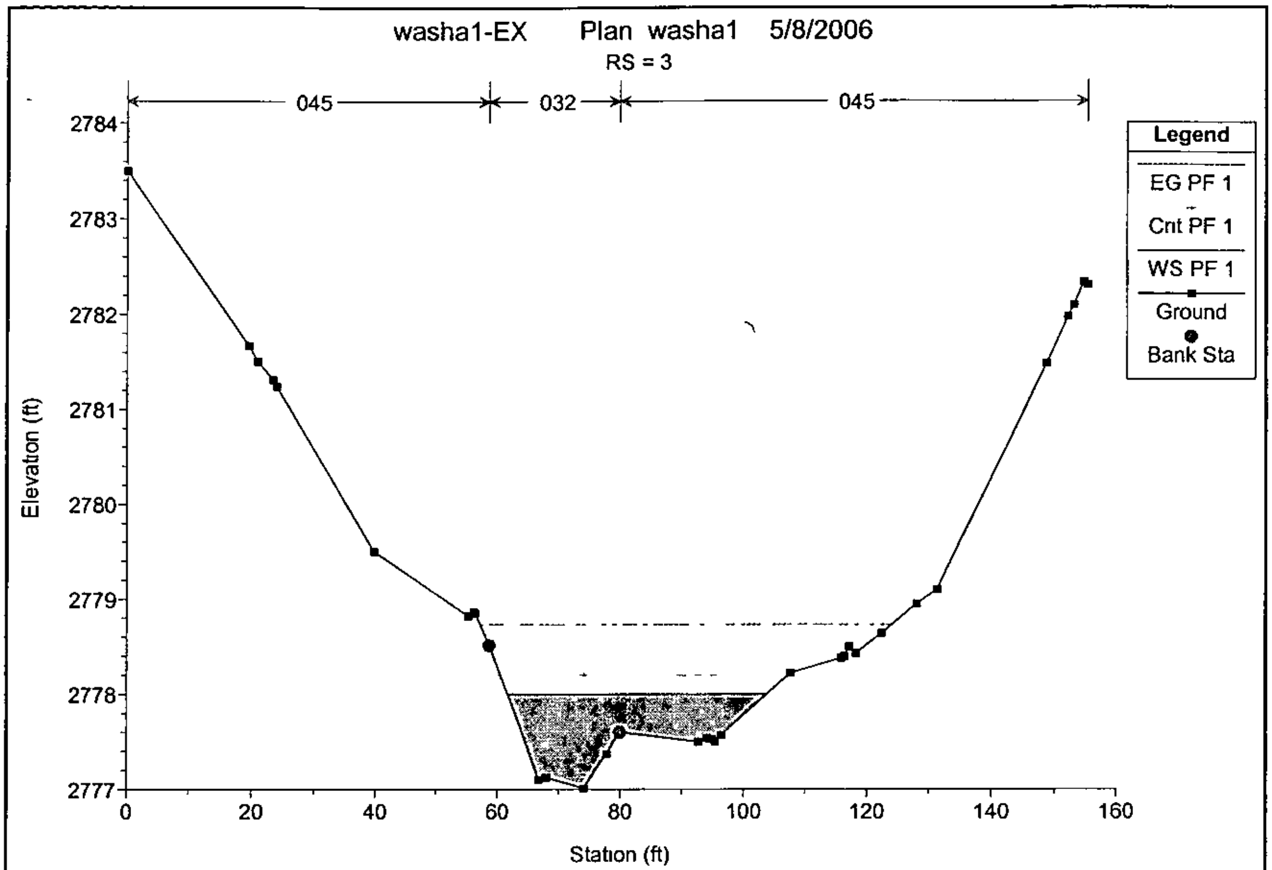
Reach	River Sta	Profile	Q Total	Min Ch El	W S Elev	Crit W S	E.G Elev	E G Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	6	PF 1	133.00	2797.99	2798.54	2798.61	2798.83	0.050016	5.63	33.66	103.73	1.57
Reach-1	5	PF 1	133.00	2793.20	2794.45	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	225.00	2761.68	2763.49	2764.10	2765.36	0.052876	11.96	24.91	36.49	1.92
Reach-1	1.5	PF 1	225.00	2759.00	2760.13	2760.26	2760.62	0.033317	5.58	40.31	75.30	1.34
Reach-1	1	PF 1	225.00	2753.00	2754.28	2754.64	2755.47	0.048122	9.80	31.88	57.99	1.78


washa1-EX Plan washa1 5/8/2006
RS = 6
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
2800 5
2800 0
2799 5
2799 0
2798 5
2798 0
2797 5
Elevation (ft)
0
50
100
150
200
Station (ft)

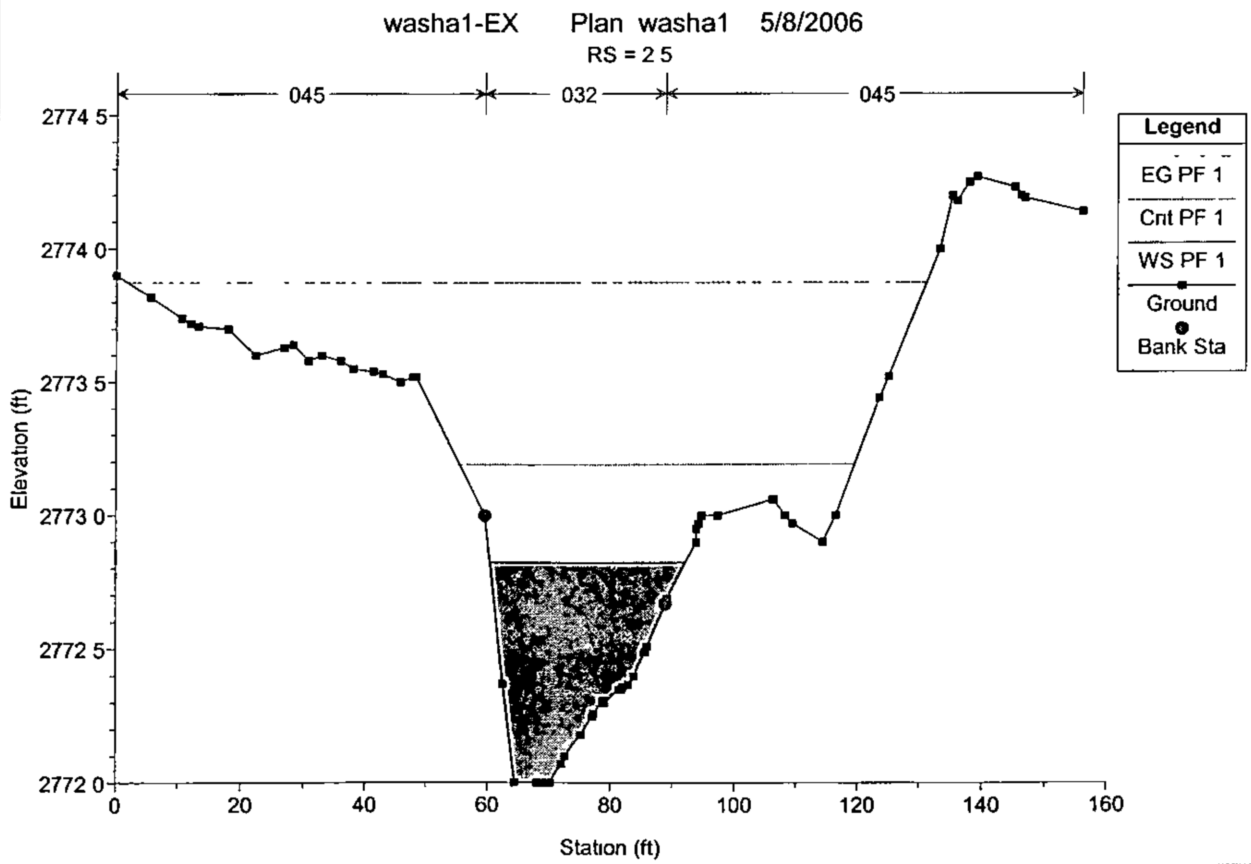

washa1-EX Plan washa1 5/8/2006
RS = 5
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
2797 0
2796 5
2796 0
2795 5
2795 0
2794 5
2794 0
2793 5
2793 0
Elevation (ft)
0
20
40
60
80
100
Station (ft)


washa1-EX Plan washa1 5/8/2006
RS = 4
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2798
2796
2794
2792
2790
2788
2786
0
20
40
60
80
100
120
140

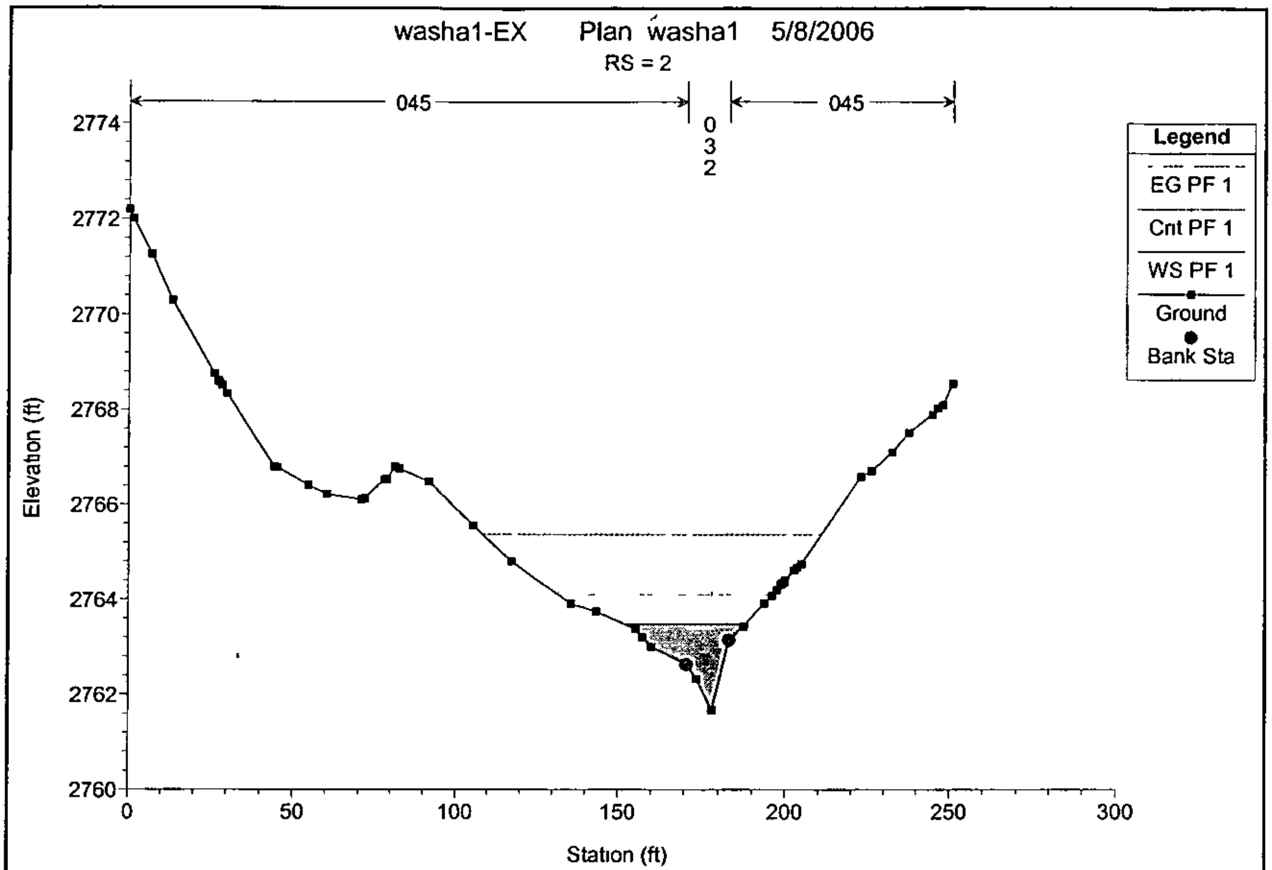

washa1-EX Plan washa1 5/8/2006
RS = 3 5
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2788
2787
2786
2785
2784
2783
2782
2781
2780
0
20
40
60
80
100
120
140

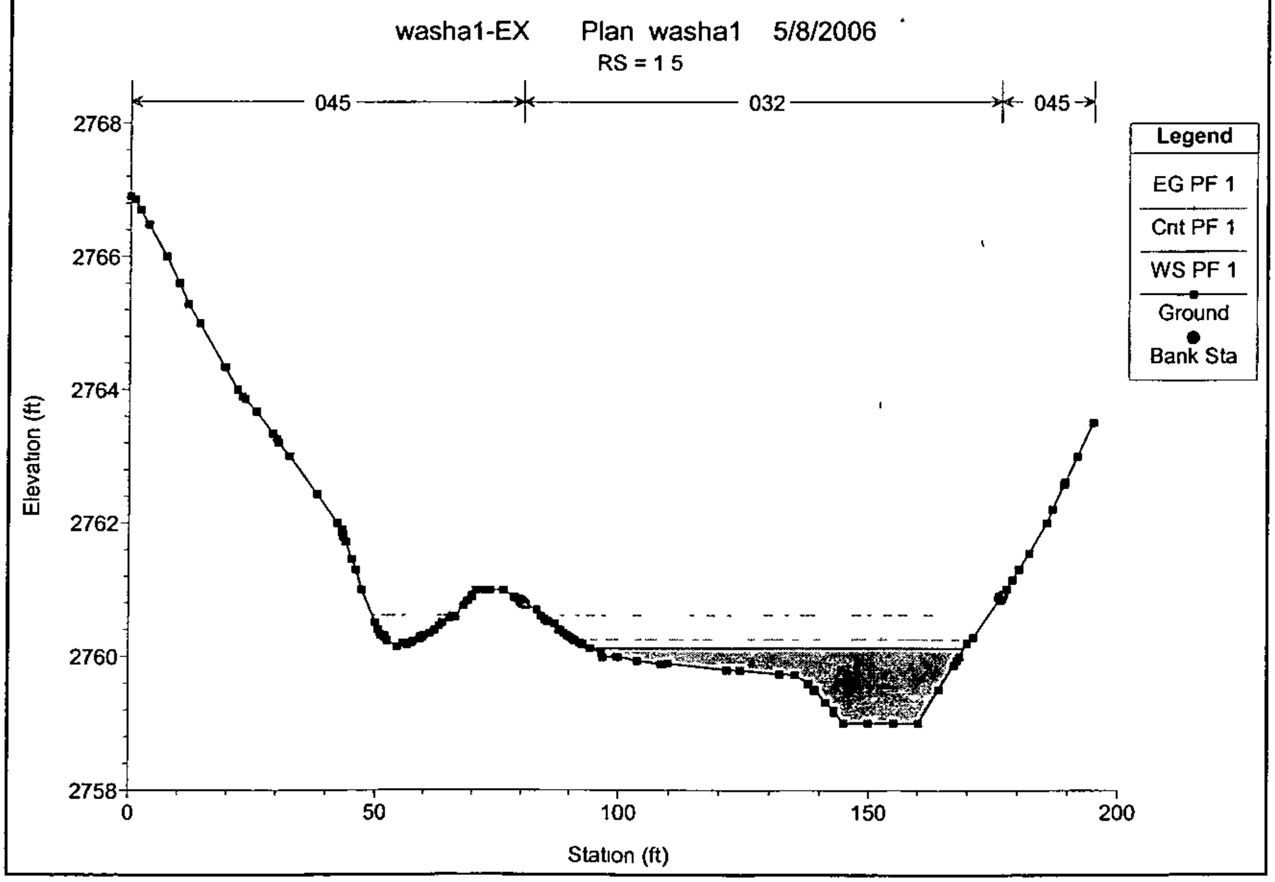


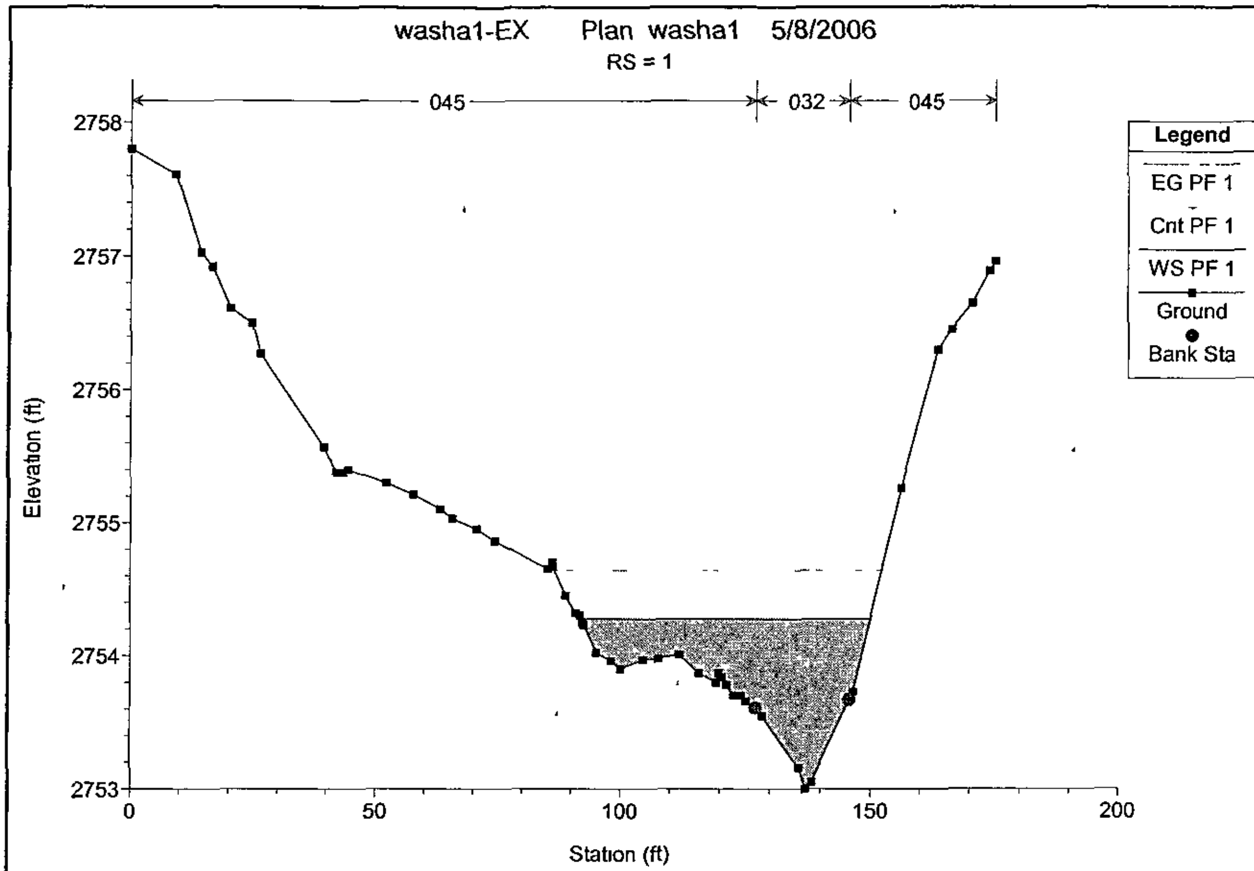
washa1-EX Plan washa1 5/8/2006
RS = 3
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2784
2783
2782
2781
2780
2779
2778
2777
0
20
40
60
80
100
120
140
160



washa1-EX Plan washa1 5/8/2006
RS = 2 5
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2774 5
2774 0
2773 5
2773 0
2772 5
2772 0
0
20
40
60
80
100
120
140
160


washa1-EX Plan washa1 5/8/2006
RS = 2
045
0
3
2
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2774
2772
2770
2768
2766
2764
2762
2760
0
50
100
150
200
250
300
Station (ft)


washa1-EX Plan washa1 5/8/2006
RS = 1 5
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)

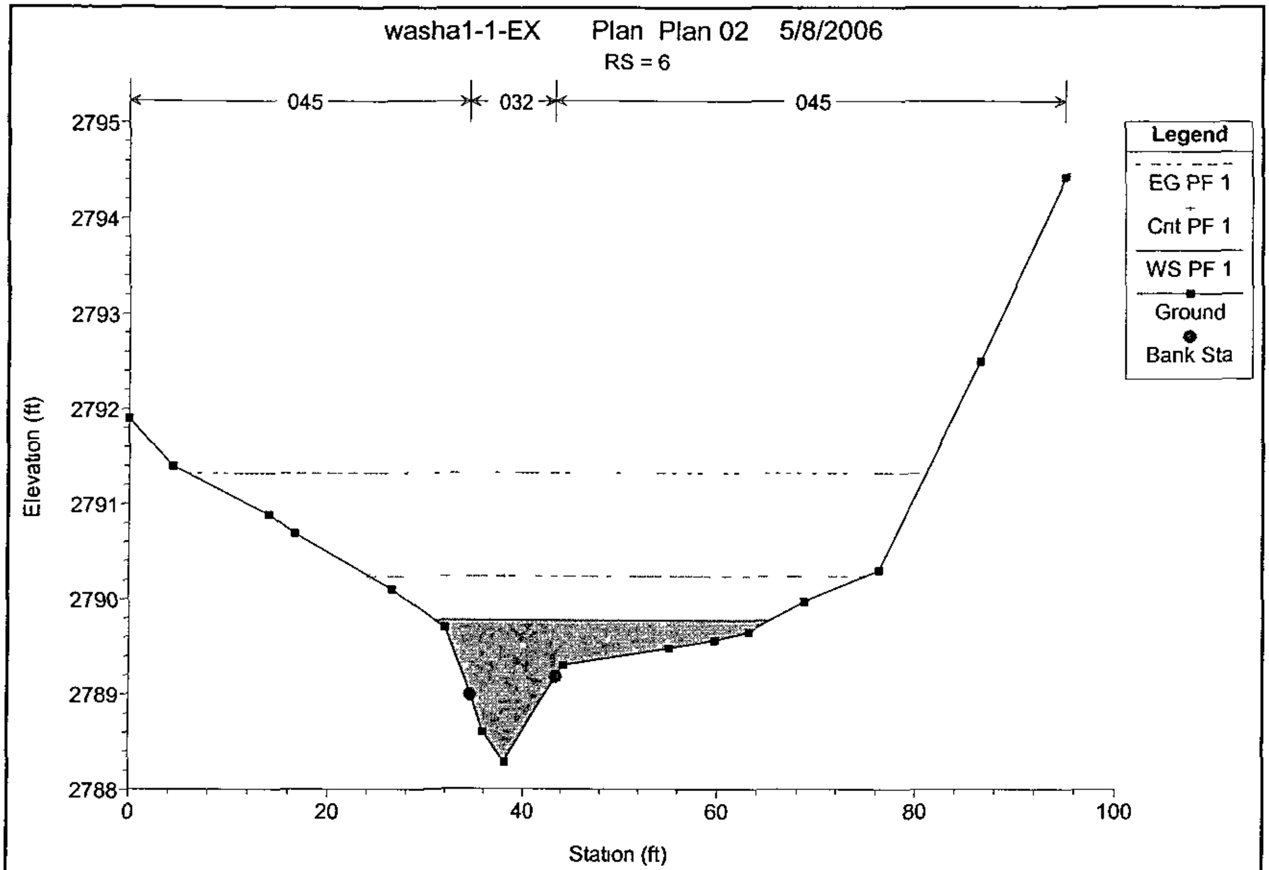


washa1-EX Plan washa1 5/8/2006
RS = 1
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2758
2757
2756
2755
2754
2753
0
50
100
150
200
Station (ft)

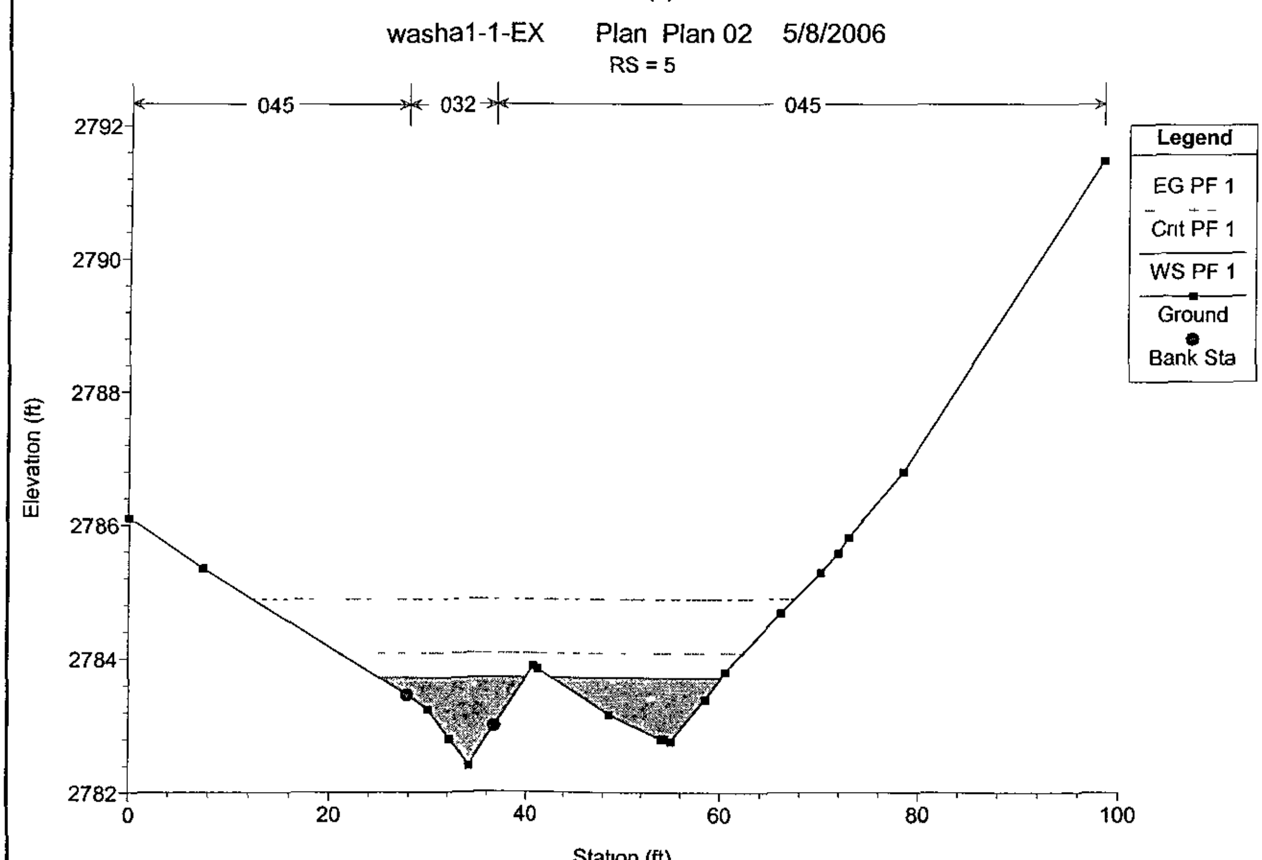
WASH A1-P

HEC-RAS Plan Plan 02 River RIVER-1 Reach Reach-1 Profile PF 1

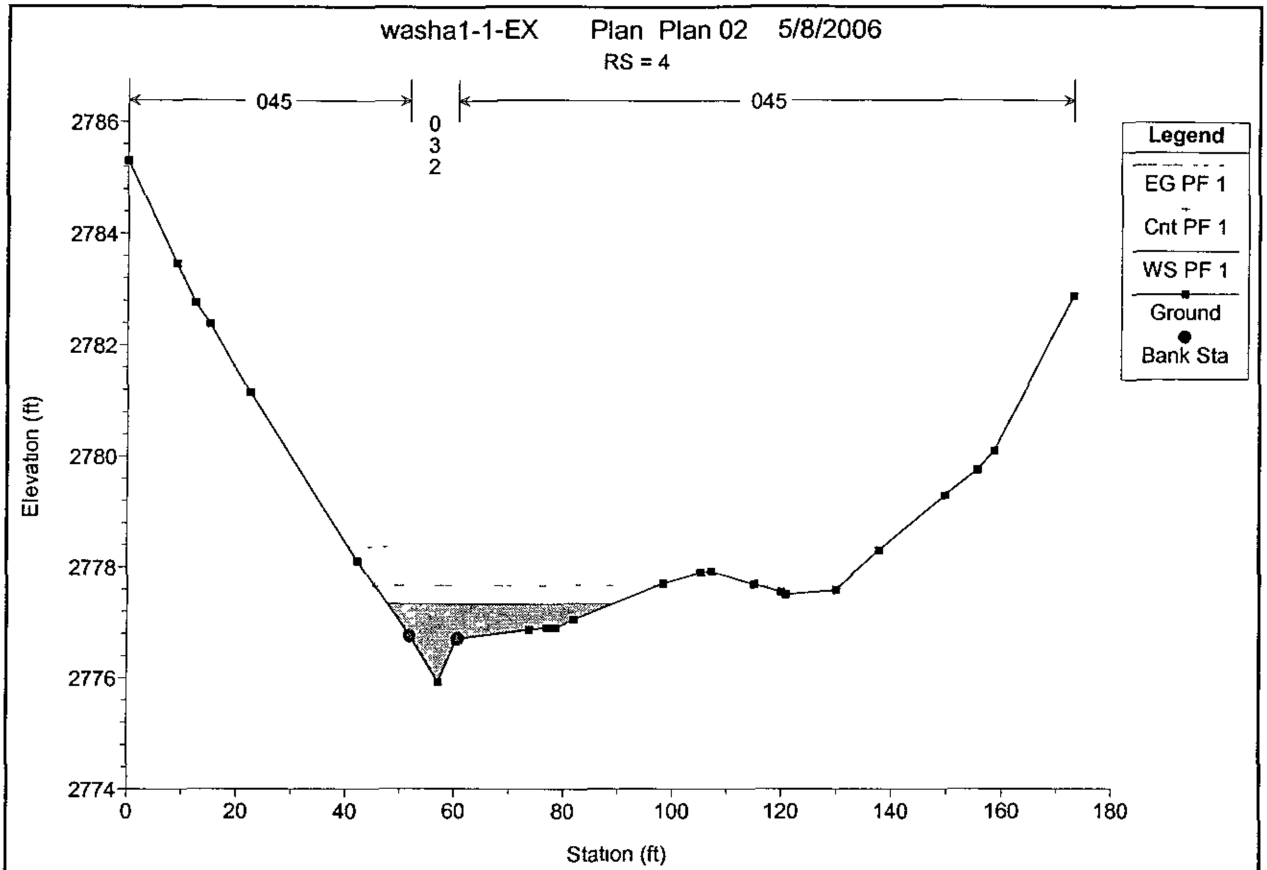
Reach	River Sta	Profile	Q Total	Min Ch El	W S Elev	Crit W S	E G Elev	E G Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	6	PF 1	133 00	2788 28	2789 77	2790 23	2791 32	0 050087	10 97	17 44	34 33	1 84
Reach-1	5	PF 1	133 00	2782 40	2783 72	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 04	2760 39	0 048351	5 71	23 31	55 71	1 55
Reach-1	1	PF 1	225 00	2753 00	2754 35	2754 62	2755 30	0 035741	8 97	36 07	59 94	1 55

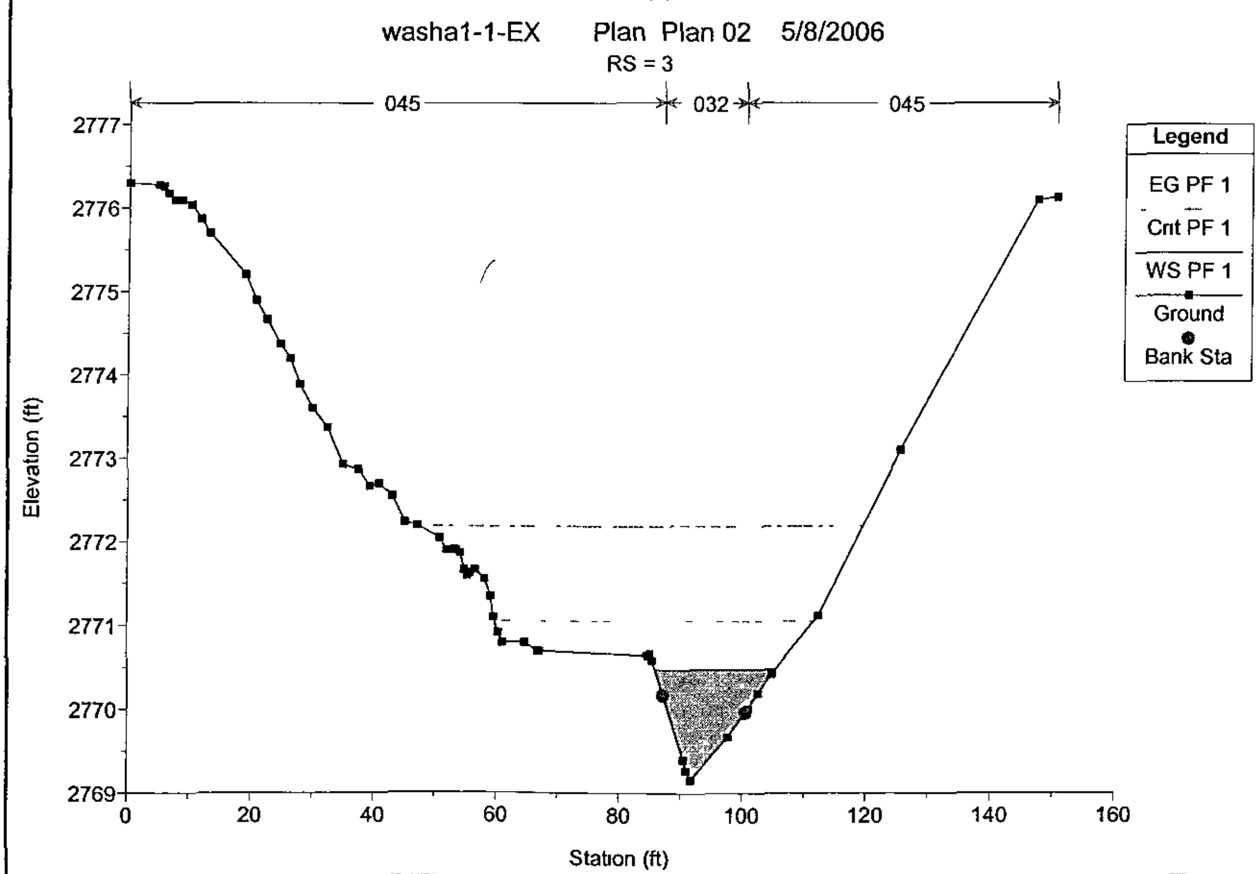


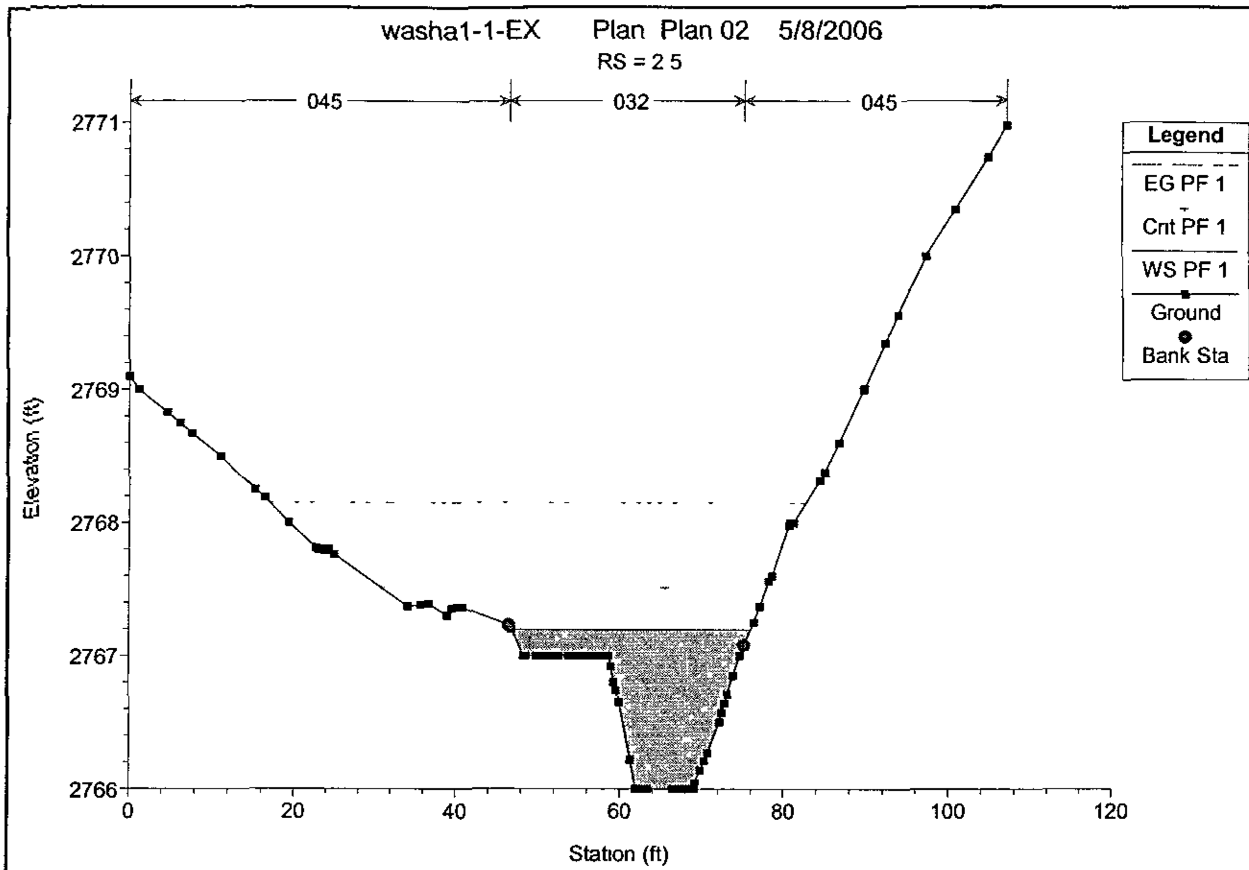
washa1-1-EX Plan Plan 02 5/8/2006
RS = 6
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2795
2794
2793
2792
2791
2790
2789
2788
0
20
40
60
80
100
Station (ft)

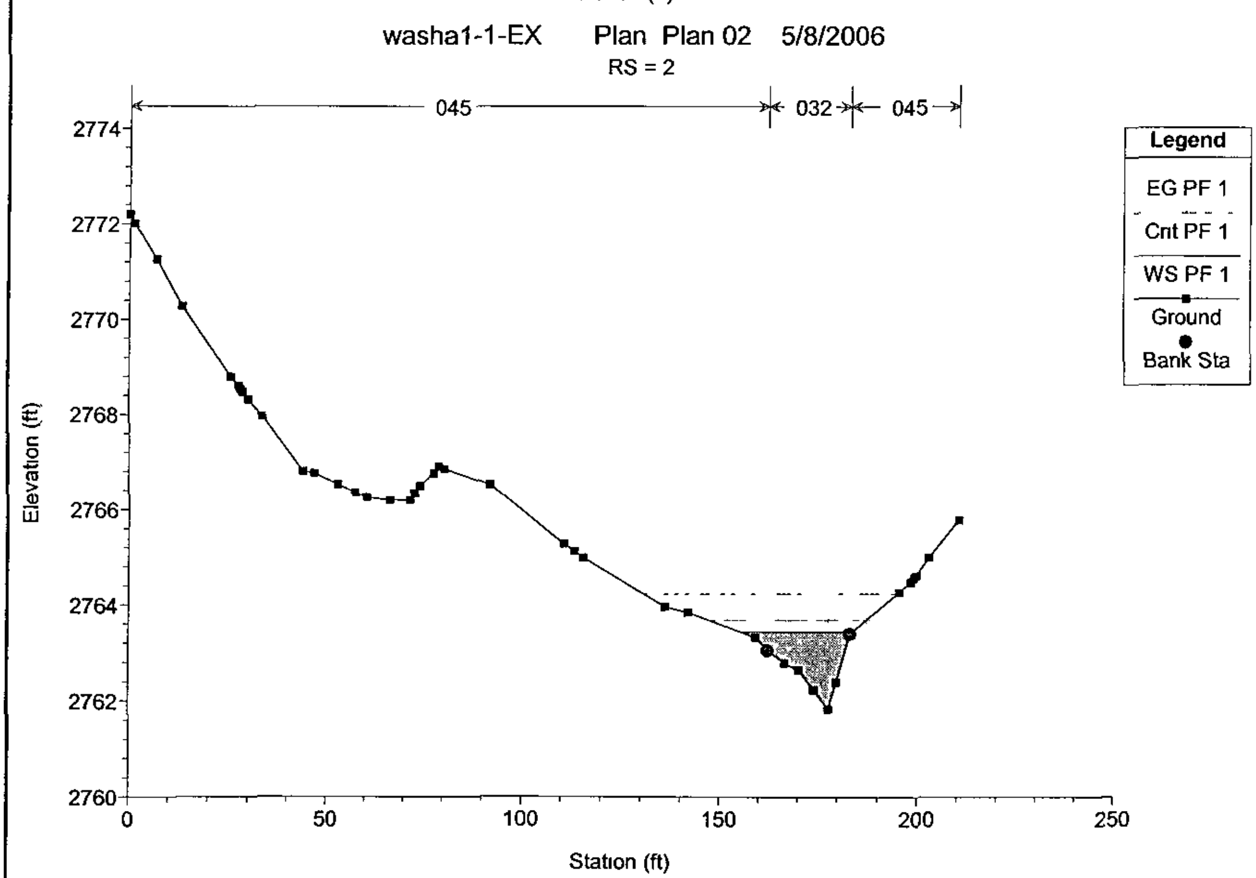


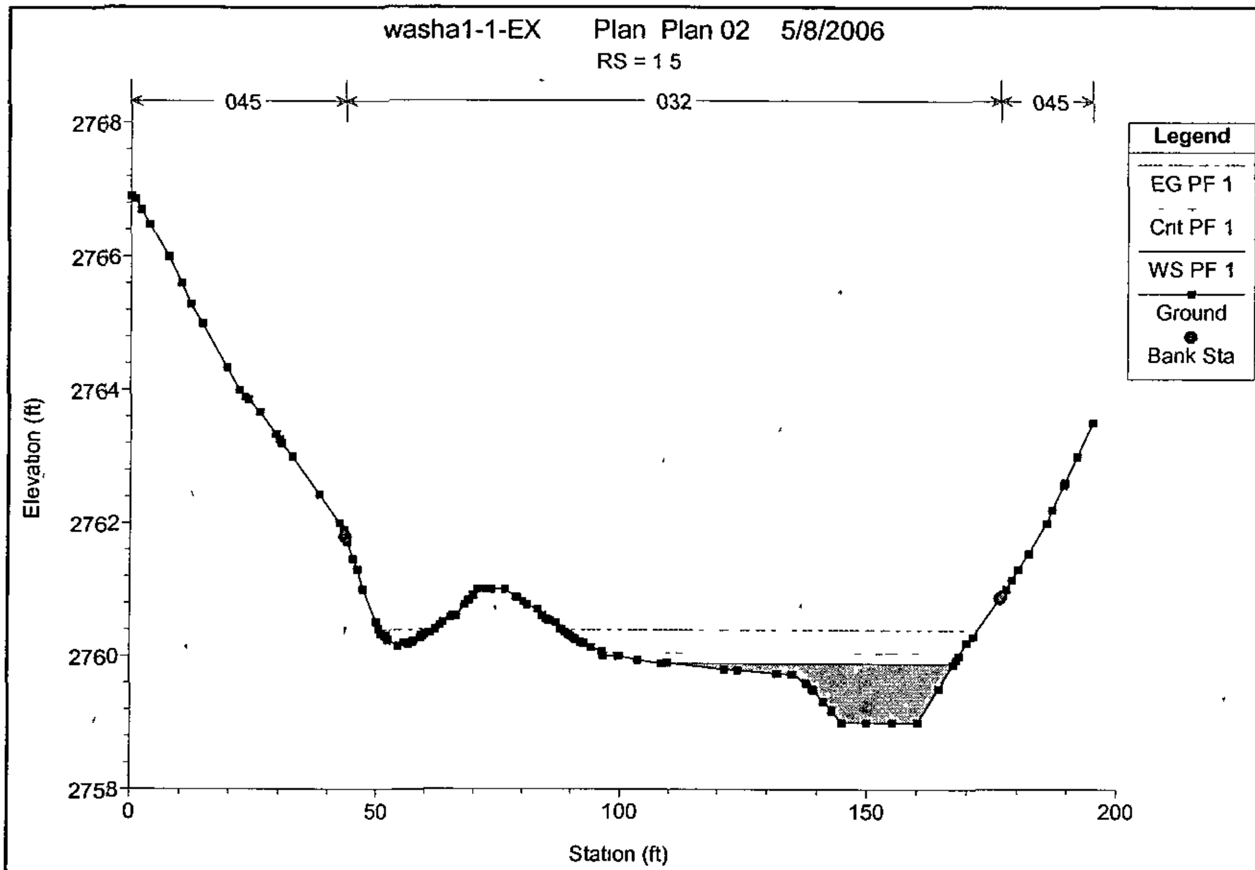
washa1-1-EX Plan Plan 02 5/8/2006
RS = 5
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2792
2790
2788
2786
2784
2782
0
20
40
60
80
100
Station (ft)

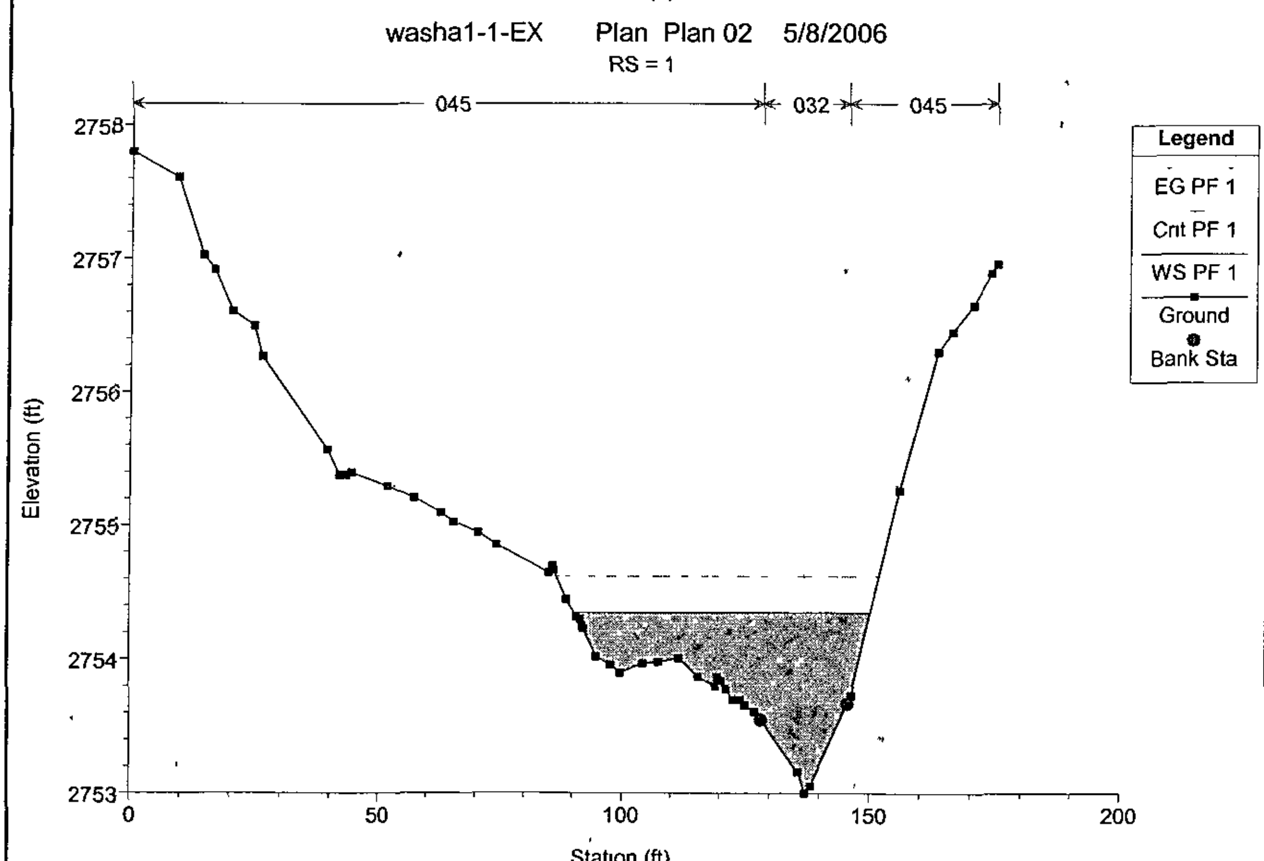

washa1-1-EX Plan Plan 02 5/8/2006
RS = 4
045
0
3
2
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2786
2784
2782
2780
2778
2776
2774
0
20
40
60
80
100
120
140
160
180
Station (ft)


washa1-1-EX Plan Plan 02 5/8/2006
RS = 3
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2777
2776
2775
2774
2773
2772
2771
2770
2769
0
20
40
60
80
100
120
140
160
Station (ft)


washa1-1-EX Plan Plan 02 5/8/2006
RS = 2 5
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2766
2767
2768
2769
2770
2771
0
20
40
60
80
100
120


washa1-1-EX Plan Plan 02 5/8/2006
RS = 2
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2760
2762
2764
2766
2768
2770
2772
2774
0
50
100
150
200
250

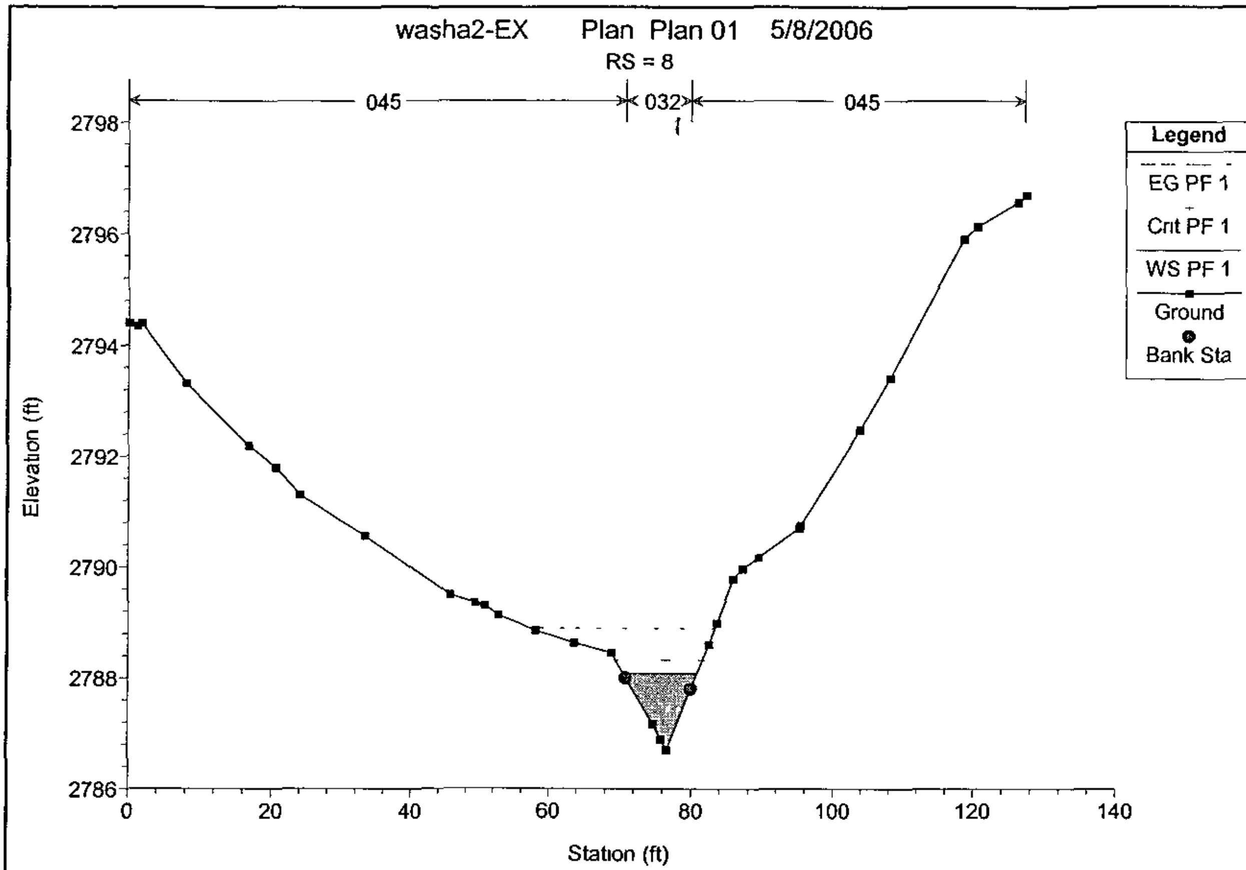

washa1-1-EX Plan Plan 02 5/8/2006
RS = 1 5
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2768
2766
2764
2762
2760
2758
0
50
100
150
200
Station (ft)

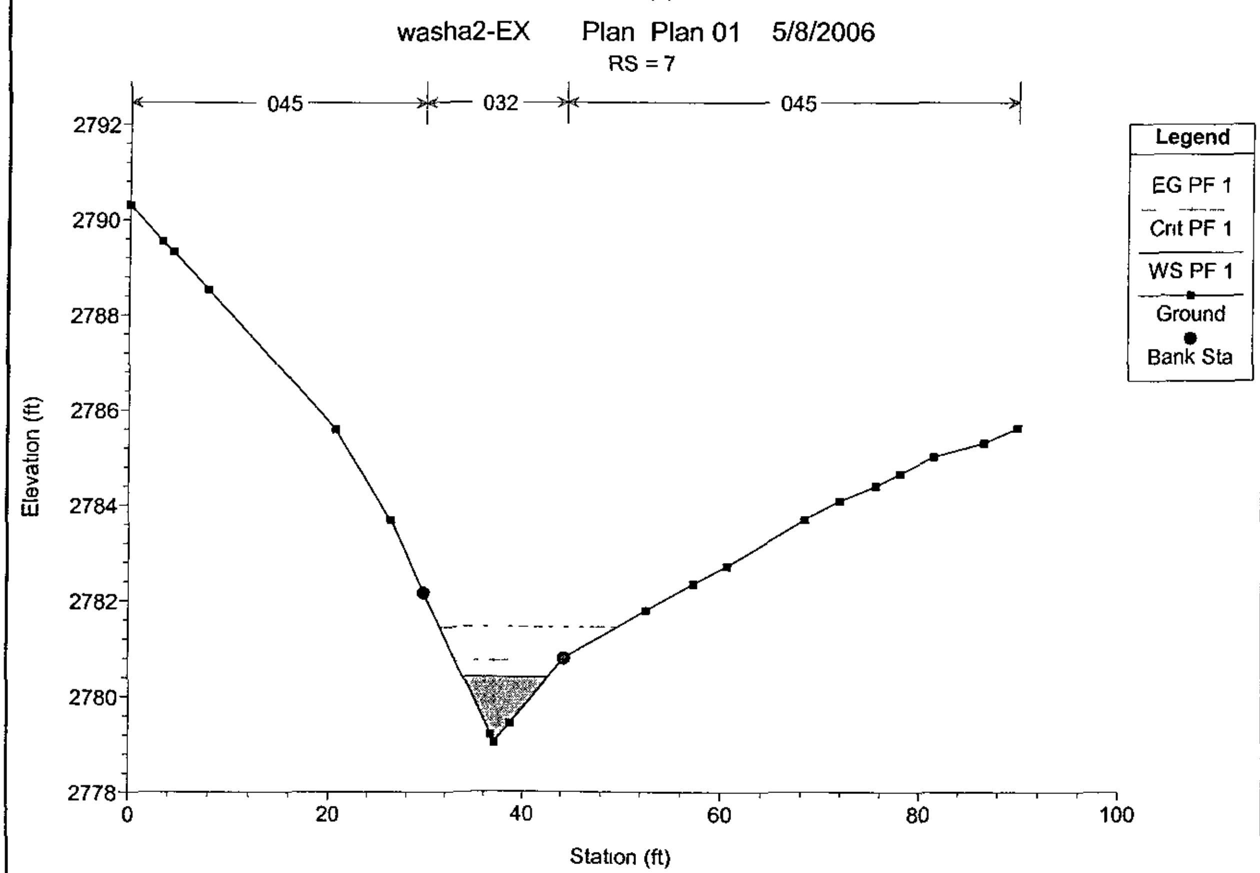

washa1-1-EX Plan Plan 02 5/8/2006
RS = 1
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2758
2757
2756
2755
2754
2753
0
50
100
150
200
Station (ft)

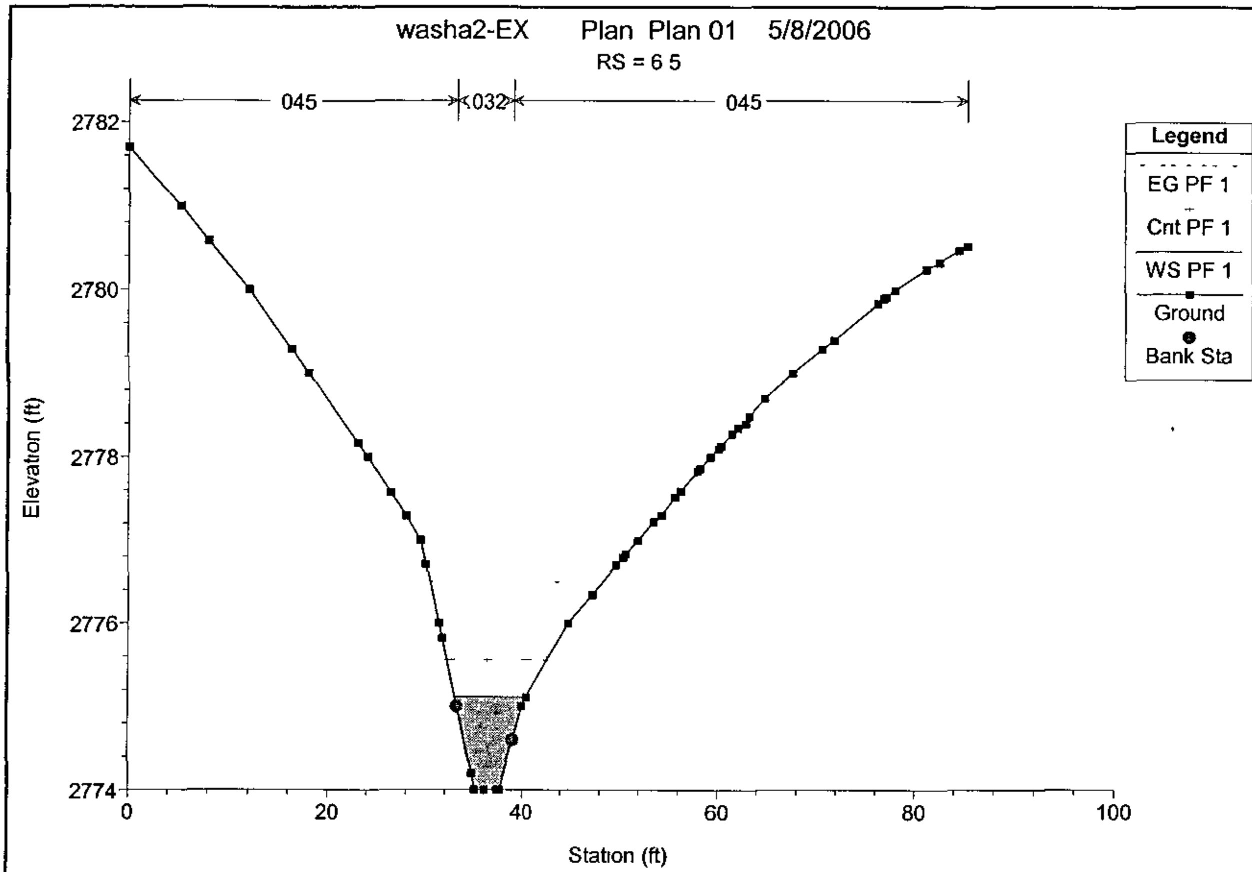
WASH A2

HEC-RAS Plan Plan 01 River RIVER-1 Reach Reach 1 Profile PF 1

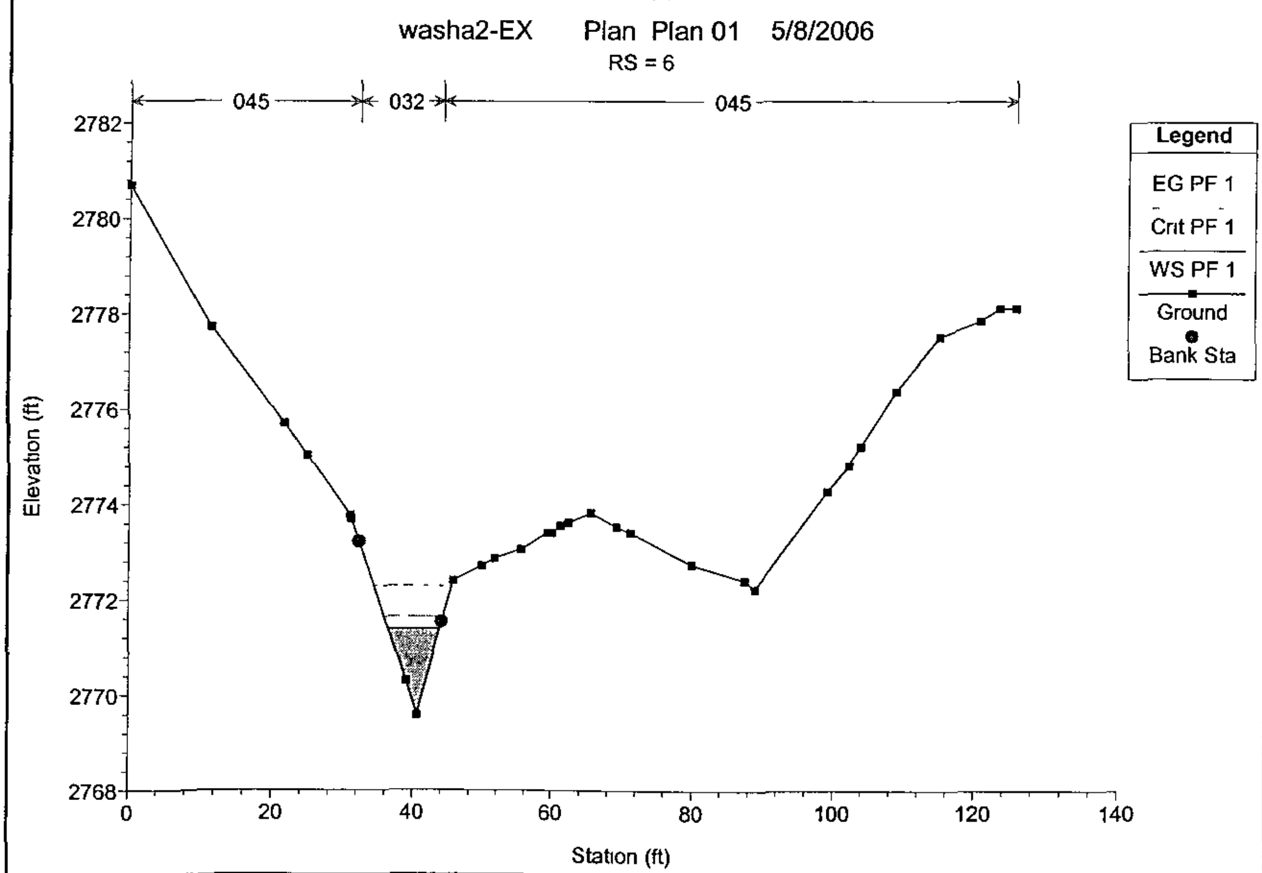
Reach	River Sta	Profile	Q Total	Min Ch El	W S Elev	Crit W S	E G Elev	E G Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	8	PF 1	50 00	2786 70	2788 08	2788 32	2788 89	0 037052	7 25	7 00	10 29	1 47
Reach-1	7	PF 1	50 00	2779 03	2780 41	2780 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	103 00	2742 10	2743 49	2743 84	2744 51	0 040565	8 21	13 15	20 48	1 59
Reach-1	1 5	PF 1	103 00	2739 00	2740 24	2740 46	2740 96	0 023639	6 94	17 39	33 29	1 24
Reach-1	1	PF 1	103 00	2733 30	2734 58	2735 00	2735 99	0 080509	9 58	10 98	20 87	2 13


washa2-EX Plan Plan 01 5/8/2006
RS = 8
045
032
045
Elevation (ft)
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta

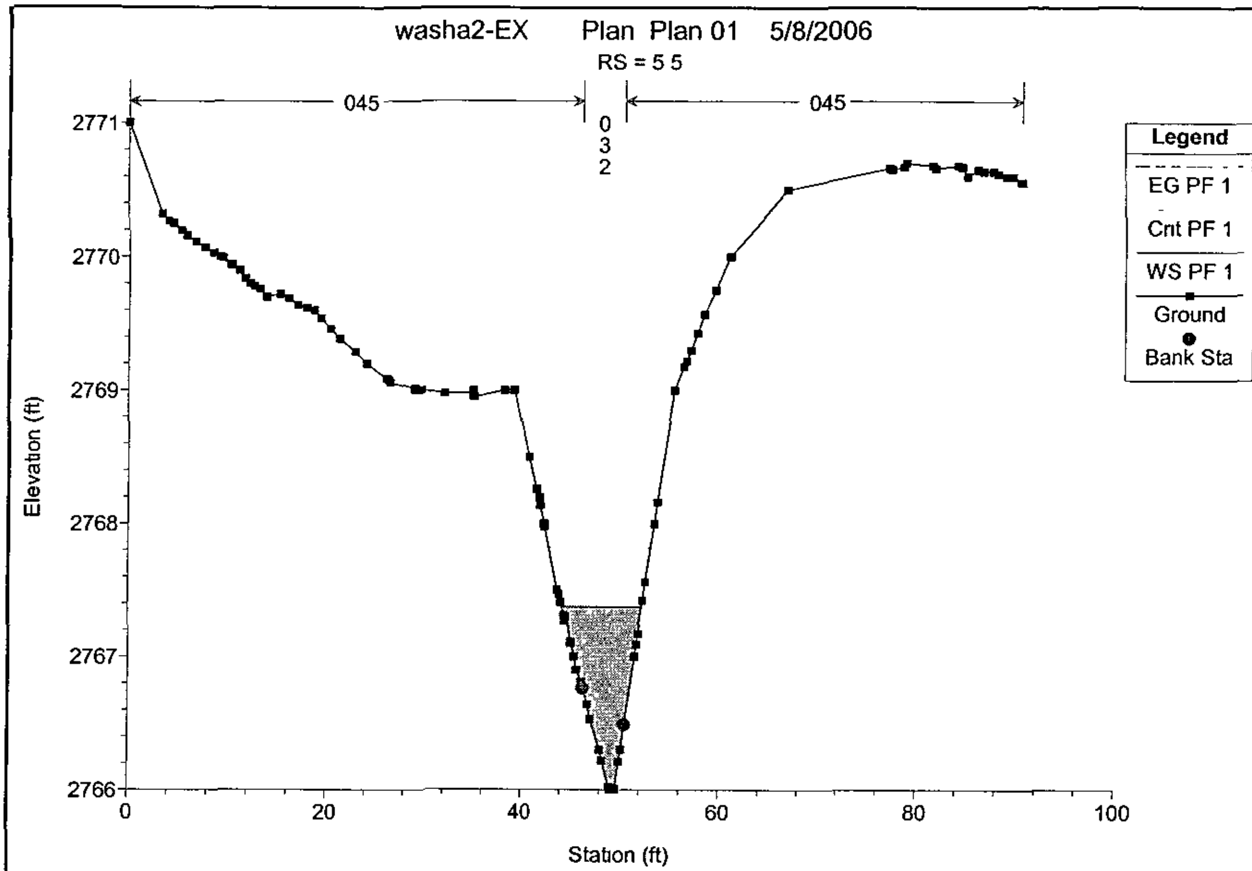

washa2-EX Plan Plan 01 5/8/2006
RS = 7
045
032
045
Elevation (ft)
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta

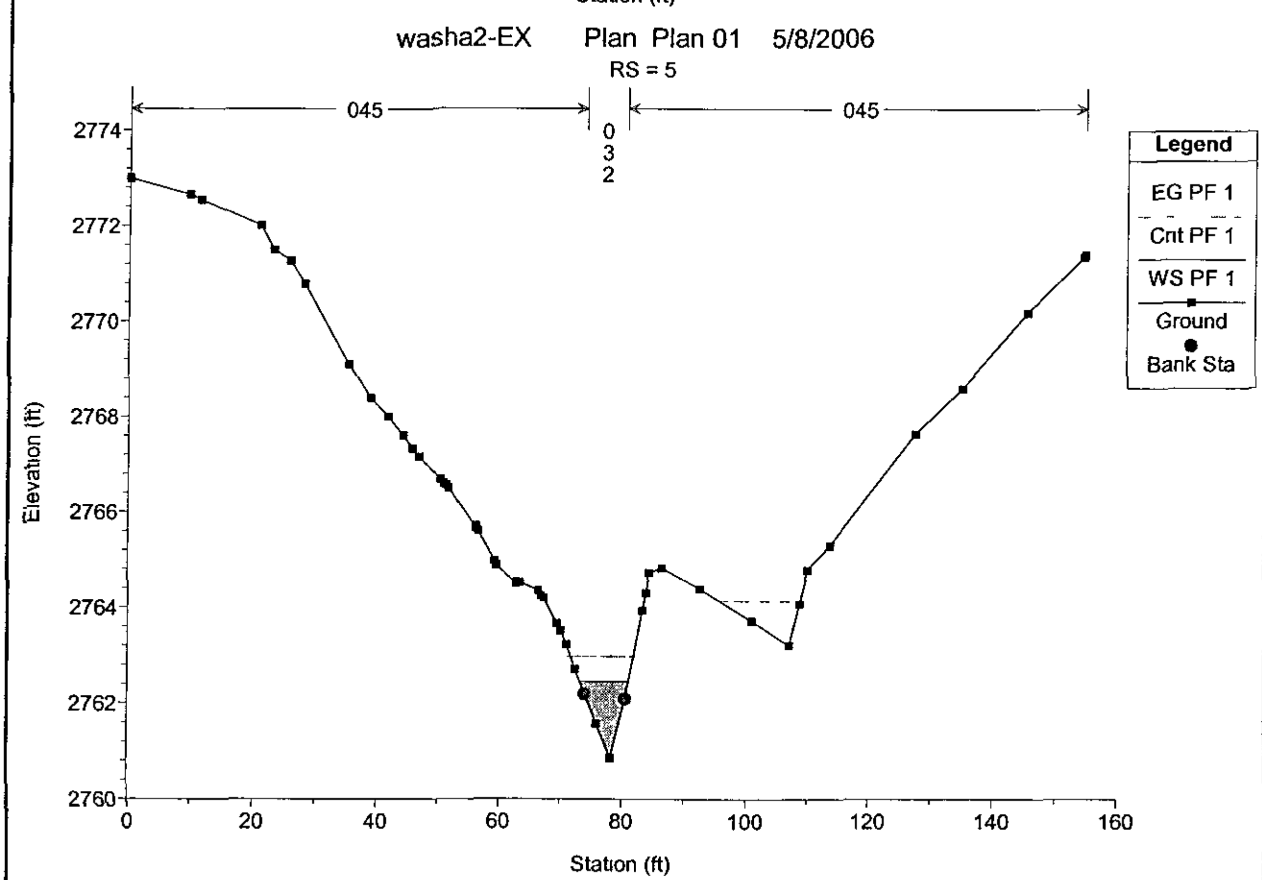


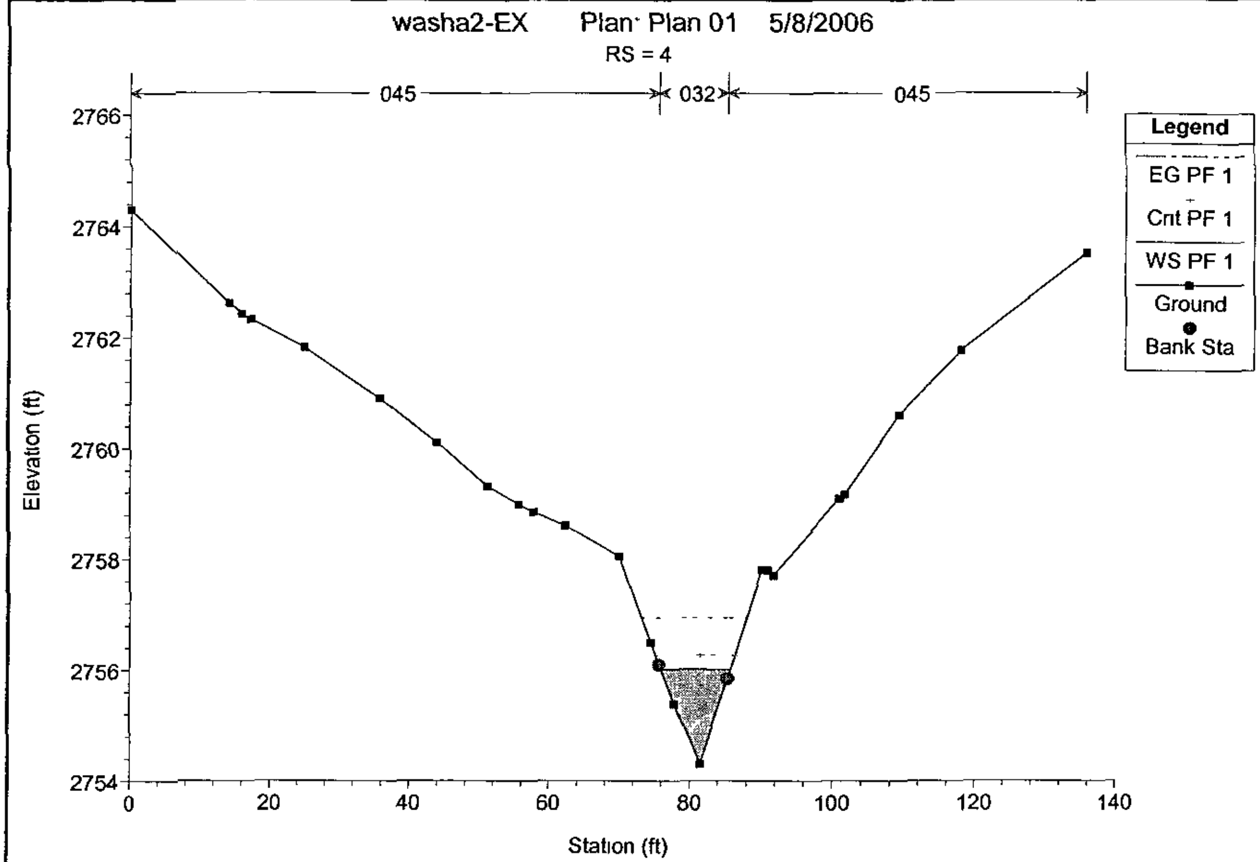
washa2-EX Plan Plan 01 5/8/2006
RS = 6 5
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2782
2780
2778
2776
2774
0
20
40
60
80
100
Station (ft)

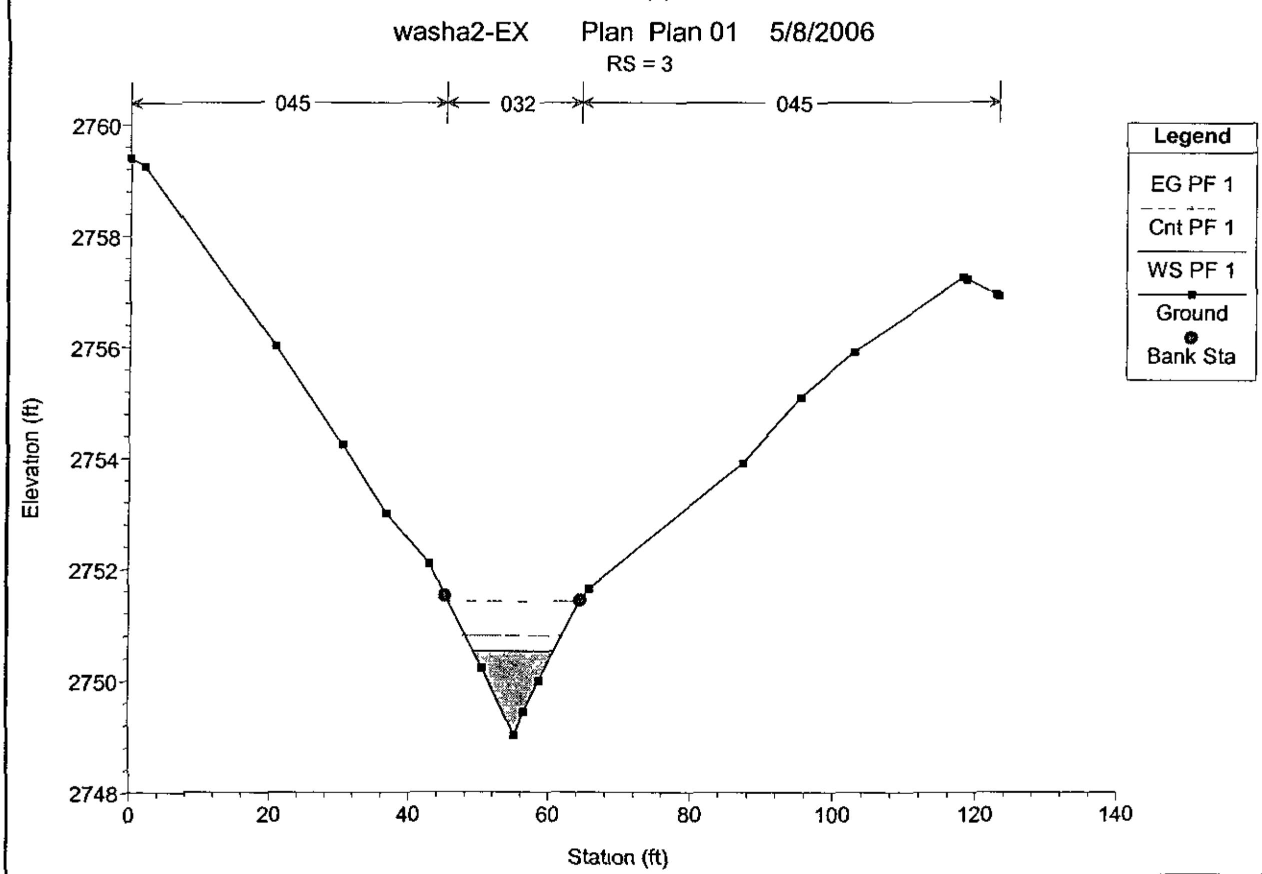


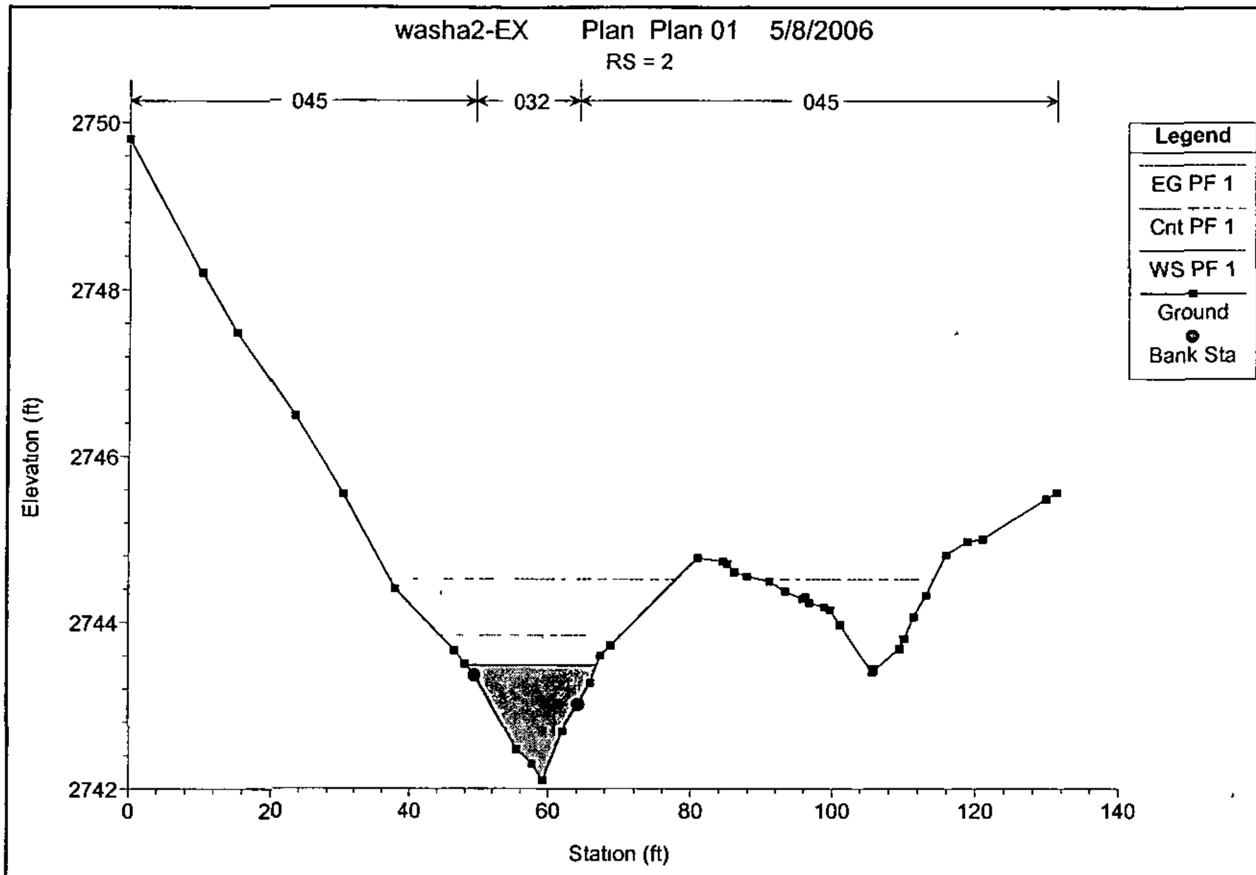
washa2-EX Plan Plan 01 5/8/2006
RS = 6
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2782
2780
2778
2776
2774
2772
2770
2768
0
20
40
60
80
100
120
140
Station (ft)

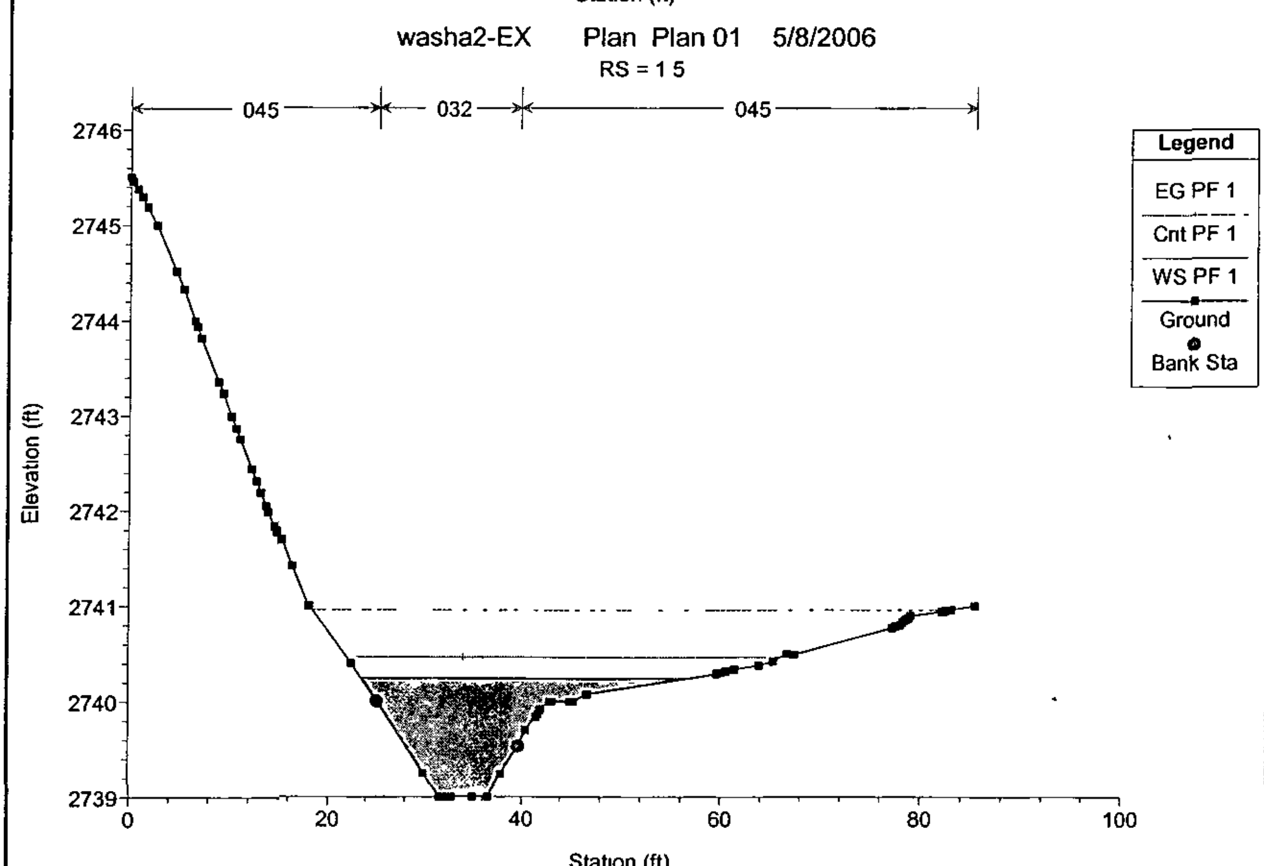

washa2-EX Plan Plan 01 5/8/2006
RS = 5 5
045
0
3
2
045
2771
2770
2769
2768
2767
2766
Elevation (ft)
0
20
40
60
80
100
Station (ft)
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta

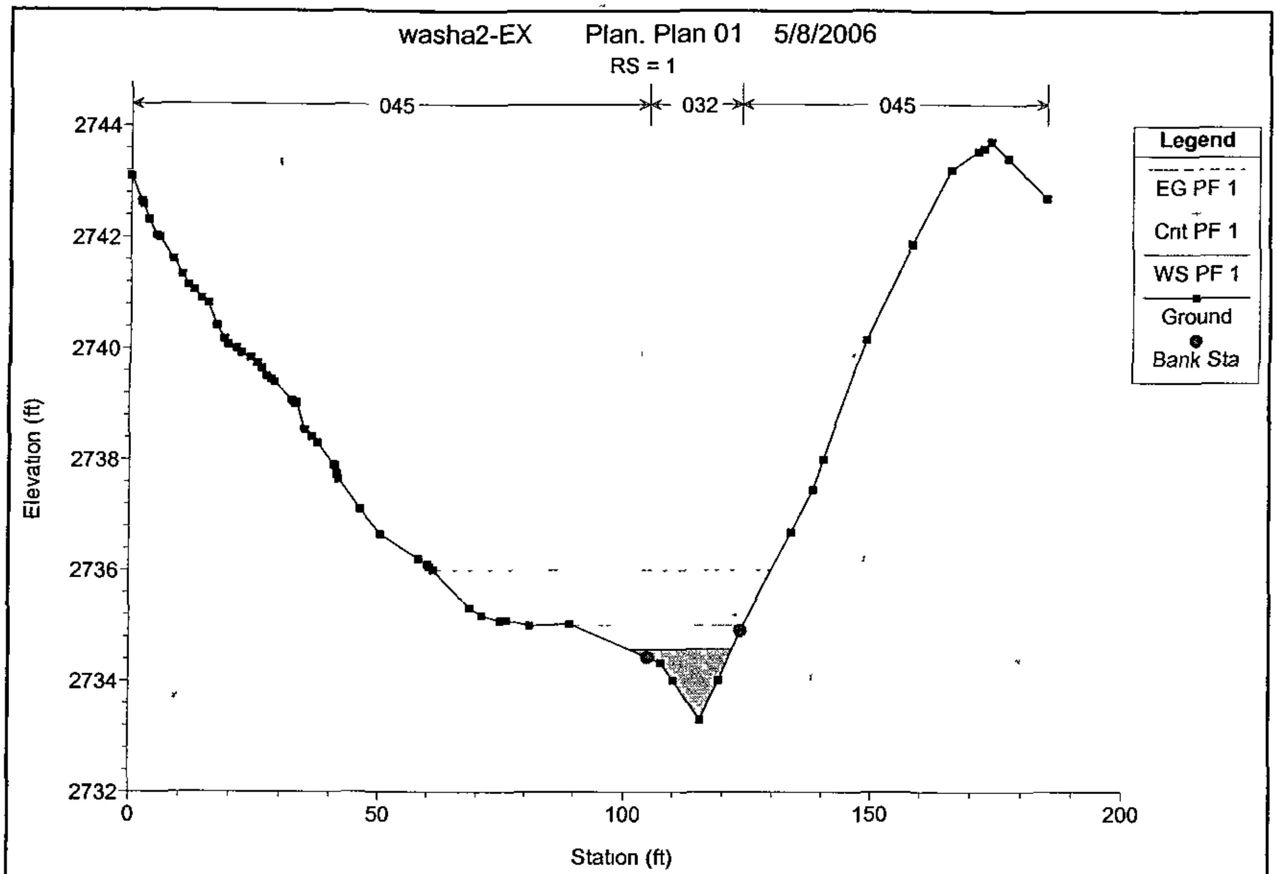

washa2-EX Plan Plan 01 5/8/2006
RS = 5
045
0
3
2
045
2774
2772
2770
2768
2766
2764
2762
2760
Elevation (ft)
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta


washa2-EX Plan· Plan 01 5/8/2006
RS = 4
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


washa2-EX Plan Plan 01 5/8/2006
RS = 3
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


washa2-EX Plan Plan 01 5/8/2006
RS = 2
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2750
2748
2746
2744
2742
0
20
40
60
80
100
120
140
Station (ft)

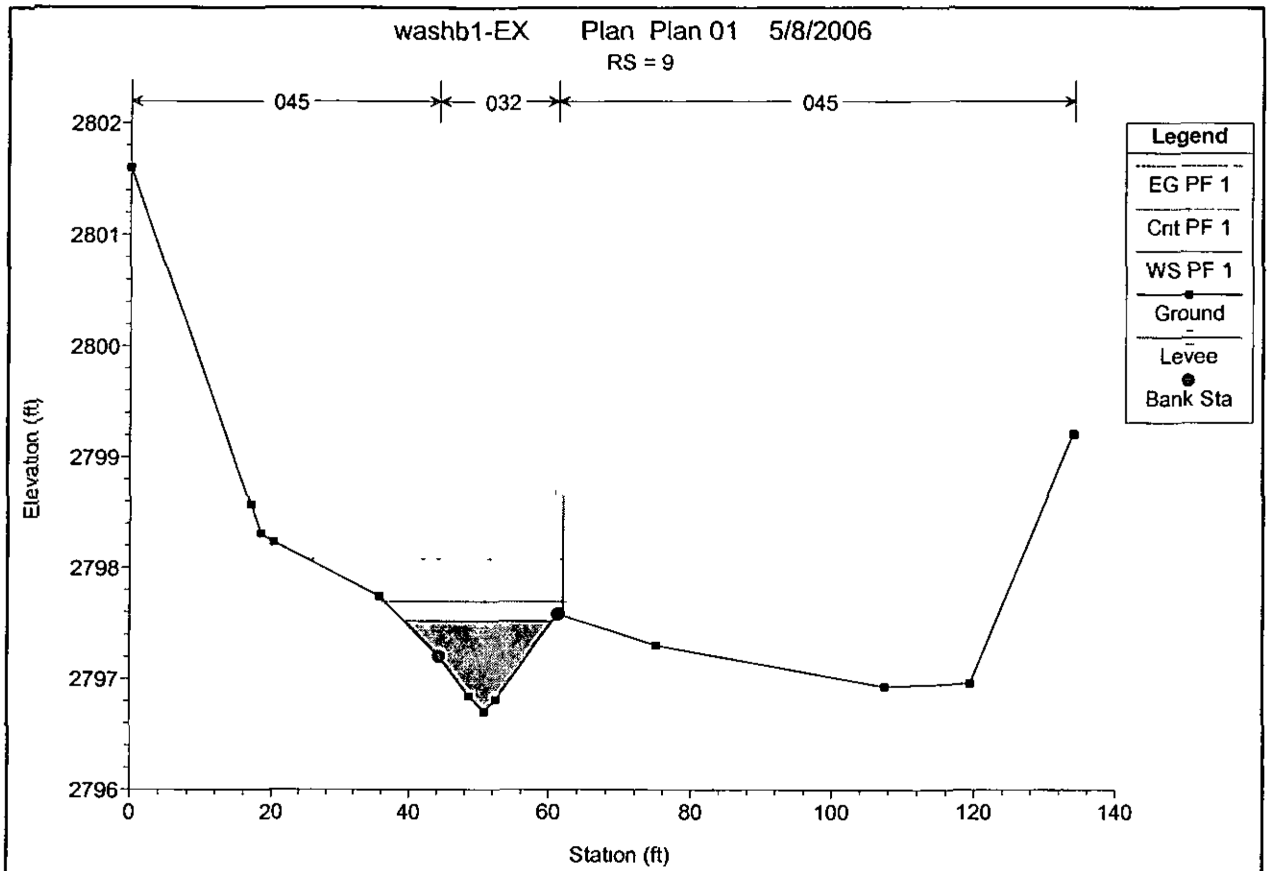

washa2-EX Plan Plan 01 5/8/2006
RS = 1 5
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2746
2745
2744
2743
2742
2741
2740
2739
0
20
40
60
80
100
Station (ft)

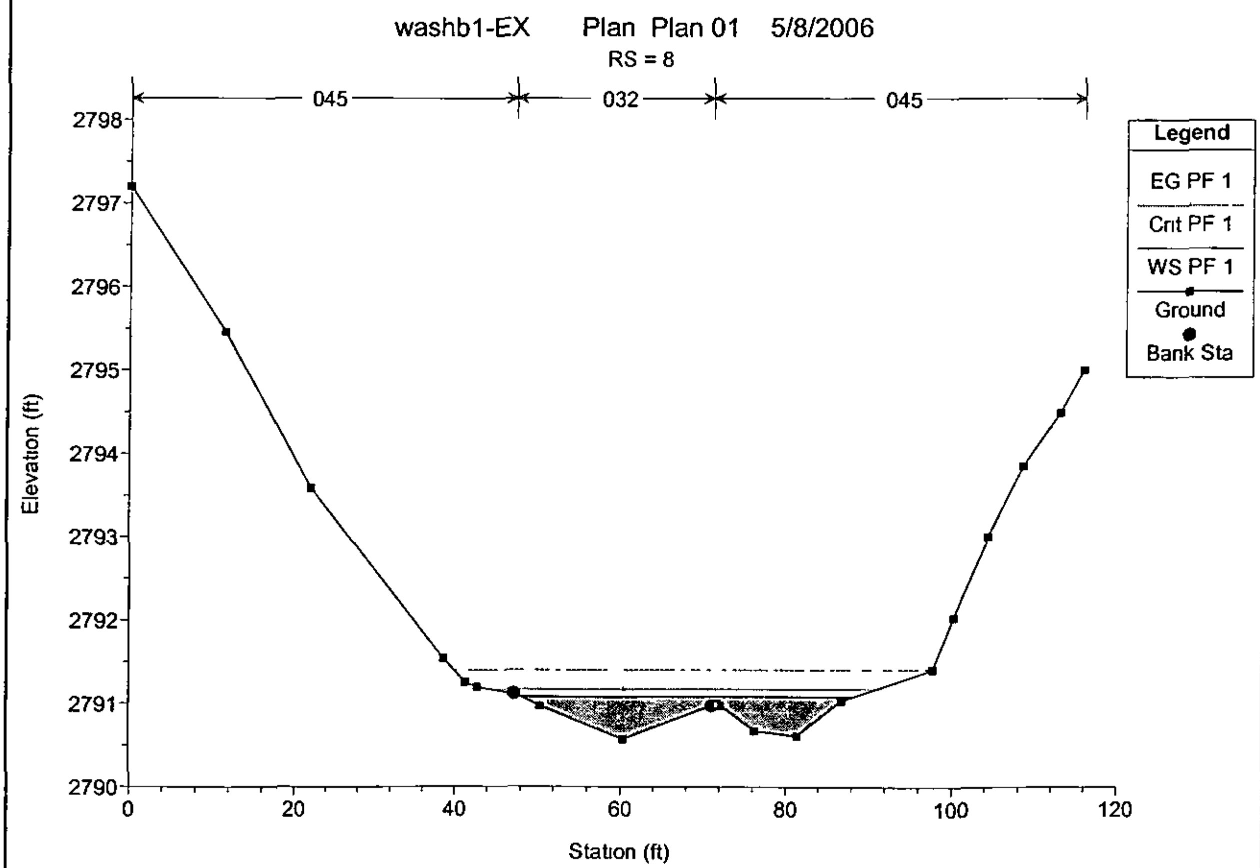

washa2-EX Plan. Plan 01 5/8/2006
RS = 1
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
2744
2742
2740
2738
2736
2734
2732
Elevation (ft)
0
50
100
150
200
Station (ft)

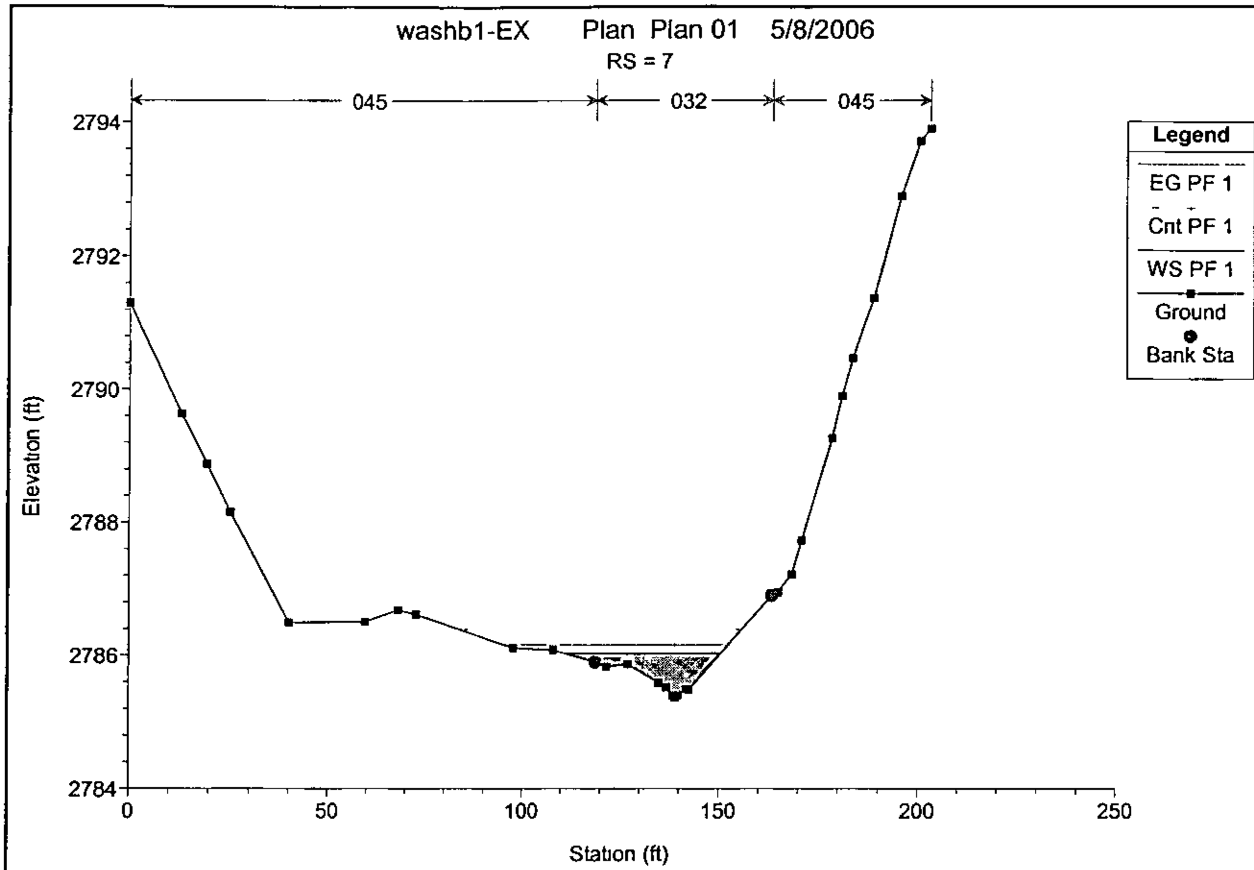
WASH B1

HEC-RAS Plan Plan 01 River RIVER-1 Reach Reach-1 Profile PF 1

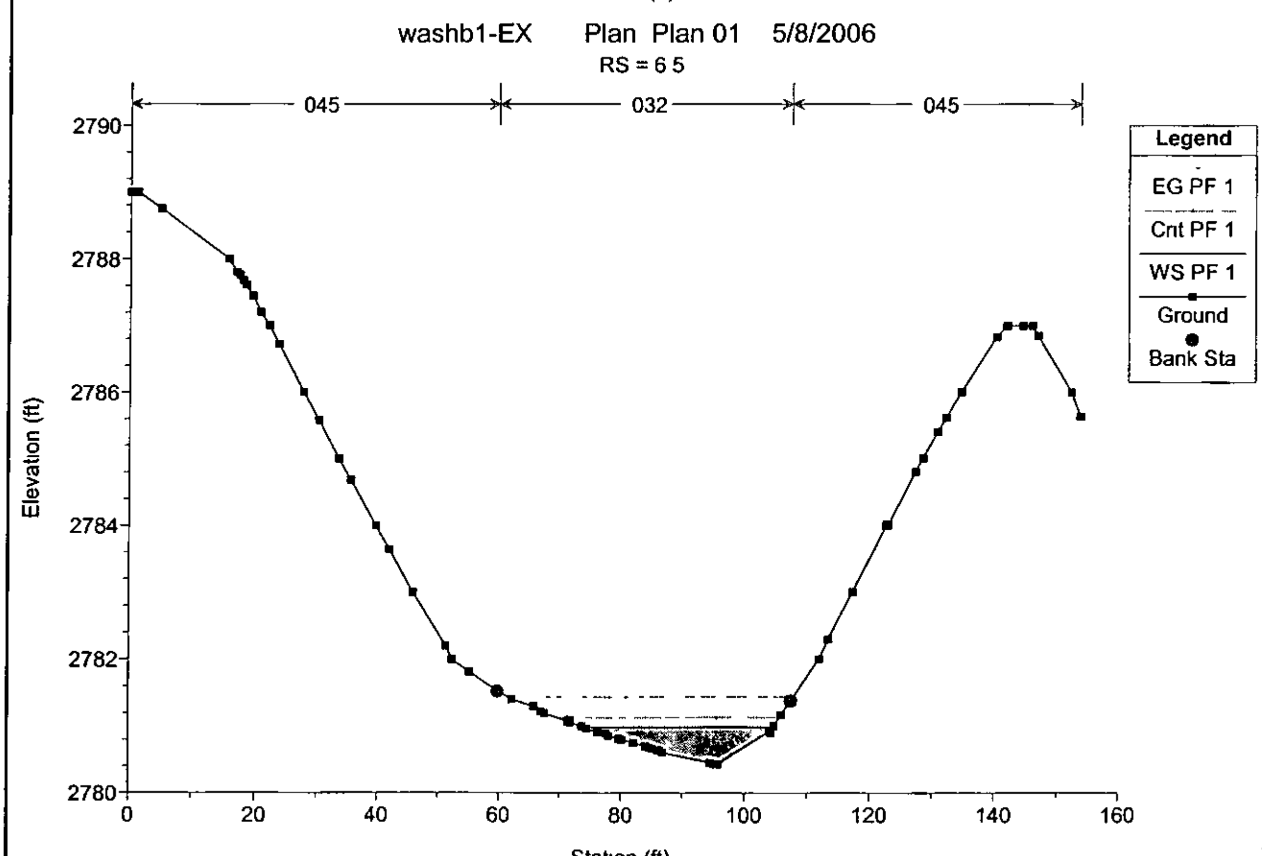
Reach	River Sta	Profile	Q Total	Min Ch El	W S Elev	Crit W S	E G Elev	E G Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	9	PF 1	50 00	2796 70	2797 52	2797 69	2798 08	0 045030	6 09	8 74	21 32	1 54
Reach 1	8	PF 1	50 00	2790 57	2791 08	2791 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	79 00	2754 10	2754 85	2755 02	2755 43	0 047512	6 18	13 44	33 39	1 58
Reach-1	1	PF 1	192 00	2745 67	2746 98	2747 15	2747 49	0 048446	7 72	39 04	85 79	1 66


washb1-EX Plan Plan 01 5/8/2006
RS = 9
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
2802
2801
2800
2799
2798
2797
2796
0
20
40
60
80
100
120
140

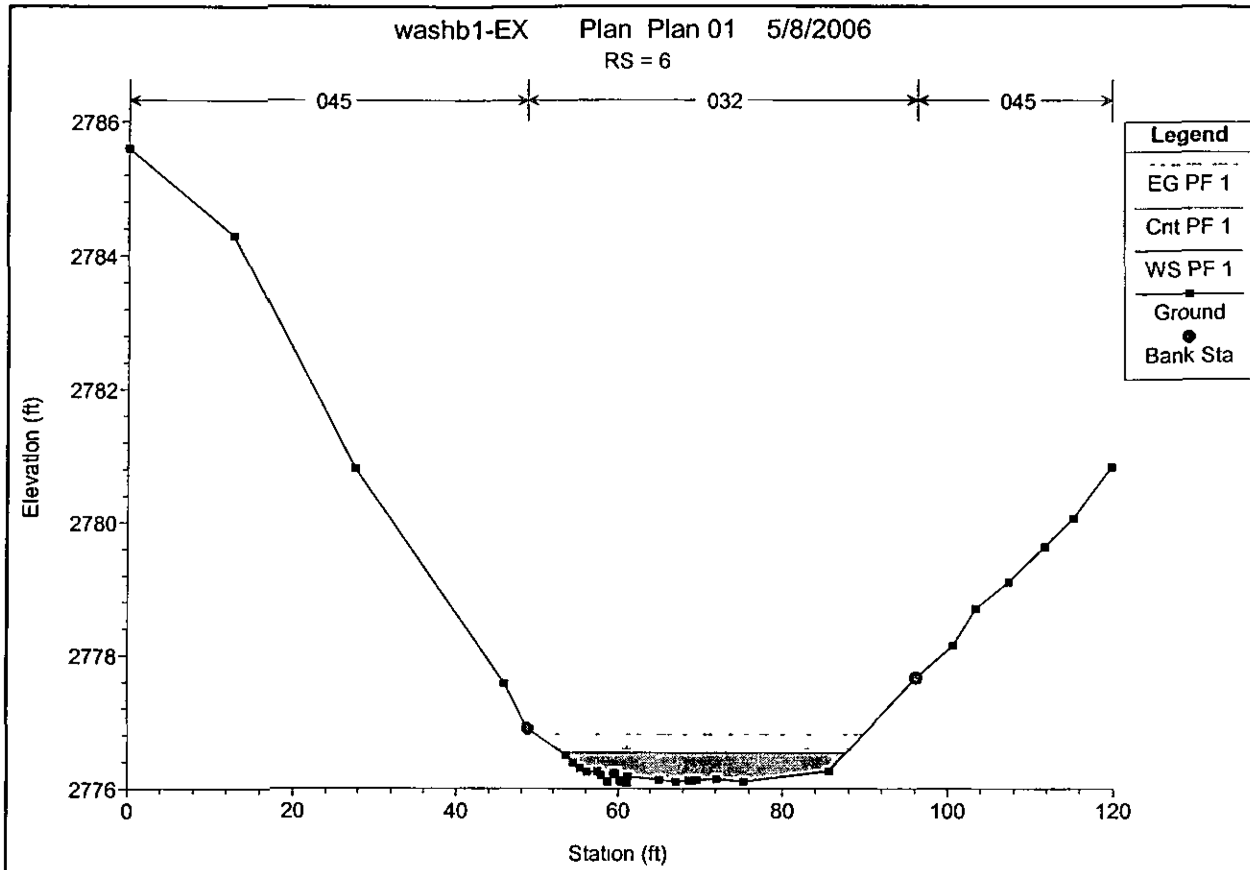

washb1-EX Plan Plan 01 5/8/2006
RS = 8
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2798
2797
2796
2795
2794
2793
2792
2791
2790
0
20
40
60
80
100
120



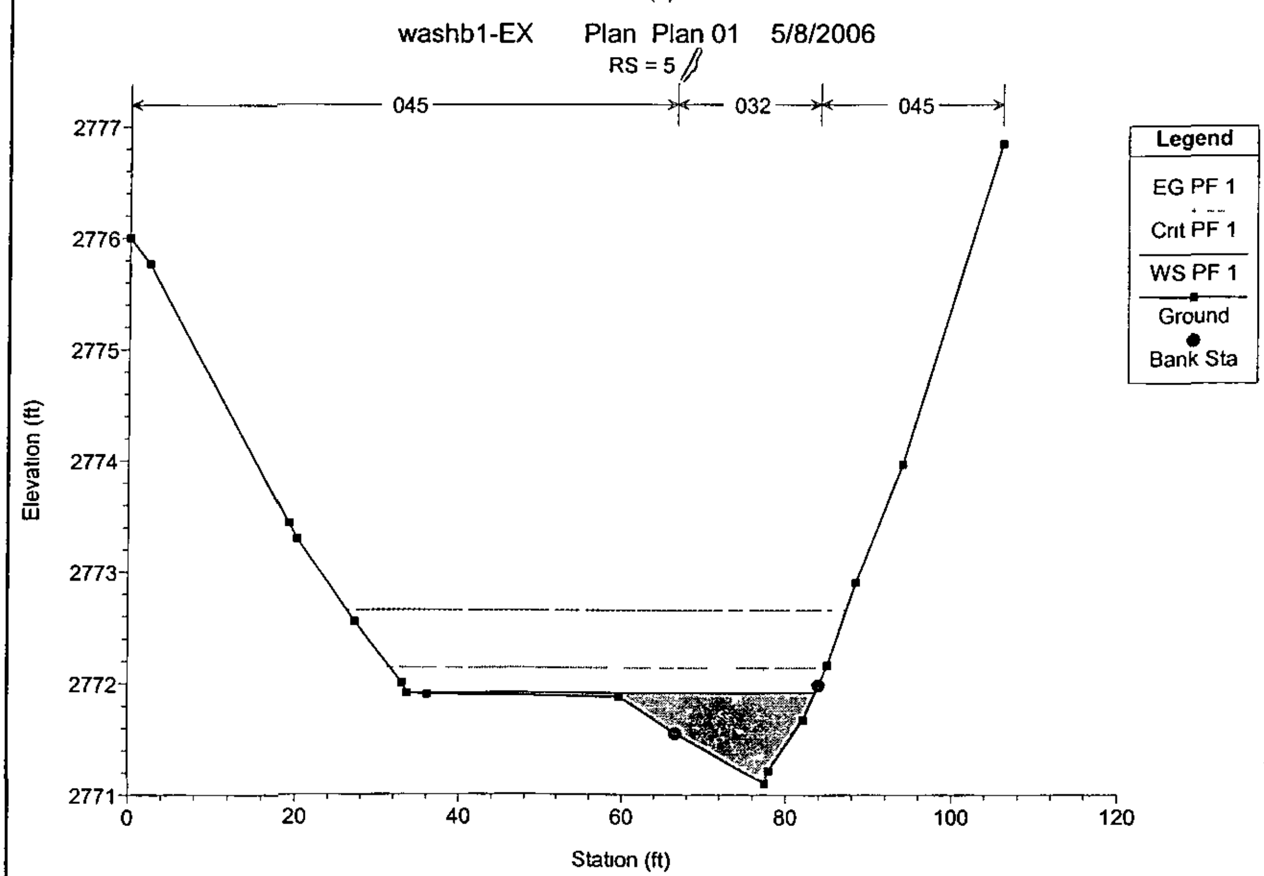
washb1-EX Plan Plan 01 5/8/2006
RS = 7
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2794
2792
2790
2788
2786
2784
0
50
100
150
200
250
Station (ft)



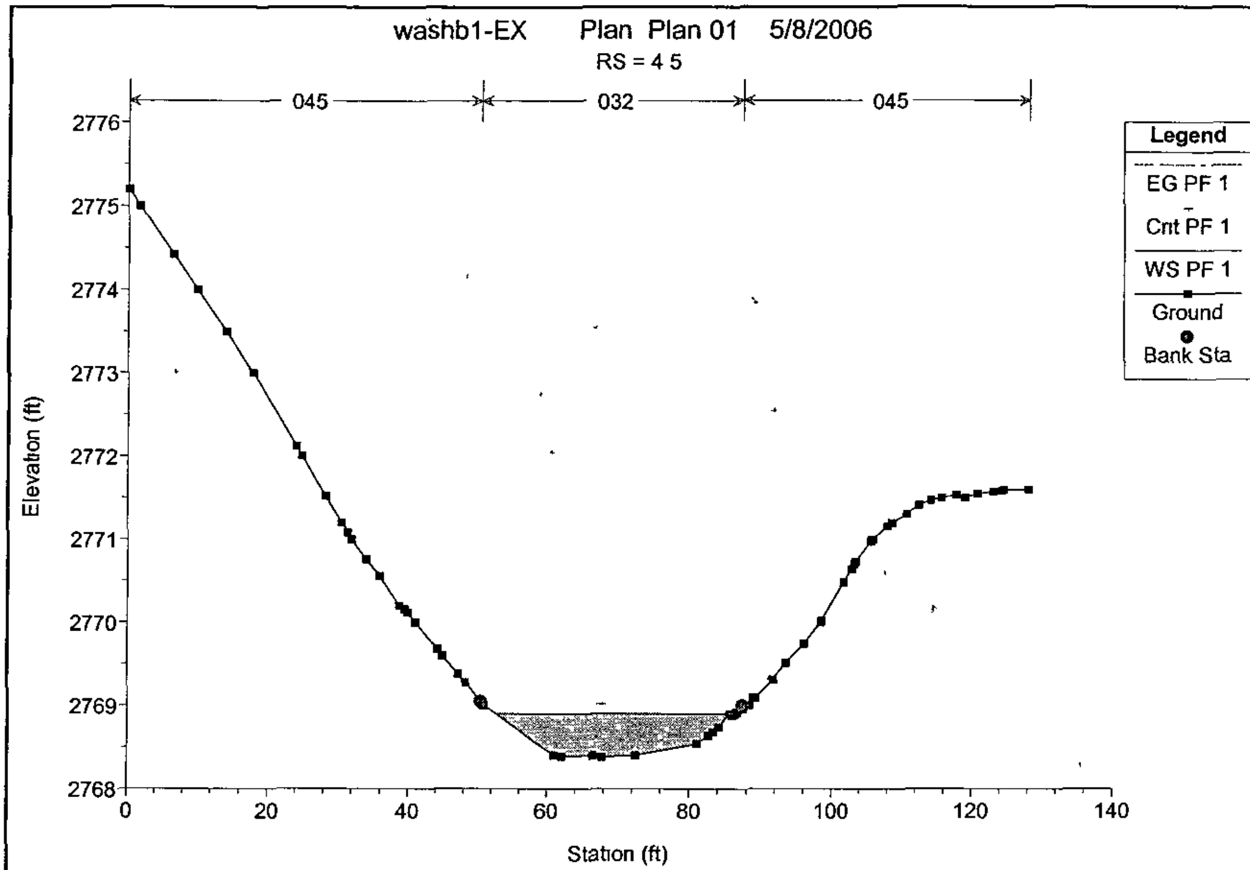
washb1-EX Plan Plan 01 5/8/2006
RS = 6 5
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2790
2788
2786
2784
2782
2780
0
20
40
60
80
100
120
140
160
Station (ft)

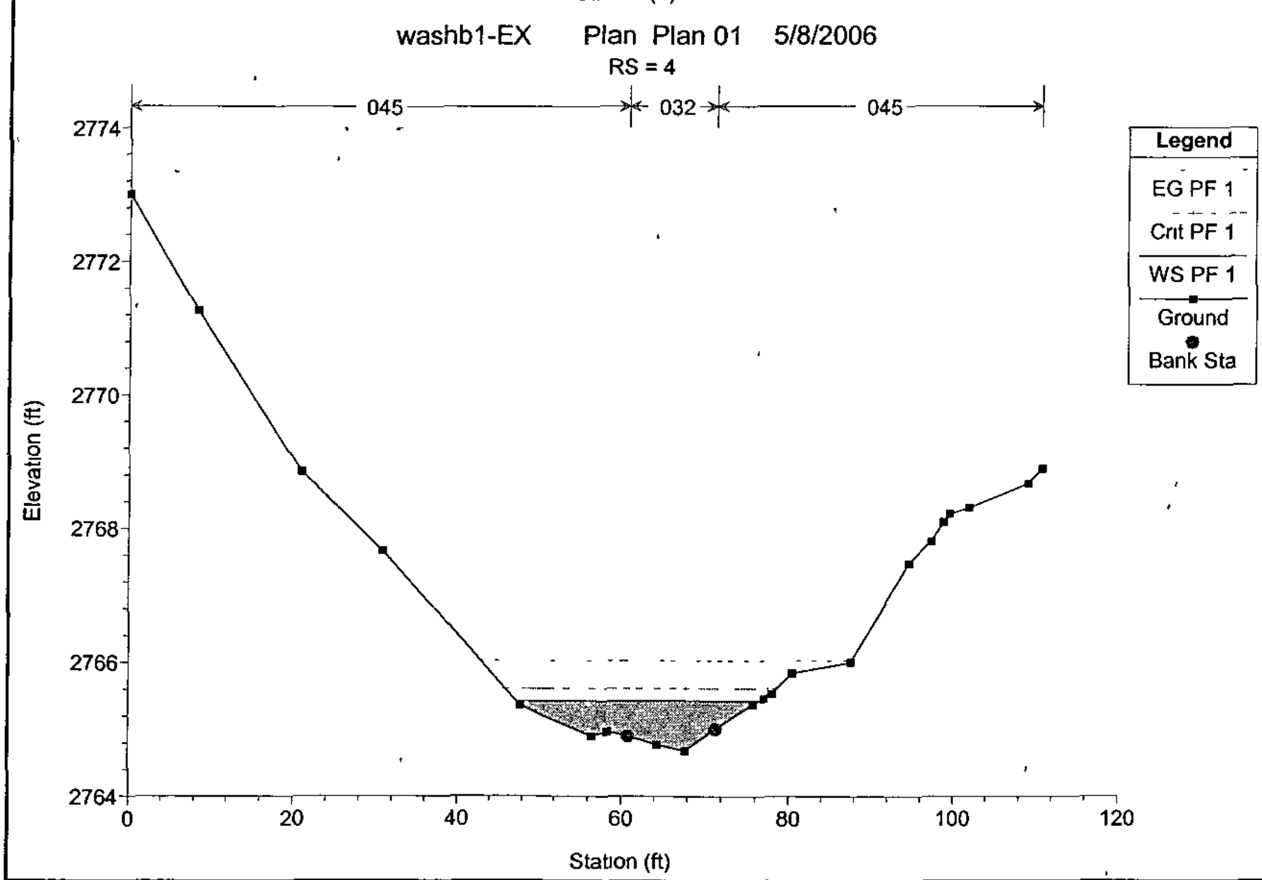


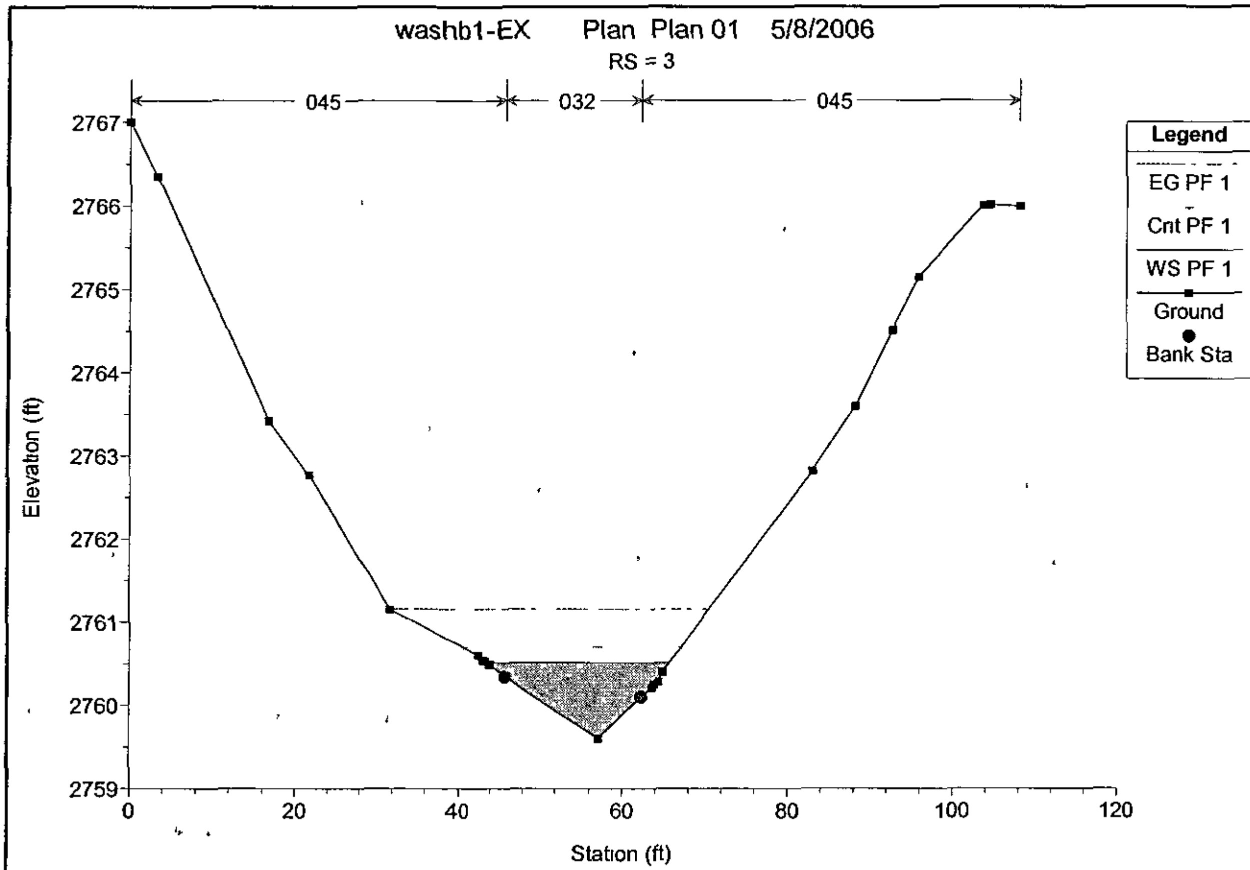
washb1-EX Plan Plan 01 5/8/2006
RS = 6
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2786
2784
2782
2780
2778
2776
0
20
40
60
80
100
120
Station (ft)



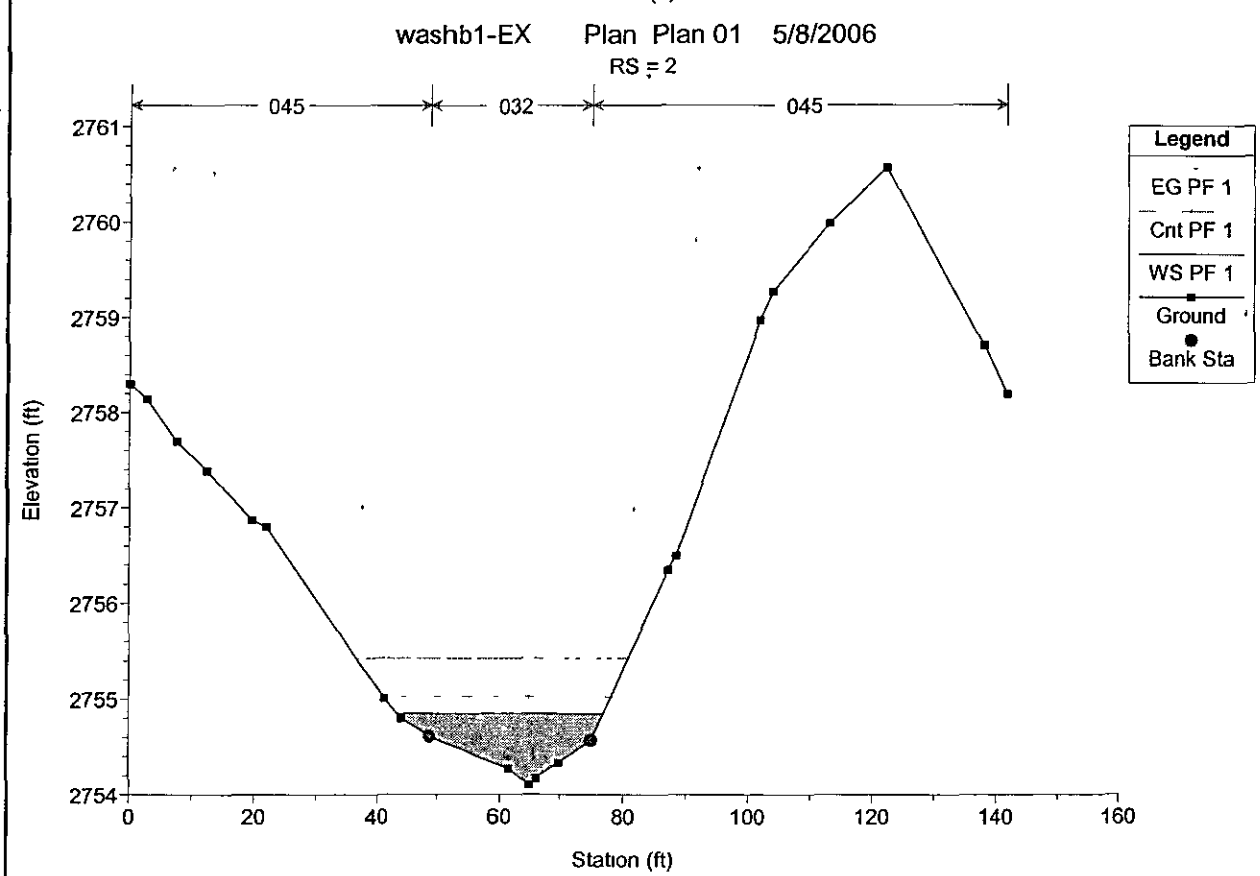
washb1-EX Plan Plan 01 5/8/2006
RS = 5
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2777
2776
2775
2774
2773
2772
2771
0
20
40
60
80
100
120
Station (ft)


washb1-EX Plan Plan 01 5/8/2006
RS = 4 5
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
Station (ft)
0
20
40
60
80
100
120
140

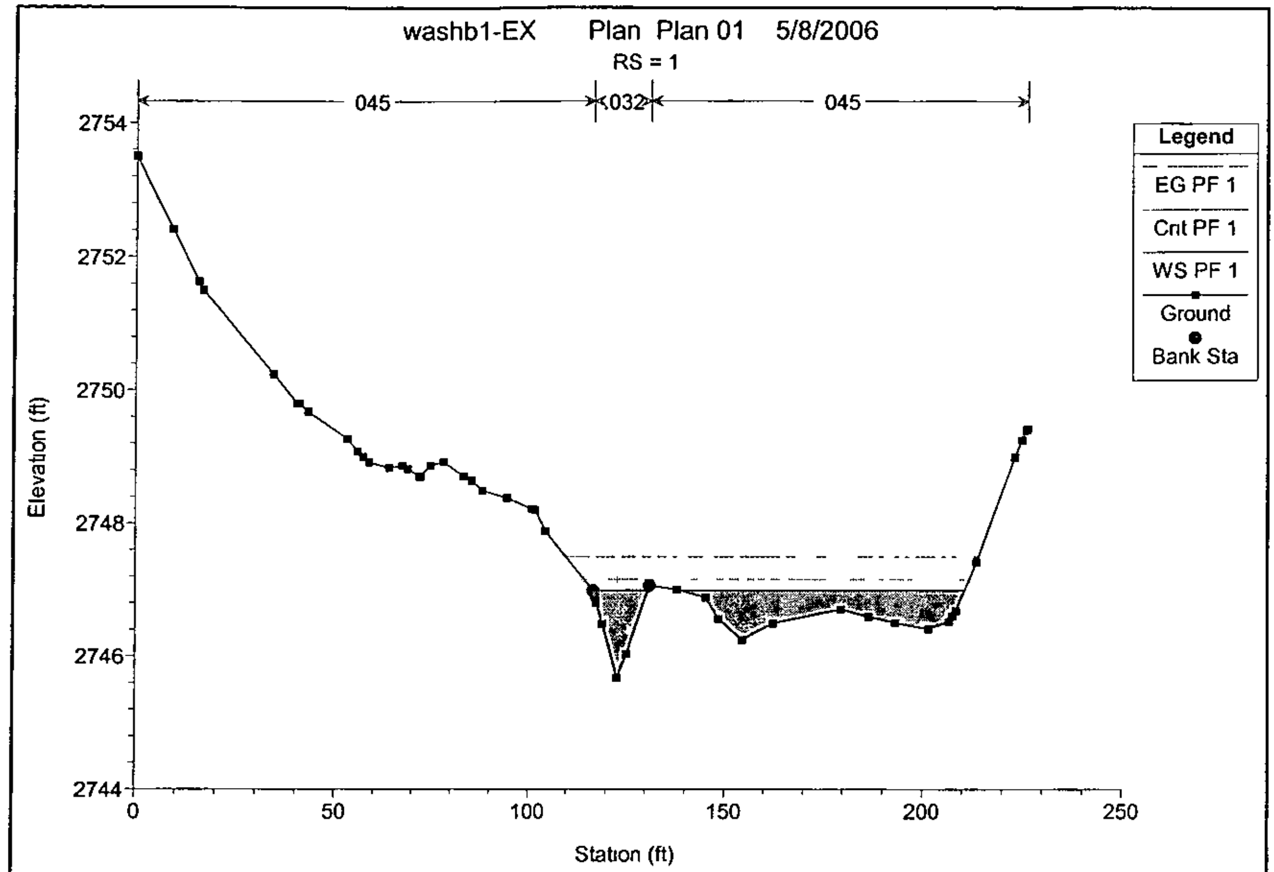

washb1-EX Plan Plan 01 5/8/2006
RS = 4
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2774
2772
2770
2768
2766
2764
Station (ft)
0
20
40
60
80
100
120



washb1-EX Plan Plan 01 5/8/2006
RS = 3
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2759
2760
2761
2762
2763
2764
2765
2766
2767
Station (ft)
0
20
40
60
80
100
120



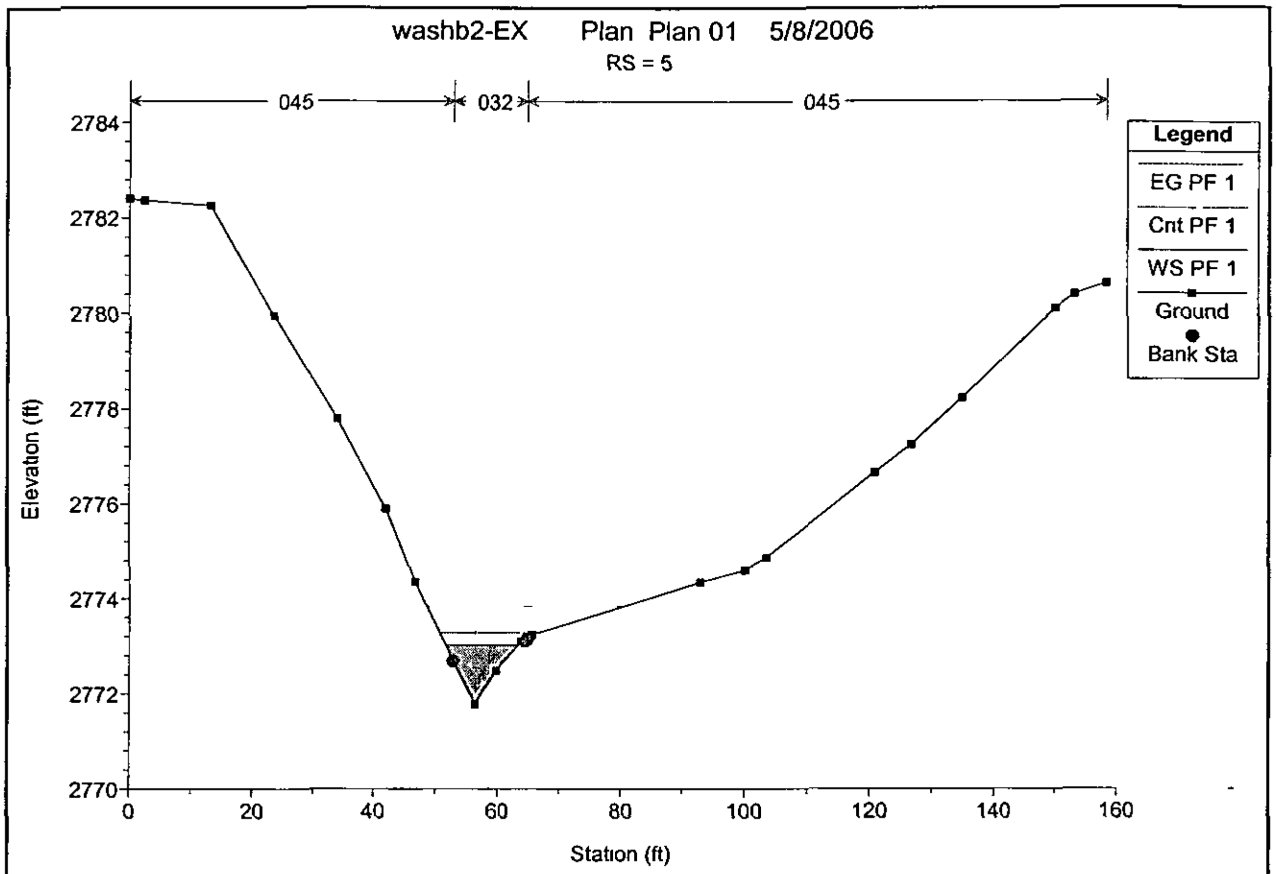
washb1-EX Plan Plan 01 5/8/2006
RS = 2
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2754
2755
2756
2757
2758
2759
2760
2761
Station (ft)
0
20
40
60
80
100
120
140
160

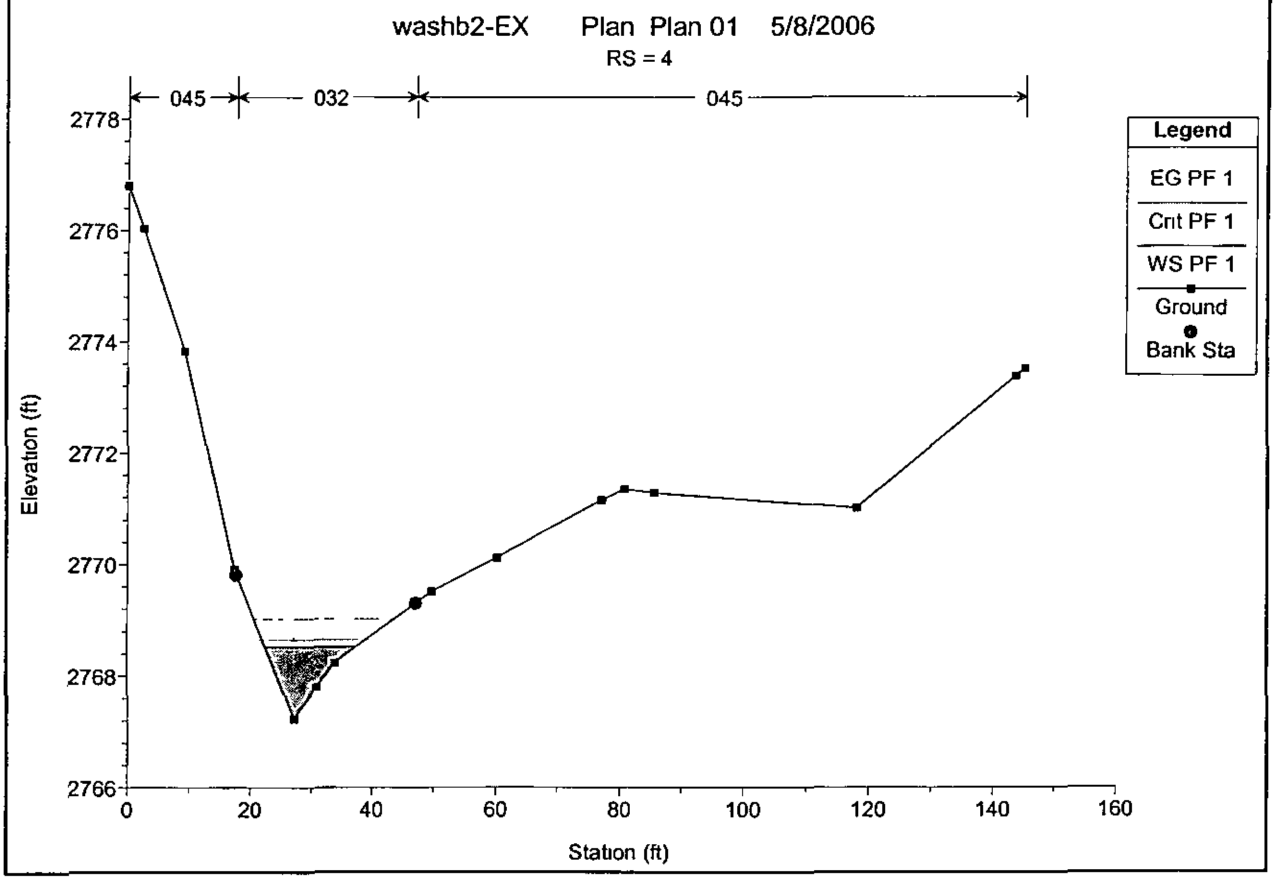

washb1-EX Plan Plan 01 5/8/2006
RS = 1
.045
.032
.045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2754
2752
2750
2748
2746
2744
0
50
100
150
200
250
Station (ft)

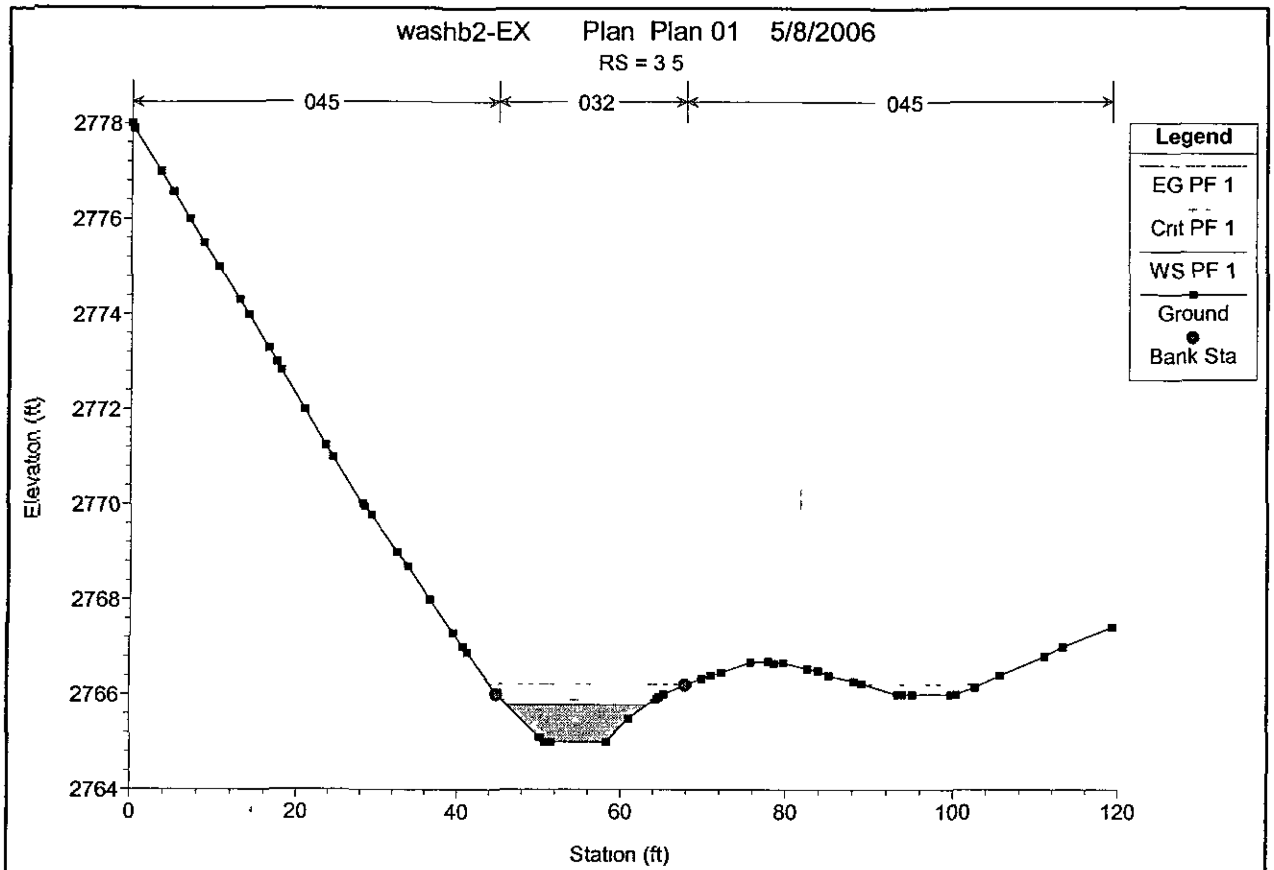
WASH B

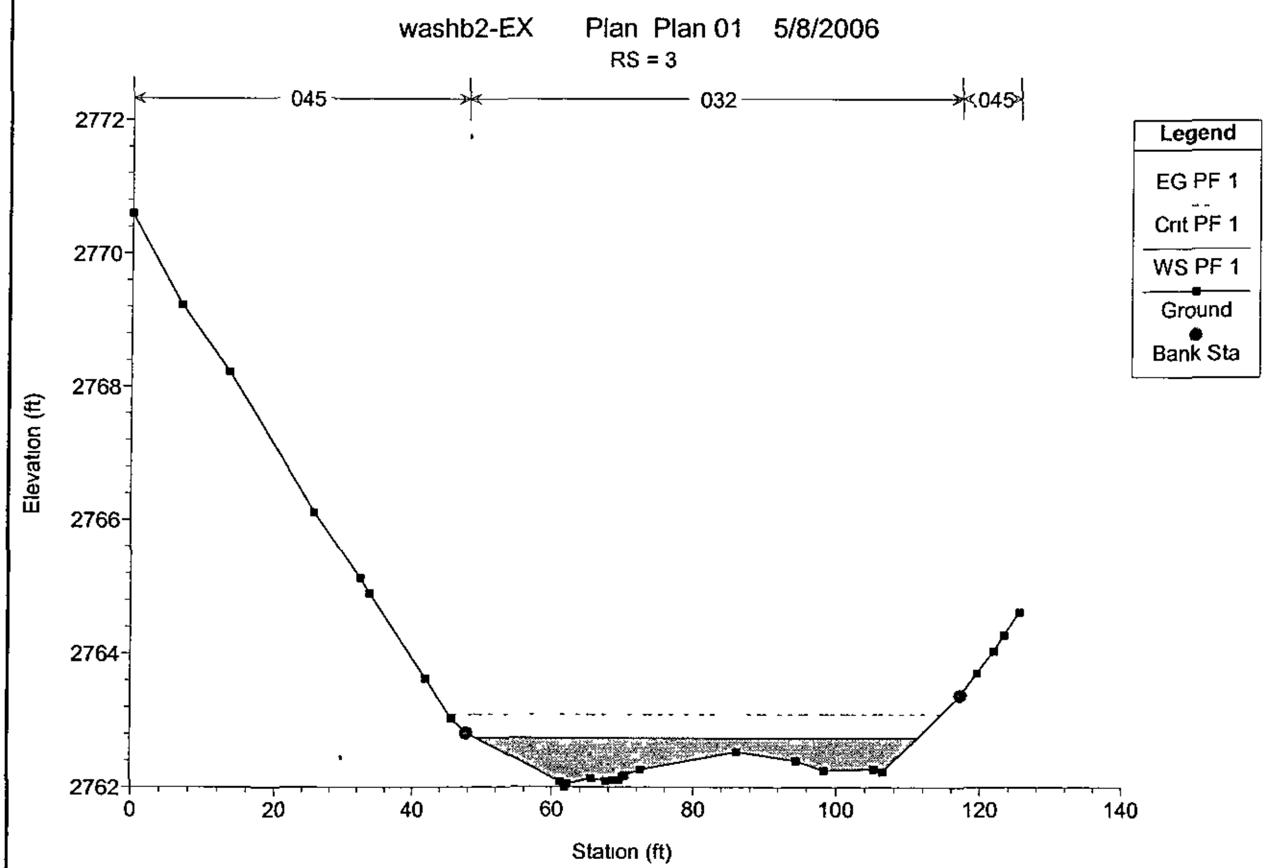
HEC-RAS Plan Plan 01 River RIVER 1 Reach Reach-1 Profile PF 1

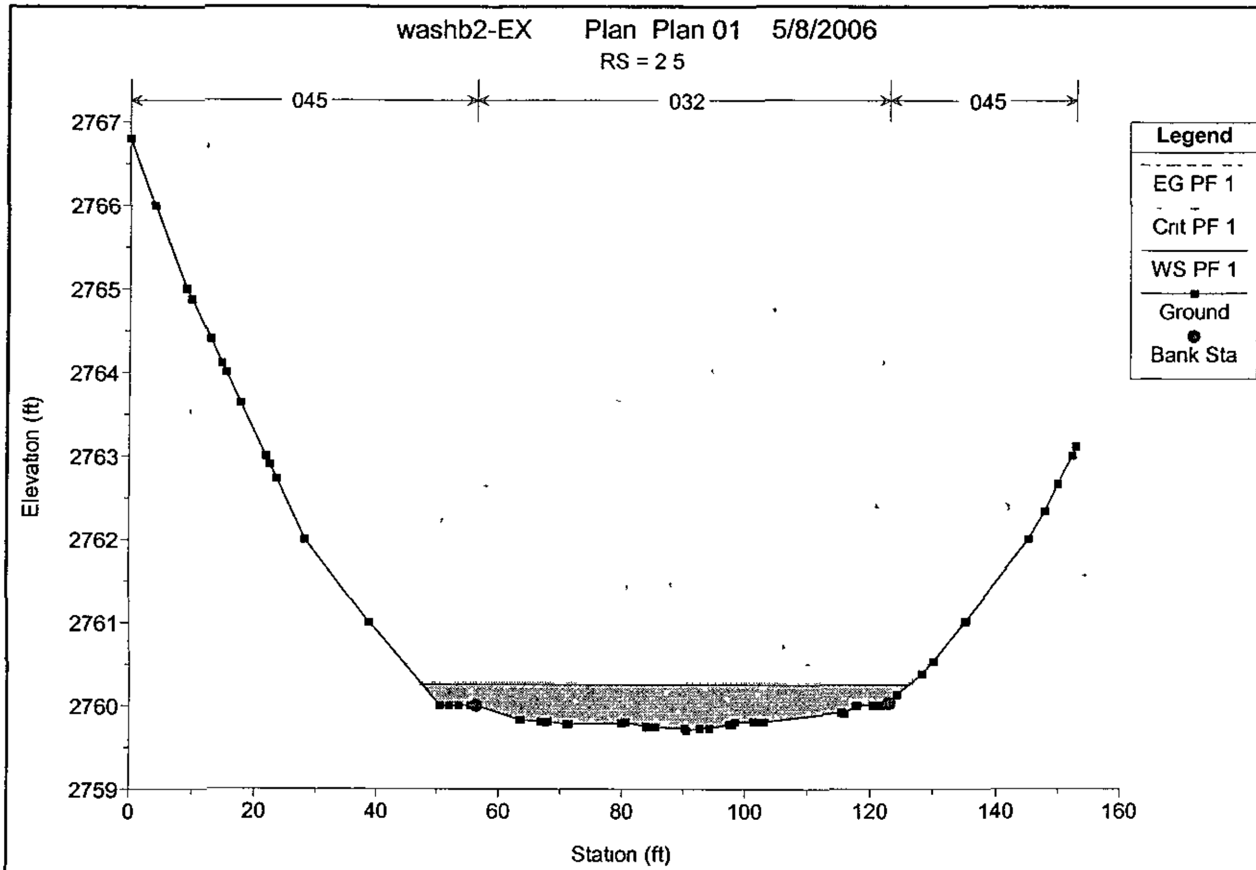
Reach	River Sta	Profile	Q Total	Min Ch El	W S Elev	Crit W S	E.G. Elev	E G Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	5	PF 1	50 00	2771 78	2773 02	2773 28	2773 84	0 045021	7 27	7 03	11 78	1 59
Reach-1	4	PF 1	50 00	2767 23	2768.51	2768 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	117 00	2762 00	2762 74	2762 82	2763 09	0 036286	4 76	24 56	62 10	1 33
Reach-1	2 5	PF 1	117 00	2759 70	2760 25	2760 28	2760 50	0 023772	4 03	30 32	78 68	1 09
Reach-1	2	PF 1	117 00	2755 39	2756 72	2757 05	2757 64	0 046277	7 69	15 28	24 82	1 69
Reach-1	1 5	PF 1	117 00	2753 00	2754 53	2754 78	2755 29	0 022422	8 31	22 76	37 34	1 27
Reach-1	1	PF 1	192 00	2745 67	2747 00	2747 15	2747 47	0 044213	7 46	40 39	87 15	1 59

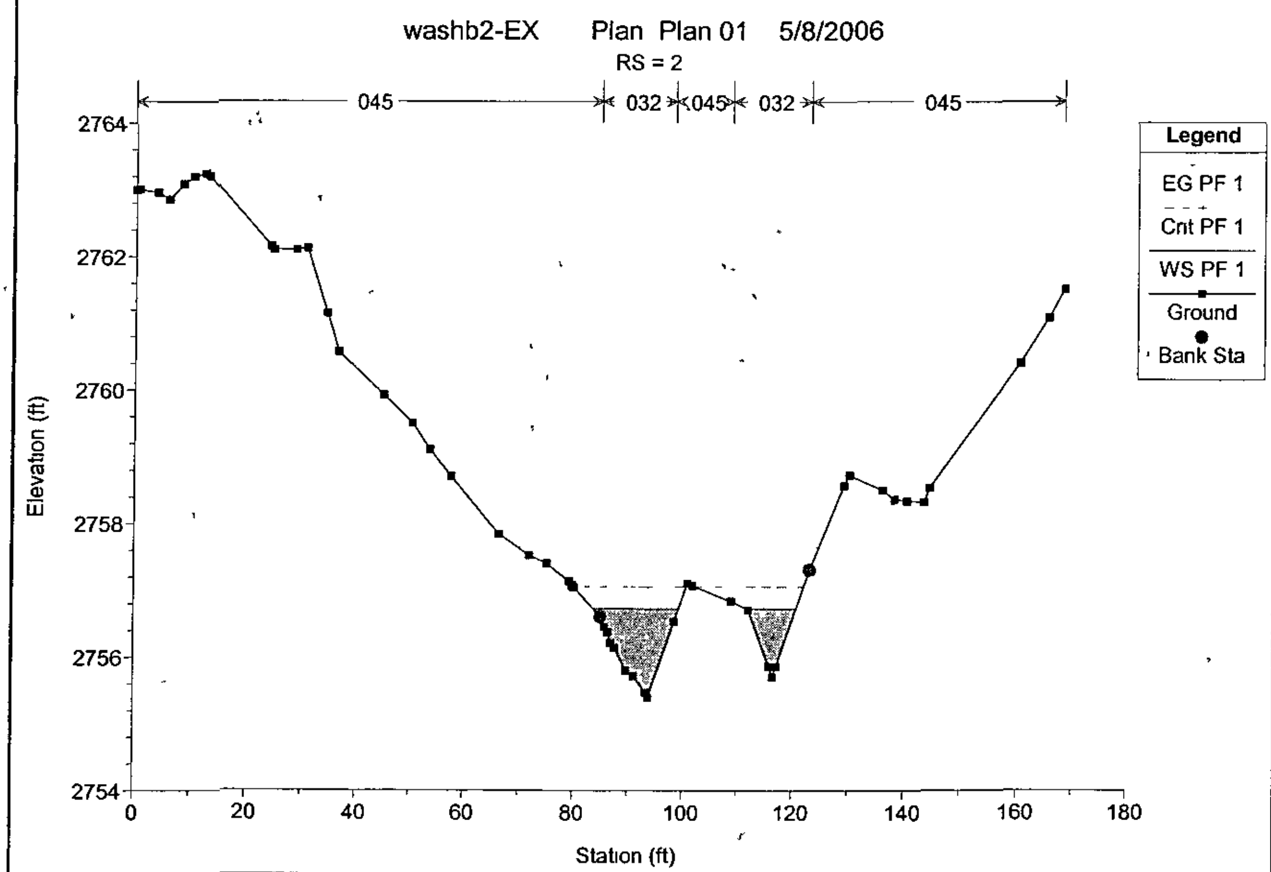

washb2-EX Plan Plan 01 5/8/2006
RS = 5
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2770
2772
2774
2776
2778
2780
2782
2784
0
20
40
60
80
100
120
140
160

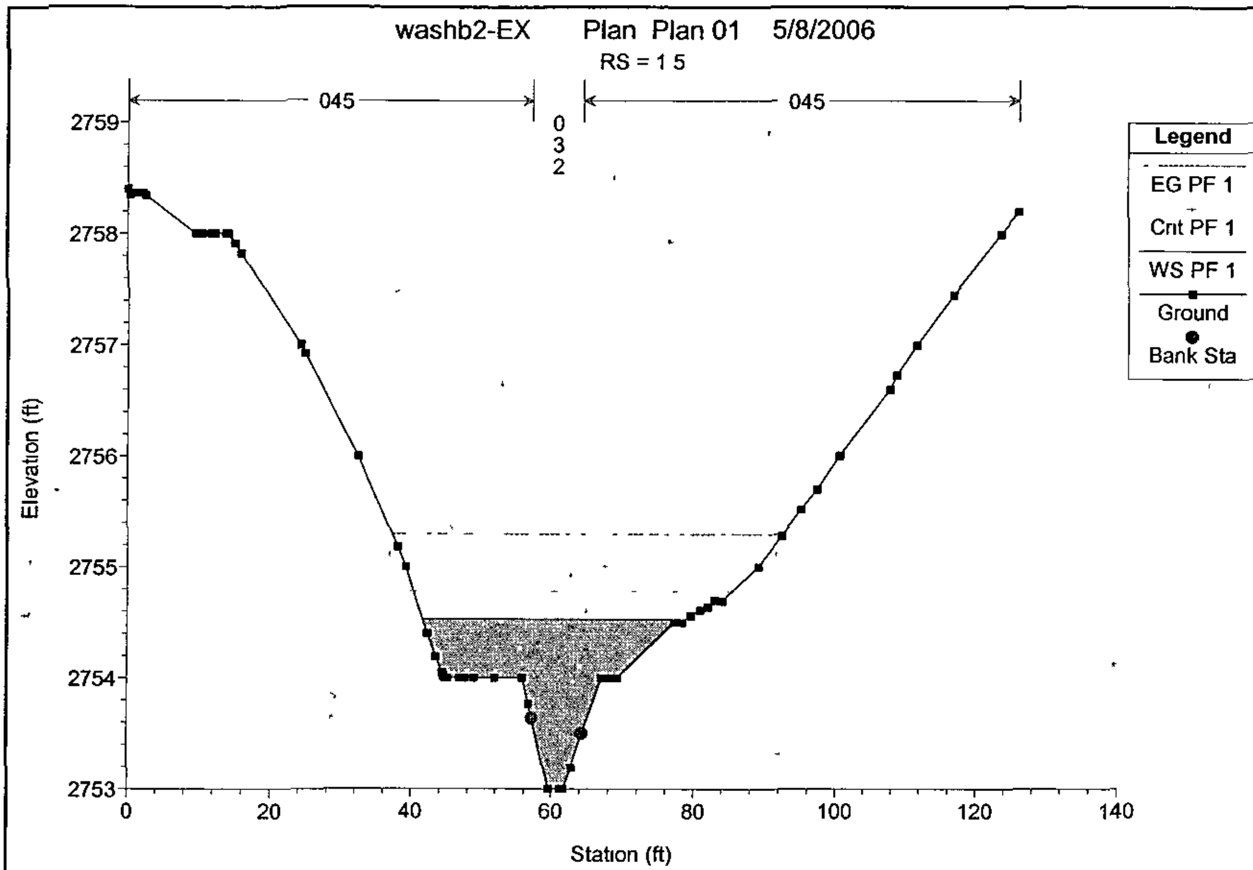

washb2-EX Plan Plan 01 5/8/2006
RS = 4
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2766
2768
2770
2772
2774
2776
2778
0
20
40
60
80
100
120
140
160

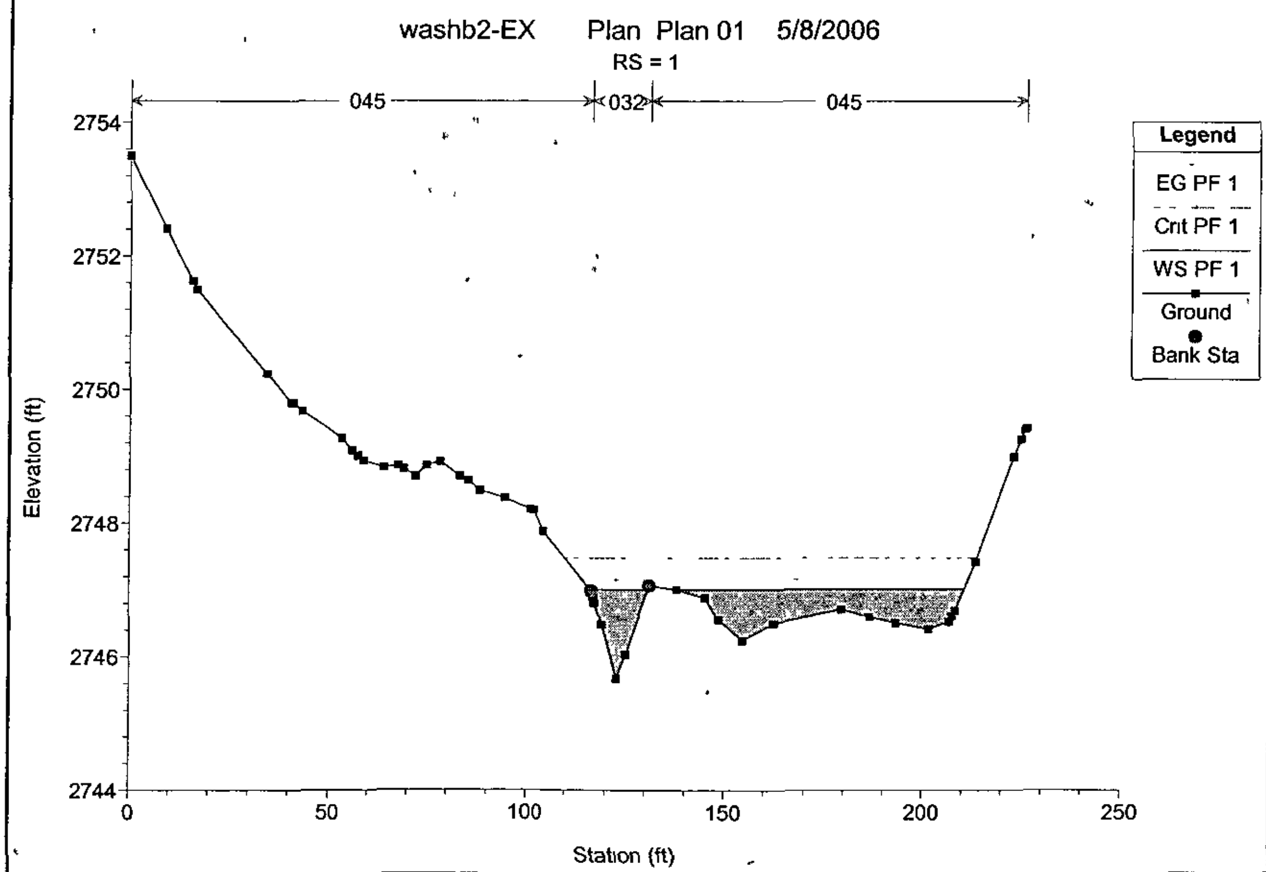

washb2-EX Plan Plan 01 5/8/2006
RS = 3 5
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


washb2-EX Plan Plan 01 5/8/2006
RS = 3
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


washb2-EX Plan Plan 01 5/8/2006
RS = 2 5
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


washb2-EX Plan Plan 01 5/8/2006
RS = 2
045
032
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

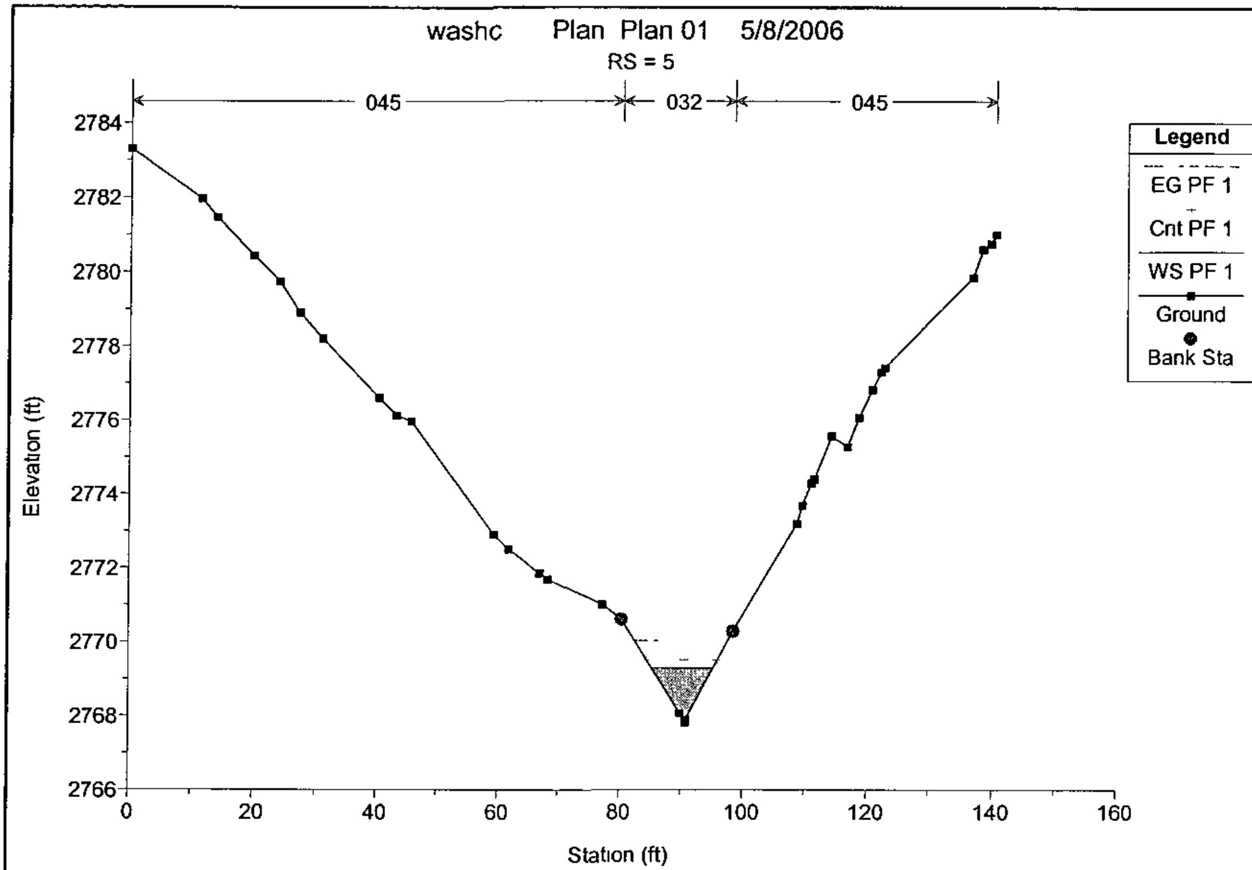

washb2-EX Plan Plan 01 5/8/2006
RS = 1 5
045
0
3
2
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2759
2758
2757
2756
2755
2754
2753
0
20
40
60
80
100
120
140
Station (ft)


washb2-EX Plan Plan 01 5/8/2006
RS = 1
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2754
2752
2750
2748
2746
2744
0
50
100
150
200
250
Station (ft)

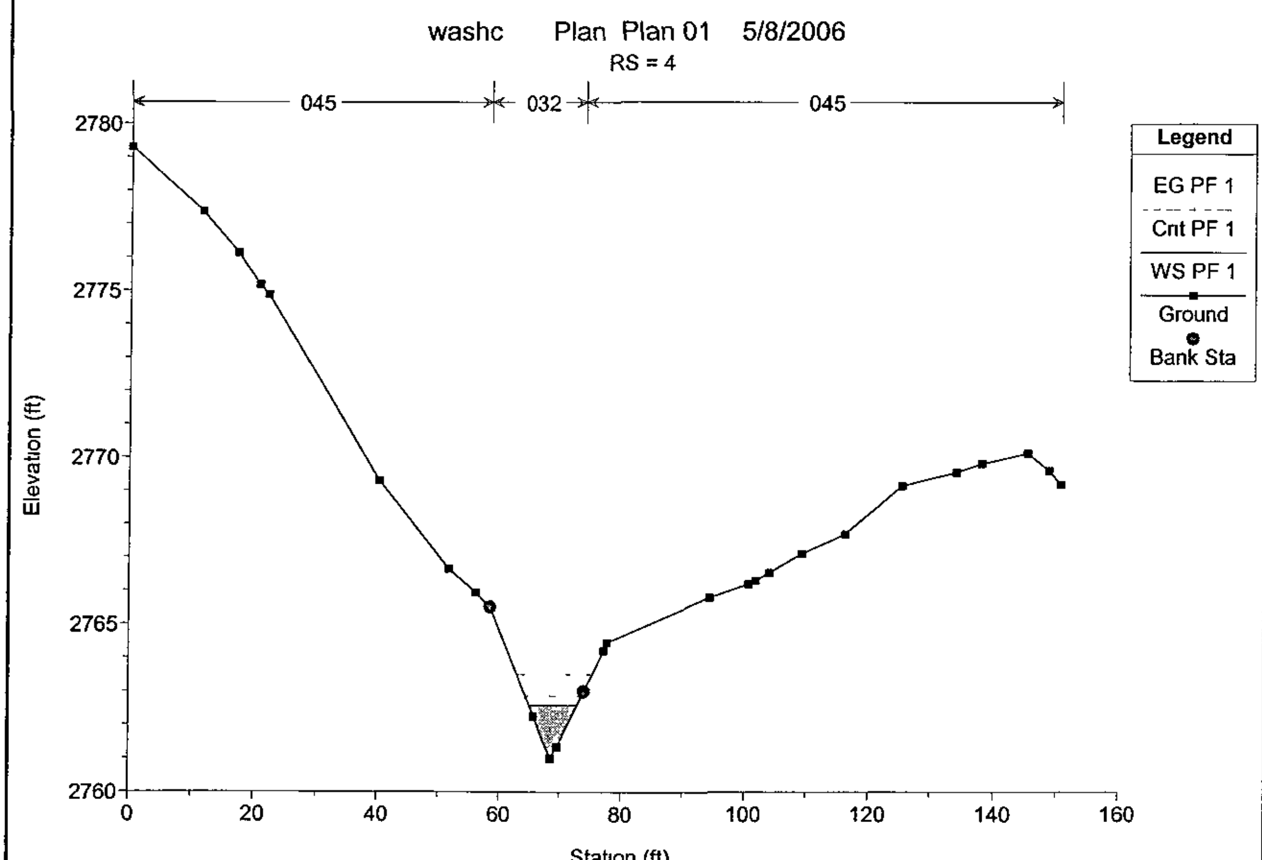
WASH C

HEC-RAS Plan Plan 01 River RIVER-1 Reach Reach-1 Profile PF 1

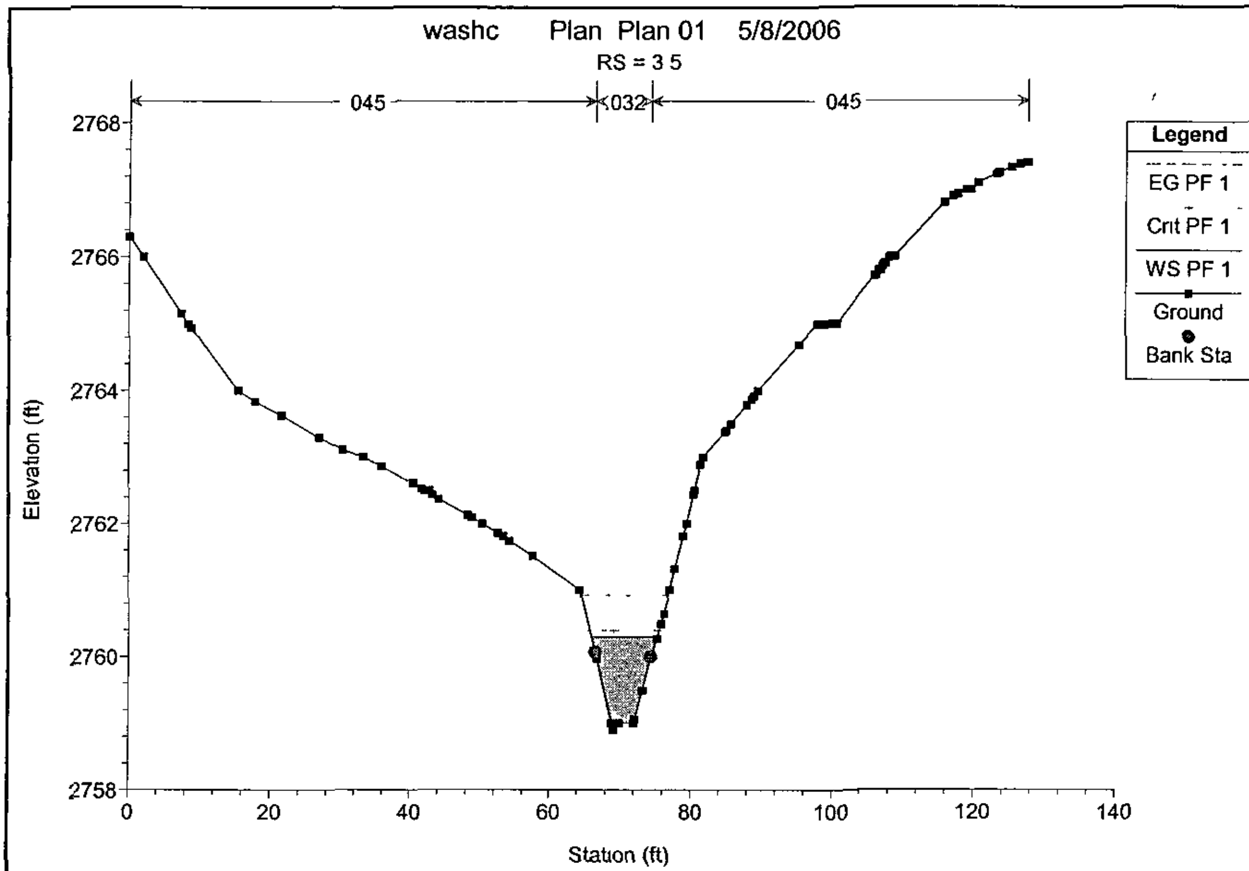
Reach	River Sta	Profile	Q Total	Min Ch El	W S Elev	Crit W S	E.G Elev	E.G Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	5	PF 1	50 00	2767 82	2769 29	2769 50	2770 03	0 036028	6 90	7 25	10 04	1 43
Reach-1	4	PF 1	50 00	2761 00	2762.59	2762 87	2763 50	0 039393	7 65	6 54	8 03	1 49
Reach 1	3 5	PF 1	50 00	2758 90	2760 30	2760 39	2760 92	0 019976	6 32	8 08	9 29	1 11
Reach-1	3	PF 1	65 00	2755 68	2757 04	2757 41	2758 20	0 059581	8 65	7 52	11 30	1 84
Reach-1	2	PF 1	65 00	2749 90	2751 82	2751 88	2752 40	0 019726	6 09	10 67	11 11	1 10
Reach-1	1 5	PF 1	65 00	2748 00	2748 96	2749 27	2749 92	0 058207	7 87	8 26	13 81	1 79
Reach-1	1	PF 1	85 00	2743 99	2745 62	2745 79	2746 33	0 026155	6 77	12 64	15 95	1 28



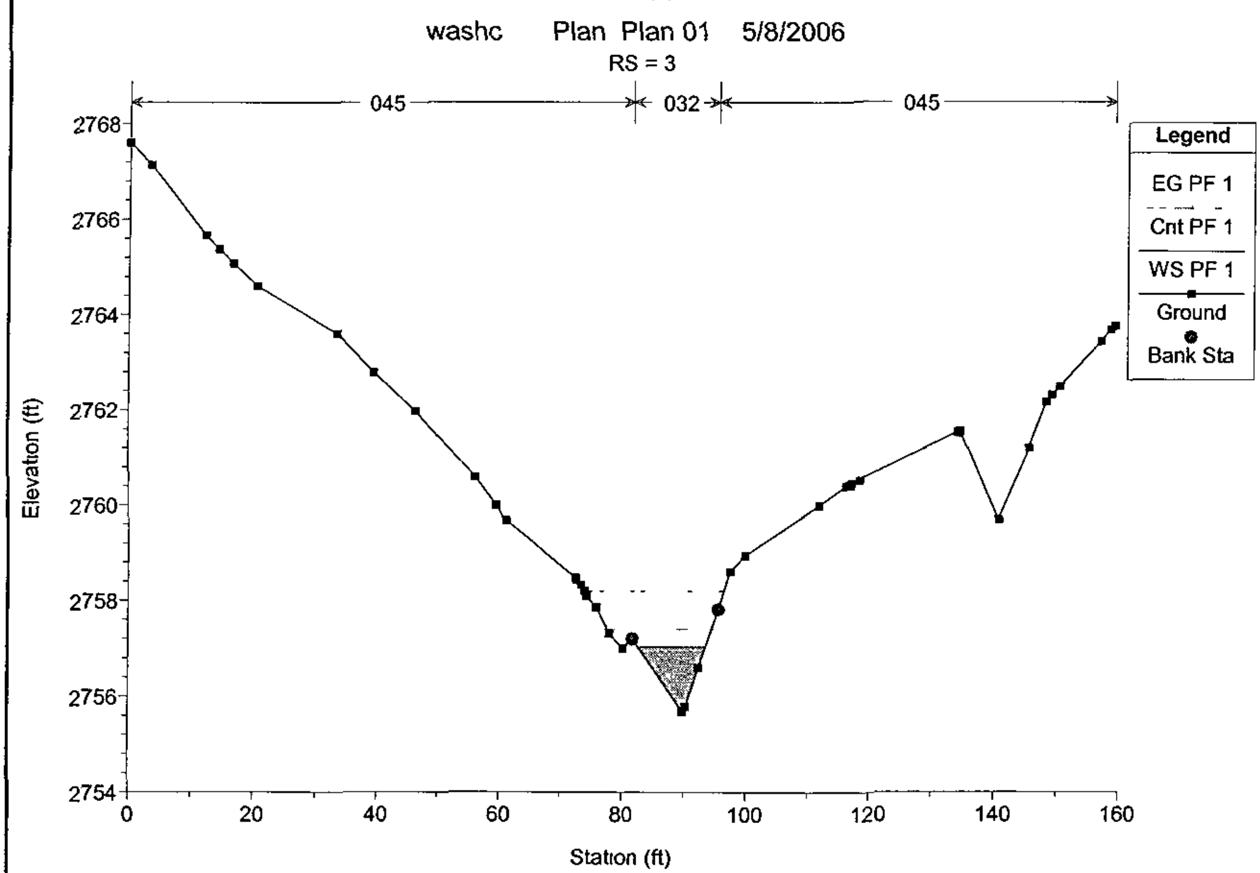
washc Plan Plan 01 5/8/2006
RS = 5
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2784
2782
2780
2778
2776
2774
2772
2770
2768
2766
0
20
40
60
80
100
120
140
160



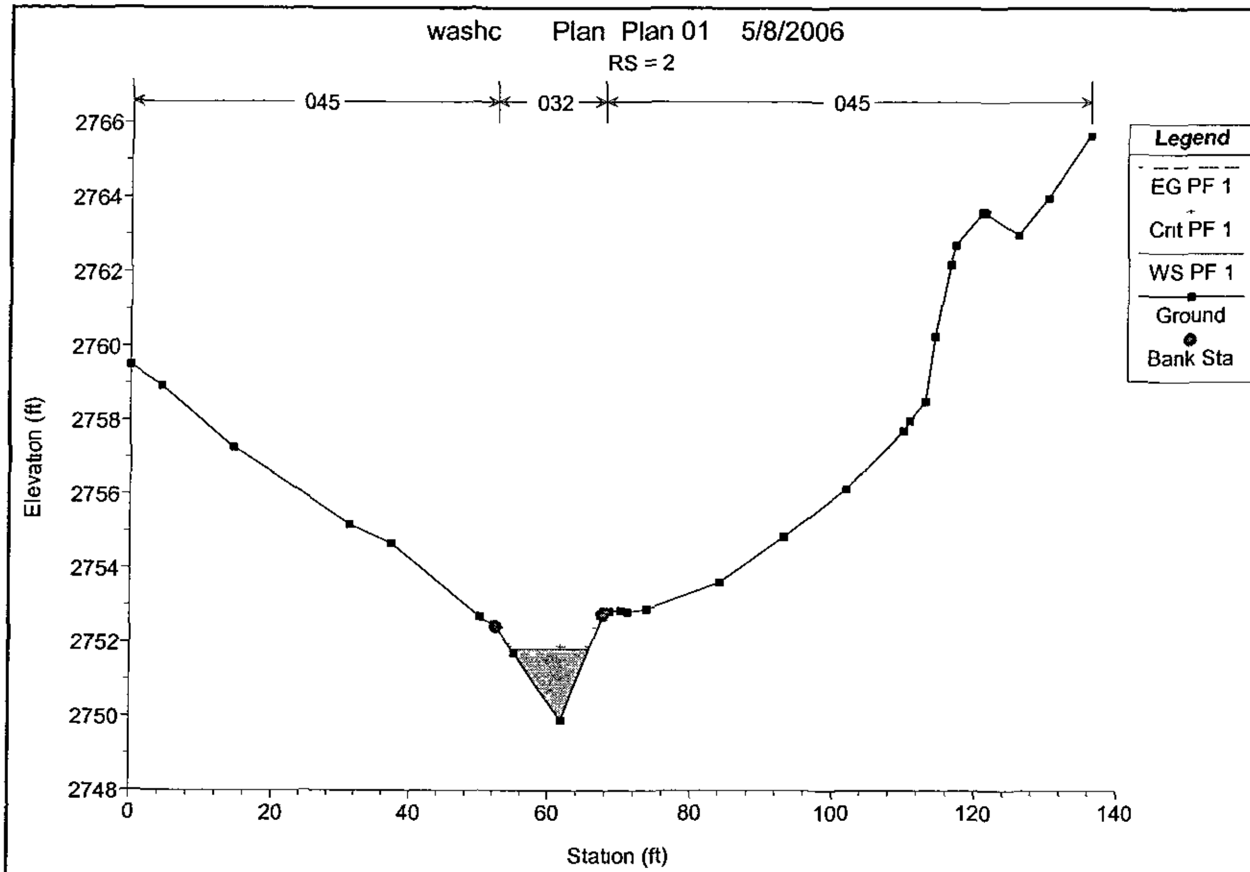
washc Plan Plan 01 5/8/2006
RS = 4
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2780
2775
2770
2765
2760
0
20
40
60
80
100
120
140
160

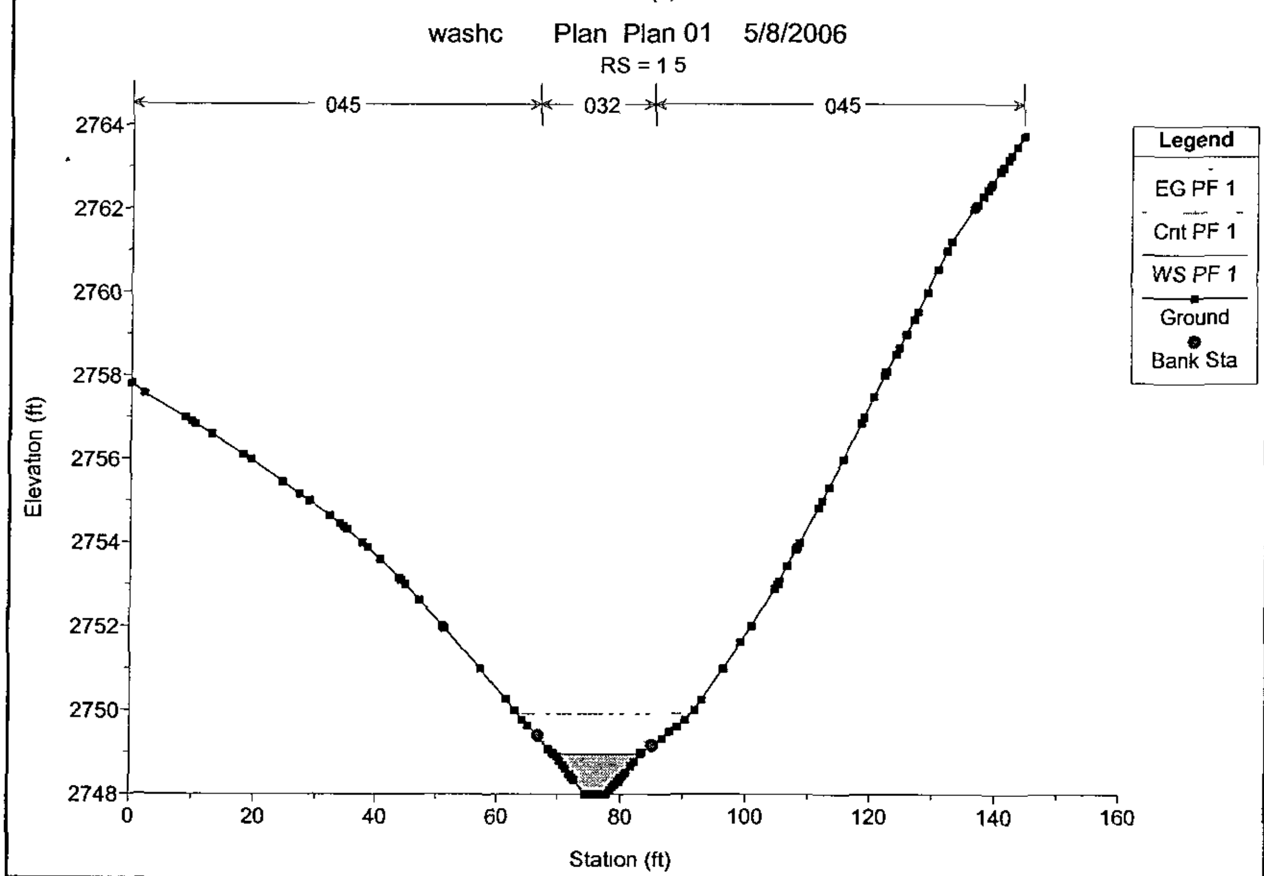


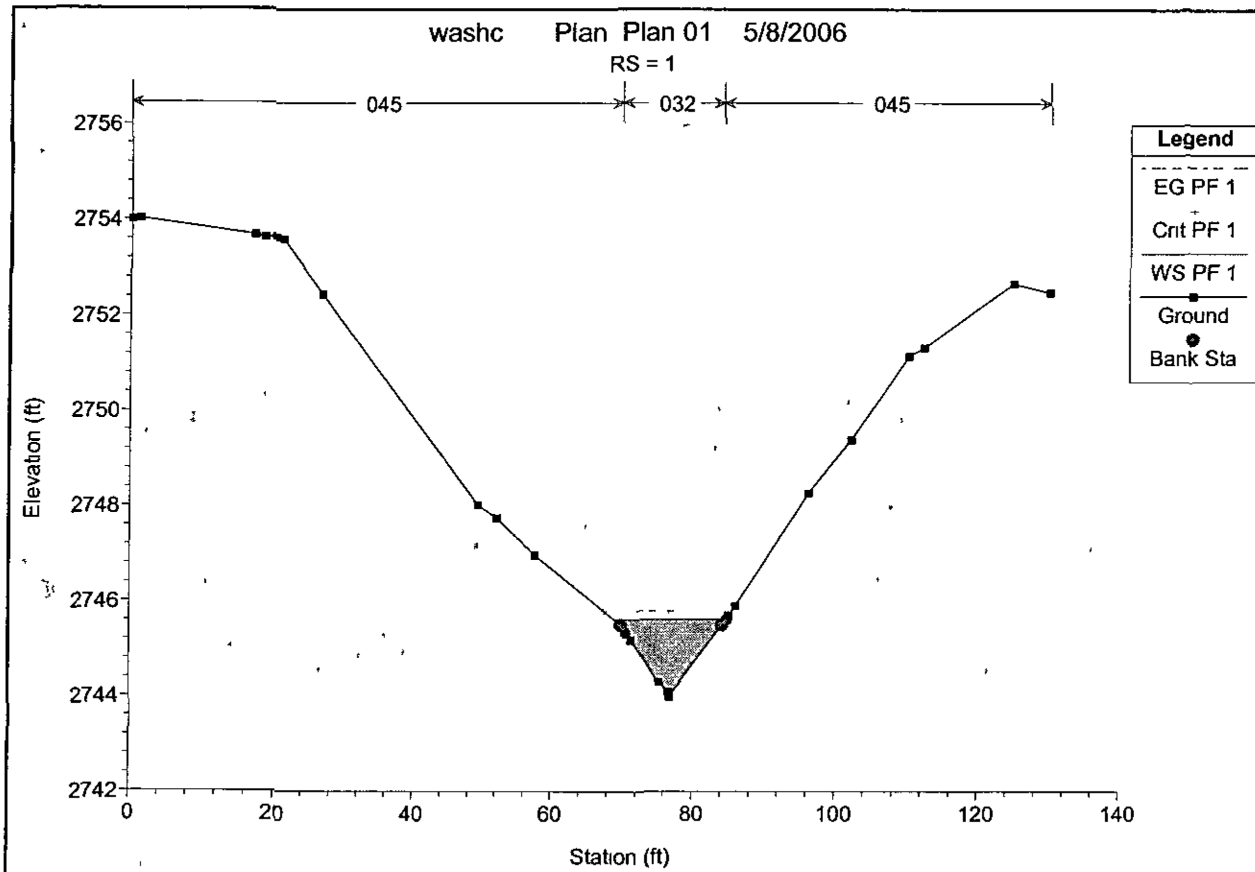
washc Plan Plan 01 5/8/2006
RS = 3 5
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2758
2760
2762
2764
2766
2768
0
20
40
60
80
100
120
140



washc Plan Plan 01 5/8/2006
RS = 3
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
2768
0
20
40
60
80
100
120
140
160


washc Plan Plan 01 5/8/2006
RS = 2
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

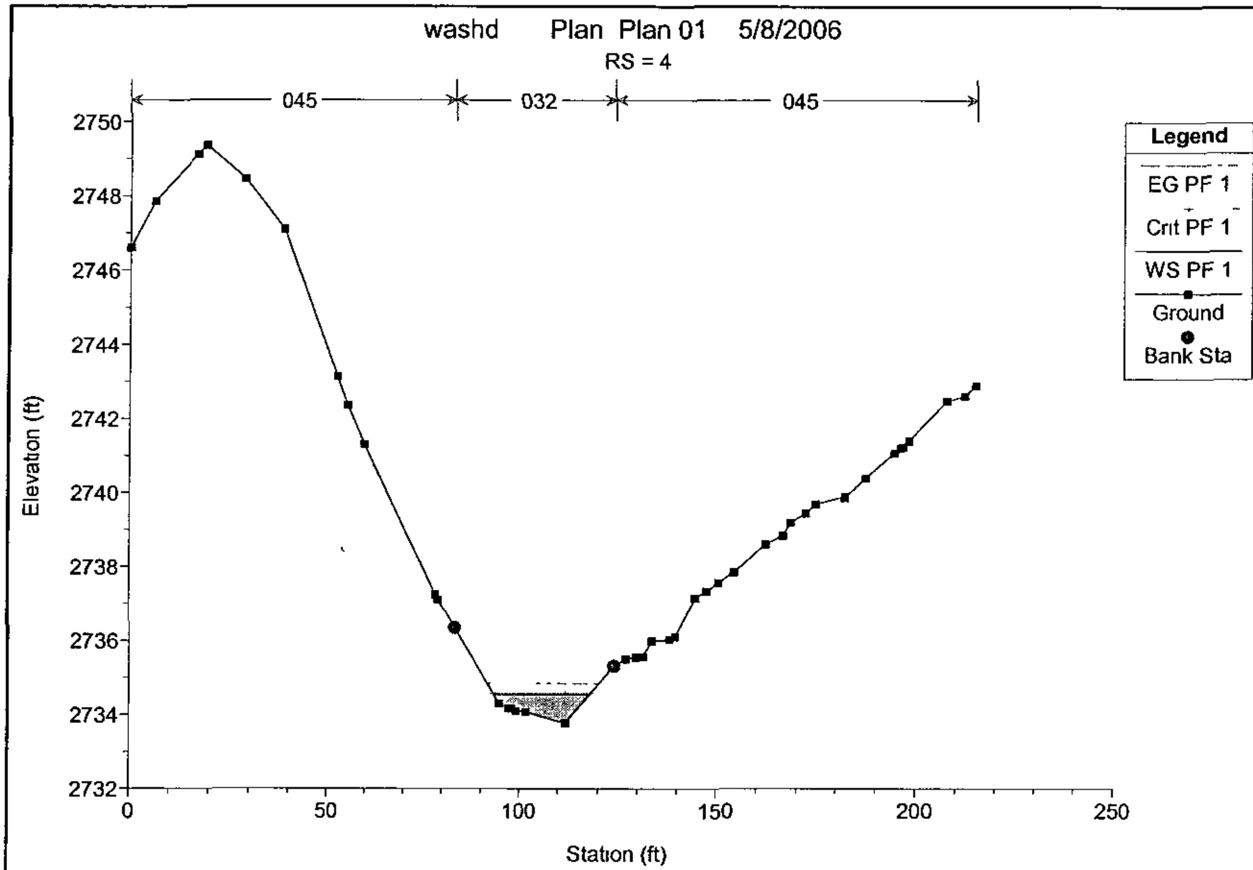

washc Plan Plan 01 5/8/2006
RS = 1 5
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

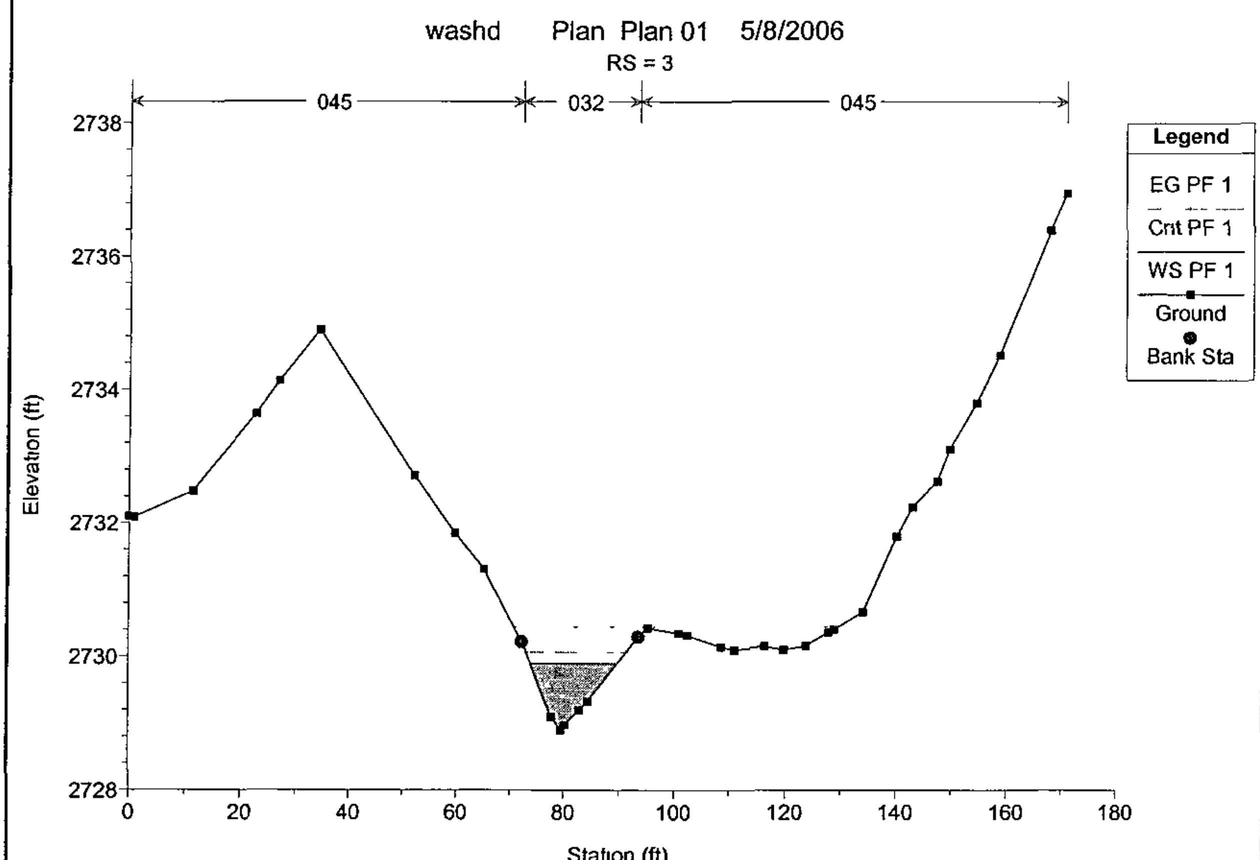

washc Plan Plan 01 5/8/2006
RS = 1
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2756
2754
2752
2750
2748
2746
2744
2742
Station (ft)
0
20
40
60
80
100
120
140

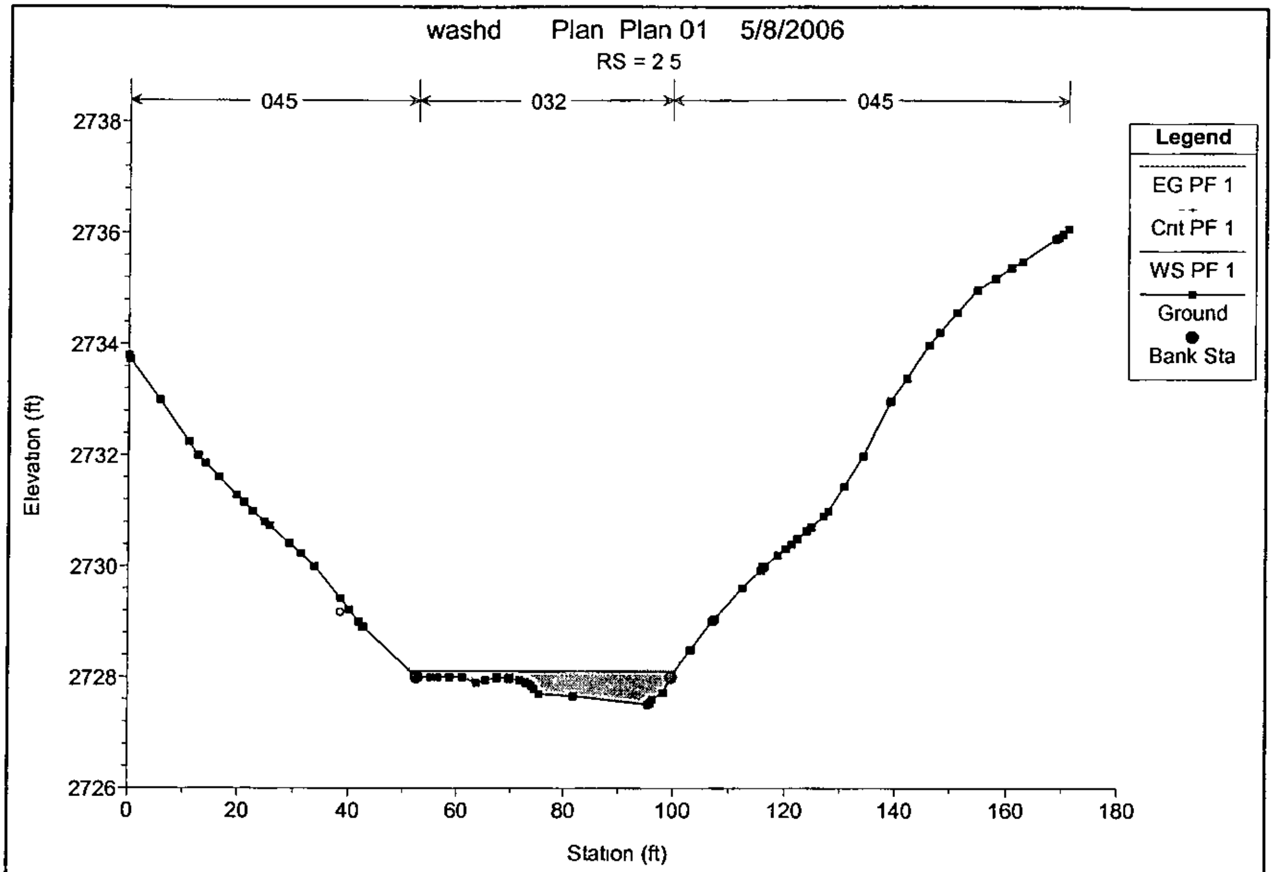
WASH D

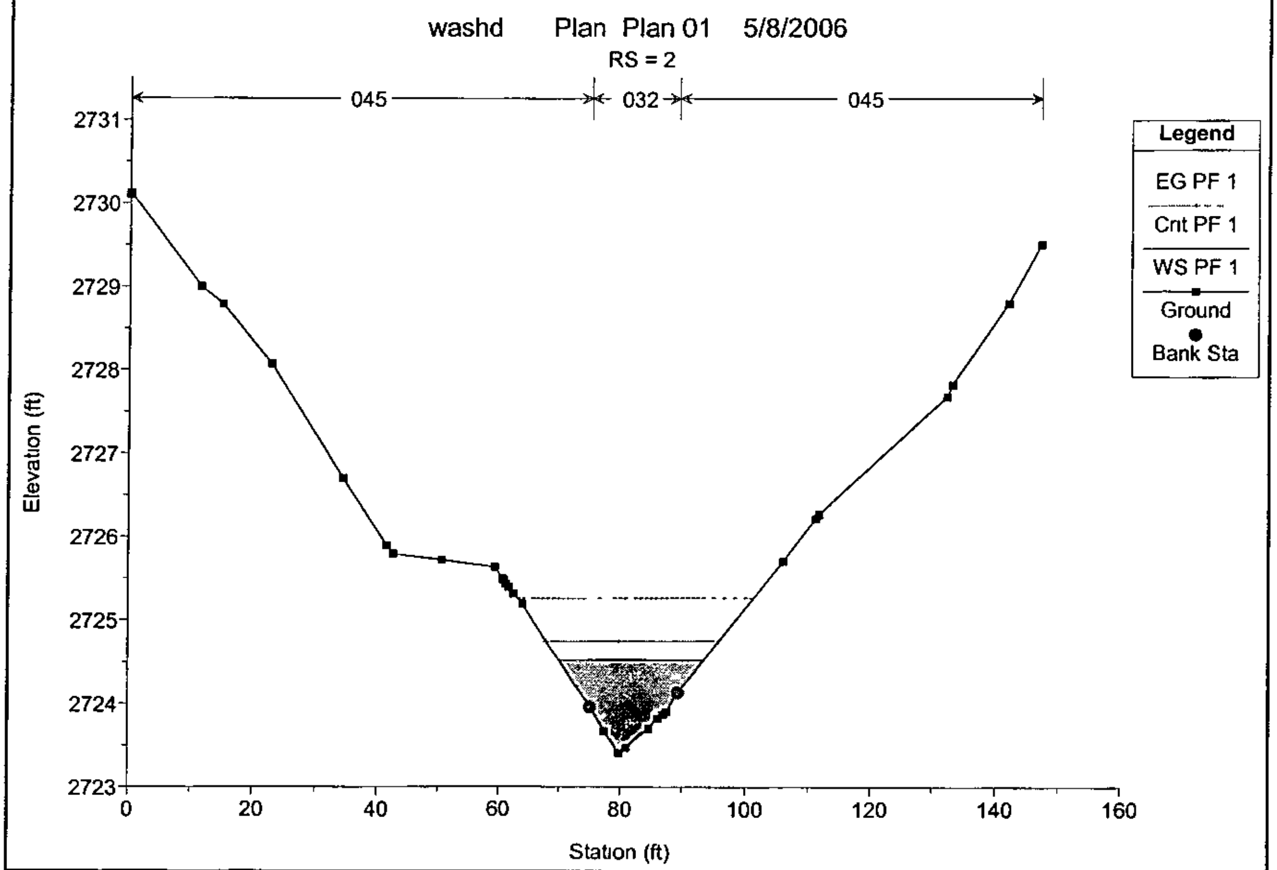
HEC-RAS Plan Plan 01 River RIVER 1 Reach Reach-1 Profile PF 1

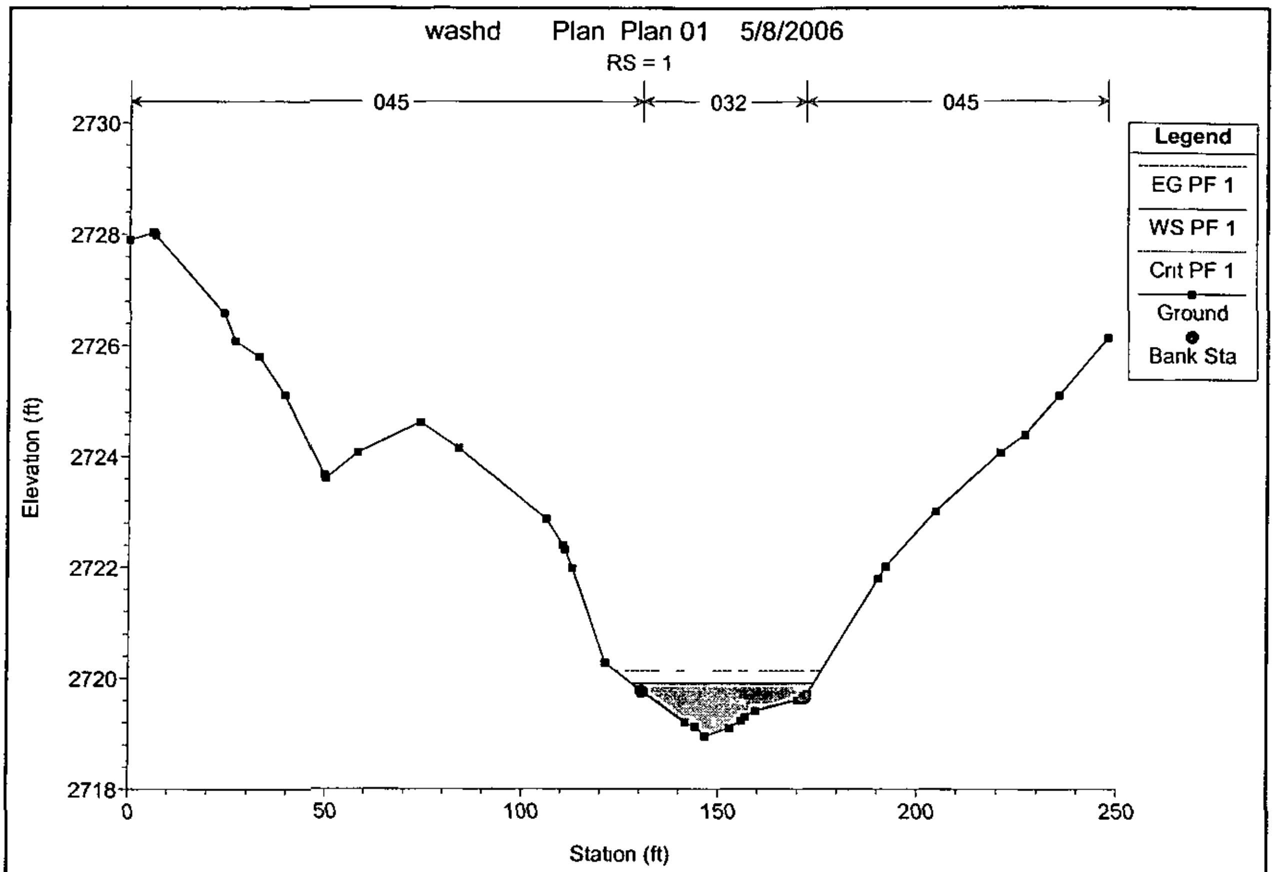
Reach	River Sta	Profile	Q Total	Min Ch El	W S Elev	Crit W S	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	4	PF 1	50 00	2733 77	2734 54	2734 58	2734 84	0 025006	4 39	11 38	24 53	1 14
Reach-1	3	PF 1	50 00	2728 90	2729 90	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	88 00	2723 41	2724 53	2724 75	2725 26	0 030279	7 07	14 00	23 61	1 37
Reach-1	1	PF 1	88 00	2718 95	2719 91	2719 86	2720 13	0 014006	3 75	23 83	46 23	0 88


washd Plan Plan 01 5/8/2006
RS = 4
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2732
2734
2736
2738
2740
2742
2744
2746
2748
2750
0
50
100
150
200
250


washd Plan Plan 01 5/8/2006
RS = 3
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2728
2730
2732
2734
2736
2738
0
20
40
60
80
100
120
140
160
180


washd Plan Plan 01 5/8/2006
RS = 2 5
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2738
2736
2734
2732
2730
2728
2726
0
20
40
60
80
100
120
140
160
180

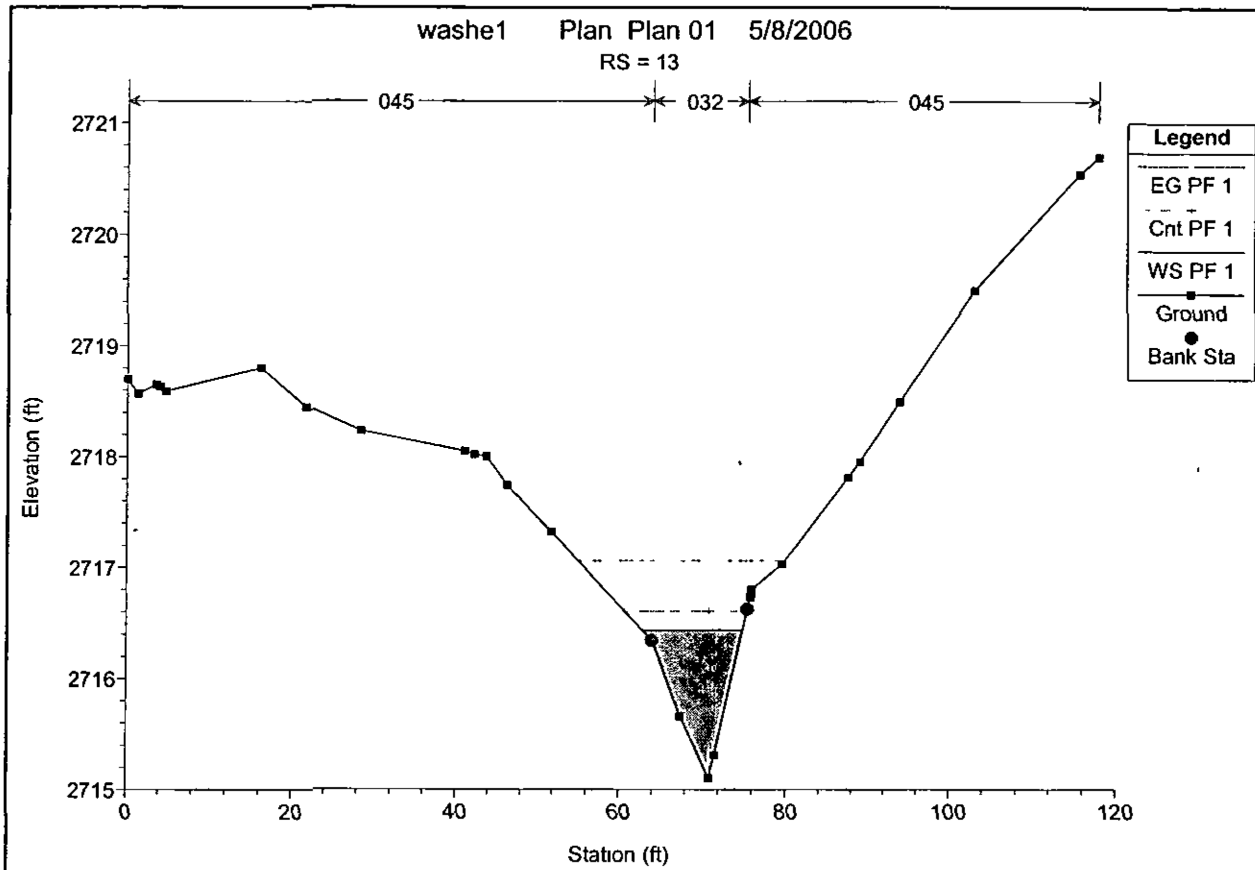

washd Plan Plan 01 5/8/2006
RS = 2
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2731
2730
2729
2728
2727
2726
2725
2724
2723
0
20
40
60
80
100
120
140
160


washd Plan Plan 01 5/8/2006
RS = 1
045
032
045
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2730
2728
2726
2724
2722
2720
2718
0
50
100
150
200
250
Station (ft)

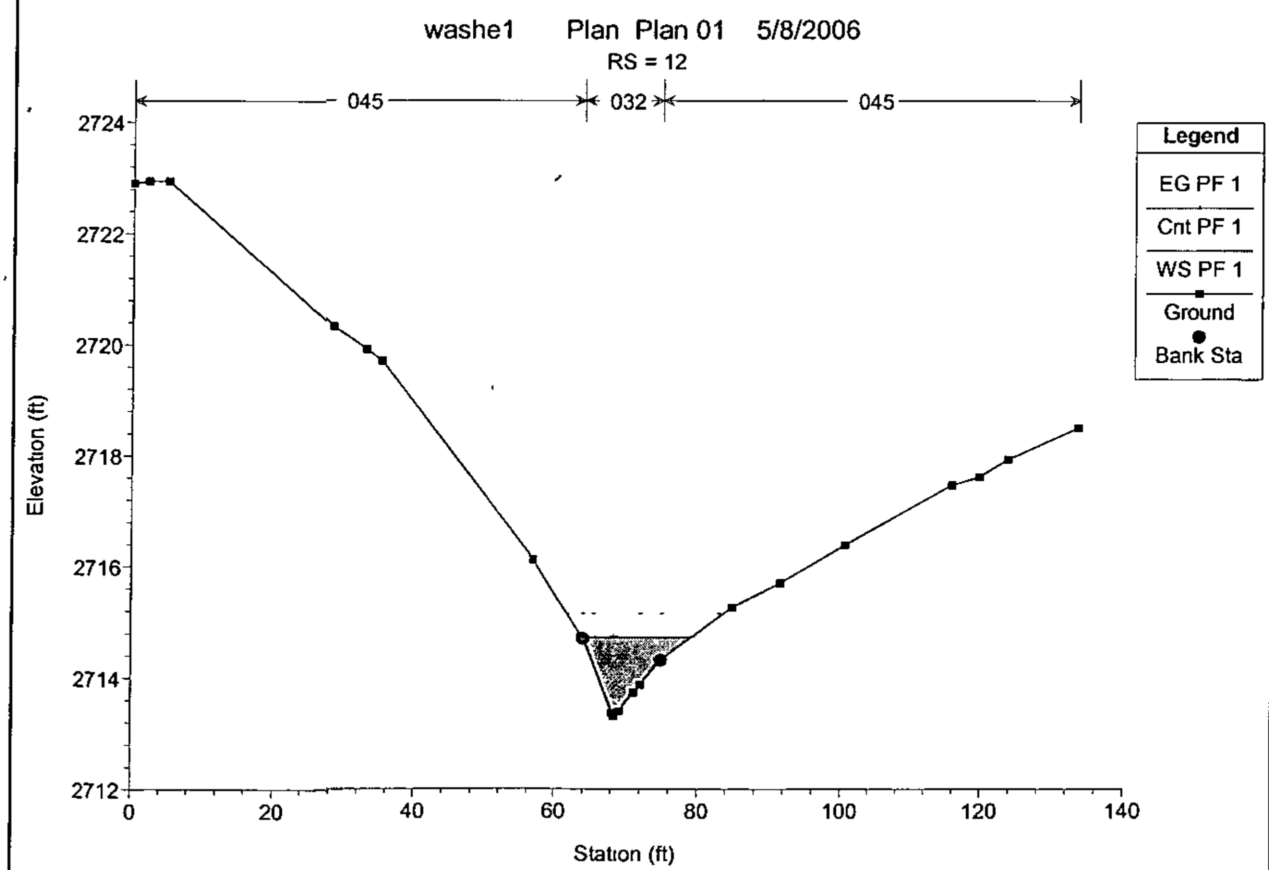
WASH E1

HEC-RAS Plan Plan 01 River RIVER 1 Reach Reach 1 Profile PF 1

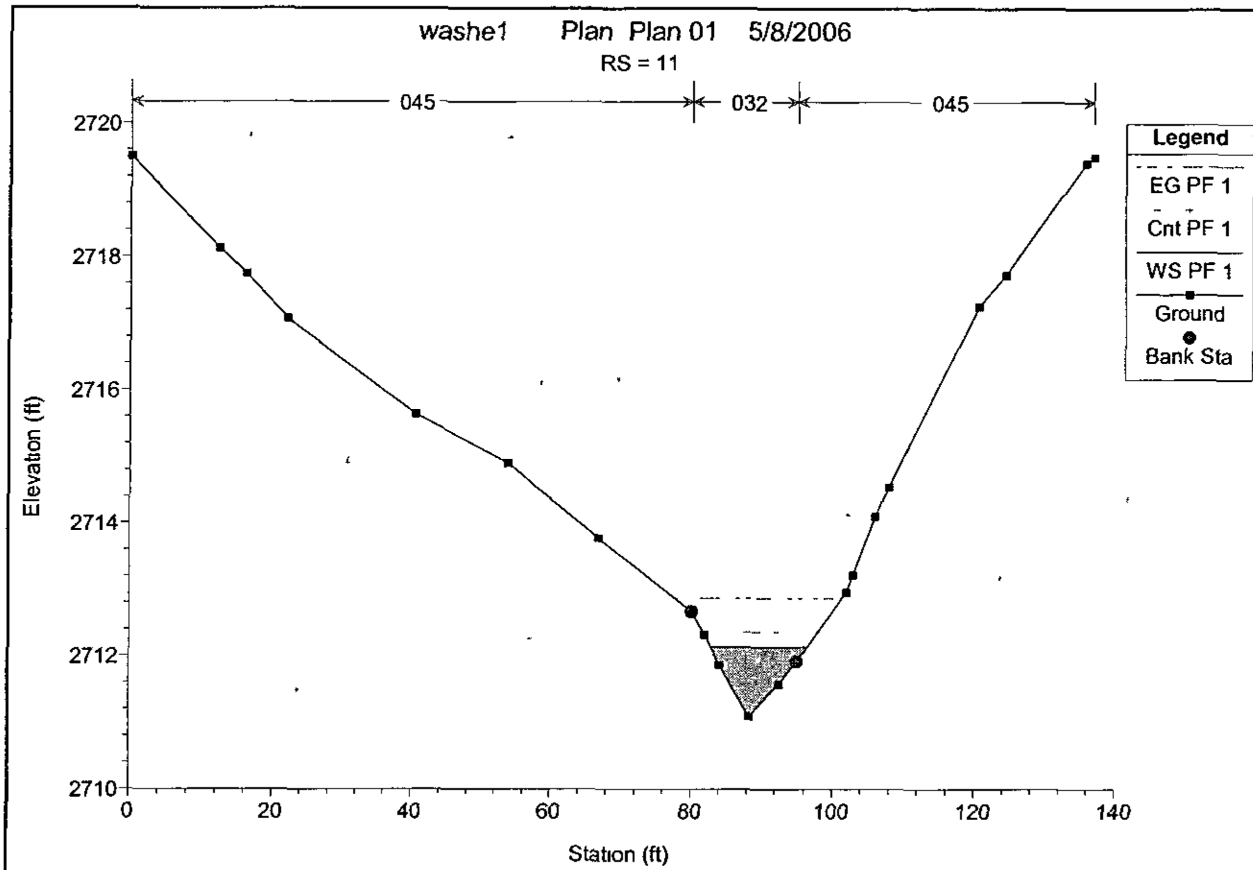
Reach	River Sta	Profile	Q Total	Min Ch El	W S Elev	Crit W S	E.G Elev	E.G Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	13	PF 1	50 00	2715 10	2716 43	2716 60	2717 06	0 030018	6 34	7 93	12.10	1 32
Reach 1	12	PF 1	50 00	2713 32	2714 73	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 17	2701 35	2701 79	0 036001	6 31	7 92	13 05	1 42
Reach 1	5	PF 1	110 00	2696 59	2698 30	2698 33	2698 80	0 017684	5 71	19 43	23 16	1 06
Reach 1	4	PF 1	110 00	2692 81	2694 46	2694 74	2695 37	0 030727	7 70	14 71	19 32	1 40
Reach 1	3 5	PF 1	110 00	2692 00	2692 95	2692 96	2693 32	0 014354	5 00	24 98	39 27	0 95
Reach 1	3	PF 1	136 00	2689 21	2690 89	2691 20	2691 69	0 023022	7 41	21 69	36 01	1 25
Reach 1	2	PF 1	258 00	2679 83	2681 80	2682 30	2683 31	0 034090	9 93	27 09	26 99	1 55
Reach 1	1	PF 1	258 00	2677 00	2679 30	2679 52	2680 19	0 016095	8 28	41 22	40 05	1 11

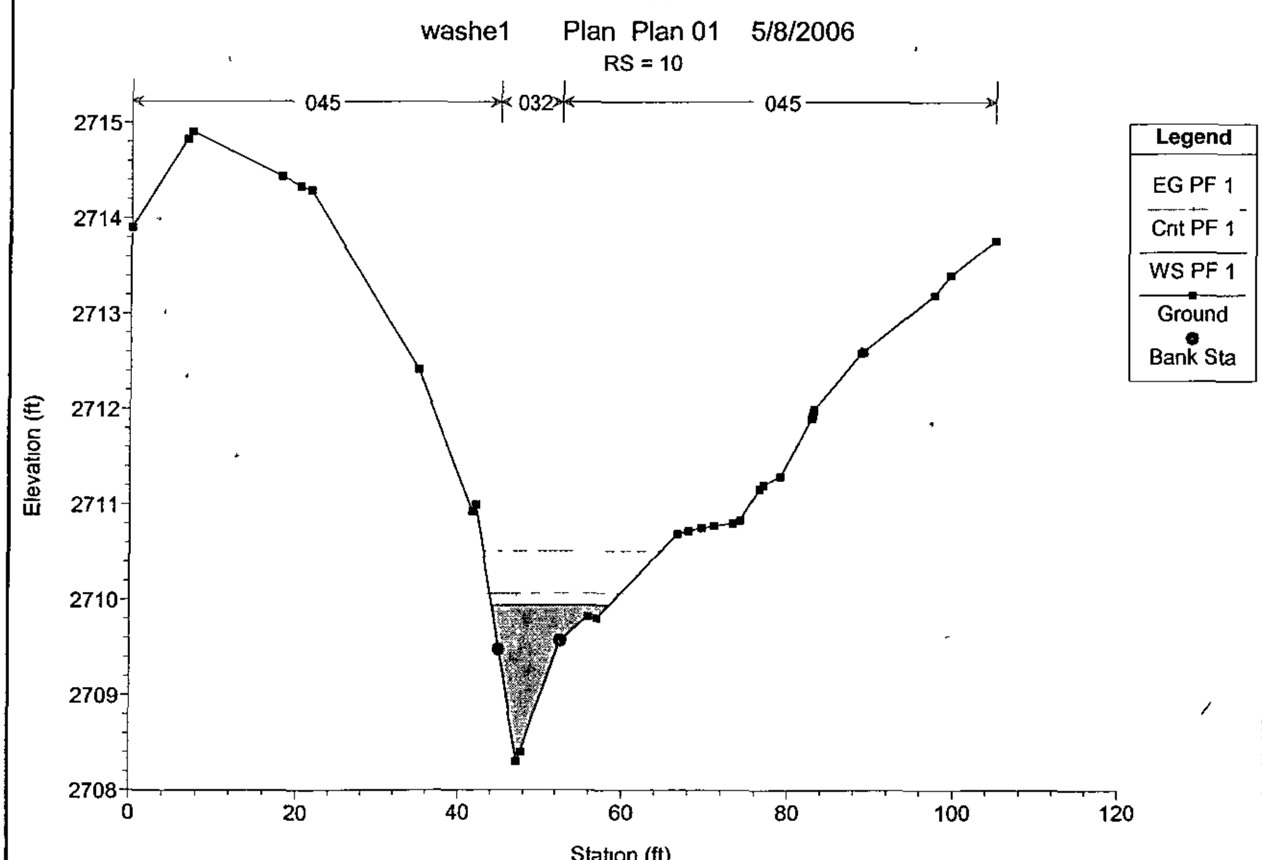


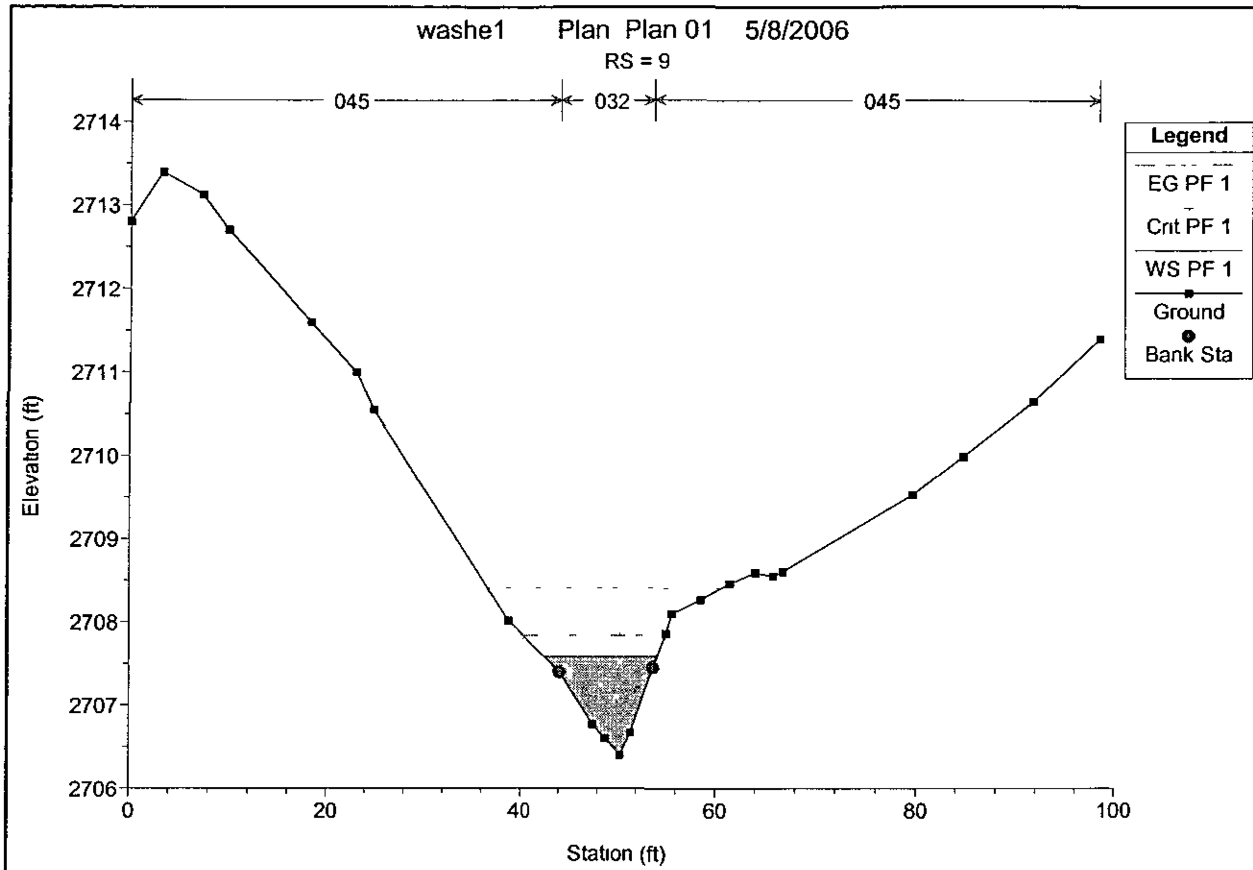
washe1 Plan Plan 01 5/8/2006
RS = 13
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2721
2720
2719
2718
2717
2716
2715
0
20
40
60
80
100
120
Station (ft)

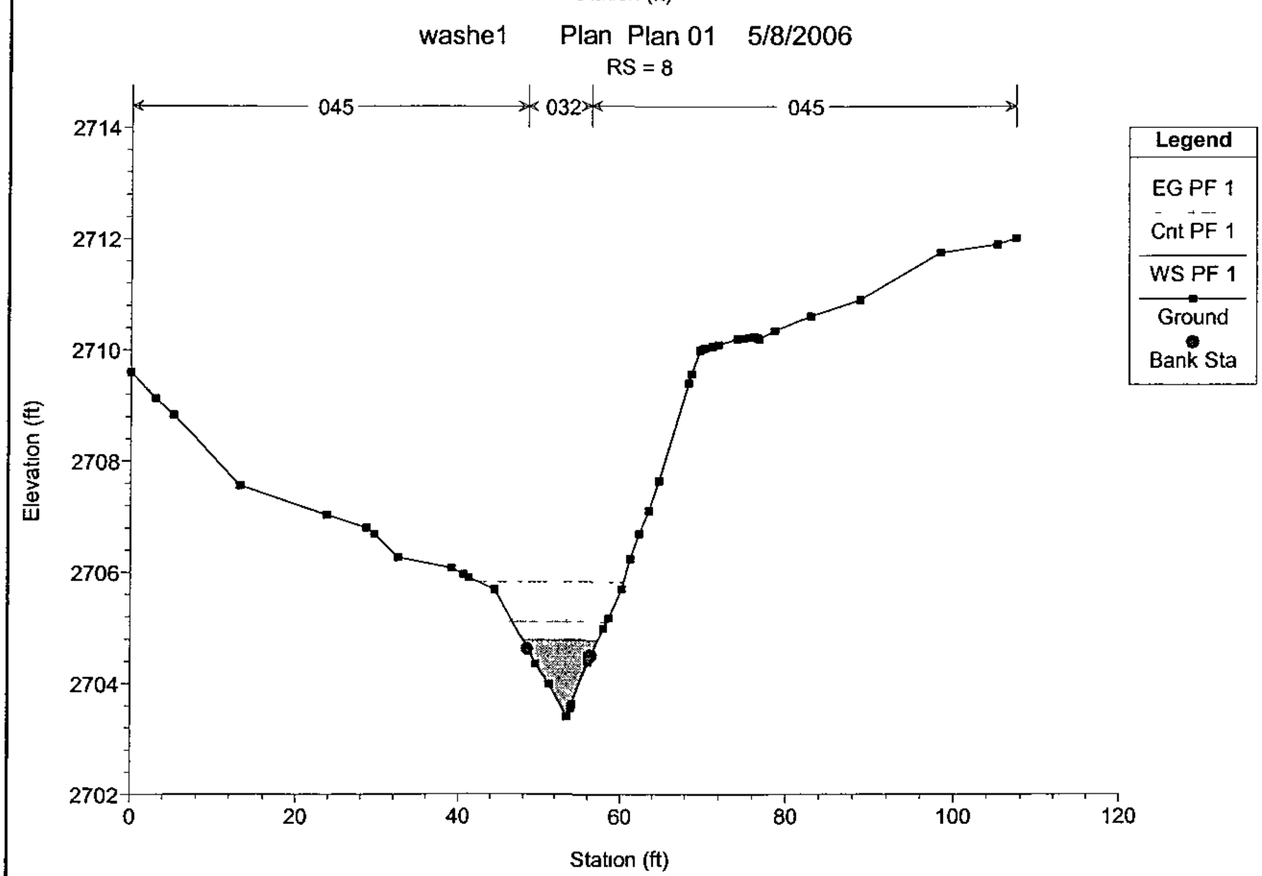


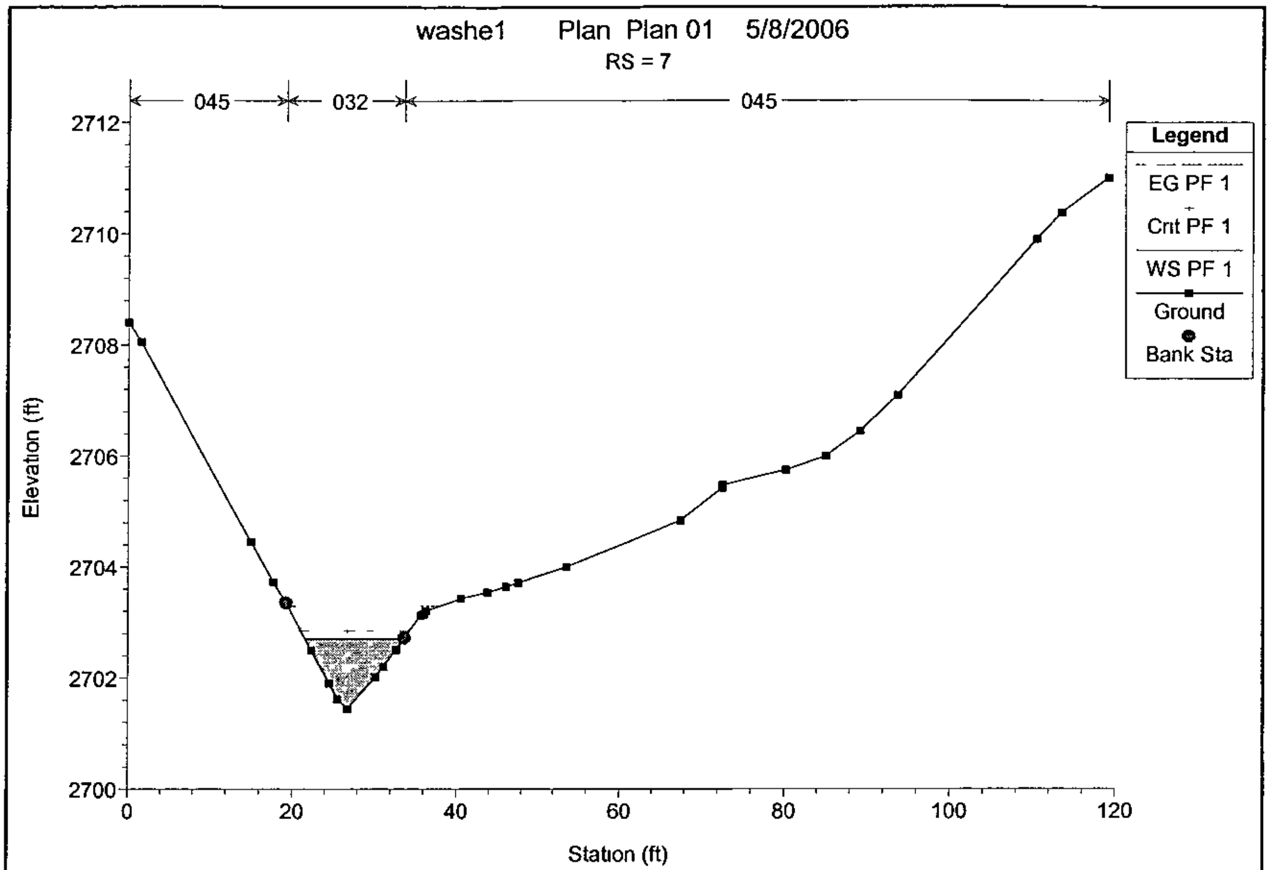
washe1 Plan Plan 01 5/8/2006
RS = 12
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2724
2722
2720
2718
2716
2714
2712
0
20
40
60
80
100
120
140
Station (ft)

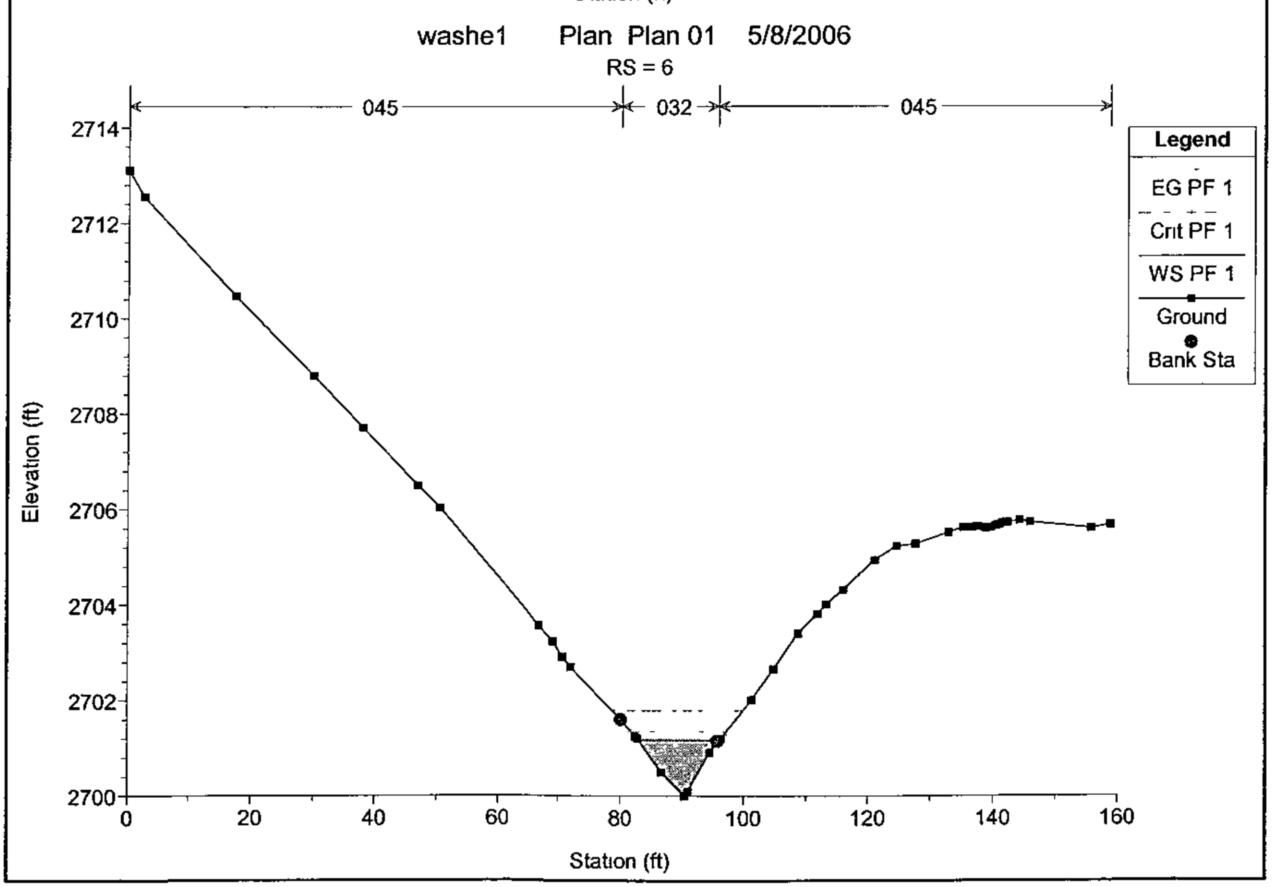

washe1 Plan Plan 01 5/8/2006
RS = 11
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2720
2718
2716
2714
2712
2710
0
20
40
60
80
100
120
140

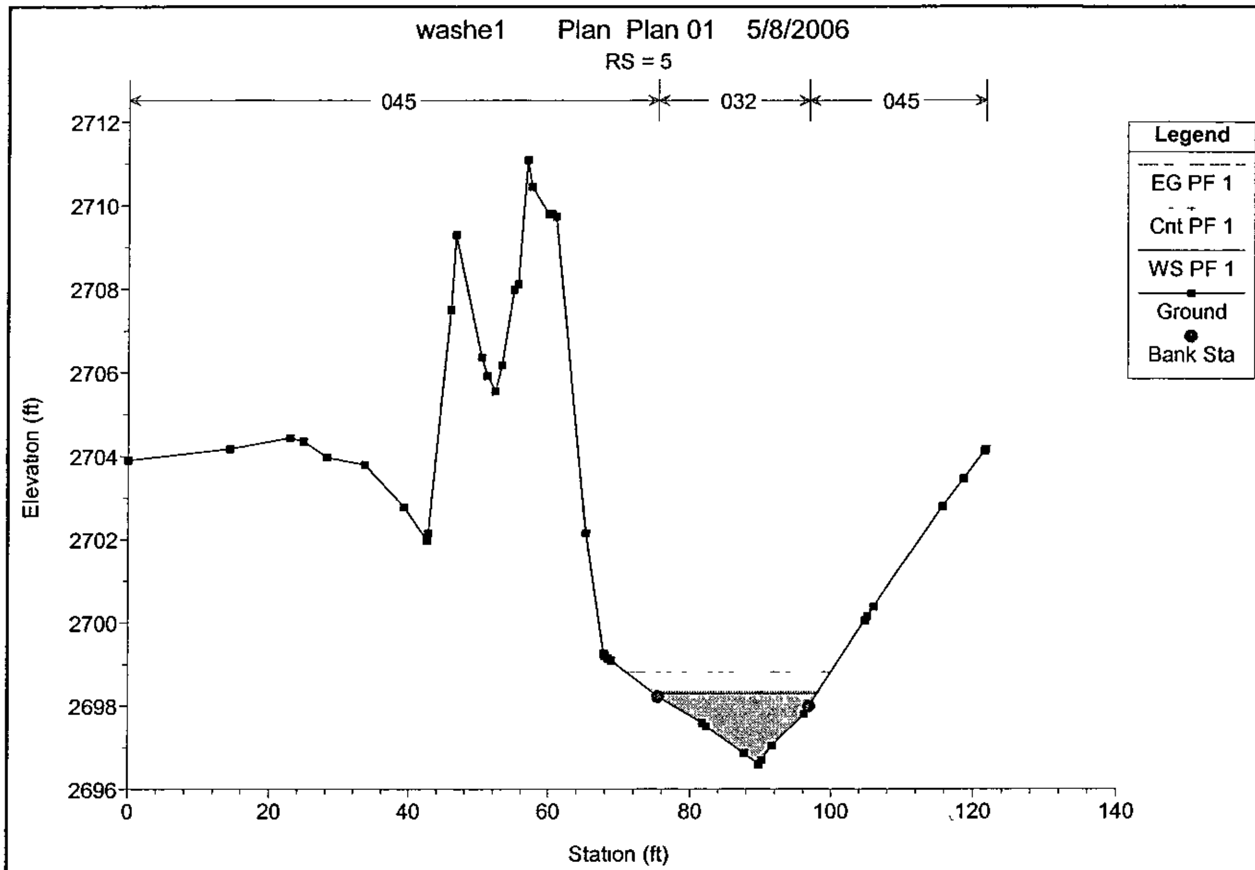

washe1 Plan Plan 01 5/8/2006
RS = 10
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2715
2714
2713
2712
2711
2710
2709
2708
0
20
40
60
80
100
120

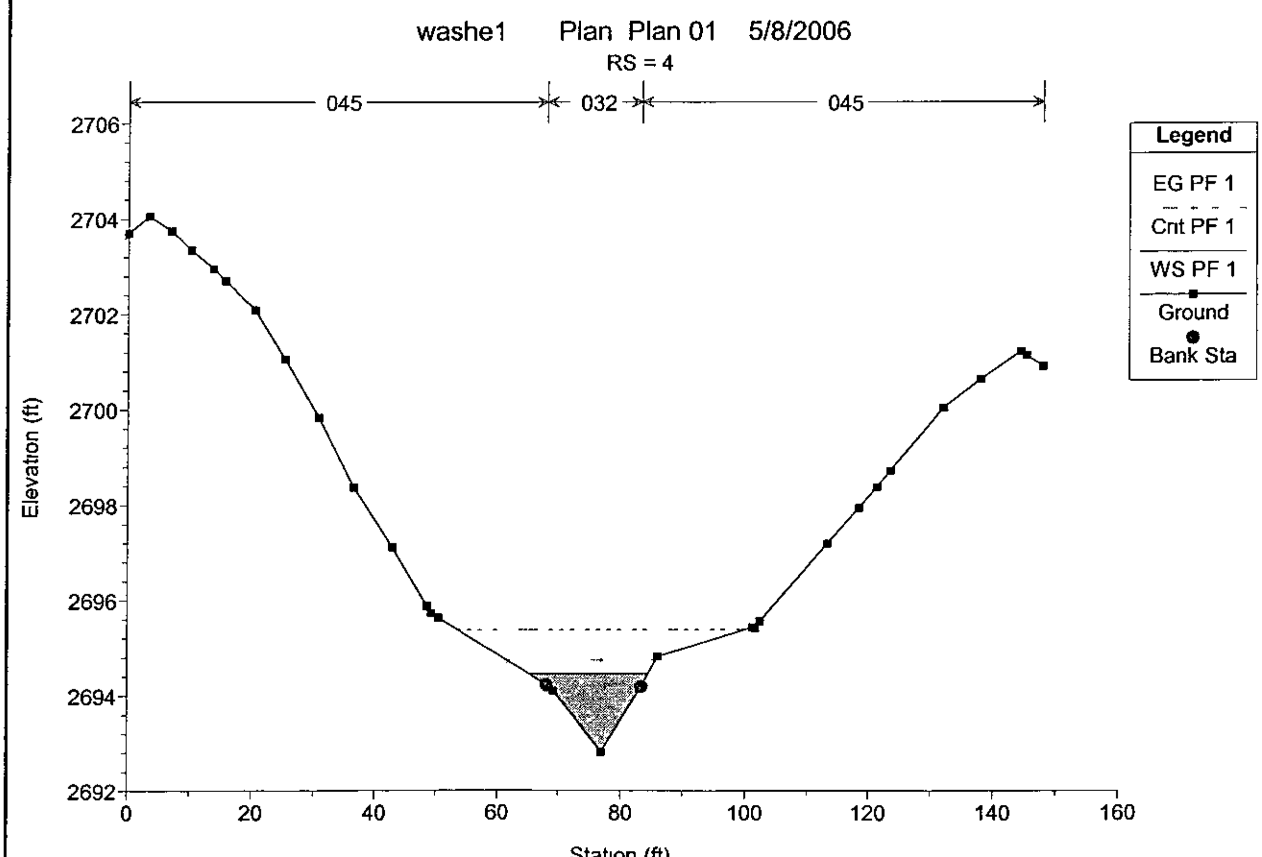

washe1 Plan Plan 01 5/8/2006
RS = 9
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2714
2713
2712
2711
2710
2709
2708
2707
2706
0
20
40
60
80
100
Station (ft)

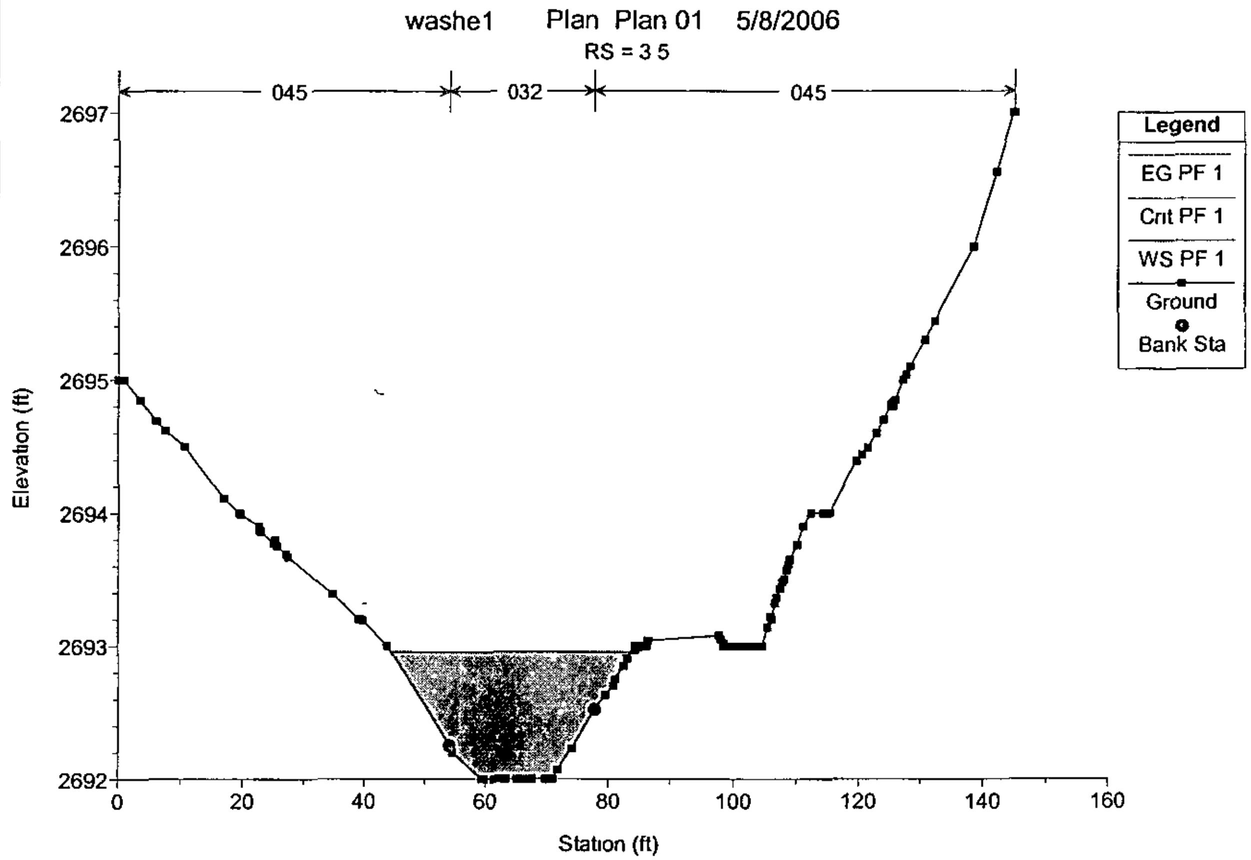

washe1 Plan Plan 01 5/8/2006
RS = 8
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2714
2712
2710
2708
2706
2704
2702
0
20
40
60
80
100
120
Station (ft)

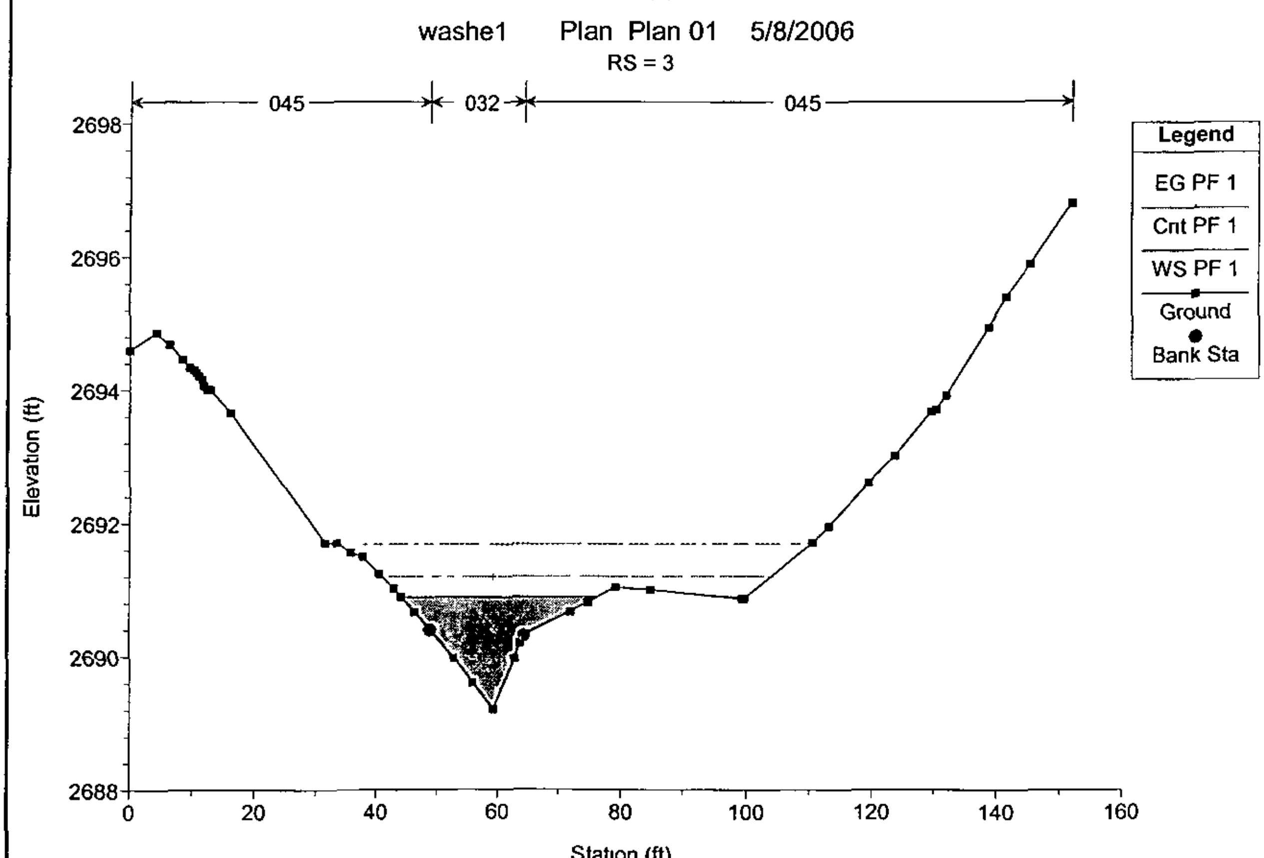

washe1 Plan Plan 01 5/8/2006
RS = 7
045
032
045
Elevation (ft)
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta

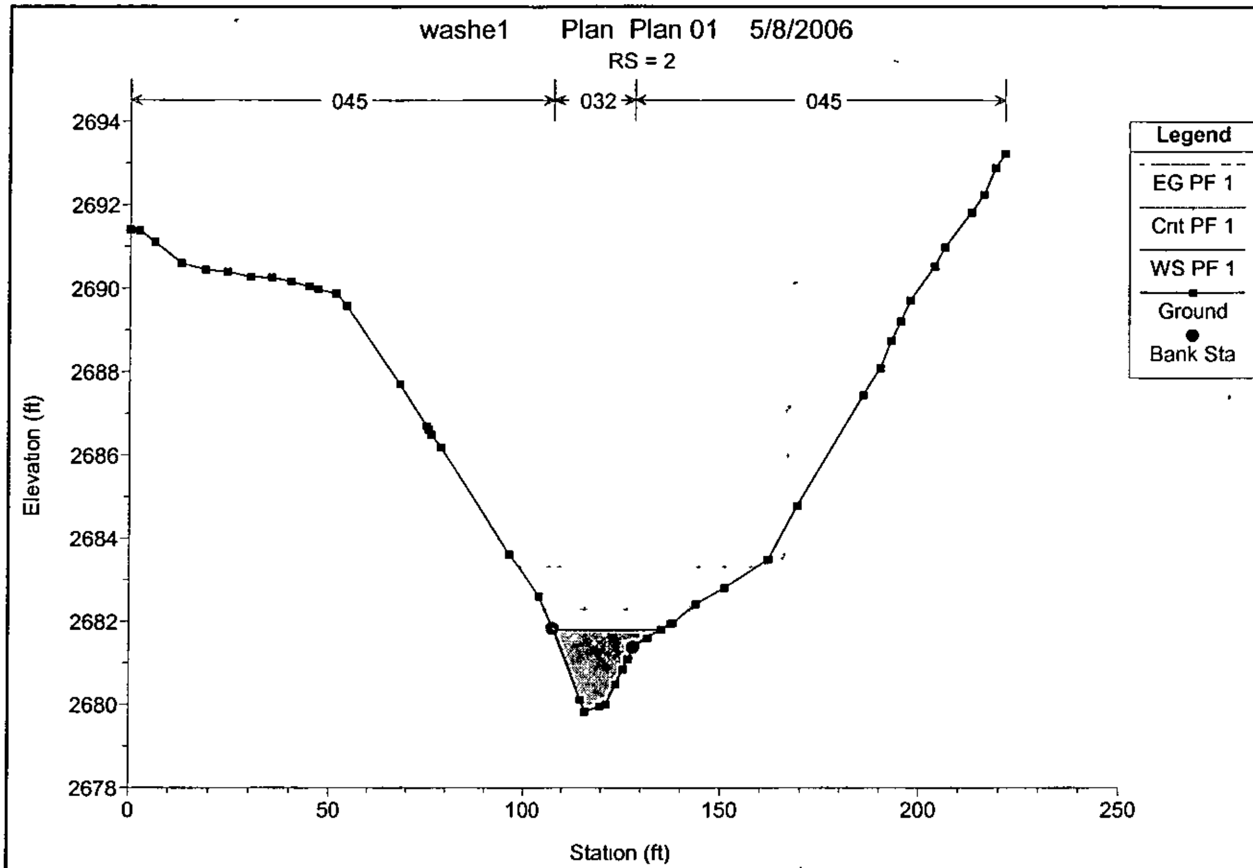

washe1 Plan Plan 01 5/8/2006
RS = 6
045
032
045
Elevation (ft)
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta

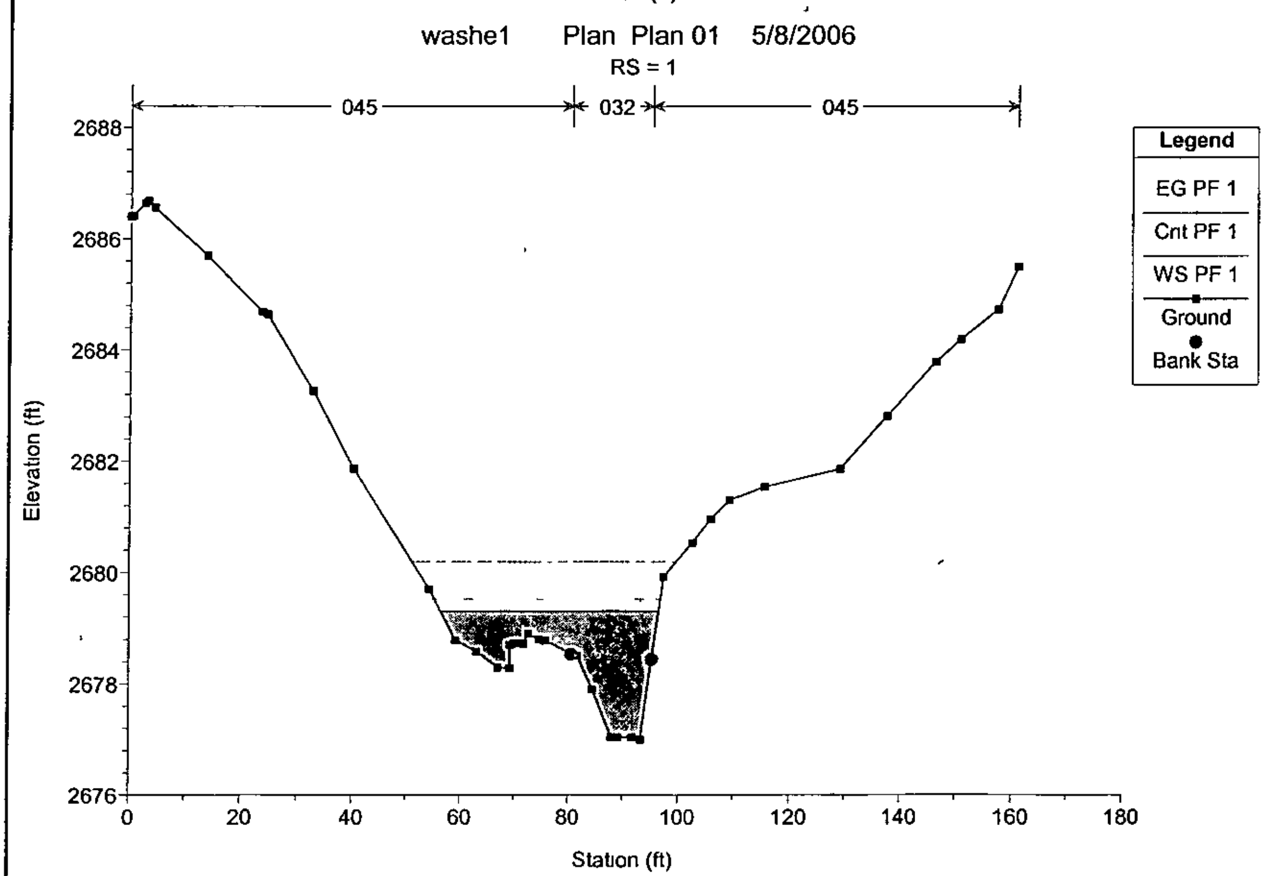

washe1 Plan Plan 01 5/8/2006
RS = 5
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2696
2698
2700
2702
2704
2706
2708
2710
2712
0
20
40
60
80
100
120
140


washe1 Plan Plan 01 5/8/2006
RS = 4
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2692
2694
2696
2698
2700
2702
2704
2706
0
20
40
60
80
100
120
140
160


washe1 Plan Plan 01 5/8/2006
RS = 3 5
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2697
2696
2695
2694
2693
2692
0
20
40
60
80
100
120
140
160
Station (ft)


washe1 Plan Plan 01 5/8/2006
RS = 3
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2698
2696
2694
2692
2690
2688
0
20
40
60
80
100
120
140
160
Station (ft)

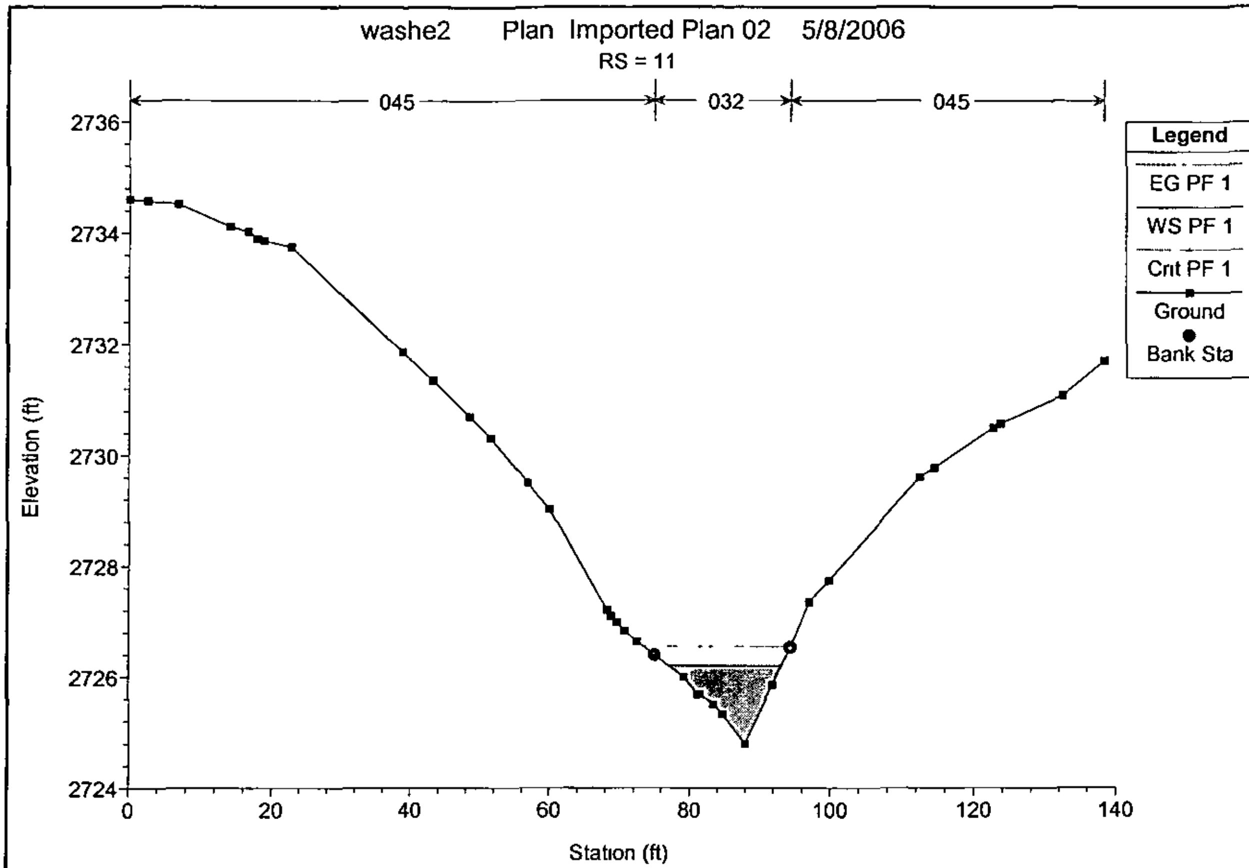

washe1 Plan Plan 01 5/8/2006
RS = 2
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2694
2692
2690
2688
2686
2684
2682
2680
2678
0
50
100
150
200
250

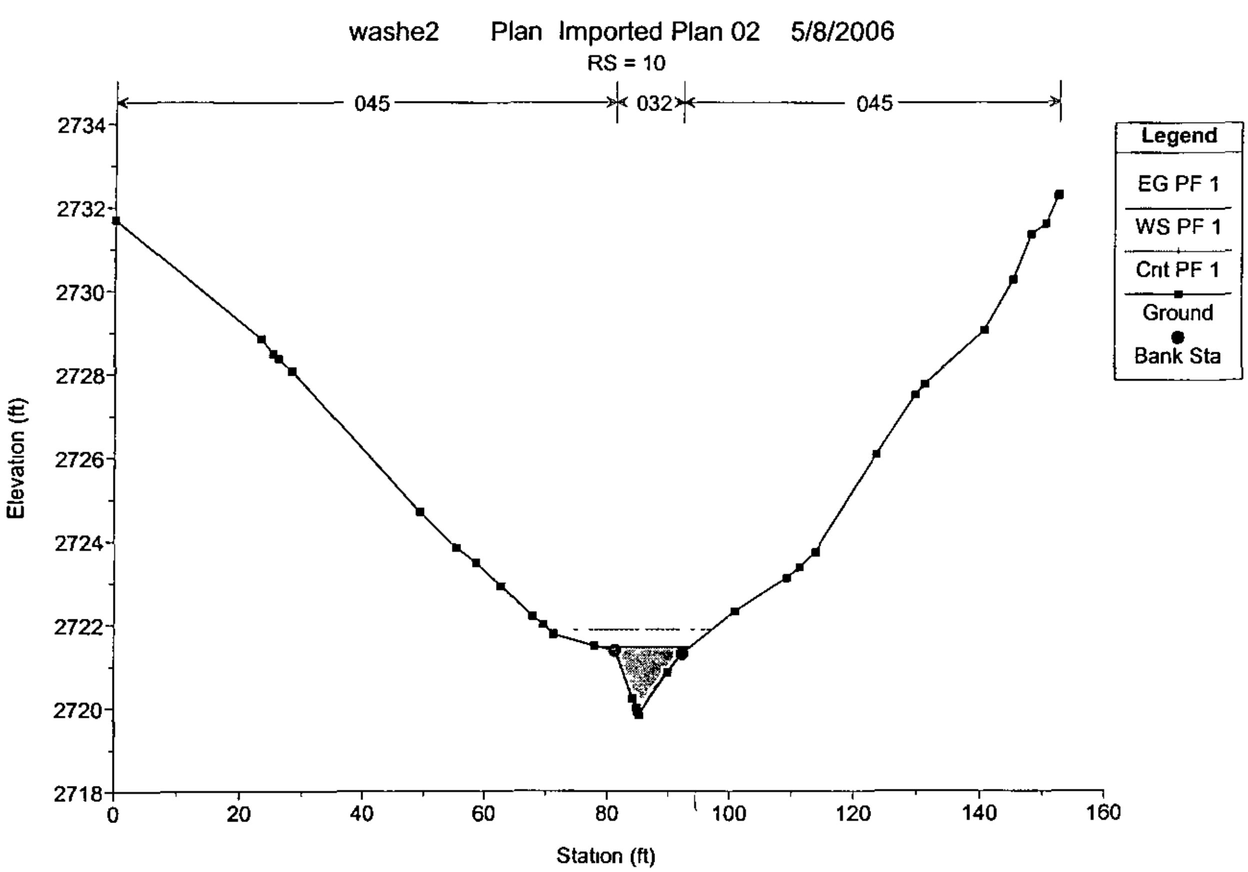

washe1 Plan Plan 01 5/8/2006
RS = 1
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2688
2686
2684
2682
2680
2678
2676
0
20
40
60
80
100
120
140
160
180

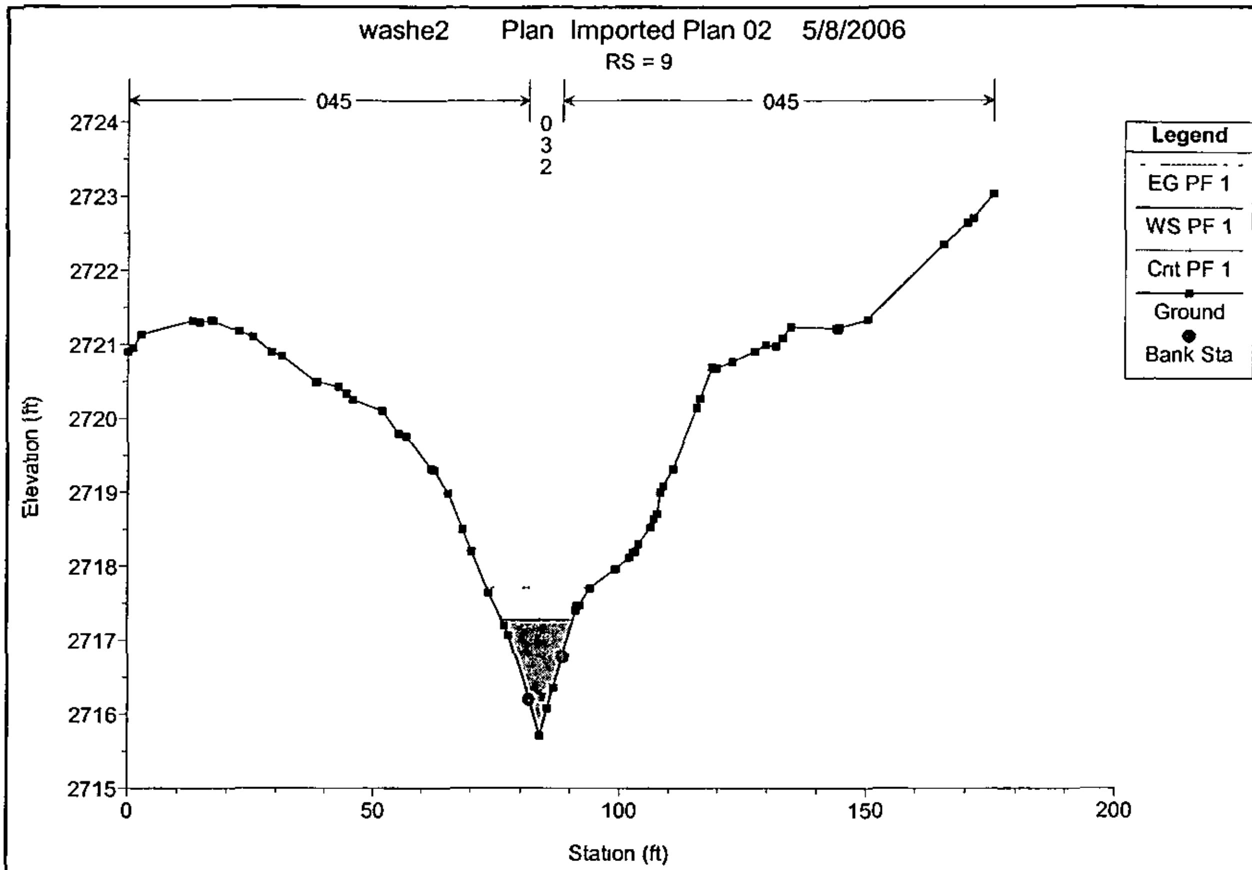
WASH E2

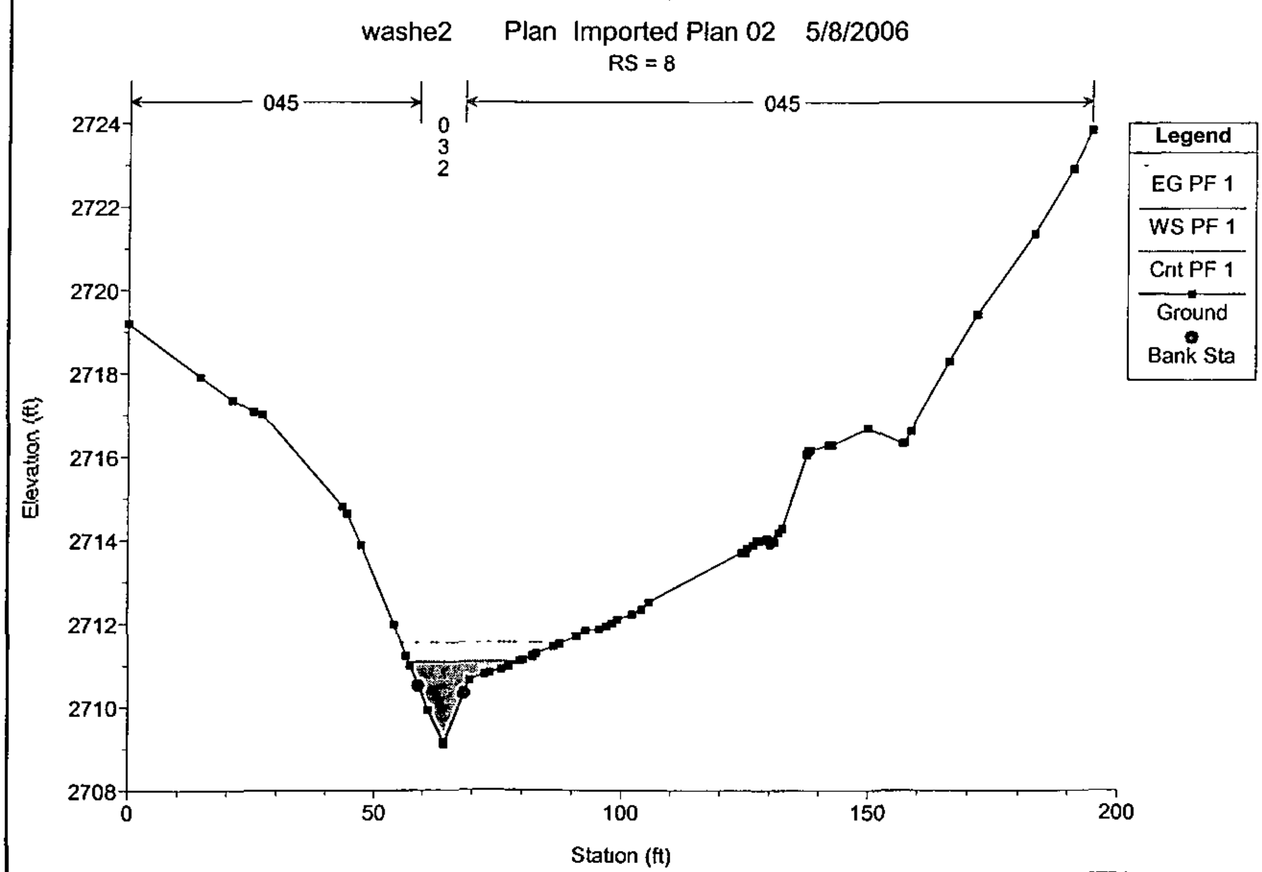
HEC-RAS Plan Imported Pla River RIVER-1 Reach Reach-1 Profile PF 1

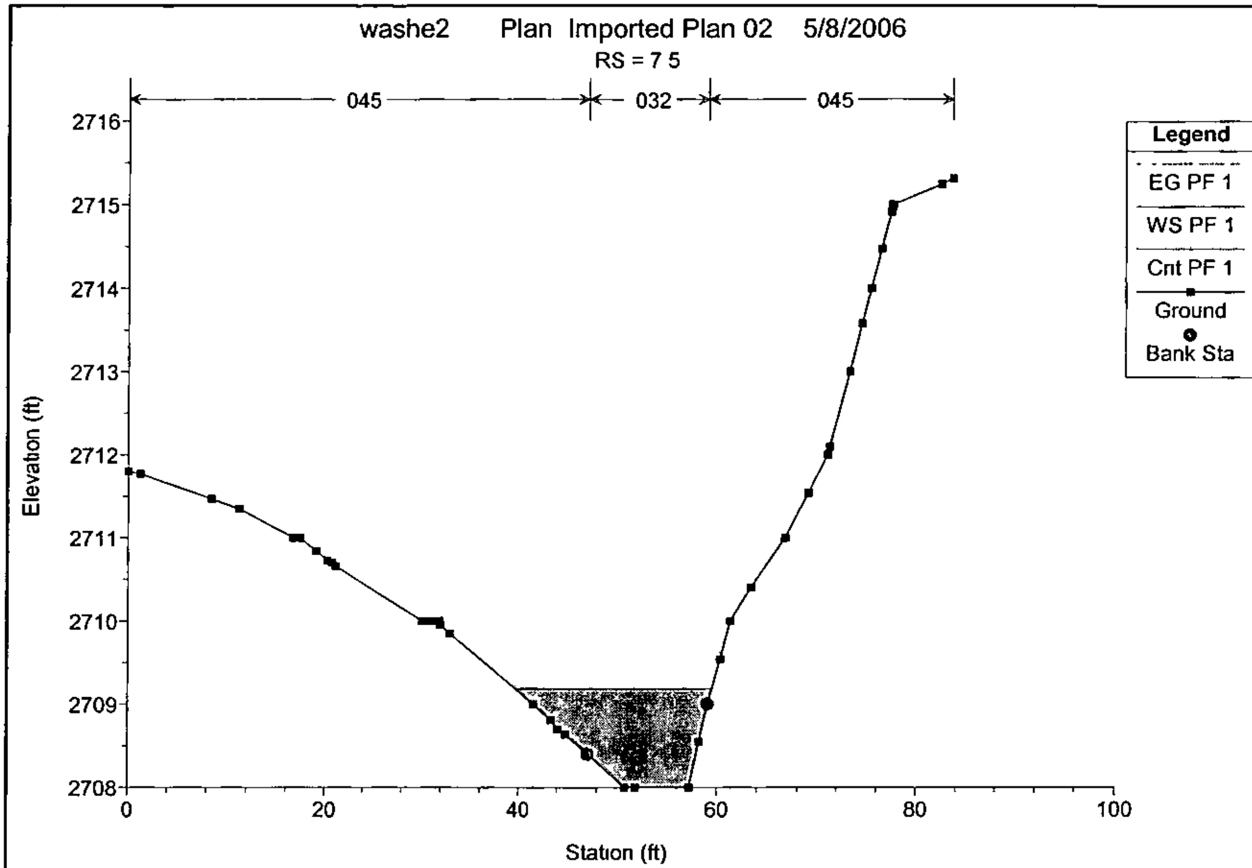
Reach	River Sta	Profile	Q Total	Min Ch El	W S Elev	Crit W S	E.G. Elev	E G Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	11	PF 1	50 00	2724 80	2726 21	2726 21	2726 55	0 018084	4 69	10 67	16 13	1 02
Reach-1	10	PF 1	50 00	2719 82	2721 45	2721 45	2721 87	0 015739	5 17	9 85	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	129 00	2687 45	2689 80	2689 80	2690 42	0 012827	6 38	21 52	20 91	0 95
Reach-1	2	PF 1	258 00	2679 83	2682 33	2682 33	2683 02	0 009910	6 95	44 53	37 38	0 89
Reach 1	1	PF 1	258 00	2677 00	2679 50	2679 50	2680 04	0 016298	6 88	49 30	41 36	0 82

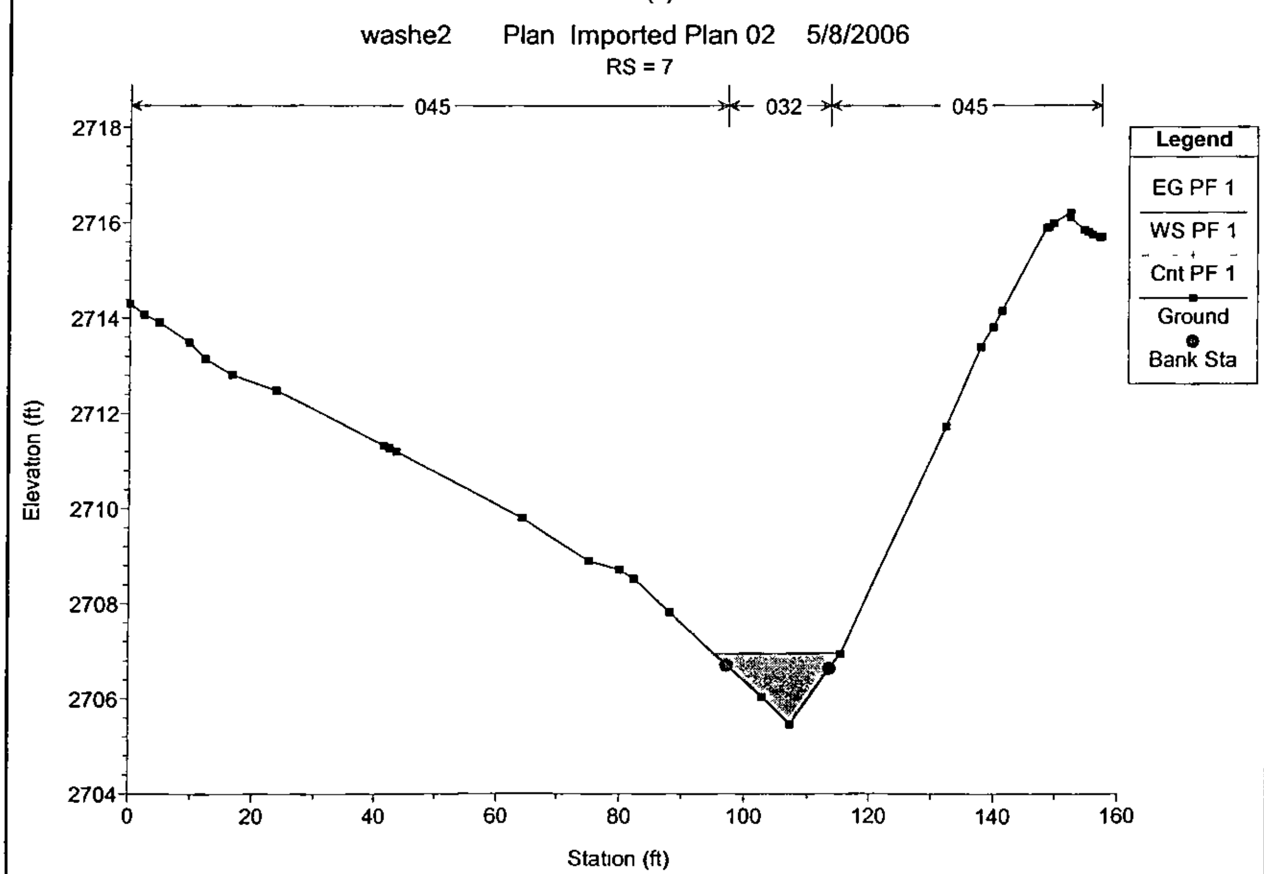

washe2 Plan Imported Plan 02 5/8/2006
RS = 11
045
032
045
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2736
2734
2732
2730
2728
2726
2724
0
20
40
60
80
100
120
140

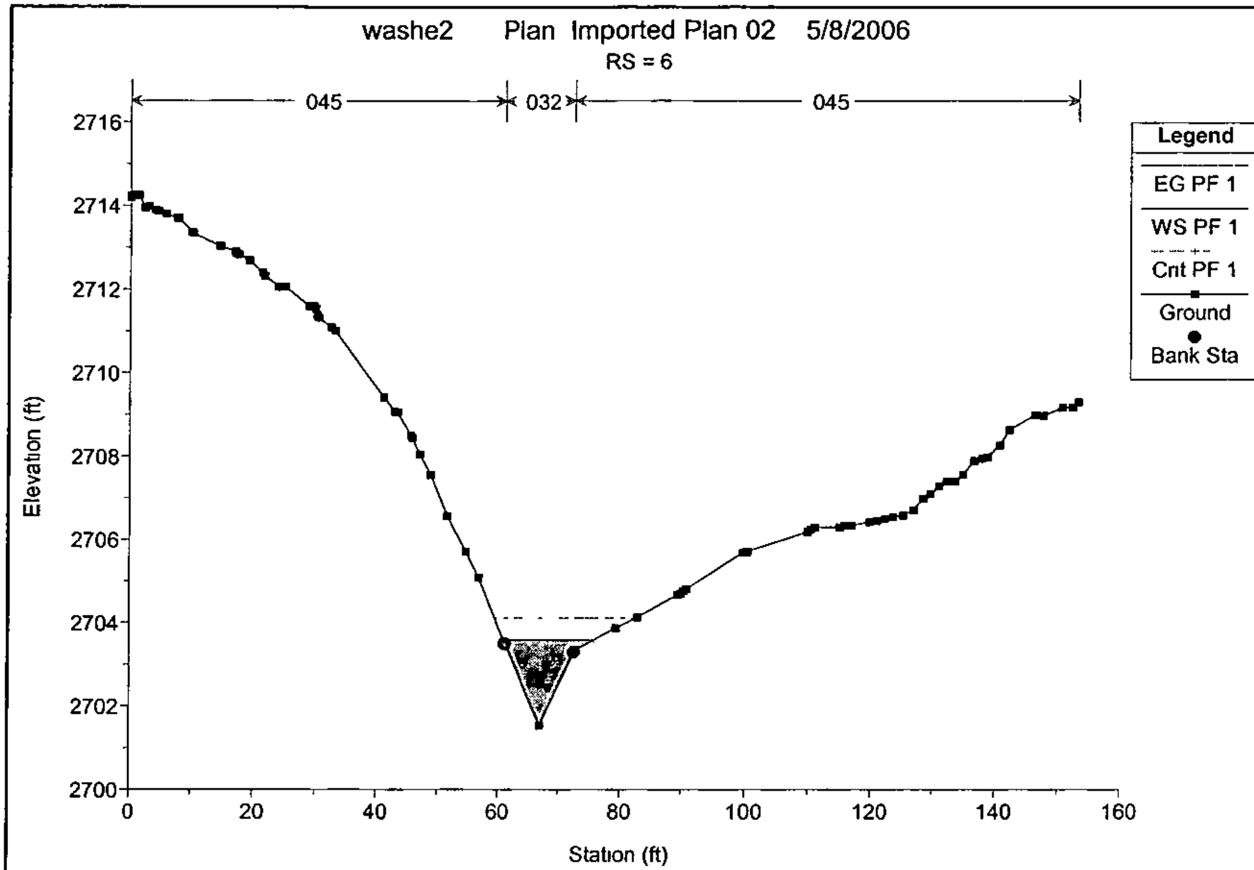

washe2 Plan Imported Plan 02 5/8/2006
RS = 10
045
032
045
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2734
2732
2730
2728
2726
2724
2722
2720
2718
0
20
40
60
80
100
120
140
160

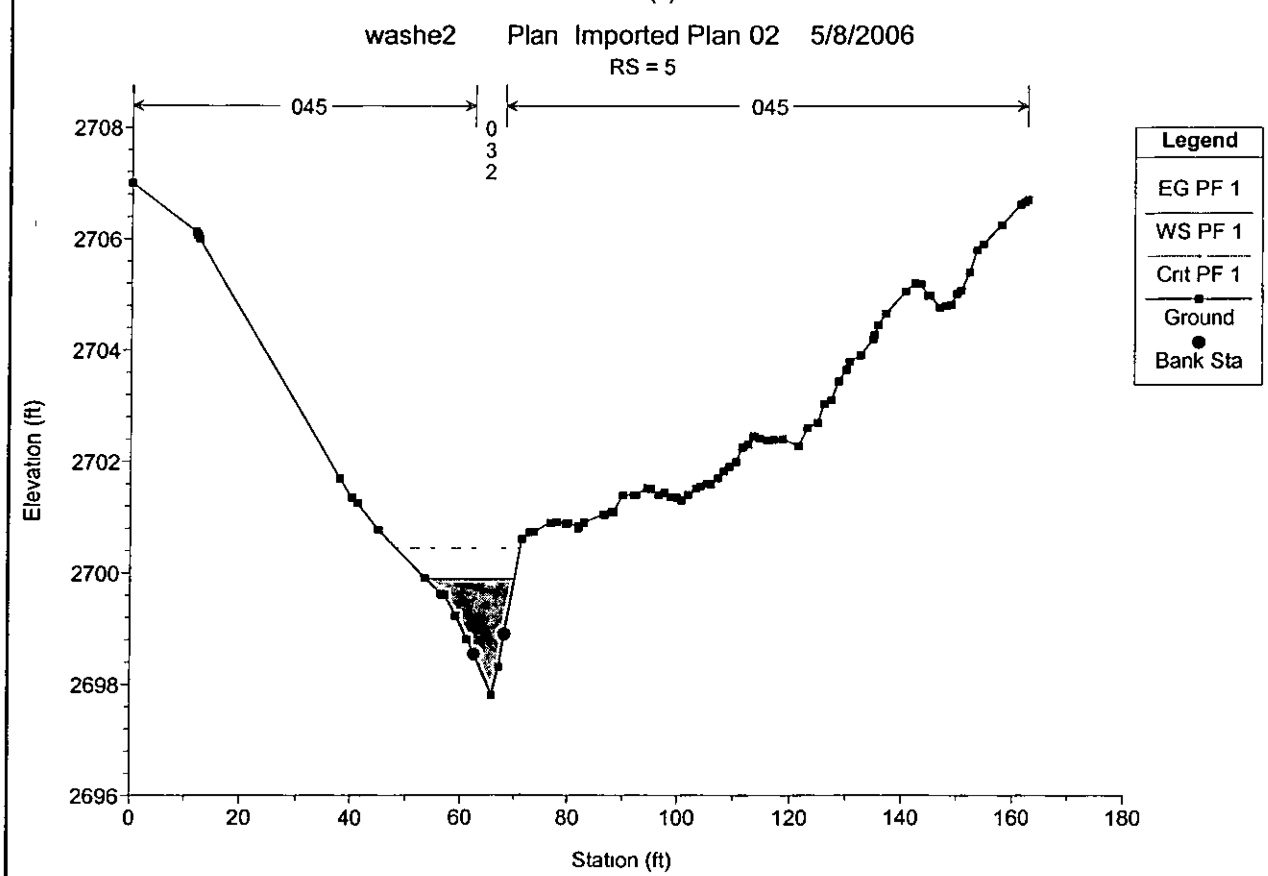

washe2 Plan Imported Plan 02 5/8/2006
RS = 9
045
0
3
2
045
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2724
2723
2722
2721
2720
2719
2718
2717
2716
2715
0
50
100
150
200
Station (ft)

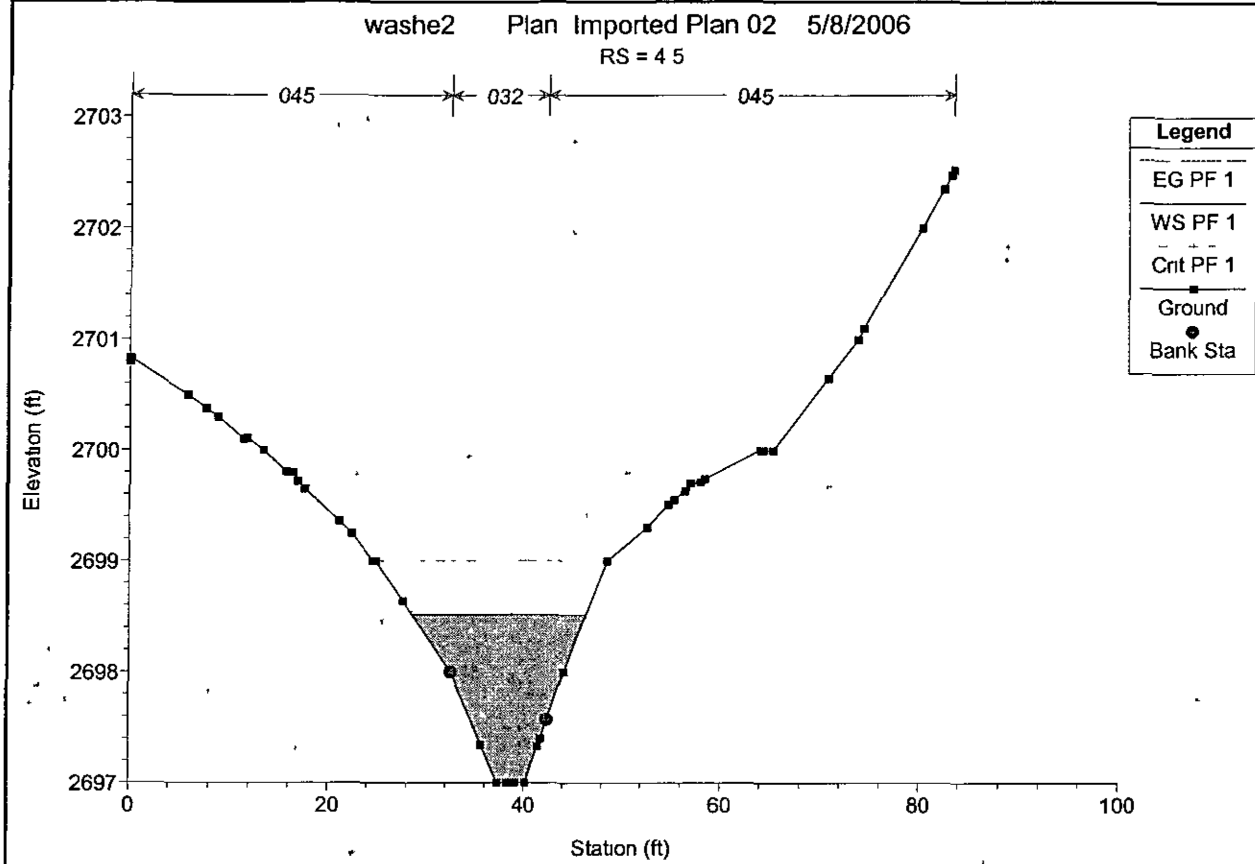

washe2 Plan Imported Plan 02 5/8/2006
RS = 8
045
0
3
2
045
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2724
2722
2720
2718
2716
2714
2712
2710
2708
0
50
100
150
200
Station (ft)


washe2 Plan Imported Plan 02 5/8/2006
RS = 7 5
045
032
045
Legend
EG PF 1
WS PF 1
Cnt PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


washe2 Plan Imported Plan 02 5/8/2006
RS = 7
045
032
045
Legend
EG PF 1
WS PF 1
Cnt PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


washe2 Plan Imported Plan 02 5/8/2006
RS = 6
045
032
045
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2716
2714
2712
2710
2708
2706
2704
2702
2700
0
20
40
60
80
100
120
140
160
Station (ft)


washe2 Plan Imported Plan 02 5/8/2006
RS = 5
045
0
3
2
045
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2708
2706
2704
2702
2700
2698
2696
0
20
40
60
80
100
120
140
160
180
Station (ft)


washe2 Plan Imported Plan 02 5/8/2006
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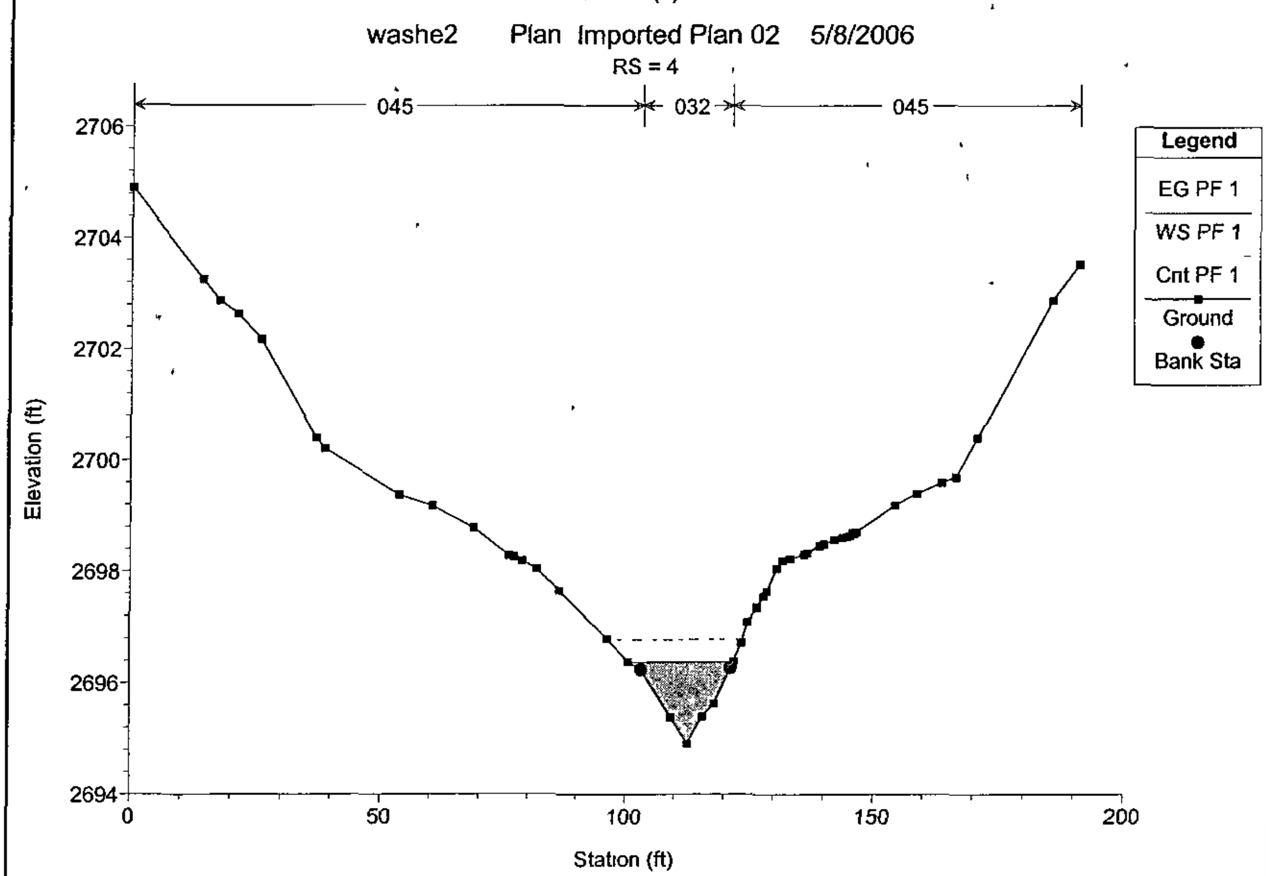
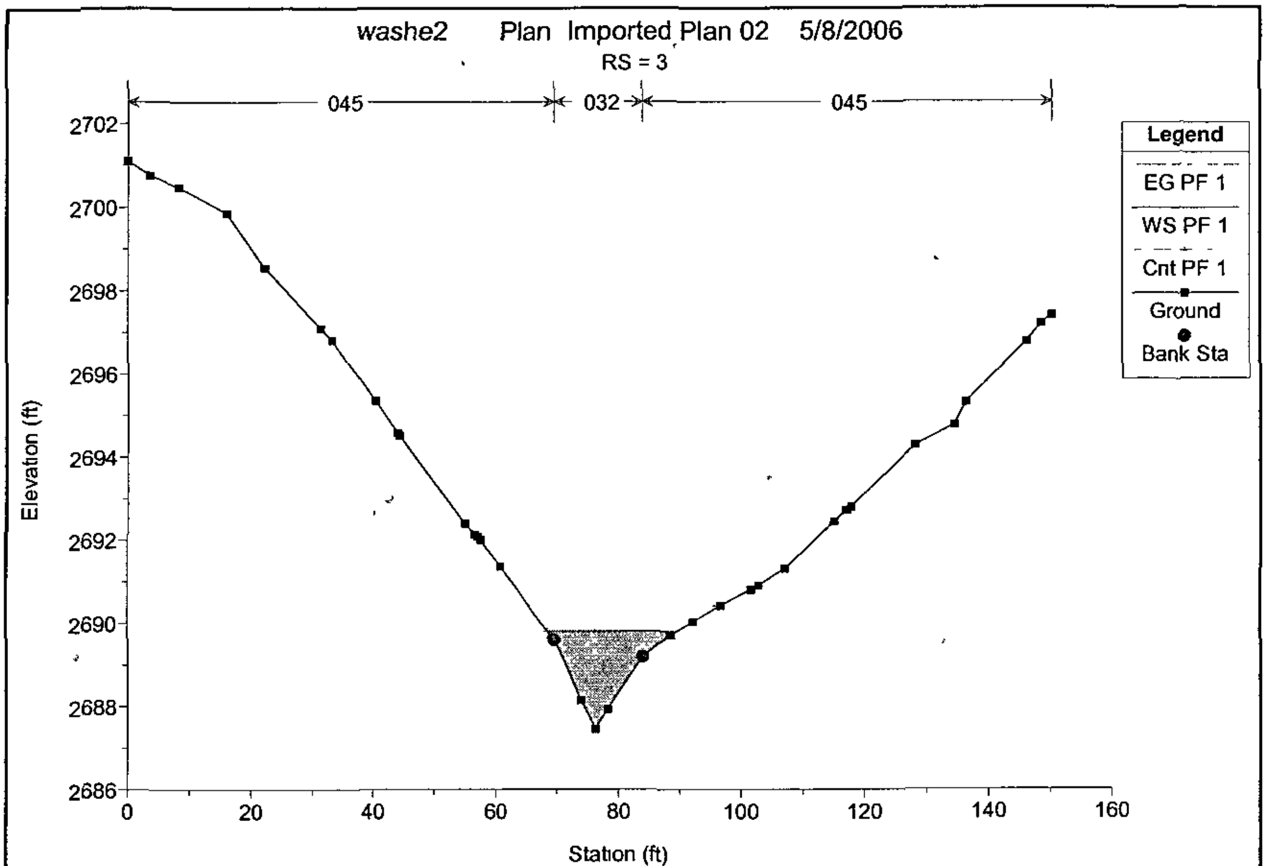
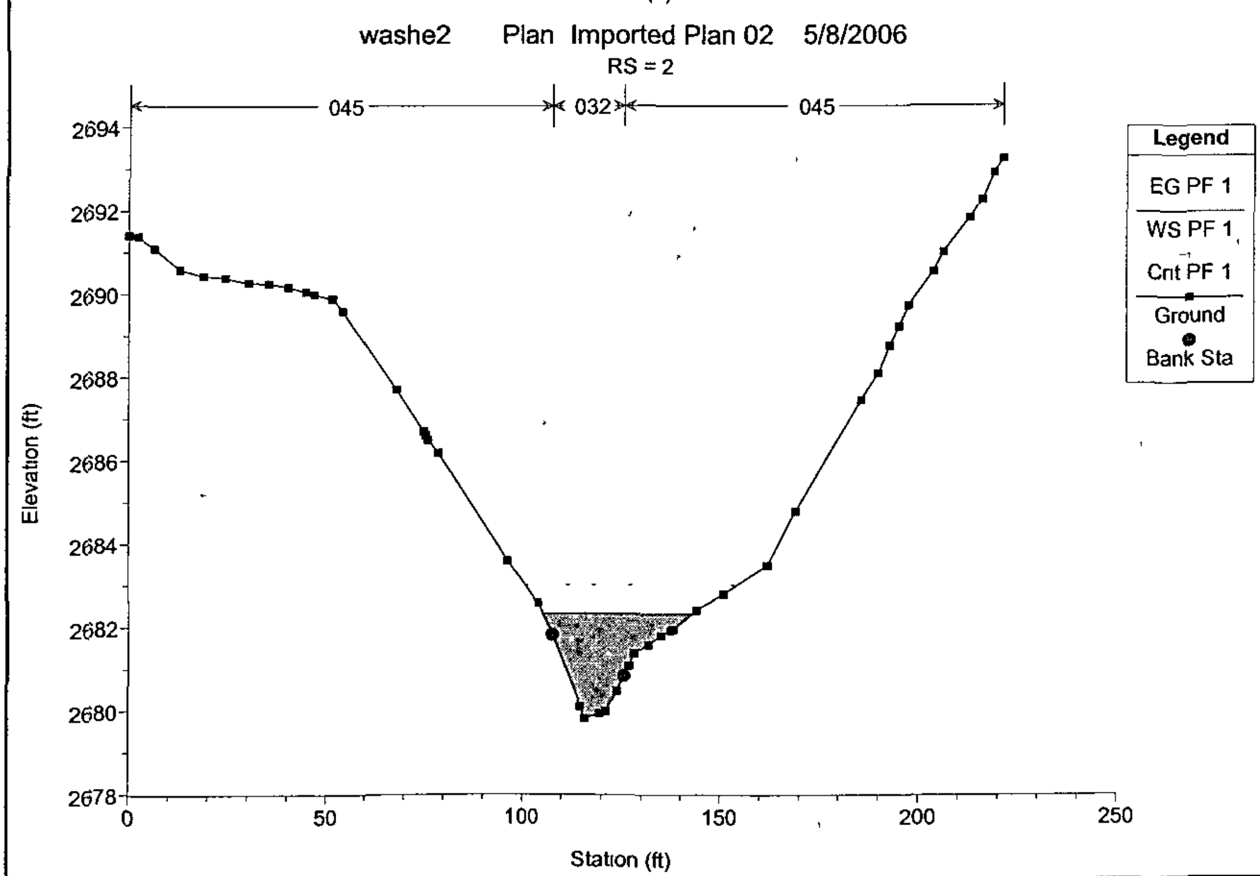
045
032
045
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

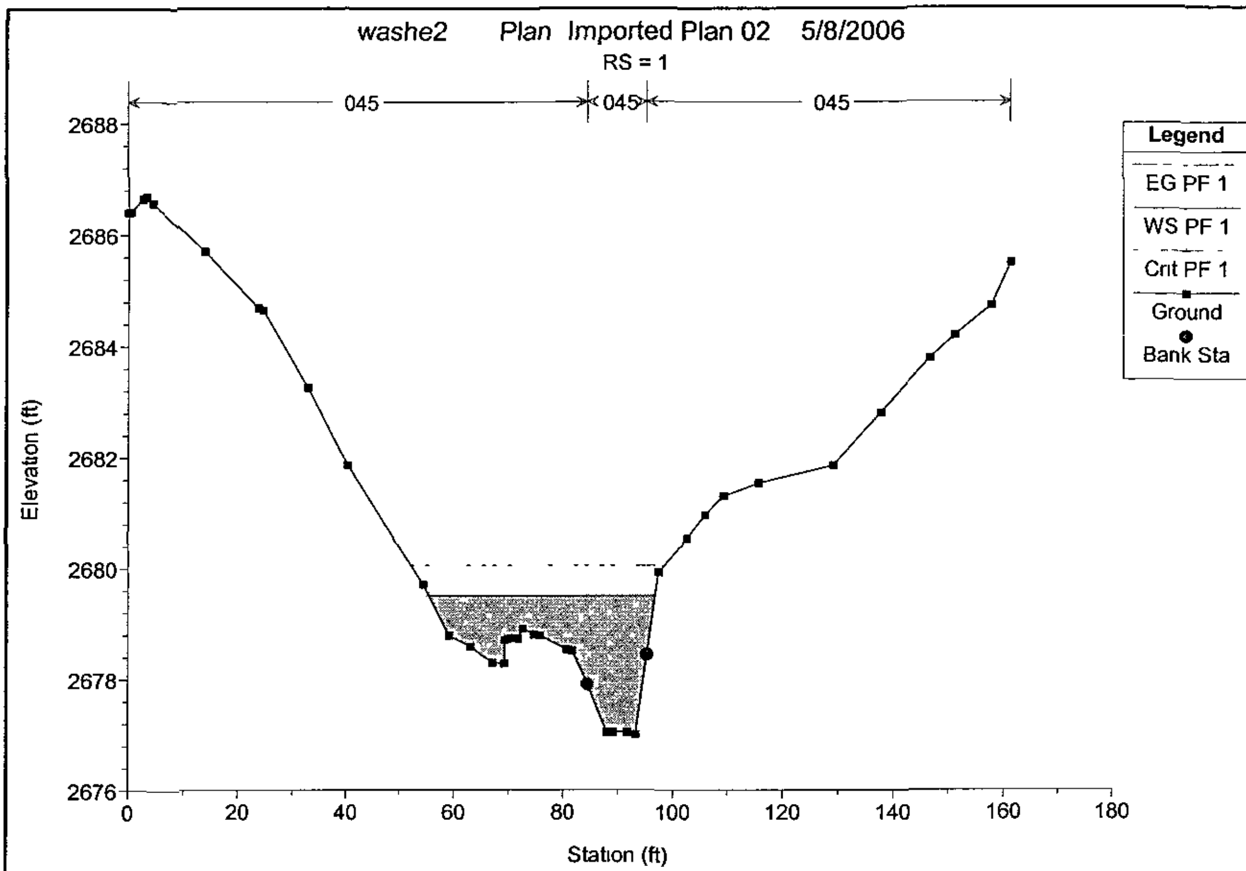

washe2 Plan Imported Plan 02 5/8/2006
RS = 4
045
032
045
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)



washe2 Plan Imported Plan 02 5/8/2006
RS = 3
045
032
045
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2686
2688
2690
2692
2694
2696
2698
2700
2702
0
20
40
60
80
100
120
140
160
Station (ft)



washe2 Plan Imported Plan 02 5/8/2006
RS = 2
045
032
045
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
2678
2680
2682
2684
2686
2688
2690
2692
2694
0
50
100
150
200
250
Station (ft)



washe2 Plan Imported Plan 02 5/8/2006
RS = 1
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)

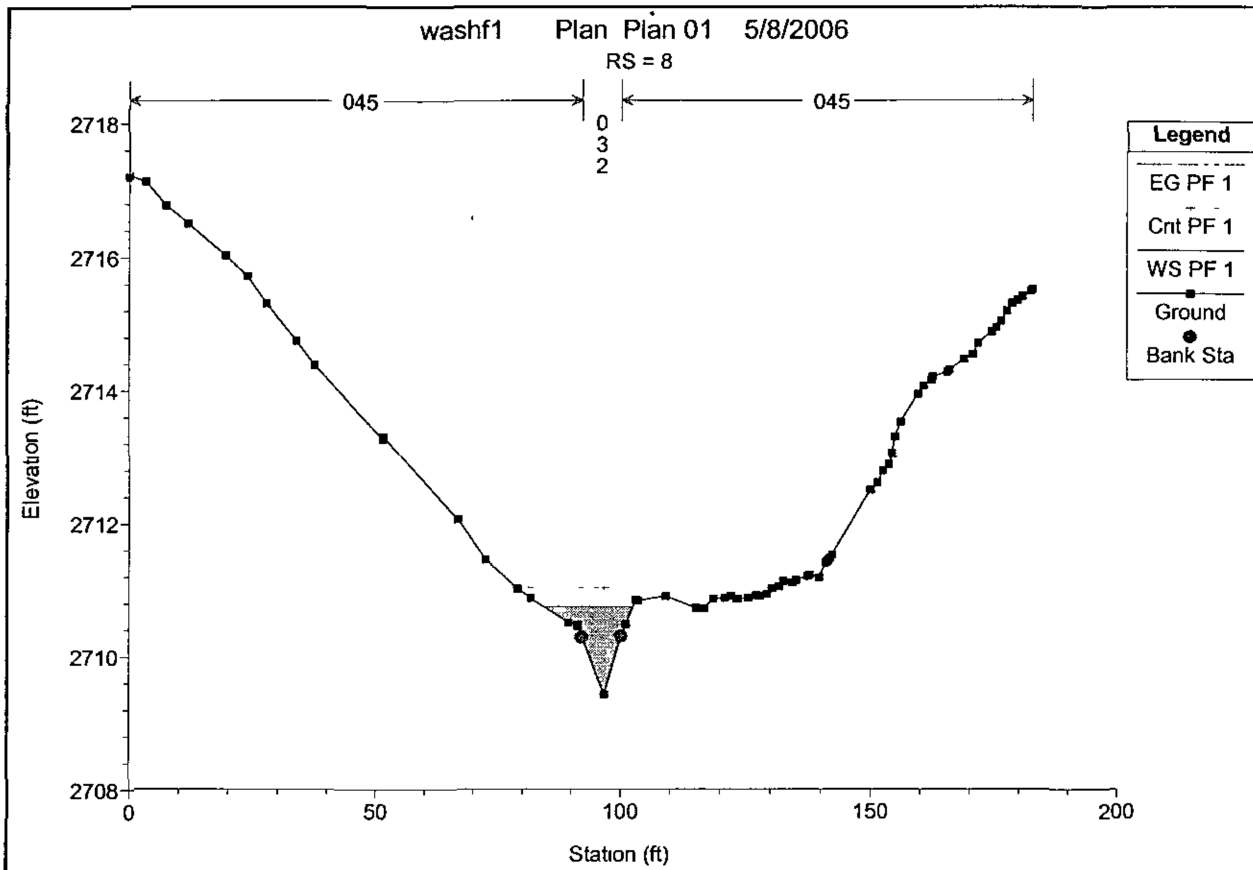
HEC-RAS Plan Imported Pla River RIVER-1 Reach Reach-1 Profile PF 1

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 82	2721 45	2721 45	2721 87	0 015739	5 17	9 85	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	129 00	2687 45	2689 80	2689 80	2690 42	0 012827	6 38	21 52	20 91	0 95
Reach-1	2	PF 1	258 00	2679 83	2682 33	2682 33	2683 02	0 009910	6 95	44 53	37 38	0 89
Reach-1	1	PF 1	258 00	2677 00	2679 50	2679 50	2680 04	0 016298	6 88	49 30	41 36	0 82

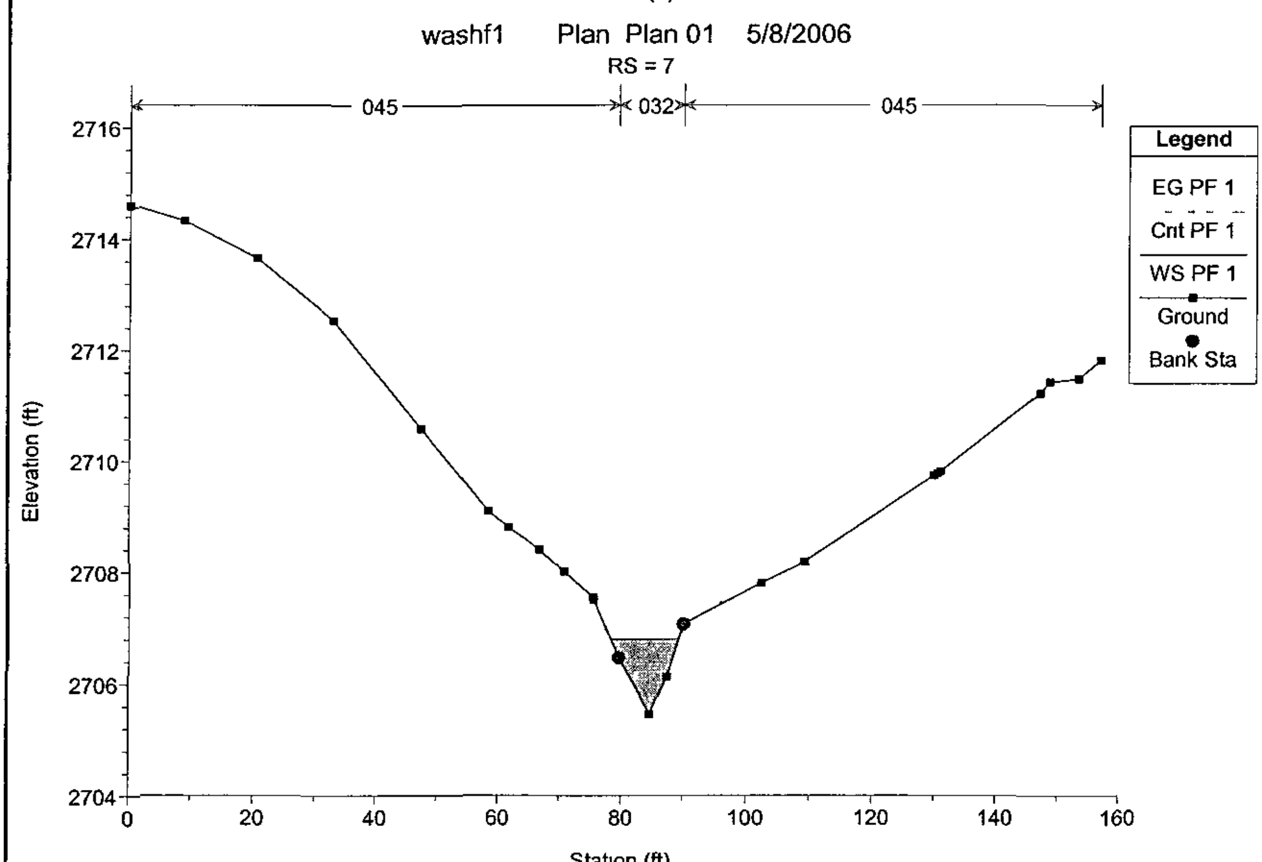
WASH F1

HEC-RAS Plan Plan 01 River RIVER-1 Reach Reach-1 Profile PF 1

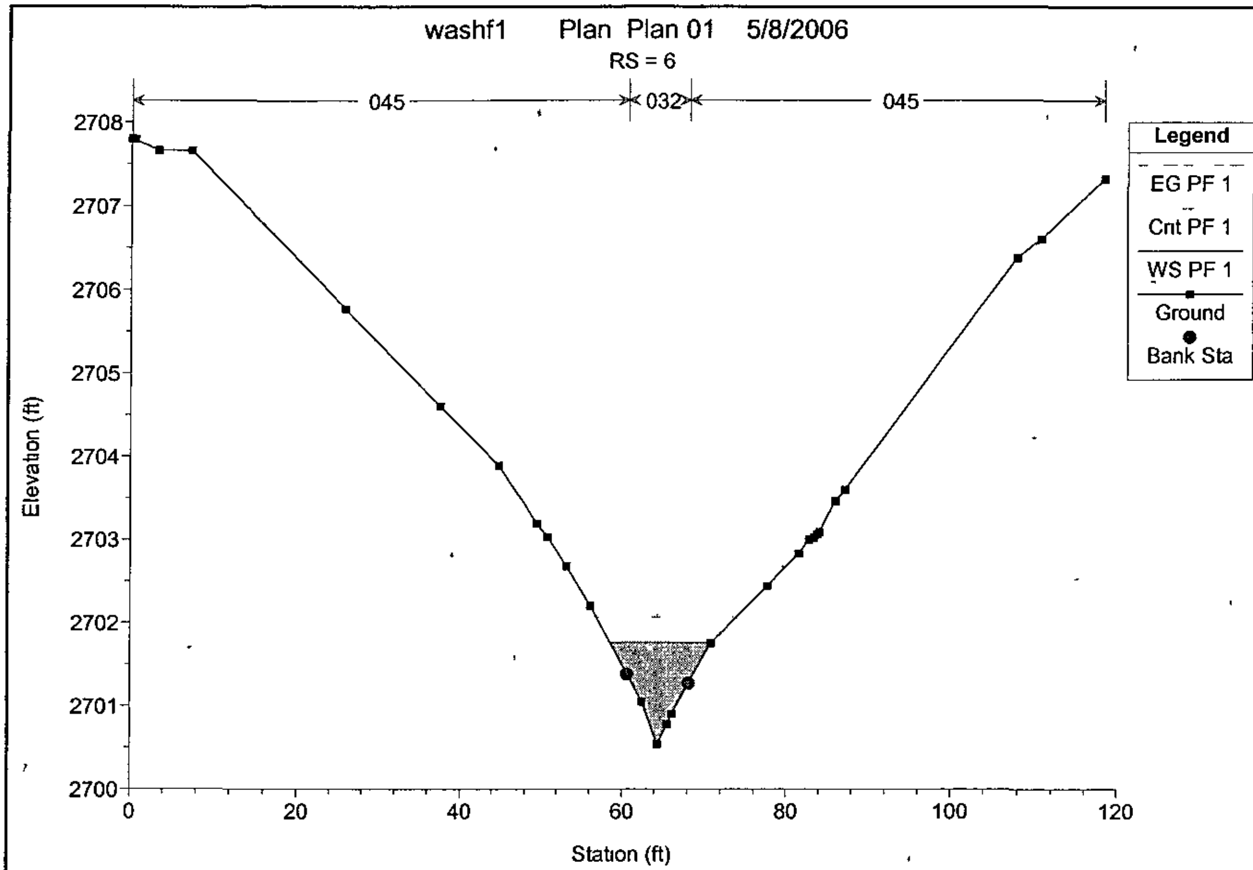
Reach	River Sta	Profile	Q Total	Min Ch El	W S Elev	Crit W S	E G Elev	E G Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	8	PF 1	50 00	2709 42	2710 74	2711 03	2711 38	0 025021	6 65	8 95	20 46	1 25
Reach-1	7	PF 1	50 00	2705 46	2706 81	2706 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	70 00	2692 65	2693 89	2694 04	2694 51	0 030515	6 32	11 17	17 42	1 34
Reach-1	3 5	PF 1	70 00	2689 00	2690 58	2690 58	2690 99	0 011182	5 40	15 90	22 12	0 87
Reach-1	3	PF 1	70 00	2686 57	2687 76	2688 03	2688 62	0 036115	7 47	9 68	14 54	1 48
Reach-1	2	PF 1	70 00	2681 90	2683 30	2683 31	2683 60	0 016888	4 45	17 26	34 61	0 98
Reach-1	1	PF 1	93 00	2677 60	2678 78	2679 00	2679 47	0 035483	6 95	17 02	53 71	1 45



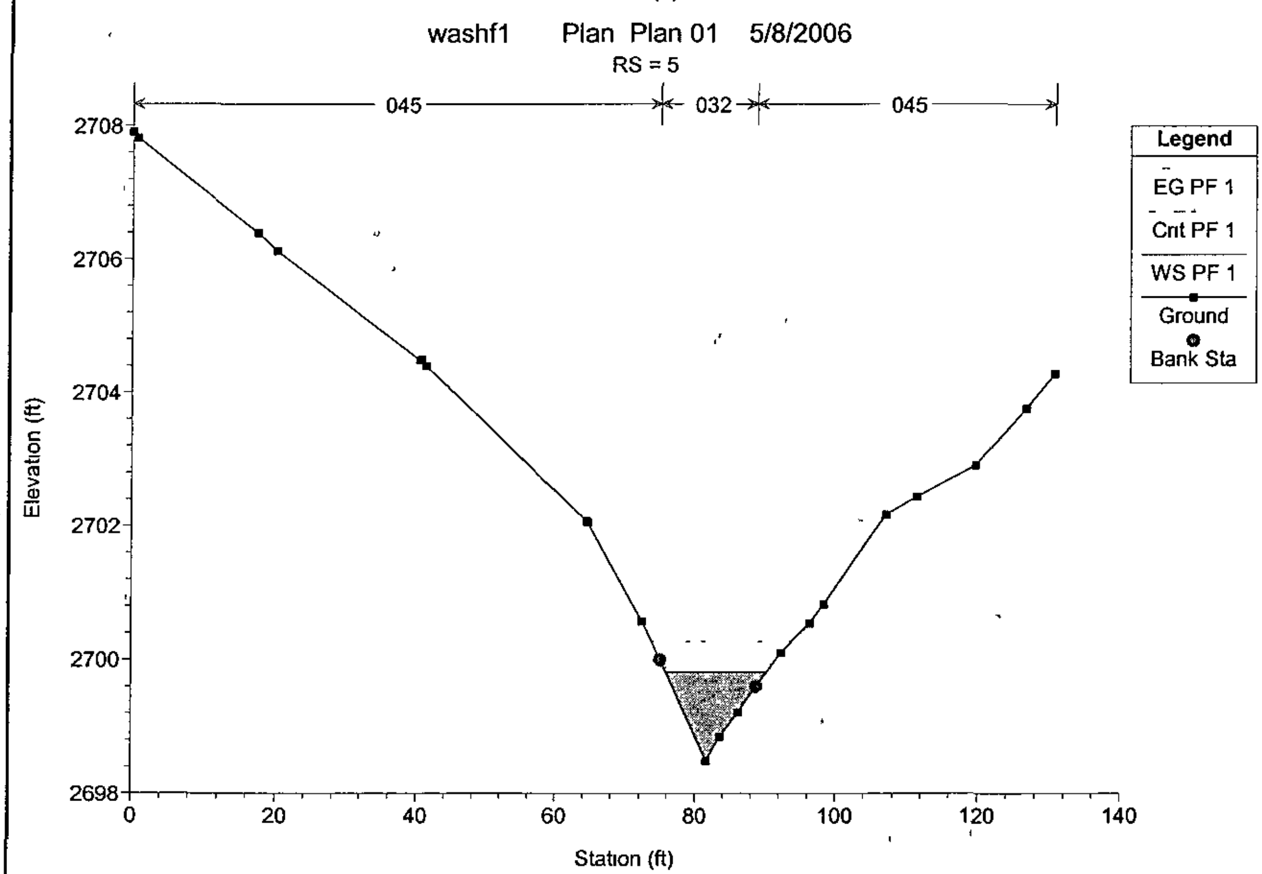
washf1 Plan Plan 01 5/8/2006
RS = 8
045
0
3
2
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2708
2710
2712
2714
2716
2718
0
50
100
150
200
Station (ft)



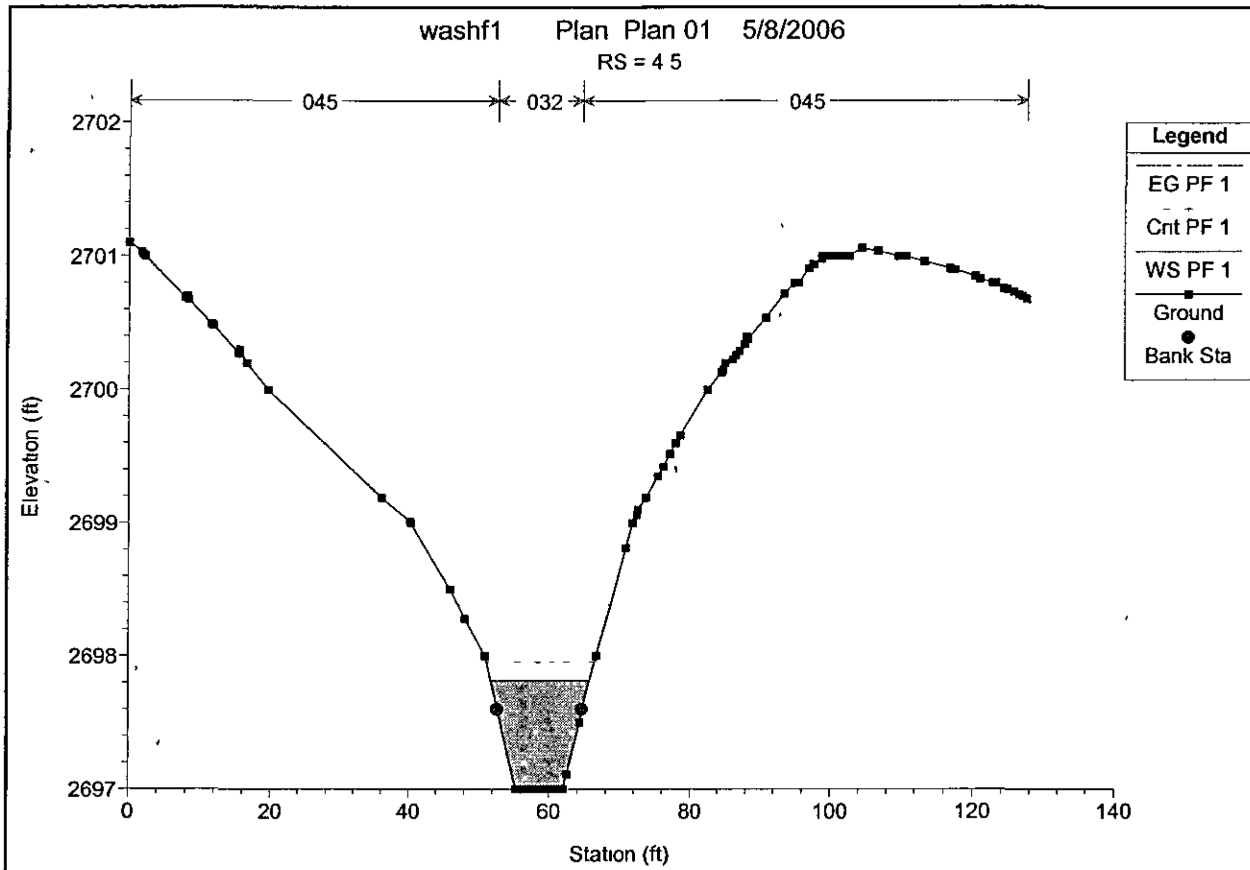
washf1 Plan Plan 01 5/8/2006
RS = 7
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2704
2706
2708
2710
2712
2714
2716
0
20
40
60
80
100
120
140
160
Station (ft)

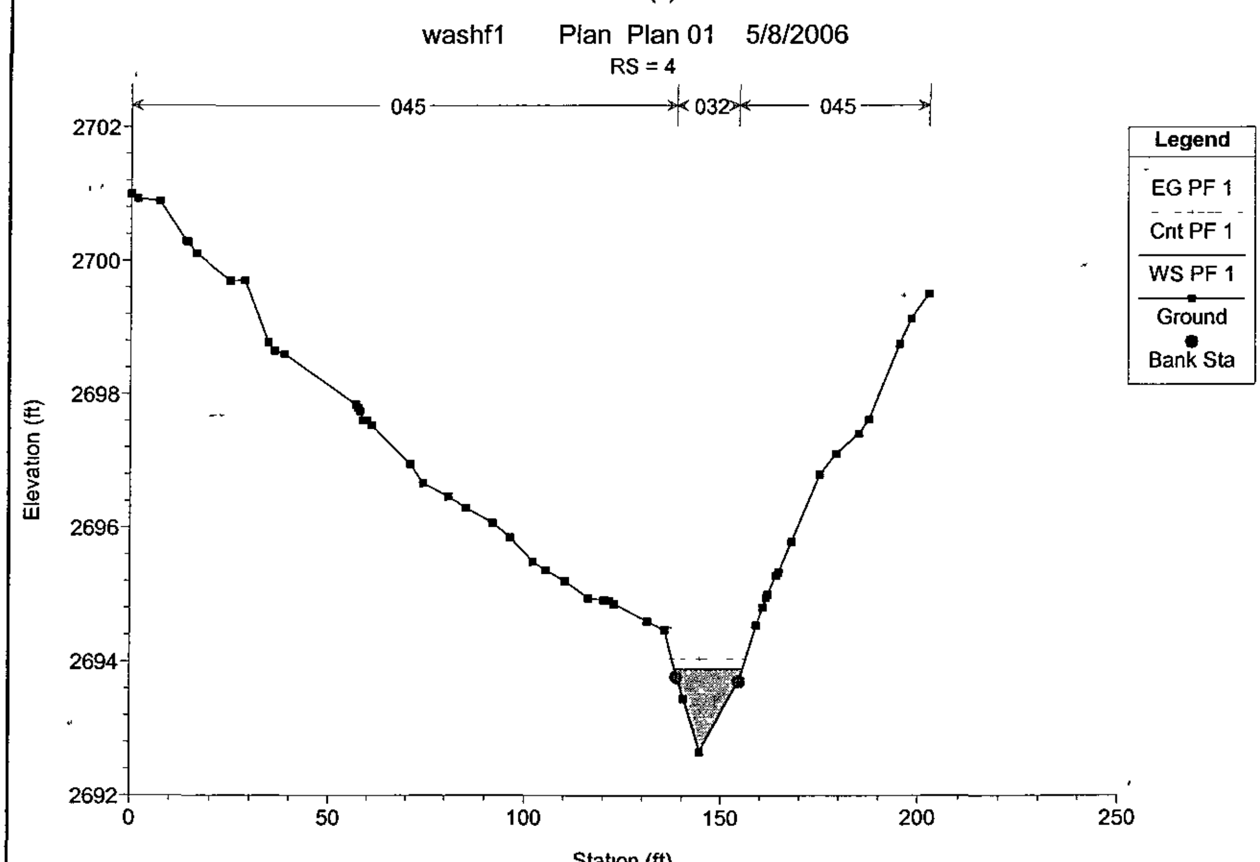


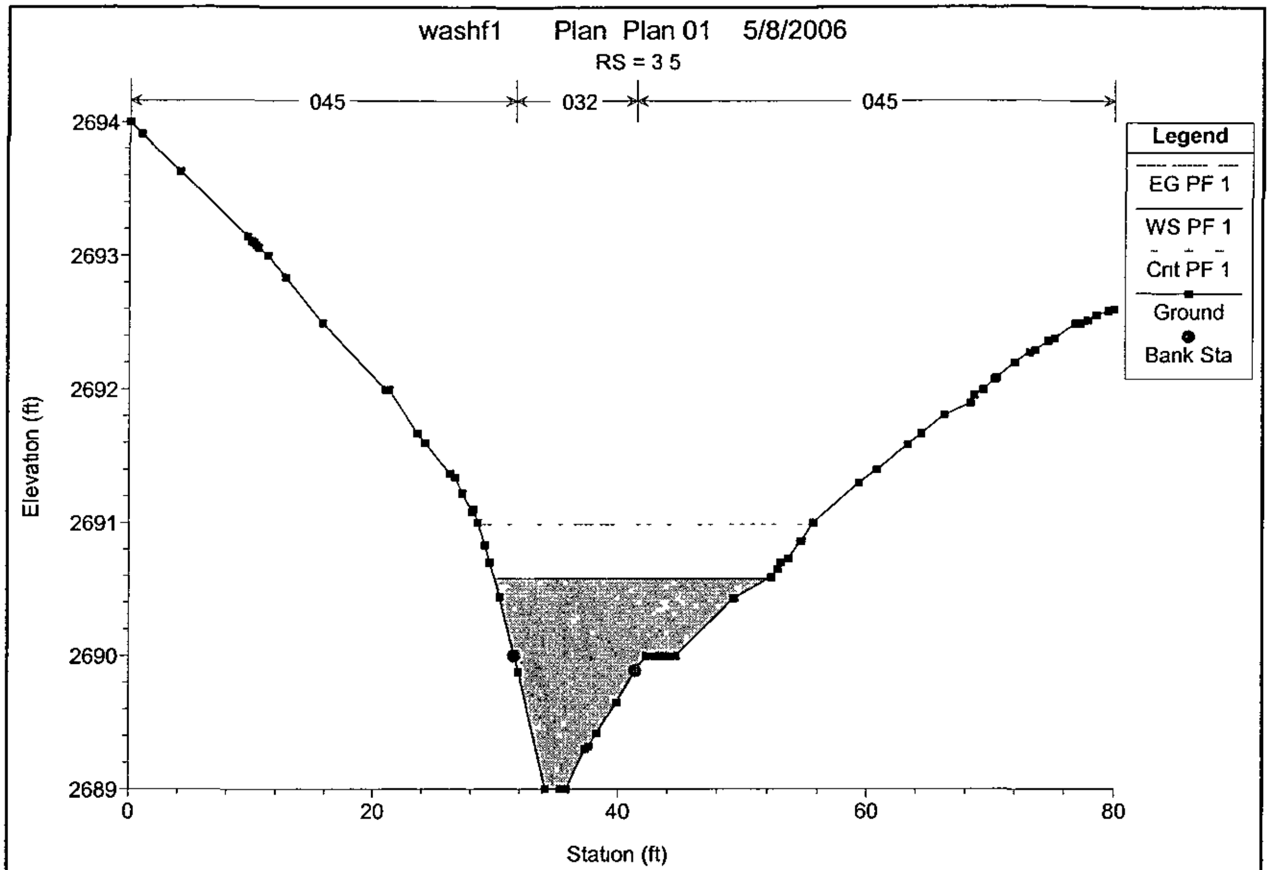
washf1 Plan Plan 01 5/8/2006
RS = 6
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2700
2701
2702
2703
2704
2705
2706
2707
2708
0
20
40
60
80
100
120
Station (ft)

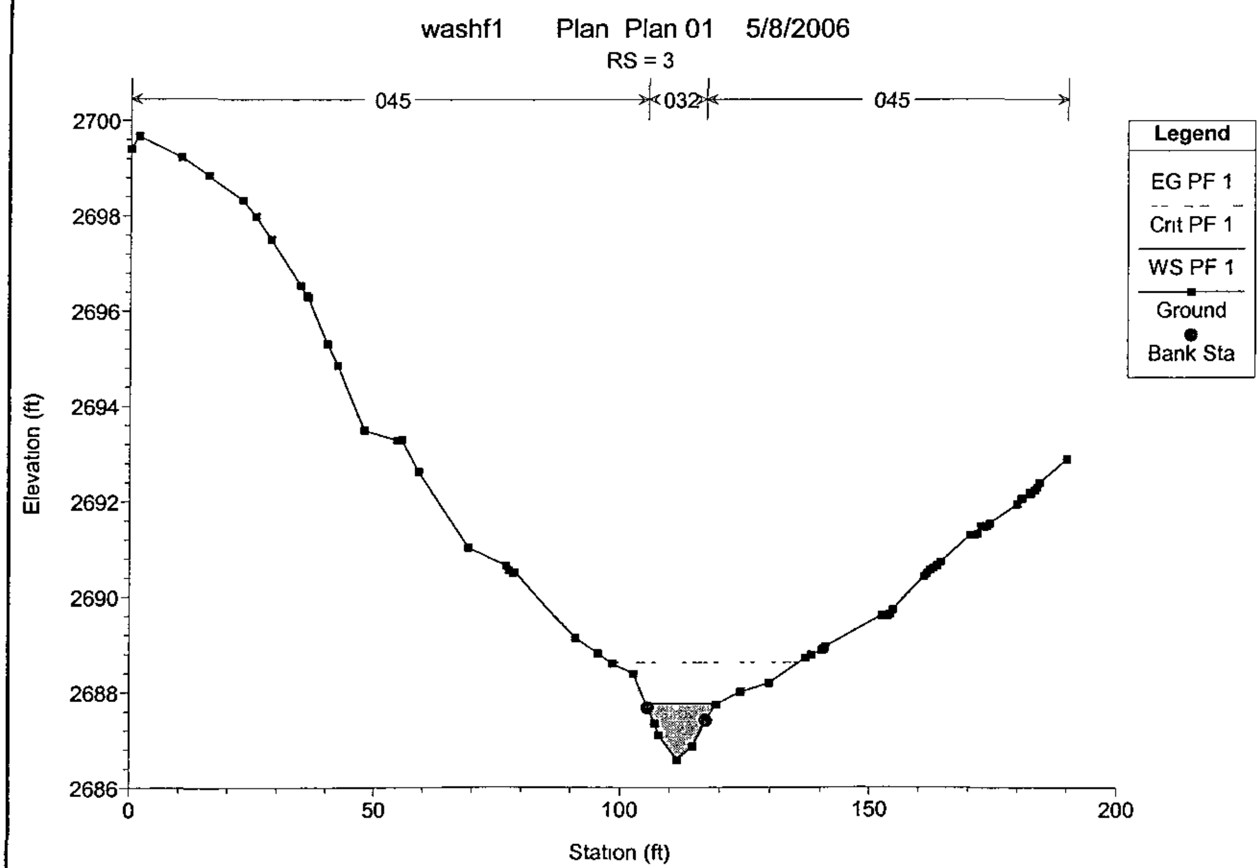


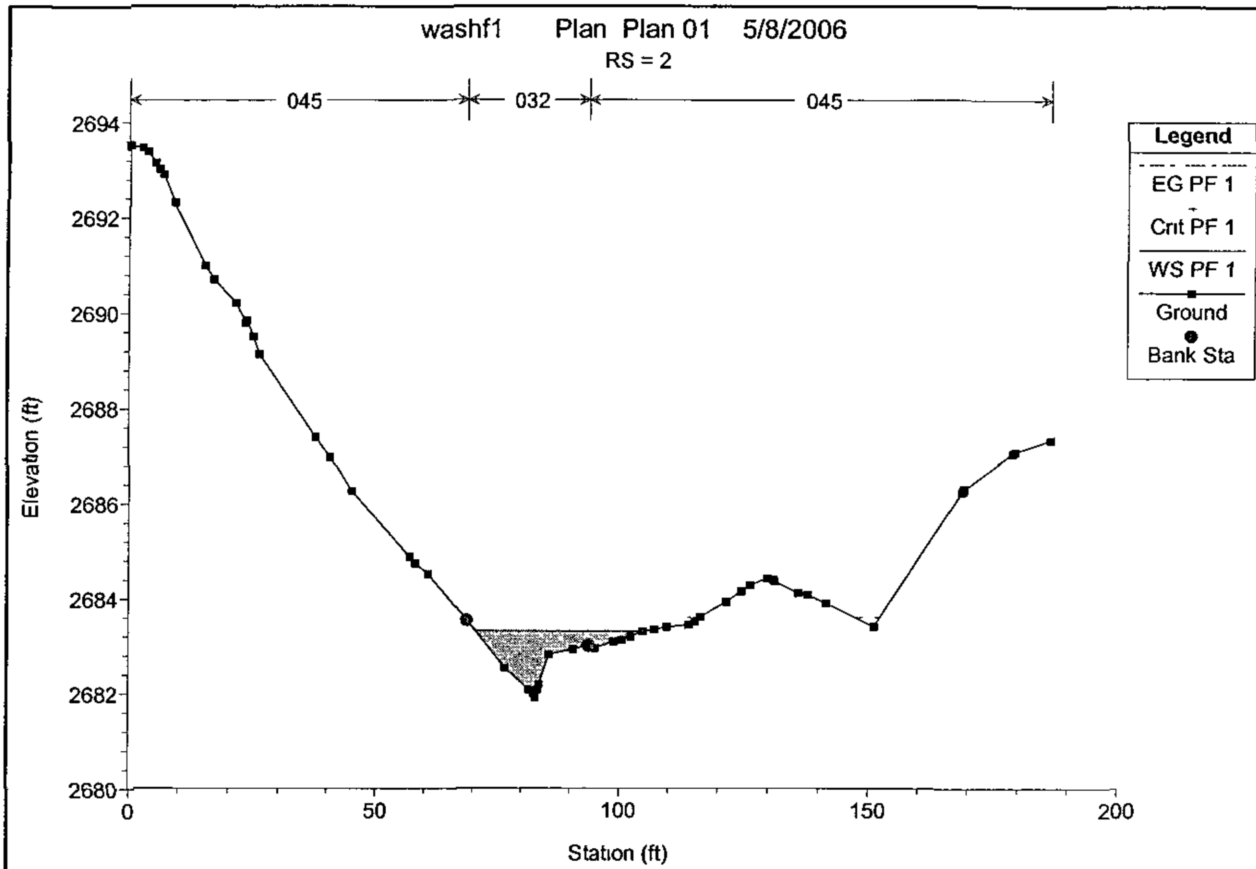
washf1 Plan Plan 01 5/8/2006
RS = 5
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2698
2700
2702
2704
2706
2708
0
20
40
60
80
100
120
140
Station (ft)

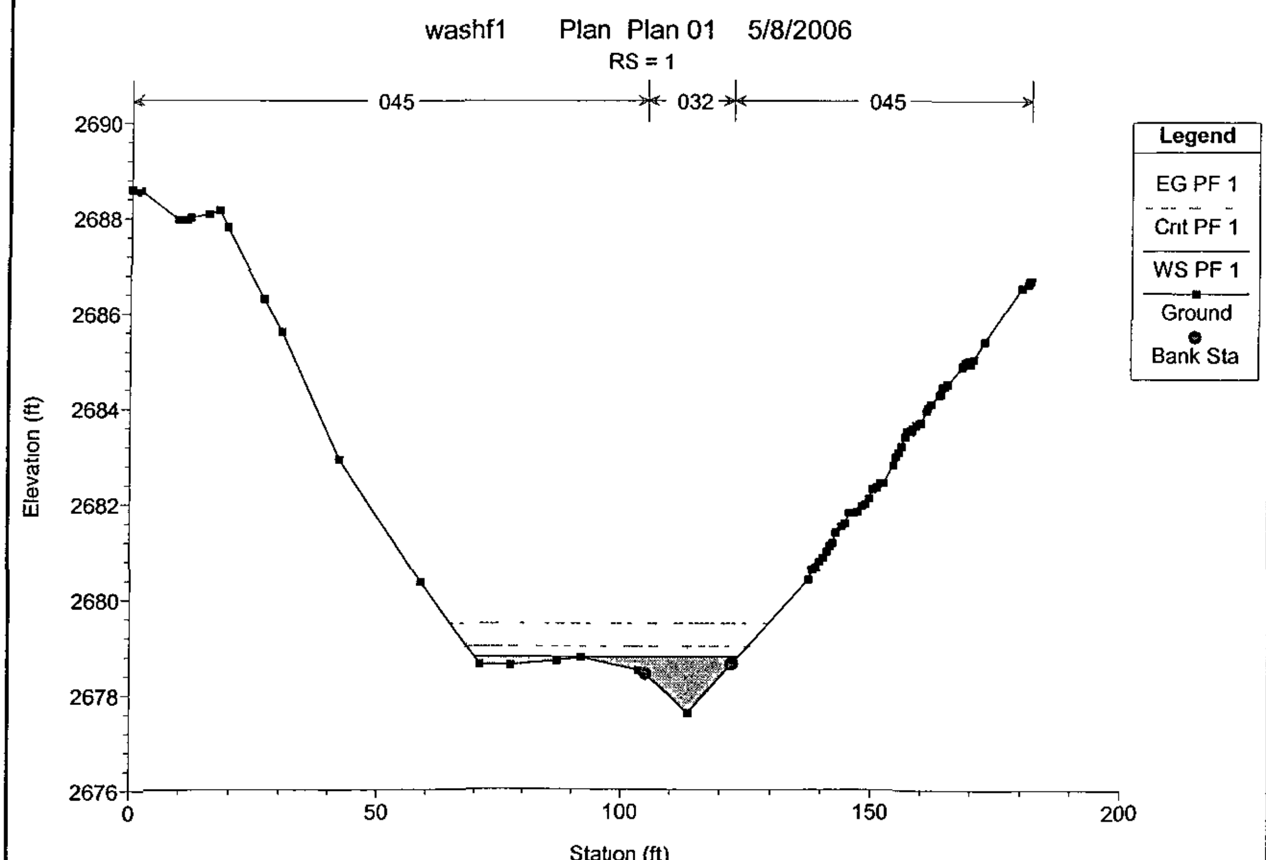

washf1 Plan Plan 01 5/8/2006
RS = 4 5
045
032
045
Elevation (ft)
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta


washf1 Plan Plan 01 5/8/2006
RS = 4
045
032
045
Elevation (ft)
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta


washf1 Plan Plan 01 5/8/2006
RS = 3 5
045
032
045
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2694
2693
2692
2691
2690
2689
0
20
40
60
80


washf1 Plan Plan 01 5/8/2006
RS = 3
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2700
2698
2696
2694
2692
2690
2688
2686
0
50
100
150
200

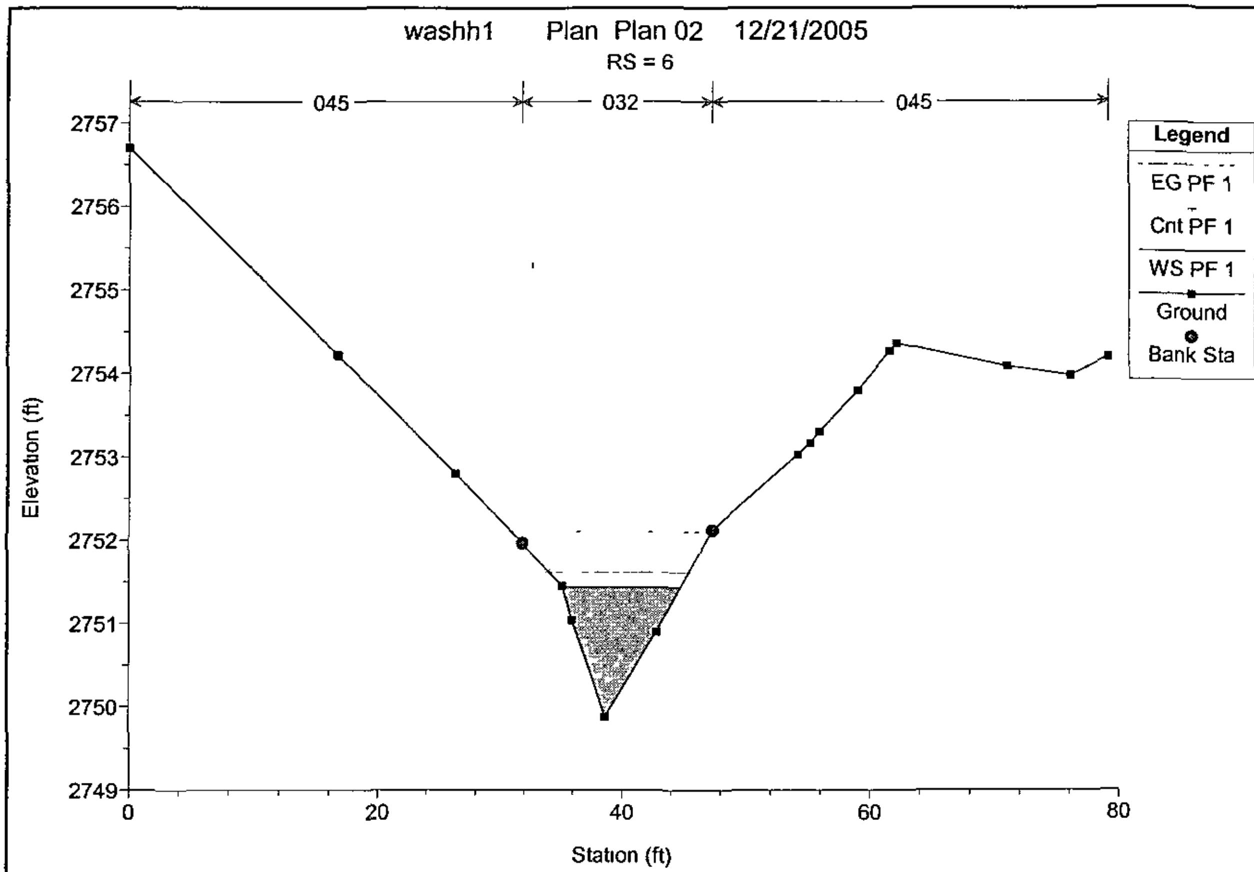

washf1 Plan Plan 01 5/8/2006
RS = 2
045
032
045
Elevation (ft)
Station (ft)
2694
2692
2690
2688
2686
2684
2682
2680
0
50
100
150
200
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta


washf1 Plan Plan 01 5/8/2006
RS = 1
045
032
045
Elevation (ft)
Station (ft)
2690
2688
2686
2684
2682
2680
2678
2676
0
50
100
150
200
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta

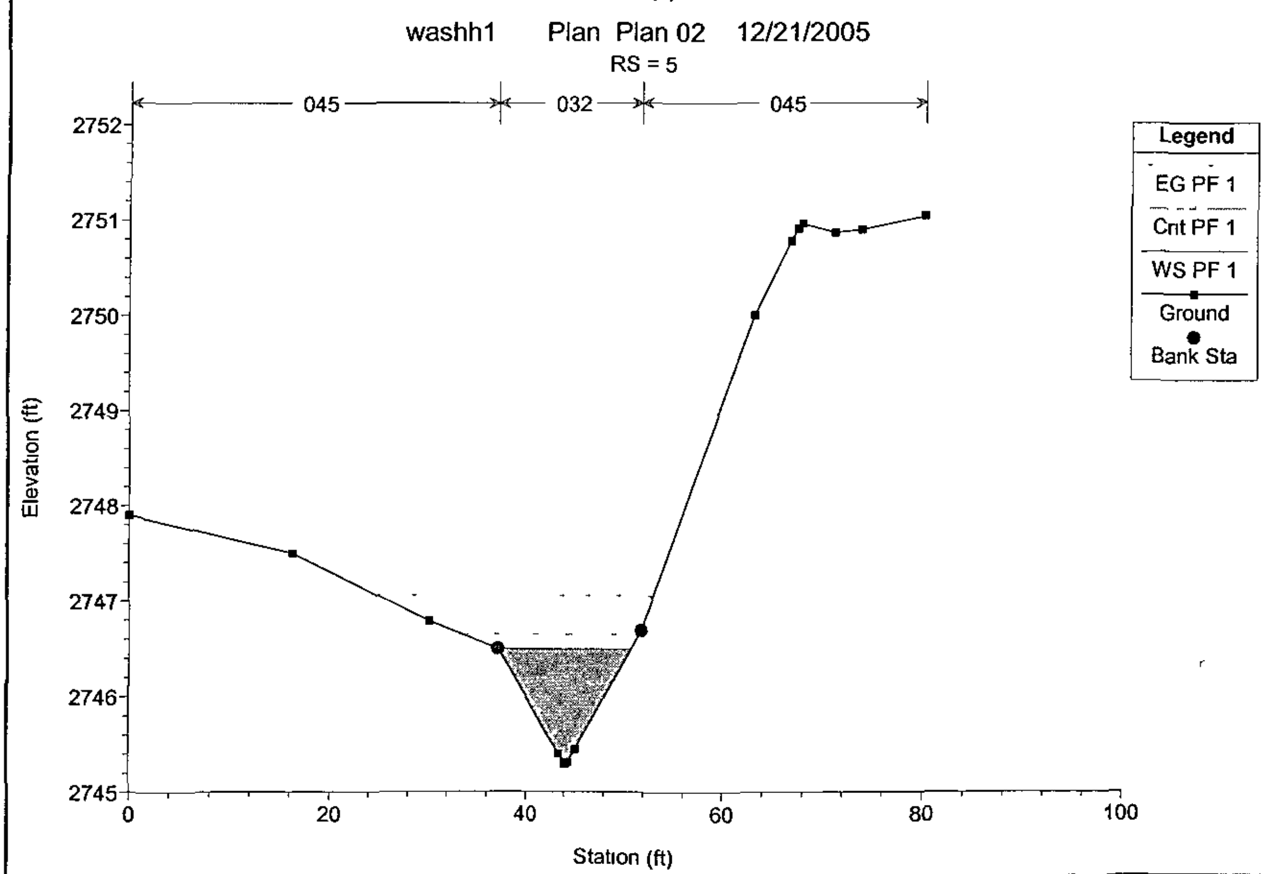
WASH H1

HEC-RAS Plan Plan 02 River RIVER 1 Reach Reach-1 Profile PF 1

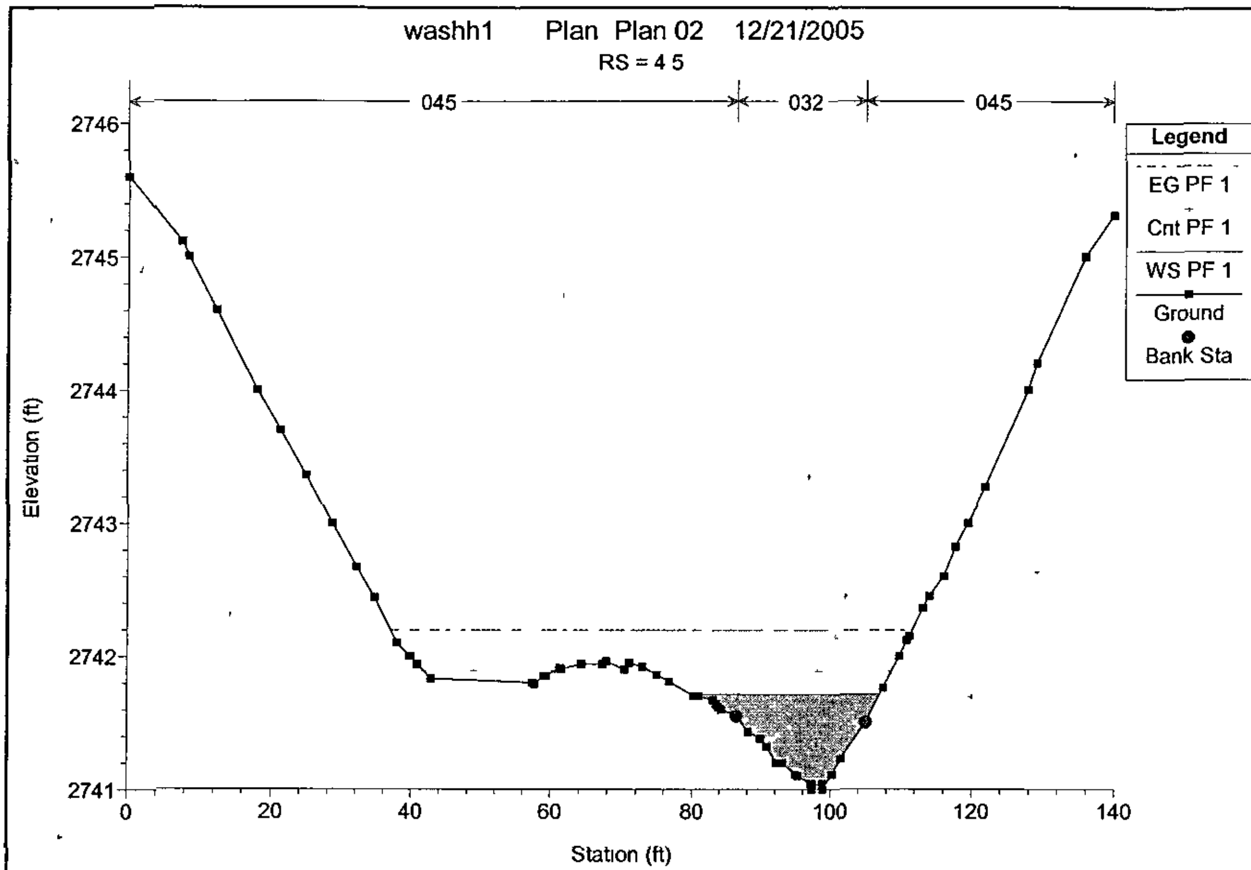
Reach	River Sta	Profile	Q Total	Min Ch El	W S Elev	Crit W S	E G Elev	E G Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	6	PF 1	50 00	2749 88	2751 43	2751 61	2752 10	0 028975	6 55	7 63	9 59	1 29
Reach-1	5	PF 1	50 00	2745 29	2746 49	2746 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	100 00	2737 70	2739 07	2739 15	2739 46	0 029073	4 98	20 28	43 02	1 24
Reach-1	3	PF 1	100 00	2732 24	2733 47	2733 71	2734 20	0 032501	6 95	16 31	45 91	1 40
Reach-1	2	PF 1	143 00	2725 11	2726 77	2726 94	2727 42	0 035977	6 47	22 20	36 12	1 43
Reach 1	1 5	PF 1	143 00	2723 00	2724 13	2724 22	2724 63	0 017888	5 81	27 34	40 51	1 07
Reach-1	1	PF 1	143 00	2720 27	2720 72	2720 96	2721 55	0 204067	7 72	19 60	64 59	2 88

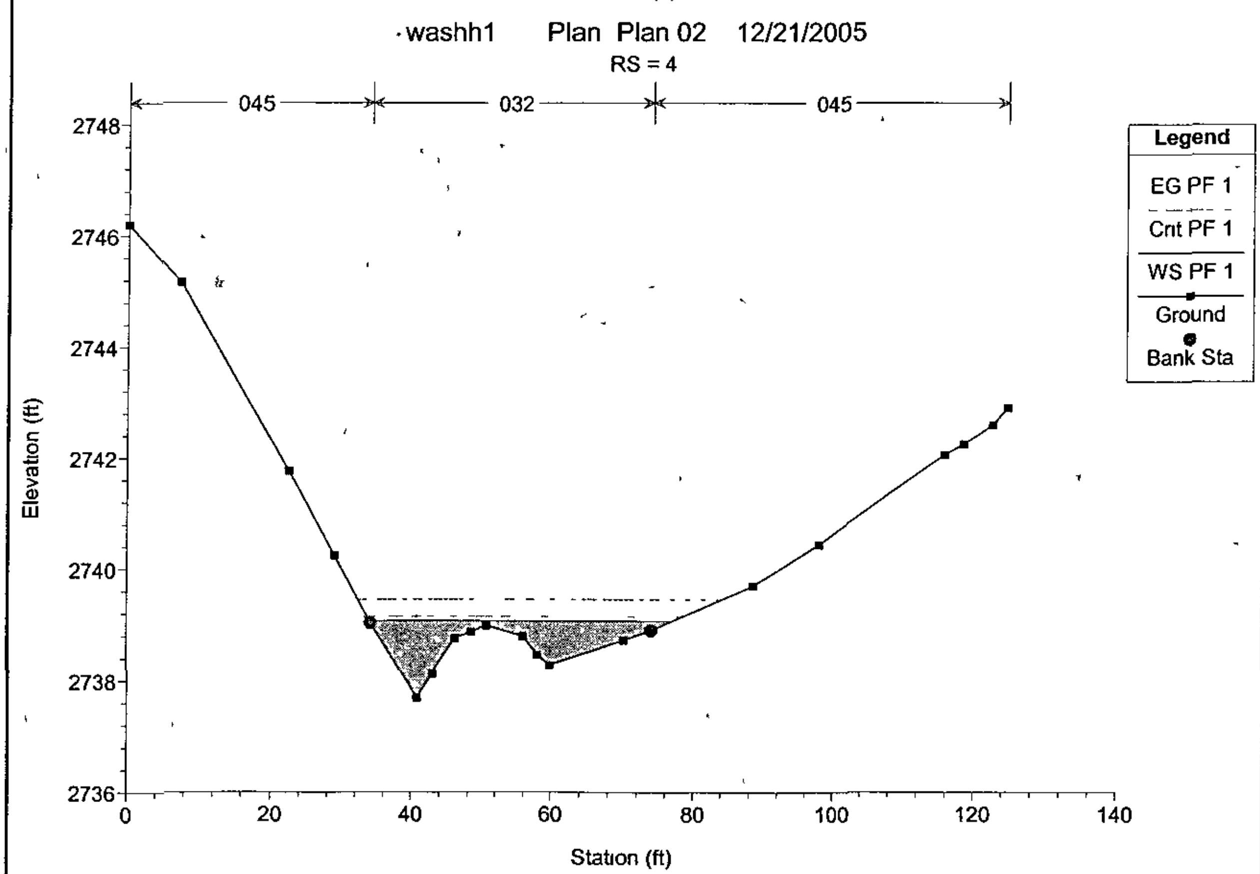


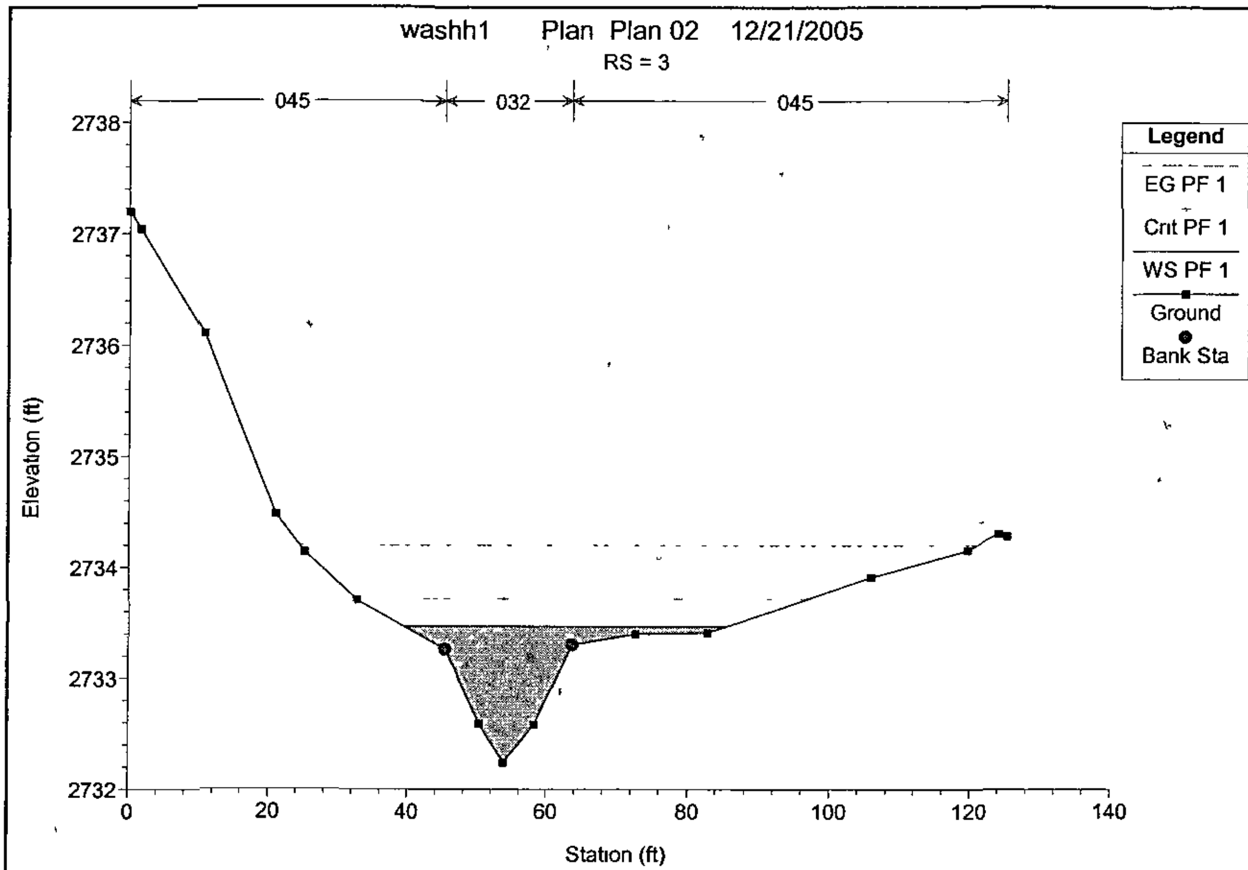
washh1 Plan Plan 02 12/21/2005
RS = 6
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2757
2756
2755
2754
2753
2752
2751
2750
2749
0
20
40
60
80
Station (ft)

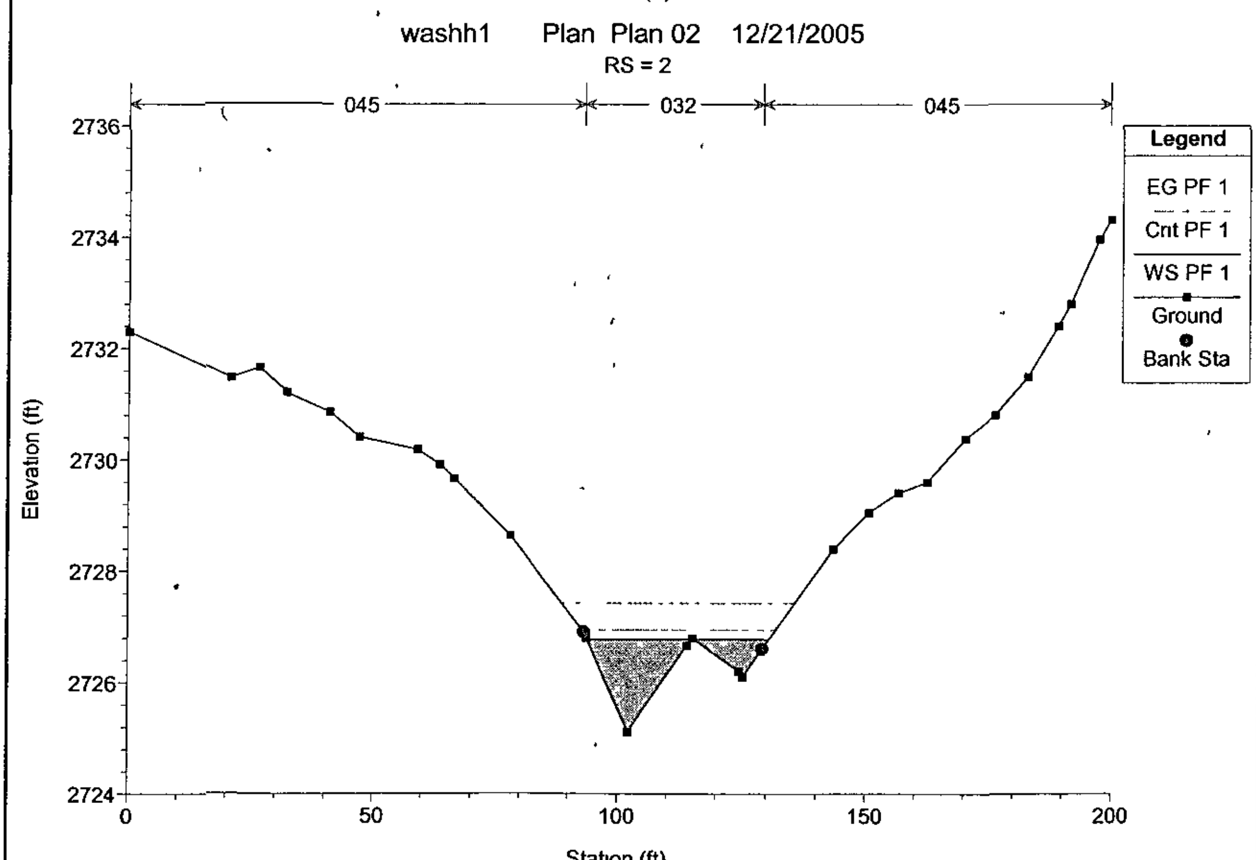


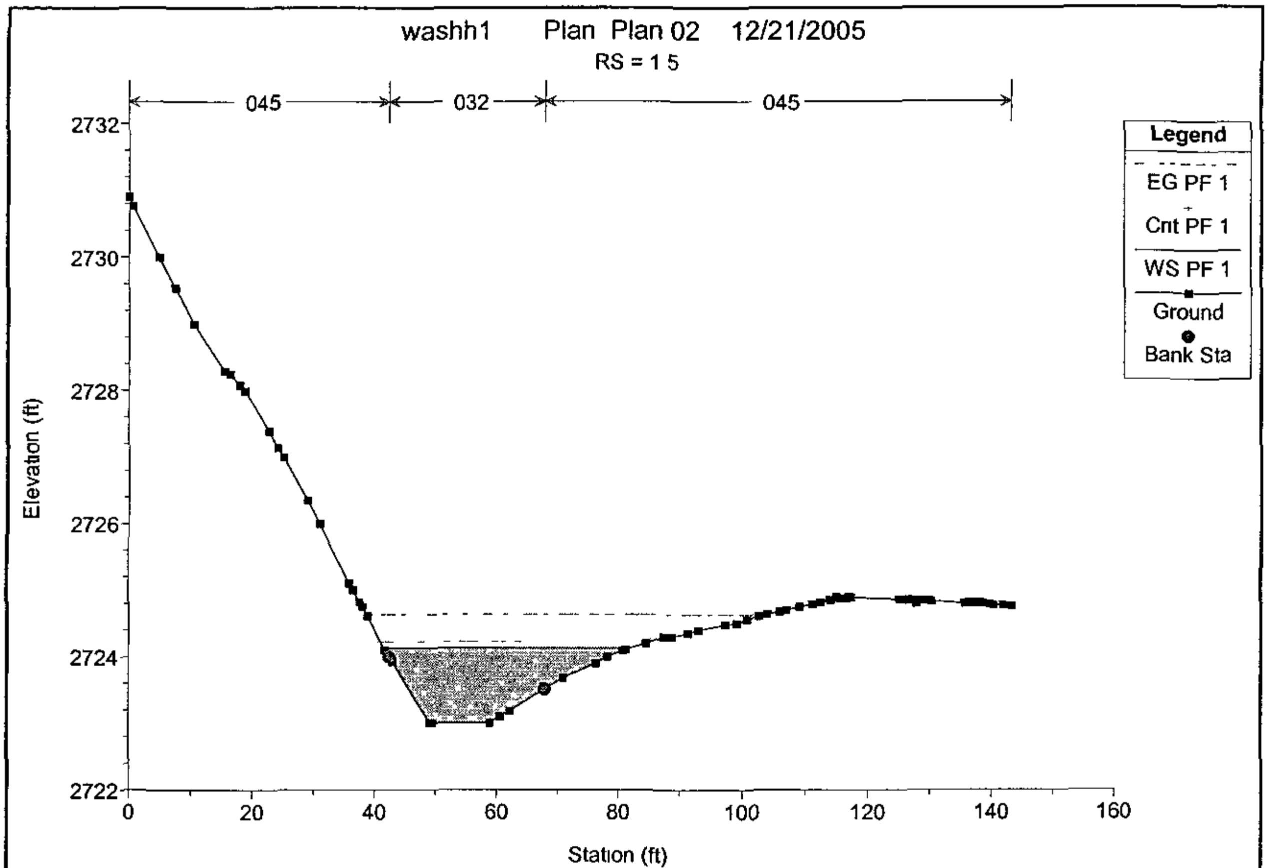
washh1 Plan Plan 02 12/21/2005
RS = 5
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2752
2751
2750
2749
2748
2747
2746
2745
0
20
40
60
80
100
Station (ft)

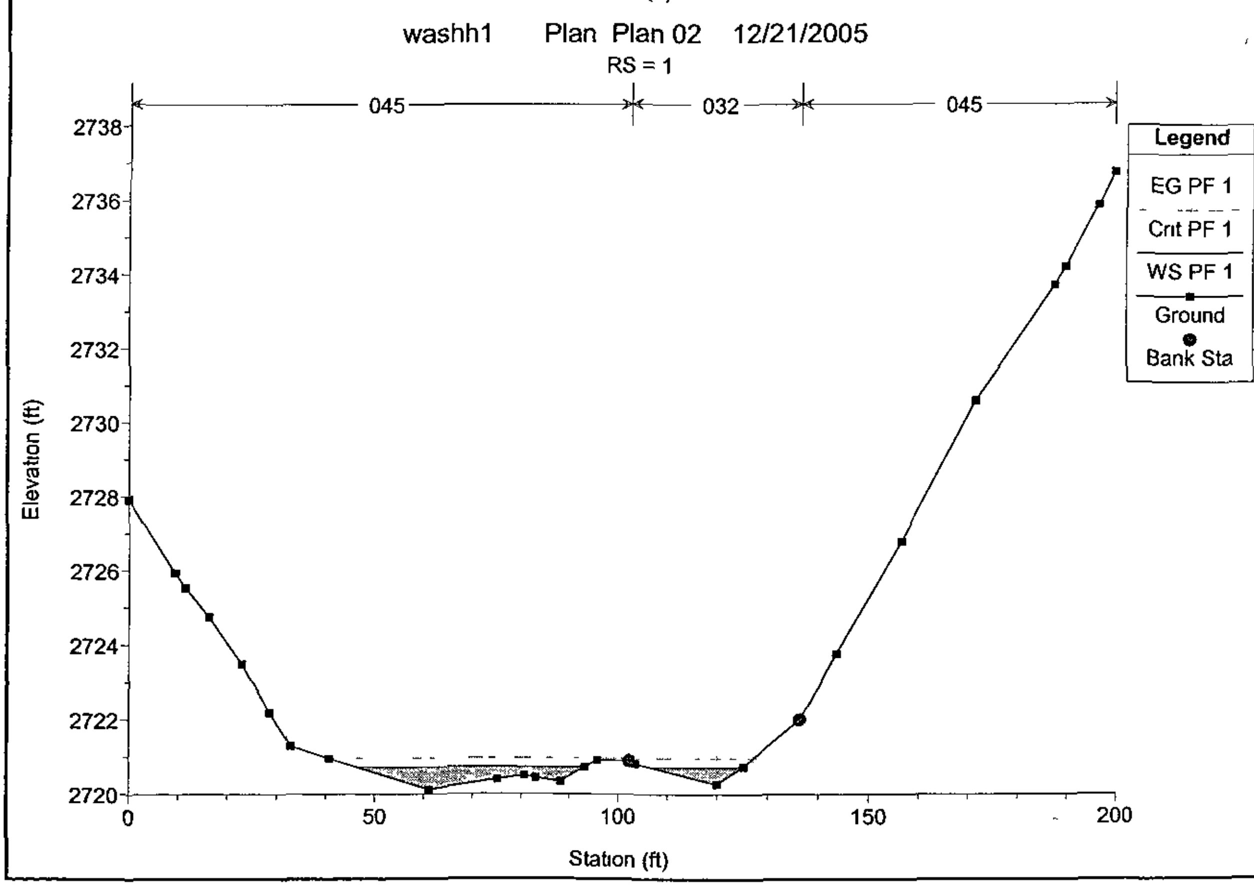

washh1 Plan Plan 02 12/21/2005
RS = 4 5
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


washh1 Plan Plan 02 12/21/2005
RS = 4
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


washh1 Plan Plan 02 12/21/2005
RS = 3
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2732
2733
2734
2735
2736
2737
2738
0
20
40
60
80
100
120
140


washh1 Plan Plan 02 12/21/2005
RS = 2
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2724
2726
2728
2730
2732
2734
2736
0
50
100
150
200

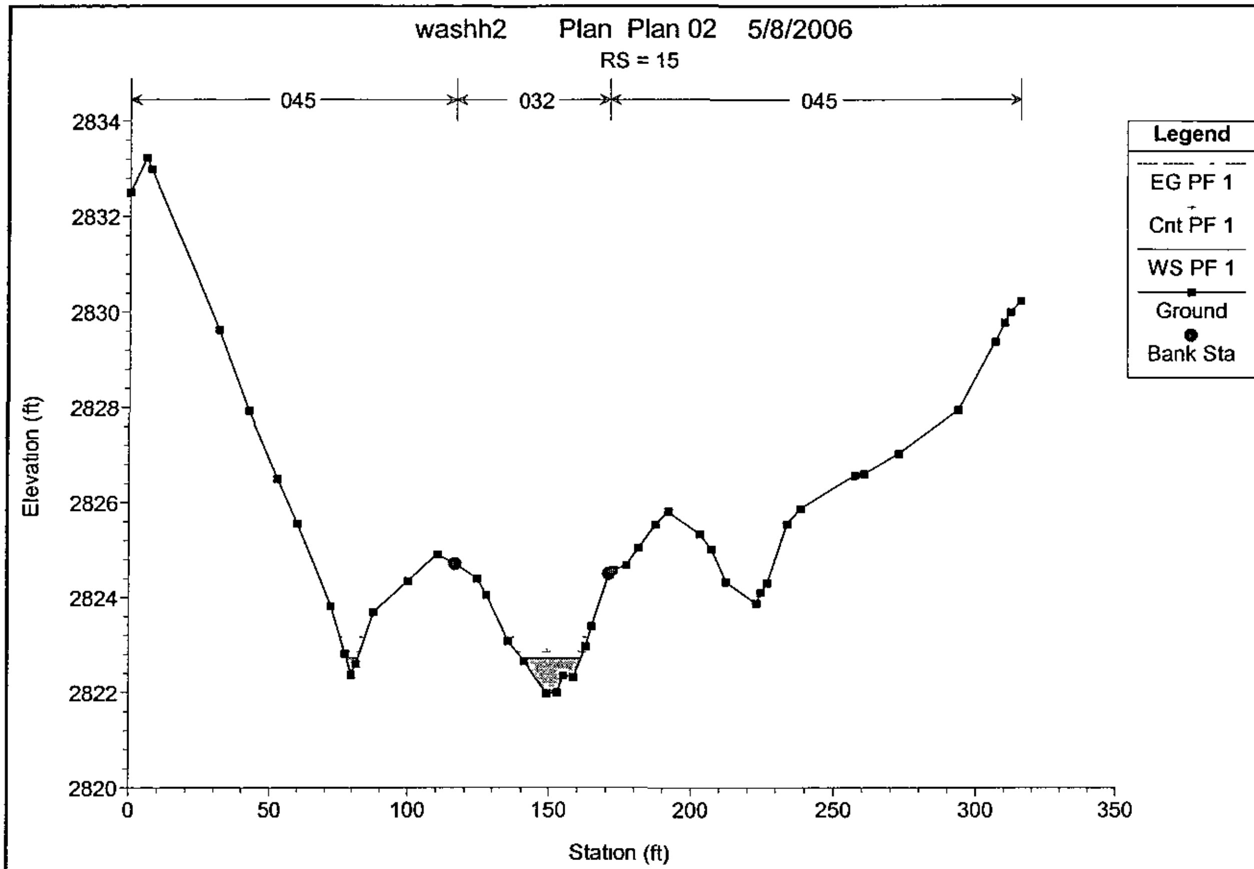

washh1 Plan Plan 02 12/21/2005
RS = 1 5
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2732
2730
2728
2726
2724
2722
0
20
40
60
80
100
120
140
160
Station (ft)

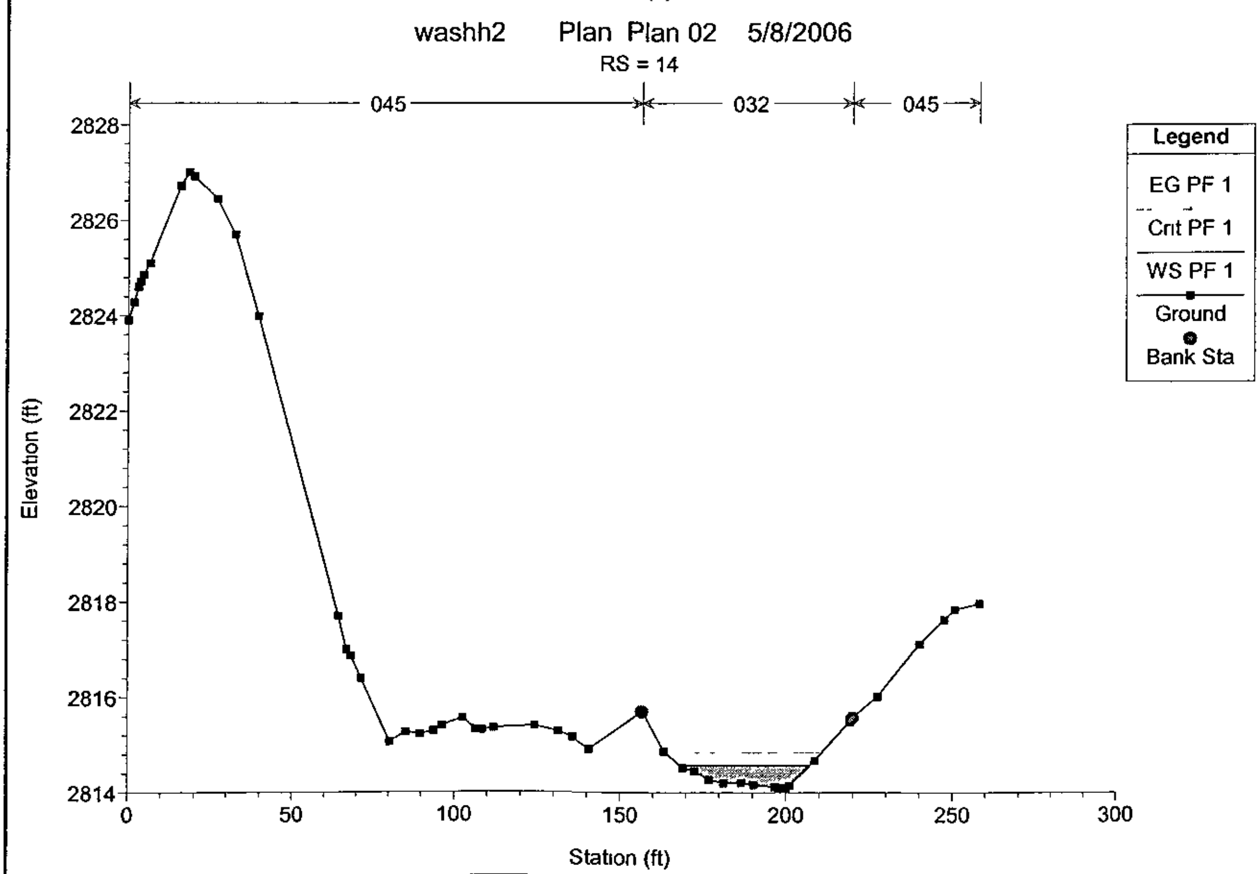

washh1 Plan Plan 02 12/21/2005
RS = 1
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2738
2736
2734
2732
2730
2728
2726
2724
2722
2720
0
50
100
150
200
Station (ft)

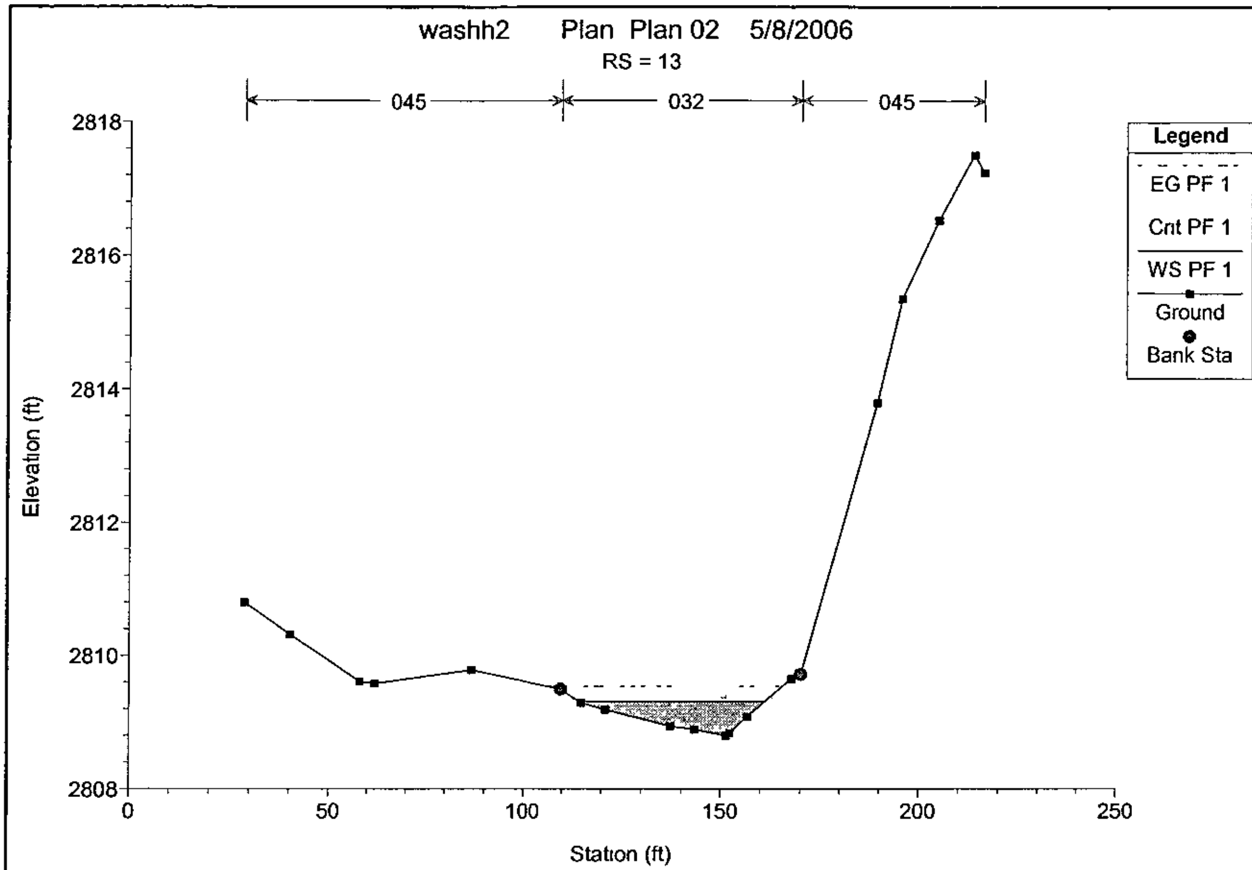
WASH H2

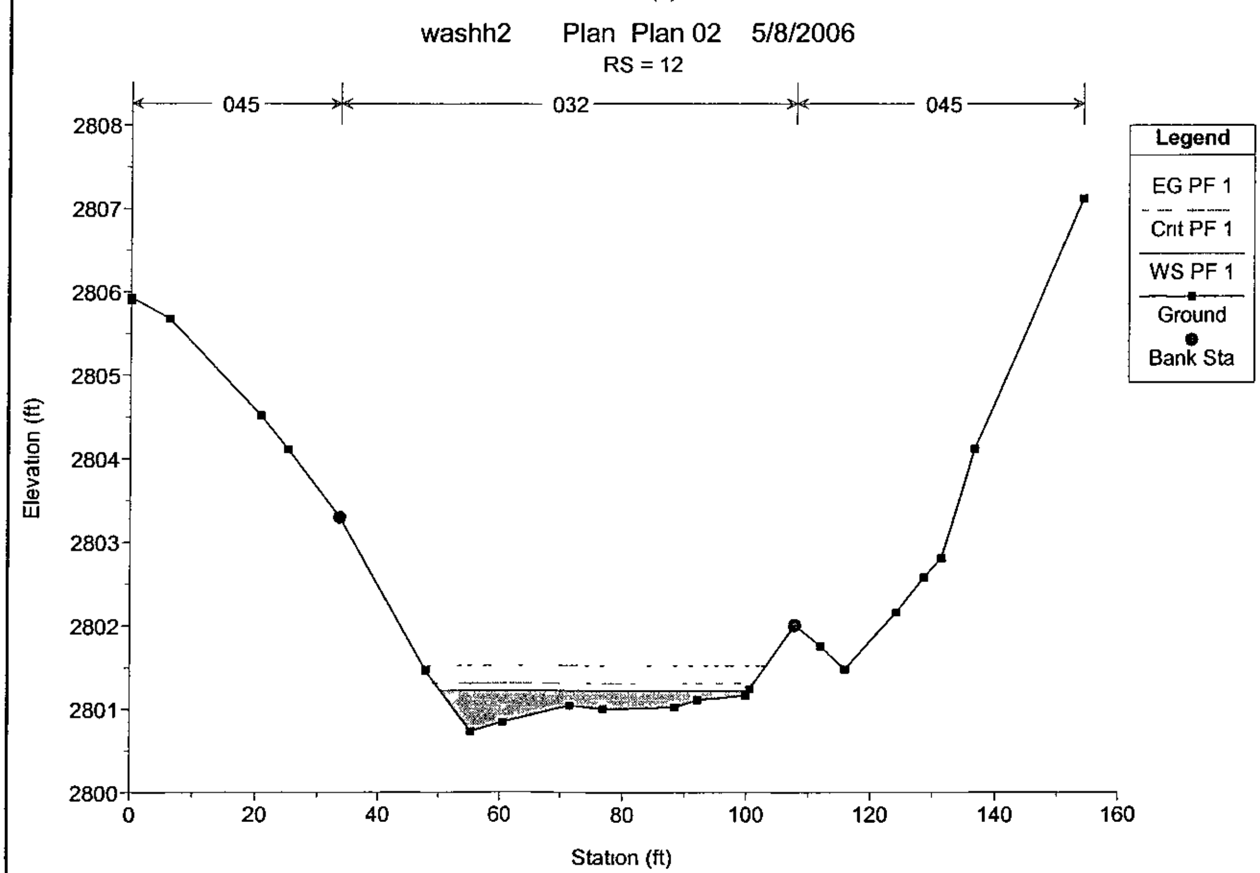
HEC-RAS Plan Plan 02 River RIVER 1 Reach Reach-1 Profile PF 1

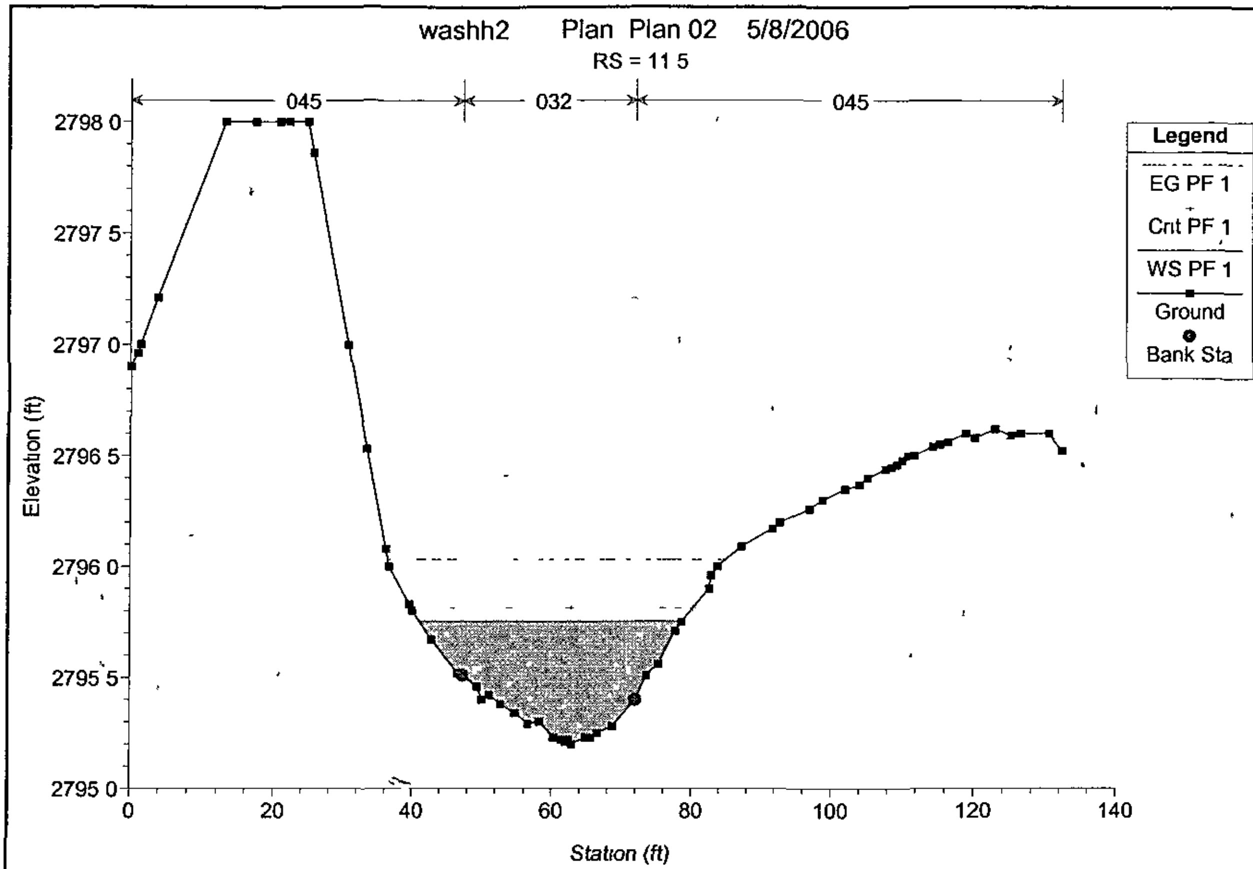
Reach	River Sta	Profile	Q Total	Min Ch El	W S Elev	Crit W S	E G Elev	E G Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	15	PF 1	50 00	2821 98	2822 72	2822 85	2823 16	0 043048	5 45	9 64	25 05	1 47
Reach-1	14	PF 1	50 00	2814 10	2814 57	2814 63	2814 83	0 038257	4 15	12 04	38 90	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 18	2775 37	2775 73	0 031554	6 25	21 64	59 62	1 35
Reach-1	9	PF 1	110 00	2764 93	2766 03	2766 36	2767 05	0 052813	8 09	13 60	20 48	1 75
Reach-1	8 5	PF 1	110 00	2761 97	2762 95	2762 99	2763 16	0 009532	4 32	45 50	141 00	0 79
Reach-1	8	PF 1	110 00	2757 40	2757 99	2758 35	2760 10	0 469743	11 66	9 51	46 80	4 35
Reach-1	7	PF 1	110 00	2751 66	2752 64	2752 66	2752 98	0 016236	4 71	24 75	45 62	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	161 00	2735 23	2736 20	2736 52	2737 24	0 053455	8 19	19 67	29 43	1 76
Reach-1	1	PF 1	161 00	2731 01	2731 61	2731 79	2732 24	0 047739	6 39	25 19	50 01	1 59

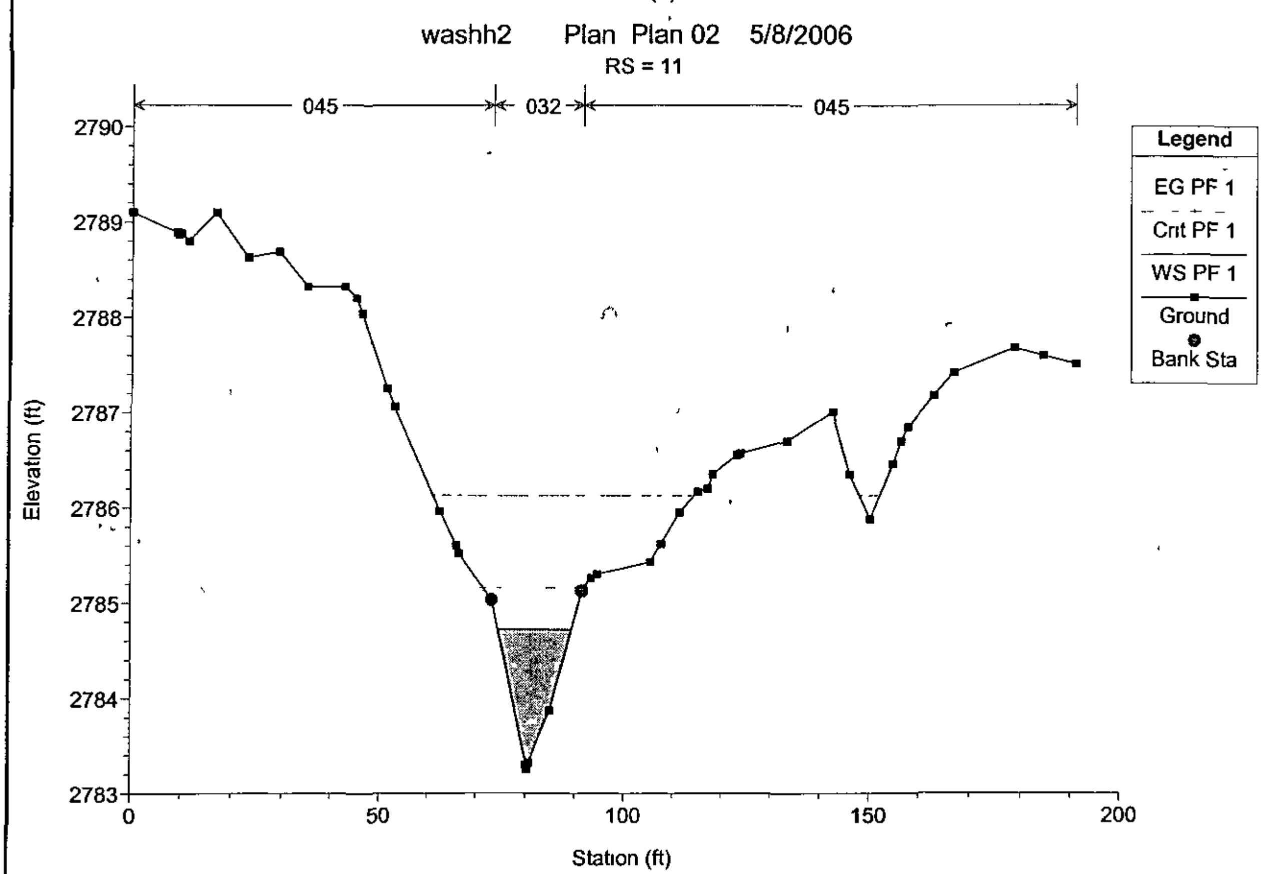

washh2 Plan Plan 02 5/8/2006
RS = 15
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2834
2832
2830
2828
2826
2824
2822
2820
0
50
100
150
200
250
300
350

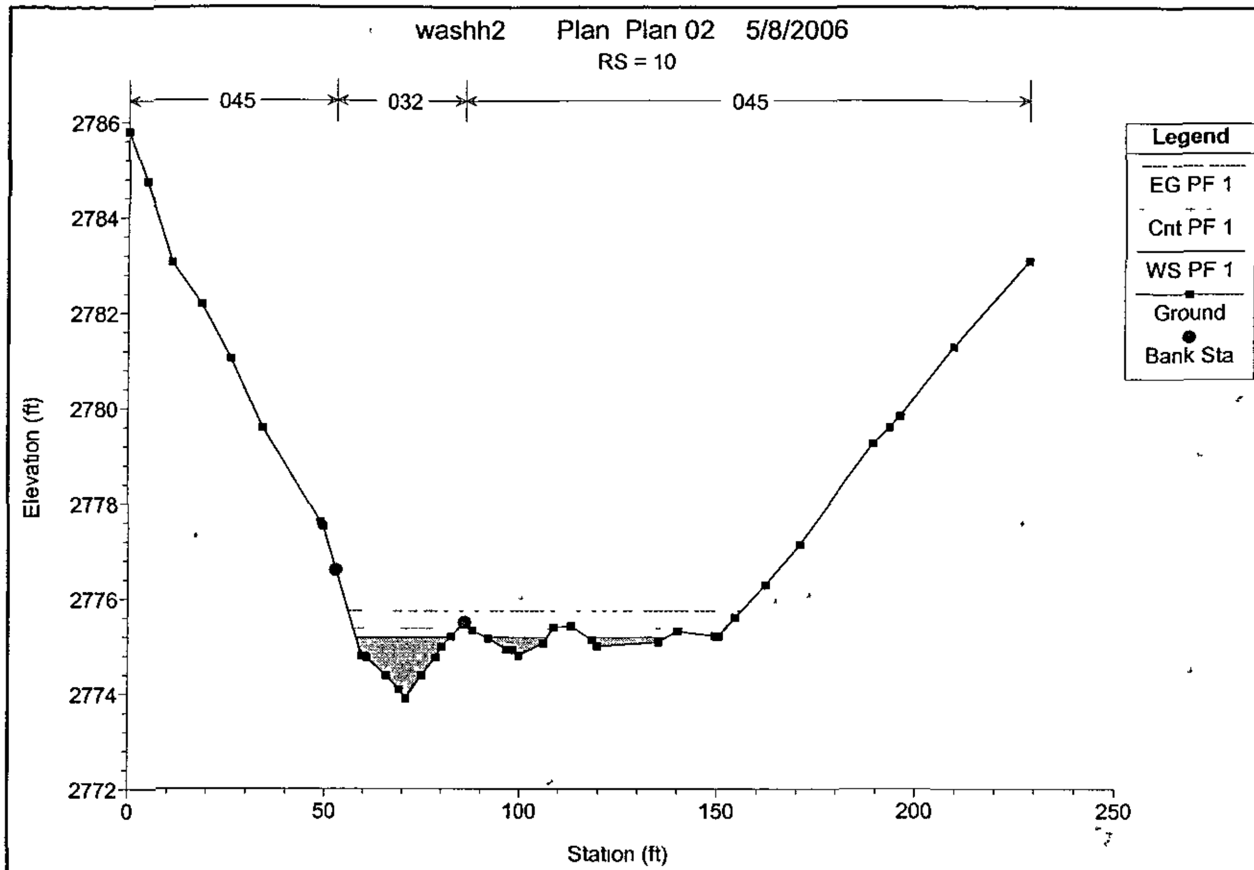

washh2 Plan Plan 02 5/8/2006
RS = 14
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2828
2826
2824
2822
2820
2818
2816
2814
0
50
100
150
200
250
300

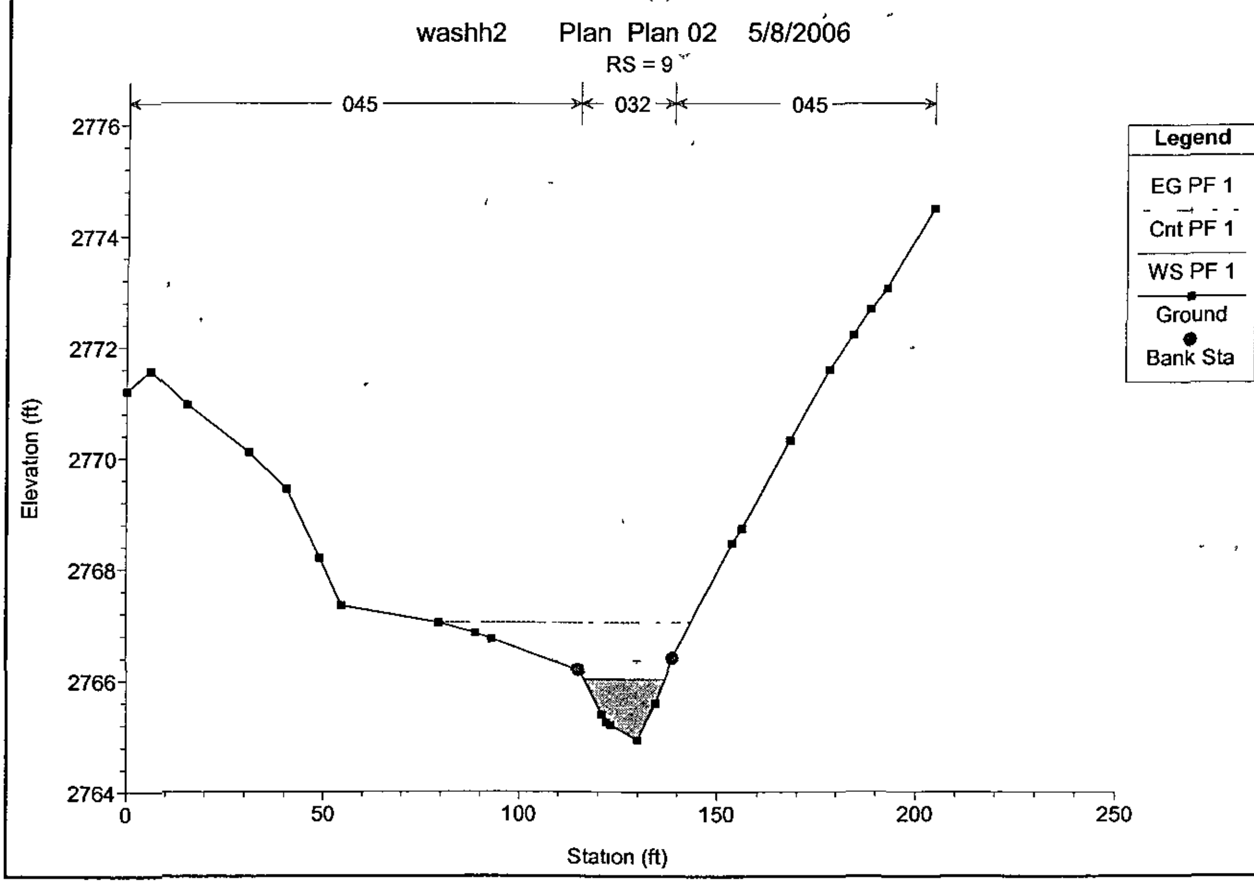

washh2 Plan Plan 02 5/8/2006
RS = 13
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2808
2810
2812
2814
2816
2818
0
50
100
150
200
250

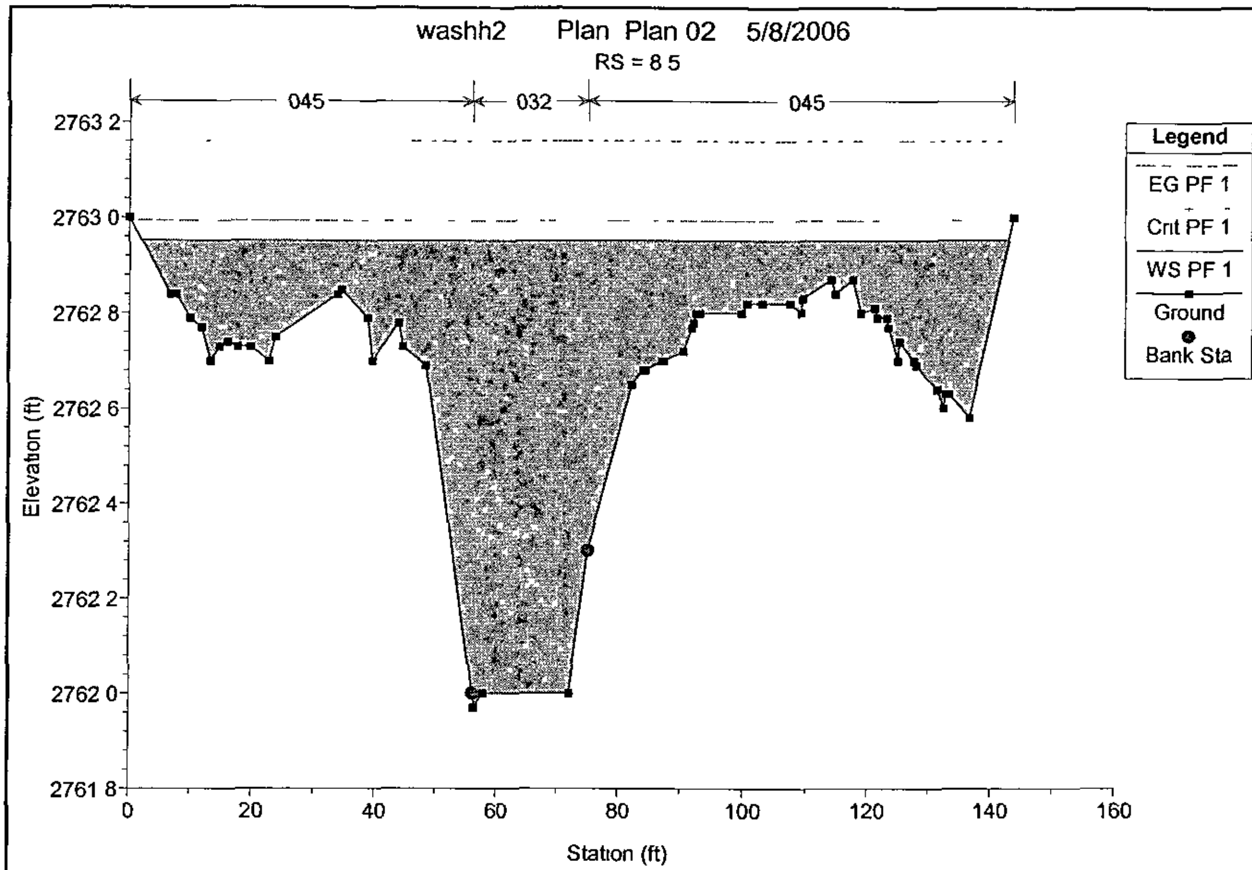

washh2 Plan Plan 02 5/8/2006
RS = 12
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2800
2801
2802
2803
2804
2805
2806
2807
2808
0
20
40
60
80
100
120
140
160

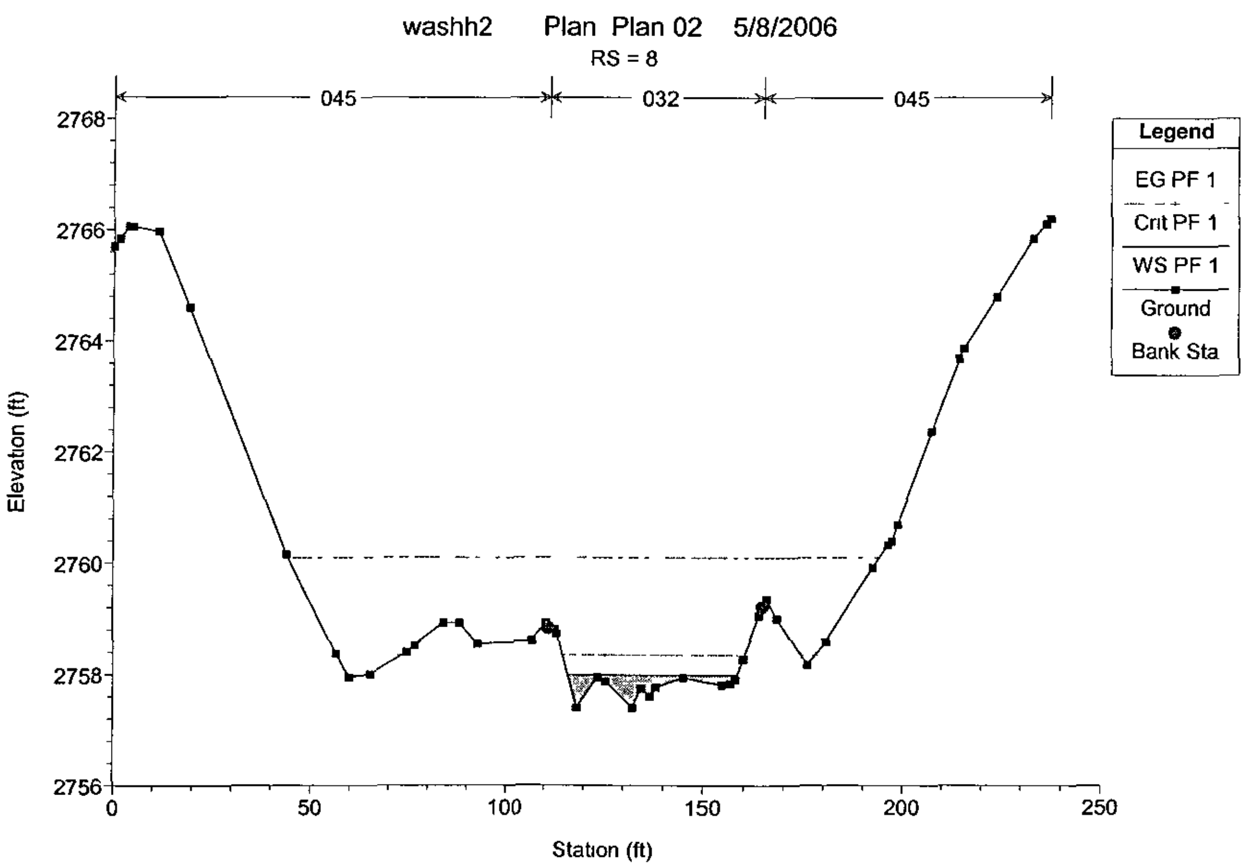

washh2 Plan Plan 02 5/8/2006
RS = 11 5
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

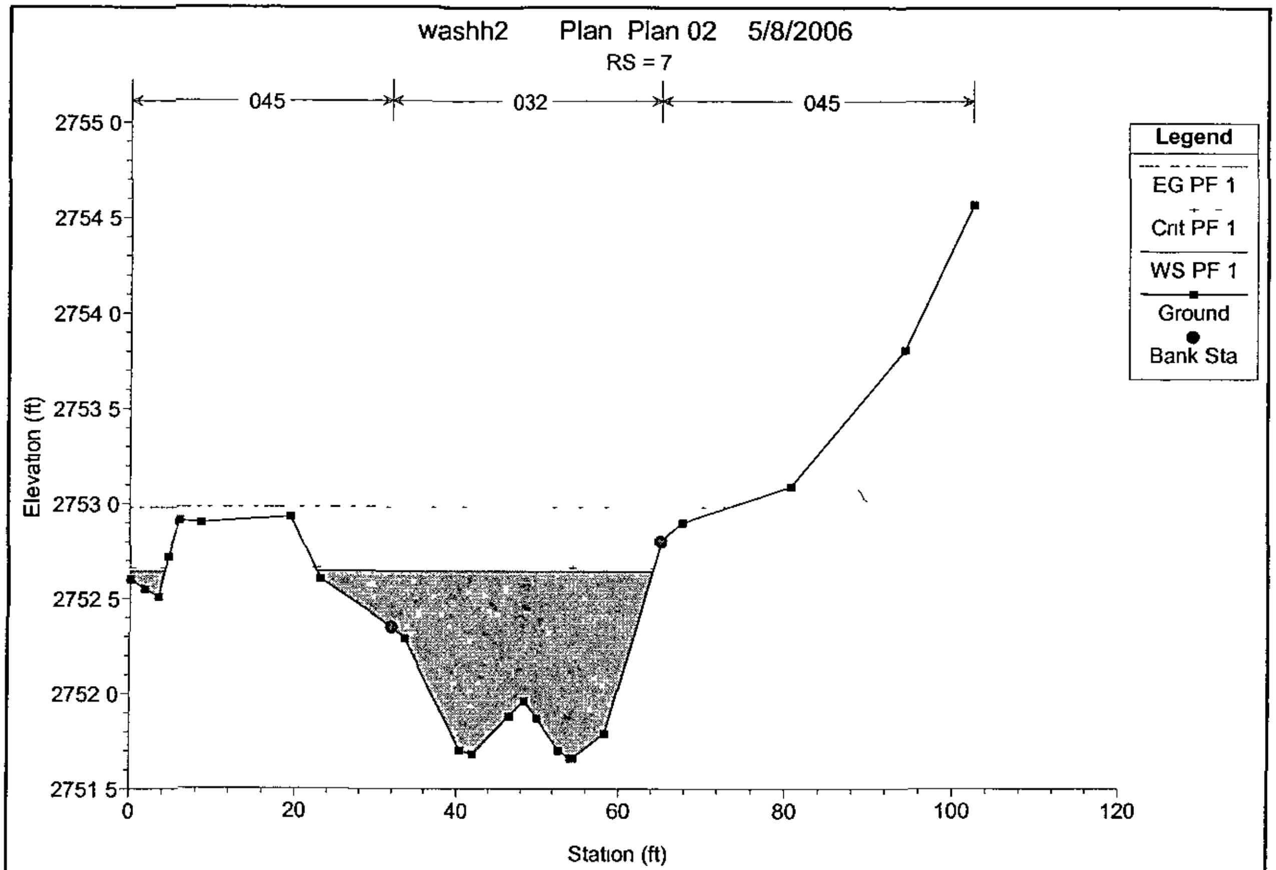

washh2 Plan Plan 02 5/8/2006
RS = 11
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


washh2 Plan Plan 02 5/8/2006
RS = 10
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2786
2784
2782
2780
2778
2776
2774
2772
0
50
100
150
200
250
Station (ft)

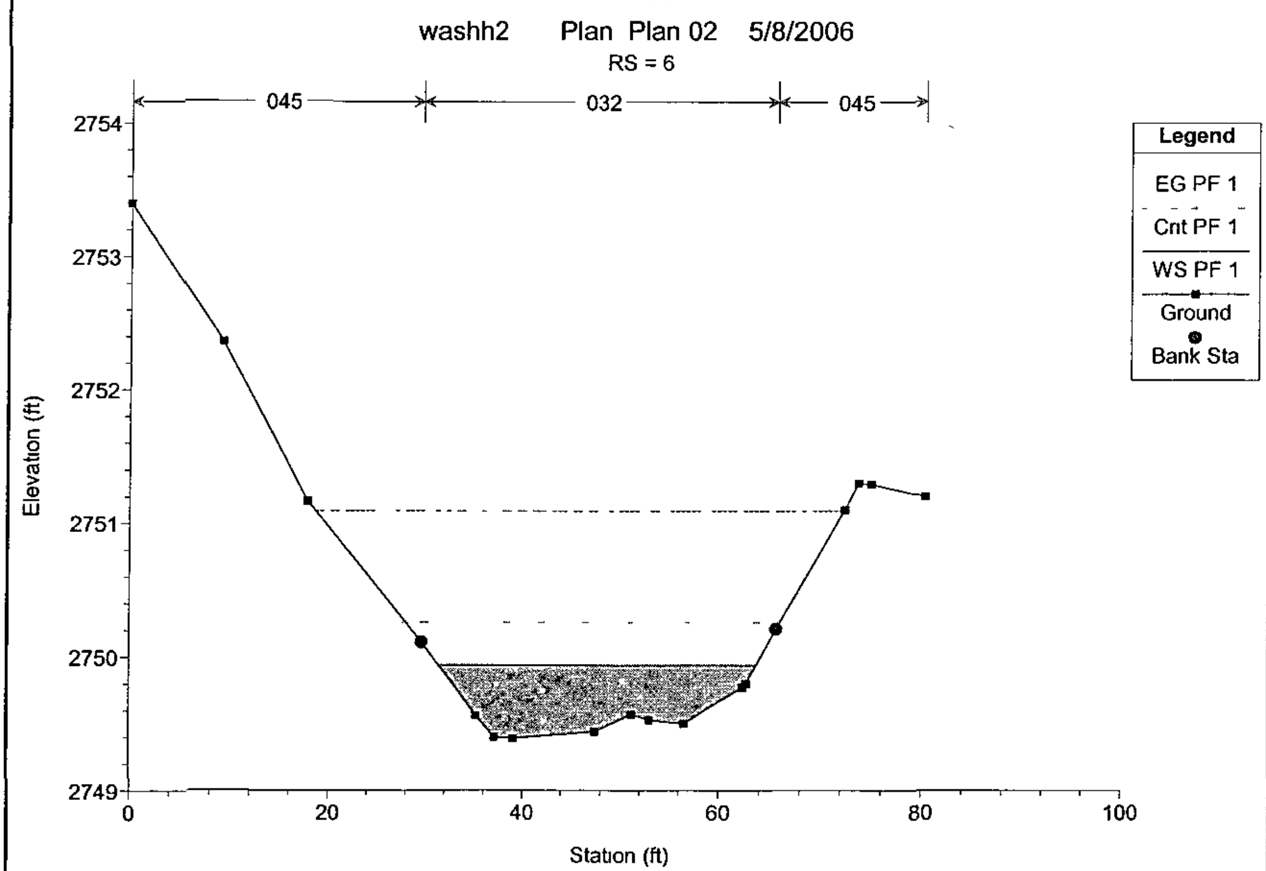

washh2 Plan Plan 02 5/8/2006
RS = 9
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2776
2774
2772
2770
2768
2766
2764
0
50
100
150
200
250
Station (ft)


washh2 Plan Plan 02 5/8/2006
RS = 8 5
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2763 2
2763 0
2762 8
2762 6
2762 4
2762 2
2762 0
2761 8
0
20
40
60
80
100
120
140
160

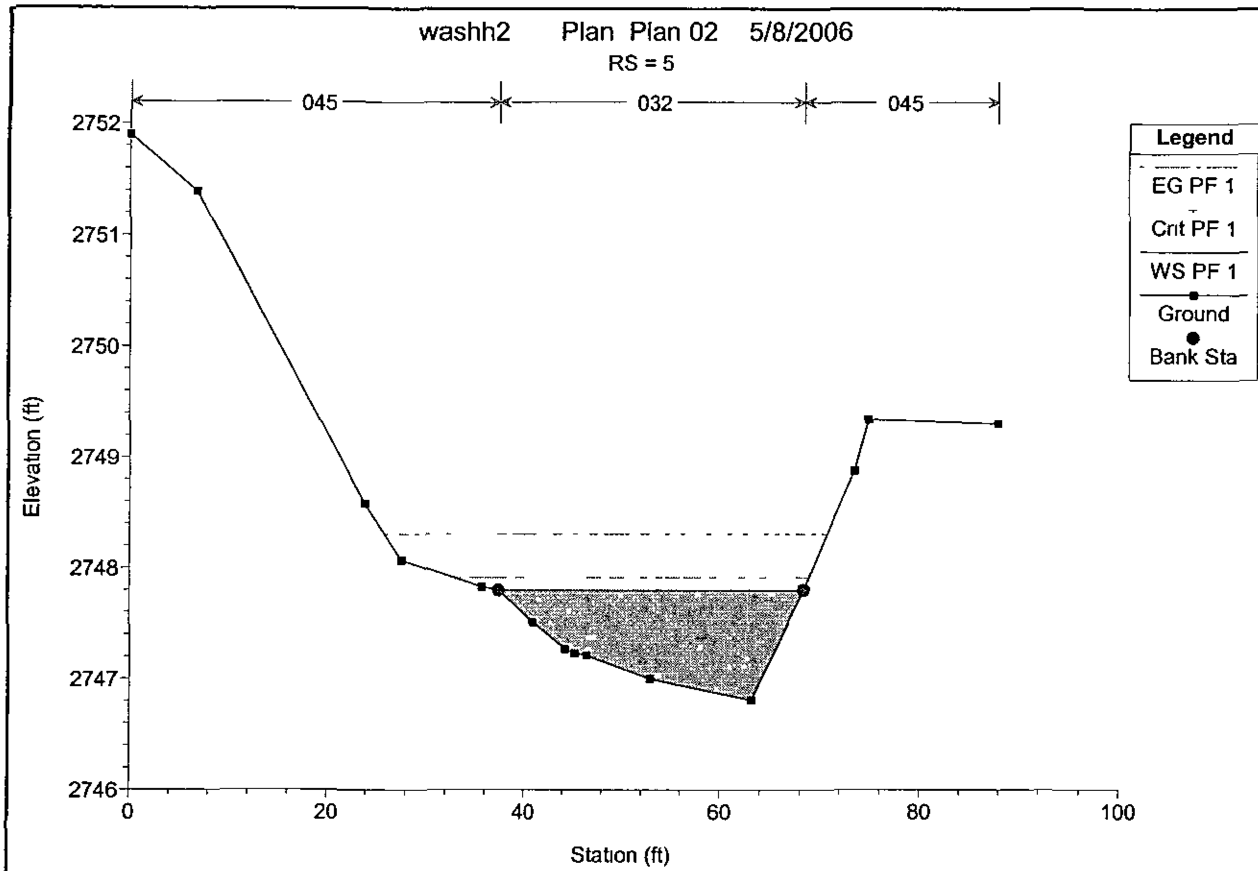

washh2 Plan Plan 02 5/8/2006
RS = 8
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2768
2766
2764
2762
2760
2758
2756
0
50
100
150
200
250



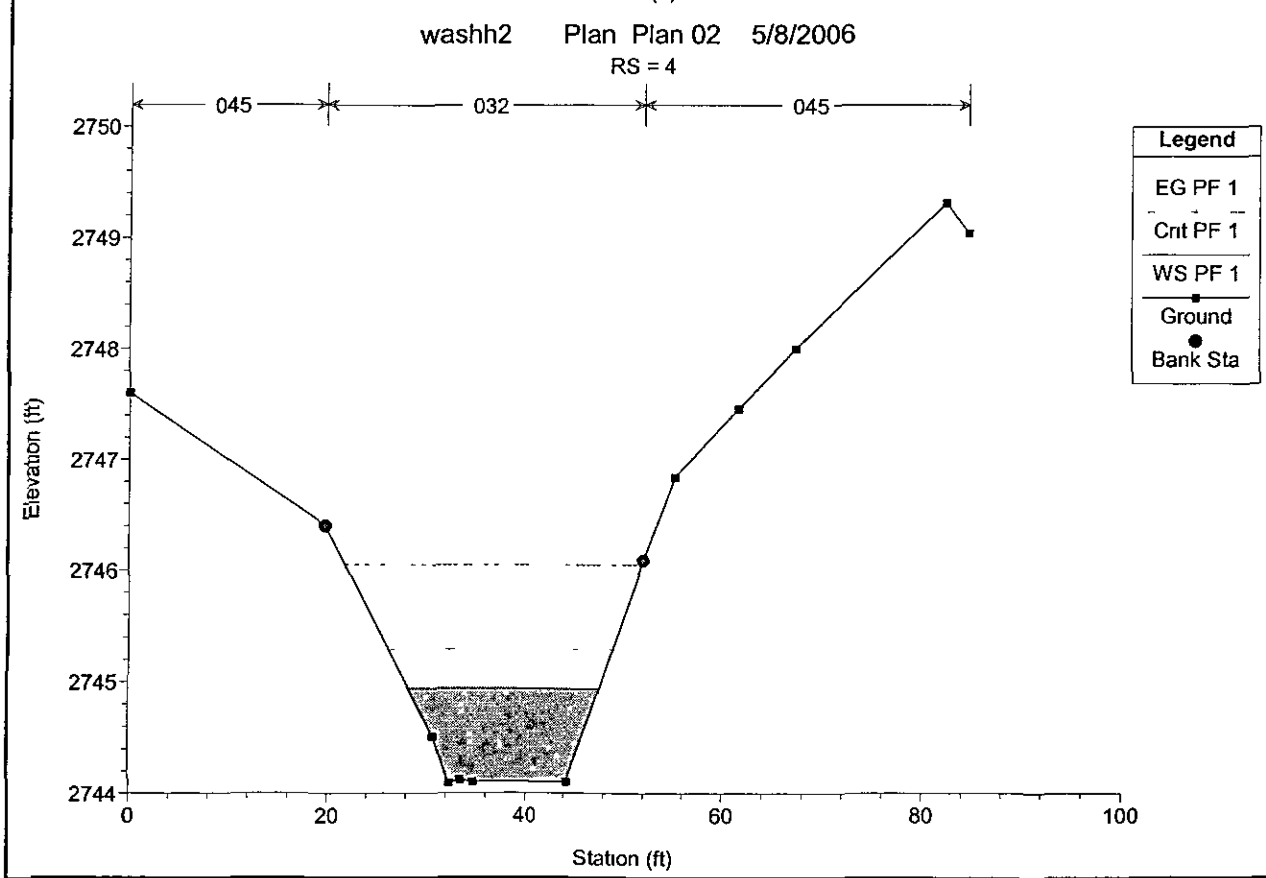
washh2 Plan Plan 02 5/8/2006
RS = 7
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2755 0
2754 5
2754 0
2753 5
2753 0
2752 5
2752 0
2751 5
0
20
40
60
80
100
120
Station (ft)



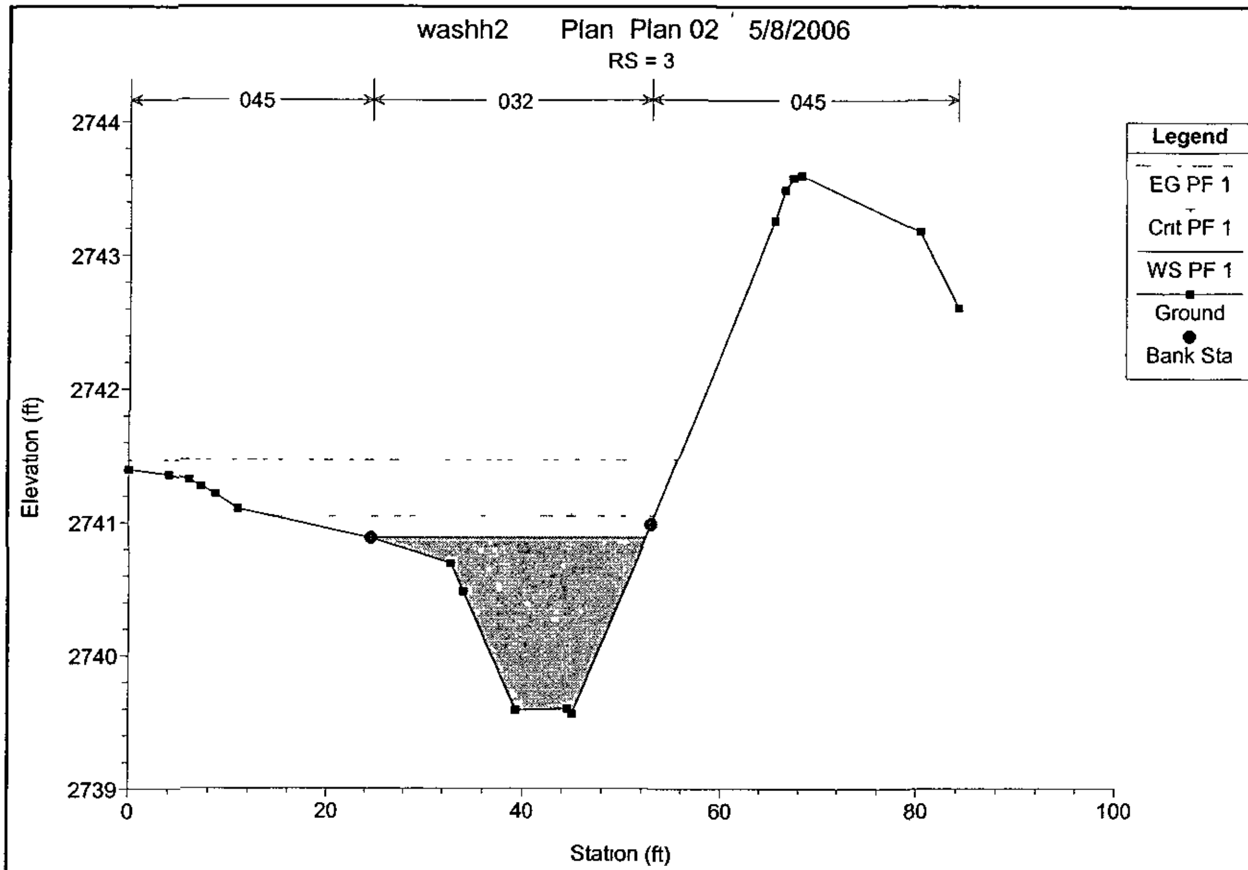
washh2 Plan Plan 02 5/8/2006
RS = 6
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2754
2753
2752
2751
2750
2749
0
20
40
60
80
100
Station (ft)

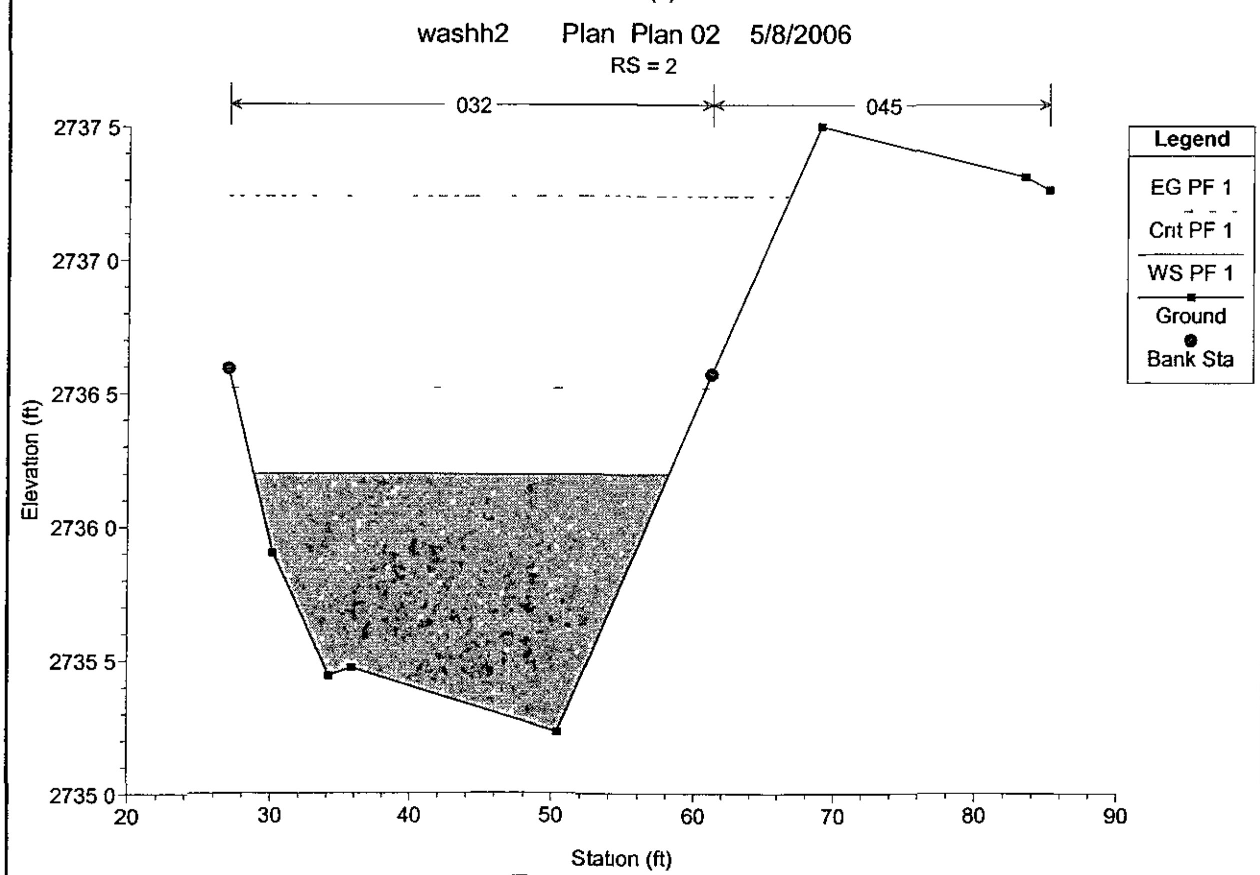


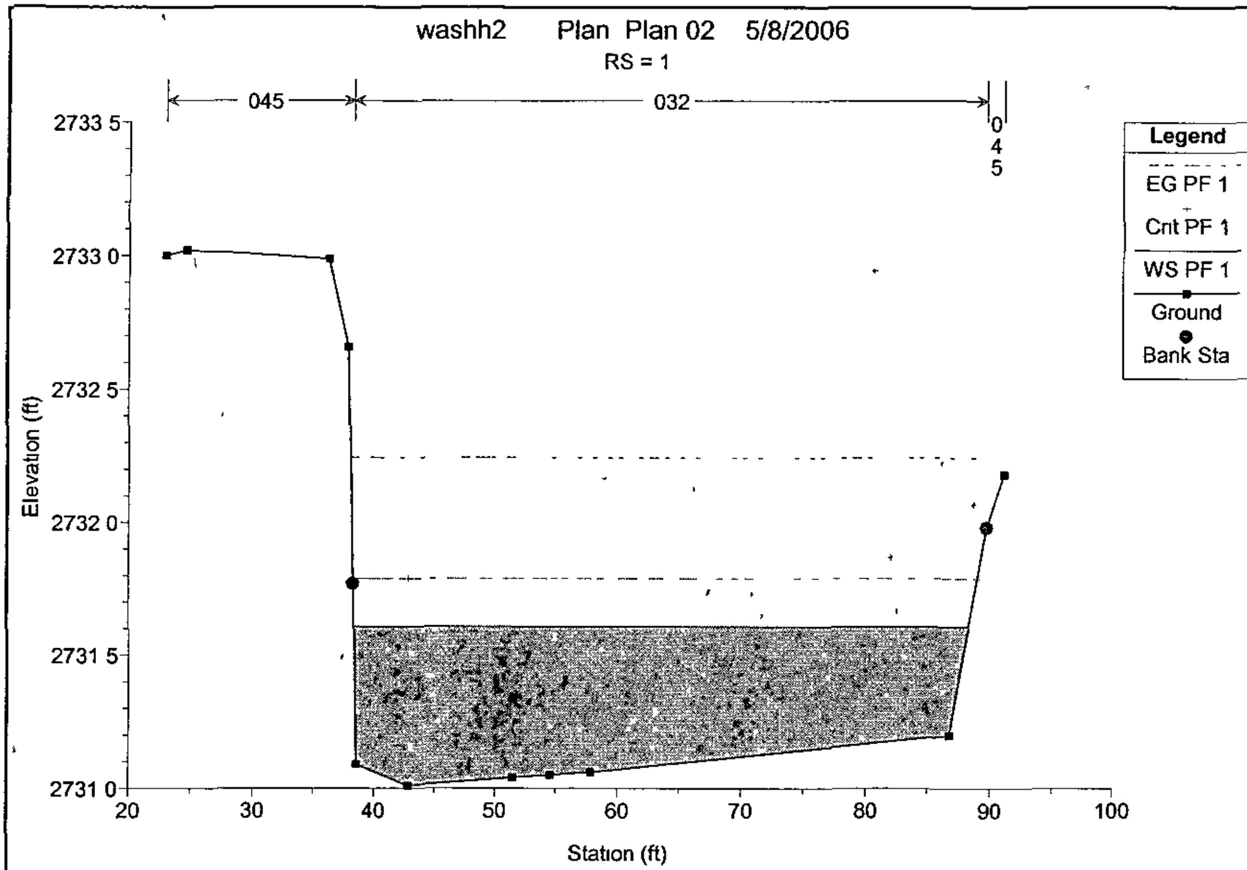
washh2 Plan Plan 02 5/8/2006
RS = 5
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2752
2751
2750
2749
2748
2747
2746
0
20
40
60
80
100
Station (ft)



washh2 Plan Plan 02 5/8/2006
RS = 4
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)

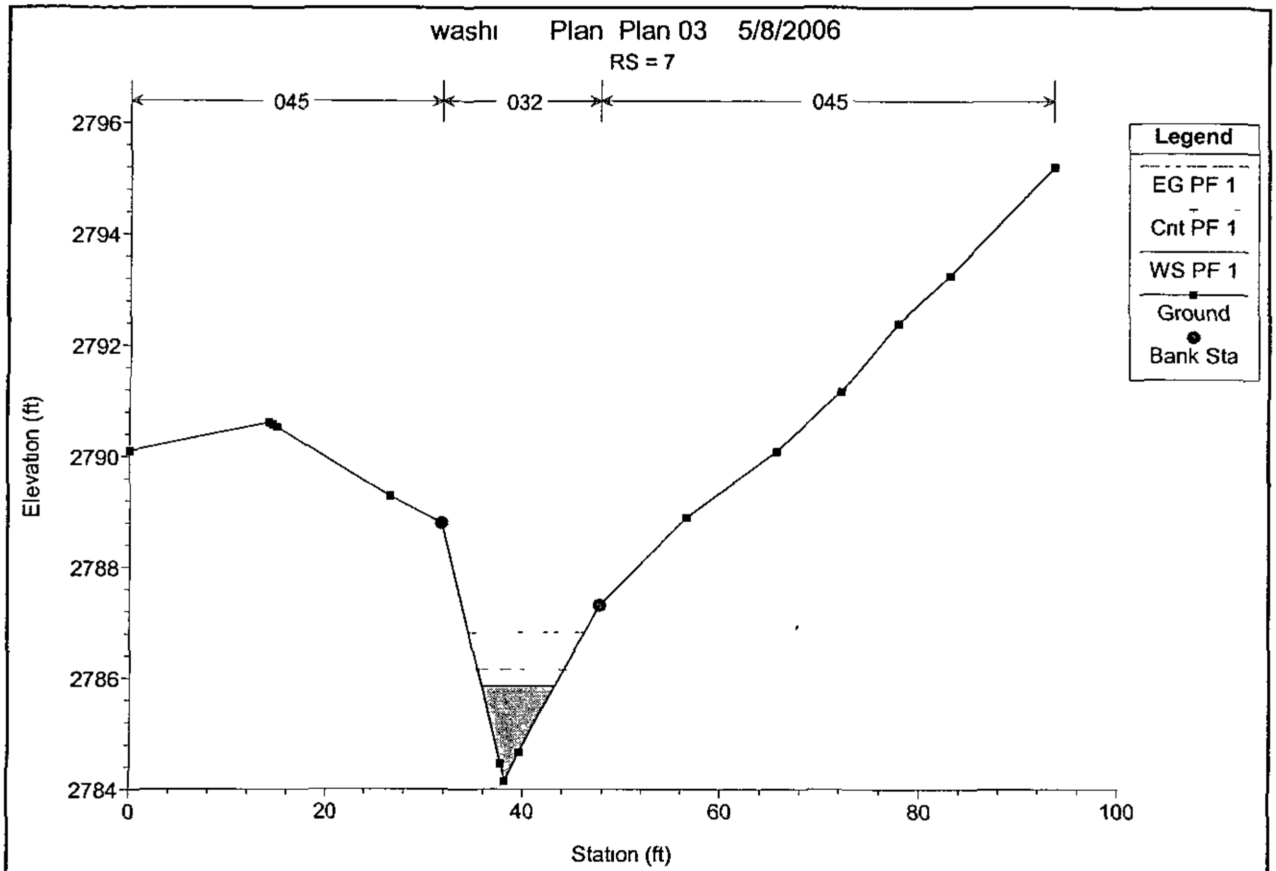

washh2 Plan Plan 02 5/8/2006
RS = 3
045
032
045
2744
2743
2742
2741
2740
2739
Elevation (ft)
0
20
40
60
80
100
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta


washh2 Plan Plan 02 5/8/2006
RS = 2
032
045
2737 5
2737 0
2736 5
2736 0
2735 5
2735 0
Elevation (ft)
20
30
40
50
60
70
80
90
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta


washh2 Plan Plan 02 5/8/2006
RS = 1
045
032
0
4
5
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)

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	70 00	2754 90	2755 86	2755 96	2756 22	0 034324	4 81	14 55	34 53	1 31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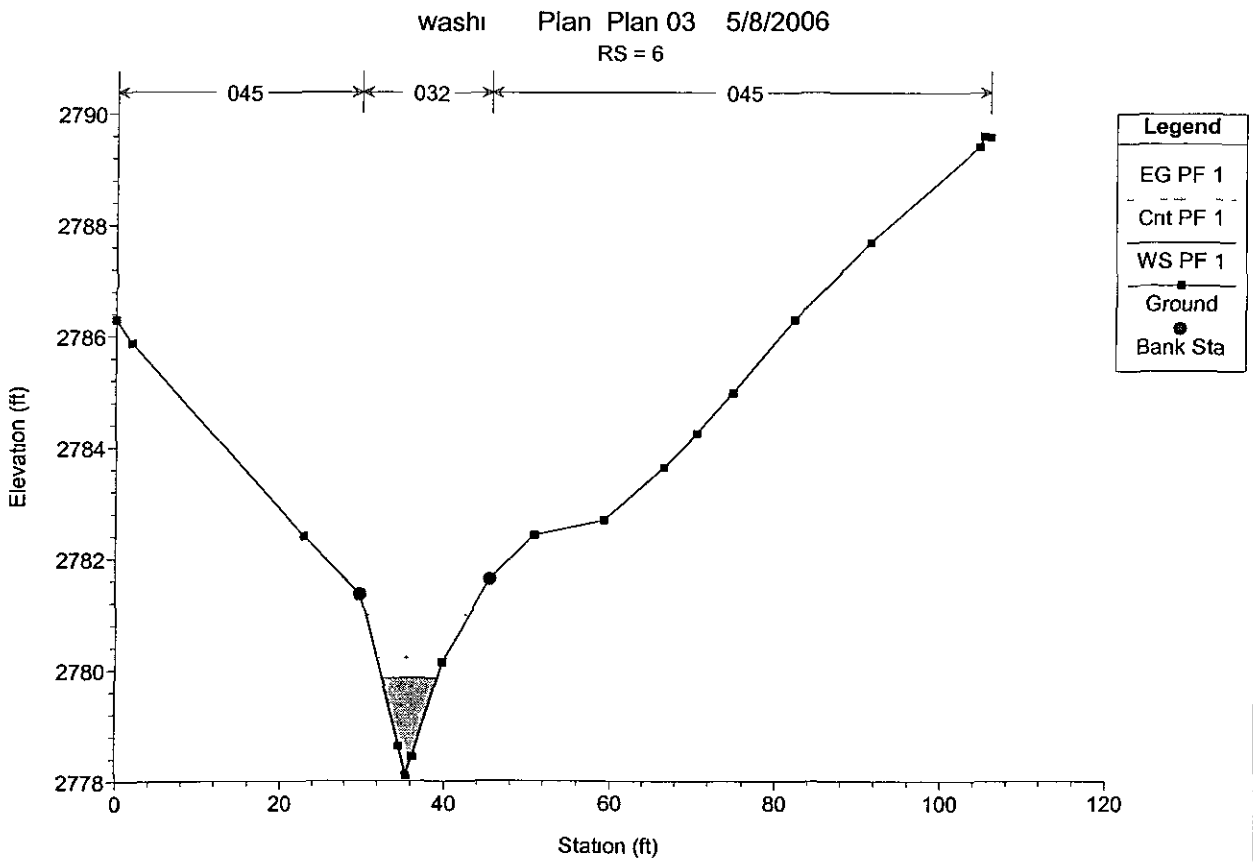
RS = 7
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2796
2794
2792
2790
2788
2786
2784
0
20
40
60
80
100
Station (ft)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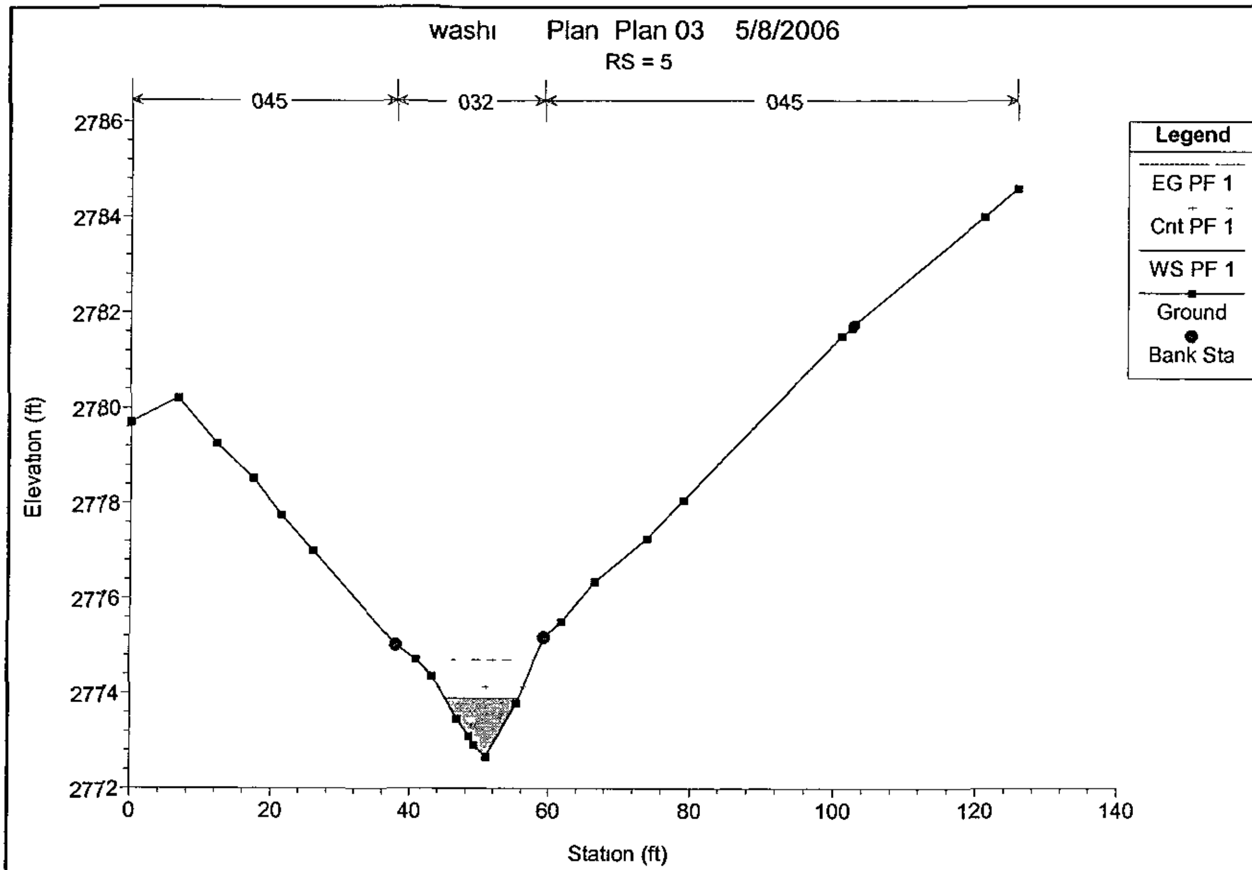
RS = 6
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2790
2788
2786
2784
2782
2780
2778
0
20
40
60
80
100
120
Station (ft)



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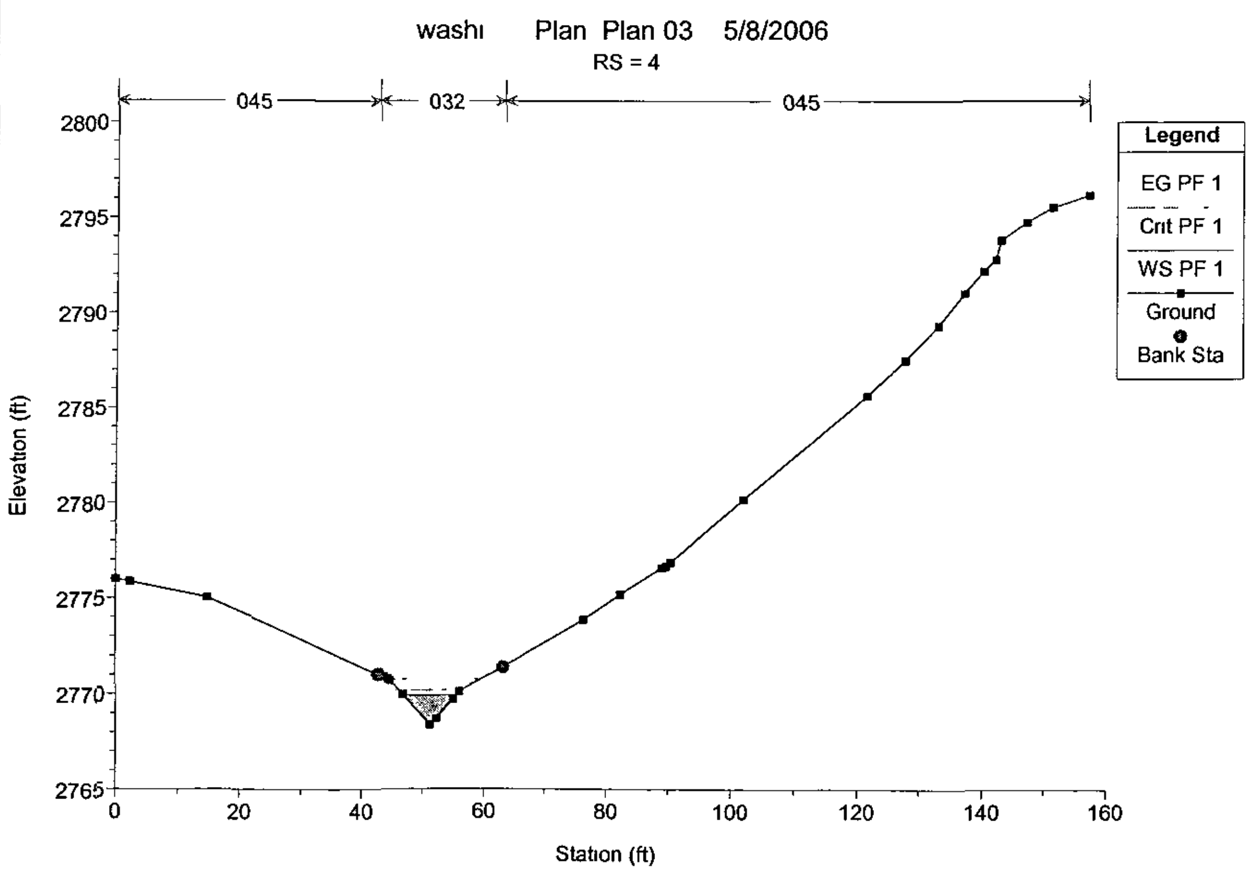
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)



washi Plan Plan 03 5/8/2006
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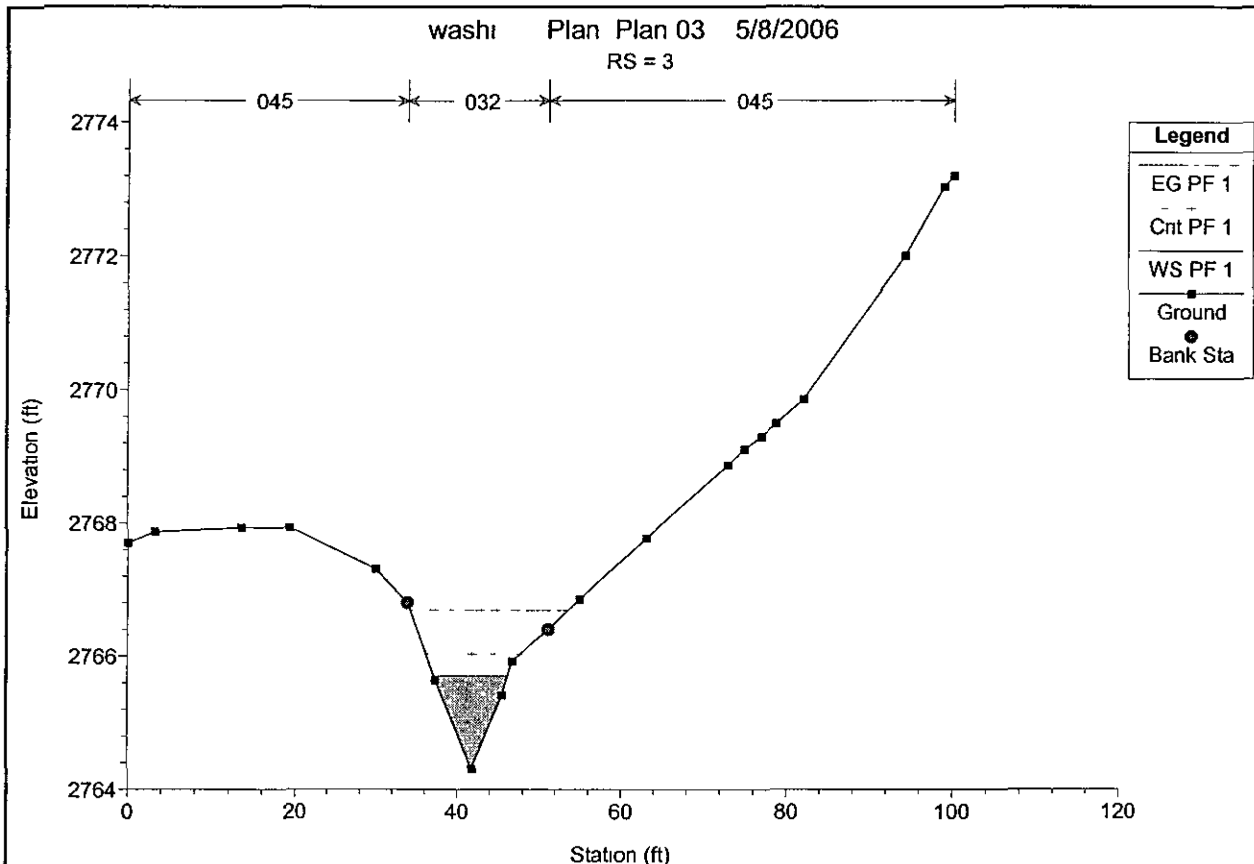
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)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045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
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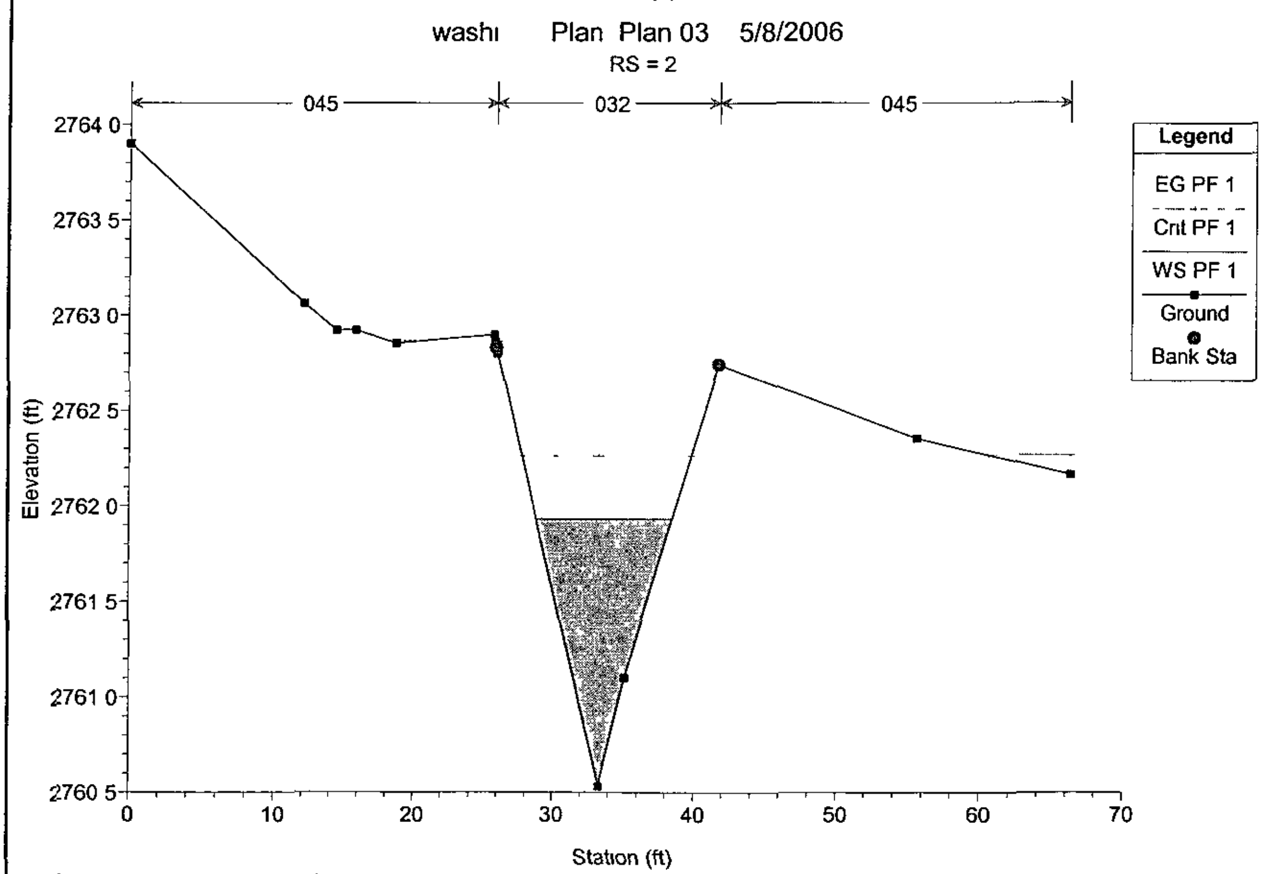
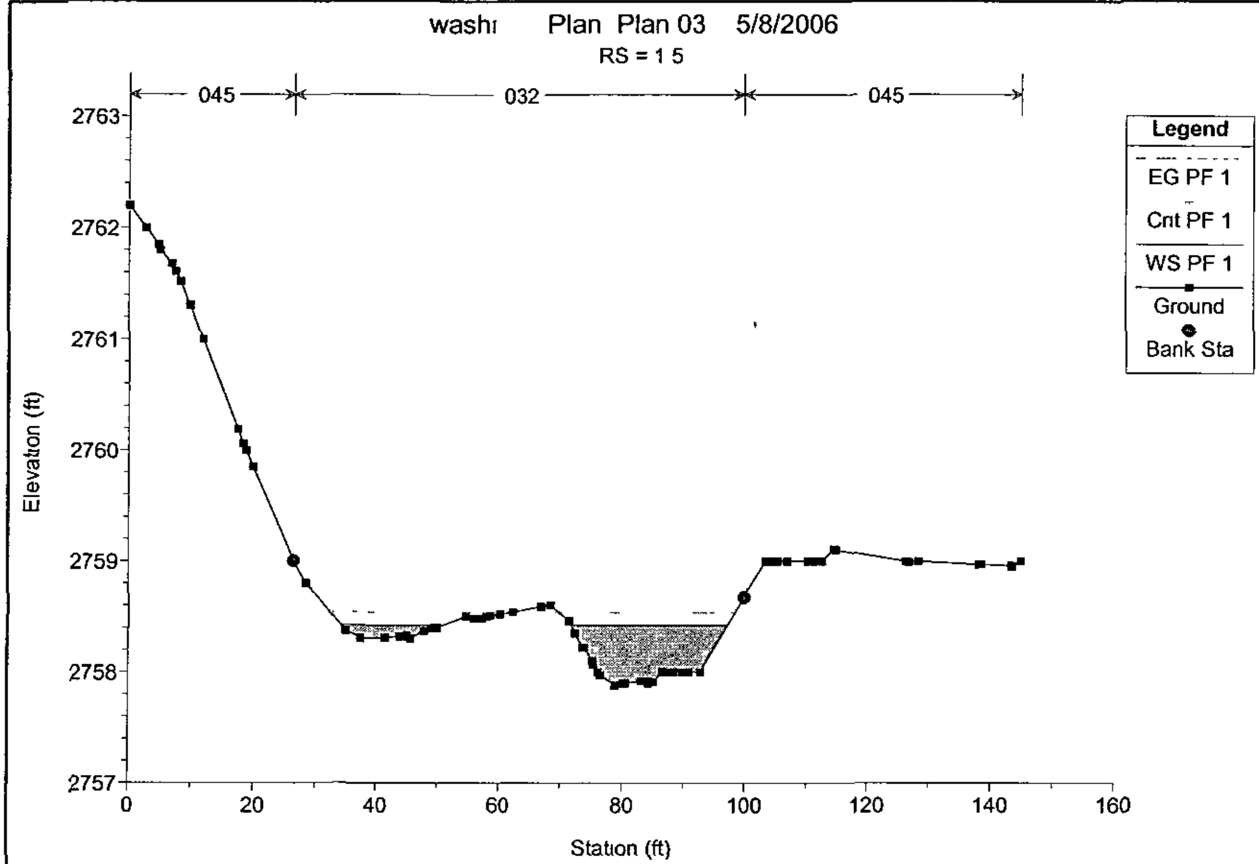
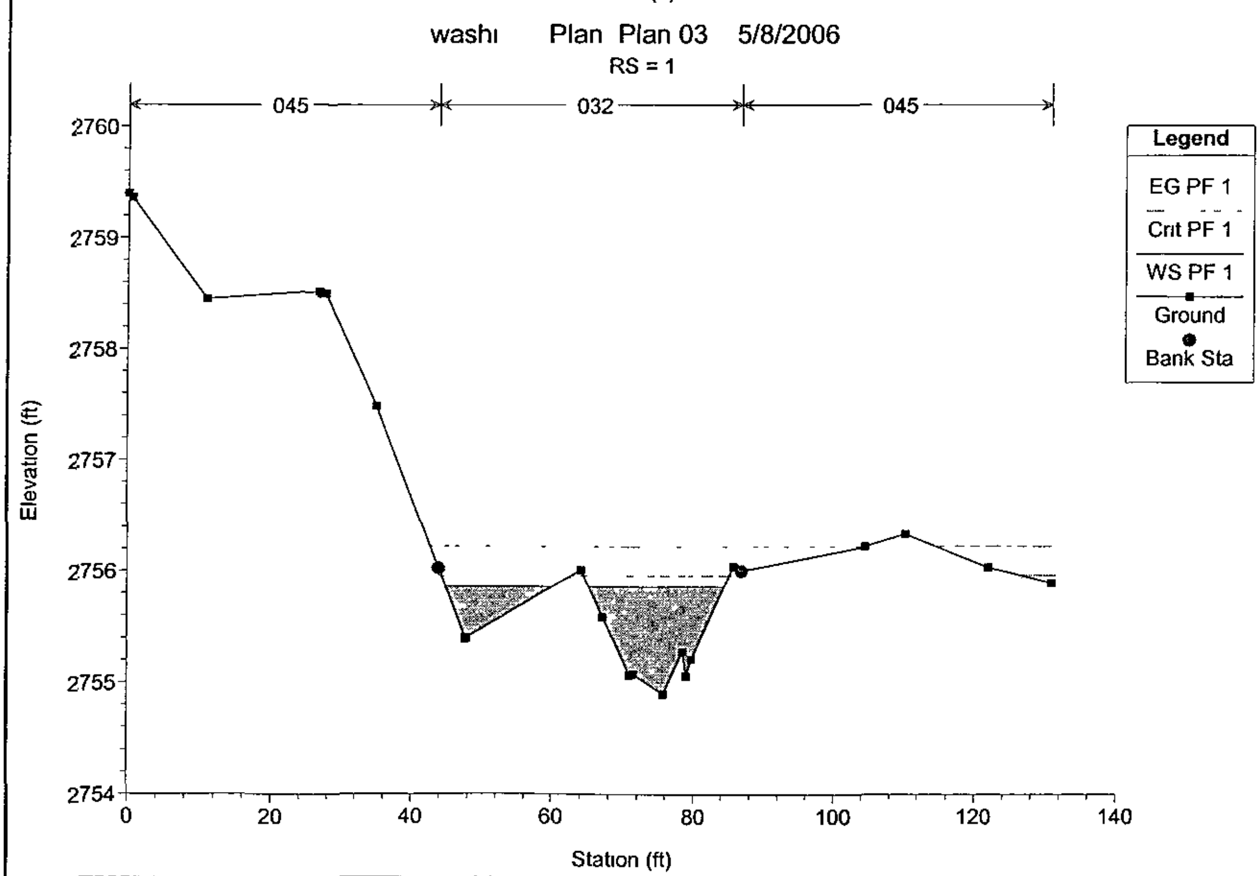
2772
2770
2768
2766
2764
0
20
40
60
80
100
120
Station (ft)


washı Plan Plan 03 5/8/2006
RS = 2
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2764 0
2763 5
2763 0
2762 5
2762 0
2761 5
2761 0
2760 5
0
10
20
30
40
50
60
70
Station (ft)


washı Plan Plan 03 5/8/2006
RS = 1 5
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
2763
2762
2761
2760
2759
2758
2757
0
20
40
60
80
100
120
140
160


washı Plan Plan 03 5/8/2006
RS = 1
045
032
045
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* **W/P#:** *042054*
Location: *City of Scottsdale* **Date:** *5/11/2006*
Reference: *Orifice Equation*

$$Q = CA\sqrt{2gh}$$

Where

C = Orifice Coefficient =	0.60	
d = Diamter of Orifice =	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

Retention Basin Volume Calculations

Sereno Canyon
Detention Basin Volume Calculations

Drainage Basin	Total Development Area (Acre)	100yr-2 hr Volume (acre-ft)	Provided Volume (acre-ft)	Volume Shortage / Excess ± (acre-ft)
A1	3 79	0 53	1 04	0 51
A2	7 17	1 01	1 01	0 00
B	10 94	1 54	1 68	0 14
C	3 65	0 51	0 79	0 28
D	7 73	1 09	1 21	0 12
E1	14 24	2 01	2 03	0 02
E2	13 23	1 87	1 93	0 06
E3	2 19	0 32	0 34	0 02
F1	10 24	1 44	1 60	0 16
F2	3 56	0 5	0 78	0 28
F3	2 93	0 41	0 56	0 15
G	3 7	0 52	0 59	0 07
Hl	12 94	1 82	1 94	0 12
H2	8 5	1 2	1 21	0 01
1	4 44	0 63	0 64	0 01
J	4 81	0 68	0 71	0 03
K	2 06	0 29	0 38	0 09
L	1 49	0 21	0 23	0 02
M	1 44	0 2	0 28	0 08
N	2 81	0 4	0 42	0 02
O	0 55	0 08	0 09	0 01
P	1 73	0 24	0 27	0 03
Q	0 52	0 07	0 07	0 00
R	0 18	0 02	0 05	0 03
Total	125	17 59	19 87	2 28

Q=(CIA)/12
Q is the volume in acre-ft
C = 0 6
I =2 82 in
A =building envelope & roadway area in ACRES

'Total Development Area Includes the Right-of-Way for the Roads plus the Building Envelopes*

WOOD/PATEL

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project *Sereno Canyon*
Location *City of Scottsdale*
Date *11-May-06*

Project Number *042054*
Project Engineer *Gordon W Wark, P E*

DETENTION BASIN VOLUME CALCULATIONS

BASIN - A1-1

STAGE	AREA [ft²]	AREA [acres]	VOLUME INC [acre-feet]	VOLUME CUM [acre-feet]
2772	1604	0 037	0 000	0 000
2773	2151	0 049	0 043	0 043
2774	2763	0 063	0 056	0 100
2777	3441	0 079	0 214	0 313

TOTAL PROVIDED VOLUME **0 313**

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 0790	0 313		
	A1-2	0 1757	0 726		
	TOTAL	0.2547	1.040	0.53	0.510

BASIN - A1-2

STAGE	AREA [ft²]	AREA [acres]	VOLUME INC [acre-feet]	VOLUME CUM [acre-feet]
2756	4199	0 096	0 000	0 000
2757	5251	0 121	0 108	0 108
2758	6404	0 147	0 134	0 242
2761	7655	0 176	0 484	0 726

TOTAL PROVIDED VOLUME **0 726**

BASIN - A2-1

STAGE	AREA [ft²]	AREA [acres]	VOLUME INC [acre-feet]	VOLUME CUM [acre-feet]
2758	351	0 008	0 000	0 000
2759	702	0 016	0 012	0 012
2760	1209	0 028	0 022	0 034
2761	1823	0 042	0 035	0 069

TOTAL PROVIDED VOLUME **0 069**

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 0419	0 069		
	A2-2	0 0284	0 040		
	A2-3	0 1476	0 407		
	A2-4	0 0376	0 0504		
	A2-5	0 1885	0 4484		
	A2-6	0 1104	0 0000		
	TOTAL	0.5544	1.01	1.01	0.0

BASIN - A2-2

STAGE	AREA [ft²]	AREA [acres]	VOLUME INC [acre-feet]	VOLUME CUM [acre-feet]
2758	112	0 003	0 000	0 000
2759	358	0 008	0 005	0 005
2760	716	0 016	0 012	0 018
2761	1236	0 028	0 022	0 040

TOTAL PROVIDED VOLUME **0.040**

BASIN - A2-3

STAGE	AREA [ft²]	AREA [acres]	VOLUME INC [acre-feet]	VOLUME CUM [acre-feet]	
2733	2653	0 061	0 000	0 000	
2734	3460	0 079	0 070	0 070	
2735	4363	0 100	0 090	0 160	
2736	5357	0 123	0 112	0 272	
2737	6431	0 148	0 135	0 407	4.0' depth

TOTAL PROVIDED VOLUME **0.407**

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**

BASIN - A2-5

STAGE	AREA [ft²]	AREA [acres]	VOLUME INC [acre-feet]	VOLUME CUM [acre-feet]
2772	4926	0 113	0 000	0 000
2773	5935	0 136	0 125	0 125
2774	7026	0 161	0 149	0 273
2775	8213	0 189	0 175	0 448

TOTAL PROVIDED VOLUME. **0 448**

BASIN - A2-6

STAGE	AREA [ft²]	AREA [acres]	VOLUME INC [acre-feet]	VOLUME CUM [acre-feet]
2772	2085	0 048	0 000	0 000
2773	2843	0 065	0 057	0 057
2774	3745	0 086	0 076	0 132
2777	4811	0 110	0 295	0 427

TOTAL PROVIDED VOLUME. **0 427**

BASIN - B-1				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	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**

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 3116	0 750		
	TOTAL	0.7491	1.683	1.54	0.143

BASIN - B-2				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	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		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	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
2784	6633	0 152	0 138	0 338

TOTAL PROVIDED VOLUME. **0 338**

BASIN - B-4				
STAGE	AREA		VOLUME	
	[ft²]	[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	
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]
2746	8320	0 191	0 000	0 000
2747	9979	0 229	0 210	0 210
2748	11724	0 269	0 249	0 459
2749	13573	0 312	0 290	0 750

TOTAL PROVIDED VOLUME **0.750**

BASIN - C-1					
STAGE	AREA		VOLUME		
	[ft²]	[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	4.0' depth

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		
	C-2	0 1121	0 225		
	TOTAL	0.3044	0.791	0.51	0.281

BASIN - C-2				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]
2754	1955	0 045	0 000	0 000
2755	2712	0 062	0 054	0 054
2756	3657	0 084	0 073	0 127
2757	4885	0 112	0 098	0 225

TOTAL PROVIDED VOLUME. **0 225**

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 1594	0 364		
	D-3	0 2176	0 500		
	TOTAL	0.5131	1.213	1.09	0.123

BASIN - D-1					
STAGE	AREA		VOLUME		
	[ft²]	[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	4.0' depth

TOTAL PROVIDED VOLUME. **0 349**

BASIN - D-2				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]
2724	3734	0 086	0 000	0 000
2725	4728	0 109	0 097	0 097
2726	5799	0 133	0 121	0 218
2727	6943	0 159	0 146	0 364

TOTAL PROVIDED VOLUME· **0 364**

BASIN - D-3				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]
2736	5188	0 119	0 000	0 000
2737	6505	0 149	0 134	0 134
2738	7928	0 182	0 166	0 300
2739	9480	0 218	0 200	0 500

TOTAL PROVIDED VOLUME: **0 500**

BASIN - E1-1				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]
2724	5286	0 121	0 000	0 000
2725	6163	0 141	0 131	0 131
2726	7100	0 163	0 152	0 284
2727	8095	0 186	0 174	0 458

TOTAL PROVIDED VOLUME **0 458**

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 1858	0 458		
	E1-2	0 2705	0 648		
	E1-3	0 2350	0 532		
	E1-4	0 1654	0 391		
	TOTAL	0'8567	2'029	2'01	0·019

BASIN - E1-2				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]
2716	7154	0 164	0 000	0 000
2717	8605	0 198	0 181	0 181
2718	10153	0 233	0 215	0 396
2719	11781	0 270	0 252	0 648

TOTAL PROVIDED VOLUME· **0 648**

BASIN - E1-3				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]
2695	5080	0 117	0 000	0 000
2696	6952	0 160	0 138	0 138
2697	8543	0 196	0 178	0 316
2698	10236	0 235	0 216	0 532

TOTAL PROVIDED VOLUME **0 532**

BASIN - E1-4				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]
2689	4285	0 098	0 000	0 000
2690	5165	0 119	0 108	0 108
2691	6138	0 141	0 130	0 238
2692	7207	0 165	0 153	0 391

TOTAL PROVIDED VOLUME· **0 391**

BASIN - E2-1					
STAGE	AREA		VOLUME		
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]	
2710	4399	0 101	0 000	0 000	
2711	5399	0 124	0 112	0 112	
2712	6476	0 149	0 136	0 249	
2713	7667	0 176	0 162	0 411	
2714	9046	0 208	0 192	0 603	4'0' depth

TOTAL PROVIDED VOLUME. **0.603**

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 2077	0 603		
	E2-2	0 3069	0 919		
	E2-3	0 1862	0 407		
	TOTAL	0.7007	1'929	1'87	0 059

BASIN - E2-2					
STAGE	AREA		VOLUME		
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]	
2694	6967	0 160	0 000	0 000	
2695	8344	0 192	0 176	0 176	
2696	9919	0 228	0 210	0 385	
2697	11588	0 266	0 247	0 632	
2698	13368	0 307	0 286	0 919	4'0' depth

TOTAL PROVIDED VOLUME **0.919**

BASIN - E2-3				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]
2682	3978	0.091	0.000	0.000
2683	5153	0.118	0.105	0.105
2684	6529	0.150	0.134	0.239
2685	8110	0.186	0.168	0.407

TOTAL PROVIDED VOLUME. **0.407**

BASIN - E3-1				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	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	0.0280	0.023		
	TOTAL	0.1762	0.345	0.32	0.025

BASIN - E3-2				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]
2676	817	0.019	0.000	0.000
2677	1226	0.028	0.023	0.023

1.0' depth

TOTAL PROVIDED VOLUME **0.023**

BASIN - F1-1				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]
2726	4563	0.105	0.000	0.000
2727	5553	0.127	0.116	0.116
2728	6670	0.153	0.140	0.256
2729	7918	0.182	0.167	0.424

TOTAL PROVIDED VOLUME. **0.424**

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	0.1818	0.424		
	F1-2	0.1987	0.462		
	F1-3	0.2059	0.483		
	F1-4	0.1128	0.227		
	TOTAL	0.6992	1.596	1.44	0.156

BASIN - F1-2				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]
2710	4891	0.112	0.000	0.000
2711	6044	0.139	0.126	0.126
2712	7298	0.168	0.153	0.279
2713	8656	0.199	0.183	0.462

TOTAL PROVIDED VOLUME· **0.462**

BASIN - F1-3				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]
2696	5180	0.119	0.000	0.000
2697	6353	0.146	0.132	0.132
2698	7624	0.175	0.160	0.293
2699	8969	0.206	0.190	0.483

TOTAL PROVIDED VOLUME: **0.483**

BASIN - F1-4				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]
2686	1919	0.044	0.000	0.000
2687	2757	0.063	0.054	0.054
2688	3733	0.086	0.074	0.128
2689	4913	0.113	0.099	0.227

TOTAL PROVIDED VOLUME **0.227**

BASIN - F2-1				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]
2701	1923	0.044	0.000	0.000
2702	2906	0.067	0.055	0.055
2703	3987	0.092	0.079	0.135
2706	5172	0.119	0.315	0.450

TOTAL PROVIDED VOLUME **0.450**

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	0.1187	0.450		
	F2-2	0.1329	0.254		
	F2-3	0.0462	0.075		
	TOTAL	0.2978	0.778	0.5	0.278

BASIN - F2-2				
STAGE	AREA		VOLUME	
	[ft^2]	[acres]	INC [acre-feet]	CUM [acre-feet]
2682	1841	0 042	0 000	0 000
2683	2963	0 068	0 055	0 055
2684	4269	0 098	0 083	0 138
2685	5789	0 133	0 115	0 254

TOTAL PROVIDED VOLUME **0 254**

BASIN - F2-3				
STAGE	AREA		VOLUME	
	[ft^2]	[acres]	INC [acre-feet]	CUM [acre-feet]
2692	353	0 008	0 000	0 000
2693	770	0 018	0 013	0 013
2694	1302	0 030	0 024	0 037
2695	2011	0 046	0 038	0 075

TOTAL PROVIDED VOLUME. **0.075**

BASIN - F3-1				
STAGE	AREA		VOLUME	
	[ft^2]	[acres]	INC [acre-feet]	CUM [acre-feet]
2724	178	0 004	0 000	0 000
2725	410	0 009	0 007	0 007
2726	746	0 017	0 013	0 020
2727	1279	0 029	0 023	0 043

TOTAL PROVIDED VOLUME **0.043**

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 0294	0 043		
	F3-2	0 1565	0 517		
	TOTAL	0 1858	0 560	0 41	0 150

BASIN - F3-2					
STAGE	AREA		VOLUME		
	[ft^2]	[acres]	INC [acre-feet]	CUM [acre-feet]	
2706	1932	0 044	0 000	0 000	
2707	2855	0 066	0 055	0 055	
2708	3941	0 090	0 078	0 133	
2709	5286	0 121	0 106	0 239	
2711	6815	0 156	0 278	0 517	4 0' depth

TOTAL PROVIDED VOLUME. **0 517**

BASIN - G-1				
STAGE	AREA		VOLUME	
	[ft^2]	[acres]	INC [acre-feet]	CUM [acre-feet]
2723	6168	0 142	0 000	0 000
2724	7712	0 177	0 159	0 159
2725	9387	0 215	0 196	0 356
2726	11197	0 257	0 236	0 592

TOTAL PROVIDED VOLUME **0.592**

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 2570	0 592		
	TOTAL	0 2570	0 592	0 52	0 072

BASIN - H1-1				
STAGE	AREA		VOLUME	
	[ft^2]	[acres]	INC [acre-feet]	CUM [acre-feet]
2770	524	0 012	0 000	0 000
2771	1010	0 023	0 018	0 018
2772	1621	0 037	0 030	0 048
2773	2383	0 055	0 046	0 094

TOTAL PROVIDED VOLUME **0.094**

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 0547	0 094		
	H1-2	0 0307	0 044		
	H1-3	0 1655	0 474		
	H1-4	0 2362	0 5850		
	H1-5	0 2956	0 7467		
	TOTAL	0 7827	1 94	1 82	0 1[illegible]

BASIN - H1-2				
STAGE	AREA		VOLUME	
	[ft^2]	[acres]	INC [acre-feet]	CUM [acre-feet]
2766	179	0 004	0 000	0 000
2767	418	0 010	0 007	0 007
2768	757	0 017	0 013	0 020
2769	1339	0 031	0 024	0 044

TOTAL PROVIDED VOLUME· **0 044**

BASIN - H1-3					
STAGE	AREA		VOLUME		
	[ft^2]	[acres]	INC [acre-feet]	CUM [acre-feet]	
2736	3296	0 076	0 000	0 000	
2737	4159	0 095	0 086	0 086	
2738	5099	0 117	0 106	0 192	
2739	6118	0 140	0 129	0 321	
2740	7208	0 165	0 153	0 474	4 0' depth

TOTAL PROVIDED VOLUME **0.474**

BASIN - H1-4				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]
2735	6797	0 156	0 000	0 000
2736	7887	0 181	0 169	0 169
2737	9051	0 208	0 194	0 363
2738	10290	0 236	0 222	0 585

TOTAL PROVIDED VOLUME. **0 585**

BASIN - H1-5				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]
2727	8891	0 204	0 000	0 000
2728	10158	0 233	0 219	0 219
2729	11486	0 264	0 248	0 467
2730	12876	0 296	0 280	0 747

TOTAL PROVIDED VOLUME. **0 747**

BASIN - H2-1				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]
2772	6928	0 159	0 000	0 000
2773	8286	0 190	0 175	0 175
2774	9774	0 224	0 207	0 382
2775	11346	0 260	0 242	0 624

TOTAL PROVIDED VOLUME· **0 624**

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 2605	0 624		
	H2-2	0 2463	0 590		
	TOTAL	0'5068	1'215	1'2	0'015

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 [acre-feet]	CUM [acre-feet]	
2769	3832	0 088	0 000	0 000	
2770	4689	0 108	0 098	0 098	
2771	5667	0 130	0 119	0 217	
2772	6755	0 155	0 143	0 359	
2773	7983	0 183	0 169	0 528	4'0' depth

TOTAL PROVIDED VOLUME: **0 528**

VOLUME BREAKDOWN

Drainage Boundary	Sub-Basin Volumes	Disturbance Areas (acres)	100yr-2hr provided ac-ft	100yr-2hr Required ac-ft	Volume Shortage / Excess ±
J	J-1	0 1833	0 528		
	J-2	0 0881	0 187		
	TOTAL	0 2713	0 715	0 68	0 035

BASIN - J-2				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]
2762	1719	0 039	0 000	0 000
2763	2323	0 053	0 046	0 046
2764	3026	0 069	0 061	0 108
2765	3836	0 088	0 079	0 187

TOTAL PROVIDED VOLUME **0 187**

BASIN - K-1				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	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 - L1				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]
2744	1366	0 031	0 000	0 000
2745	1889	0 043	0 037	0 037

1'0' depth

TOTAL PROVIDED VOLUME **0.037**

BASIN - L2				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]
2722	1003	0 023	0 000	0 000
2723	2030	0 047	0 035	0 035
2724	3288	0 075	0 061	0 096
2725	4723	0 108	0 092	0 188

TOTAL PROVIDED VOLUME· **0 188**

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 0434	0 037		
	L-2	0 1084	0 188		
	TOTAL	0 1518	0 225	0 21	0 015

BASIN - M-1				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]
2721	2543	0 058	0 000	0 000
2722	3462	0 079	0 069	0 069
2723	4509	0 104	0 091	0 160
2724	5737	0 132	0 118	0 278

TOTAL PROVIDED VOLUME· **0 278**

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 1317	0 278		
	TOTAL	0 1317	0 278	0 2	0 078

BASIN - N-1				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]
2691	4188	0 096	0 000	0 000
2692	5407	0 124	0 110	0 110
2693	6760	0 155	0 140	0 250
2694	8217	0 189	0 172	0 422

TOTAL PROVIDED VOLUME **0 422**

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 1886	0 422		
	TOTAL	0 1886	0 422	0 4	0 022

BASIN - O-1				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]
2721	3682	0 085	0 000	0 000
2722	4568	0 105	0 095	0 095

1'0' depth

TOTAL PROVIDED VOLUME· **0 095**

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 1049	0 095		
	TOTAL	0 1049	0 095	0 08	0 015

BASIN - P-1				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	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**

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 0647	0 056		
	P-3	0 1693	0 156		
	TOTAL	0 2967	0 268	0 24	0 028

BASIN - P-2				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]
2749	2063	0 047	0 000	0 000
2750	2818	0 065	0 056	0 056

1'0' depth

TOTAL PROVIDED VOLUME **0.056** acre-feet

BASIN - P-3				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]
2744	6240	0 143	0 000	0 000
2745	7374	0 169	0 156	0 156

1'0' depth

TOTAL PROVIDED VOLUME **0 156**

BASIN - Q-1				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]
2774	2722	0 062	0 000	0 000
2775	3568	0 082	0 072	0 072

1'0' depth

TOTAL PROVIDED VOLUME **0 072**

VOLUME BREAKDOWN

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

BASIN - R-1				
STAGE	AREA		VOLUME	
	[ft²]	[acres]	INC [acre-feet]	CUM [acre-feet]
2775	2030	0 047	0 000	0 000
2776	2639	0 061	0 054	0 054

1'0' depth

TOTAL PROVIDED VOLUME **0 054**

VOLUME BREAKDOWN

Drainage Boundary	Sub-Basin Volumes	Disturbance Areas (acres)	100yr-2hr provided ac-ft	100yr-2hr Required ac-ft	Volume Shortage / Excess ±
S	S-1	0 0606	0 054		
	TOTAL	0 0606	0 054	0 02	0 034

Disturbance Calculations:

Site Gross Area
14,388,631 5541 Sq Ft
330 3175 Ac

Basin Disturbance:
8 5394 Ac

Disturbance:
2 59%

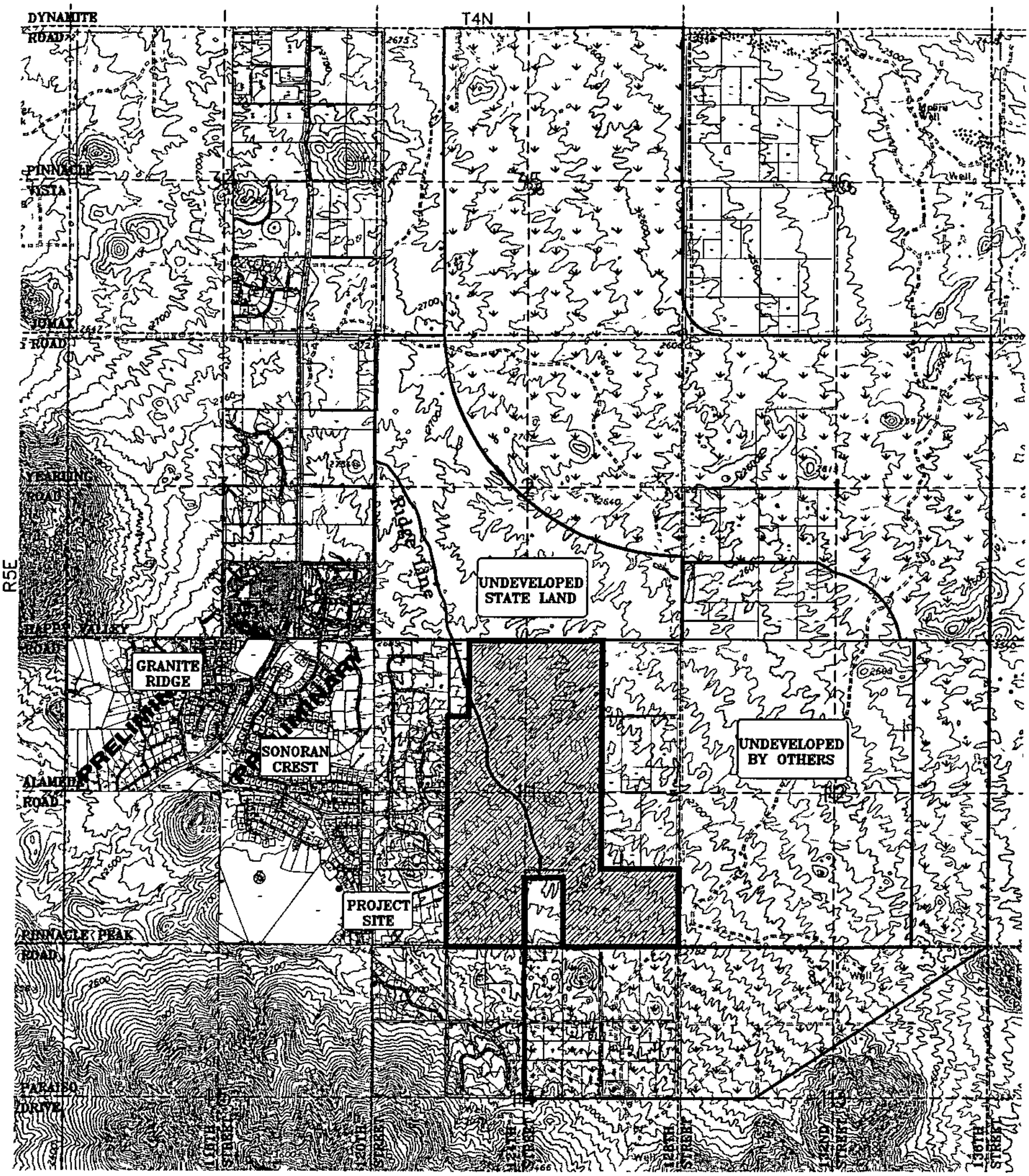
Basin locations & volumes are conceptual & are subject to change with Final Improvement Plan Design

VOLUME BREAKDOWN TOTALS

Drainage Boundary	Sub-Basin Volumes	Disturbance Areas (acres)	100yr-2hr provided ac-ft	100yr-2hr Required ac-ft	Volume Shortage / Excess ±
A1	A1-1 - A1-2	0 2547	1 04	0 53	0 510
A2	A2-1 - A2-3	0 5544	1 01	1 01	0 00
B	B1 - B5	0 7491	1 68	1 54	0 143
C	C1 - C2	0 3044	0 79	0 51	0 281
D	D1 - D2	0 5131	1 21	1 09	0 123
E1	E1-1 - E1-4	0 8567	2 03	2 01	0 019
E2	E2-1 - E2-2	0 7007	1 93	1 87	0 059
E3	E3-1-E3-2	0 1762	0 34	0 32	0 025
F1	F1-1 - F1-4	0 6992	1 60	1 44	0 156
F2	F2-1 - F2-3	0 2978	0 78	0 5	0 278
F3	F3-1 - F3-2	0 1858	0 56	0 41	0 150
G	G1	0 2570	0 59	0 52	0 072
H1	H1-1 - H1-3	0 7827	1 94	1 82	0 123
H2	H2-1 - H2-2	0 5068	1 21	1 2	0 015
I	I1	0 2556	0 64	0 63	0 010
J	J1 - J2	0 2713	0 71	0 68	0 035
K	K1	0 1575	0 38	0 29	0 088
L	L1 - L2	0 1518	0 23	0 21	0 015
M	M1	0 1317	0 28	0 2	0 078
N	N1	0 1886	0 42	0 4	0 022
O	O1	0 1049	0 09	0 08	0 015
P	P1-P3	0 2967	0 27	0 24	0 028
Q	Q1	0 0819	0 07	0 07	0 002
R	R1	0 0606	0 05	0 02	0 034
	TOTAL	8 5394	19 87	17 59	2 284

PLATE 1

Vicinity Map



2500 0 1250 2500

1 inch = 2500 ft.

LEGEND

Project Boundry

Project Site

McDowell Sonoran Preserve

Existing 5 Foot Contours

CROWN COMMUNITY DEVELOPMENT
A Henry Crown Company

SERENO CANYON

Plate 1
"Vicinity Map"

WOOD/PATEL
LAND DEVELOPMENT • WATER RESOURCES
TRANSPORTATION / TRAFFIC
WATER / WASTEWATER • SURVEYING
CONSTRUCTION MANAGEMENT
(602) 335-8500
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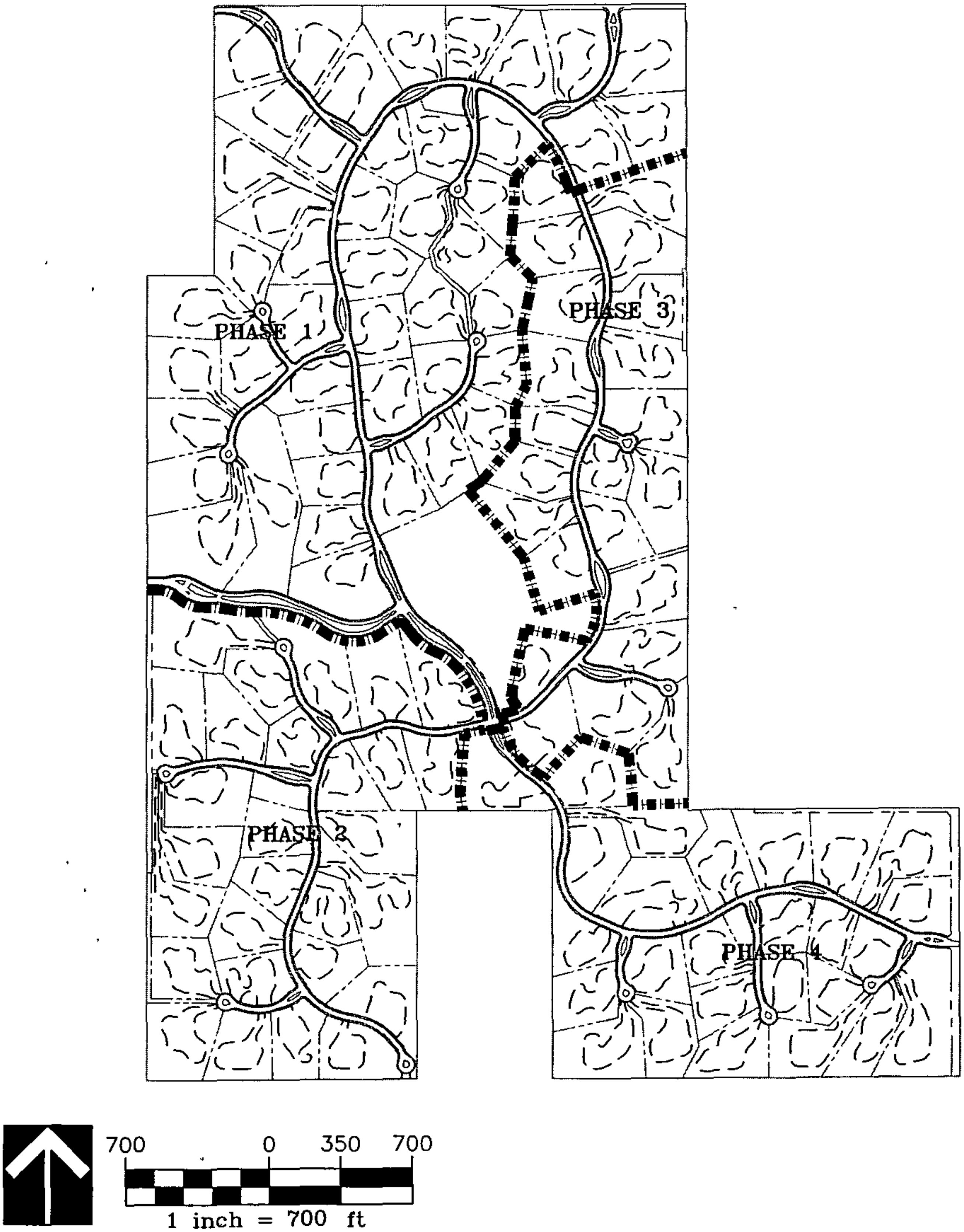
N:\2004\042054\Project Support\Hydro\Exhibits\FDR\ PLATE 01-VICINITYMAP.dwg - Feb 22,2006

PLATE 1A

Phasing Map



CROWN
COMMUNITY DEVELOPMENT
A Henry Crown Company

SERENO CANYON

Plate 1A

"Phasing Map"

WOOD/PATEL

LAND DEVELOPMENT • WATER RESOURCES
TRANSPORTATION / TRAFFIC
WATER / WASTEWATER • SURVEYING
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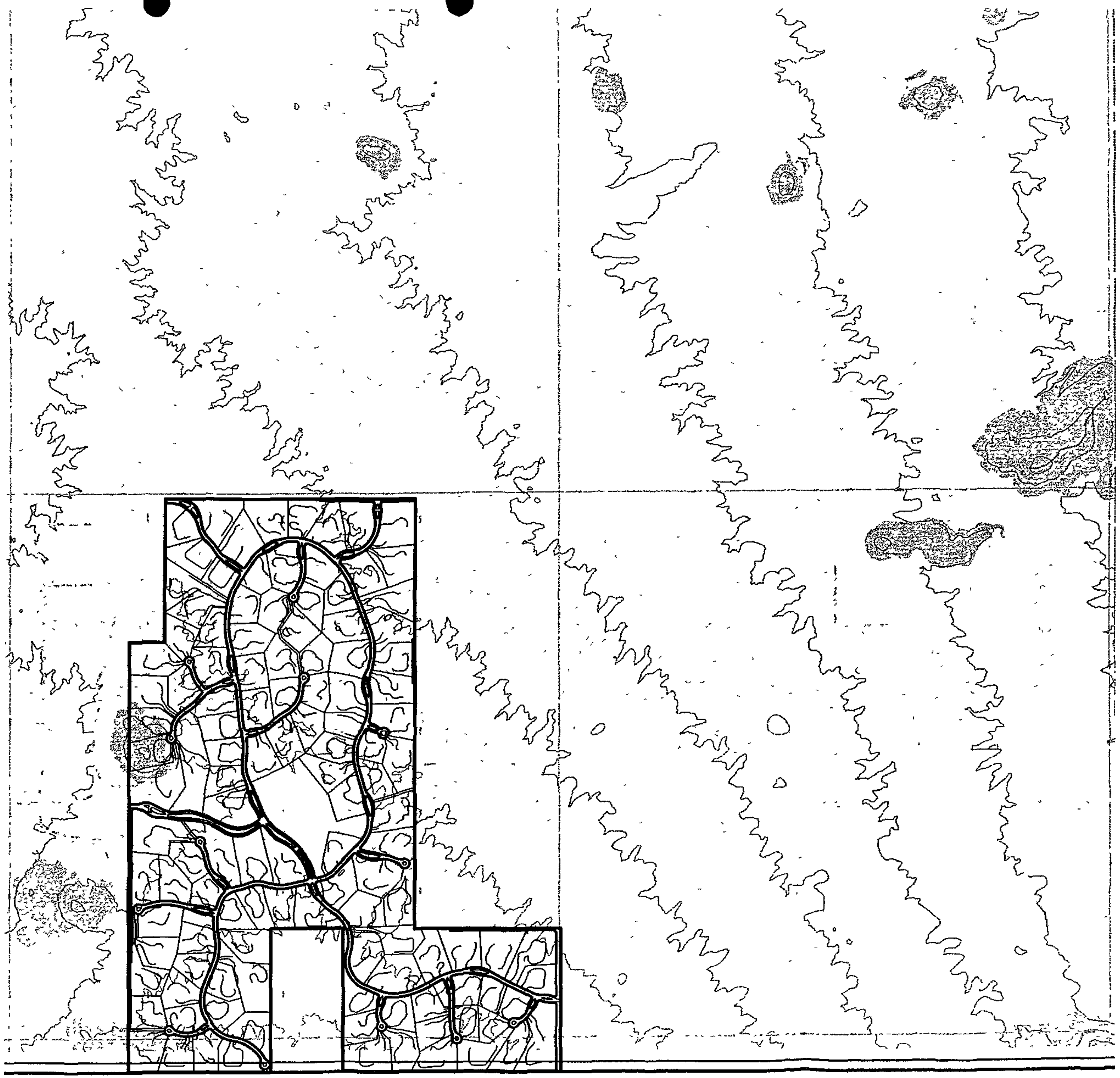
N:\2004\042054\Project Support\Hydro\Exhibits\FDR\ PLATE 01A-Phasing Map.dwg - Feb 13,2006

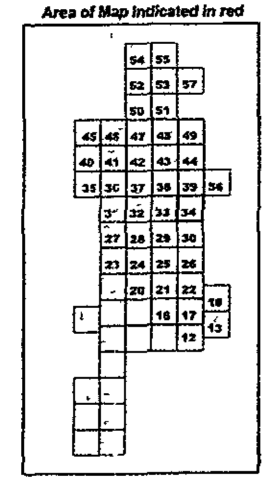
PLATE 2

ESL Classification

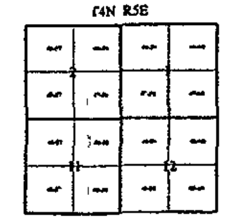


ESL Landforms and Protected Peaks and Ridges

City Limits
Section Boundary
Streets
Landforms
Lower Desert
Upper Desert
Hillside
Elevation
50' Contour
20' Contour
Protected Peaks and Ridges
Peak or Ridge Line



Official Detail Map
Map 34



Data Source City of Scottsdale

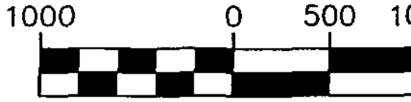


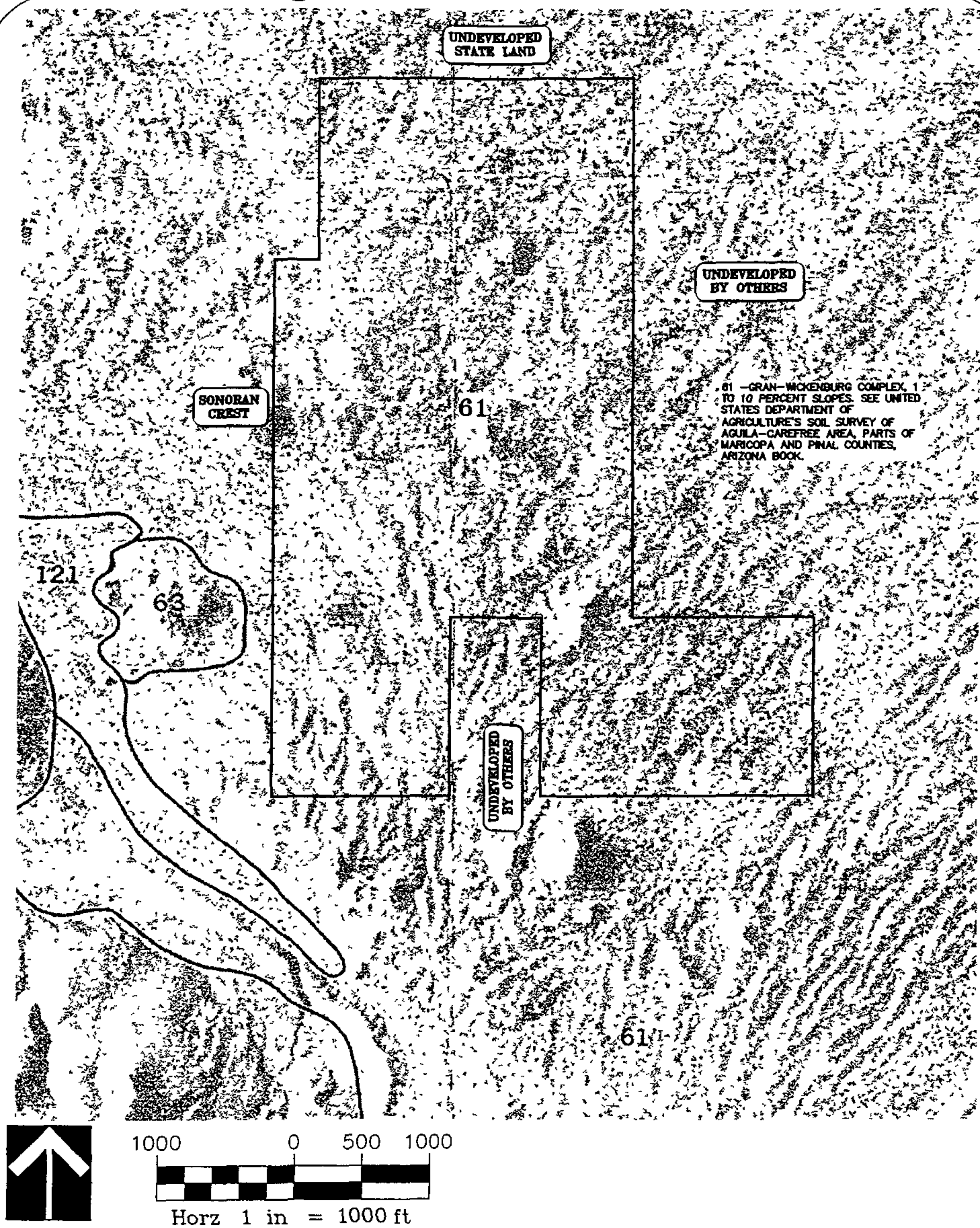
PLATE 2
ESL CLASSIFICATION

CROWN COMMUNITY DEVELOPMENT
A Henry Crown Company

WOOD/PATEL
LAND DEVELOPMENT • WATER RESOURCES
TRANSPORTATION / TRAFFIC
WATER / WASTEWATER • SURVEYING
CONSTRUCTION MANAGEMENT
PHOENIX • MESA • TUCSON

PLATE 3

Soils Classification Map



CROWN
COMMUNITY DEVELOPMENT
A Henry Crown Company

SERENO CANYON

Plate 3

"Soils Classification"

WOOD/PATEL
LAND DEVELOPMENT • WATER RESOURCES
TRANSPORTATION/TRAFFIC
WATER/WASTEWATER • SURVEYING
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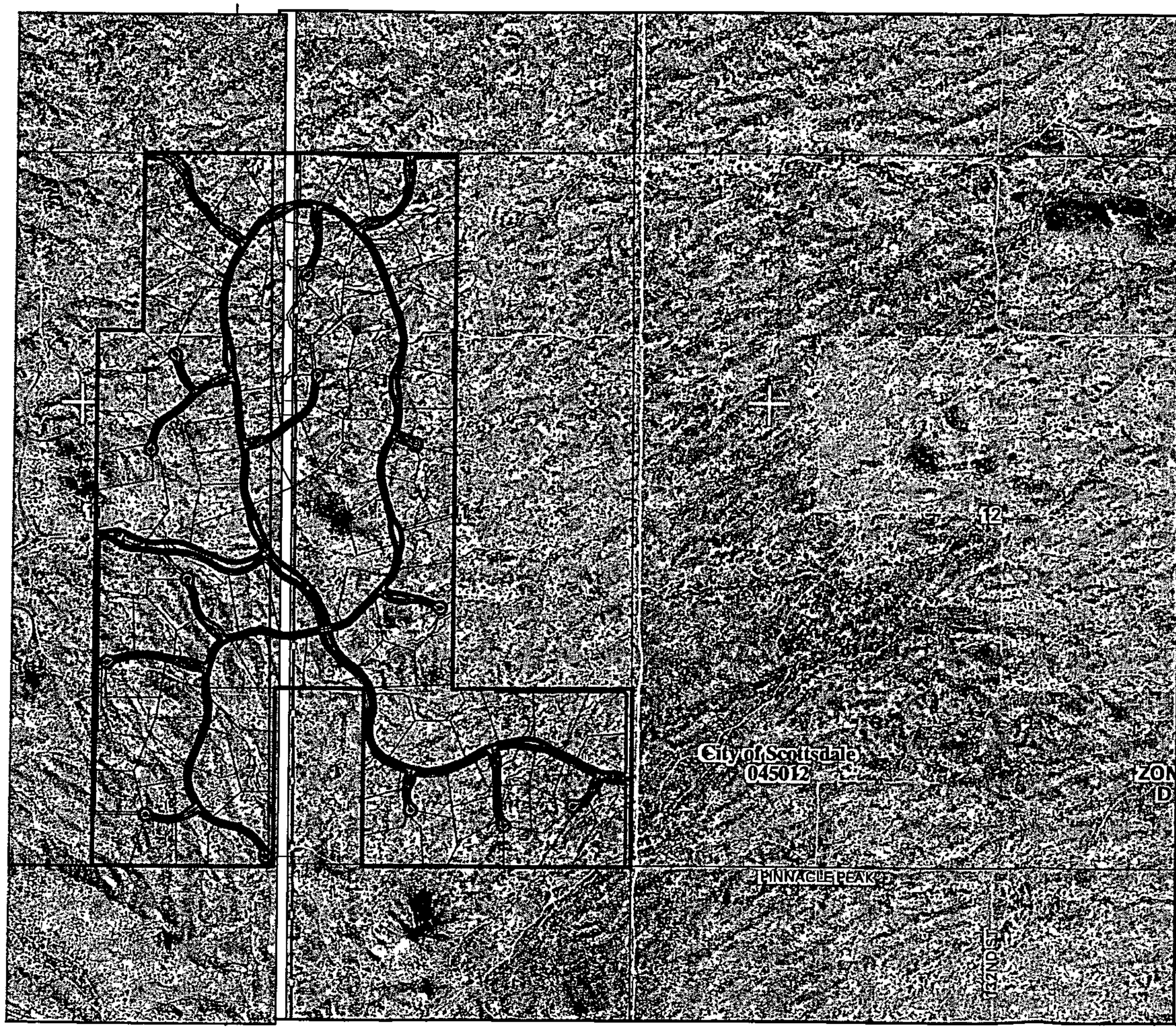
N \2004\042054\Dwg\Exhibits\Soils Exhibit dwg

PLATE 4

Flood Insurance Rate Map (FIRM)



N

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

N

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

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PLATE 5

Color Topographic Aerial Photograph

(In with plans)

PLATE 6

Off-Site Watershed Area Map

(with plans)

PLATE 7

404 Washes

(with plans)

PLATE 8

Pre-Development Drainage Site Plan

(with plans)

PLATE 9

Pre-Development Grading and Drainage Plan

(with plans)

PLATE 10

Post-Development Drainage Site Plan

(with plans)

PLATE 11

Post-Development Grading and Drainage Plan

(with plans)