CONCEPTUAL
MASTER DRAINAGE REPORT
FOR
SERENO CANYON

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WP# 042054

Prepared for

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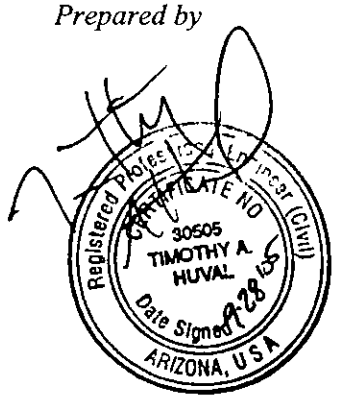

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1 0 INTRODUCTION

This Conceptual Master Drainage Report has been prepared to meet the master drainage plan requirements, in accordance with the City of Scottsdale development criteria for the proposed Sereno Canyon Project Sereno Canyon is a planned 330-acre custom lot residential subdivision located in the northeastern portion of Scottsdale, Arizona This report presents the hydrological and hydraulic modeling and storm water storage requirements

Sereno Canyon is located in Section 11, Township 4 North, Range 5 East 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 phases Please refer to Plate 1A for a *Phasing Map* of the Project The development includes approximately 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

2 0 GENERAL LOCATION AND DESCRIPTION

2 1 Site Features

The proposed project lies in the northern planning section of the City of Scottsdale The site drains from the south to the north Elevations range from 2,830 in the south to 2,675 feet in the northeast Vegetation is typical Sonoran Desert type with creosote bush, jumping cholla, saguaro cacti, palo verde, ironwood and mesquite trees

2.2 Flood Insurance Rate Map (FIRM)

The Flood Insurance Rate Maps (FIRM) for Maricopa County, Arizona and incorporated areas, Map Numbers 04013C1255F and 04013C1260E, dated July 19, 2001 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 2 – *Flood Insurance Rate Map (FIRM)*

3.0 HYDROLOGY

3 1 Methodology

The U S Army Corps of Engineers' HEC-1 hydrologic model was utilized to compute the pre- and post-development 100-year, 6-hour storm runoff discharge rates The preparation of input data necessary for the computer analysis included definition and measurement of the drainage sub-basins, assignment of soil curve numbers and calculations of the proposed impervious factors The City of Scottsdale modeling procedures were followed as outlined in Chapter 2 of the *City of Scottsdale Design Standards and Policies Manual (DSPM)*

Provided below is a more detailed explanation of the methods utilized to compute the definition of drainage sub-basins, determination of soil curve numbers, impervious percentages for the study area and the selection of the design rainfall event

3.2 Drainage Sub-Basins

3 2 1 Off-site Contributing Areas

U S G S quad maps with 2-foot contour interval topography were utilized to define the drainage sub-basins for the off-site portions of the drainage areas Please refer to Plate 5 - *Off-Site Watershed Area Map* for the limits of the drainage sub-basins and concentration points

3 2.2 On-site Contributing Areas

Digital topography with 1-foot contours was used to define the shape of the on-site drainage areas Please refer to Plate 4 - *Pre-Development Drainage Site Plan* for the limits of the on-site sub-basins and concentration points

3 3 Soil Curve Numbers

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 Figure 2 2-19 "Runoff Curve Numbers for Urban Areas" located in the *City of Scottsdale DSPM* was used to determine the soil curve number

The cover type and hydrologic condition were estimated as desert shrub areas with poor hydrologic conditions Runoff curve numbers of 77, 85, and 88 were used respectively, for the corresponding soils groups B, C, and D that occur within the watershed area Please refer to Appendix A for the curve number selection

3 4 Impervious Area

Impervious percentages were determined for each sub-basin for the developed condition HEC-1 model Presently no development consists on the site For the on-site developed conditions, impervious percentages were calculated utilizing the "Percent of Impervious Area vs Dwelling Units/Acre" (Figure 2 2-16), as contained in Chapter 2 of the *City of Scottsdale Drainage DSPM* Based on the lot sizes, an impervious percentage of 12 percent was used for the developed areas

3 5 Rainfall Event

The precipitation amount for the 100-year, 6-hour return period was obtained from NOAA Atlas 2 Volume VIII maps located in the *City of Scottsdale Manual* A copy of this map is included in Appendix A The total calculated 100-year rainfall depth is 3 37 inches for the 100-year, 6-hour rainfall event

3 6 On-site Detention

According to the City's Drainage Ordinance, all runoff generated from the developed portion of the site must be managed and the peak discharge rate from the site reduced to at least pre-development values However, since the property is located within the lower desert landform of the Environmentally Sensitive Lands Ordinance, storing the 100-year, 2-hour storm event would require storage basins that would severely impact natural vegetation and the rural "feel" of the area With the development being sparse in nature at approximately 0 5 dwelling units per acre and no mass grading being proposed, post-development flows are only slightly higher than pre-development flows It is our understanding that the site qualifies for a storm water storage waiver Therefore on-line detention basins, located immediately upstream of culverted roadway crossings are proposed to reduce the post-development flows at or below the pre-development flows for all concentration points The smaller basins situated adjacent to the project boundary were not included in the HEC-1 analysis as their developed stormwater runoff is negligible Please refer to Appendix E for the 100-year 2-hour detention volume calculations for all detention basins

3 7 Summary of Modeling Results

As previously discussed, the U S Army Corps of Engineers' HEC-1 computer analysis program was utilized to compute the peak storm water discharge rates for both existing and proposed conditions Runoff for each drainage sub-basin was computed and then routed, if required, through downstream drainage sub-basins where the hydrographs were then combined

Table 3 1 provides the comparative peak discharge rates for the pre- vs post-developed conditions at each concentration point For the location of these concentration points and corresponding flow values, please refer to Plates 6 and 7 for existing conditions, and Plates 8 and 9 for developed conditions As mentioned previously, the developed conditions HEC-1 model with on-line detention upstream of the culverted road crossings reduced the peak flows at or below the pre-development peak flows at all concentration points The actual HEC-1 input data and result files for the existing and developed conditions are included in Appendices B and C, respectively

Table 3 1 – Flow Summary

100-year		
Concentration Point	**Existing Flow cfs**	**Developed Flow cfs**
A1	213	213
A2	100	98
B	177	174
C	83	78
D	85	85
E1	133	125
E2	122	112
COMBE	251	233
E3	22	17
F1	87	86
F2	40	36
F3	37	34
G	41	39
H1	140	135
H2	155	149
I	67	58

4 0 PROPOSED DRAINAGE SYSTEMS

4 1 Identification of Major Drainage Courses

There are no washes on the site with an anticipated 100-year flow equal to or greater than 750 cfs, therefore no washes are categorized as a Vista Corridor The major water courses that traverse through the project have been identified as washes with a 100-year flow greater than 50 cfs These washes will be maintained in their natural location and will not be re-aligned

4 2 404 Washes

A preliminary investigation has been done on the major washes within the project to identify the washes that may be deemed jurisdictional A request for 404 Jurisdictional Delineation Verification has been submitted to the Army Corp or Engineers for review and approval Plate 3 – *404 Washes* provides the preliminary 404 wash locations in reference to the aerial photograph for the site The preliminary 404 washes are also illustrated on the Pre- and Post-Development Grading and Drainage Plans

4.3 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 Therefore, as lots are developed individual lot engineers will be required to provide drainage documentation to substantiate the development of the lot

4 4 Easement Requirements

Where flows from the 100-year storm event are greater than 50 cfs, natural area open space (NAOS) drainage easements have been provided In addition, Drainage and Flood Control Easements shall be dedicated to the limits of inundation for the 100-year, 2-hour storm event

4.5 Roadway Crossing Requirements

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

4 6 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 for 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 to have drainage systems perform to the level of protection or service as presented in this report and the project's plans and specifications

5 0 HYDRAULICS

5 1 100-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 starting water surface elevations were determined using slope area method A delineation of the 100-year water surface elevation for these washes that experience pre-development peak flows has been drawn based on results from the HEC-RAS analysis Water surface elevations and top widths during pre-development flows for each cross section are included on Plate 7 - *Pre-Development Grading and Drainage Plan*

The 100-year floodplain delineation for these washes that experience post-development peak flows has been revised to reflect the limits of ponding that occurs on the upstream side of the culverted road crossings At this point, the 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 delineation as the pre-development delineation with the exception of the widened areas at ponding locations Water surface elevations and top widths for each cross section are included on Plate 9 – *Post-Development Grading and Drainage Plan*

5.2 Roadway Crossing Structures

Roadway crossing structures were designed to convey the anticipated 100-year flows Thirteen (13) culvert crossings have been designed and are identified on Plate 9 The approximate 100-year backwater limits (ponding) have been incorporated with the proposed floodplain delineations shown on the post-development Plates 8 and 9 The supporting hydraulic calculations are included in Appendix D

These culverts are designed to provide storm water storage on the upstream side of the culvert The difference between the inflow and out flow rates at the culverts is identified in Table 5 2-1 on the following page Please refer to Plate 9 for the location of the culverts according to their ID

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

Table 5.2 – 1 Culvert Inflow vs. Outflow

Basin	Culvert ID	Description	Inflow (cfs)	Outflow (cfs)	Inflow - Outflow (cfs)
F3	1	(1) 30" Pipe	39	34	5
F2	2	(1) 30" Pipe	42	36	6
F1	3	(2) 36" Pipes	93	86	7
E2	4	(2) 42" Pipes	128	112	16
E1	5	(2) 36" Pipes	142	125	17
E3	6	(1) 24" Pipe	24	17	7
D	7	(2) 36" Pipes	91	85	6
C	8	(2) 30" Pipes	85	78	7
B	9	(2) 48" Pipes	186	174	12
A2	10	(2) 36" Pipes	103	98	5
I	11	(2) 30" Pipes	70	58	12
H2	12	(2) 12" Pipes	160	149	11
H1	13	(2) 36" Pipes	149	135	14
G1	14	(1) 24" Pipe	39	39	0

6 0 CONCLUSIONS

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

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

3 The differences of the peak flow rates for the pre- versus post-development conditions for the 100-year, 6-hour storm event is negligible in instances where the post-development flows have increased over the pre-development conditions

4 It is being proposed that in lieu of providing 100-year, 2-hour detention, online detention on the upstream side of the road culvert crossings be provided to reduce post-development flows to at or below pre-development levels A storm water storage waiver has been submitted to the City of Scottsdale

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

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

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

7 0 REFERENCES

1 City of Scottsdale, *Design Standards and Policies Manual Chapter 2 Drainage*, December, 1999

2 Flood Control District of Maricopa County, *Drainage Design Manual for Maricopa County, Arizona Volume I – Hydrology,* revised January 1995

3 Flood Control District of Maricopa County, *Drainage Design Manual for Maricopa County, Arizona Volume II – Hydraulics*, January 28, 1996

4 U S Army Corps of Engineers, *HEC-1, Flood Hydrograph Package*, June 1998

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

APPENDIX A

HEC-1 Input Parameters

APPENDIX B

Existing HEC-1 Model

APPENDIX C

Proposed HEC-1 Model

APPENDIX D

Hydraulics

Culvert Rating Curves for Stage-Storage Intervals

HEC-RAS Output Files

APPENDIX E

Detention Basin Volume Calculations

APPENDIX F

Stormwater Storage Waiver Application

PLATE 1

Vicinity Map

PLATE 1A

Phasing Map

PLATE 2

Flood Insurance Rate Map (FIRM)

PLATE 3

404 Washes

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Color Topographic Aerial Photograph

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Off-Site Watershed Area Map

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Pre-Development Drainage Site Plan

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Pre-Development Grading and Drainage Plan

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Post-Development Drainage Site Plan

PLATE 9

Post-Development Grading and Drainage Plan

APPENDIX A

HEC-1 Input Parameters

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

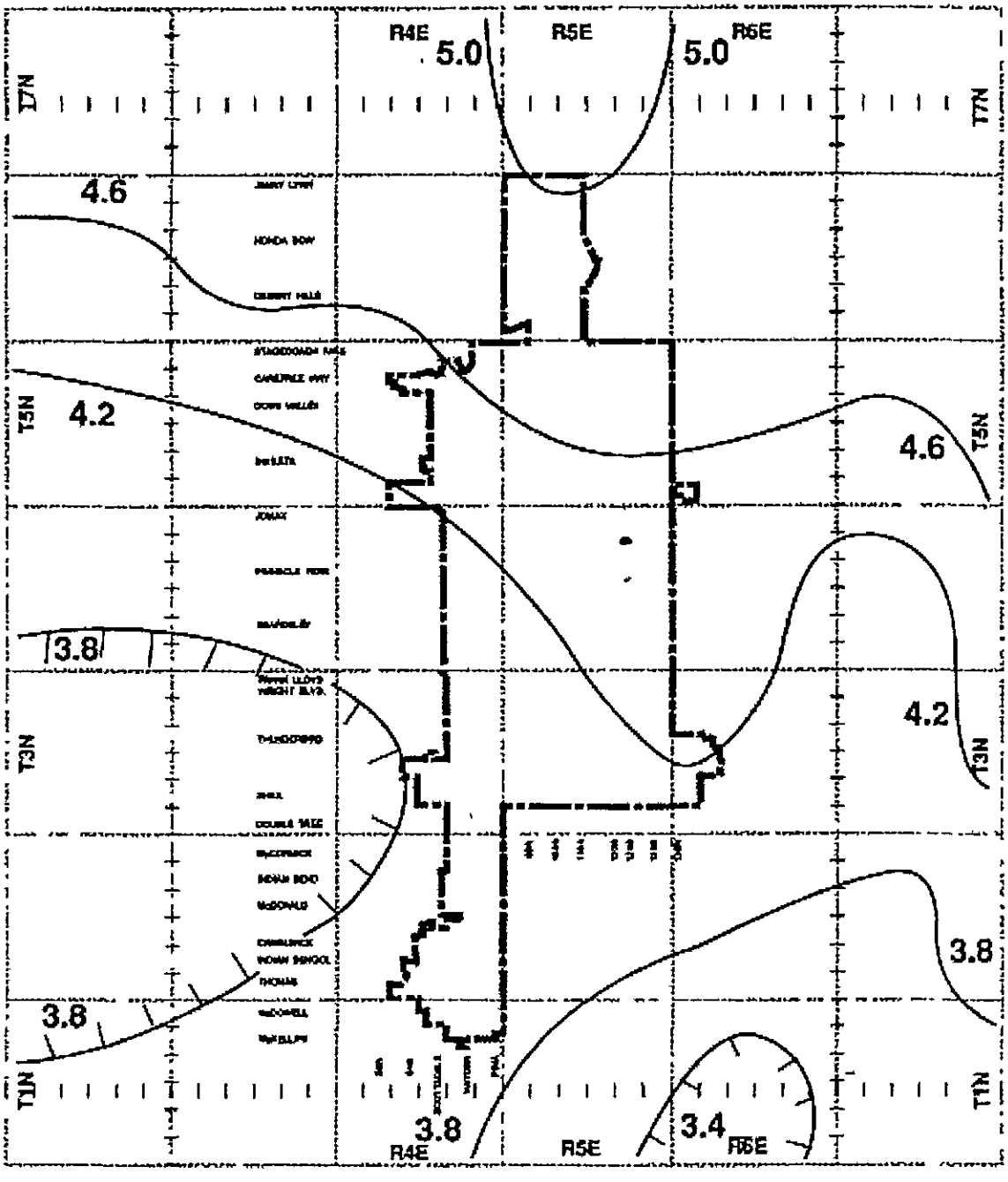


FIGURE 2.2-12

Isopluvials 100 Year 24 Hour Precipitation in Inches

Rainfall Data From NOAA Atlas 2, Vol VIII

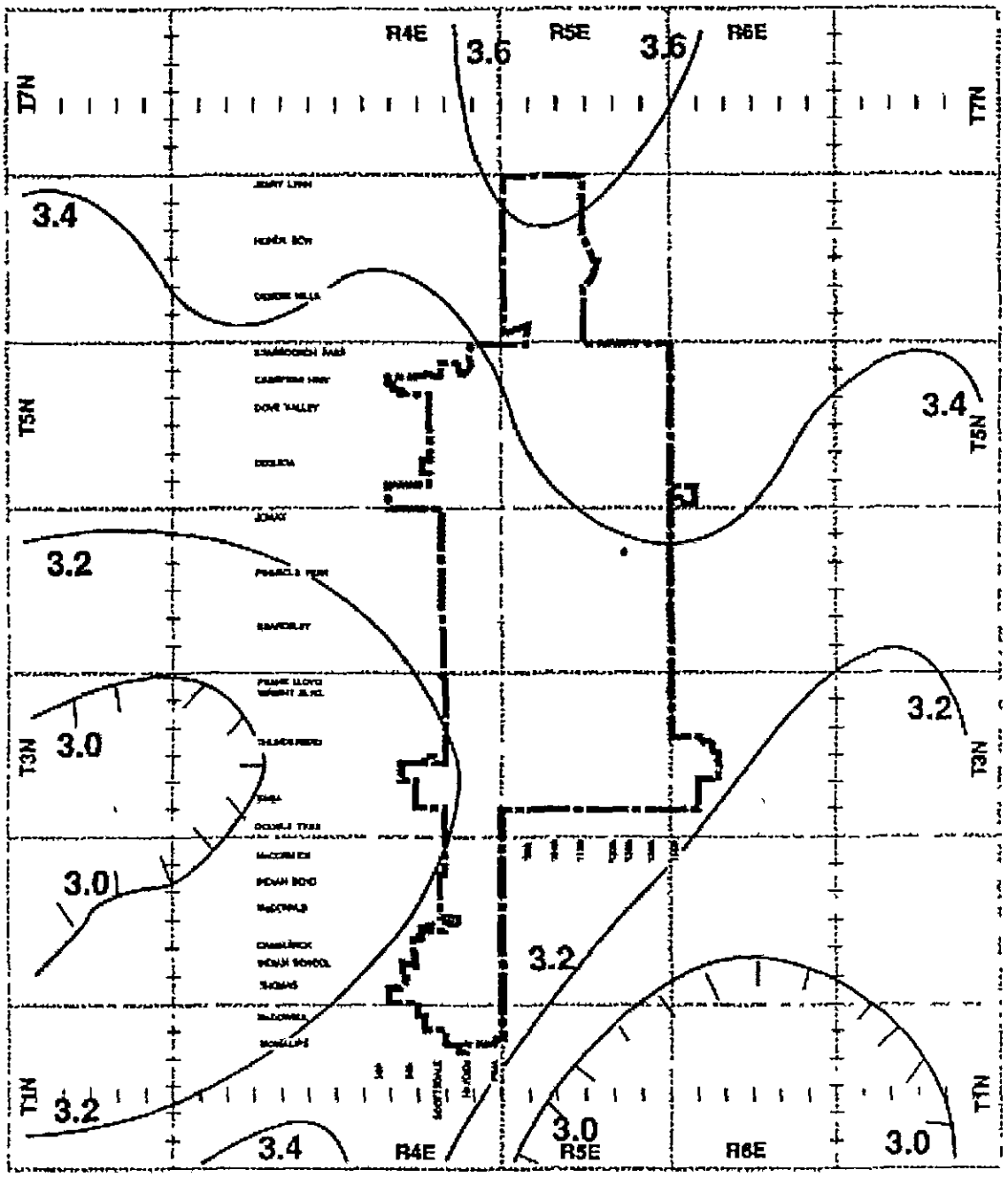


FIGURE 2.2-6

Isopluvials 100 Year 6 Hour Precipitation in Inches

Rainfall Data From NOAA Atlas 2, Vol VIII

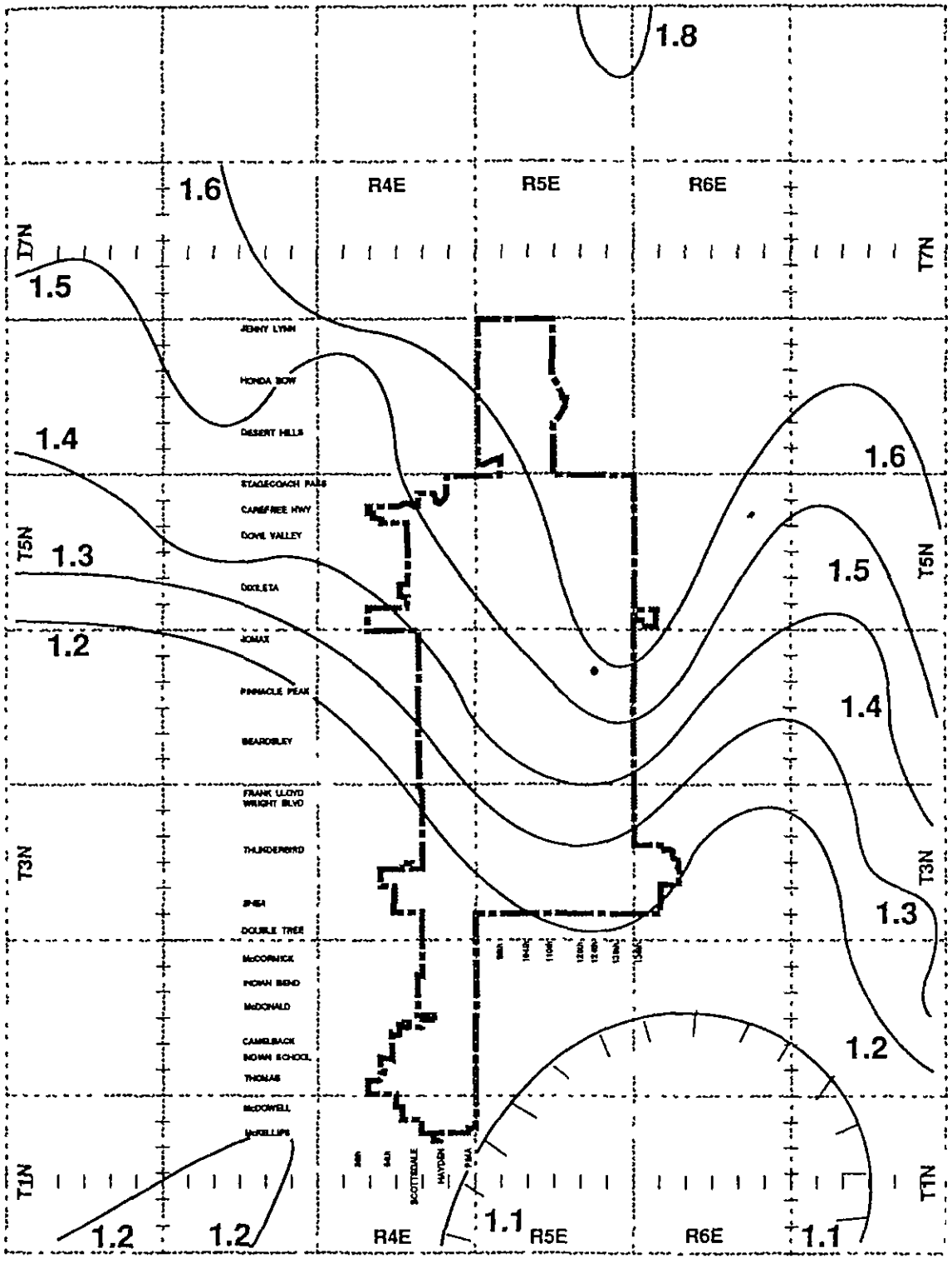


FIGURE 2.2-1

Isopluvials 2 Year 6 Hour Precipitation in Inches

Rainfall Data From NOAA Atlas 2, Vol VIII

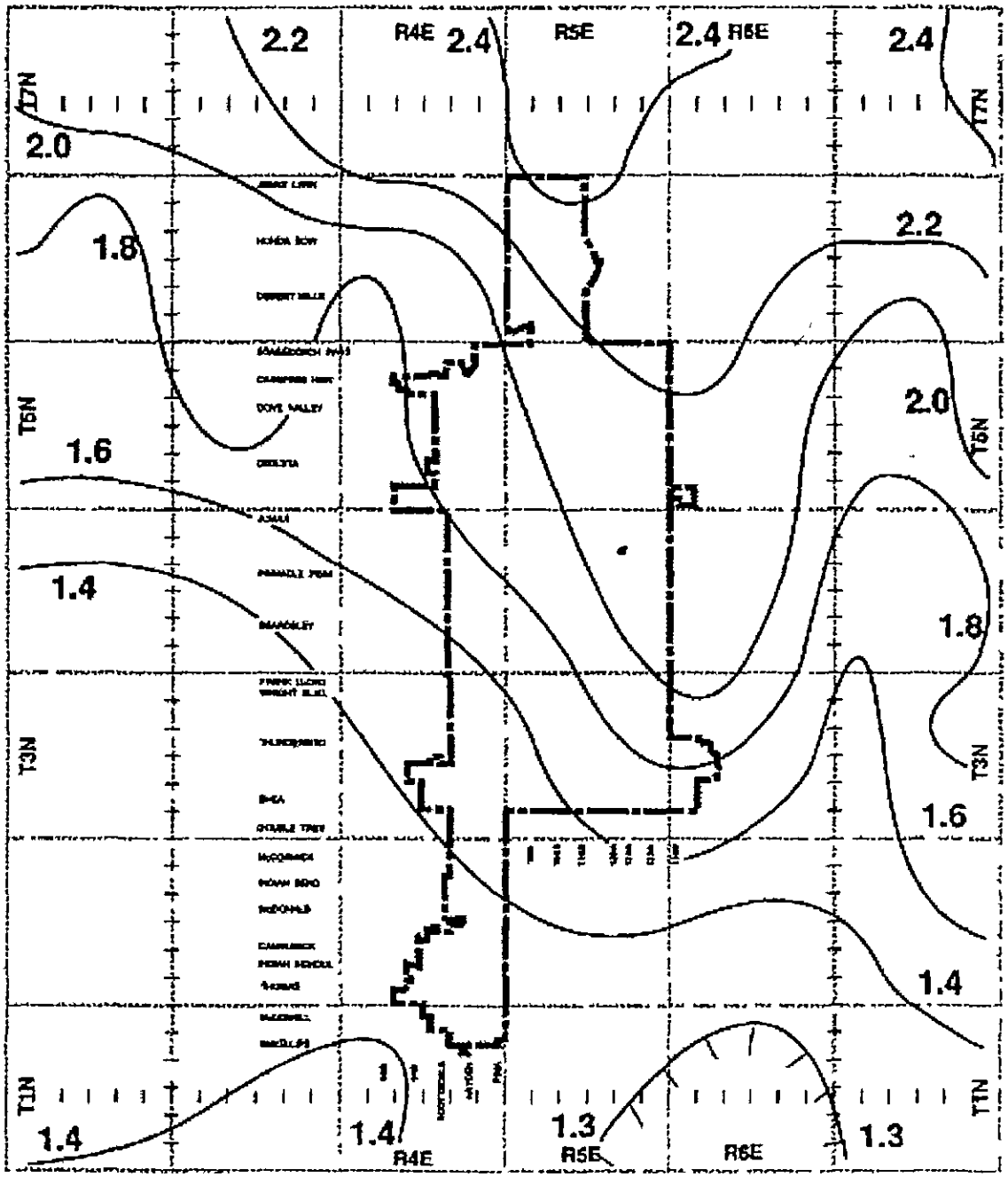


FIGURE 2.2-7

Isopluvials 2 Year 24 Hour Precipitation in Inches

Rainfall Data From NOAA Atlas 2, Vol. VIII

Runoff Curve Numbers for Urban Areas[1]

Cover type and hydrologic condition	Average % Impervious Area[2]	Curve numbers for hydrologic soil group A	B	C	D
Fully developed urban areas with vegetation established					
Open space (lawns, parks, golf courses, cemeteries, etc)[3]:					
Poor condition (grass cover less that 50%)		68	79	86	89
Fair condition (grass cover 50-75%)		49	69	79	84
Good condition (grass cover greater than 75%)		39	61	74	80
Impervious areas					
Paved parking lots, roads, driveways, etc. (excld. right-of-way)		98	98	98	98
Steets and roads:					
Paved, curbs and storm sewer (excld right-of-way)		98	98	98	98
Paved, open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas'					
Natural desert landscaping (pervious areas only)[4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1 to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85				
Industrial	85				
Townhouse duplexes	65	Not Applicable in Scottsdale			
Multi-Family	85				
Residential districts by average lot size. (See Figure 2.2-16)					
Developing Urban Areas					
Newly graded areas (pervious areas only, no vegetation)[5]		77	86	91	94

[1]Average runoff condition, and I_a = 0.2S, Table 2-2a, 210 VI TR55, Second Ed., June 1986
[2]The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows. impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition (not applicable in Scottsdale)
[3]CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.
[4]Composite CN's for natural desert landscaping should be computed based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition
[5]*Composite CN's to use for the design of temporary measures during grading and construction should be computed based* on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

FIGURE 2.2-19
Runoff Curve Numbers for Urban Areas[1]

Runoff Curve Numbers for Arid and Semiarid Rangelands[1]

Cover type and hydrologic condition	Hydrologic Condition[2]	Curve numbers for hydrologic soil group A	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, creosotebush, blackbrush, bursage, palo verde, mequite, 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, Table 2-2d, 210-VI-TR55, Second Ed., June 1986.
[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 2.2-20

Runoff Curve Numbers for Arid and Semiarid Rangelands[1]

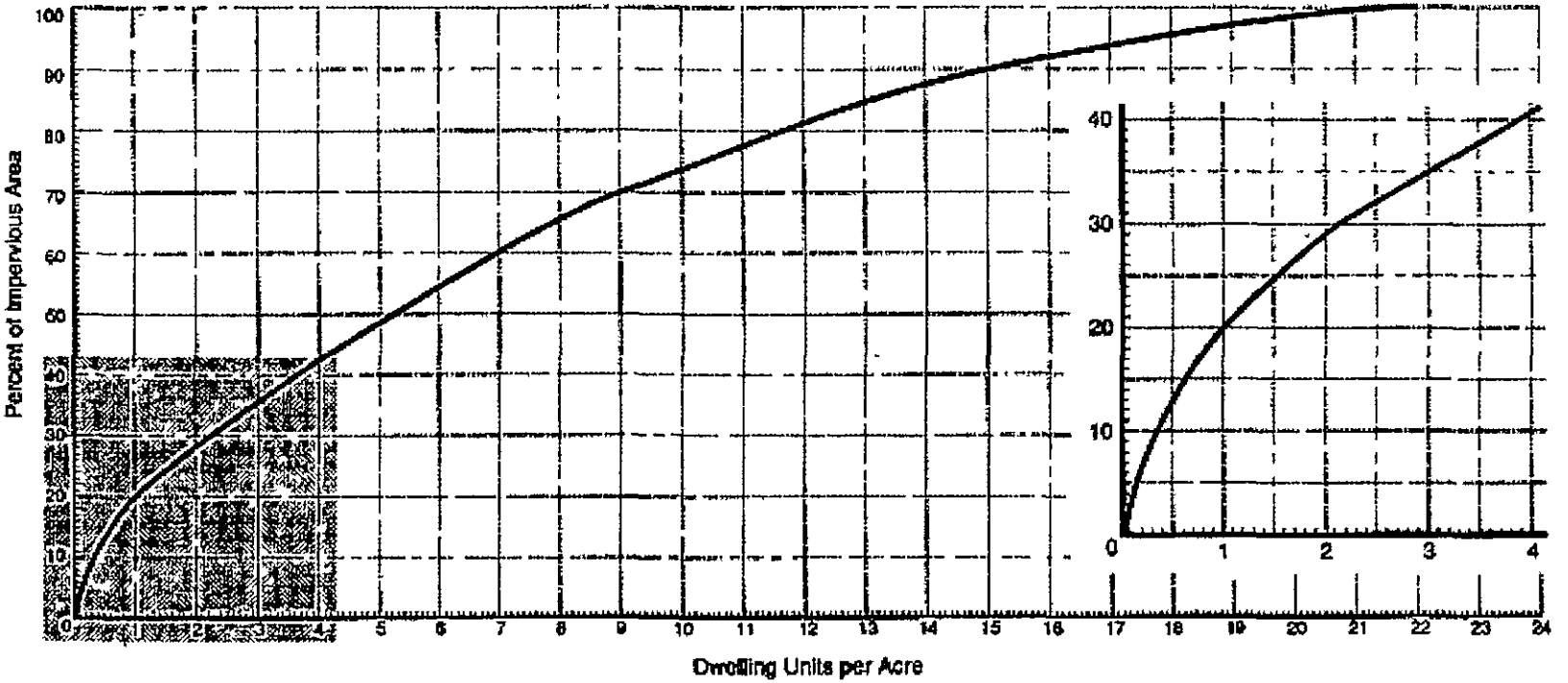


FIGURE 2.2-16

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

Sereno Canyon
Online Detention Volumes

Sub-Basin A1

STAGE	AREA		VOLUME	
	(ft2)	(acres)	INC (acre-feet)	CUM (acre-feet)
2755	437	0 010	0 000	0 000
2756	1762	0 040	0 025	0 025
2757	3113	0 071	0 056	0 081
2758	4788	0 110	0 091	0 172

TOTAL PROVIDED VOLUME ***0 17 acre-feet***

Sub-Basin A2

STAGE	AREA		VOLUME	
	(ft2)	(acres)	INC (acre-feet)	CUM (acre-feet)
2757	71	0 002	0 000	0 000
2758	406	0 009	0 005	0 005
2759	1038	0 024	0 017	0 022
2760	2176	0 050	0 037	0 059
2761	3483	0 080	0 065	0 124
2762	7769	0 178	0 129	0 253

TOTAL PROVIDED VOLUME **0 25 acre-feet**

Sub-Basin B

STAGE	AREA		VOLUME	
	(ft2)	(acres)	INC (acre-feet)	CUM (acre-feet)
2779	662	0 015	0 000	0 000
2780	1865	0 043	0 029	0 029
2781	3305	0 076	0 059	0 088
2782	5175	0 119	0 097	0 186
2783	7601	0 174	0 147	0 332
2784	10263	0 236	0 205	0 537

TOTAL PROVIDED VOLUME **0 54 acre-feet**

Sub-Basin C

STAGE	AREA		VOLUME	
	(ft2)	(acres)	INC (acre-feet)	CUM (acre-feet)
2779	211	0 005	0 000	0 000
2780	1232	0 028	0 017	0 017
2781	2680	0 062	0 045	0 061
2782	4153	0 095	0 078	0 140
2783	6614	0 152	0 124	0 263
2784	10181	0 234	0 193	0 456

TOTAL PROVIDED VOLUME **0 46 acre-feet**

Sub-Basin D

STAGE	AREA		VOLUME	
	(ft2)	(acres)	INC (acre-feet)	CUM (acre-feet)
2739	91	0 002	0 000	0 000
2740	1528	0 035	0 019	0 019
2741	3160	0 073	0 054	0 072
2742	5156	0 118	0 095	0 168
2743	7491	0 172	0 145	0 313

TOTAL PROVIDED VOLUME **0 31 acre-feet**

Sub-Basin E1

STAGE	AREA		VOLUME	
	(ft2)	(acres)	INC (acre-feet)	CUM (acre-feet)
2694	25	0 001	0 000	0 000
2695	843	0 019	0 010	0 010
2696	2627	0 060	0 040	0 050
2697	5367	0 123	0 092	0 142
2698	8611	0 198	0 160	0 302
2699	12335	0 283	0 240	0 542
2700	17669	0 406	0 344	0 887

TOTAL PROVIDED VOLUME **0 89 acre-feet**

Sub-Basin E2

STAGE	AREA		VOLUME	
	(ft2)	(acres)	INC (acre-feet)	CUM (acre-feet)
2693	23 5	0 001	0 000	0 000
2694	588	0 013	0 007	0 007
2695	4722	0 108	0 061	0 068
2696	9159	0 210	0 159	0 227
2697	14440	0 331	0 271	0 498
2698	20604	0 473	0 402	0 900

TOTAL PROVIDED VOLUME **0 90 acre-feet**

Sereno Canyon
Online Detention Volumes

Sub-Basin E3

STAGE	AREA		VOLUME	
	(ft2)	(acres)	INC (acre-feet)	CUM (acre-feet)
2700	400	0 009	0 000	0 000
2701	1352	0 031	0 020	0 020
2702	2856	0 066	0 048	0 068
2703	5049	0 116	0 091	0 159

TOTAL PROVIDED VOLUME **0 16 acre-feet**

Sub-Basin F1

STAGE	AREA		VOLUME	
	(ft2)	(acres)	INC (acre-feet)	CUM (acre-feet)
2696	98	0 002	0 000	0 000
2697	584	0 013	0 008	0 008
2698	1694	0 039	0 026	0 034
2699	3800	0 087	0 063	0 097
2700	9470	0 217	0 152	0 249

TOTAL PROVIDED VOLUME **0 25 acre-feet**

Sub-Basin F2

STAGE	AREA		VOLUME	
	(ft2)	(acres)	INC (acre-feet)	CUM (acre-feet)
2701	93	0 002	0 000	0 000
2702	545	0 013	0 007	0 007
2703	1341	0 031	0 022	0 029
2704	3126	0 072	0 051	0 080
2705	5640	0 129	0 101	0 181

TOTAL PROVIDED VOLUME **0 18 acre-feet**

Sub-Basin F3

STAGE	AREA		VOLUME	
	(ft2)	(acres)	INC (acre-feet)	CUM (acre-feet)
2720	0	0 000	0 000	0 000
2721	192	0 004	0 002	0 002
2722	808	0 019	0 011	0 014
2723	1908	0 044	0 031	0 045
2724	3360	0 077	0 060	0 105
2725	5225	0 120	0 099	0 204

TOTAL PROVIDED VOLUME **0.20 acre-feet**

Sub-Basin G

STAGE	AREA		VOLUME	
	(ft2)	(acres)	INC (acre-feet)	CUM (acre-feet)
2745	44	0 001	0 000	0 000
2746	305	0 007	0 004	0 004
2747	871	0 020	0 014	0 018
2748	1786	0 041	0 048	0 052
2749	3136	0 072	0 092	0 110

TOTAL PROVIDED VOLUME **0 11 acre-feet**

Sub-Basin H1

STAGE	AREA		VOLUME	
	(ft2)	(acres)	INC (acre-feet)	CUM (acre-feet)
2765	69	0 002	0 000	0 000
2766	270	0 006	0 004	0 004
2767	698	0 016	0 011	0 015
2768	1485	0 034	0 025	0 040
2769	2655	0 061	0 048	0 088
2770	4775	0 110	0 085	0 173
2771	6819	0 157	0 133	0 306

TOTAL PROVIDED VOLUME **0 31 acre-feet**

Sub-Basin H2

STAGE	AREA		VOLUME	
	(ft2)	(acres)	INC (acre-feet)	CUM (acre-feet)
2771	192	0 004	0 000	0 000
2772	1598	0 037	0 021	0 021
2773	5361	0 123	0 080	0 100
2774	8349	0 192	0 157	0 258
2775	12231	0 281	0 236	0 494
2776	16738	0 384	0 333	0 827

TOTAL PROVIDED VOLUME **0 83 acre-feet**

Sereno Canyon
Online Detention Volumes

Sub-Basin I

STAGE	AREA		VOLUME	
	(ft2)	(acres)	INC (acre-feet)	CUM (acre-feet)
2755	272	0 006	0 000	0 000
2756	2462	0 057	0 031	0 031
2757	6002	0 138	0 097	0 129
2758	10089	0 232	0 185	0 313
2759	14432	0 331	0 281	0 595

TOTAL PROVIDED VOLUME **0 59 acre-feet**

APPENDIX B

Existing HEC-1 Model

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC 1)   *
*              JUN  1998                *
*            VERSION 4 1                *
*                                       *
*  RUN DATE   12MAY05  TIME  17 12 19   *
*                                       *
*****************************************
```

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

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

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

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

1 HEC 1 INPUT PAGE 1

```
LINE          ID       1       2       3       4       5       6       7       8       9      10
   1          ID        HEC 1 MODEL FOR SERENO CANYON
   2          ID        100 YEAR  6-HOUR STORM
   3          ID        RAINFALL FROM NOAA ATLAS
   4          ID        SCS CURVE NUMBER SOIL LOSS PARAMETERS
   5          ID        KINEMATIC WAVE HYDROGRAPH ROUTING
   6          ID        EXISTING CONDITIONS
   7          ID
   8          ID        PREPARED BY WOOD/PATEL  8 4 2004
   9          ID        FILE NAME   EX-100 DAT
  10          ID
              *DIAGRAM
  11          IT      2                    2000
  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
              *       1
  17          BA      084
  18          LS              88
  19          UK     260     025      15     100
  20          RK    3520     023     045            TRAP      15       5

  21          KK      A2
  22          KM       RUNOFF FROM SUB-BASIN A2
  23          BA     036
  24          LS              88
  25          UK     235     025      15     100
  26          RK    2000      02     045            TRAP      15       5

  27          KK       B
  28          KM       RUNOFF FROM SUB BASIN B
  29          BA      077
  30          LS              88
  31          UK     400     025      15     100
  32          RK    2420     024     045            TRAP      15       5

  33          KK       C
  34          KM       RUNOFF FROM SUB-BASIN C
  35          BA      03
  36          LS              88
  37          UK     250     023      15     100
  38          RK    1570     017     045            TRAP      15       5

  39          KK       D
  40          KM       RUNOFF FROM SUB BASIN D
  41          BA      034
  42          LS              88
  43          UK     300      02      15     100
  44          RK    1425     014     045            TRAP      15       5
```

1 HEC 1 INPUT PAGE 2

```
LINE          ID       1       2       3       4       5       6       7       8       9      10
  45          KK      E1
```

```
          46          KM       RUNOFF FROM SUB-BASIN E1
          47          BA     061
          48          LS               88
          49          UK     400       02       15      100
          50          RK    2050      013      045             TRAP       15        5

          51          KK      E2
          52          KM       RUNOFF FROM SUB BASIN E2
          53          BA     046
          54          LS               88
          55          UK     200       02       15      100
          56          RK    2370      013      045             TRAP       15        5

          57          KK    COMBE
          58          KM         COMBINE SECTIONS E1 AND E2
          59          HC       2
                      *

          60          KK    CLEAR
          61          KM         CLEAR HYDROGRAPH STACK
          62          HC       6
                      *

          63          KK      E3
          64          KM       RUNOFF FROM SUB-BASIN E3
          65          BA     007
          66          LS               88
          67          UK     175       025      15      100
          68          RK     750       032      045             TRAP       15        5

          69          KK      F1
          70          KM       RUNOFF FROM SUB-BASIN F1
          71          BA     036
          72          LS               88
          73          UK     225       018      15      100
          74          RK    2500       012      045             TRAP       15        5
                      *

          75          KK      F2
          76          KM       RUNOFF FROM SUB BASIN F2
          77          BA     014
          78          LS               88
          79          UK     200       018      15      100
          80          RK    1440       028      045             TRAP       15        5
                      *

          81          KK      F3
          82          KM       RUNOFF FROM SUB BASIN F3
          83          BA     013
          84          LS               88
          85          UK     225       018      15      100
          86          RK     850       026      045             TRAP       15        5
                      *
1                                                HEC-1 INPUT                                                    PAGE  3

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

          87          KK      G
          88          KM       RUNOFF FROM SUB-BASIN G
          89          BA     017
          90          LS               88
          91          UK     400       025      15      100
          92          RK     720       022      045             TRAP       15        5

          93          KK      H1
          94          KM       RUNOFF FROM SUB BASIN H1
          95          BA     059
          96          LS               88
          97          UK     375       025      15      100
          98          RK    2210       019      045             TRAP       15        5

          99          KK      H2
         100          KM       RUNOFF FROM SUB-BASIN H2
         101          BA     072
         102          LS               88
         103          UK     400       025      15      100
         104          RK    3480       019      045             TRAP       15        5

         105          KK       I
         106          KM       RUNOFF FROM SUB BASIN I
         107          BA     025
         108          LS               88
         109          UK     225       02       15      100
         110          RK    2100       026      045             TRAP       15        5
         111          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
```

```
   21                    A2

   27                                 B

   33                                             C

   39                                                          D

   45                                                                      E1

   51                                                                                  E2

   57                                                                      CONBE

   60       CLEAR

   63                    E3

   69                                 F1

   75                                             F2

   81                                                          F3

   87                                                                      G

   93                                                                                  H1

   99                                                                                        H2

  105                                                                                              I

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*             JUN   1998               *
*           VERSION 4 1                *
*                                      *
*  RUN DATE   12MAY05  TIME  17 12 19  *
*                                      *
****************************************

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

                          HEC-1 MODEL FOR MCDOWELL MOUNTAIN BACKBOWL
                          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        2000  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE      3   0  ENDING DATE
                      NDTIME       1838  ENDING TIME
                      ICENT          19  CENTURY MARK

                    COMPUTATION INTERVAL      03 HOURS
                        TOTAL TIME BASE   66 63 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

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

1
                                        RUNOFF SUMMARY
                                  FLOW IN CUBIC FEET PER SECOND
                                TIME IN HOURS   AREA IN SQUARE MILES

                                        PEAK    TIME OF    AVERAGE FLOW FOR MAXIMUM PERIOD      BASIN     MAXIMUM     TIME OF
          OPERATION       STATION       FLOW    PEAK       6-HOUR    24-HOUR    72 HOUR        AREA      STAGE       MAX STAGE
+
          HYDROGRAPH AT
+                           A1          213     3 20         19          5          2           08
          HYDROGRAPH AT
+                           A2          100     3 17          8          2          1           04
          HYDROGRAPH AT
+                           B           177     3 20         18          4          2           08
          HYDROGRAPH AT
+                           C            83     3 17          7          2          1           03
          HYDROGRAPH AT
+                           D            85     3 17          8          2          1           03
          HYDROGRAPH AT
+                           E1          133     3 23         14          4          1           06
          HYDROGRAPH AT
+                           E2          122     3 17         11          3          1           05
          2 COMBINED AT
+                         COMBE         251     3 20         24          6          2           11
          6 COMBINED AT
+                         CLEAR         897     3 20         84         21          8           37
          HYDROGRAPH AT
+                           E3           22     3 10          2          0          0           01
          HYDROGRAPH AT
+                           F1           87     3 20          8          2          1           04
          HYDROGRAPH AT
+                           F2           40     3 17          3          1          0           01
          HYDROGRAPH AT
+                           F3           37     3 13          3          1          0           01
          HYDROGRAPH AT
+                           G            41     3 17          4          1          0           02
          HYDROGRAPH AT
+                           H1          140     3 20         13          3          1           06
          HYDROGRAPH AT
+                           H2          155     3 23         16          4          1           07
          HYDROGRAPH AT
+                           I            67     3 17          6          1          1           03
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)	DT (MIN)	INTERPOLATED TO COMPUTATION INTERVAL PEAK (CFS)	INTERPOLATED TO COMPUTATION INTERVAL TIME TO PEAK (MIN)	INTERPOLATED TO COMPUTATION INTERVAL VOLUME (IN)
FOR STORM = 1 STORM AREA (SQ MI) = 01									
A1	MANE	1 84	215 36	191 18	2 14	2 00	213 24	192 00	2 14

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 9633E+01 OUTFLOW= 9599E+01 BASIN STORAGE= 3750E-03 PERCENT ERROR= 4

FOR STORM = 1 STORM AREA (SQ MI) = 01									
A2	MANE	1 88	100 57	189 37	2 14	2 00	99 86	190 00	2 14

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 4129E+01 OUTFLOW= 4113E+01 BASIN STORAGE= 1196E 03 PERCENT ERROR= 4

FOR STORM = 1 STORM AREA (SQ MI) = 01									
B	MANE	1 80	178 02	192 66	2 14	2 00	177 17	192 00	2 14

CONTINUITY SUMMARY (AC FT) - INFLOW= 0000E+00 EXCESS= 8830E+01 OUTFLOW= 8777E+01 BASIN STORAGE= 6009E-03 PERCENT ERROR= 6

FOR STORM = 1 STORM AREA (SQ MI) = 01									
C	MANE	1 71	82 90	189 95	2 14	2 00	82 77	190 00	2 15

CONTINUITY SUMMARY (AC FT) - INFLOW= 0000E+00 EXCESS= 3440E+01 OUTFLOW= 3430E+01 BASIN STORAGE= 1239E-03 PERCENT ERROR= 3

FOR STORM = 1 STORM AREA (SQ MI) = 01									
D	MANE	1 53	86 22	190 92	2 14	2 00	84 94	190 00	2 14

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 3899E+01 OUTFLOW= 3884E+01 BASIN STORAGE= 1962E-03 PERCENT ERROR= 4

FOR STORM = 1 STORM AREA (SQ MI) = 01									
E1	MANE	2 00	133 36	194 55	2 14	2 00	133 14	194 00	2 14

CONTINUITY SUMMARY (AC FT) - INFLOW= 0000E+00 EXCESS= 6996E+01 OUTFLOW= 6955E+01 BASIN STORAGE= 5608E-03 PERCENT ERROR= 6

FOR STORM = 1 STORM AREA (SQ MI) = 01									
E2	MANE	1 89	121 94	190 01	2 14	2 00	121 89	190 00	2 15

CONTINUITY SUMMARY (AC FT) INFLOW= 0000E+00 EXCESS= 5275E+01 OUTFLOW= 5259E+01 BASIN STORAGE= 1471E-03 PERCENT ERROR= 3

FOR STORM = 1 STORM AREA (SQ MI) = 01									
E3	MANE	90	22 74	186 82	2 15	2 00	22 38	186 00	2 15

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 8028E+00 OUTFLOW= 8015E+00 BASIN STORAGE= 1492E-04 PERCENT ERROR= 2

FOR STORM = 1 STORM AREA (SQ MI) = 01									
F1	MANE	2 00	88 17	192 44	2 14	2 00	86 82	192 00	2 14

CONTINUITY SUMMARY (AC FT) - INFLOW= 0000E+00 EXCESS= 4129E+01 OUTFLOW= 4112E+01 BASIN STORAGE= 1537E 03 PERCENT ERROR= 4

FOR STORM = 1 STORM AREA (SQ MI) = 01									
F2	MANE	1 50	39 90	188 55	2 14	2 00	39 62	190 00	2 14

CONTINUITY SUMMARY (AC FT) - INFLOW= 0000E+00 EXCESS= 1606E+01 OUTFLOW= 1601E+01 BASIN STORAGE= 4495E 04 PERCENT ERROR= 3

FOR STORM = 1 STORM AREA (SQ MI) = 01									
F3	MANE	1 04	37 48	188 27	2 15	2 00	37 29	188 00	2 15

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 1491E+01 OUTFLOW= 1488E+01 BASIN STORAGE= 4746E-04 PERCENT ERROR= 2

FOR STORM = 1 STORM AREA (SQ MI) = 01									
G	MANE	94	40 94	190 89	2 14	2 00	40 78	190 00	2 14

CONTINUITY SUMMARY (AC FT) INFLOW= 0000E+00 EXCESS= 1950E+01 OUTFLOW= 1939E+01 BASIN STORAGE= 1252E-03 PERCENT ERROR= 5

FOR STORM = 1 STORM AREA (SQ MI) = 01									
H1	MANE	1 85	141 10	192 31	2 14	2 00	140 41	192 00	2 14

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 6766E+01 OUTFLOW= 6736E+01 BASIN STORAGE= 3891E 03 PERCENT ERROR= 4

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

H2	MANE	2 00	155 41	195 66	2 14	2 00	154 63	194 00	2 14

CONTINUITY SUMMARY (AC-FT) INFLOW= 0000E+00 EXCESS= 8257E+01 OUTFLOW= 8203E+01 BASIN STORAGE= 6010E 03 PERCENT ERROR= 6

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

I	MANE	1 91	66 92	191 14	2 14	2 00	66 84	190 00	2 14

CONTINUITY SUMMARY (AC FT) - INFLOW= 0000E+00 EXCESS= 2867E+01 OUTFLOW= 2856E+01 BASIN STORAGE= 1048E-03 PERCENT ERROR= 4

*** NORMAL END OF HEC 1 ***

APPENDIX C

Proposed HEC-1 Model

```
1  ****************************************
 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
 *             JUN  1998                *
 *          VERSION 4 1                 *
 *                                      *
 *  RUN DATE   12MAY05  TIME  18 22 36  *
 *                                      *
 ****************************************
```

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

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

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

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


```
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       12% 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                   2000
  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     083
  19          LS              88      1 4
  20          UK     260      025      15     100
  21          RK    3520      023      045            TRAP      15       5

  22          KK      A2
  23          KM       RUNOFF FROM SUB-BASIN A2
  24          BA     036
  25          LS              88      8 7
  26          UK     235      025      15     100
  27          RK    2000       02      045            TRAP      15       5

  28          KK    BASA2
  29          KM         2 36" PIPES
  30          KM         V-NOTCH WEIR WITH 75 DEGREE ANGLE AT HEADWALL
  31          RS       1    STOR       0
  32          SV       0     005      022     026     059     124     253
  33          SE    2757    2758     2759  2759 5    2760    2761    2762
  34          SQ       0     1 9     10 8    18 8    29 7    60 9   106 4

  35          KK       B
  36          KM       RUNOFF FROM SUB-BASIN B
  37          BA     077
  38          LS              88      6 9
  39          UK     400      025      15     100
  40          RK    2420      024      045            TRAP      15       5

  41          KK     BASB
  42          KM         2 48  PIPES
  43          RS       1    STOR       0
  44          SV       0     029      088     137     186     332     537
  45          SE    2779    2780     2781  2781 5    2782    2783    2784
  46          SQ       0       16       46      69      92     142     190
```



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

```
47          KK       C
48          KM       RUNOFF FROM SUB-BASIN C
49          BA      03
50          LS *             88      6 8
51          UK     250       023       15      100
52          RK    1570       017       045             TRAP       15        5


53          KK    BASC
54          KM         2 30" PIPES
55          KM         1-12  PIPE AND 9  WEIR AT HEADWALL
56          RS        1    STOR        0
57          SV        0      017       061       14      263      456
58          SE     2779     2780      2781     2782     2783     2784
59          SQ        0        2         5       15       53      108
            *


60          KK        D
61          KM        RUNOFF FROM SUB-BASIN D
62          BA      034
63          LS               88       12
64          UK     300       02       15      100
65          RK    1425       014       045             TRAP       15        5
            *


66          KK    BASD
67          KM         2-36  PIPES
68          KM         V NOTCH WEIR WITH 95 DEGREE ANGLE AT HEADWALL
69          RS        1    STOR        0
70          SV        0      019       072      168      313
71          SE     2739     2740      2741     2742     2743
72          SQ        0      2 7      15 3     42 2     86 7
            *


73          KK       E1               5
74          KM        RUNOFF FROM SUB-BASIN E1
75          BA      061
76          LS               88       12
77          UK     400       02       15      100
78          RK    2050       013       045             TRAP       15        5
            *


79          KK    BASE1
80          KM         2 36" PIPES
81          KM         V NOTCH WEIR WITH 65 DEGREE ANGLE AT HEADWALL
82          RS        1    STOR        0
83          SV        0       01        05      142      302      542      887
84          SE     2694     2695      2696     2697     2698     2699     2700
85          SQ        0      1 6       8 9     24 6     50 6     88 4    139 4
1                                                HEC-1 INPUT                                                PAGE  3

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


86          KK       E2
87          KM        RUNOFF FROM SUB BASIN E2
88          BA      046
89          LS               88       12
90          UK     200       02       15      100
91          RK    2370       013       045             TRAP       15        5
            *


92          KK    BASE2
93          KM         2 42" PIPES
94          KM         1-12  PIPE AND 13  WEIR AT HEADWALL
95          RS        1    STOR        0
96          SV        0      007       068      227      498        9
97          SE     2693     2694      2695     2696     2697     2698
98          SQ        0      2 2       4 5     18 9       74    152 1
            *


99          KK    COMBE
100         KM         COMBINE SECTIONS E1 AND E2
101         HC        2
            *


102         KK    CLEAR
103         KM         CLEAR HYDROGRAPH STACK
104         HC        6
            *


105         KK       E3
106         KM        RUNOFF FROM SUB BASIN E3
107         BA      007
108         LS               88       12
109         UK     175       025       15      100
110         RK     750       032       045             TRAP       15        5
            *


111         KK    BASE3
112         KM         1 24  PIPE
113         RS        1    STOR        0
114         SV        0       02       068      159
115         SE     2700     2701      2702     2703
116         SQ        0      4 2      12 5     20 2
```

```
                *
          117   KK      F1
          118   KM       RUNOFF FROM SUB-BASIN F1
          119   BA     036
          120   LS               88      12
          121   UK     225      018      15      100
          122   RK    2500      012      045             TRAP      15       5
                *
1                                                HEC 1 INPUT                                                    PAGE  4

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

          123   KK   BASF1
          124   KM        2 36  PIPES
          125   RS        1    STOR       0
          126   SV        0     008      034      097      249
          127   SE     2696    2697     2698     2699     2700
          128   SQ        0      12       36       70      100
                *
          129   KK      F2
          130   KM       RUNOFF FROM SUB-BASIN F2
          131   BA     014
          132   LS               88      12
          133   UK     200      018      15      100
          134   RK    1440      028      045             TRAP      15       5
                *
          135   KK   BASF2
          136   KM        1 30  PIPE
          137   KM       V-NOTCH WEIR WITH 50 DEGREE ANGLE AT HEADWALL
          138   RS        1    STOR       0
          139   SV        0     007      029       08      181
          140   SE     2701    2702     2703     2704     2705
          141   SQ        0     1 2      6 6       18       37
                *
          142   KK      F3
          143   KM       RUNOFF FROM SUB BASIN F3
          144   BA     013
          145   LS               88      12
          146   UK     225      018      15      100
          147   RK     850      026      045             TRAP      15       5
                *
          148   KK   BASF3
          149   KM        1-30  PIPE
          150   KM       V-NOTCH WEIR WITH 50 DEGREE ANGLE AT HEADWALL
          151   RS        1    STOR       0
          152   SV        0     011      043      103      202
          153   SE     2721    2722     2723     2724     2725
          154   SQ        0     1 2      6 6       18       37
                *
          155   KK       G
          156   KM       RUNOFF FROM SUB BASIN G
          157   BA     015
          158   LS               88      12
          159   UK     400      025      15      100
          160   RK     720      022      045             TRAP      15       5
                *
1                                                HEC 1 INPUT                                                    PAGE  5

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

          161   KK     G 1
          162   KM       RUNOFF FROM SUB BASIN G 1
          163   BA    0014
          164   LS               88      12
                *
          165   KK   BASIN G 1
          166   KM        1-24" PIPE
          167   RS        1    STOR       0
          168   SV        0     004      014      048
          169   SE     2745    2746     2747     2748
          170   SQ        0     4 2     12 5     20 2
                *
          171   KK    RG 1
          172   KM       ROUTE BASIN G-1 THROUGH G
          173   RS        1    FLOW       0
          174   RC       45      35       45      610      048     2744
          175   RX      100     110      120      138      148      166      176      186
          176   RY       10      99       98       95       95       98       99      100
                *
          177   KK     CPG
          178   KM    CONCENTRATION POINT G
          179   HC        2
                *
```

```
          180          KK      H1
          181          KM       RUNOFF FROM SUB BASIN H1
          182          BA     059
          183          LS              88    11 4
          184          UK    375      025      15     100
          185          RK   2210      019      045            TRAP      15       5
                       *

          186          KK   BASH1
          187          KM        2-36" PIPE
          188          RS       1    STOR       0
          189          SV       0     004      015      04     088     173     306
          190          SE    2765    2766     2767    2768    2769    2770    2771
          191          SQ       0      12       36      70     100     122     140
                       *

          192          KK      H2
          193          KM       RUNOFF FROM SUB BASIN H2
          194          BA     072
          195          LS              88     S 7,
          196          UK    400      025      15     100
          197          RK   3480      019      045            TRAP      15       5
                       *
1                                                    HEC 1 INPUT                                                    PAGE  6

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

          198          KK   BASH2
          199          KM        2 42  PIPES
          200          KM        1 12  PIPE AND 13  WEIR AT HEADWALL
          201          RS       1    STOR       0
          202          SV       0     021       1     258     494     827
          203          SE    2771    2772    2773    2774    2775    2776
          204          SQ       0     2 2     4 5    18 9      74   152 1
                       *

          205          KK       I
          206          KM       RUNOFF FROM SUB BASIN I
          207          BA     025
          208          LS              88     8 3
          209          UK    225      02       15     100
          210          RK   2100      026      045            TRAP      15       5
                       *

          211          KK    BASI
          212          KM        2 30  PIPE
          213          KM        1-12  PIPE AND 9  WEIR AT HEADWALL
          214          RS       1    STOR       0
          215          SV       0     031     129     313     595
          216          SE    2755    2756    2757    2758    2759
          217          SQ       0       2       5      31      78
          218          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

    22                    A2
                           V
                           V
    28                  BASA2
                              *

    35                                B
                                      V
                                      V
    41                              BASB

    47                                        C                                                *
                                              V
                                              V
    53                                      BASC

    60                                                D
                                                      V
                                                      V
    66                                              BASD

    73                                                        E1
                                                               V
                                                               V
    79                                                      BASE1

    86                                                                  E2
                                                                         V
```

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

A1	MANE	1 89	213 77	191 82	2 16	2 00	212 79	192 00	2 16

CONTINUITY SUMMARY (AC FT) INFLOW= 0000E+00 EXCESS= 9594E+01 OUTFLOW= 9557E+01 BASIN STORAGE= 3502E-03 PERCENT ERROR= 4

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

A2	MANE	1 81	103 47	189 97	2 25	2 00	103 38	190 00	2 25

CONTINUITY SUMMARY (AC-FT) INFLOW= 0000E+00 EXCESS= 4332E+01 OUTFLOW= 4323E+01 BASIN STORAGE= 1434E-03 PERCENT ERROR= 2

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

B	MANE	1 76	186 57	192 53	2 23	2 00	186 02	192 00	2 23

CONTINUITY SUMMARY (AC FT) INFLOW= 0000E+00 EXCESS= 9176E+01 OUTFLOW= 9144E+01 BASIN STORAGE= 5317E 03 PERCENT ERROR= 3

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

C	MANE	1 70	86 27	189 53	2 23	2 00	85 10	190 00	2 23

CONTINUITY SUMMARY (AC FT) INFLOW= 0000E+00 EXCESS= 3573E+01 OUTFLOW= 3562E+01 BASIN STORAGE= 1213E 03 PERCENT ERROR= 3

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

D	MANE	1 54	91 45	190 44	2 29	2 00	90 74	190 00	2 29

CONTINUITY SUMMARY (AC FT) - INFLOW= 0000E+00 EXCESS= 4165E+01 OUTFLOW= 4151E+01 BASIN STORAGE= 1845E 03 PERCENT ERROR= 3

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

E1	MANE	1 91	143 07	193 32	2 29	2 00	141 94	192 00	2 29

CONTINUITY SUMMARY (AC FT) INFLOW= 0000E+00 EXCESS= 7472E+01 OUTFLOW= 7442E+01 BASIN STORAGE= 5914E 03 PERCENT ERROR= 4

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

E2	MANE	1 88	128 90	191 15	2 29	2 00	127 60	190 00	2 29

CONTINUITY SUMMARY (AC FT) INFLOW= 0000E+00 EXCESS= 5634E+01 OUTFLOW= 5622E+01 BASIN STORAGE= 1638E-03 PERCENT ERROR= 2

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

E3	MANE	95	23 99	186 21	2 29	2 00	23 78	186 00	2 29

CONTINUITY SUMMARY (AC FT) INFLOW= 0000E+00 EXCESS= 8574E+00 OUTFLOW= 8566E+00 BASIN STORAGE= 1659E-04 PERCENT ERROR= 1

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

F1	MANE	2 00	93 19	191 92	2 29	2 00	93 06	192 00	2 29

CONTINUITY SUMMARY (AC-FT) INFLOW= 0000E+00 EXCESS= 4409E+01 OUTFLOW= 4392E+01 BASIN STORAGE= 1704E-03 PERCENT ERROR= 4

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

F2	MANE	1 56	42 05	189 24	2 29	2 00	41 60	188 00	2 29

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 1715E+01 OUTFLOW= 1712E+01 BASIN STORAGE= 5243E-04 PERCENT ERROR= 2

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

F3	MANE	90	39 23	187 53	2 29	2 00	39 15	188 00	2 29

CONTINUITY SUMMARY (AC-FT) - INFLOW= 0000E+00 EXCESS= 1592E+01 OUTFLOW= 1589E+01 BASIN STORAGE= 5312E-04 PERCENT ERROR= 2

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

G	MANE	96	38 58	189 40	2 29	2 00	38 55	190 00	2 29

CONTINUITY SUMMARY (AC-FT) INFLOW= 0000E+00 EXCESS= 1837E+01 OUTFLOW= 1834E+01 BASIN STORAGE= 1056E-03 PERCENT ERROR= 2

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

H1	MANE	1 78	149 40	191 90	2 28	2 00	149 04	192 00	2 28

CONTINUITY SUMMARY (AC-FT) INFLOW= 0000E+00 EXCESS= 7204E+01 OUTFLOW= 7183E+01 BASIN STORAGE= 4047E 03 PERCENT ERROR= 3

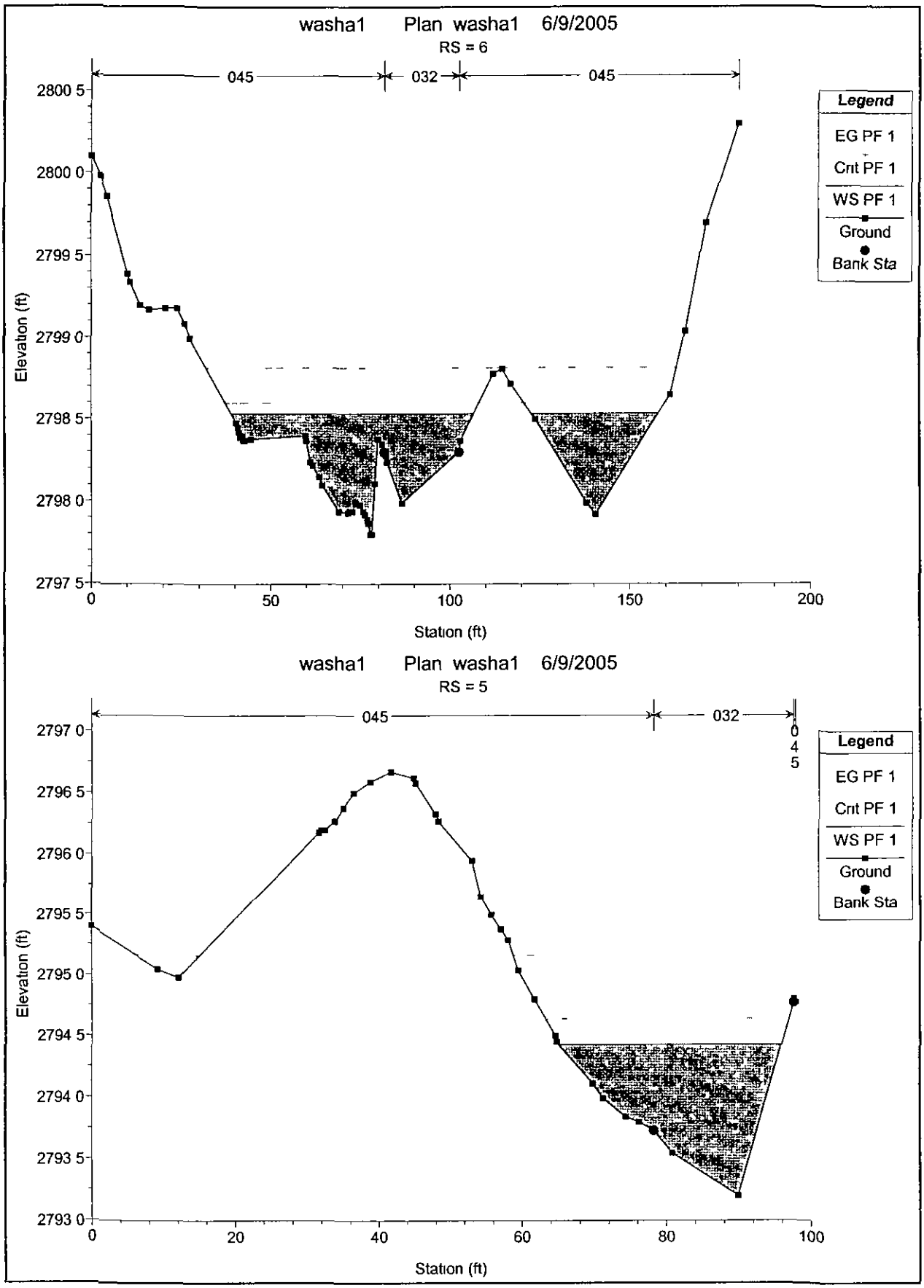
FOR STORM = 1 STORM AREA (SQ MI) = 01

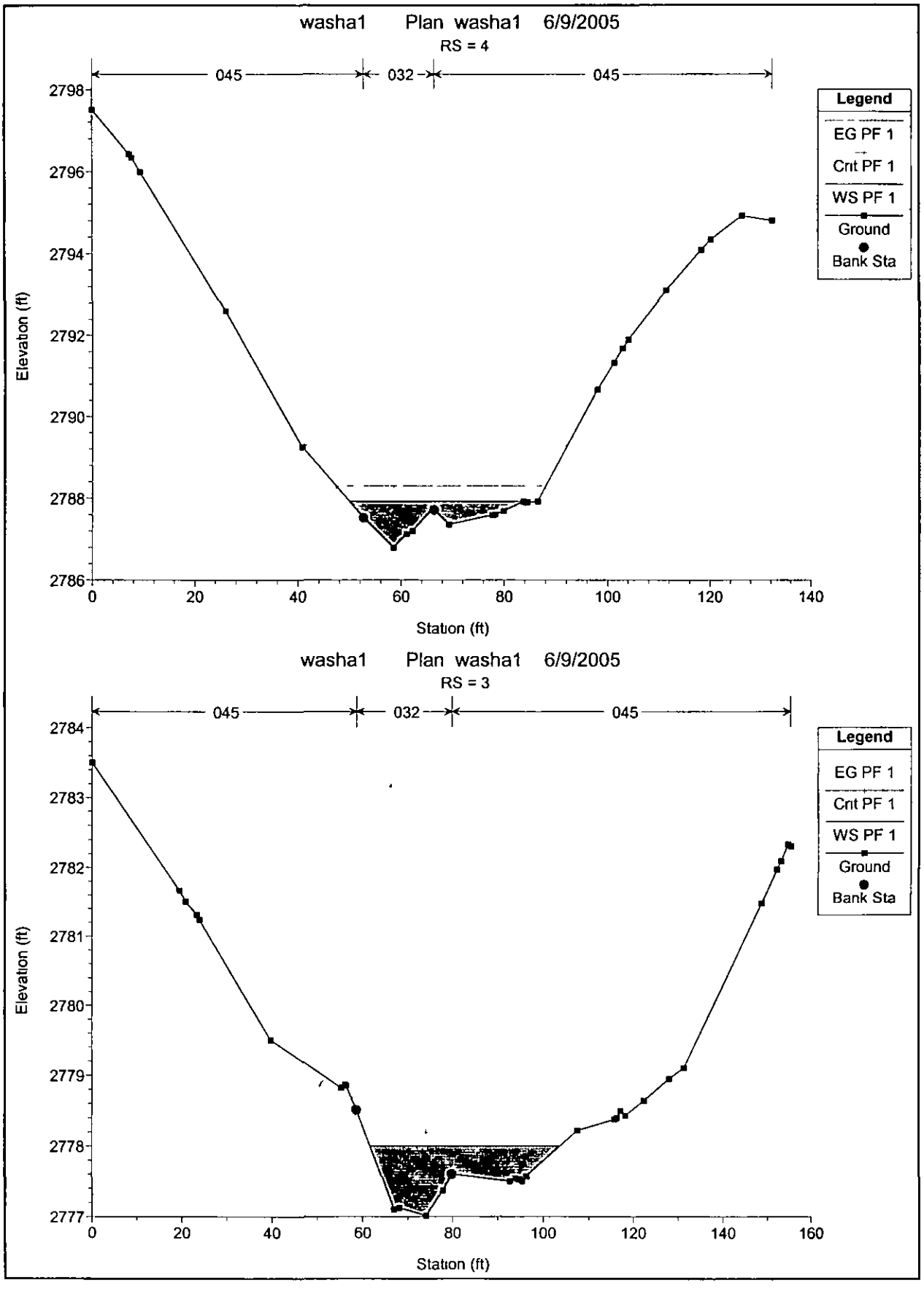
H2	MANE	2 00	161 47	194 90	2 21	2 00	159 91	194 00	2 21

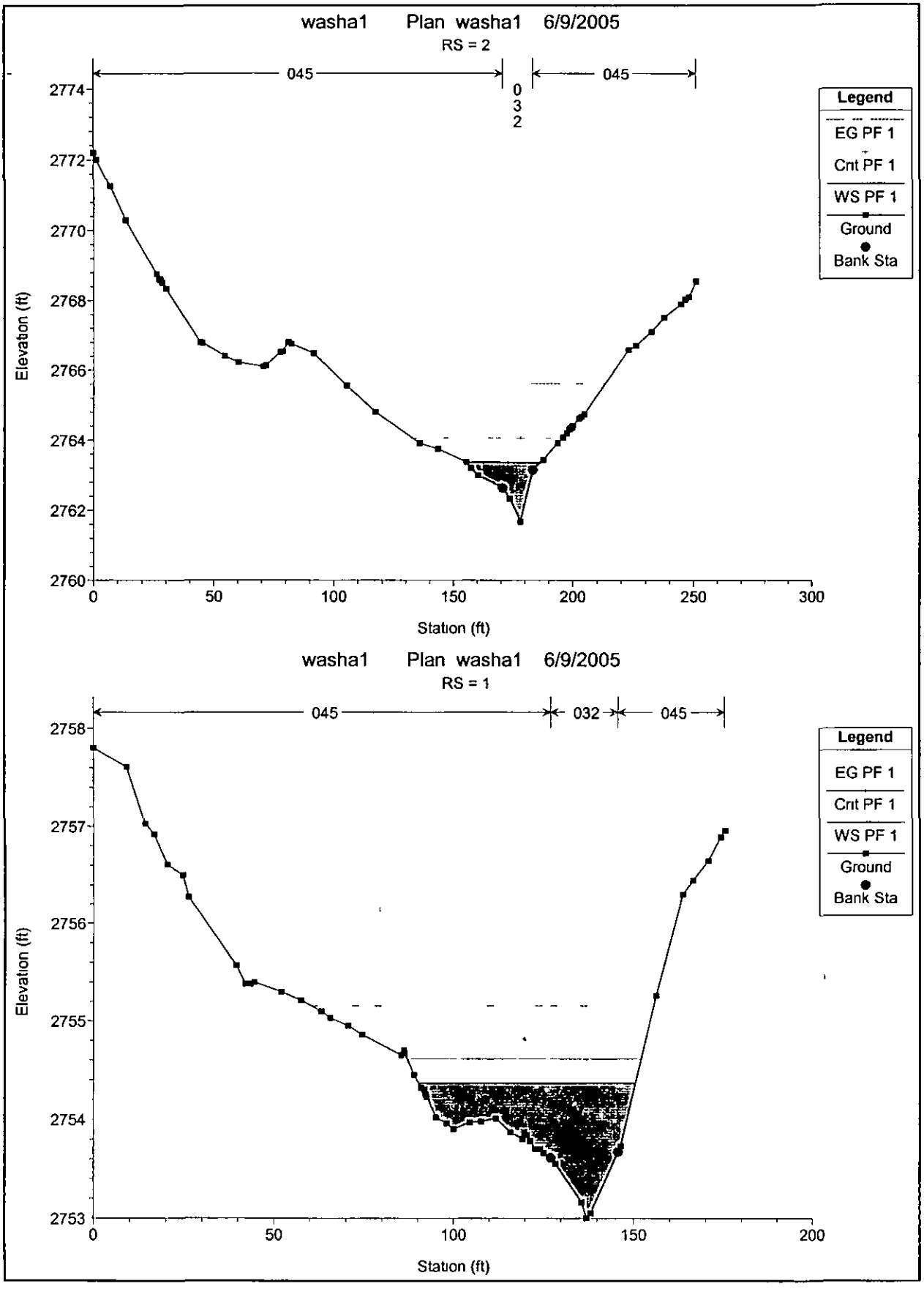
WASH A1

Errors Warnings and Notes for Plan wasa1

Location	River RIVER-1 Reach Reach-1 RS 6 Profile PF 1
Warning	Divided flow computed for this cross-section
Location	River RIVER-1 Reach Reach-1 RS 5 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 4 Profile PF 1
Warning	Divided flow computed for this cross-section
Warning	The velocity head has changed by more than 0 5 ft (0 15 m) This may indicate the need for
	additional cross sections
Warning	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0 7
	or greater than 1 4 This may indicate the need for additional cross sections
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 3 Profile PF 1
Warning	The velocity head has changed by more than 0 5 ft (0 15 m) This may indicate the need for
	additional cross sections
Warning	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0 7
	or greater than 1 4 This may indicate the need for additional cross sections
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 2 Profile PF 1
Warning	The velocity head has changed by more than 0 5 ft (0 15 m) This may indicate the need for
	additional cross sections
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 1 Profile PF 1
Warning	The velocity head has changed by more than 0 5 ft (0 15 m) This may indicate the need for
	additional cross sections
Warning	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0 7
	or greater than 1 4 This may indicate the need for additional cross sections
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections


washa1 Plan washa1 6/9/2005
RS = 6
045
032
045
2800 5
2800 0
2799 5
2799 0
2798 5
2798 0
2797 5
Elevation (ft)
0
50
100
150
200
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
washa1 Plan washa1 6/9/2005
RS = 5
045
032
045
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)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta


washa1 Plan washa1 6/9/2005
RS = 4
045
032
045
2798
2796
2794
2792
2790
2788
2786
Elevation (ft)
0
20
40
60
80
100
120
140
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
washa1 Plan washa1 6/9/2005
RS = 3
045
032
045
2784
2783
2782
2781
2780
2779
2778
2777
Elevation (ft)
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta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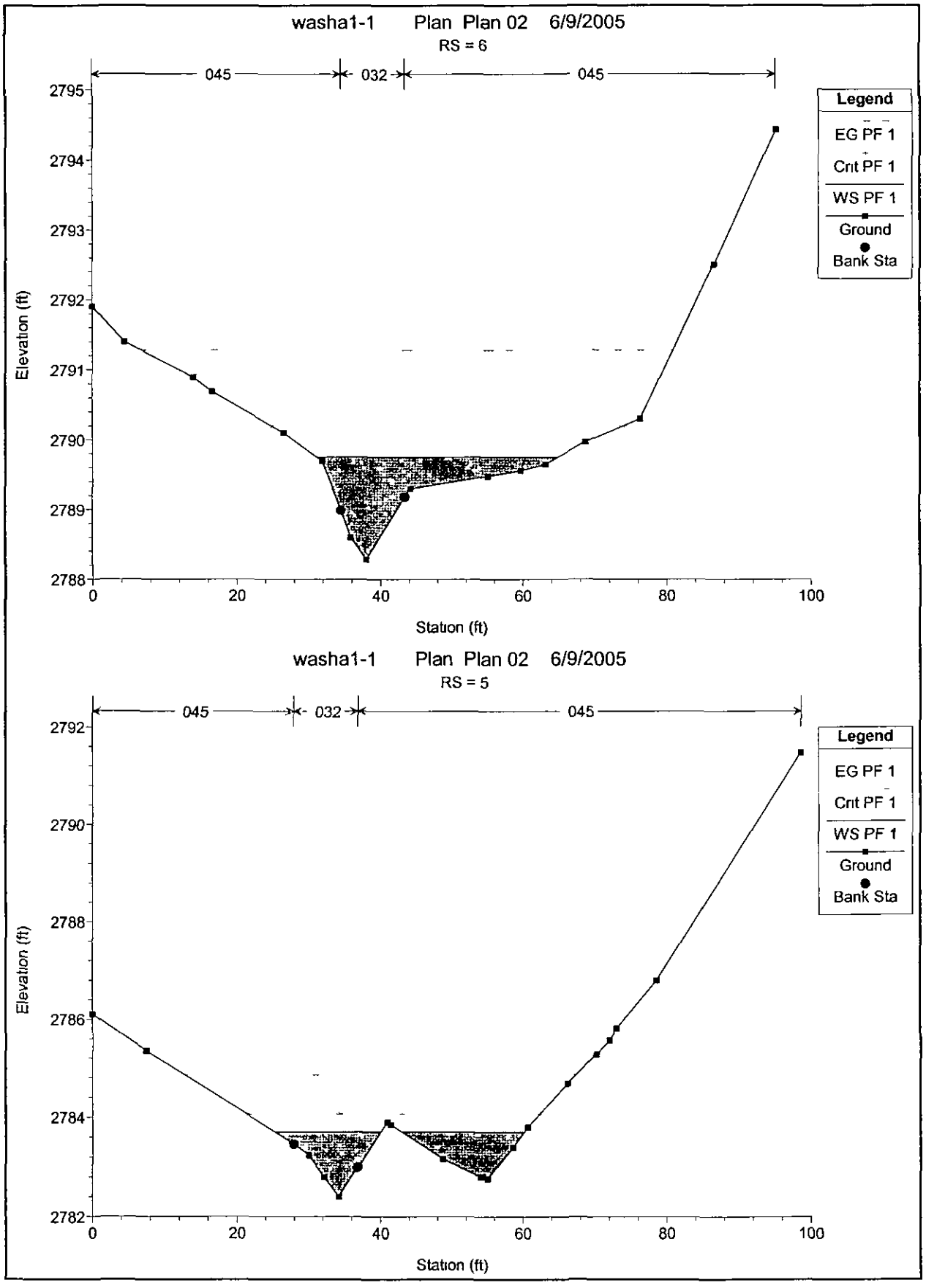
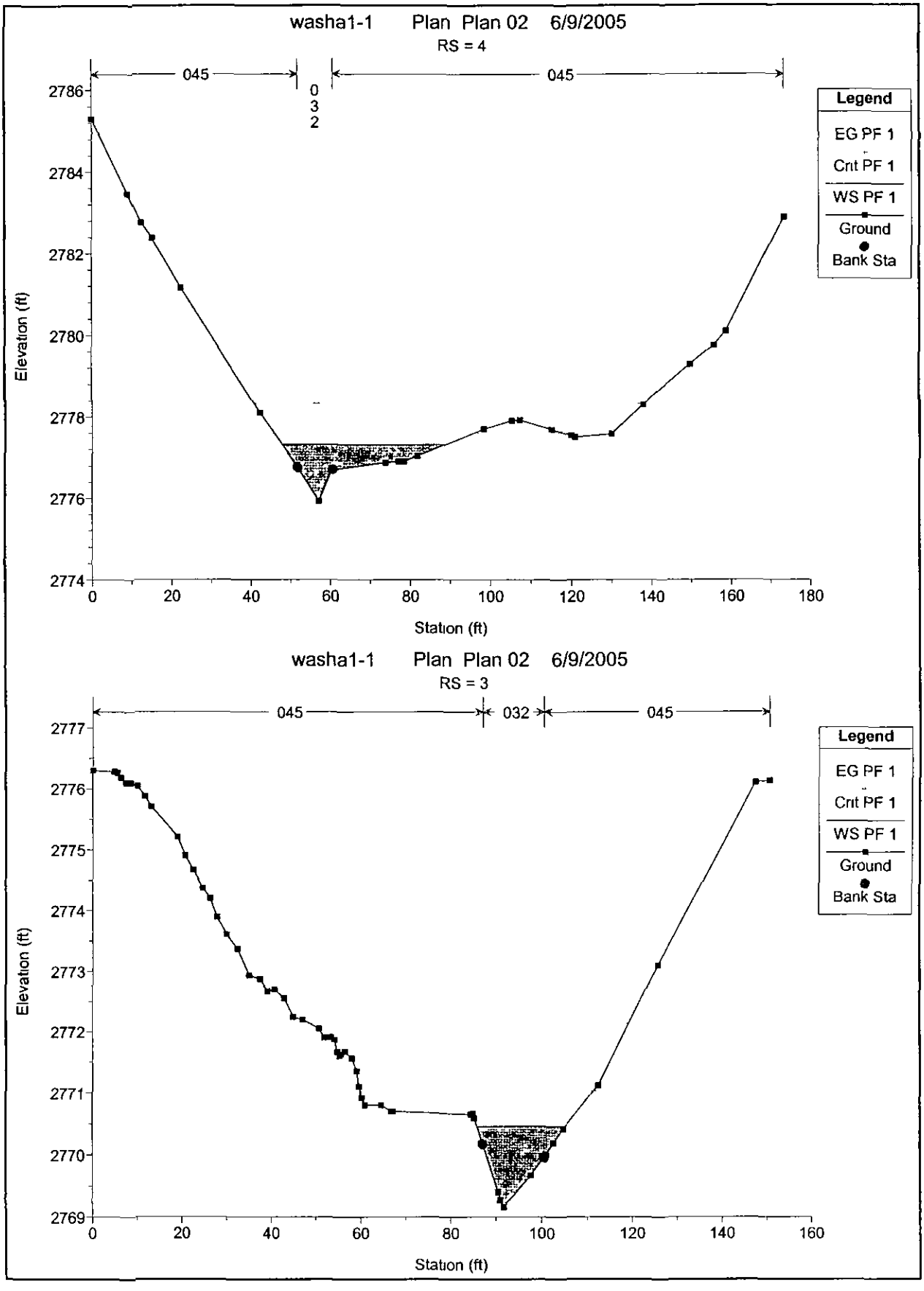
RS = 2
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
washa1 Plan washa1 6/9/2005
RS = 1
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

WASH A1-1

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

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W S Elev (ft)	Crit W S (ft)	E G Elev (ft)	E G Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	6	PF 1	128.00	2768.28	2789.75	2790.21	2791.28	0.050053	10.84	16.83	33.79	1.83
Reach-1	5	PF 1	128.00	2782.40	2783.71	2784.06	2784.85	0.068334	10.34	17.44	32.03	2.04
Reach-1	4	PF 1	128.00	2775.92	2777.31	2777.64	2778.33	0.045358	9.63	20.71	40.76	1.72
Reach-1	3	PF 1	128.00	2769.16	2770.46	2771.03	2772.13	0.062347	10.54	13.08	19.34	1.98
Reach-1	2	PF 1	213.00	2761.84	2763.64	2764.10	2764.92	0.036592	9.23	25.57	37.22	1.57
Reach-1	1	PF 1	213.00	2753.00	2754.27	2754.61	2755.39	0.045251	9.59	31.52	57.91	1.73


washa1-1 Plan Plan 02 6/9/2005
RS = 6
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
washa1-1 Plan Plan 02 6/9/2005
RS = 5
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)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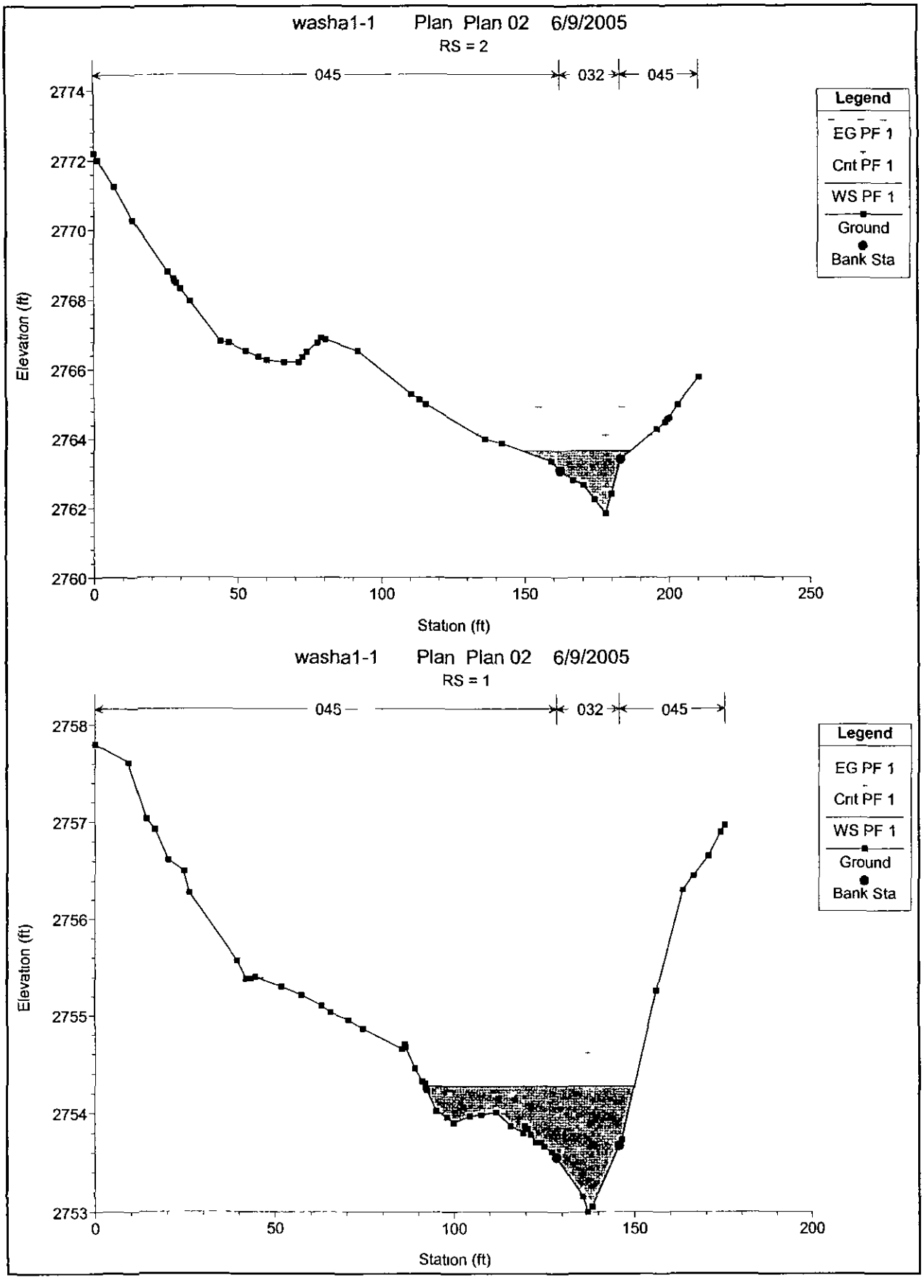
RS = 4
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
washa1-1 Plan Plan 02 6/9/2005
RS = 3
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


washa1-1 Plan Plan 02 6/9/2005
RS = 2
045
032
045
2774
2772
2770
2768
2766
2764
2762
2760
Elevation (ft)
0
50
100
150
200
250
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
washa1-1 Plan Plan 02 6/9/2005
RS = 1
045
032
045
2758
2757
2756
2755
2754
2753
Elevation (ft)
0
50
100
150
200
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta

Wash A2

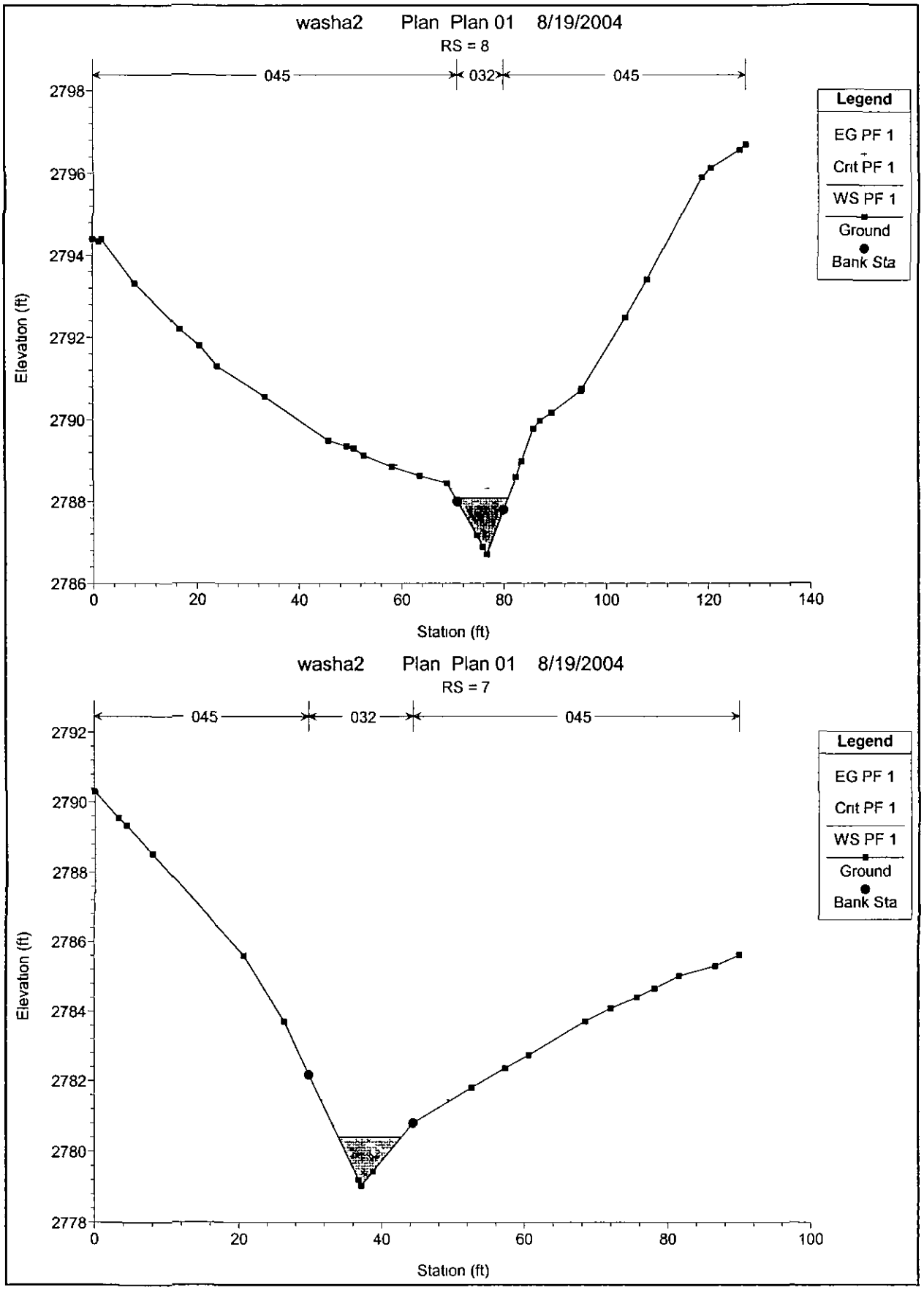
HEC-RAS Plan: Plan 01 River: RIVER 1 Reach: Reach-1 Profile: PF 1

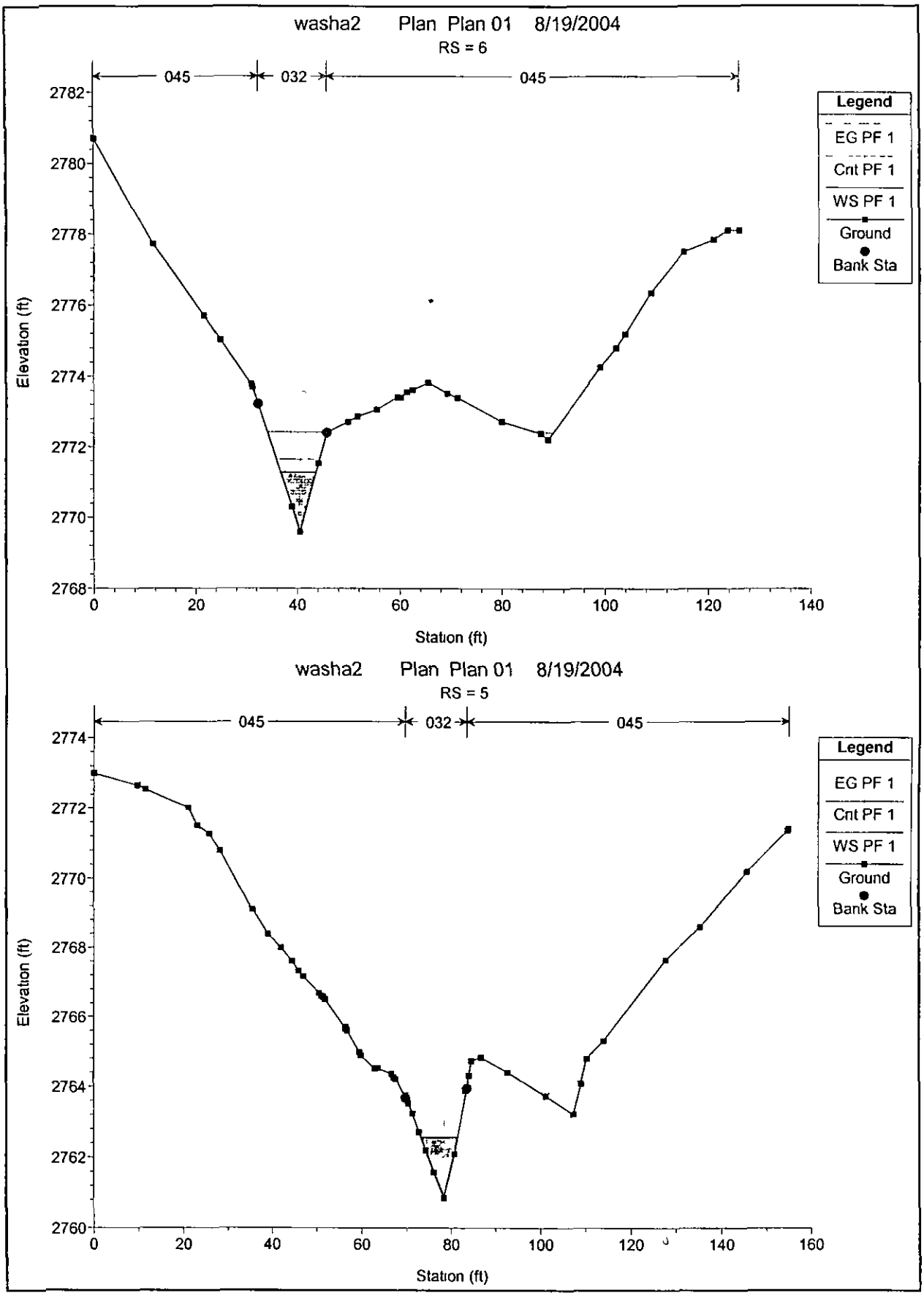
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W S Elev (ft)	Crit W S (ft)	E G Elev (ft)	E G Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach 1	8	PF 1	50 00	2786 70	2788 08	2788 32	2788 89	0 037052	7 25	7 00	10 29	1 47
Reach 1	7	PF 1	50 00	2779 03	2780 41	2780 74	2781 45	0 054930	8 20	6 09	8 86	1 74
Reach 1	6	PF 1	50 00	2769 58	2771 28	2771 64	2772 41	0 049137	8 55	5 85	6 93	1 64
Reach 1	5	PF 1	65 00	2760 85	2762 58	2762 96	2763 82	0 050493	9 00	7 22	8 30	1 70
Reach 1	4	PF 1	65 00	2754 30	2755 98	2756 26	2756 97	0 038091	7 97	8 17	9 67	1 50
Reach 1	3	PF 1	65 00	2749 02	2750 55	2750 80	2751 38	0 037807	7 31	8 89	11 81	1 48
Reach 1	2	PF 1	100 00	2742 10	2743 46	2743 82	2744 50	0 042671	8 24	12 63	19 53	1 62
Reach-1	1	PF 1	100 00	2733 30	2734 75	2734 98	2735 51	0 033817	7 10	15 08	26 24	1 43

WASH A2

Errors Warnings and Notes for Plan Plan 01

Location	River RIVER-1 Reach Reach-1 RS 7 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 6 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 5 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 4 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 3 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 2 Profile PF 1
Warning	Divided flow computed for this cross-section
Warning	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0 7
	or greater than 1 4 This may indicate the need for additional cross sections
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 1 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections


washa2 Plan Plan 01 8/19/2004
RS = 8
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
washa2 Plan Plan 01 8/19/2004
RS = 7
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)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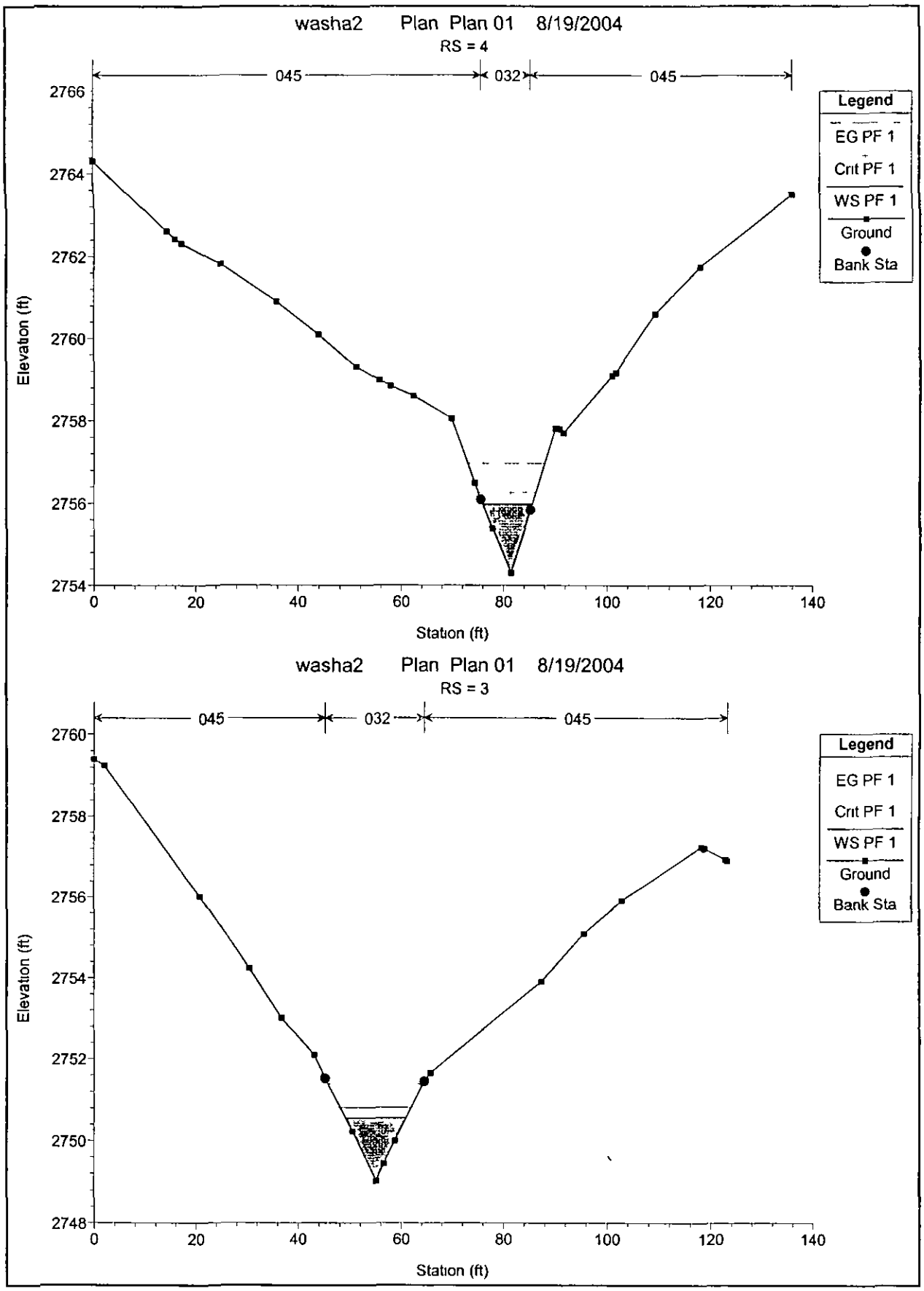
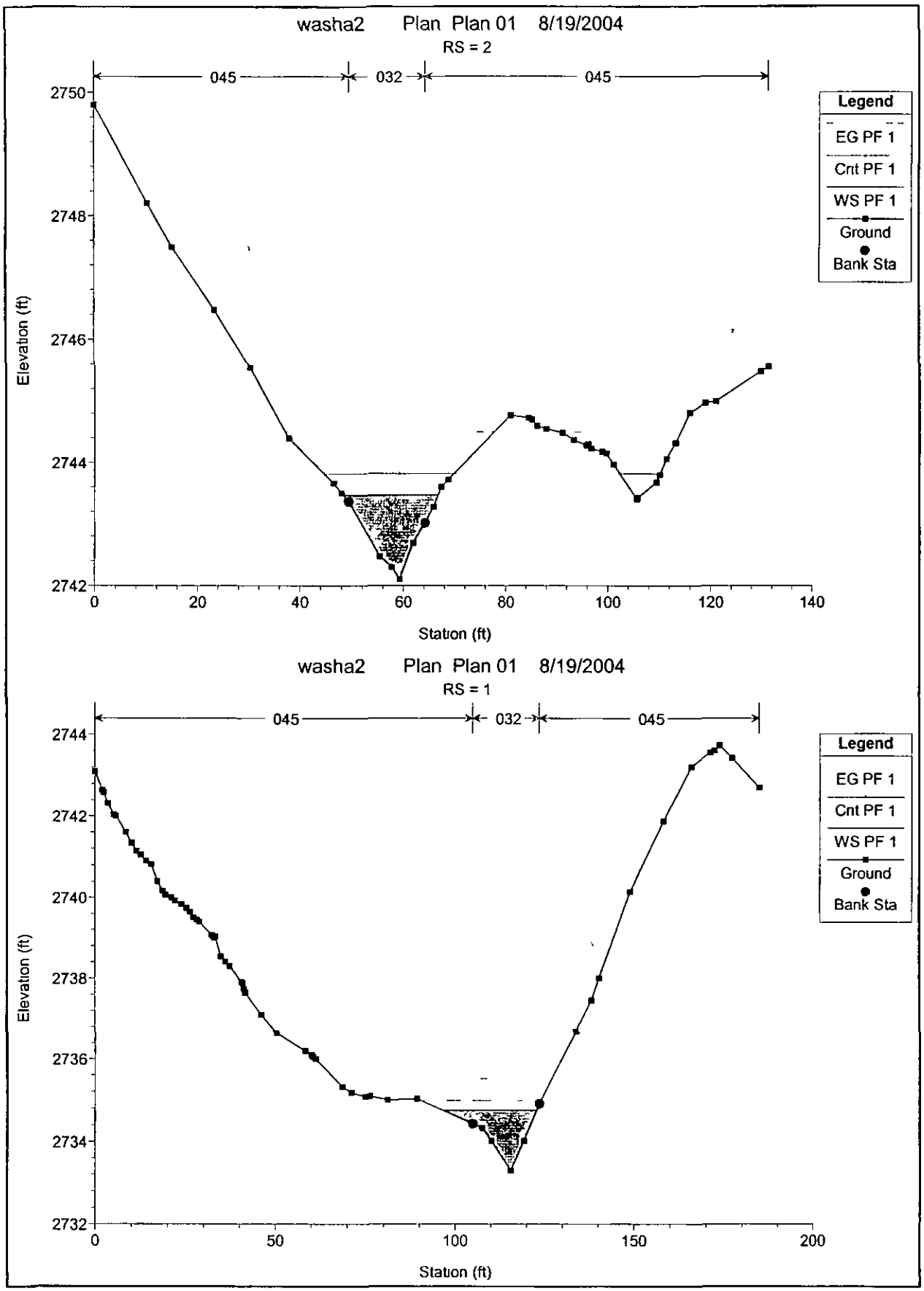
RS = 6
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
washa2 Plan Plan 01 8/19/2004
RS = 5
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


washa2 Plan Plan 01 8/19/2004
RS = 4
045
032
045
2766
2764
2762
2760
2758
2756
2754
Elevation (ft)
0
20
40
60
80
100
120
140
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
washa2 Plan Plan 01 8/19/2004
RS = 3
045
032
045
2760
2758
2756
2754
2752
2750
2748
Elevation (ft)
0
20
40
60
80
100
120
140
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta


washa2 Plan Plan 01 8/19/2004
RS = 2
045
032
045
2750
2748
2746
2744
2742
Elevation (ft)
0
20
40
60
80
100
120
140
Station (ft)
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
washa2 Plan Plan 01 8/19/2004
RS = 1
045
032
045
2744
2742
2740
2738
2736
2734
2732
Elevation (ft)
0
50
100
150
200
Station (ft)
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta

Wash B1

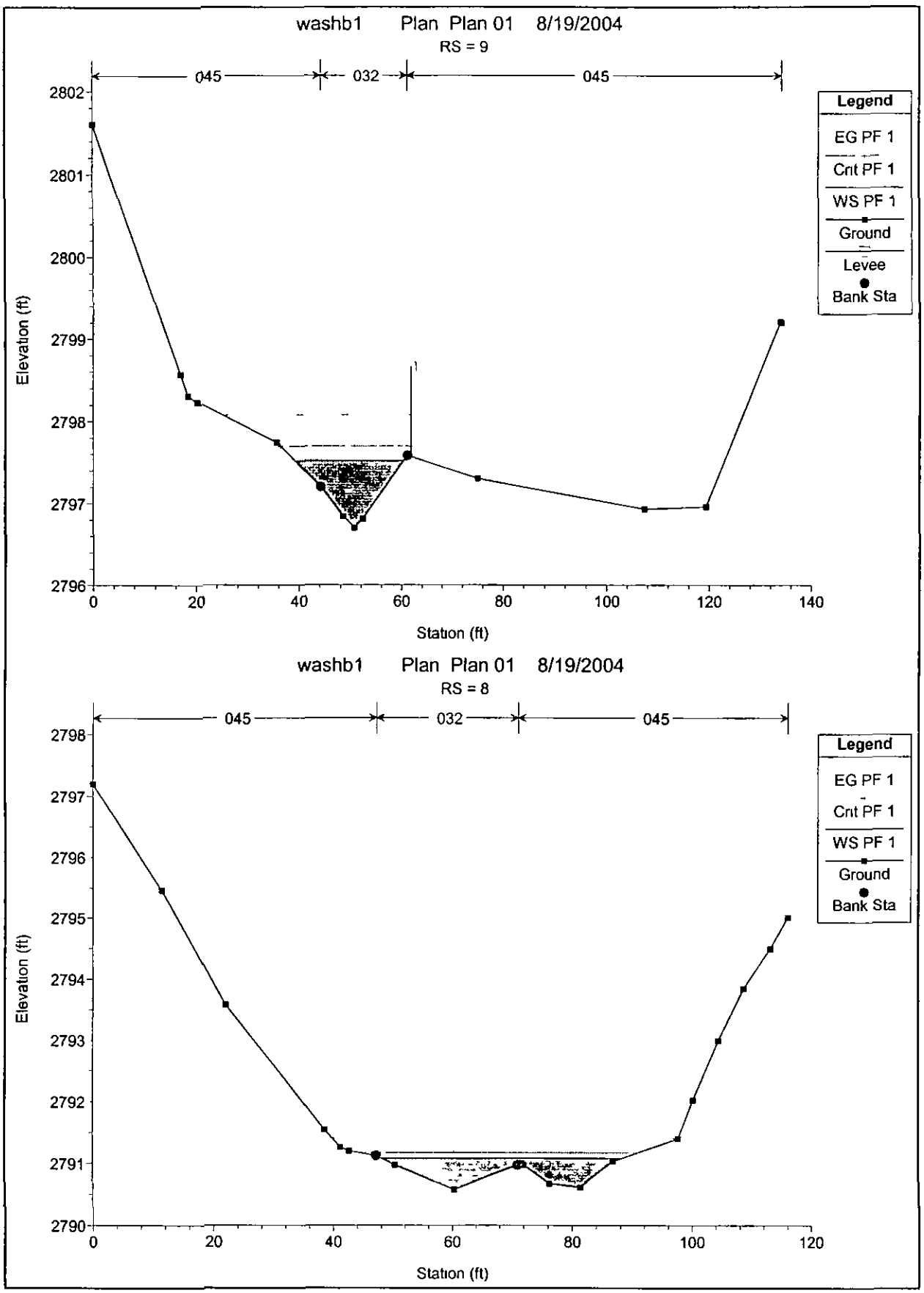
HEC-RAS Plan: Plan 01 River: RIVER 1 Reach: Reach-1 Profile: PF 1

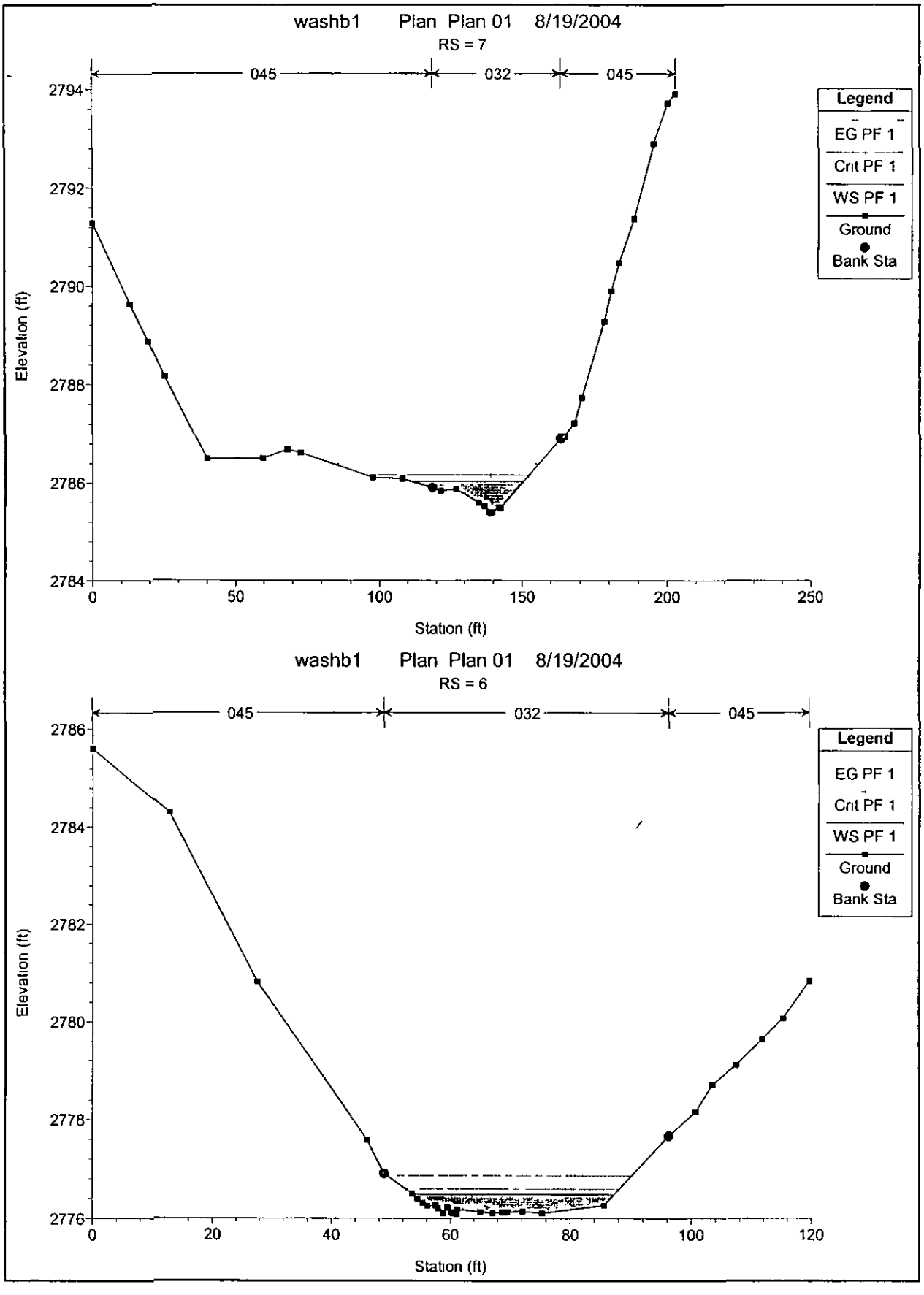
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W S Elev (ft)	Crit W S (ft)	E.G Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach 1	9	PF 1	50 00	2796 70	2797 52	2797 69	2798 08	0 045030	6 09	8 74	21 32	1 54
Reach-1	8	PF 1	50 00	2790 57	2791 08	2791 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	PF 1	50 00	2776 08	2776 49	2776 59	2776 86	0 053930	4 67	10 26	33 67	1 56
Reach 1	5	PF 1	75 00	2771 10	2771 99	2772 17	2772 59	0 039898	6 52	14 82	50 97	1 49
Reach-1	4	PF 1	75 00	2764 68	2765 43	2765 67	2766 21	0 055256	8 02	12 56	29 42	1 78
Reach-1	3	PF 1	75 00	2759 60	2760 60	2760 78	2761 23	0 034124	6 50	12 51	23 71	1 41
Reach 1	2	PF 1	75 00	2754 10	2754 80	2755 00	2755 48	0 061819	6 57	11 87	32 36	1 77
Reach 1	1	PF 1	177 00	2745 67	2746 97	2747 10	2747 43	0 044024	7 31	38 06	84 85	1 58

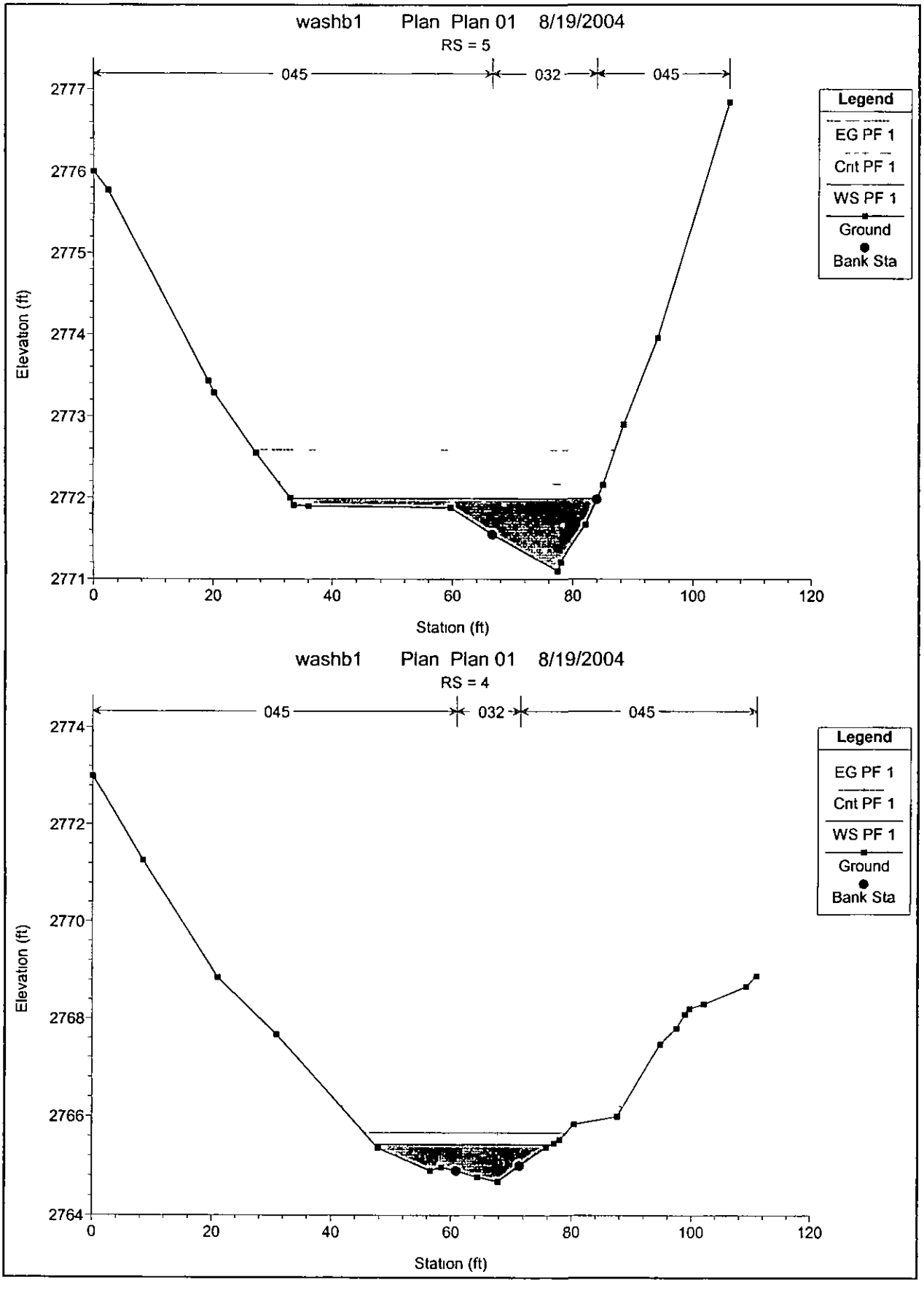
WASH B1

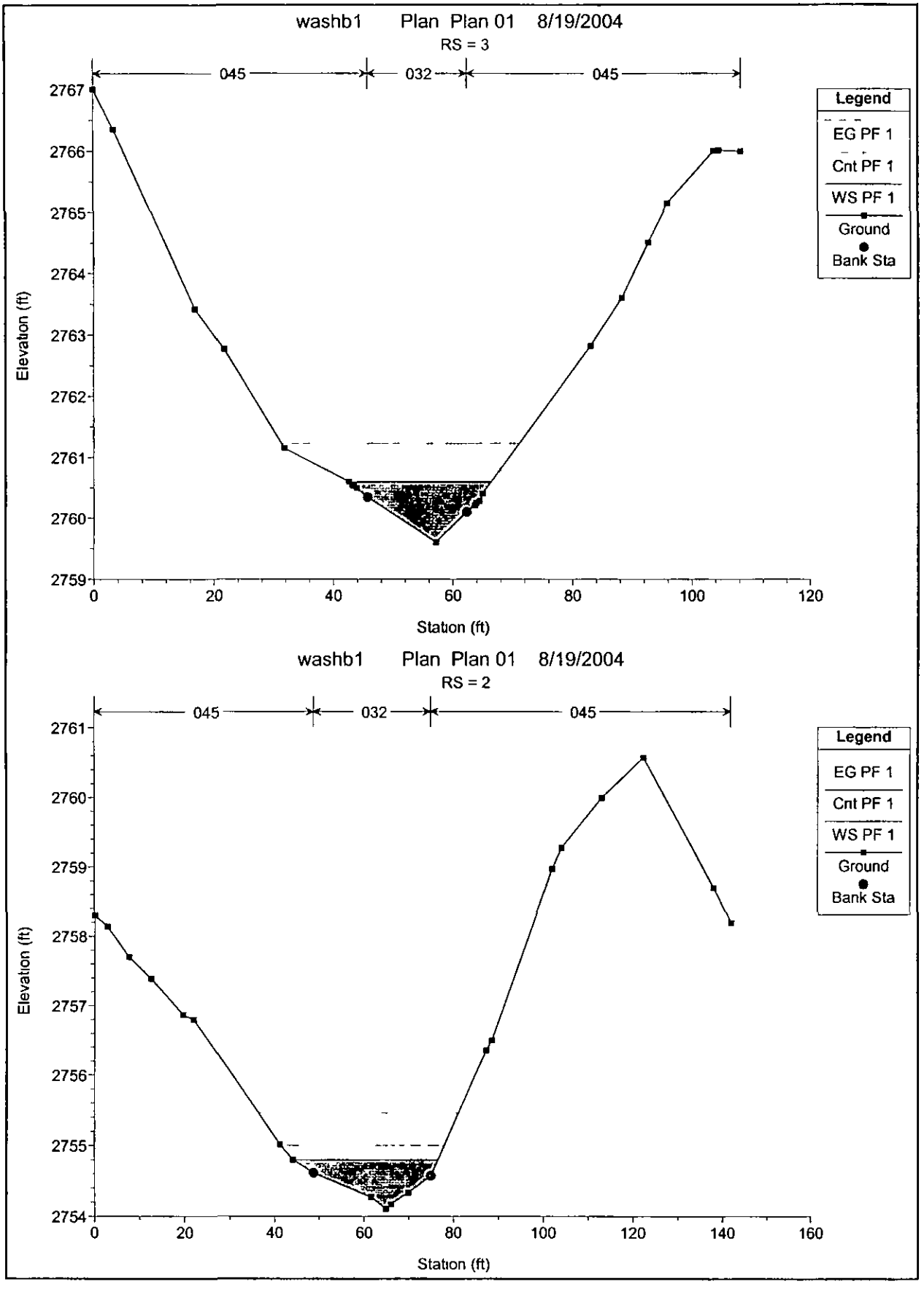
Errors Warnings and Notes for Plan Plan 01

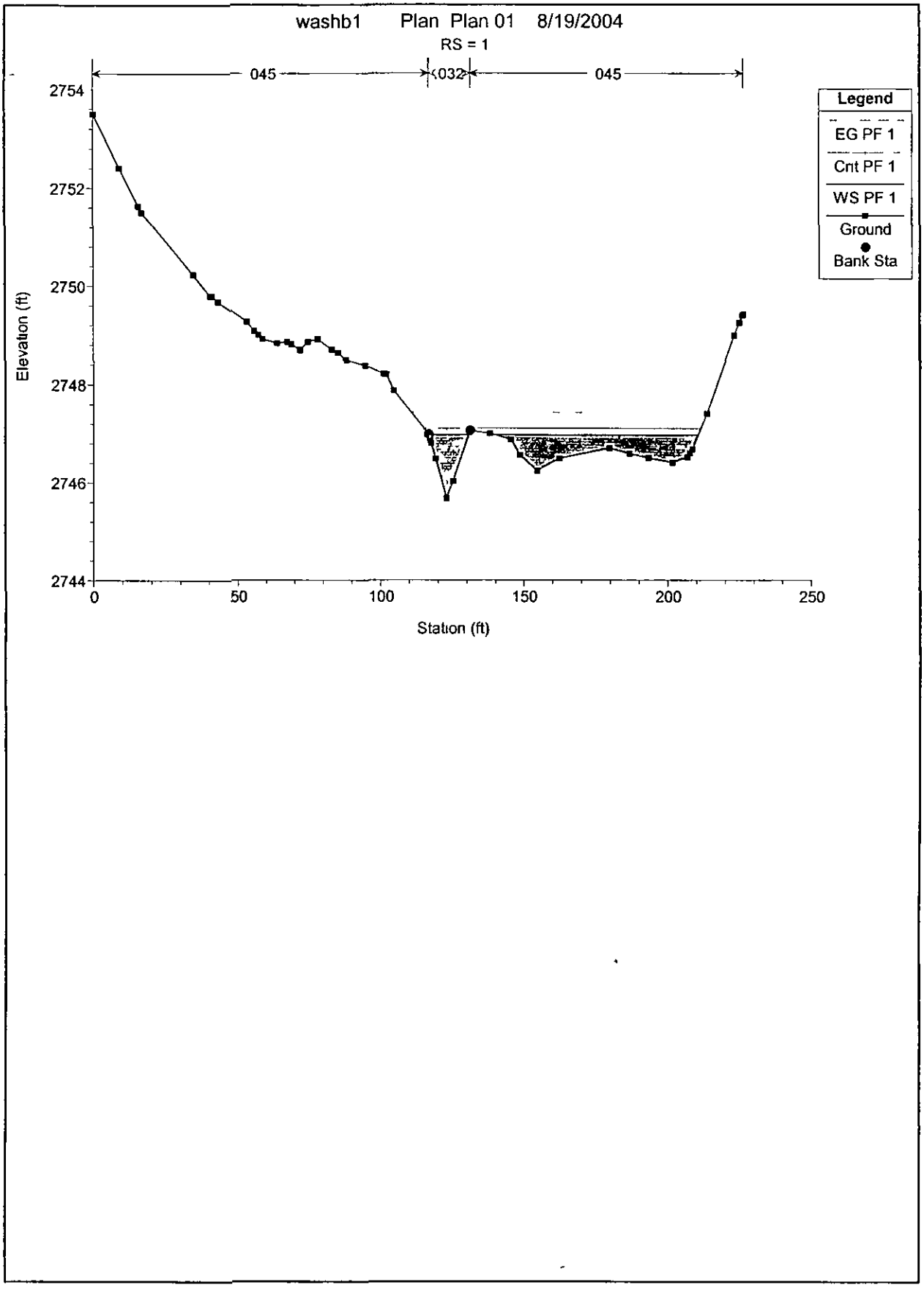
Location	River RIVER-1 Reach Reach-1 RS 9 Profile PF 1
Note	Multiple critical depths were found at this location The critical depth with the lowest valid water
	surface was used
Location	River RIVER-1 Reach Reach-1 RS 8 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 7 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 6 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 5 Profile PF 1
Warning	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0 7
	or greater than 1 4 This may indicate the need for additional cross sections
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 4 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 3 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 2 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 1 Profile PF 1
Warning	Divided flow computed for this cross-section
Warning	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0 7
	or greater than 1 4 This may indicate the need for additional cross sections
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections


washb1 Plan Plan 01 8/19/2004
RS = 9
045
032
045
2802
2801
2800
2799
2798
2797
2796
Elevation (ft)
0
20
40
60
80
100
120
140
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Levee
Bank Sta
washb1 Plan Plan 01 8/19/2004
RS = 8
045
032
045
2798
2797
2796
2795
2794
2793
2792
2791
2790
Elevation (ft)
0
20
40
60
80
100
120
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta


washb1 Plan Plan 01 8/19/2004
RS = 7
045
032
045
2794
2792
2790
2788
2786
2784
Elevation (ft)
0
50
100
150
200
250
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
washb1 Plan Plan 01 8/19/2004
RS = 6
045
032
045
2786
2784
2782
2780
2778
2776
Elevation (ft)
0
20
40
60
80
100
120
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta


washb1 Plan Plan 01 8/19/2004
RS = 5
045
032
045
2777
2776
2775
2774
2773
2772
2771
Elevation (ft)
0
20
40
60
80
100
120
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
washb1 Plan Plan 01 8/19/2004
RS = 4
045
032
045
2774
2772
2770
2768
2766
2764
Elevation (ft)
0
20
40
60
80
100
120
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta


washb1 Plan Plan 01 8/19/2004
RS = 3
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
washb1 Plan Plan 01 8/19/2004
RS = 2
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


washb1 Plan Plan 01 8/19/2004
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 B2

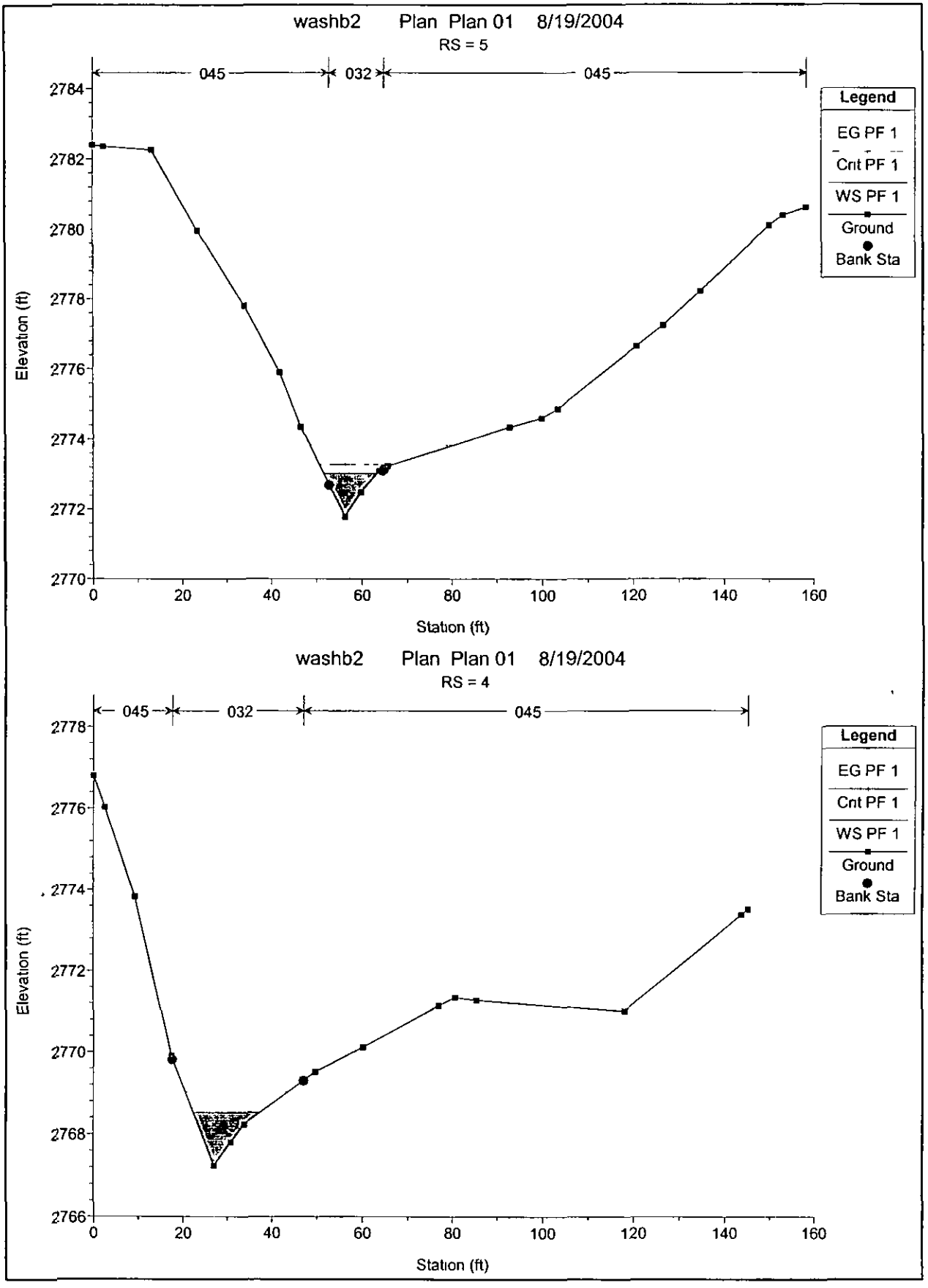
HEC-RAS Plan: Plan 01 River: RIVER 1 Reach: Reach 1 Profile: PF 1

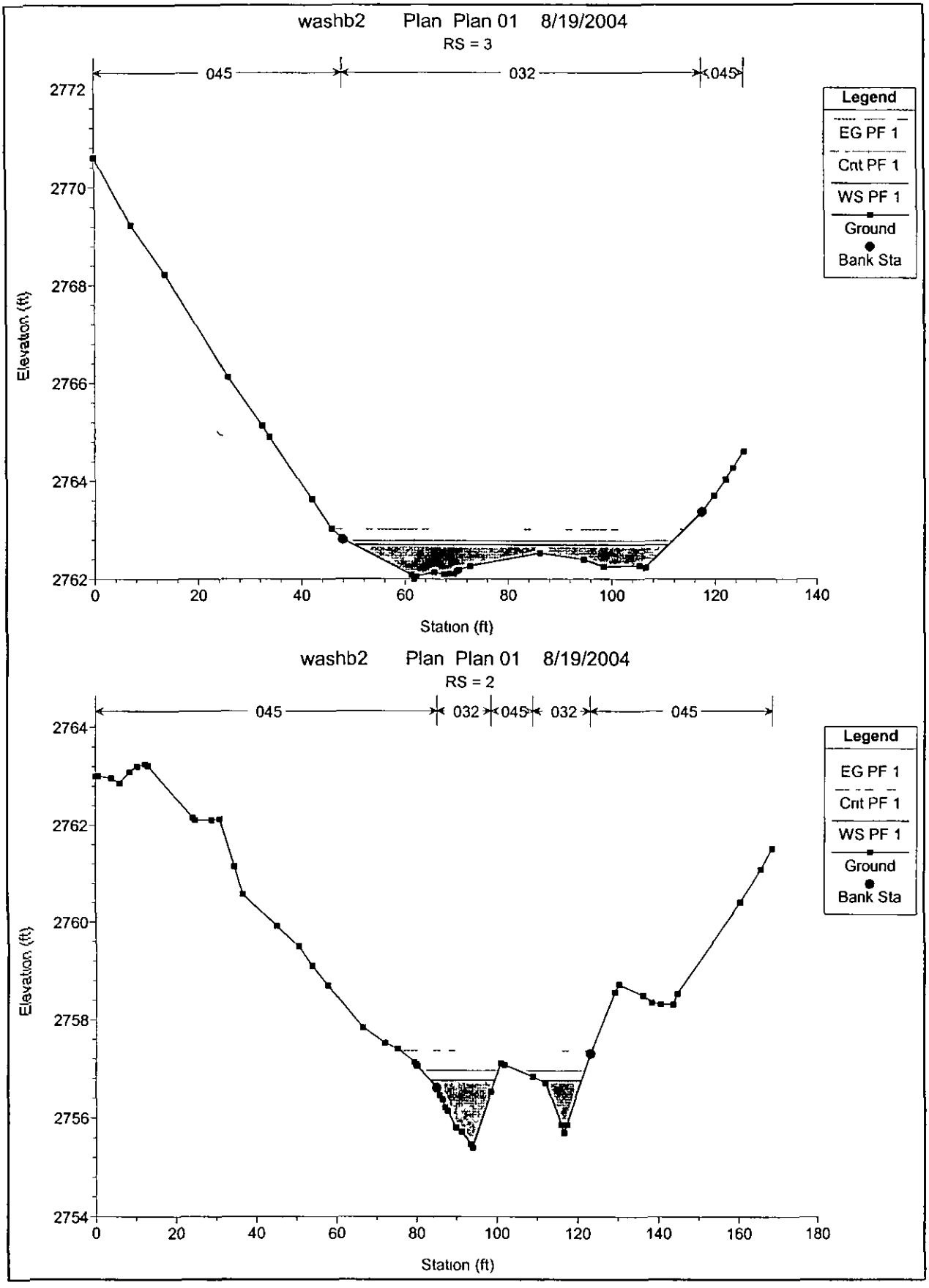
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W S Elev (ft)	Crit W S (ft)	E G Elev (ft)	E G Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach 1	5	PF 1	50 00	2771 78	2773 02	2773 28	2773 84	0 045021	7 27	7 03	11 78	1 59
Reach 1	4	PF 1	50 00	2767 23	2768 51	2768 64	2769 01	0 030968	5 67	8 82	15 02	1 30
Reach 1	3	PF 1	100 00	2762 00	2762 70	2762 78	2763 01	0 035521	4 47	22 35	61 10	1 30
Reach 1	2	PF 1	100 00	2755 39	2756 75	2756 95	2757 36	0 029636	6 24	16 13	26 25	1 36
Reach 1	1	PF 1	177 00	2745 67	2747 01	2747 11	2747 39	0 035101	6 71	41 55	88 99	1 42

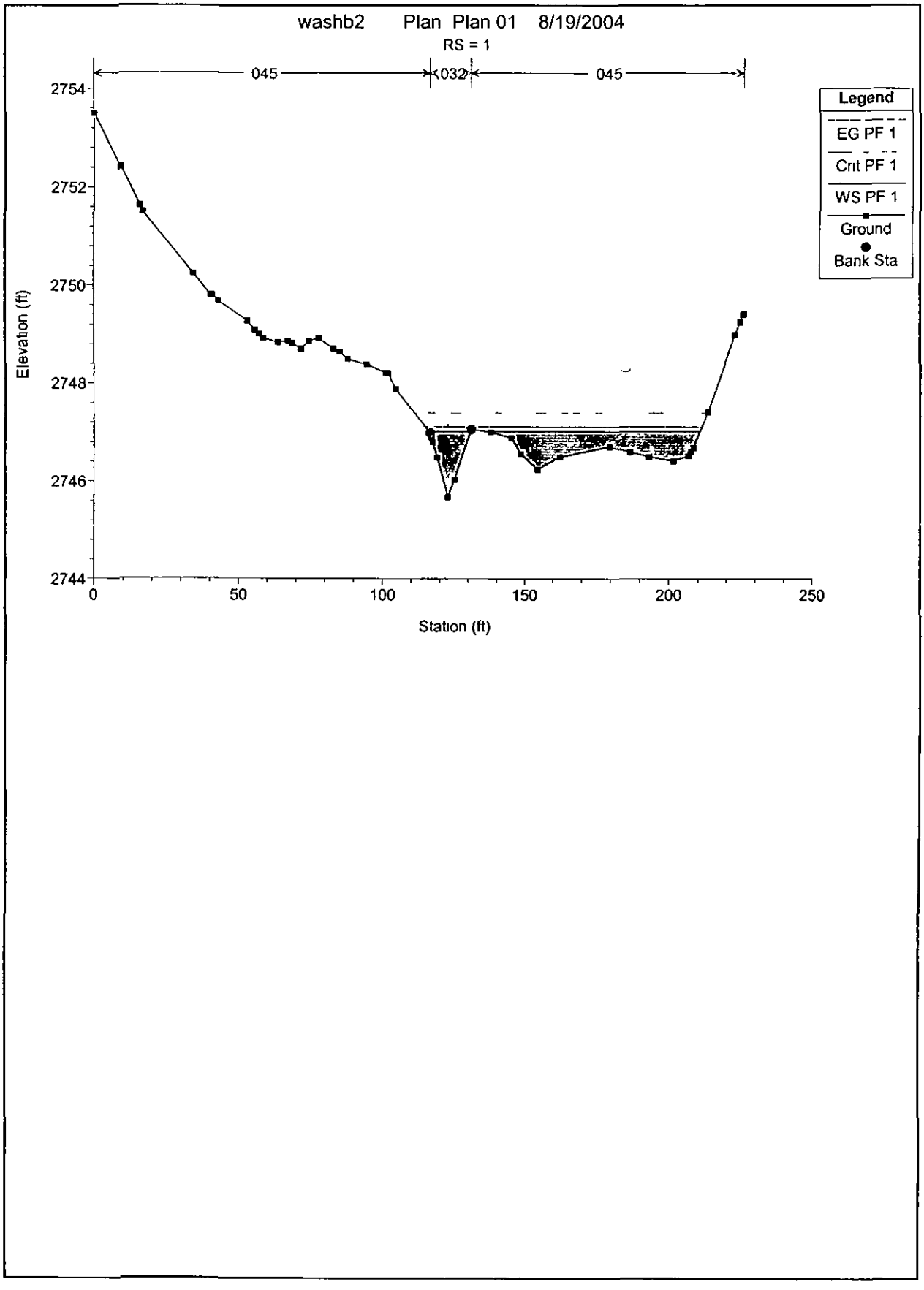
WASH B2

Errors Warnings and Notes for Plan Plan 01

Location	River RIVER-1 Reach Reach-1 RS 4 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 3 Profile PF 1
Warning	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0 7
	or greater than 1 4 This may indicate the need for additional cross sections
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 2 Profile PF 1
Warning	Divided flow computed for this cross-section
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 1 Profile PF 1
Warning	Divided flow computed for this cross-section
Warning	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0 7
	or greater than 1 4 This may indicate the need for additional cross sections
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections


washb2 Plan Plan 01 8/19/2004
RS = 5
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2784
2782
2780
2778
2776
2774
2772
2770
0
20
40
60
80
100
120
140
160
Station (ft)
washb2 Plan Plan 01 8/19/2004
RS = 4
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2778
2776
2774
2772
2770
2768
2766
0
20
40
60
80
100
120
140
160
Station (ft)


washb2 Plan Plan 01 8/19/2004
RS = 3
045
032
045
2772
2770
2768
2766
2764
2762
Elevation (ft)
0
20
40
60
80
100
120
140
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
washb2 Plan Plan 01 8/19/2004
RS = 2
045
032
045
032
045
2764
2762
2760
2758
2756
2754
Elevation (ft)
0
20
40
60
80
100
120
140
160
180
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta


washb2 Plan Plan 01 8/19/2004
RS = 1
045
032
045
2754
2752
2750
2748
2746
2744
Elevation (ft)
0
50
100
150
200
250
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta

Wash C

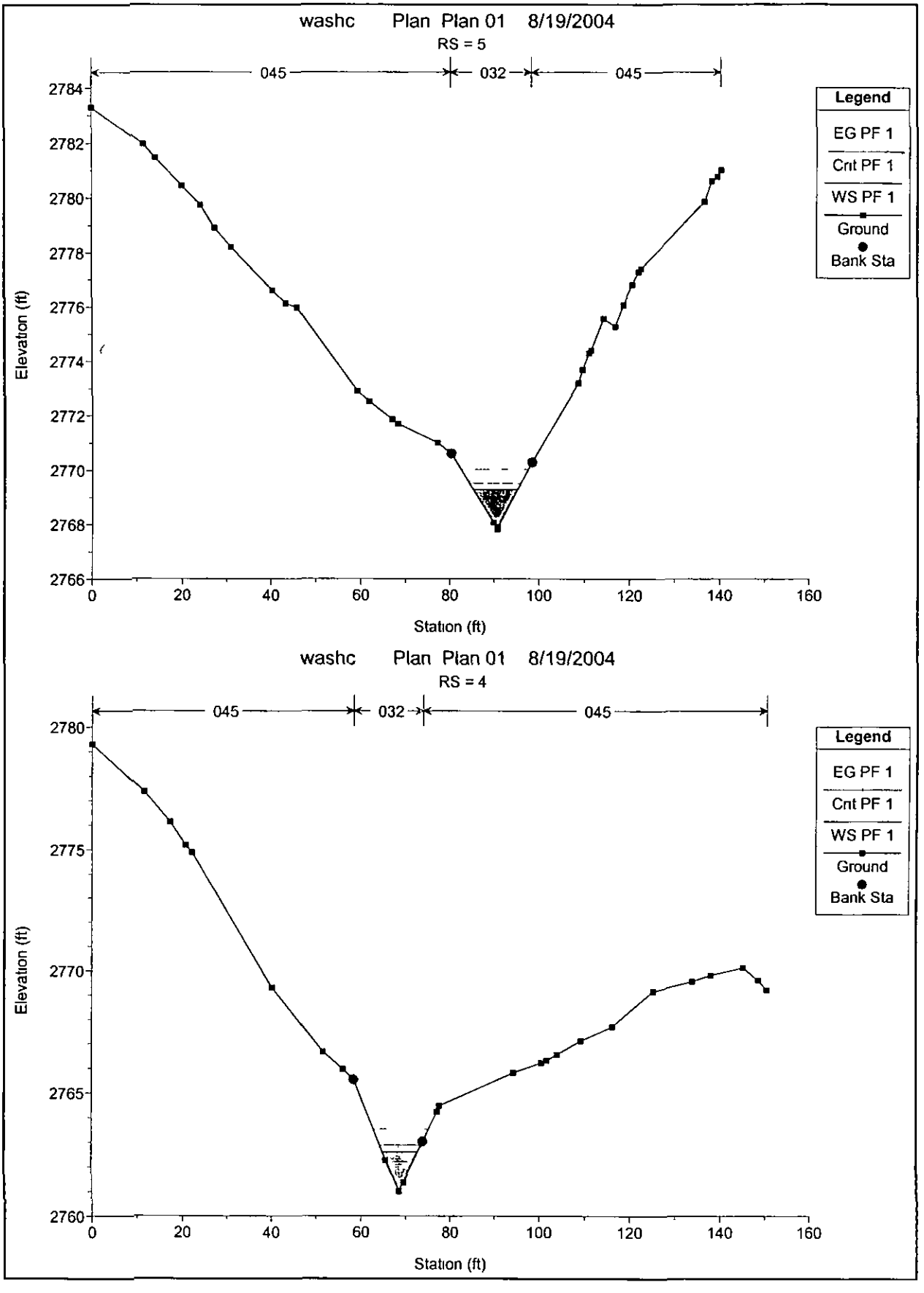
HEC-RAS Plan: Plan 01 River: RIVER 1 Reach: Reach 1 Profile: PF 1

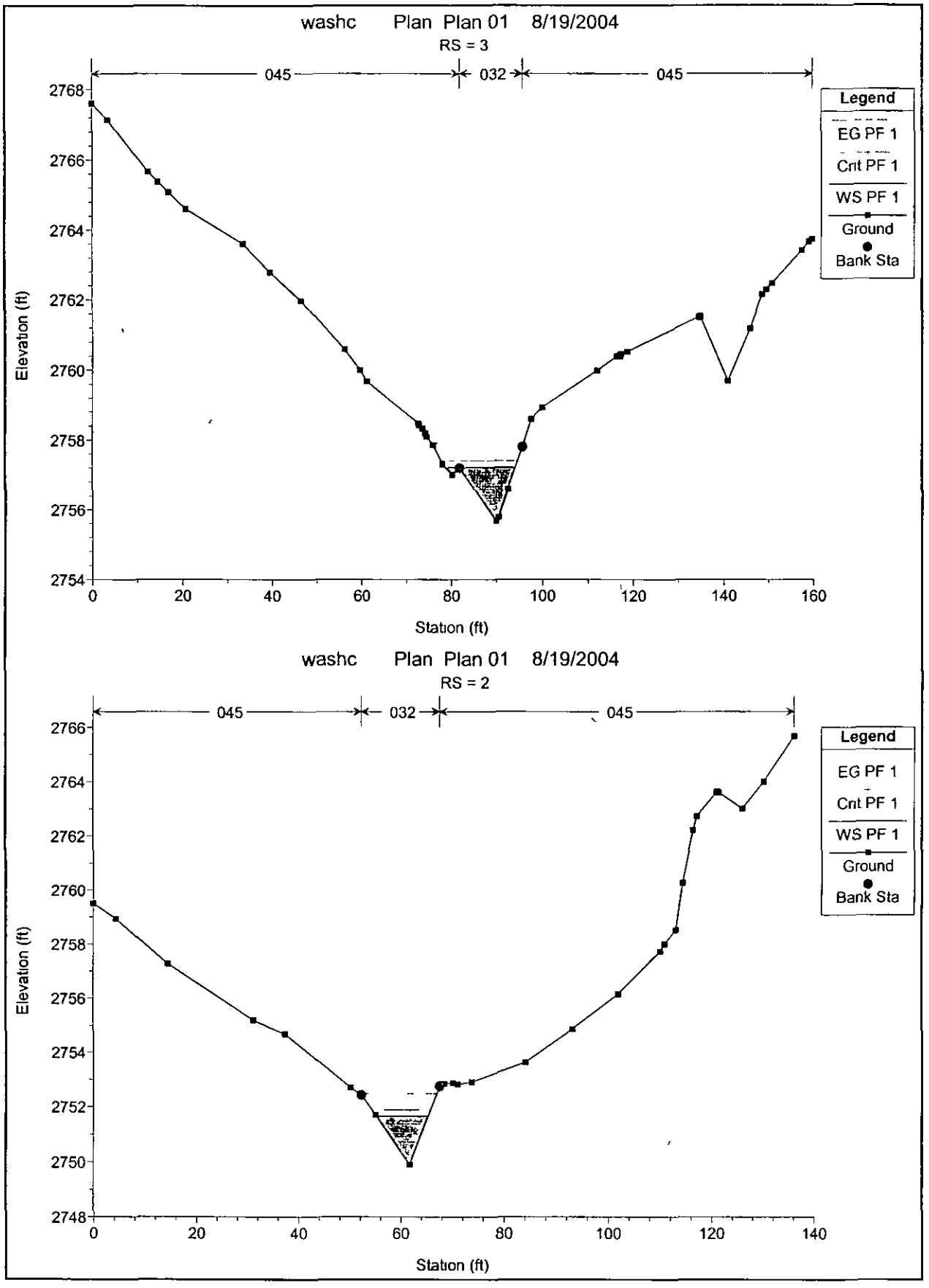
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W S Elev (ft)	Crit W S (ft)	E G Elev (ft)	E G Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach 1	5	PF 1	50 00	2767 82	2769 29	2769 50	2770 03	0 036028	6 90	7 25	10 04	1 43
Reach 1	4	PF 1	50 00	2761 00	2762 59	2762 87	2763 50	0 039393	7 65	6 54	8 03	1 49
Reach 1	3	PF 1	65 00	2755 68	2757 22	2757 41	2757 91	0 029952	6 70	9 98	15 38	1 33
Reach 1	2	PF 1	65 00	2749 90	2751 68	2751 89	2752 48	0 031341	7 25	8 96	10 17	1 36
Reach 1	1	PF 1	83 00	2743 99	2745 52	2745 77	2746 39	0 038330	7 52	11 03	14 53	1 51

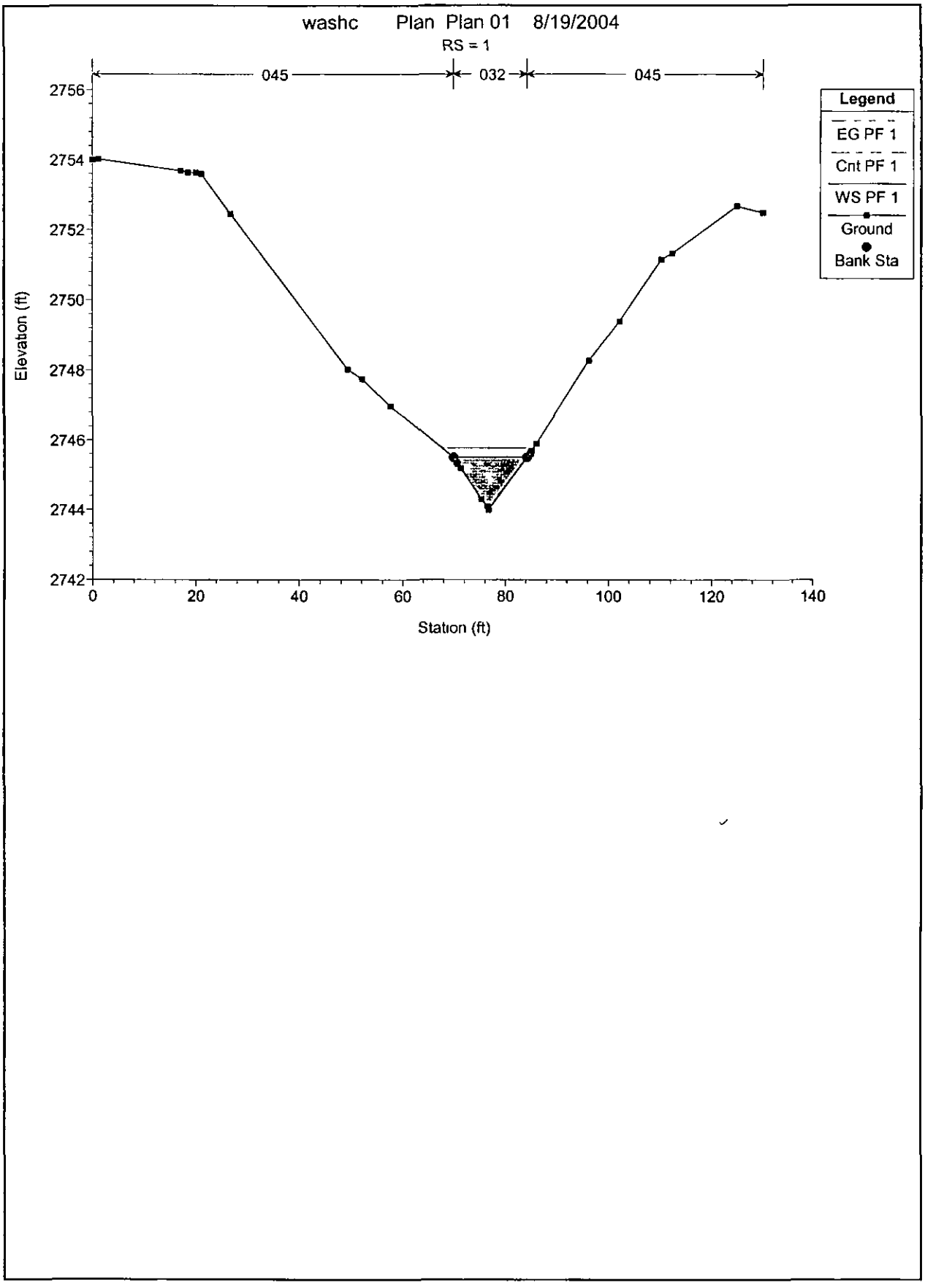
WASH C

Errors Warnings and Notes for Plan Plan 01

Location	River RIVER-1 Reach Reach-1 RS 4 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 3 Profile PF 1
Warning	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0 7
	or greater than 1 4 This may indicate the need for additional cross sections
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 2 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 1 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections


washc Plan Plan 01 8/19/2004
RS = 5
045
032
045
2784
2782
2780
2778
2776
2774
2772
2770
2768
2766
Elevation (ft)
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
washc Plan Plan 01 8/19/2004
RS = 4
045
032
045
2780
2775
2770
2765
2760
Elevation (ft)
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta


washc Plan Plan 01 8/19/2004
RS = 3
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
washc Plan Plan 01 8/19/2004
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 8/19/2004
RS = 1
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2756
2754
2752
2750
2748
2746
2744
2742
0
20
40
60
80
100
120
140
Station (ft)

Wash D

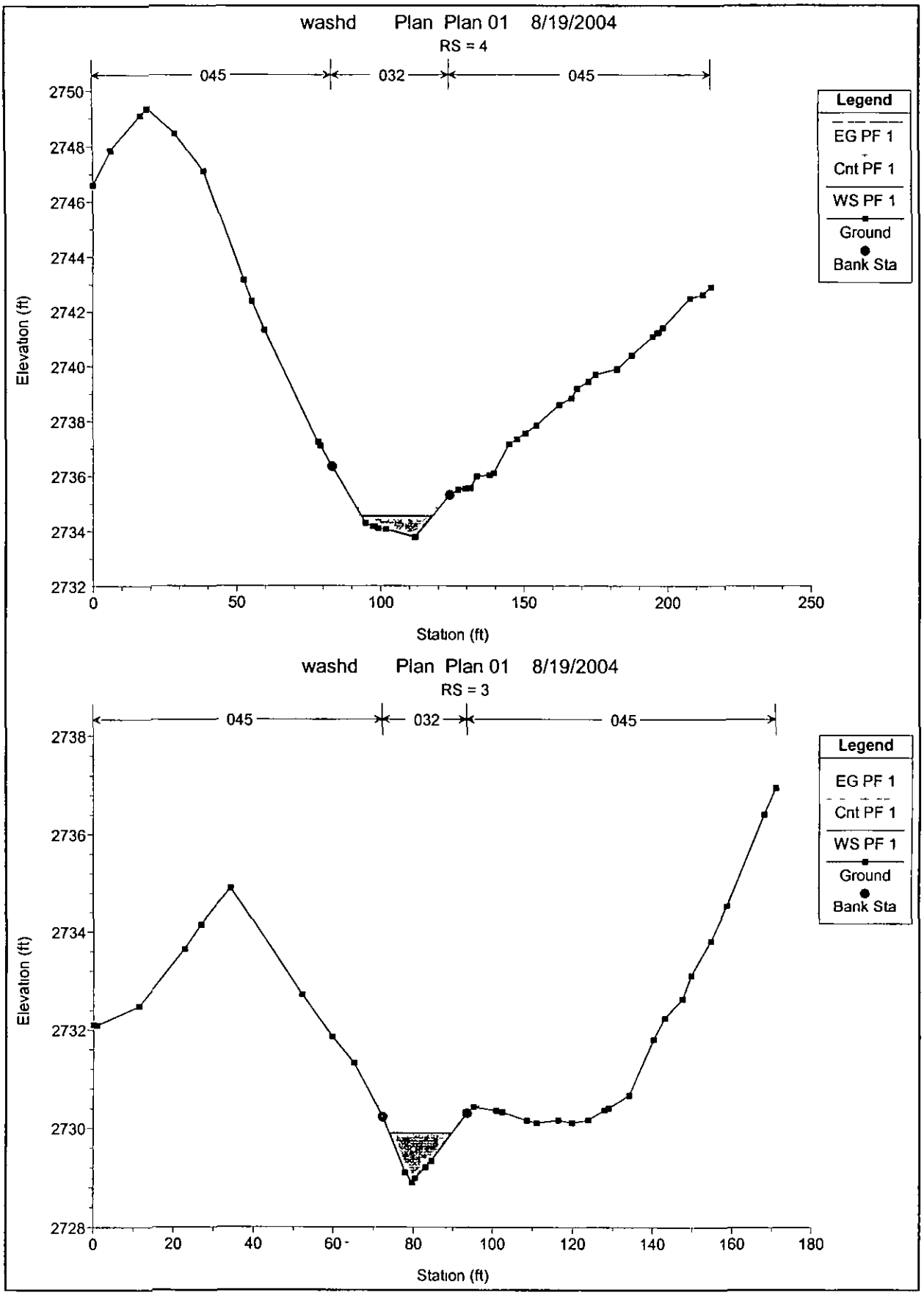
HEC-RAS Plan: Plan 01 River: RIVER 1 Reach: Reach 1 Profile: PF 1

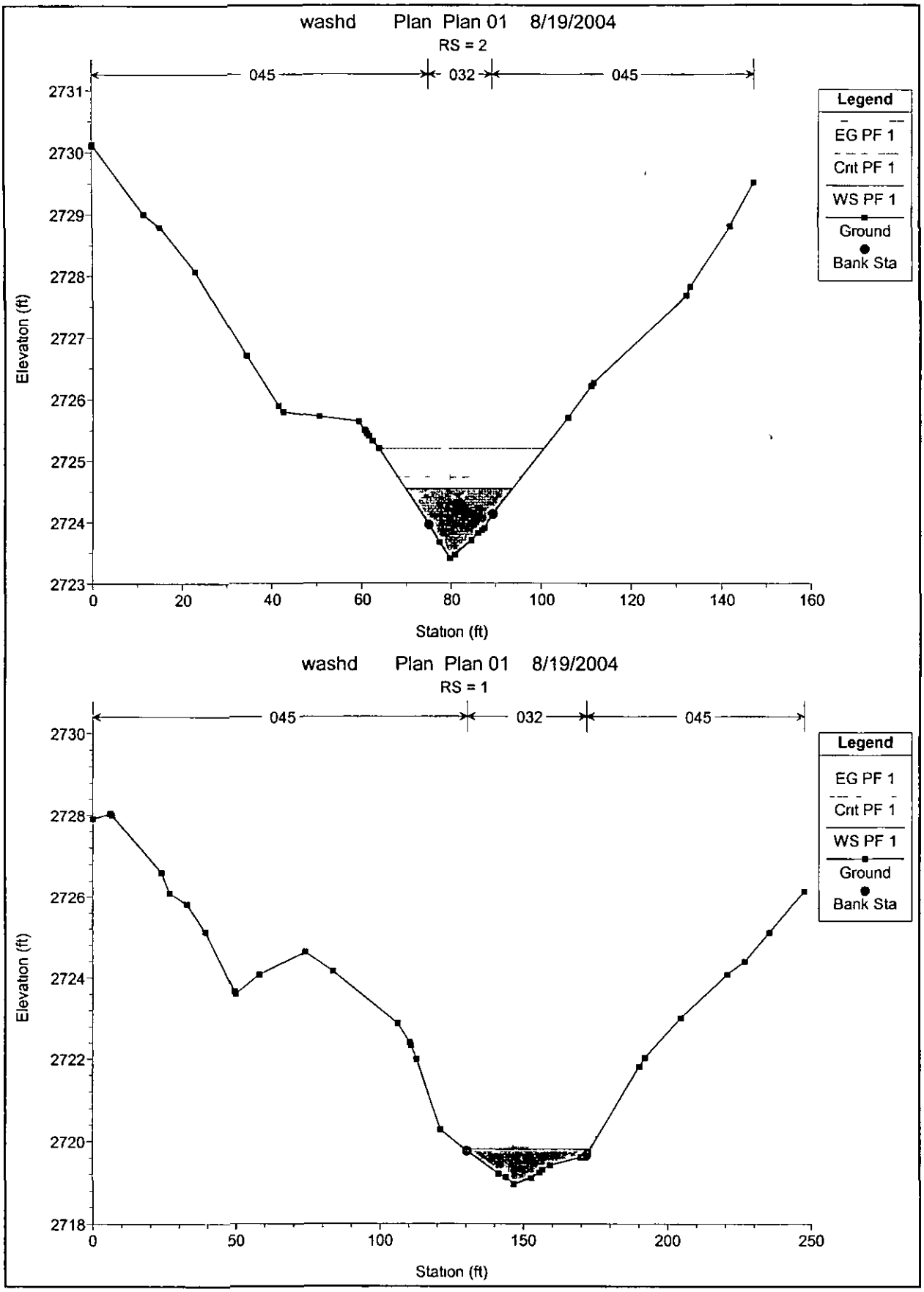
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W S Elev (ft)	Crit W S (ft)	E G Elev (ft)	E G Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach 1	4	PF 1	50 00	2733 77	2734 54	2734 58	2734 84	0 025008	4 39	11 38	24 53	1 14
Reach 1	3	PF 1	50 00	2728 90	2729 90	2730 05	2730 45	0 038474	5 94	8 42	15 86	1 44
Reach 1	2	PF 1	85 00	2723 41	2724 54	2724 73	2725 20	0 026452	6 69	14 36	23 90	1 29
Reach 1	1	PF 1	85 00	2718 95	2719 80	2719 85	2720 11	0 025808	4 45	19 20	43 50	1 15

WASH D

Errors Warnings and Notes for Plan Plan 01

Location	River RIVER-1 Reach Reach-1 RS 3 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 2 Profile PF 1
Warning	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0 7
	or greater than 1 4 This may indicate the need for additional cross sections
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 1 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections


washd Plan Plan 01 8/19/2004
RS = 4
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
washd Plan Plan 01 8/19/2004
RS = 3
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


washd Plan Plan 01 8/19/2004
RS = 2
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
washd Plan Plan 01 8/19/2004
RS = 1
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

Wash E1

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

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W S Elev (ft)	Crit W S (ft)	E G Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
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	8 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 18	1 06
Reach-1	4	PF 1	110 00	2692 81	2694 46	2694 72	2695 37	0 030755	7 70	14 71	19 32	1 40
Reach-1	3	PF 1	133 00	2689 21	2690 99	2691 19	2691 58	0 015633	6 47	25 89	50 20	1 04
Reach-1	2	PF 1	251 00	2679 83	2681 69	2682 26	2683 44	0 042975	10 66	24 18	24 72	1 72
Reach-1	1	PF 1	251 00	2677 00	2679 32	2679 50	2680 13	0 014601	7 94	41 91	40 16	1 08

WASH E1

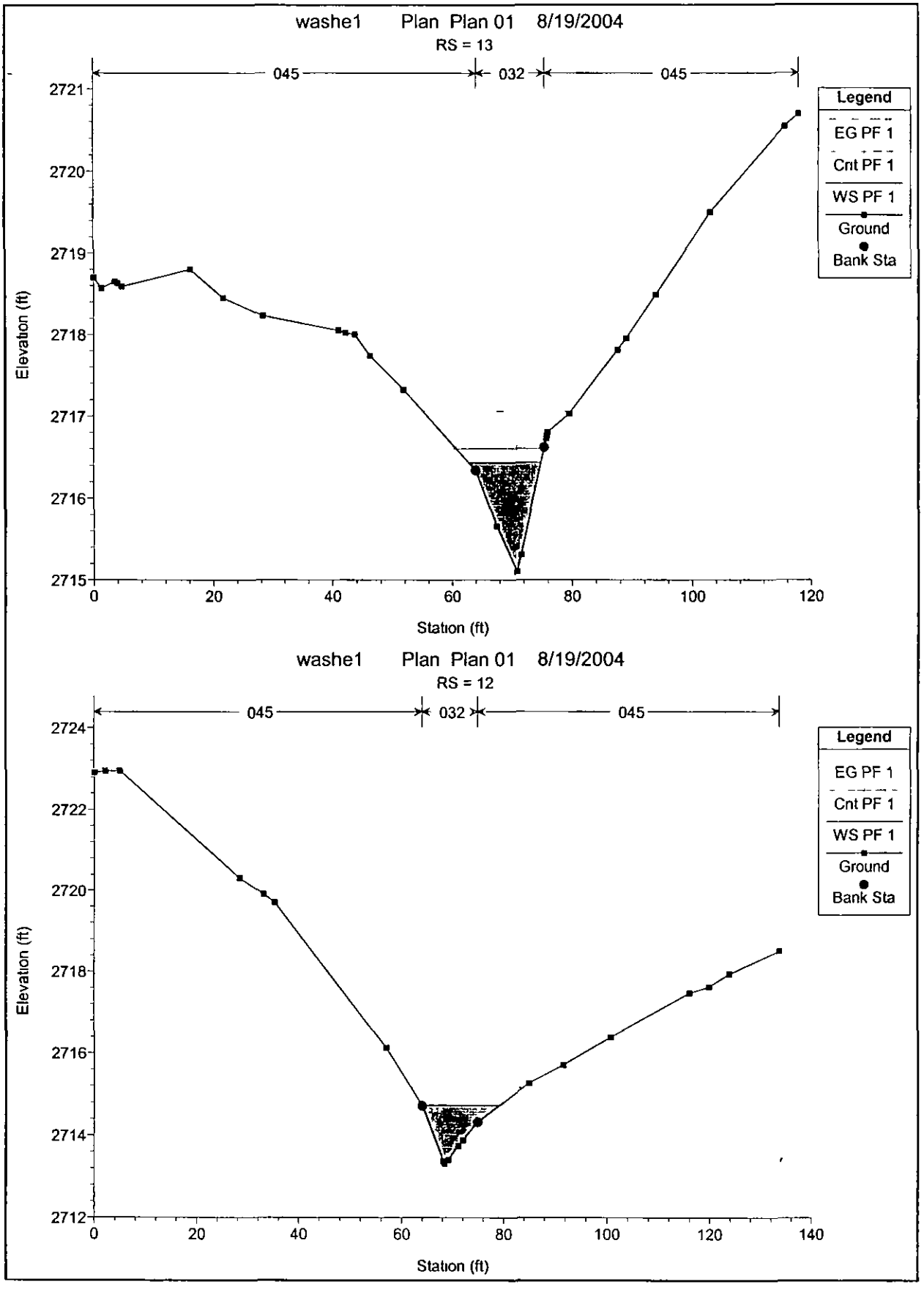
Errors Warnings and Notes for Plan Plan 01

Location	River RIVER-1 Reach Reach-1 RS 12 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 11 Profile PF 1
Warning	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0 7
	or greater than 1 4 This may indicate the need for additional cross sections
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 10 Profile PF 1
Warning	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0 7
	or greater than 1 4 This may indicate the need for additional cross sections
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 9 Profile PF 1
Warning	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0 7
	or greater than 1 4 This may indicate the need for additional cross sections
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 8 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 7 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 6 Profile PF 1
Warning	The energy equation could not be balanced within the specified number of iterations The program
	selected the water surface that had the least amount of error between computed and assumed
	values
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 5 Profile PF 1
Warning	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0 7
	or greater than 1 4 This may indicate the need for additional cross sections
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 4 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 3 Profile PF 1
Warning	Divided flow computed for this cross section
Warning	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0 7
	or greater than 1 4 This may indicate the need for additional cross sections
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 2 Profile PF 1
Warning	The velocity head has changed by more than 0 5 ft (0 15 m) This may indicate the need for
	additional cross sections
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 1 Profile PF 1
Warning	The velocity head has changed by more than 0 5 ft (0 15 m) This may indicate the need for
	additional cross sections
Warning	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0 7

WASH E1

Errors Warnings and Notes for Plan Plan 01 (Continued)

	or greater than 1 4 This may indicate the need for additional cross sections
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections


washe1 Plan Plan 01 8/19/2004
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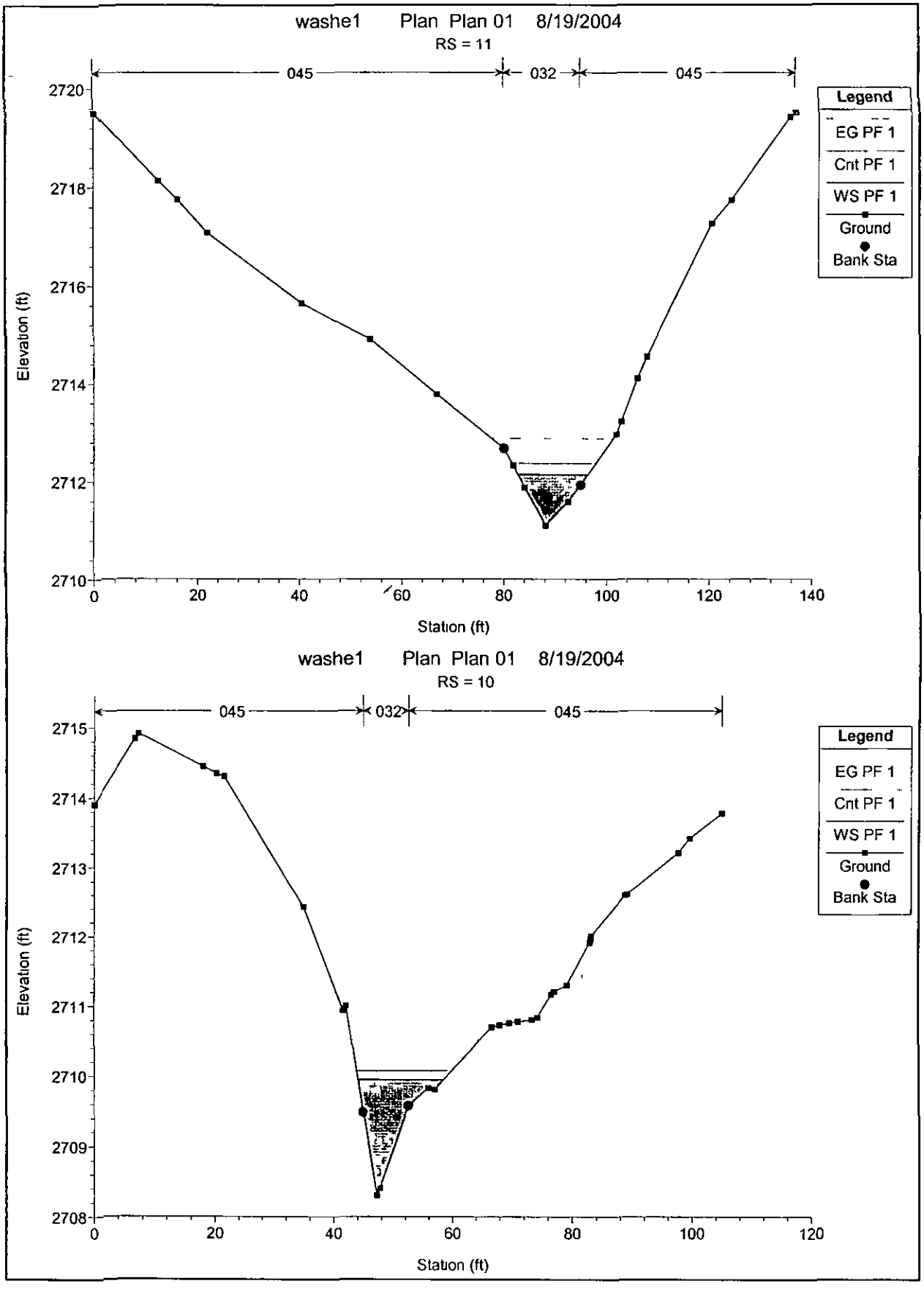
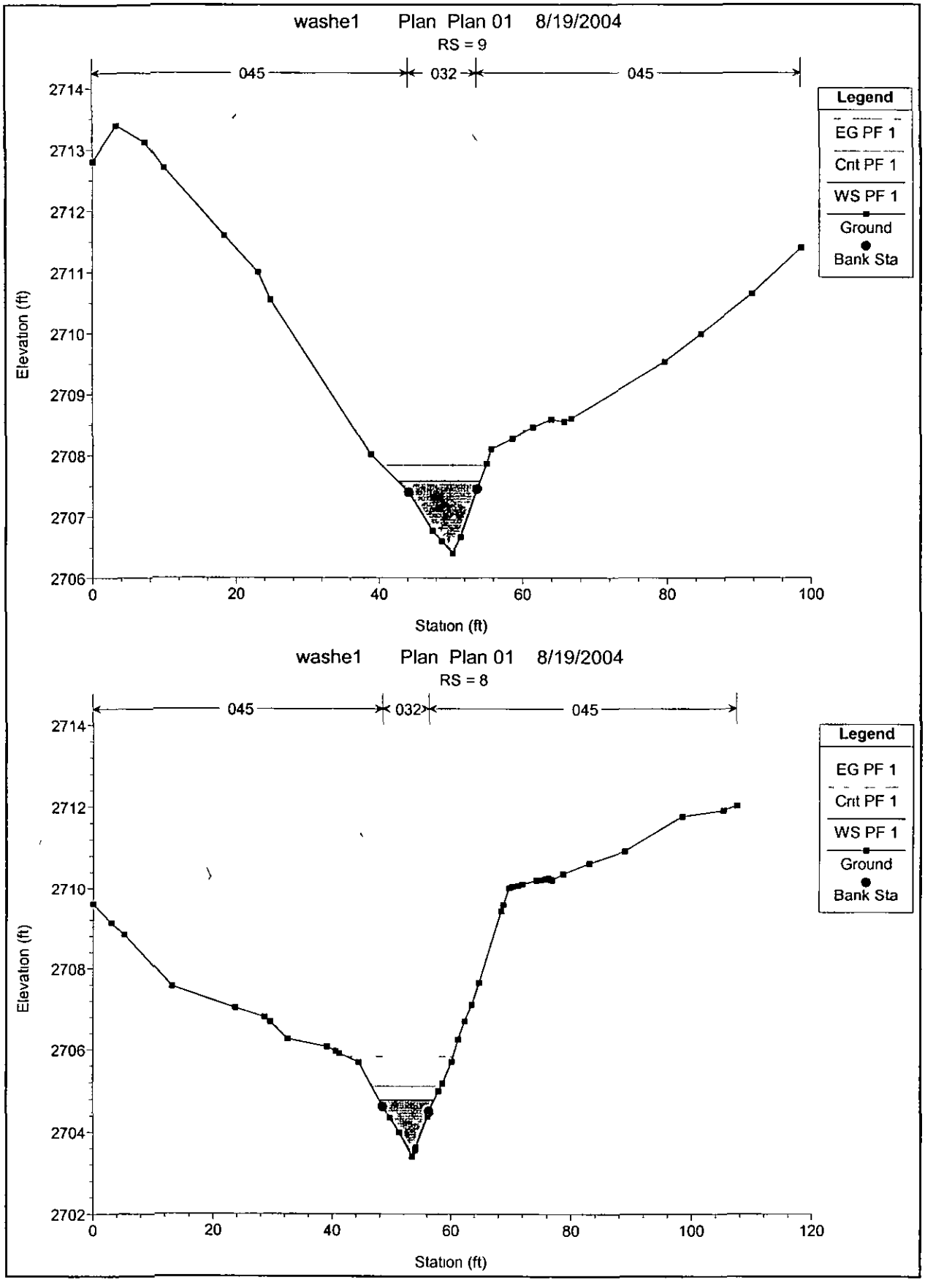
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
washe1 Plan Plan 01 8/19/2004
RS = 12
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


washe1 Plan Plan 01 8/19/2004
RS = 11
045
032
045
2720
2718
2716
2714
2712
2710
Elevation (ft)
0
20
40
60
80
100
120
140
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
washe1 Plan Plan 01 8/19/2004
RS = 10
045
032
045
2715
2714
2713
2712
2711
2710
2709
2708
Elevation (ft)
0
20
40
60
80
100
120
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta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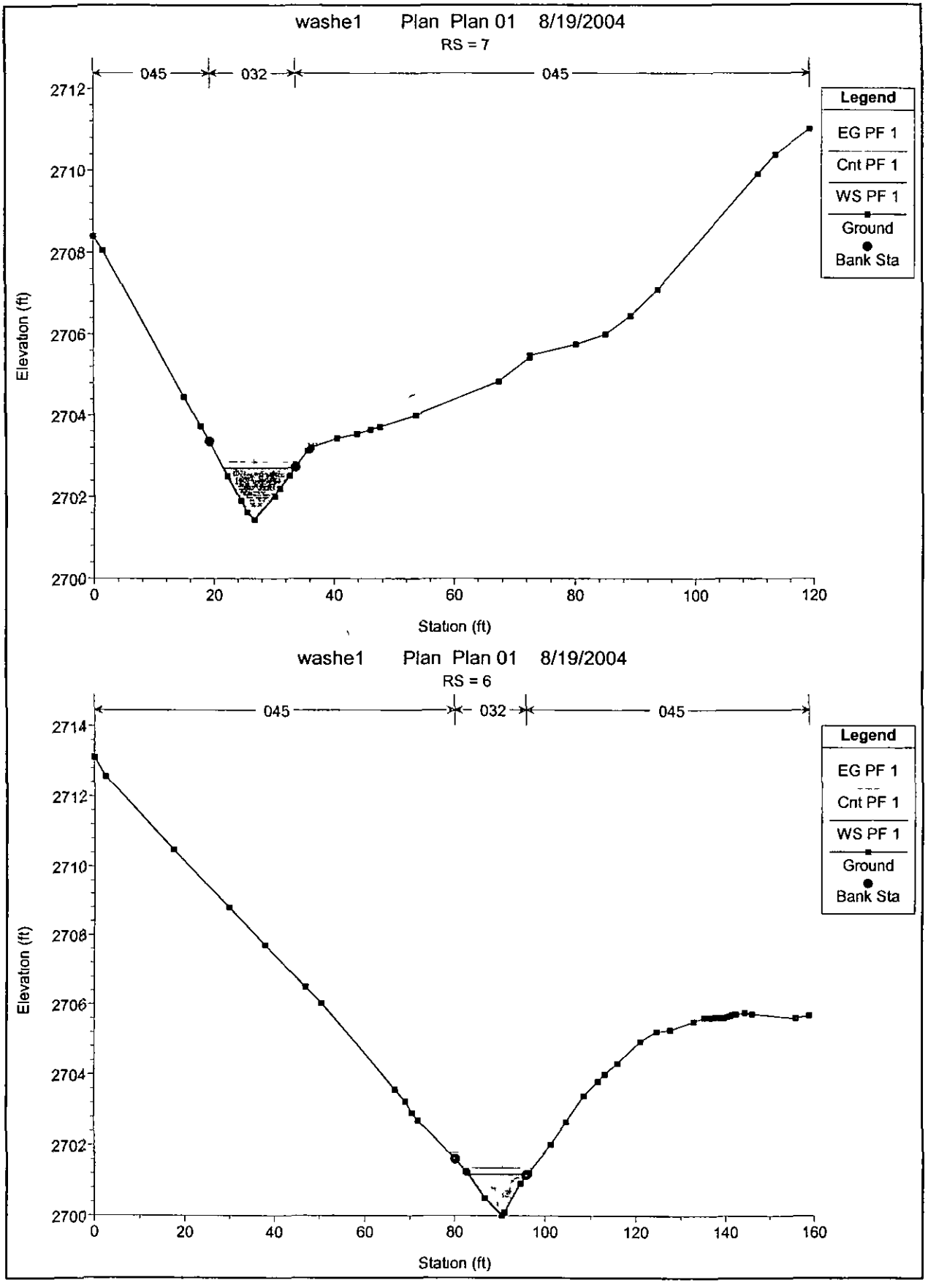
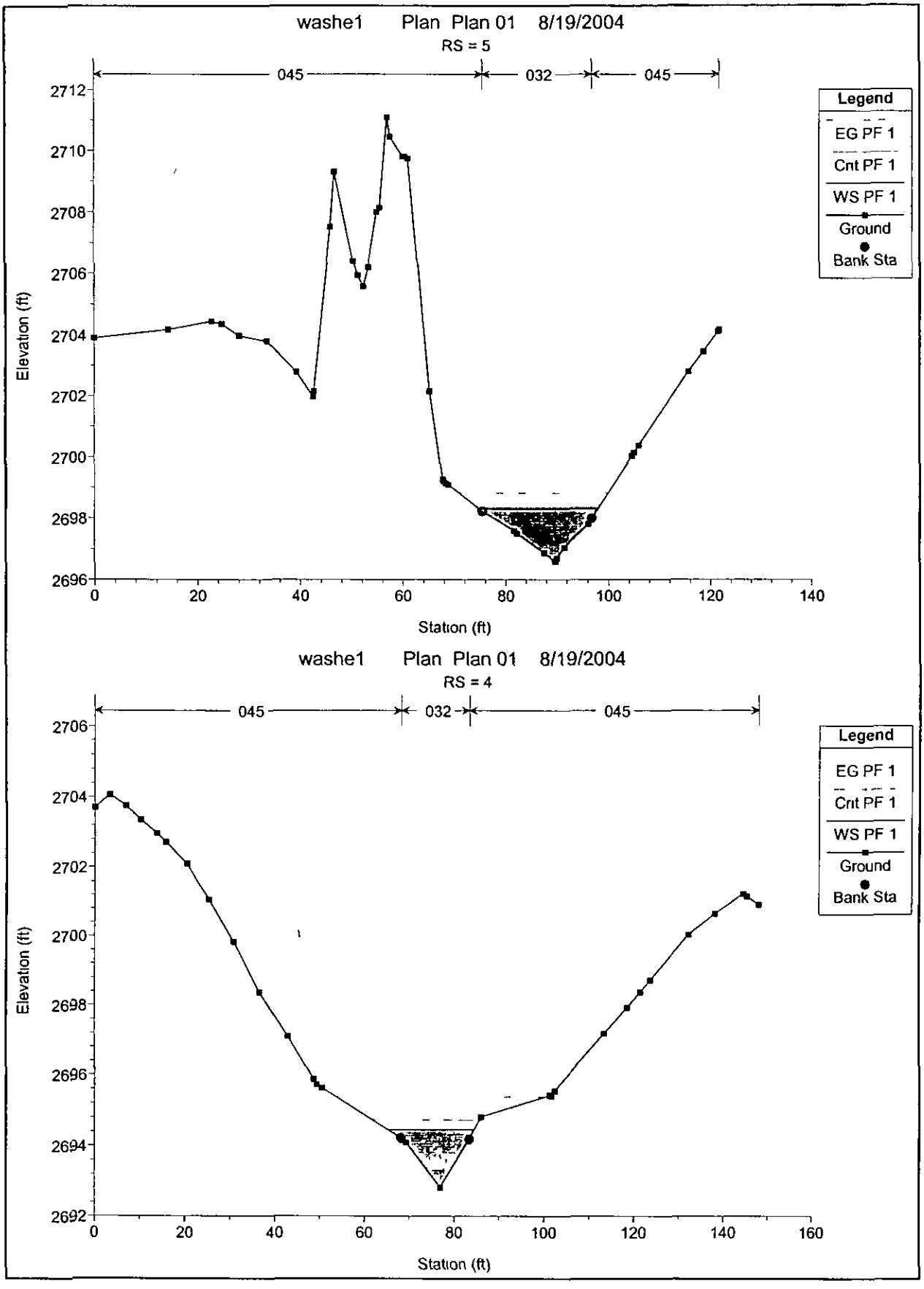
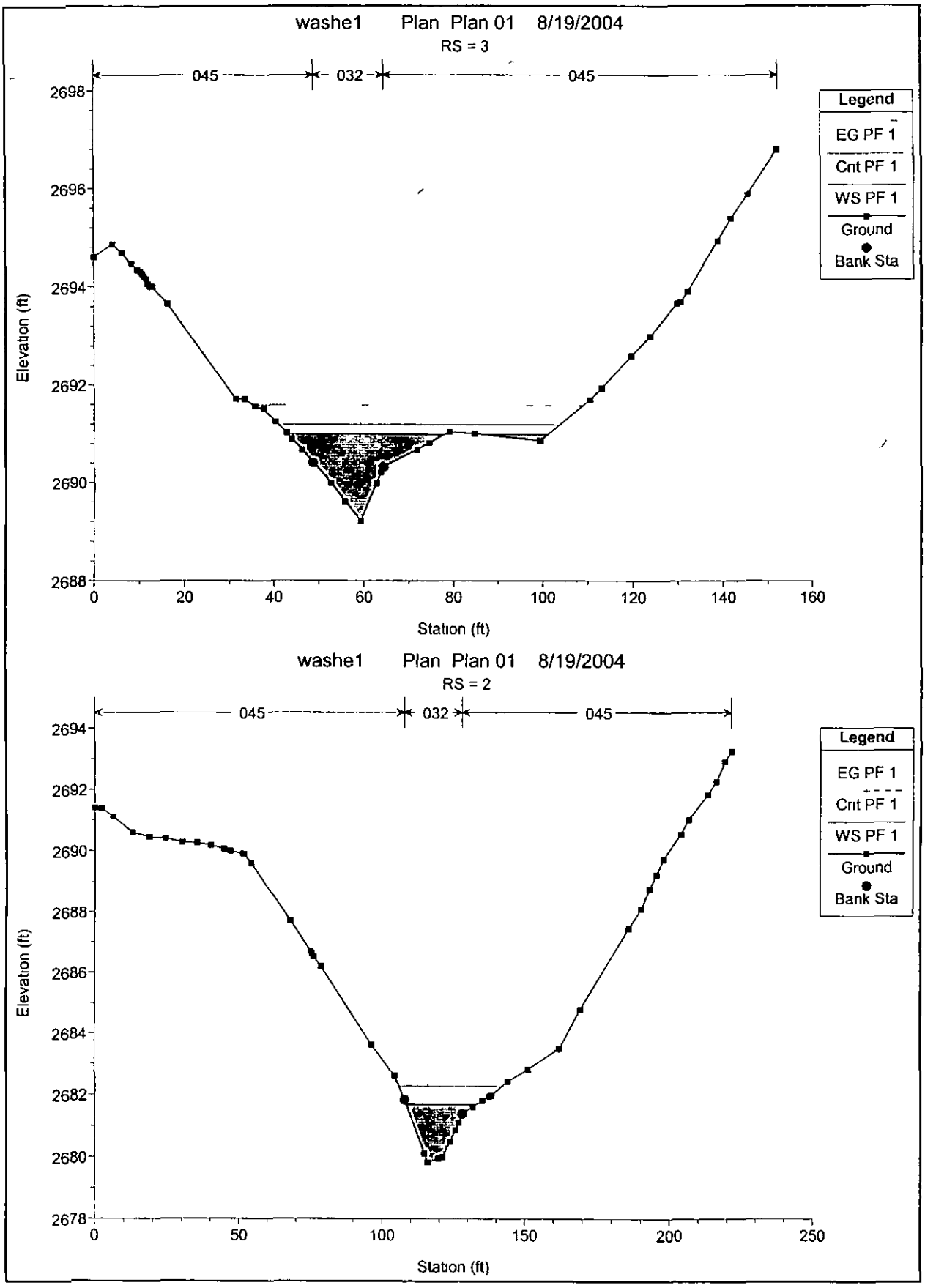
RS = 9
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
washe1 Plan Plan 01 8/19/2004
RS = 8
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


washe1 Plan Plan 01 8/19/2004
RS = 7
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
washe1 Plan Plan 01 8/19/2004
RS = 6
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


washe1 Plan Plan 01 8/19/2004
RS = 5
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
washe1 Plan Plan 01 8/19/2004
RS = 4
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)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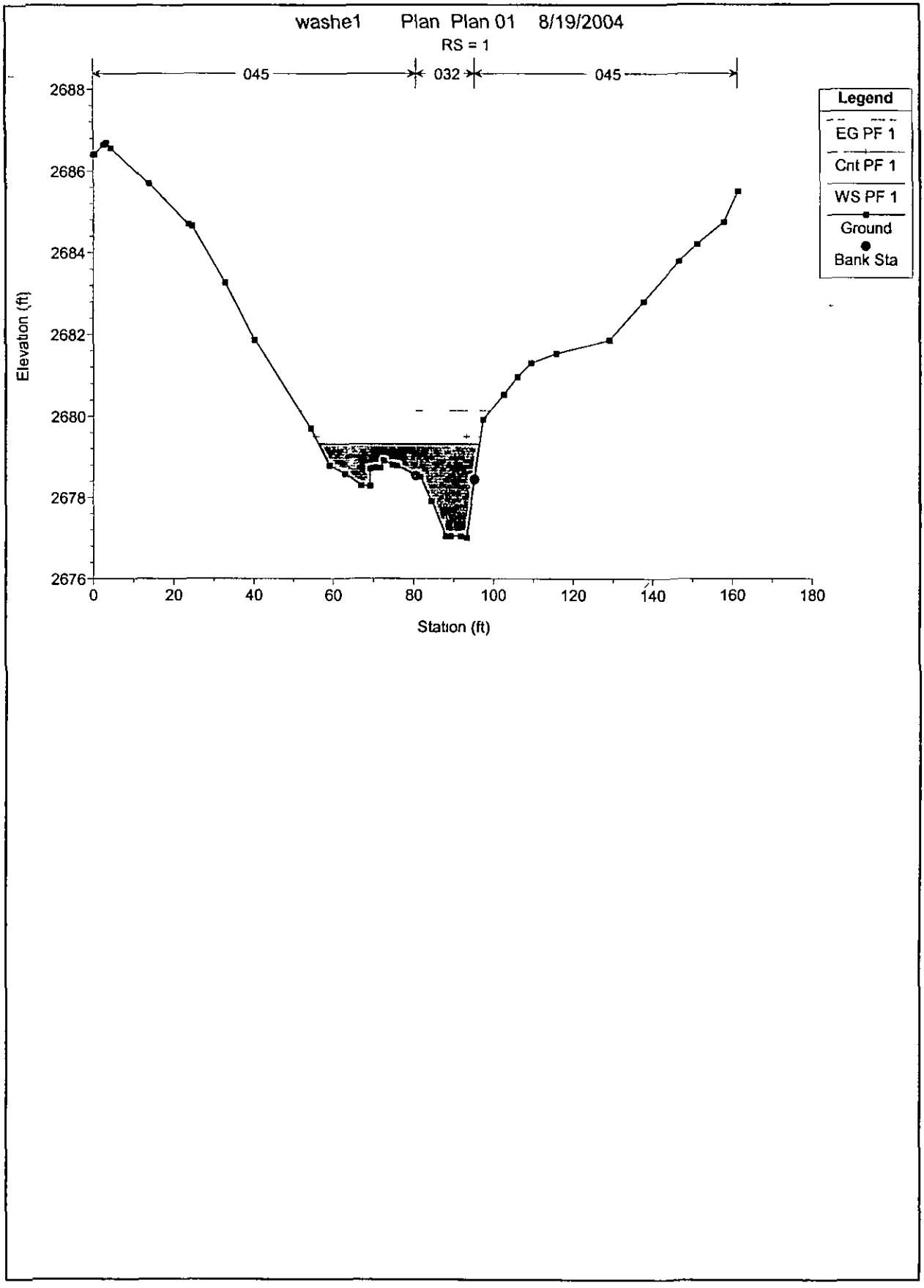
RS = 3
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
washe1 Plan Plan 01 8/19/2004
RS = 2
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


washe1 Plan Plan 01 8/19/2004
RS = 1
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2688
2686
2684
2682
2680
2678
2676
0
20
40
60
80
100
120
140
160
180
Station (ft)

Wash E2

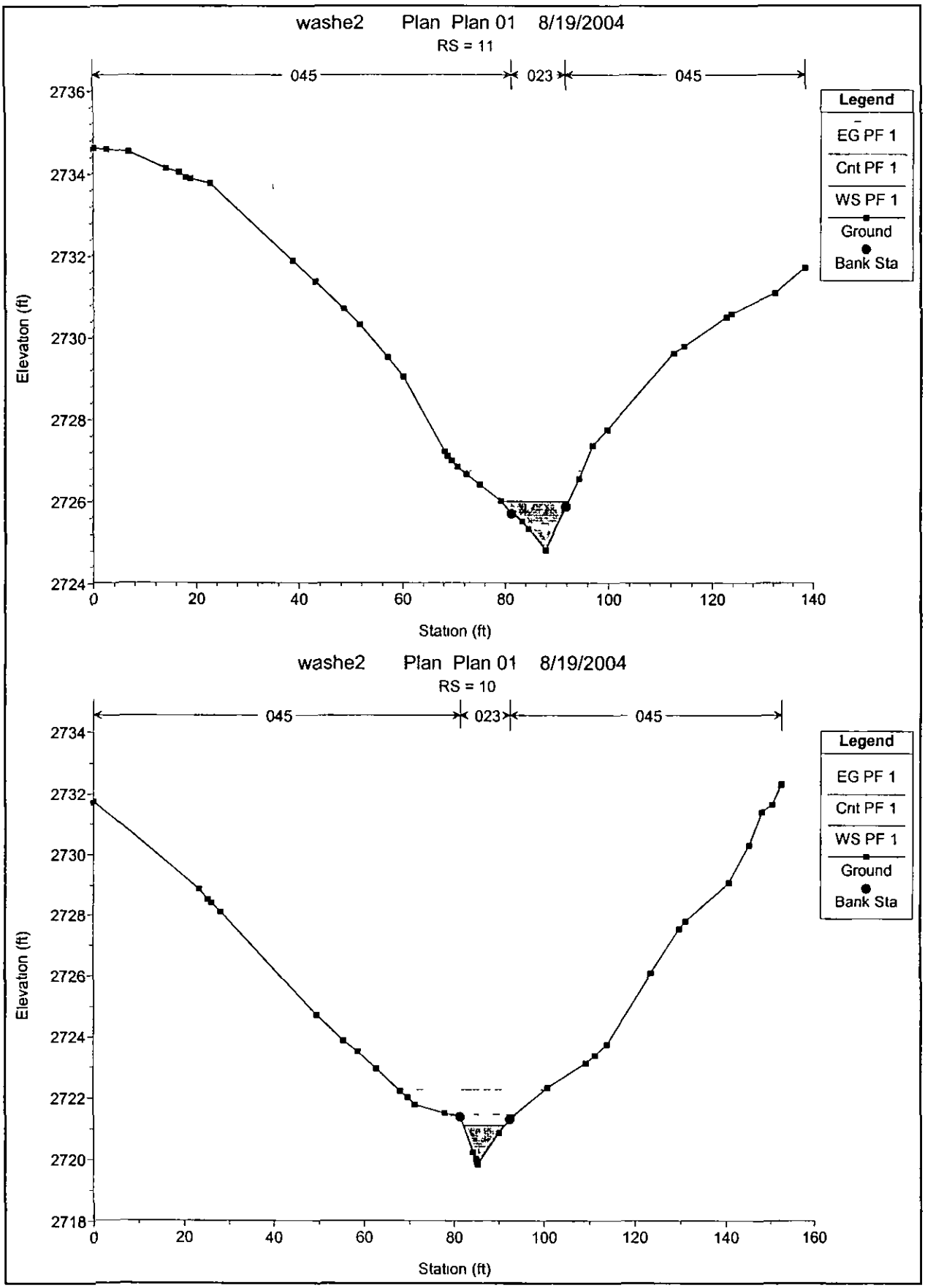
HEC-RAS Plan: Plan 01 River: RIVER 1 Reach: Reach-1 Profile: PF 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W S Elev (ft)	Crit W S (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach 1	11	PF 1	50.00	2724.80	2725.99	2726.21	2726.73	0.020013	6.94	7.48	13.06	1.49
Reach-1	10	PF 1	50.00	2719.82	2721.09	2721.44	2722.24	0.035149	8.63	5.80	9.27	1.92
Reach-1	9	PF 1	50.00	2715.71	2716.97	2717.21	2717.78	0.021955	7.21	7.01	11.19	1.55
Reach-1	8	PF 1	75.00	2709.10	2710.57	2711.05	2712.02	0.034731	9.64	7.78	10.45	1.97
Reach 1	7	PF 1	75.00	2705.46	2706.65	2706.94	2707.61	0.030625	7.88	9.51	16.16	1.81
Reach-1	6	PF 1	75.00	2701.53	2703.23	2703.57	2704.35	0.023010	8.49	8.83	10.42	1.62
Reach 1	5	PF 1	75.00	2697.79	2699.31	2699.76	2700.73	0.028580	9.56	8.00	10.43	1.82
Reach-1	4	PF 1	75.00	2694.91	2696.14	2696.38	2696.93	0.022699	7.11	10.55	16.72	1.58
Reach-1	3	PF 1	122.00	2687.45	2689.20	2689.73	2690.94	0.033261	10.56	11.53	13.14	1.99
Reach-1	2	PF 1	251.00	2679.83	2681.67	2682.25	2683.48	0.023084	10.80	23.84	24.44	1.76
Reach-1	1	PF 1	251.00	2677.00	2678.99	2679.54	2680.76	0.019267	11.08	29.30	38.04	1.63

WASH E2

Errors Warnings and Notes for Plan Plan 01

Location	River RIVER-1 Reach Reach-1 RS 10 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 9 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 8 Profile PF 1
Warning	The velocity head has changed by more than 0 5 ft (0 15 m) This may indicate the need for
	additional cross sections
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 7 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 6 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 5 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 4 Profile PF 1
Warning	The velocity head has changed by more than 0 5 ft (0 15 m) This may indicate the need for
	additional cross sections
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 3 Profile PF 1
Warning	The velocity head has changed by more than 0 5 ft (0 15 m) This may indicate the need for
	additional cross sections
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 2 Profile PF 1
Warning	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0 7
	or greater than 1 4 This may indicate the need for additional cross sections
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 1 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections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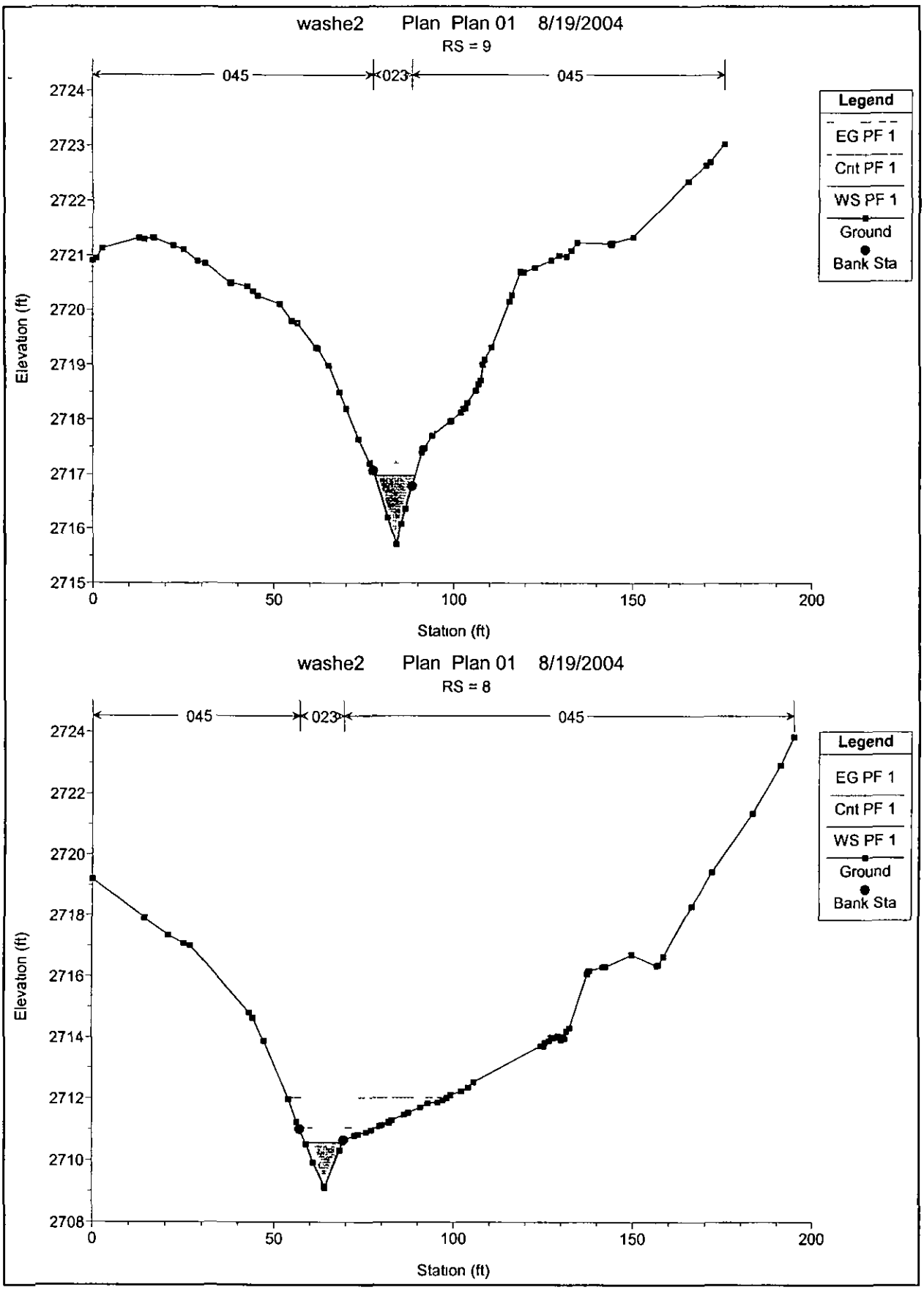
RS = 11
045
023
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
washe2 Plan Plan 01 8/19/2004
RS = 10
045
023
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)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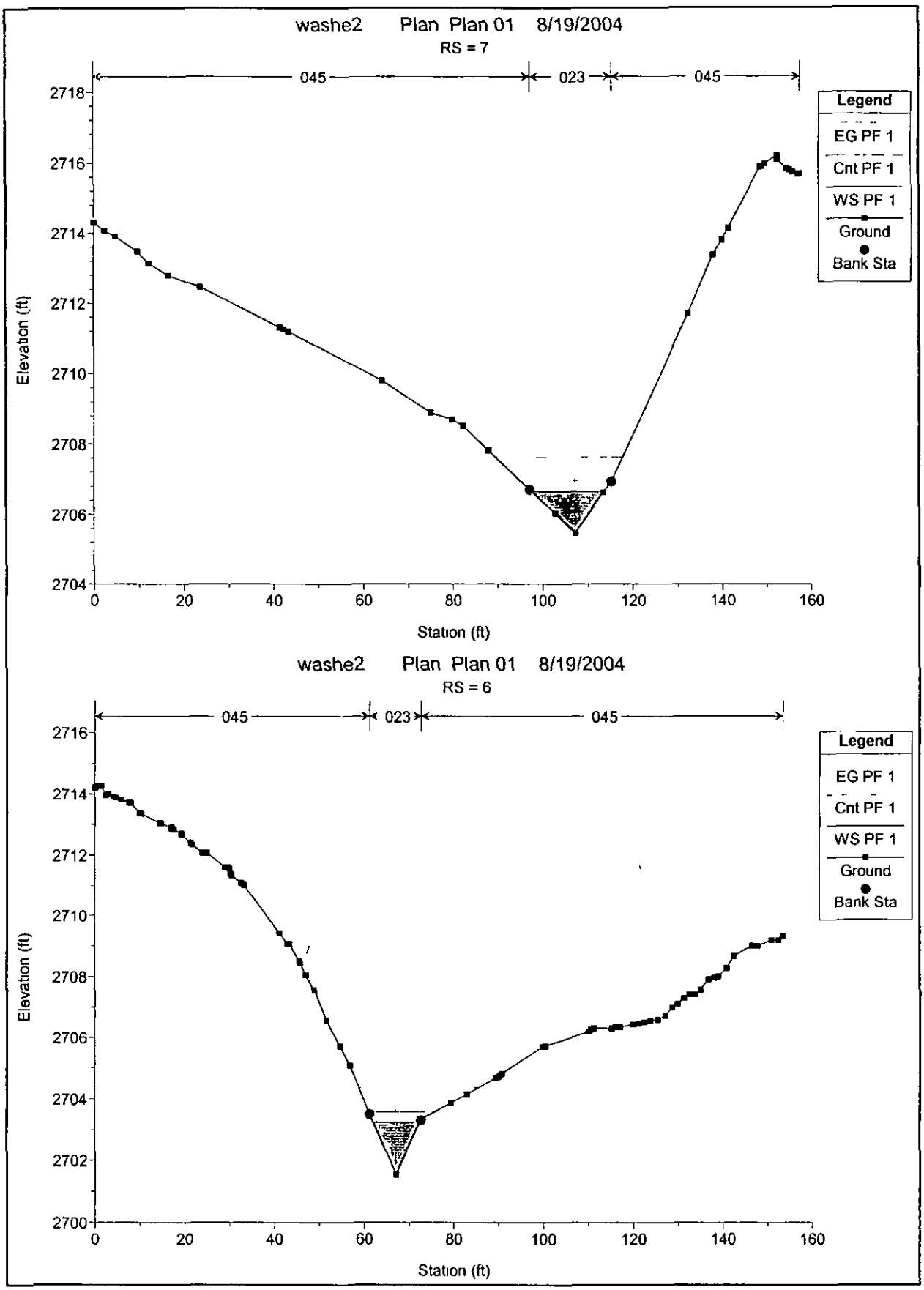
RS = 9
045
023
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
washe2 Plan Plan 01 8/19/2004
RS = 8
045
023
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)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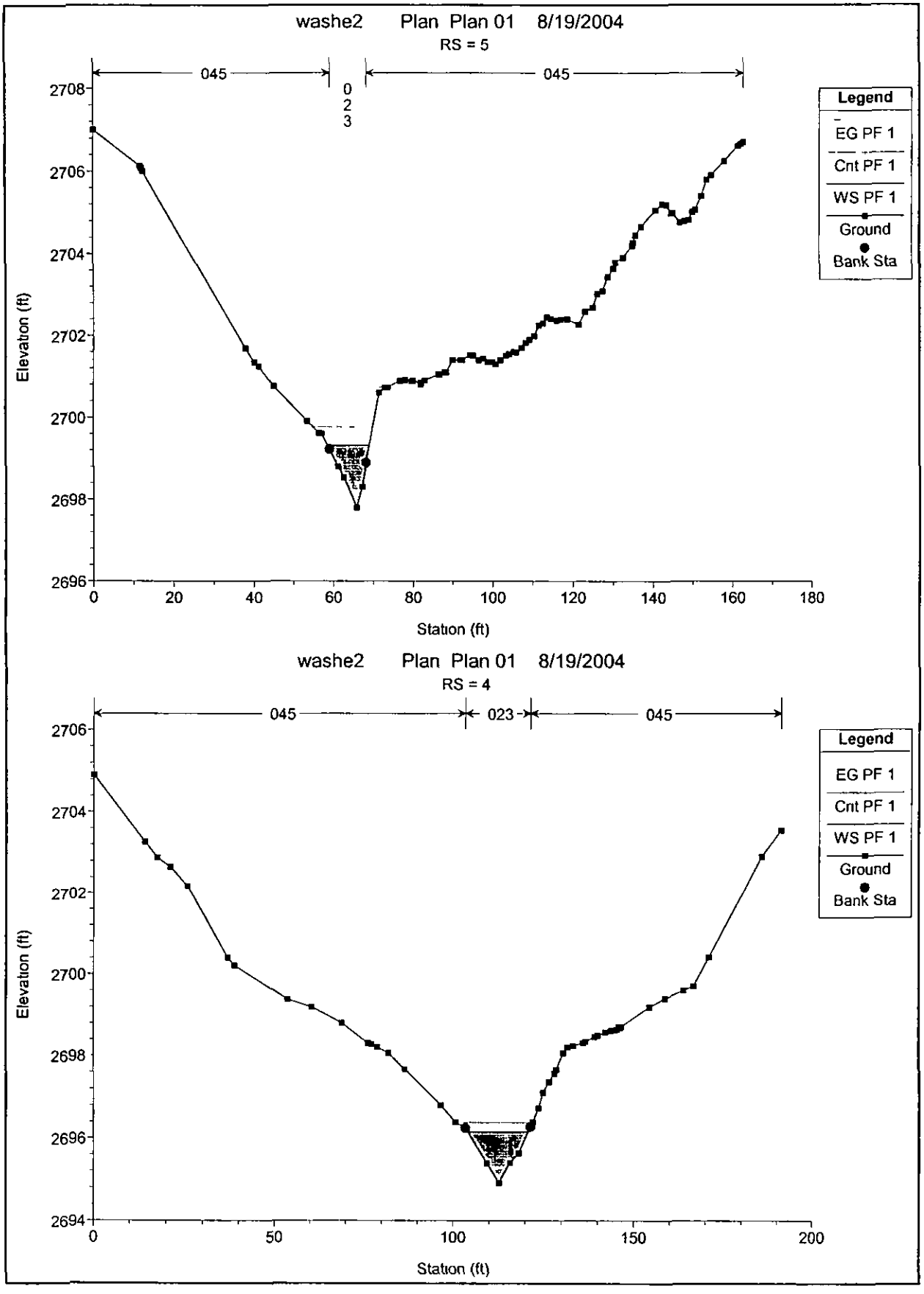
RS = 7
045
023
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
washe2 Plan Plan 01 8/19/2004
RS = 6
045
023
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)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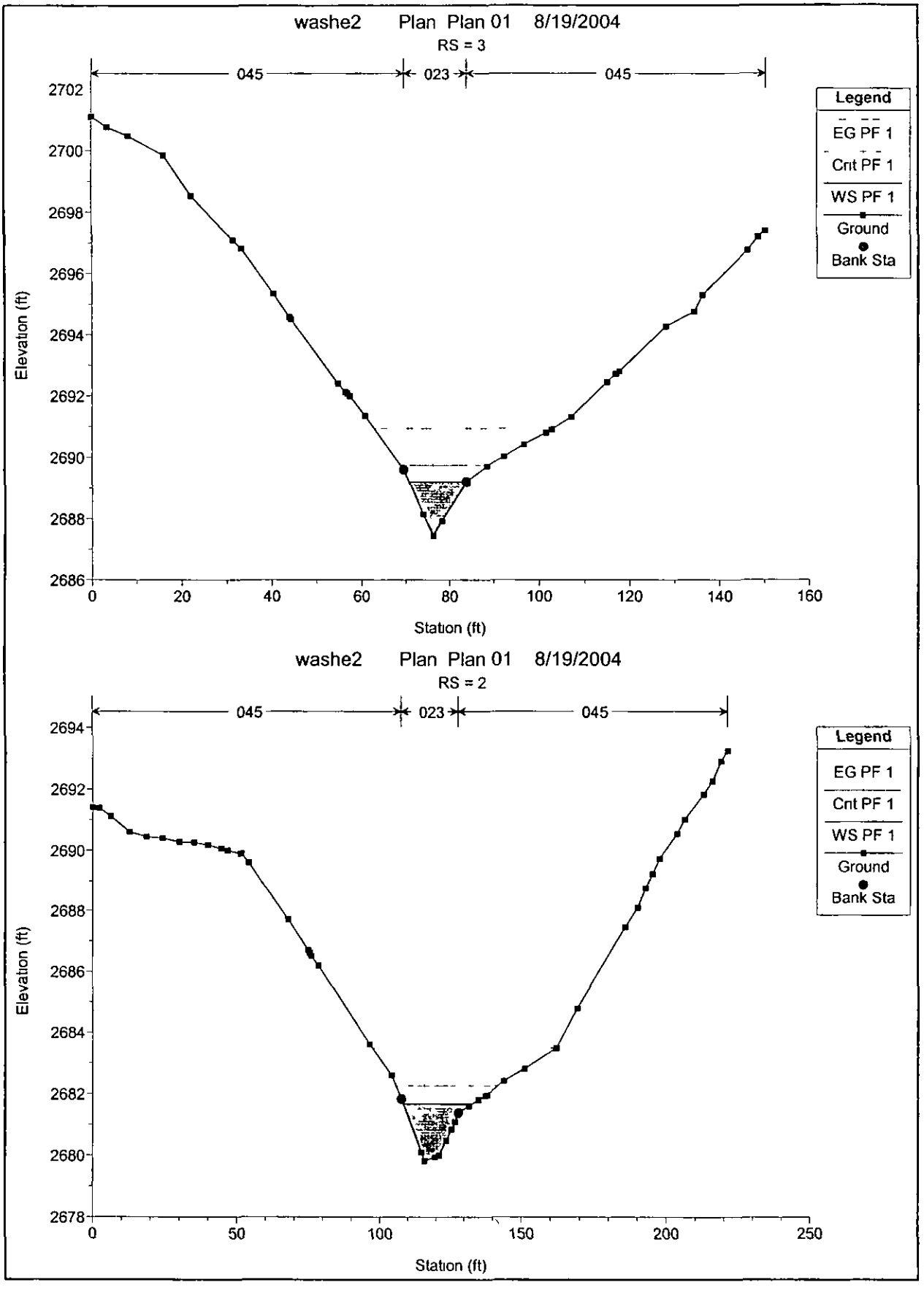
RS = 5
045
023
045
2708
2706
2704
2702
2700
2698
2696
Elevation (ft)
0
20
40
60
80
100
120
140
160
180
Station (ft)
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
washe2 Plan Plan 01 8/19/2004
RS = 4
045
023
045
2706
2704
2702
2700
2698
2696
2694
Elevation (ft)
0
50
100
150
200
Station (ft)
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta


washe2 Plan Plan 01 8/19/2004
RS = 3
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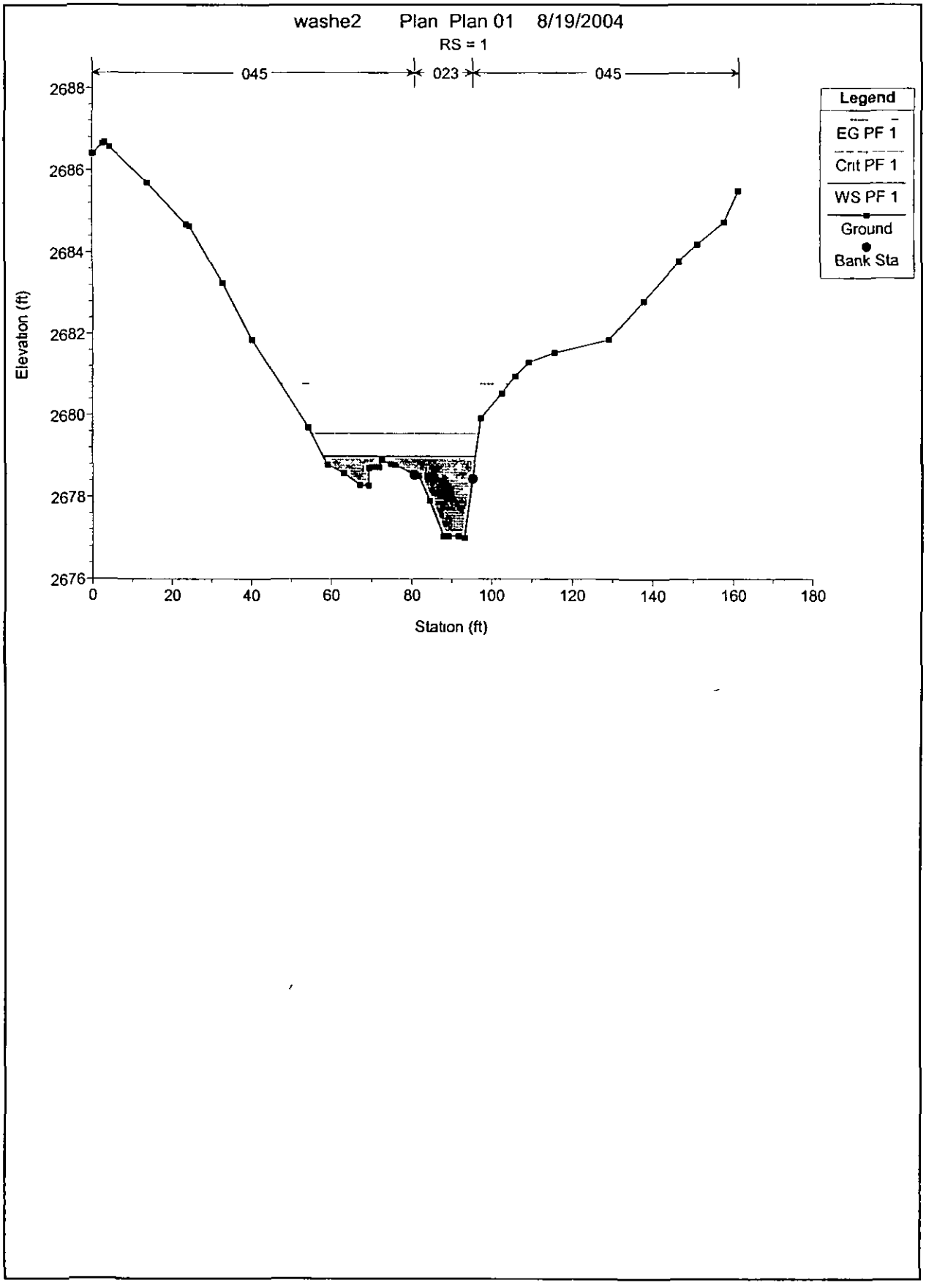
023
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
washe2 Plan Plan 01 8/19/2004
RS = 2
045
023
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)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023
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2688
2686
2684
2682
2680
2678
2676
0
20
40
60
80
100
120
140
160
180
Station (ft)

Wash F1

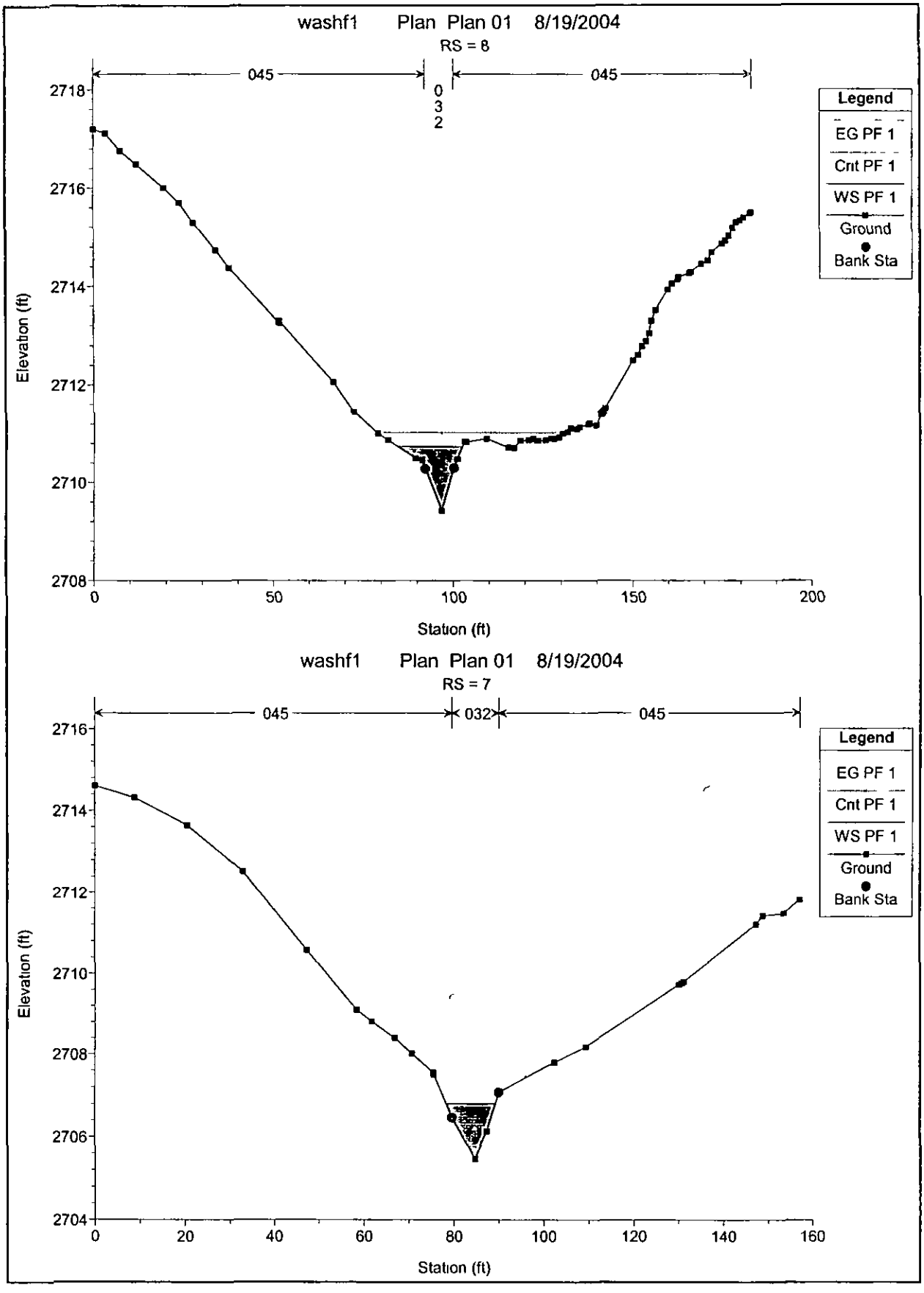
HEC-RAS Plan: Plan 01 River: RIVER 1 Reach: Reach 1 Profile: PF 1

Reach	River Sta	Profile	Q Total	Min Ch El	W S Elev	Crit W S	E G Elev	E G Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	8	PF 1	50 00	2709 42	2710 74	2711 03	2711 38	0 025021	6 65	8 95	20 46	1 25
Reach 1	7	PF 1	50 00	2705 46	2706 81	2706 97	2707 46	0 027912	6 49	7 87	11 03	1 29
Reach 1	6	PF 1	50 00	2700 54	2701 76	2702 06	2702 68	0 039439	7 86	7 10	12 34	1 54
Reach 1	5	PF 1	50 00	2698 48	2699 81	2699 89	2700 28	0 022873	5 50	9 22	14 31	1 15
Reach 1	4	PF 1	70 00	2692 65	2693 88	2694 04	2694 51	0 031360	6 38	11 08	17 37	1 35
Reach 1	3	PF 1	70 00	2686 57	2687 86	2688 03	2688 53	0 023987	6 59	11 24	16 79	1 23
Reach 1	2	PF 1	70 00	2681 90	2683 24	2683 31	2683 61	0 023295	4 97	15 25	32 77	1 14
Reach 1	1	PF 1	67 00	2677 60	2678 79	2678 98	2679 35	0 028227	6 29	17 84	53 95	1 30

WASH F1

Errors Warnings and Notes for Plan Plan 01

Location	River RIVER-1 Reach Reach-1 RS 8 Profile PF 1
Warning	Divided flow computed for this cross-section
Location	River RIVER-1 Reach Reach-1 RS 7 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 6 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 5 Profile PF 1
Warning	The energy equation could not be balanced within the specified number of iterations The program
	selected the water surface that had the least amount of error between computed and assumed
	values
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 4 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 3 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 2 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 1 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections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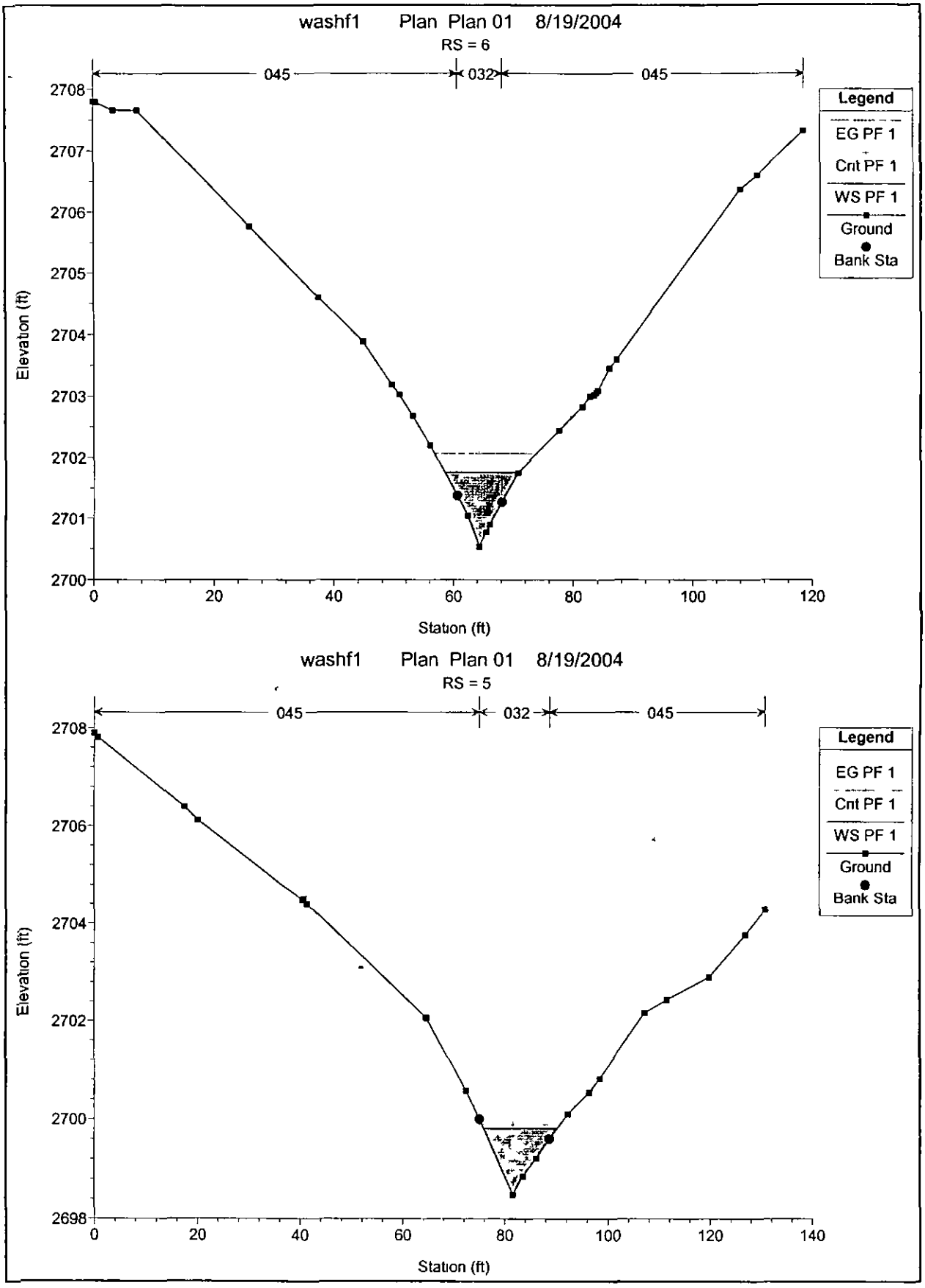
045
0
3
2
2718
2716
2714
2712
2710
2708
Elevation (ft)
0
50
100
150
200
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
washf1 Plan Plan 01 8/19/2004
RS = 7
045
032
045
2716
2714
2712
2710
2708
2706
2704
Elevation (ft)
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta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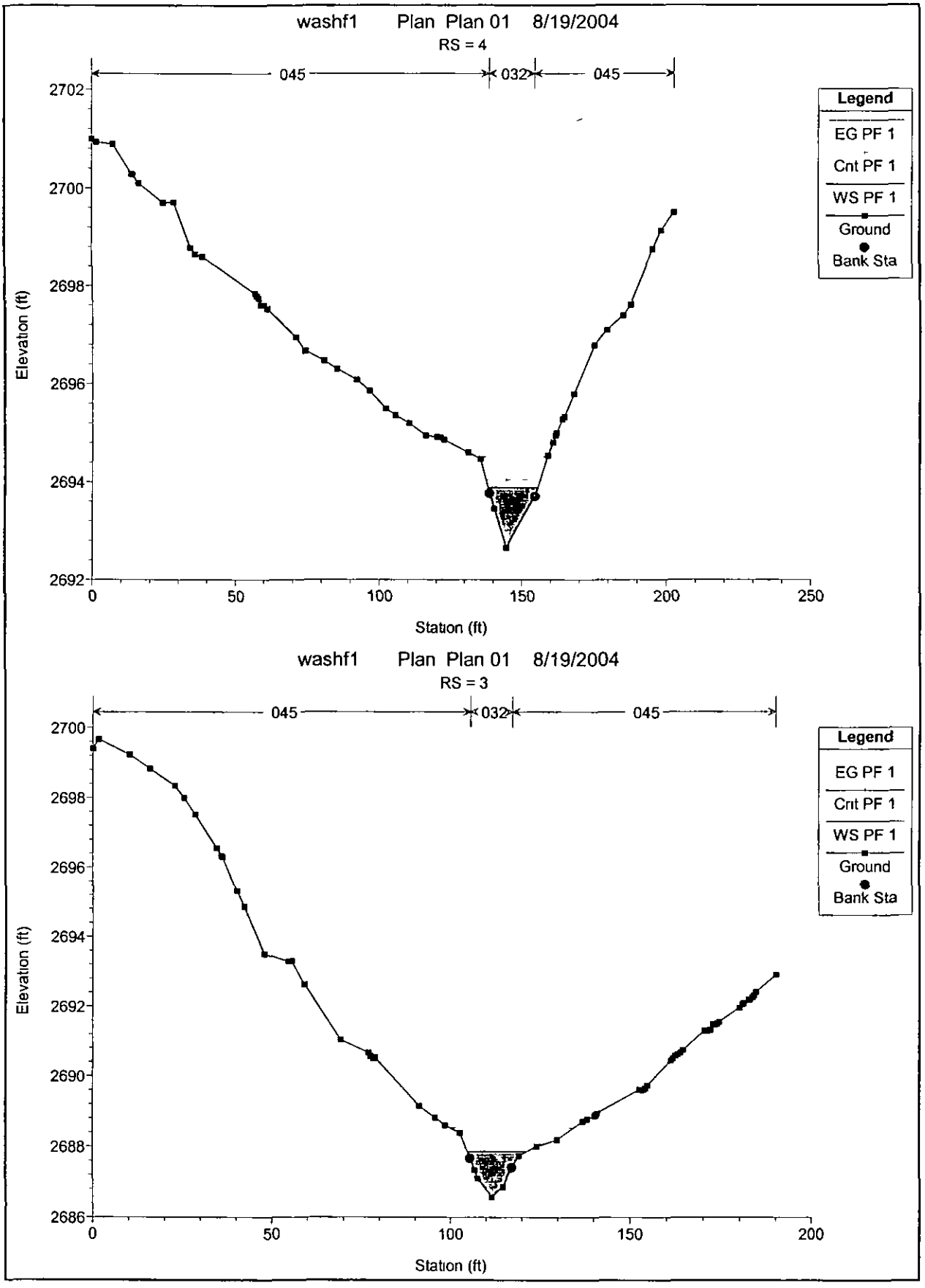
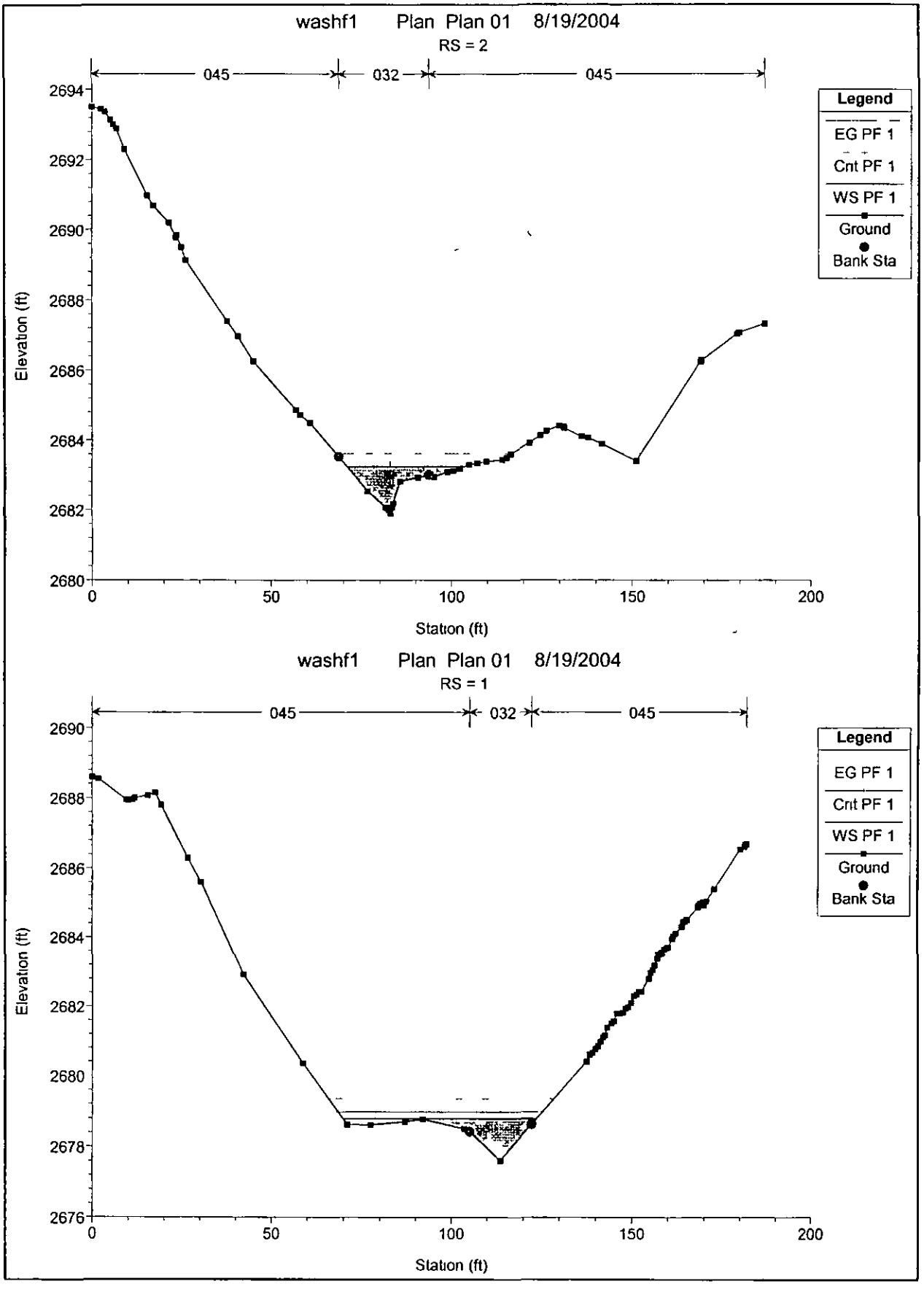
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
washf1 Plan Plan 01 8/19/2004
RS = 5
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


washf1 Plan Plan 01 8/19/2004
RS = 4
045
032
045
2702
2700
2698
2696
2694
2692
Elevation (ft)
0
50
100
150
200
250
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
washf1 Plan Plan 01 8/19/2004
RS = 3
045
032
045
2700
2698
2696
2694
2692
2690
2688
2686
Elevation (ft)
0
50
100
150
200
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta


washf1 Plan Plan 01 8/19/2004
RS = 2
045
032
045
2694
2692
2690
2688
2686
2684
2682
2680
Elevation (ft)
0
50
100
150
200
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
washf1 Plan Plan 01 8/19/2004
RS = 1
045
032
045
2690
2688
2686
2684
2682
2680
2678
2676
Elevation (ft)
0
50
100
150
200
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta

Wash H1

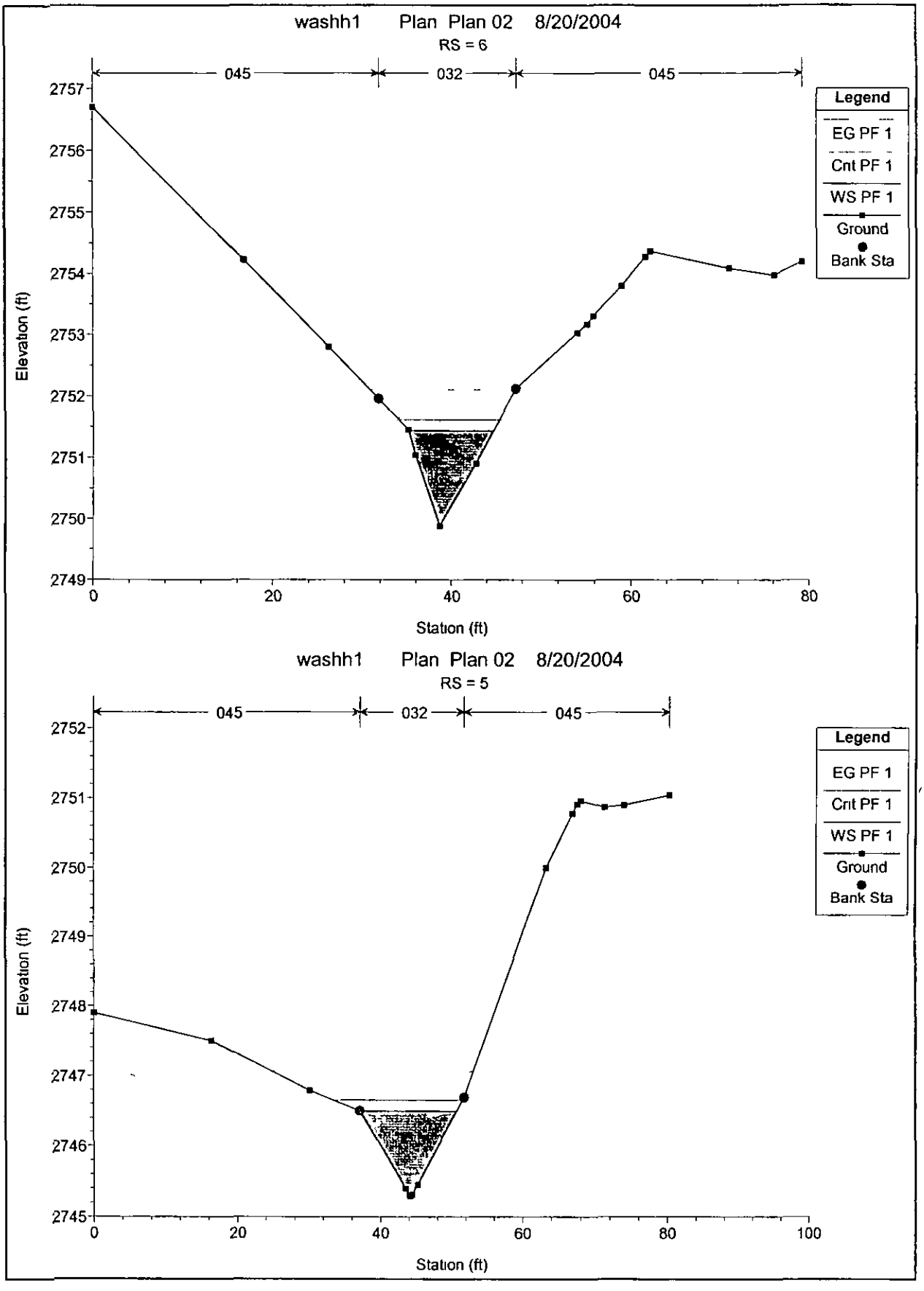
HEC-RAS Plan: Plan 02 River: RIVER 1 Reach: Reach 1 Profile: PF 1

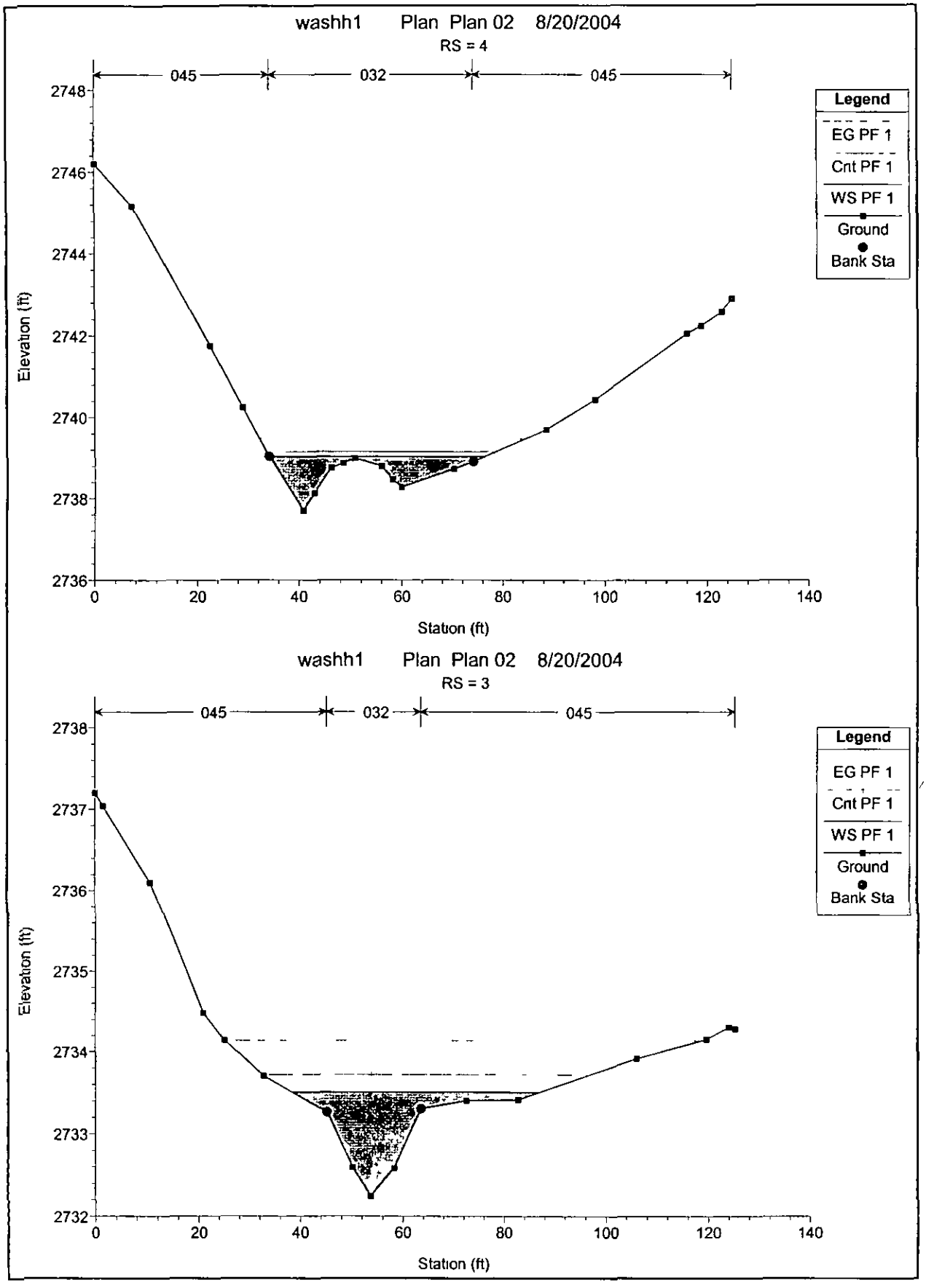
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W S Elev (ft)	Crit W S (ft)	E G Elev (ft)	E G Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach 1	6	PF 1	50 00	2749 88	2751 43	2751 61	2752 10	0 028975	6 55	7 63	9 59	1 29
Reach 1	5	PF 1	50 00	2745 29	2746 49	2746 65	2747 06	0 033158	6 03	8 30	13 57	1 36
Reach 1	4	PF 1	100 00	2737 70	2739 04	2739 15	2739 48	0 037087	5 36	18 79	42 22	1 38
Reach 1	3	PF 1	100 00	2732 24	2733 50	2733 71	2734 13	0 026736	6 51	18 10	48 74	1 28
Reach 1	2	PF 1	140 00	2725 11	2726 72	2726 92	2727 44	0 041456	6 79	20 66	34 49	1 53
Reach 1	1	PF 1	140 00	2720 27	2720 97	2720 96	2721 18	0 029041	4 23	38 81	86 82	1 19

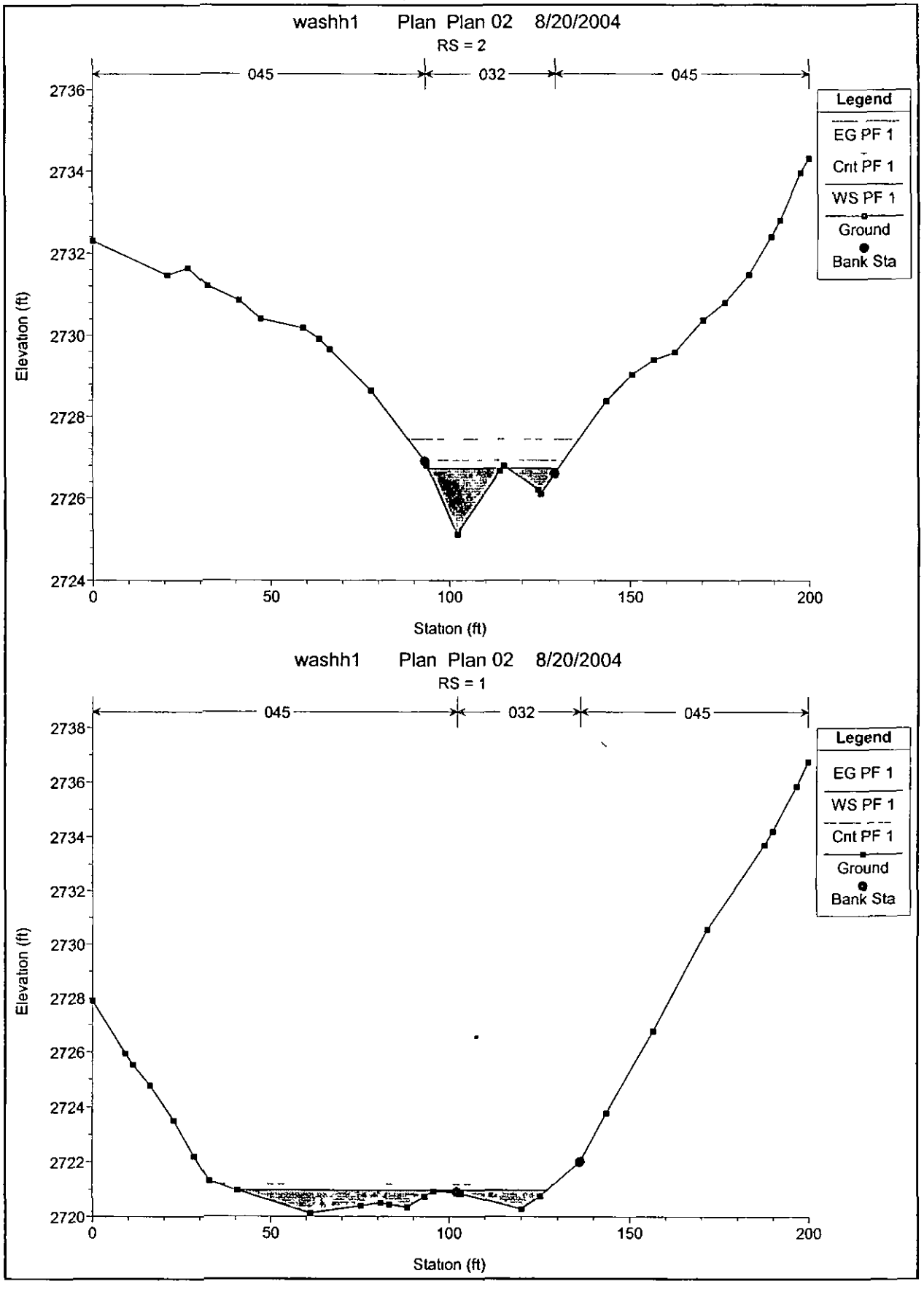
WASH HI

Errors Warnings and Notes for Plan Plan 02

Location	River RIVER-1 Reach Reach-1 RS 5 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 4 Profile PF 1
Warning	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0 7
	or greater than 1 4 This may indicate the need for additional cross sections
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 3 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 2 Profile PF 1
Warning	Divided flow computed for this cross-section
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 1 Profile PF 1
Note	Hydraulic jump has occurred between this cross section and the previous upstream section


washh1 Plan Plan 02 8/20/2004
RS = 6
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
washh1 Plan Plan 02 8/20/2004
RS = 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 8/20/2004
RS = 4
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
washh1 Plan Plan 02 8/20/2004
RS = 3
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


washh1 Plan Plan 02 8/20/2004
RS = 2
045
032
045
2736
2734
2732
2730
2728
2726
2724
Elevation (ft)
0
50
100
150
200
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
washh1 Plan Plan 02 8/20/2004
RS = 1
045
032
045
2738
2736
2734
2732
2730
2728
2726
2724
2722
2720
Elevation (ft)
0
50
100
150
200
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta

Wash H2

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

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W S Elev (ft)	Crit W S (ft)	E G Elev (ft)	E G Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach 1	15	PF 1	50 00	2821 98	2822 73	2822 87	2823 20	0 043010	5 50	9 10	21 01	1 47
Reach 1	14	PF 1	50 00	2814 10	2814 57	2814 63	2814 83	0 038439	4 16	12 02	38 88	1 32
Reach 1	13	PF 1	50 00	2808 80	2809 31	2809 36	2809 54	0 036980	3 82	13 10	46 83	1 27
Reach 1	12	PF 1	50 00	2800 73	2801 22	2801 31	2801 52	0 063174	4 36	11 47	50 18	1 61
Reach 1	11	PF 1	110 00	2783 25	2784 86	2785 16	2785 85	0 038129	8 00	13 76	16 27	1 53
Reach 1	10	PF 1	110 00	2773 90	2775 12	2775 38	2775 90	0 045460	7 23	16 84	37 06	1 61
Reach 1	9	PF 1	110 00	2764 93	2766 11	2766 36	2766 92	0 038379	7 21	15 26	21 49	1 51
Reach 1	8	PF 1	110 00	2757 40	2758 22	2758 36	2758 72	0 045595	5 69	19 35	44 32	1 52
Reach 1	7	PF 1	110 00	2751 66	2752 49	2752 67	2753 08	0 034695	6 03	18 55	36 22	1 39
Reach 1	6	PF 1	110 00	2749 39	2750 04	2750 28	2750 75	0 056994	6 76	16 28	34 17	1 72
Reach 1	5	PF 1	110 00	2746 81	2747 73	2747 91	2748 36	0 039069	6 37	17 27	29 75	1 47
Reach 1	4	PF 1	110 00	2744 09	2745 00	2745 29	2745 95	0 045868	7 84	14 03	19 83	1 64
Reach 1	3	PF 1	110 00	2739 56	2740 83	2741 04	2741 51	0 038401	6 61	16 63	25 58	1 45
Reach 1	2	PF 1	155 00	2735 23	2736 19	2736 50	2737 17	0 050299	7 92	19 57	29 38	1 71
Reach 1	1	PF 1	155 00	2731 01	2731 59	2731 77	2732 22	0 050013	6 39	24 27	49 93	1 61

WASH H2

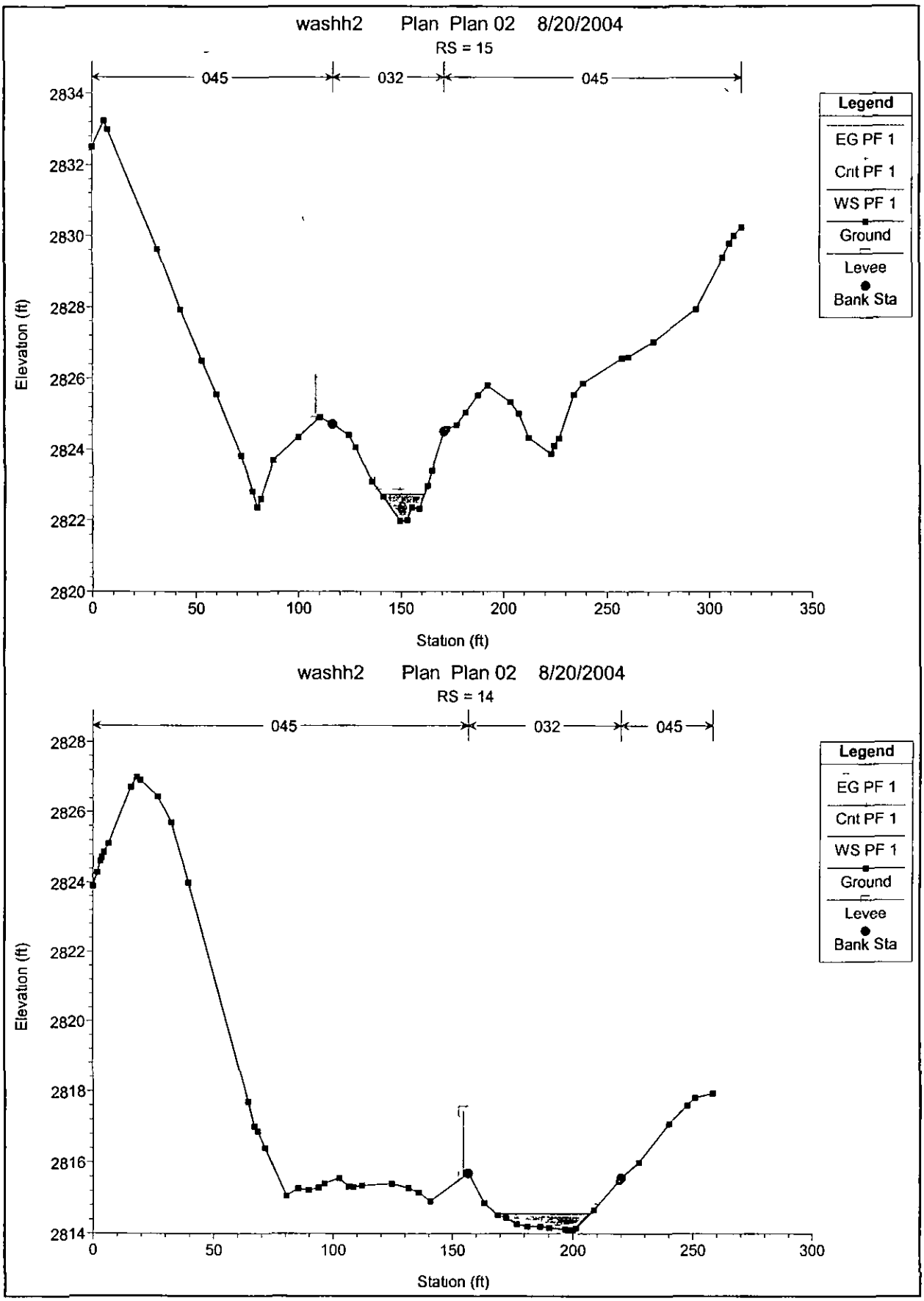
Errors Warnings and Notes for Plan Plan 02

Location	River RIVER-1 Reach Reach-1 RS 15 Profile PF 1
Note	Multiple critical depths were found at this location The critical depth with the lowest valid water
	surface was used
Location	River RIVER-1 Reach Reach-1 RS 14 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Note	Multiple critical depths were found at this location The critical depth with the lowest valid water
	surface was used
Location	River RIVER-1 Reach Reach-1 RS 13 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 12 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 11 Profile PF 1
Warning	The velocity head has changed by more than 0 5 ft (0 15 m) This may indicate the need for
	additional cross sections
Warning	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0 7
	or greater than 1 4 This may indicate the need for additional cross sections
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 10 Profile PF 1
Warning	Divided flow computed for this cross-section
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Note	Multiple critical depths were found at this location The critical depth with the lowest valid water
	surface was used
Location	River RIVER-1 Reach Reach-1 RS 9 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 8 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Note	Multiple critical depths were found at this location The critical depth with the lowest, valid water
	surface was used
Location	River RIVER-1 Reach Reach-1 RS 7 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Note	Multiple critical depths were found at this location The critical depth with the lowest, valid water
	surface was used
Location	River RIVER-1 Reach Reach-1 RS 6 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 5 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 4 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 3 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 2 Profile PF 1

WASH H2

Errors Warnings and Notes for Plan Plan 02 (Continued)

Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 1 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections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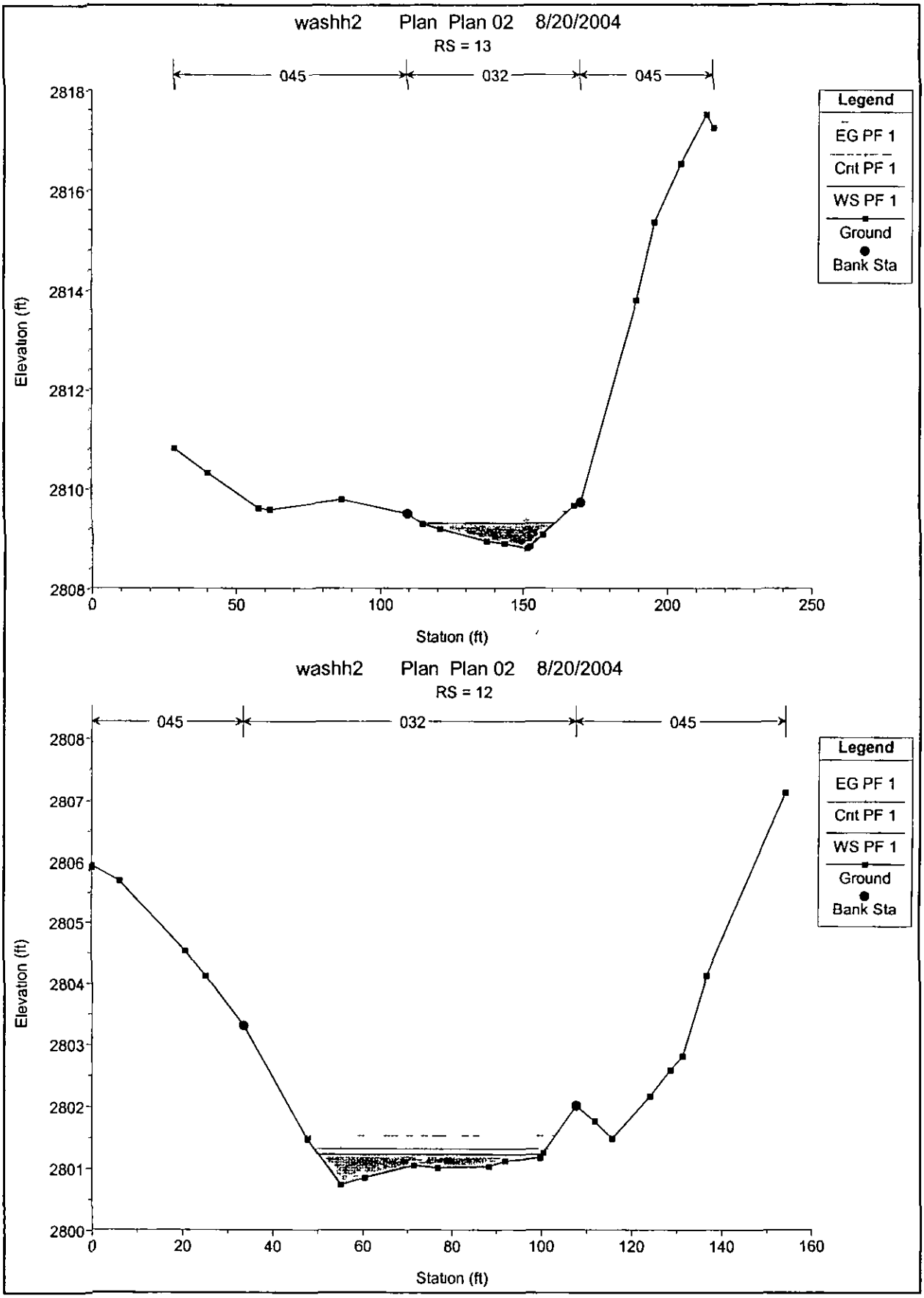
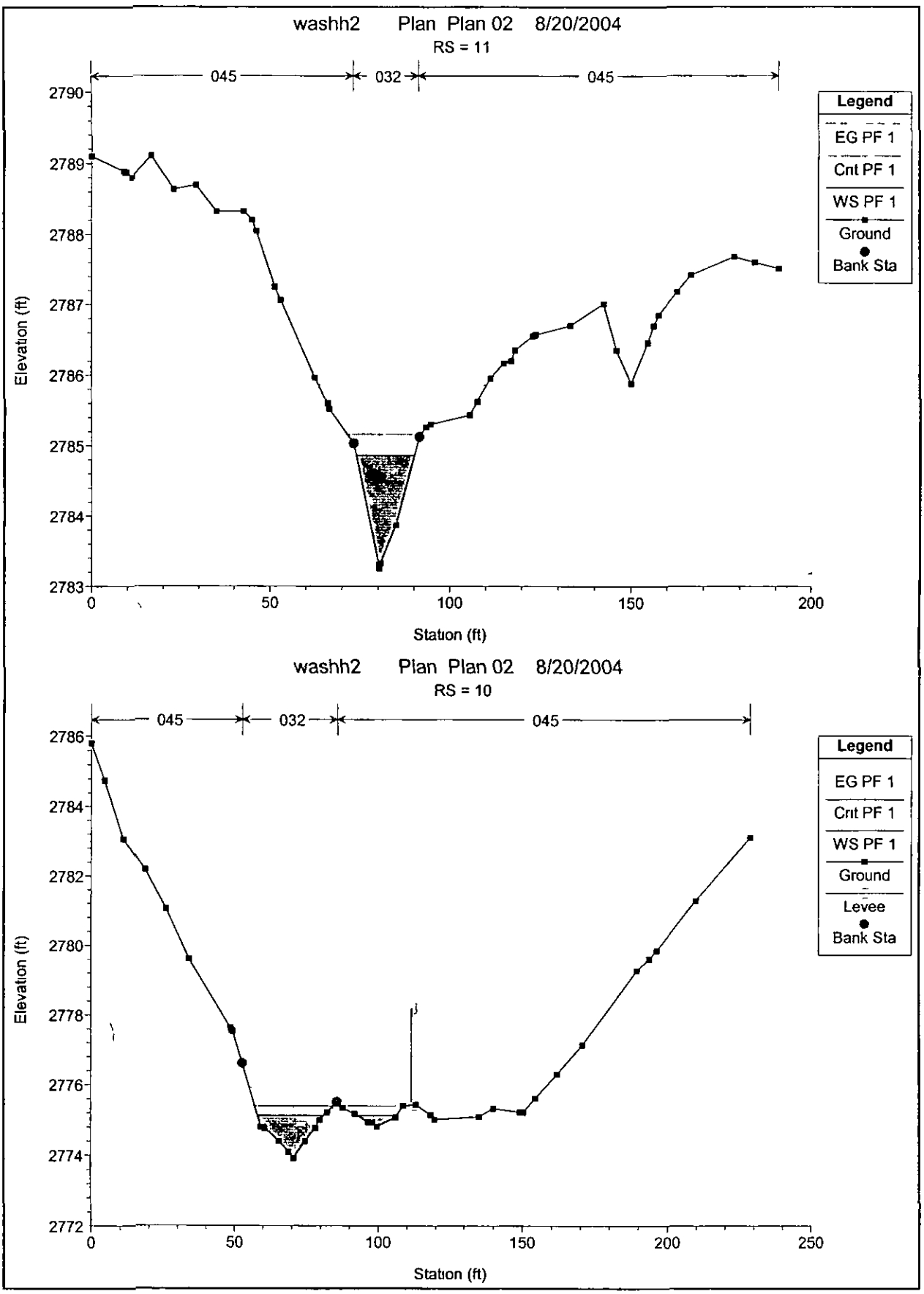
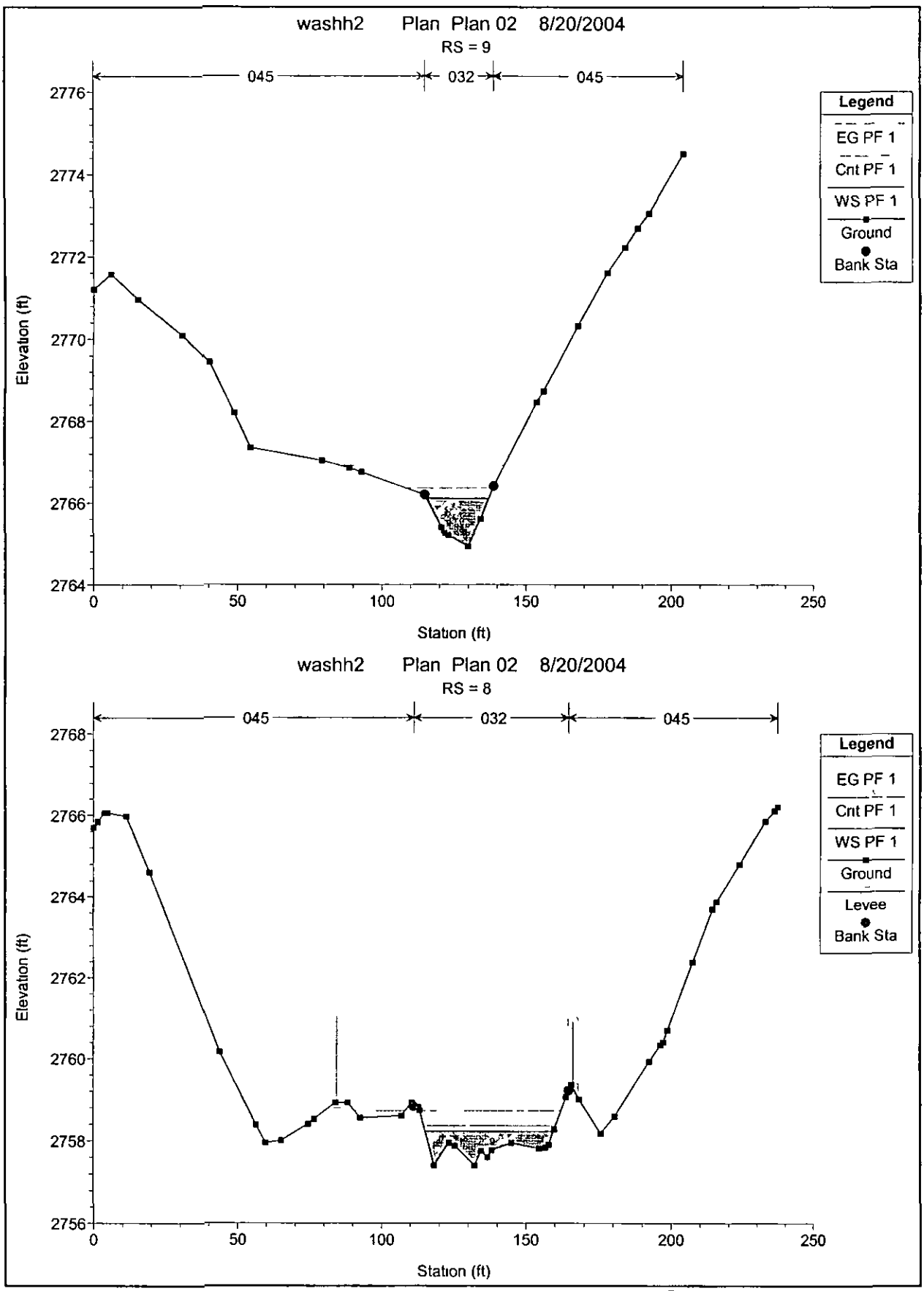
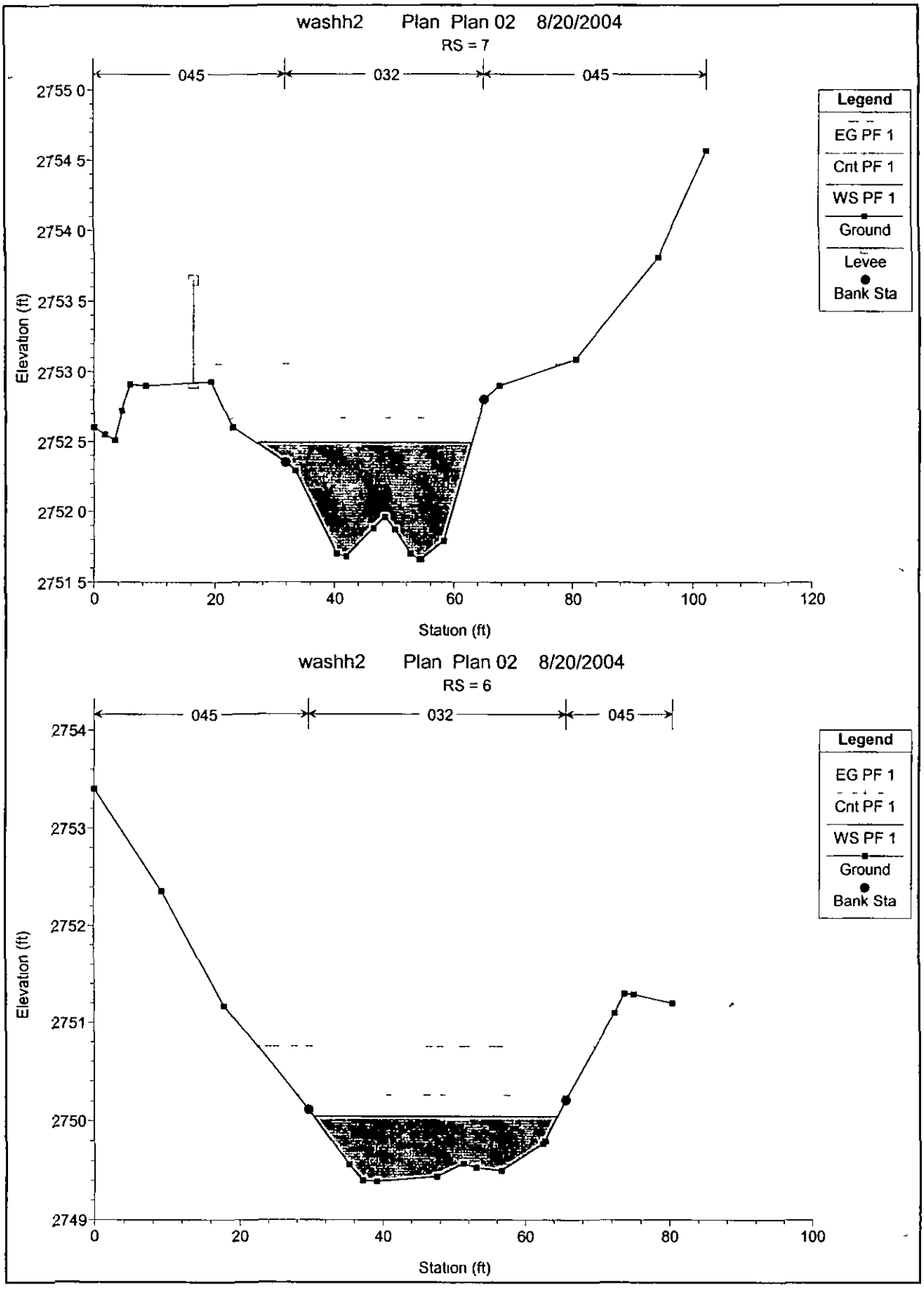
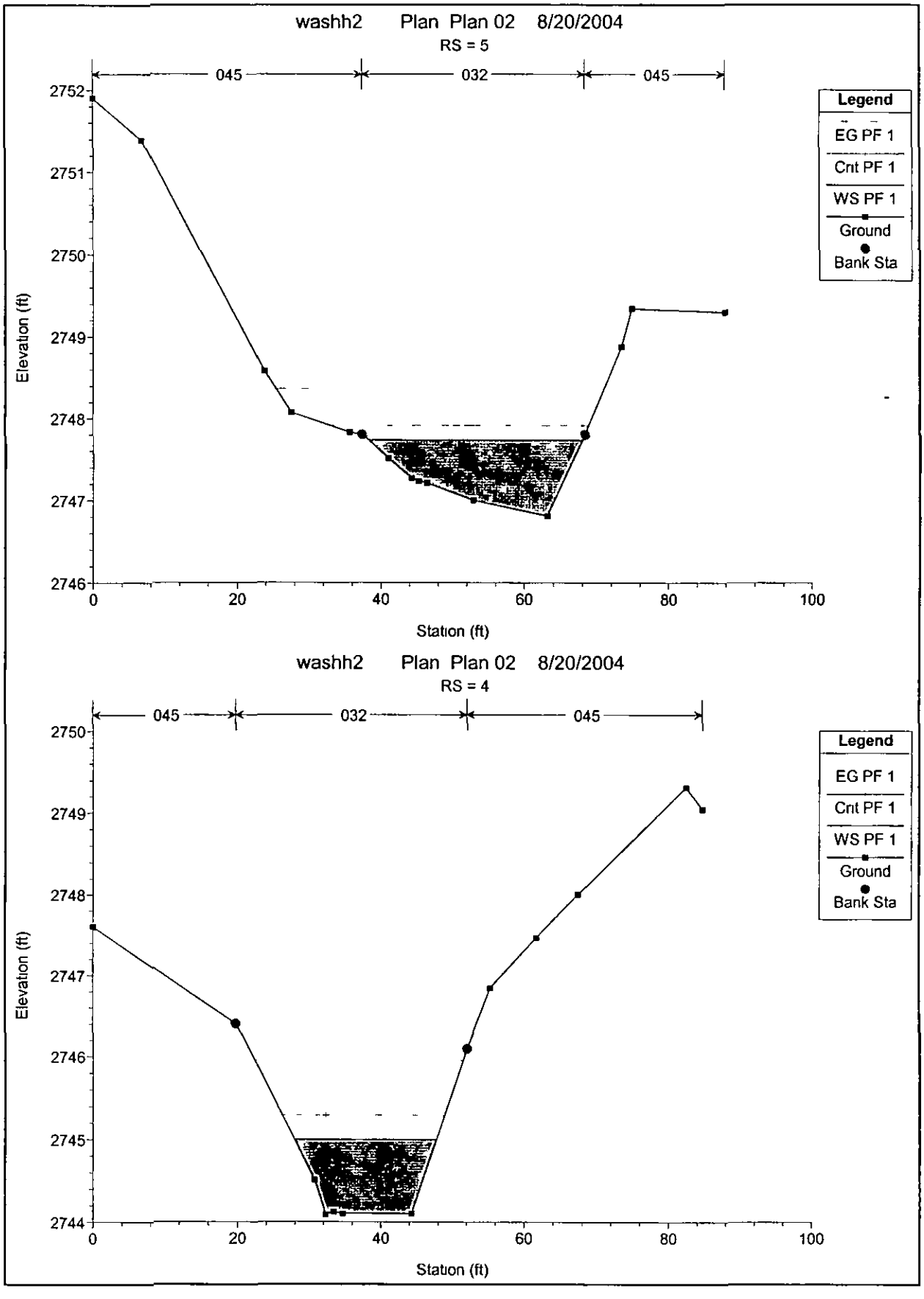
RS = 15
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
washh2 Plan Plan 02 8/20/2004
RS = 14
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

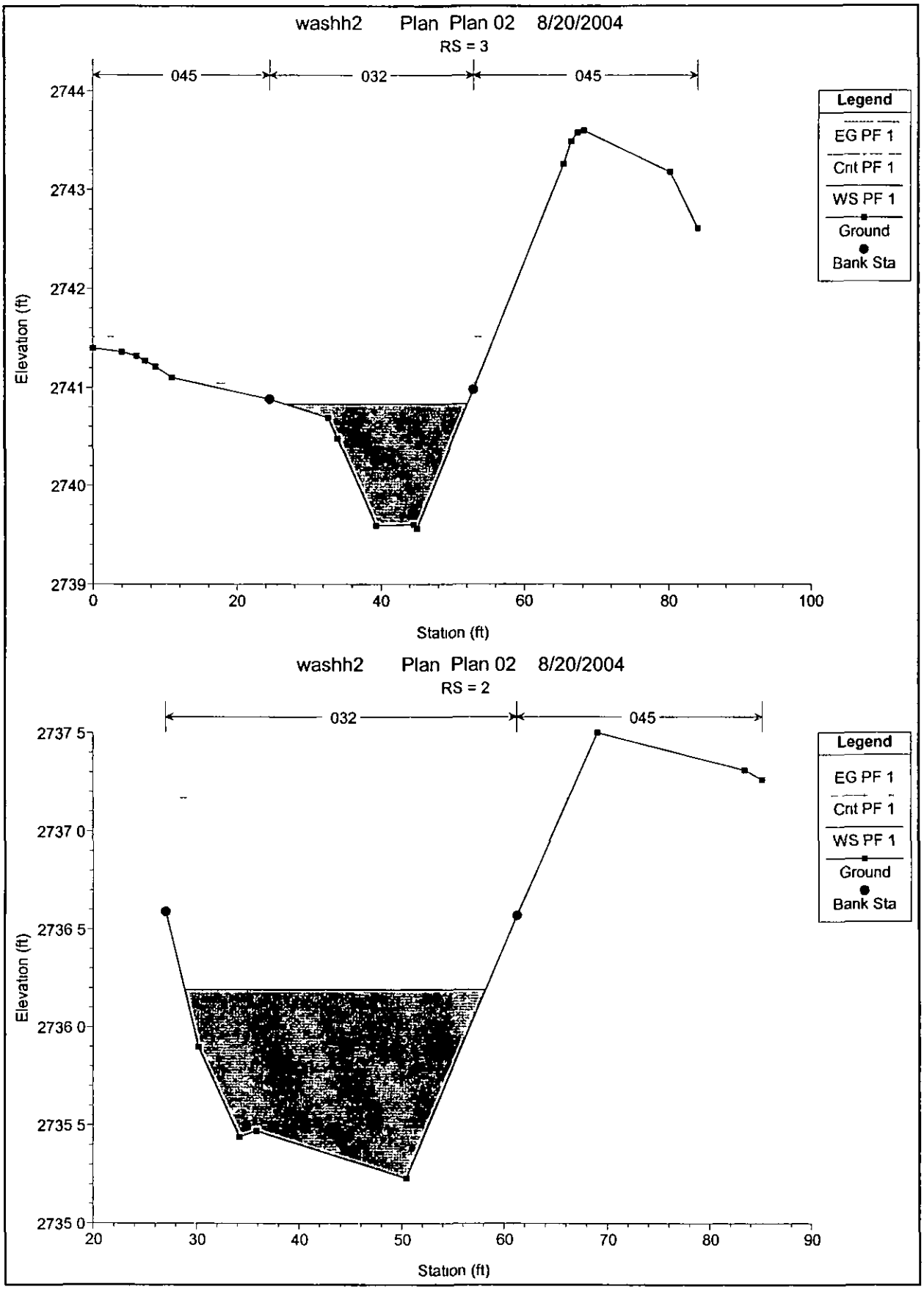

washh2 Plan Plan 02 8/20/2004
RS = 13
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2818
2816
2814
2812
2810
2808
0
50
100
150
200
250
Station (ft)
washh2 Plan Plan 02 8/20/2004
RS = 12
045
032
045
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2808
2807
2806
2805
2804
2803
2802
2801
2800
0
20
40
60
80
100
120
140
160
Station (ft)


washh2 Plan Plan 02 8/20/2004
RS = 11
045
032
045
2790
2789
2788
2787
2786
2785
2784
2783
Elevation (ft)
0
50
100
150
200
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
washh2 Plan Plan 02 8/20/2004
RS = 10
045
032
045
2786
2784
2782
2780
2778
2776
2774
2772
Elevation (ft)
0
50
100
150
200
250
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Levee
Bank Sta


washh2 Plan Plan 02 8/20/2004
RS = 9
045
032
045
2776
2774
2772
2770
2768
2766
2764
Elevation (ft)
0
50
100
150
200
250
Station (ft)
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
washh2 Plan Plan 02 8/20/2004
RS = 8
045
032
045
2768
2766
2764
2762
2760
2758
2756
Elevation (ft)
0
50
100
150
200
250
Station (ft)
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Levee
Bank Sta


washh2 Plan Plan 02 8/20/2004
RS = 7
045
032
045
2755 0
2754 5
2754 0
2753 5
2753 0
2752 5
2752 0
2751 5
Elevation (ft)
0
20
40
60
80
100
120
Station (ft)
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Levee
Bank Sta
washh2 Plan Plan 02 8/20/2004
RS = 6
045
032
045
2754
2753
2752
2751
2750
2749
Elevation (ft)
0
20
40
60
80
100
Station (ft)
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta


washh2 Plan Plan 02 8/20/2004
RS = 5
045
032
045
2752
2751
2750
2749
2748
2747
2746
Elevation (ft)
0
20
40
60
80
100
Station (ft)
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
washh2 Plan Plan 02 8/20/2004
RS = 4
045
032
045
2750
2749
2748
2747
2746
2745
2744
Elevation (ft)
0
20
40
60
80
100
Station (ft)
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta


washh2 Plan Plan 02 8/20/2004
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 8/20/2004
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

WASH I

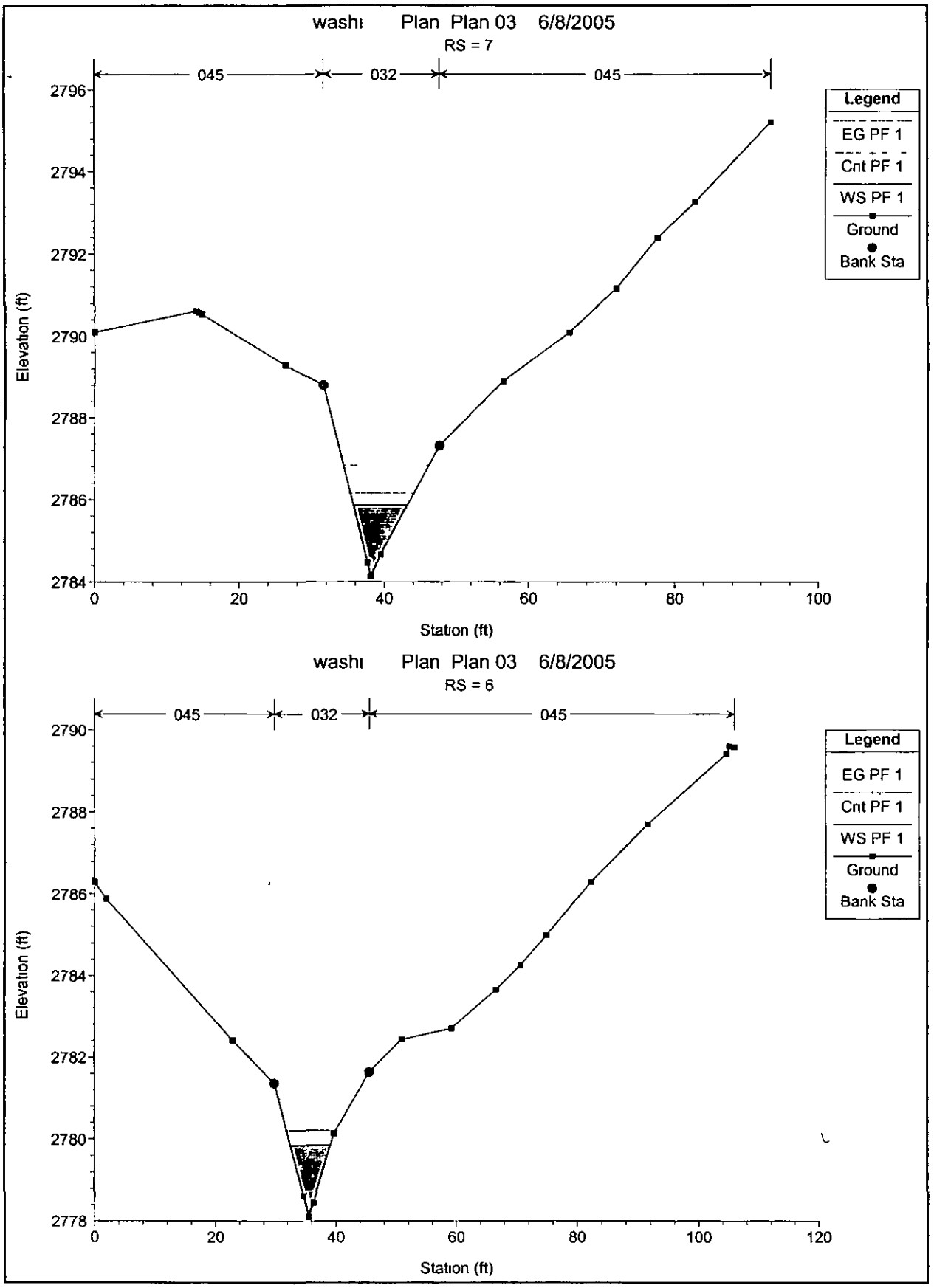
HEC-RAS Plan: Plan 03 River: RIVER 1 Reach: Reach-1 Profile: PF 1

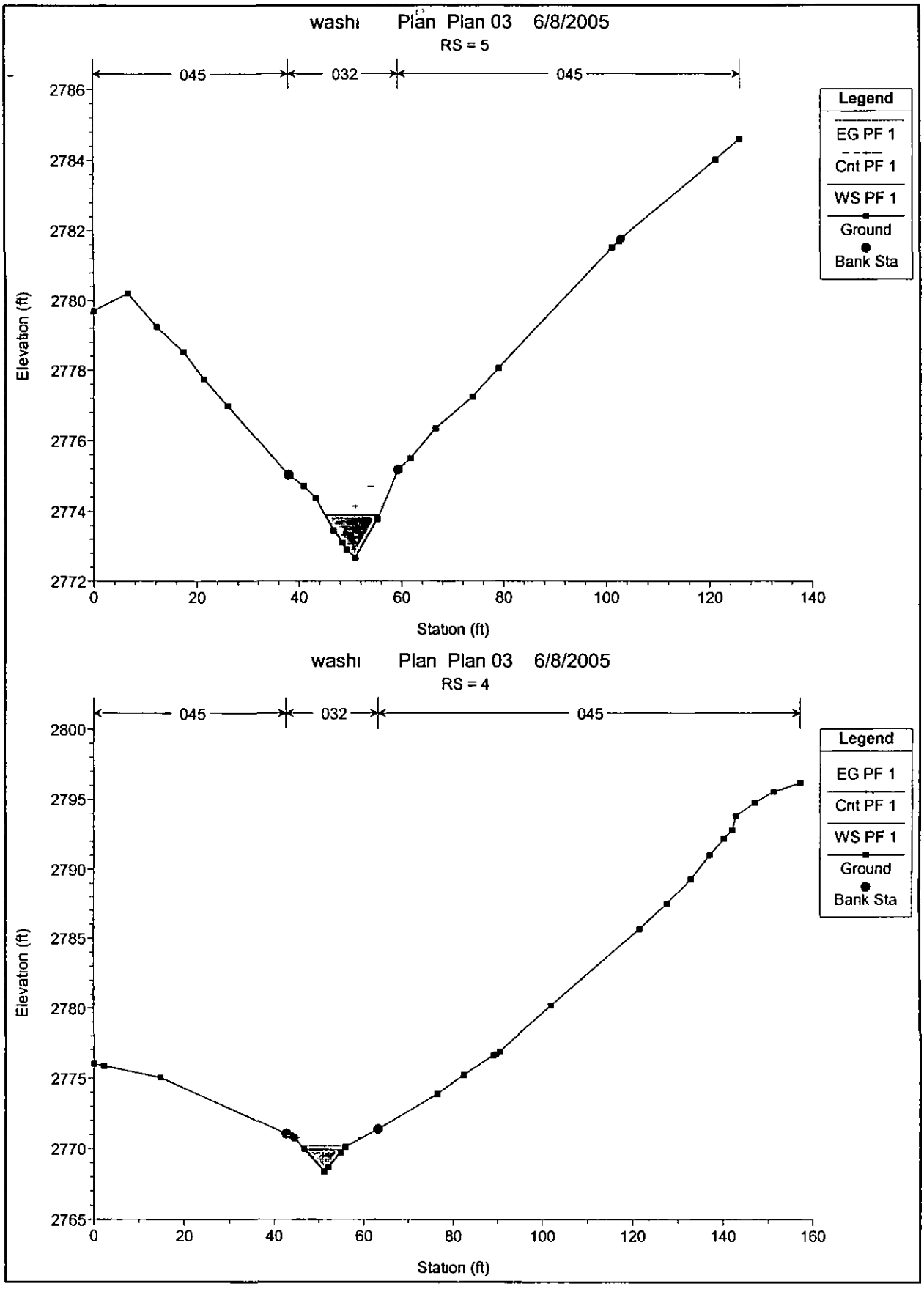
Reach	River Sta	Profile	Q Total	Min Ch El	W S Elev	Crit W S	E G Elev	E G Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	7	PF 1	50 00	2784 14	2785 86	2786 15	2786 82	0 041077	7 86	6 36	7 51	1 50
Reach-1	6	PF 1	50 00	2778 10	2779 85	2780 22	2780 99	0 047885	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	65 00	2764 31	2765 87	2766 22	2766 90	0 043629	8 14	7 99	9 95	1 60
Reach-1	2	PF 1	65 00	2760 53	2762 04	2762 48	2763 16	0 053335	8 49	7 66	10 43	1 75
Reach-1	1	PF 1	67 00	2754 90	2755 78	2756 01	2756 38	0 046718	8 47	11 90	30 70	1 58

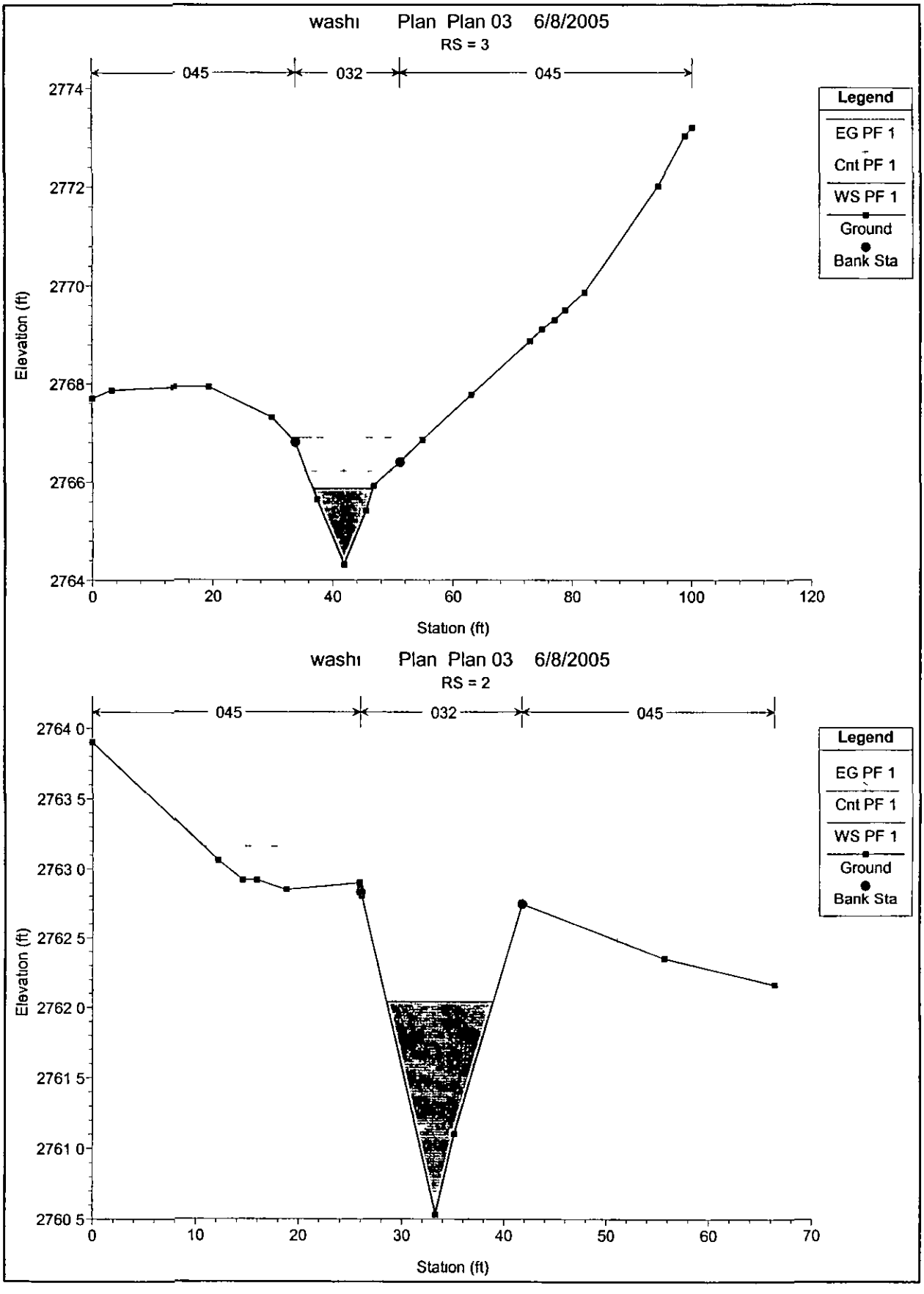
WASH I

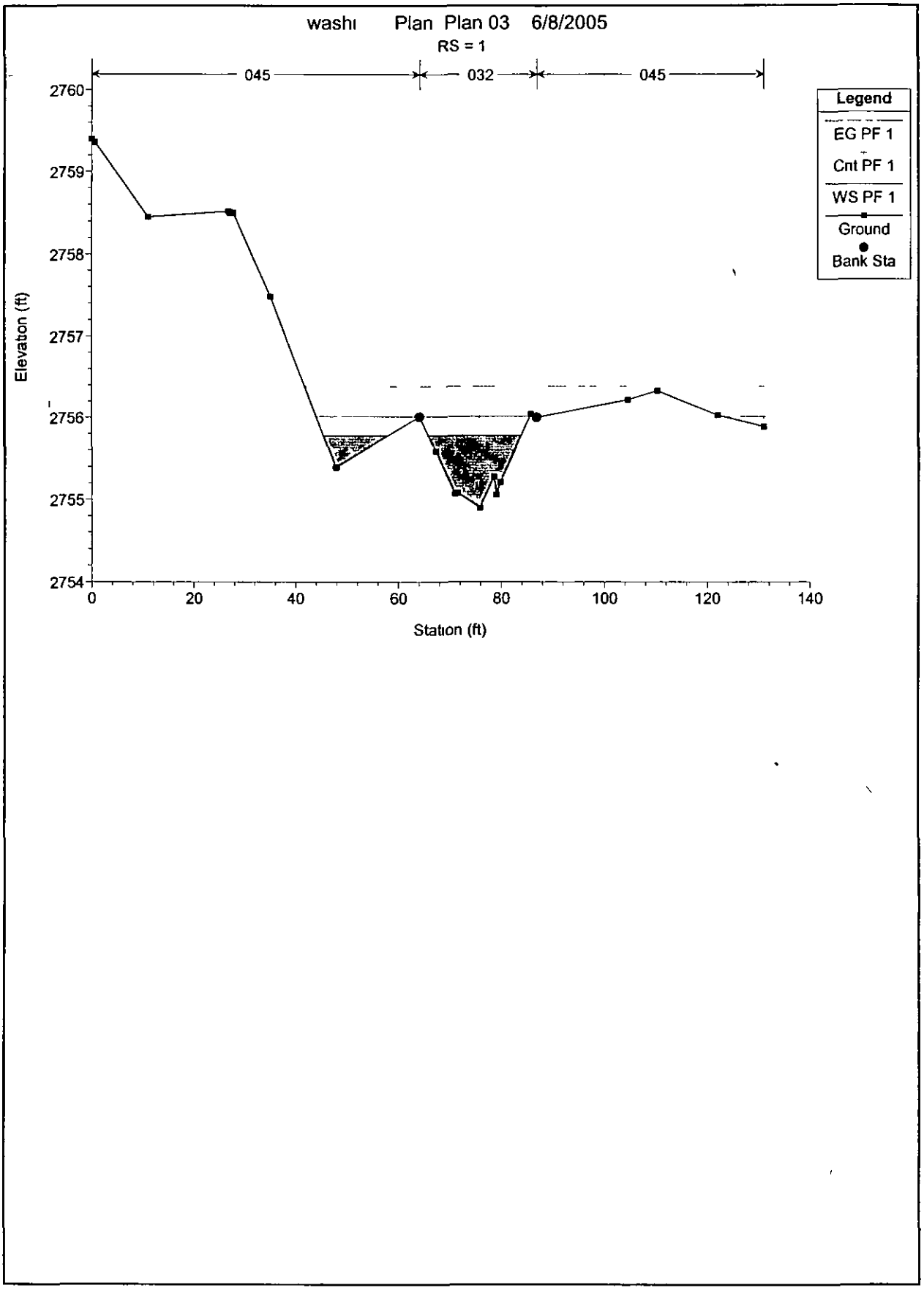
Errors Warnings and Notes for Plan Plan 03

Location	River RIVER-1 Reach Reach-1 RS 6 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 5 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 4 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 3 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 2 Profile PF 1
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections
Location	River RIVER-1 Reach Reach-1 RS 1 Profile PF 1
Warning	Divided flow computed for this cross-section
Warning	The energy loss was greater than 1 0 ft (0 3 m) between the current and previous cross section
	This may indicate the need for additional cross sections


washi Plan Plan 03 6/8/2005
RS = 7
045
032
045
2796
2794
2792
2790
2788
2786
2784
Elevation (ft)
0
20
40
60
80
100
Station (ft)
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
washi Plan Plan 03 6/8/2005
RS = 6
045
032
045
2790
2788
2786
2784
2782
2780
2778
Elevation (ft)
0
20
40
60
80
100
120
Station (ft)
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta


washi Plan Plan 03 6/8/2005
RS = 5
045
032
045
2786
2784
2782
2780
2778
2776
2774
2772
Elevation (ft)
0
20
40
60
80
100
120
140
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
washi Plan Plan 03 6/8/2005
RS = 4
045
032
045
2800
2795
2790
2785
2780
2775
2770
2765
Elevation (ft)
0
20
40
60
80
100
120
140
160
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta


washi Plan Plan 03 6/8/2005
RS = 3
045
032
045
2774
2772
2770
2768
2766
2764
Elevation (ft)
0
20
40
60
80
100
120
Station (ft)
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
washi Plan Plan 03 6/8/2005
RS = 2
045
032
045
2764 0
2763 5
2763 0
2762 5
2762 0
2761 5
2761 0
2760 5
Elevation (ft)
0
10
20
30
40
50
60
70
Station (ft)
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta


washi Plan Plan 03 6/8/2005
RS = 1
045
032
045
Legend
EG PF 1
Cnt PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
2760
2759
2758
2757
2756
2755
2754
0
20
40
60
80
100
120
140
Station (ft)

Detention Basin Volume Calculations

Basin	Total Development Area (Acre)	100yr-2 hr Volume (acre-ft)	Provided Volume (acre-ft)	Waiver Volume (acre-ft)
A1	3 79	0 53	0 17	0 36
A2	7 21	1 02	0 25	0 77
B	10 94	1 54	0 54	1
C	3 65	0 51	0 46	0 05
D	7 73	1 09	0 31	0 78
E1	14 24	2 01	0 89	1 12
E2	13 23	1 87	0 9	0 97
E3	2 19	0 31	0 16	0 15
F1	10 24	1 44	0 25	1 19
F2	3 56	0 5	0 18	0 32
F3	2 93	0 41	0 2	0 21
G	3 7	0 52	0 11	0 41
HI	12 94	1 82	0 31	1 51
H2	8 5	1 2	0 83	0 37
1	4 44	0 63	0 59	0 04
J	4 81	0 68		0 68
K	2 06	0 29		0 29
L	1 49	0 21		0 21
M	1 44	0 2		0 2
N	2 81	0 4		0 4
O	0 05	0 01		0 01
P	0 55	0 08		0 08
Q	1 73	0 24		0 24
R	0 52	0 07		0 07
S	0 18	0 02		0 02
Total	125	17 6	6 15	11 57

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*

Area Calculation Study
Wood/Patel

Section	S F Total Development Area	S F Drainage Area	Percent of Total Drainage Area, %
A1	164,942	2,502,397	7
A2	314,229	989,311	32
B	476,593	2,153,597	22
C	158,838	808,701	20
D	336,803	962,840	35
E1	620,146	1,714,032	36
E2	576,414	1,296,994	44
E3	95,400	204,569	47
F1	446,220	987,558	45
F2	154,889	397,173	39
F3	127,604	359,761	35
G	161,125	455,632	35
H1	563,578	1,639,478	34
H2	370,064	1,998,066	19
I	193,334	700,376	28

Area of Development Outside Specified Drainage Sections
588013 75 S F

Area of Right-of-Way Outside Specified Drainage Sections
94576 98 S F

APPENDIX F

Stormwater Storage Waiver Application

WOOD/PATEL

CIVIL ENGINEERS • HYDROLOGISTS • LAND SURVEYORS • CONSTRUCTION MANAGERS

Darrel E Wood PE RLS
Ashok C Patel, PE RLS CFM
Gordon W R Wark PE
James S Campbell PE
Thomas R Gettings RLS
Timothy A Huval, PE
Michael T Young PE
Peter Hemingway, PE
Jeffrey R Minch PE
Robert D Gofonia PE RLS

September 27, 2005

Mr Tim Curtis, AICP
Senior Planner
City of Scottsdale, Community Development
7447 East Indian School Road
Suite 105
Scottsdale, AZ 85251

Phone (480) 312-4210
Fax (480) 312-7088
Email tcurtis@scottsdaleaz gov

Re **Sereno Canyon**
Stormwater Waiver Application
WP #042054

Dear Mr Curtis

The proposed development is a custom home subdivision nestled at the northern base of the McDowell Mountains in the City of Scottsdale We are attempting to maintain as much of the natural open space as possible, while minimizing impacts to the natural vegetation in potential excavating areas Therefore, we are submitting a waiver application for stormwater storage and corresponding drainage report for the Sereno Canyon

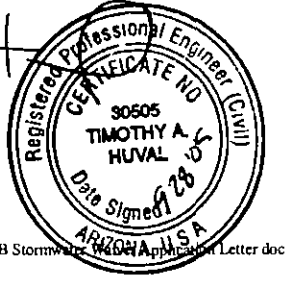
The criteria for the initial waiver application is based on preserving the site in its natural state and abiding by the City's Environmentally Sensitive Land Ordinance (Criteria #5), which best fits our proposed approach The runoff will be discharged to existing watercourses without increasing the potential for flooding by reducing the post-development flows less than or equal to pre-development flows Based on the proposed design, the development is maintaining existing watercourses through the site with little or no increase in flows due to onsite development

Should you have any questions or need additional information, please contact me

Sincerely,

WOOD, PATEL & ASSOCIATES, INC

Timothy A Huval, P E
Vice President



TAH/kk
Y \WP\General Correspondence\042054 MMBB Stormwater Waiver Application Letter doc

Request for Stormwater Storage Waiver

City of Scottsdale Case Numbers

___ - PA - ____ ____ - ZN - ____ ____ - UP - ____ ____ - DR - ____ ____ - PP - ____

The applicant/developer must complete and submit this form to the city for processing and obtain approval of waiver request ***before submitting improvement plans*** Denial of the waiver may require a revised site plan be submitted to the Development Review Board

Date Sept 27, 2005 **Project Name** Sereno Canyon

Project Location 330ac, within Section 11, T4N, R5E (122nd Street and Happy Valley Rd)

Applicant Contact Gordon Wark @ Wood/Patel E-mail gwark@woodpatel com

Phone 602-335-8500 Fax 602-335-8580

Address 2051 W Northern Ave, Suite 100, Phoenix, AZ 85021

Waiver Criteria

A waiver is an intentional relinquishment of a claim or right Before the city can waive some or all required stormwater storage, at least one of the following city ordinance criteria (**in bold**) must be met Check the criteria that applies to this project and provide the engineering analyses that demonstrate that the effect of this waiver will not increase the potential for flooding on any property

☐ 1 **The runoff has been included in a storage facility at another location** The developer must demonstrate that runoff from this site will be safely conveyed to the other location through an adequately designed conveyance facility

☐ 2 **Application is for a building permit to construct a single family residential structure**

☐ 3 **Development is adjacent to a watercourse or channel that has been designed and constructed to handle the additional runoff flow without increasing the potential for flood damage to any other downstream property** The developer must demonstrate that the watercourse has the extra capacity needed to convey the additional runoff

☐ 4 **The development is for a parcel under one-half acre in an area where it can be demonstrated by engineering analysis that no significant increase in the potential for flood damage will be created by the development**

☒ 5 **There is a possible conflict with the requirements of the city's Environmentally Sensitive Lands Ordinance** (city staff must make this determination)

By signing below, I certify that the stated project meets the ordinance criteria selected above

Developer or Engineer (circle one) Sept 27, 2005 Date

Planning & Development Services Department

7447 E Indian School Road, Suite 105, Scottsdale, AZ 85251 • Phone 480-312-7000 • Fax 480-312-7088

Request for Stormwater Storage Waiver

City of Scottsdale Case Numbers

___ - PA - ____ ____ - ZN - ____ ____ - UP - ____ ____ - DR - ____ ____ - PP - ____

CITY STAFF TO COMPLETE THIS PAGE

Project Name Sereno Canyon

Check Appropriate Boxes

☐ Meets waiver criteria (specify) ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

☐ Recommend approve waiver

☐ Recommend deny waiver

- ☐ None of waiver criteria met
- ☐ Downstream conditions prohibit waiver of any storage
- ☐ Other

Explain _____

☐ Return waiver request

- ☐ Insufficient data provided
- ☐ Other _____

Explain _____

Recommended Conditions of Waiver

- ☐ All storage requirements waived
- ☐ Pre development conditions must be maintained
- ☐ Other

Explain _____

☐ **Waiver approved per above conditions**

☐ **Waiver denied**

_____ _____

Floodplain Administrator/Engineering Coordination Manager Date

Planning & Development Services Department

7447 E Indian School Road, Suite 105, Scottsdale, AZ 85251 • Phone 480-312-7000 • Fax 480-312-7088

Request for Stormwater Storage Waiver

City of Scottsdale Case Numbers

___ - PA - ___ ____ - ZN - ____ ____ - UP - ____ ____ - DR - ____ ____ - PP - ____

In-Lieu Fee Calculations

If the city grants a waiver, the developer is required to contribute the following In-Lieu Fees for the cost of drainage facilities as determined in 1, 2, or 3 below Please check the appropriate box for determining the In-Lieu Fee

Project Name Sereno Canyon

☐ 1 The fee is based on runoff contribution determined as follows

_____

_____

_____

The scope and cost of drainage facilities that fees are being contributed towards include the following components

- _____ $ _____
- _____ _____
- _____ _____

TOTAL In-Lieu Fee $ _____

☒ 2 The fee is based on what it would cost to provide the volume of storage being waived Payment in-lieu of stormwater storage shall include all applicable costs, including, but not limited to

- _____ $ 323,197
- _____ _____
- _____ _____

TOTAL In-Lieu Fee $ 323,197

☐ 3 No In-Lieu Fee recommended by city staff
Reason _____

Approved by

_____ _____

Floodplain Administrator/Engineering Coordination Manager Date

Planning & Development Services Department
7447 E Indian School Road, Suite 105, Scottsdale, AZ 85251 • Phone 480-312-7000 • Fax 480-312-7088

2 The fee is based on what it would cost to provide the volume of storage being waived Payment in-lieu of stormwater storage shall include all applicable costs, including, but not limited to

• Land costs (documentation must be provided for verification of land costs)	$ 241,484
• Construction costs	
o Evacuation and disposal	$ 24,781
o Fill	$ 4,646
o Inlet and outlet structures	$ 3,000
o Overflow Structures	$ 4,000
• Plant salvage and/or revegetation costs	$ 49,932
In-lieu Fees Total	**$323,197**

Detention Basin Volume Requirements

Site Data

Vp =	Volume provided =	6 15	ac-ft
Vr =	Required Volume =	17 6	ac-ft
Vn=	Needed Volume=	11 46	ac-ft
Area =	Total site area =	330	ac
NAOS =	Natural Area Open Space Area =	205	ac
Ad =	Net development area = Area - NAOS =	125	ac
P =	100 Yr - 2 Hr precipitation =	2 82	in
C =	Runoff coefficient =	0 6	
Vr =	Required volume = P/12*Ad*C =	17 6	ac-ft
Yb =	Average depth of detention basins =	3	ft
Ab =	Surface area for detention basins	3 8	ac
=		166,440	sq ft
Cut[1] =	Average volume of excavation * 0 67 =	12,391	cu yd
Fill =	Average volume of berm fill = cut * 5 =	6,195	cu yd
EP =	Permanent erosion protection is the		
=	same regardless of basin size	15	cu yd
N =	Number of basins =	1	ea
Lp =	Length of pipe per basin =	80	ft

Construction Cost

Item No	Description	Unit	Quantity	Unit Cost[2]	Cost
1	Excavation	CY	12,391	$ 2 00	$ 24,781
2	Compacted Fill	CY	6,195	$ 0 75	$ 4,646
3	Outlet Pipe (18")	LF	80	$ 50 00	$ 4,000
4	Headwalls	EA	2	$ 1,500	$ 3,000
5	Landscape	SF	166,440	$ 0 30	$ 49,932
				Totals =	$ 86,359
			Cost per ac ft of volume =		$ 7,534
			Cost per cu yd of volume =		$ 5
			Cost per acre =		$ 22,601
			Cost per basin =		$ 86,359

Estimated Cost for Payment in Lieu of Required Detention Volume

Required Land Area	3 8 ac	
Land Cost per Acre[3]	$ 63,200	
Total Land Cost	3 8 ac x $63,200	***$ 241,484***
Required Volume	17 63 ac ft	
Volume Provided	6 15 ac ft	
Difference	11 48 ac ft	
Cost per ac ft of volume	$ 7,534	
Total Cost for Volume	11 48 ac ft x $7,011	***$ 86,451***
Payment In-Lieu		***$ 327,934***

Notes

(1) This number assumes area of excavation in 2% - 3% slopes Therefore it is multiplied by 0 67

(2) Refer to attached City of Phoenix Formal Bid Tabulation example documents for mean 2005 prices

(3) Refer to attached land cost calculations based on buyer/borrower settlement statement

Land Cost Reference

Purchase Price for Parcels within Sereno Canyon
Reference Chicago Title Insurance Company Buyer's/Borrower's Settlement Statement
Dated October 27, 2004

	$1,870,492 00
	$1,192,886 50
	$1,239,491 50
	$1,301,293 50
	$1,300,924 95
	$2,575,807 00
	$1,299,629 50
	$1,218,080 50
	$1,303,087 50
	$1,326,513 50
	$1,226,056 00
	$2,392,715 00
	$2,663,089 00
Total Cost of Land =	***$20,910,066 45***
Total Acreage =	***330 9***
Total Cost per Acre =	***$63,200 00***

CHICAGO TITLE INSURANCE COMPANY

BUYER'S/BORROWER'S SETTLEMENT STATEMENT PAGE 01

ESCROW NUMBER 02900-002403253-001 ORDER NUMBER 02900-002403253

CLOSING DATE 10/27/04 CLOSER Ken Buvala

BUYER McDowell Mountain Back Bowl, LLC

SELLER McDowell Slope Limited Partnership

PROPERTY Vacant Land, Maricopa County, Arizona

	CHARGE BUYER	CREDIT BUYER
Sales Price	$ 1,870,492 00	$
Earnest Money Deposit		10,000 00
Extension Fees 4 @ $15,000 00		60,000 00
Wired Funds Received 10/27/04		1,803,536 03
Zoning Endorsement	750 00	
Comprehensive Endorsement	100 00	
Access Endorsement	100 00	
Survey Endorsement	100.00	
Patent Endorsement	100 00	
Location Endorsement	100 00	
Water Endorsement	100 00	
Prorations And Adjustments		
County Taxes from 10/27/04 to 01/01/05	5 04	
Total amount $ 27 88 for 365 days		
Settlement or Closing Fee To Chicago Title	821 00	
Chicago Title - Extended Owner's Policy	1,543 00	
Recording Memorandums 4 @ 10 00	20 00	
Reimbursement to Buyer 1/2 Survey Fee		1,250 00
Funds Due To Buyer At Closing	554 89	
TOTALS	$ 1,874,786 03	$ 1,874,786 03

FINAL

Settlement Statement

CHICAGO TITLE INSURANCE COMPANY

BUYER'S/BORROWER'S SETTLEMENT STATEMENT

ESCROW NUMBER 02900-002403254-001 ORDER NUMBER 02900-002403254

CLOSING DATE 10/27/04 CLOSER Ken Buvala

BUYER McDowell Mountain Back Bowl, LLC

SELLER Panorama North II Limited Partnership

PROPERTY Vacant Land, Maricopa County, Arizona

	CHARGE BUYER	CREDIT BUYER
Sales Price	$ 1,192,886 50	$
Earnest Money Deposit		10,000 00
Extension Fees 4 @ $10,000 00		40,000 00
Accrued Int Earned on Deposit		20 13
Wired Funds Received 10/27/04		1,145,394 93
Contiguity Endorsement	100 00	
Zoning Endorsement	750 00	
Access Endorsement	100 00	
Water Endorsement	100 00	
Comprehensive Endorsement	100 00	
Survey Endorsement	100 00	
Patent Endorsement	100 00	
Location Endorsement	100 00	
Prorations And Adjustments		
County Taxes from 10/27/04 to 01/01/05	3 06	
Total amount $ 16 94 for 365 days		
Settlement or Closing Fee To Chicago Title	618 50	
Chicago Title - Extendede Owner's Policy	1,132 00	
Recording Memorandums	20 00	
Reimbursement to Buyer for 1/2 ALTA Survey		1,250 00
Funds Due To Buyer At Closing	555 00	
TOTALS	$ 1,196,665 06	$ 1,196,665 06

FINAL

Settlement Statement

CHICAGO TITLE INSURANCE COMPANY

BUYER'S/BORROWER'S SETTLEMENT STATEMENT PAGE 01

ESCROW NUMBER 02900-002403255-001 ORDER NUMBER 02900-002403255

CLOSING DATE 10/27/04 CLOSER Ken Buvala

BUYER McDowell Mountain Back Bowl, LLC

SELLER Panorama North I Limited Partnership

PROPERTY Vacant Land Maricopa County, Arizona

	CHARGE BUYER	CREDIT BUYER
Sales Price	$ 1,239,491 50	$
Earnest Money Deposit		10,000 00
Extension Fees 4 @ $10,000 00		40,000 00
Wired Funds Received 10/27/04		1 191,958 21
Accrued Interest Earned on Deposit		20 13
Contiguity Endorsement	100 00	
Zoning Endorsement	750 00	
Comprehensive Endorsement	100 00	
Access Endorsement	100 00	
Patent Endorsement	100 00	
Water Endorsement	100 00	
Location Endorsement	100 00	
Survey Endorsement	100 00	
Prorations And Adjustments		
County Taxes from 10/17/04 to 11/01/04	71	
Total amount $ 17 38 for 365 days		
Settlement or Closing Fee To Chicago Title	632 00	
Chicago Title - Extended Owner's Policy	1,159 00	
Recording Memorandums	20 00	
Reimbursement to Buyer for 1/2 Survey Fee		1 250 00
Funds Due To Buyer At Closing	475 13	
TOTALS	$ 1,243,228 34	$ 1,243,228 34

FINAL

Settlement Statement

CHICAGO TITLE INSURANCE COMPANY

BUYER S/BORROWER'S SETTLEMENT STATEMENT PAGE 01

ESCROW NUMBER 02900-002403257-001 ORDER NUMBER 02900-002403257

CLOSING DATE 10/27/04 CLOSER Ken Buvala

BUYER McDowell Mountain Back Bowl, LLC,

SELLER Horizons II Investment Group Limited Partnership

PROPERTY Vacant Land Maricopa County, Arizona

	CHARGE BUYER	CREDIT BUYER
Sales Price	$ 1,301,293 50	$
Earnest Money Deposit		10,000 00
Extension Fees 4 @ $10,000 00		40,000 00
Accrued Int. Earned on Deposit		20 13
Wired Funds Received 10/27/04		1,252,489 21
Zoning Endorsement	750 00	
Comprehensive Endorsement	100 00	
Access Endorsement	100 00	
Patent Endorsement	100 00	
Survey Endorsement	100 00	
Water Endorsement	100 00	
Location Endorsement	100 00	
Contiguity Endorsement	100 00	
Prorations And Adjustments		
County Taxes from 07/01/04 to 10/27/04		1 308 66
Total amount $ 4,047 96 for 365 days		
Settlement or Closing Fee To Chicago Title	651 50	
Chicago Title - Extended Owner's Policy	1,198 00	
Recording Memorandums	10 00	
Reimbursement to Buyer for 1/2 Survey Fee		1,250 00
Funds Due To Buyer At Closing	465 00	
TOTALS	$ 1,305,068 00	$ 1,305,068 00

FINAL

Settlement Statement

CHIC[illegible] TITLE INSURANCE CO[illegible]PANY

BUYER'S/BORROWER'S SETTLEMENT STATEMENT

ESCROW NUMBER 02900-002403256-001 ORDER NUMBER 02900-002403256

CLOSING DATE 10/27/04 CLOSER Ken Buvala

BUYER McDowell Mountain Back Bowl, LLC

SELLER William T Northey

PROPERTY Vacant Land, Maricopa County, Arizona

	CHARGE BUYER	CREDIT BUYER
Sales Price	$ 1,300,924 95	$
Earnest Money Deposit		10 000 00
Extension Fees 4 @ $10,000 00		40 000 00
Accrued Interest Earned on Deposit		20 13
Wired Funds Received 10/27/04		1 253,532 69
Zoning Endorsement	750 00	
Comprehensive Endorsement	100 00	
Access Endorsement	100 00	
Survey Endorsement	100 00	
Patent Endorsement	100 00	
Water Endorsement	100 00	
Location Endorsement	100 00	
Contiguity Endorsement	100 00	
Prorations And Adjustments		
County Taxes from 10/27/04 to 01/01/05	3 36	
Total amount $ 18 56 for 365 days		
Settlement or Closing Fee To Chicago Title Insurance Comp	631 50	
Chicago Title - Extended Owner s Policy	1,198 00	
Affidavit of Property Value 2 00 Memorandums $20 00	10 00	
Reimbursement to Buyer for 1/2 Survey Fee		1,250 00
Funds Due To Buyer At Closing	865 00	
TOTALS	$ 1,304,802 81	$ 1,304,802 81

FINAL

Settlement Statement

CHICAGO TITLE INSURANCE COMPANY

BUYER'S/BORROWER'S SETTLEMENT STATEMENT PAGE 0_

ESCROW NUMBER 02900-002403259-001 ORDER NUMBER 02900-002403259

CLOSING DATE 10/27/04 CLOSER Ken Buvala

BUYER McDowell Mountain Back Bowl, L L C

SELLER Pinnacle Peak Partners Limited Partnership

PROPERTY Vacant Land, Maricopa County Arizona

	CHARGE BUYER	CREDIT BUYER
Sales Price	$ 2,573,907 00	$
Earnest Money Deposit		10,000 00
Extension Fees 4 @ $20,000 00		80,000 00
Accrued Int Earned on Deposit		25 47
Wired Funds Received 10/27/04		2,489,164 00
Zoning Endorsement	750 00	
Comprehensive Endorsement	100 00	
Access Endorsement	100 00	
Survey Endorsement	100 00	
Patent Endorsement	100 00	
Water Endorsement	100 00	
Location Endorsement	100 00	
Prorations And Adjustments		
County Taxes from 10/17/04 to 01/01/05	$ 32	
Total amount $ 39 98 for 365 days		
Settlement or Closing Fee To Chicago Title	724 00	
Chicago Title - Extended Owner's Policy	1,958 00	
Recording Memorandums	20 00	
Reimbursement to Buyer for 1/2 Survey		1,250 00
Funds Due To Buyer At Closing	$70 15	
TOTALS	$ 2,580,439 47	$ 2,580,439 47

FINAL

Settlement Statement

CHICAGO TITLE INSURANCE COMPANY

BUYER'S/BORROWER'S SETTLEMENT STATEMENT PAGE 01

ESCROW NUMBER 02900-002403260-001 ORDER NUMBER 02900-002403260

CLOSING DATE 10/27/04 CLOSER Ken Buvala

BUYER McDowell Mountain Back Bowl, LLC

SELLER Denise Ricketts O'Connor

PROPERTY Vacant Land Maricopa County, Arizona

	CHARGE BUYER	CREDIT BUYER
Sales Price	$ 1,295,629 50	$
Earnest Money Deposit		10,000 00
Extension Fees 4 @ $10,000 00		40,000 00
Wired Funds Received 10/27/04		1,252,027 52
Accrued Interest Earned on Deposit		19 92
Zoning Endorsement	750 00	
Access Endorsement	100 00	
Survey Endorsement	100 00	
Patent Endorsement	100 00	
Water Endorsement	100 00	
Location Endorsement	100 00	
Contiguity Endorsement	100 00	
Comprehensive Endorsement	100 00	
Prorations And Adjustments		
County Taxes from 10/27/04 to 01/01/05		2 96
Total amount $ 16 38 for 365 days		
Settlement or Closing Fee To Chicago Title	550 00	
Chicago Title - Extended Owner's Policy	1,196 00	
Recording Memorandums	16 00	
Reimbursement to Buyer for 1/2 Survey Fee		1,250 00
Funds Due To Buyer At Closing	365 00	
TOTALS	$ 1,303,300 50	$ 1,303,300 50

FINAL

Settlement Statement

CHIC[illegible]O TITLE INSURANCE CO[illegible]ANY

BUYER'S/BORROWER'S SETTLEMENT STATEMENT PAGE 01

ESCROW NUMBER 02900-002403261-001 ORDER NUMBER 02900-002403261

CLOSING DATE 10/27/04 CLOSER Ken Buvala

BUYER McDowell Mountain Back Bowl, LLC

SELLER Milton P Smith Trustee

PROPERTY Vacant Land, Maricopa County, Arizona

	CHARGE BUYER	CREDIT BUYER
Sales Price	$ 1,218,080 50	$
Earnest Money Deposit		10,000 00
Extension Fees (4) @ $10,000 00 Each		40,000 00
Wired Funds Received 10/27/04		1,169,153 87
Accrued Irt Earned on Deposit		19 92
Contiguity Endorsement	100 00	
Comprehensive Endorsement	100 00	
Patent Endorsement	100 00	
Zoning Endorsement	750 00	
Access Endorsement	100 00	
Survey Endorsement	100 00	
Location Endorsement	100 00	
Water Endorsement	100 00	
Prorations And Adjustments		
County Taxes from 07/01/04 to 10/27/04		1,266 71
Total amount $ 3 918 20 for 365 days		
Settlement or Closing Fee To Chicago Title	438 00	
Chicago Title - Extended Owner's Policy	1,147 00	
Recording Memorandums	10 00	
Reimbursement to Buyer for 1/2 Survey Fee		1,250 00
Funds Due To Buyer At Closing	565 00	
TOTALS	$ 1,221,690 50	$ 1,221,690 50

FINAL

Settlement Statement

CHICAGO TITLE INSURANCE COMPANY

BUYER'S/BORROWER'S SETTLEMENT STATEMENT

ESCROW NUMBER 02900-002403262-001 ORDER NUMBER 02900-002403262

CLOSING DATE 10/27/04 CLOSER Ken Buvala

BUYER McDowell Mountain Back Bowl, LLC

SELLER Ridgecrest Limited Partnership

PROPERTY Vacant Land, Maricopa County, Arizona

	CHARGE BUYER	CREDIT BUYER
Sales Price	$ 1,300,087.50	$
Earnest Money Deposit		10,000.00
Extension Fees 4 @ $10,000.00		40,000.00
Accrued Interest Earned on Deposit		20.12
Wired Funds received 10/27/04		1,255,545.51
Zoning Endorsement	750.00	
Access Endorsement	100.00	
Survey Endorsement	100.00	
Patent Endorsement	100.00	
Water Endorsement	100.00	
Location Endorsement	100.00	
Contiguity Endorsement	100.00	
Comprehensive Endorsement	100.00	
Prorations And Adjustments		
County Taxes from 10/27/04 to 01/01/05	3.36	
Total amount $ 18.60 for 365 days		
Settlement or Closing Fee To Chicago Title	651.50	
Chicago Title - Extended Owner's Policy	1,198.00	
Recording Memorandums	10.00	
Reimbursement to Buyer for 1/2 of Survey		1,250.00
Funds Due To Buyer At Closing	415.26	
TOTALS	$ 1,306,815.64	$ 1,306,815.64

FINAL

Settlement Statement

CHICAGO TITLE INSURANCE COMPANY

BUYER'S/BORROWER'S SETTLEMENT STATEMENT

ESCROW NUMBER 02900-002403263-004 ORDER NUMBER 02900-002403263

CLOSING DATE 10/27/04 CLOSER Ken Buvala

BUYER McDowell Mountain Back Bowl, LLC

SELLER Horizons Investment Group Limited Partnership

PROPERTY Vacant Land, Maricopa County, Arizona

	CHARGE BUYER	CREDIT BUYER
Sales Price	$ 1,326,513 50	$
Earnest Money Deposit		10,000 00
Accrued Interest Earned on Deposit		20 13
Wired Funds received 10/27/04		1,277,224 21
Extension Fees 4 @ $10,000 00		40,000 00
Zoning Endorsement	750 00	
Comprehensive Endorsement	100 00	
Access Endorsement	100 00	
Survey Endorsement	100 00	
Patent Endorsement	100 00	
Water Endorsement	100 00	
Location Endorsement	100 00	
Contiguity Endorsement	100 00	
Prorations And Adjustments		
County Taxes from 07/01/04 to 10/27/04		1,317 16
Total amount $ 4,074 28 for 365 days		
Settlement or Closing Fee To Chicago Title	659 00	
Chicago Title - Extended Owner's Policy	1,214 00	
Recording Fees for Memorandums	10 00	
Reimbursement to Buyer for 1/2 Survye Fee		1 250 00
Funds Due To Buyer At Closing	565 00	
TOTALS	$ 1,330,411 50	$ 1,330,411 50

FINAL

Settlement Statement

CHICAGO TITLE INSURANCE COMPANY

BUYER'S/BORROWER'S SETTLEMENT STATEMENT PAGE 01

ESCROW NUMBER 02900-002403264-001 ORDER NUMBER 02900-002403264

CLOSING DATE 10/28/04 CLOSER Ken Buvala

BUYER McDowell Mountain Back Bowl, LLC

SELLER Robert L Dicus and Kay M Dicus

PROPERTY Vacant Land, Maricopa County Arizona

	CHARGE BUYER	CREDIT BUYER
Sales Price	$ 1,226,056 00	$
Earnest Money Deposit		10,000 00
Extension Fees 4 @ $10 000 00		40,000 00
Wired Funds Received 10/27/04		1,177,320 83
Accrued Int Earned on Deposit		20 13
Zoning Endorsement	750 00	
Access Endorsement	100 00	
Survey Endorsement	100 00	
Patent Endorsement	100 00	
Water Endorsement	100 00	
Comprehensive Endorsement	100 00	
Location Endorsement	100 00	
Fence Encroachment Endorsement	100 00	
Contiguity Endorsement	100 00	
Prorations And Adjustments		
County Taxes from 07/01/04 to 10/28/04		1,282 90
Total amount $ 4,002 22 for 365 days		
Settlement or Closing Fee To Chicago Title	629 00	
Chicago Title - Extended Owner's Policy	1,151 00	
Recording Memorandums	20 00	
Reimbursement to Buyer for 1/2 of the Survey		1,250 00
Funds Due To Buyer At Closing	465 96	
TOTALS	$ 1,229,873 96	$ 1,229,873 96

FINAL

Settlement Statement

CHICAGO TITLE INSURANCE COMPANY

SELLER'S SETTLEMENT STATEMENT

ESCROW NUMBER 02900-002403265-001 ORDER NUMBER 02900 002403265

CLOSING DATE 10/27/04 CLOSER Ken Buvala

BUYER McDowell Mountain Back Bowl, LLC

SELLER David C Stansbury
IPX Qualified Intermediary FBO Todd Stansbury Properties, LLC
IPX Qualified Intermediary FBO Stansbury Investment Co
IPX Exchange Qualified Intermediary FBO Mimi S Stansbury

PROPERTY Vacart Land, Maricopa County, Arizona

		CHARGE SELLER	CREDIT SELLER
Sales Price	$		$ 2,392,715 00
All 2004 R E Taxes 217-01-010		35 18	
Prorations And Adjustments			
County Taxes from 10/27/04 to 01/01/05			6 36
Total amount $ 35 18 for 365 days			
Total commission $ 143,562 90			
Nathan & Associates 71,781 45			
MJ REal Estate Services 35,890 73			
Commission paid at Settlement		107,672 18	
Kevin Walden 35,890 72		35,890 72	
Settlement or Closing Fee To Chicago Title		978 50	
Chicago Title - Standard Owner's Policy		4,836 00	
Recording Fees		10 00	
Affidavit of Property Value $2 00A		15 00	
Recording Memorandums 4 @ $10 00		20 00	
IPX Exchange Fee - Todd Stansbury Properties		675 00	
IPX Exchangfe Fee - Stansbury Investment Company		675 00	
IPX Exchange Fee -Mimi Stansbury		675 00	
Reimoursement to Buyer fo 1/2 Survey Fee		1,250 00	
IPX Exchange Proceeds - Mimi Stansbury		548,618 38	
IPX Exchange Fee Stansbury Inv Co		44,165 28	
IPX Exchange Fee Todd Stansbury Prop		1,097,911 75	
Proceeds - David C Stansbury		$49,293 37	
TOTALS	$	2,392,721 36	$ 2,392,721 36

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Settlement Statement

CHICAGO TITLE INSURANCE COMPANY

BUYER'S/BORROWER'S SETTLEMENT STATEMENT PAGE 01

ESCROW NUMBER 02900-002406033-001 ORDER NUMBER 02900-002406033

CLOSING DATE 10/27/04 CLOSER Ker Buvala

BUYER McDowell Mountain Back Bowl, LLC

SELLER Pinnacle Peak Partners, LP

PROPERTY Vacant Land, Maricopa County, Arizona

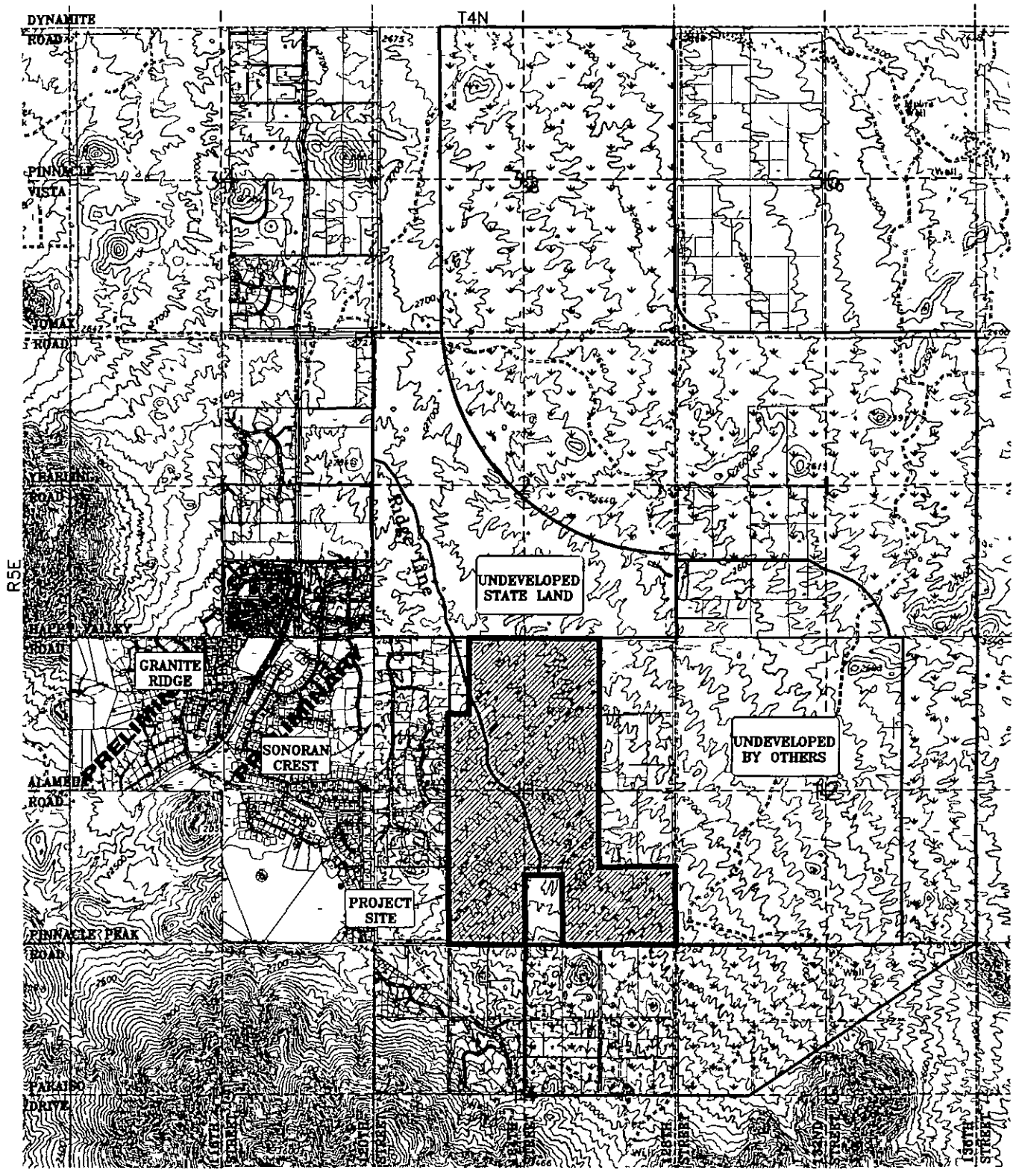
	CHARGE BUYER	CREDIT BUYER
Sales Price	$ 2,663,089 00	$
Earnest Money Deposit		10,000 00
Extension Fees 4 @ $20,000 00 Each		80,000 00
Wired Funds Received 10/27/04		2,576,411 96
Accrued Interest Earned on Deposit		39 85
Zoning Endorsement	750 00	
Access Endorsement	100 00	
Survey Endorsement	100 00	
Patent Endorsement	100 00	
Water Endorsement	100 00	
Comprehensive Endorsement	100 00	
Location Endorsement	100 00	
Prorations And Adjustments		
County Taxes from 10/27/04 to 01/01/05	5 93	
Total amount $ 32 82 for 365 days		
Settlement or Closing Fee To Chicago Title	741 50	
Chicago Title - Extended Owner's Policy	2,026 00	
Recording Memorandums	10 00	
Reimbursement to Buyer for 1/2 of Survey		1,250 00
Funds Due To Buyer At Closing	479 38	
TOTALS	$ 2,667,701 81	$ 2,667,701 81

FINAL

Settlement Statement

PLATE 1

Vicinity Map



LEGEND

- Project Boundry
- Project Site
- McDowell Sonoran Preserve
- Existing 5 Foot Contours

2500 0 1250 2500

1 inch = 2500 ft.

CROWN COMMUNITY DEVELOPMENT
A Kenny Crown Company

SERENO CANYON

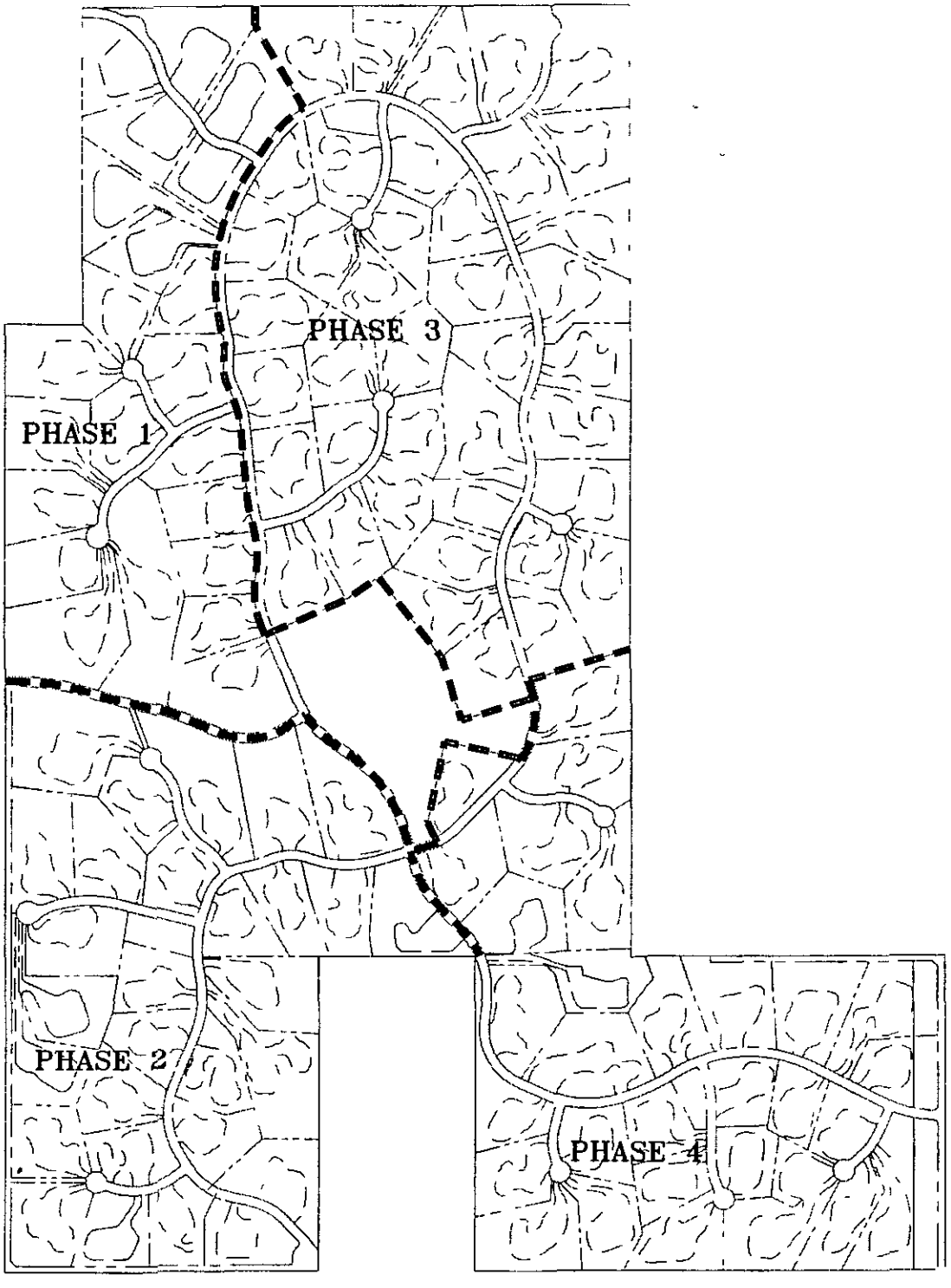
Plate 1
"Vicinity Map"

WOOD/PATEL ASSOCIATES
Civil Engineers
Hydrologists
Land Surveyors
(602) 335-8500

N:\2004\042054\Project Support\Hydro\Exhibits\FDR\ PLATE 01-VICINITYMAP.dwg - Sep 28,2005

PLATE 1A

Phasing Map



700 0 350 700

1 inch = 700 ft

CROWN
COMMUNITY DEVELOPMENT
A Kenny Crown Company

SERENO CANYON

Plate 1A

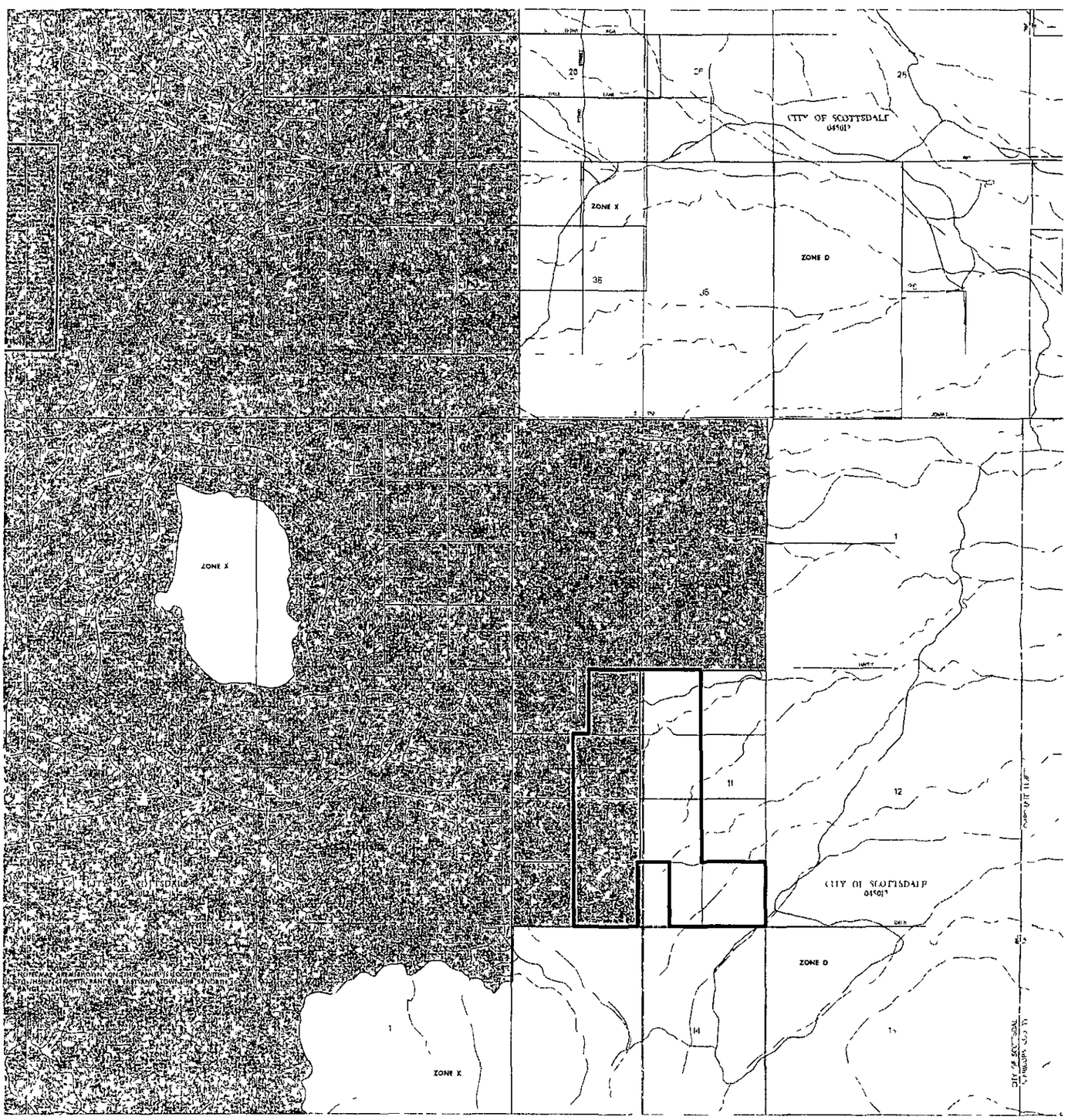
"Phasing Map"

WOOD/PATEL
ASSOCIATES
Civil Engineers
Hydrologists
Land Surveyors
(602) 335-8500

N:\2004\042054\Project Support\Hydro\Exhibits\FDR\ PLATE 01A-Phasing Map.dwg - Sep 28,2005

PLATE 2

Flood Insurance Rate Map (FIRM)



2400 0 1200 2400
Horz. 1 in. = 2400 ft.

CROWN COMMUNITY DEVELOPMENT
A Kenny Dawson Company

SERENO CANYON

Plate 2

"Flood Insurance Rate Map"

WOOD/PATEL ASSOCIATES
Civil Engineers
Hydrologists
Land Surveyors
(602) 335-8500

N:\2004\042054\Project Support\Hydro\Exhibits\FDR\PLATE 02-FIRM.dwg

PLATE 3

404 Washes

PLATE 4

Color Topographic Aerial Photograph

PLATE 5

Off-Site Watershed Area Map

PLATE 6

Pre-Development Drainage Site Plan

PLATE 7

Pre-Development Grading and Drainage Plan

PLATE 8

Post-Development Drainage Site Plan

PLATE 9

Post-Development Grading and Drainage Plan